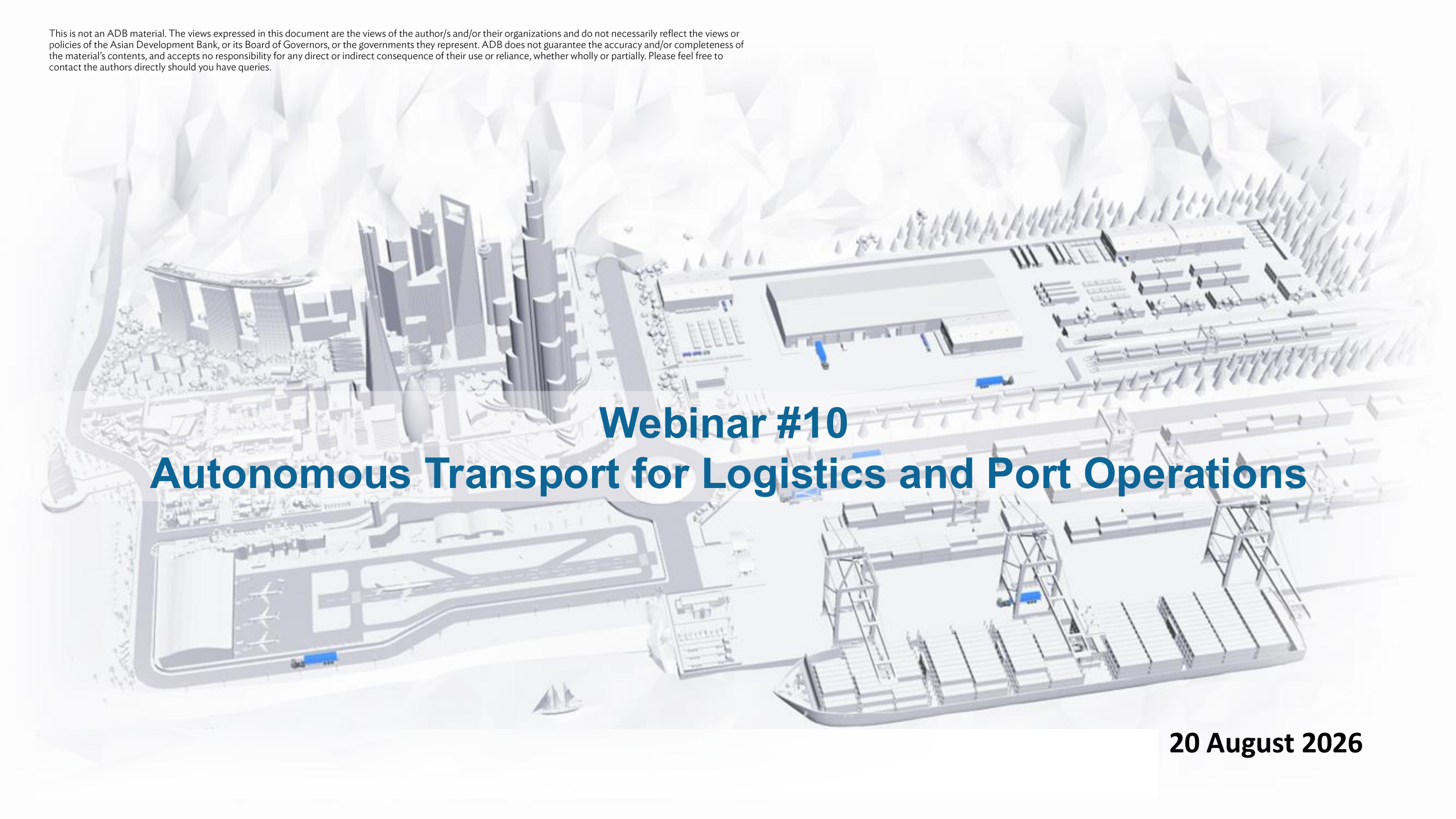




Webinar #10

Autonomous Transport for Logistics and Port Operations

20 August 2026

Key operational challenges in ports and logistics

The logistics sector continues to report strong growth, driven by e-commerce, sustainability and geopolitics; fueling an increase demand for innovation to meet industry needs of operational reliability, efficiency and safety



COST



Logistics: High Labor + Fuel Costs



Retail: Labor Intensive + Capital Heavy



Sanitation: Consistently High Labor Costs

Electricity cost < Fuel cost
Software cost < Labor cost



EFFICIENCY & SUSTAINABILITY



Supply Chain:

- × Low Digital Adoption
- × Complex Ordering
- × Lack of Standardization



Logistics:

- × Inefficient Routes
- × Lack of Standardization



Sustainability

- × Manual Route Planning
- × Poor Optimization

Reduce carbon emissions
AI analytics to improve utilization levels
& better decision making



MANPOWER



- × Driver Shortage
- × Ageing Workforce



- × Widespread Retail Staffing Gaps



- × Worker Shortages
- × Ageing Staff

Alleviate manpower challenges
Reduce human exposure to hazard

Technological Evolution - Degrees of Transport Autonomy

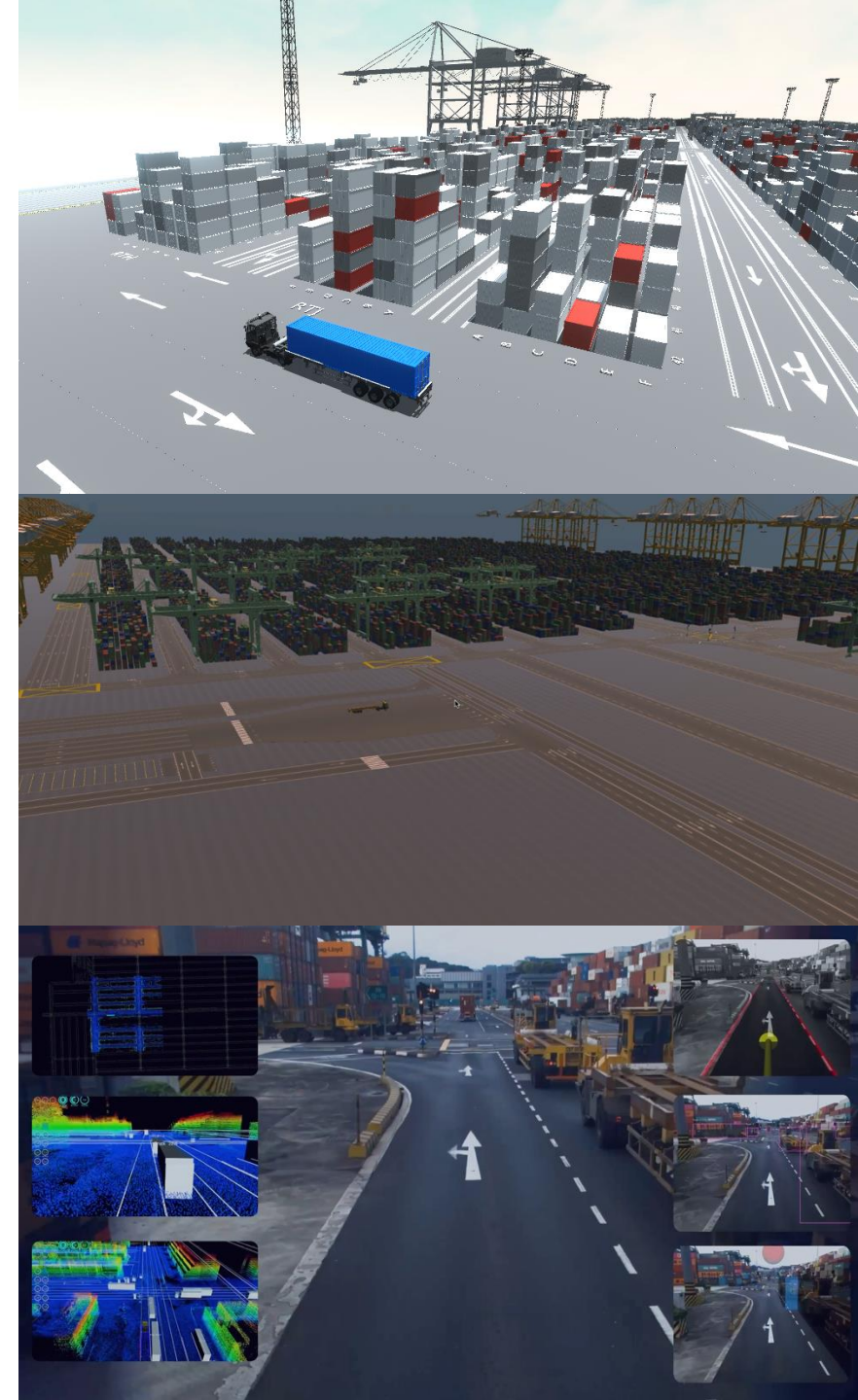


	Automated Guided Vehicles (AGVs)	Automated Vehicles	Autonomous Vehicles
Technology	Obsolete technology and expensive	Costly to deploy at scale (engineering and infrastructure cost)	Able to deploy on public roads
Hardware	Relies on RFIDs to navigate	Usually retrofitted on manual (diesel/electric) vehicles	Relies on onboard sensory hardware electric vehicles. Low reliance on infrastructure due to higher AI
Operating Environment	Deployed in confined space	Deployed in mixed traffic environment but limited to private premises	Mixed traffic environment
Advantage	Resolve challenges in the earlier years of the 90s in Rotterdam	Provides option of manual or driverless mode of deployment	Inter-logistics deployment, cheapest overall cost. Ready for scale deployment
Disadvantage	High maintenance High capex and opex Not deployable under mixed traffic conditions	Difficult to scale High NRE cost May not be full autonomous; dependency on remote operations	Regulations/Customer will require a certain degree of AI expertise to operate the vehicles

AV challenges for Smart Port vs Smart City

Port & City environment are completely different!

- **Lack of fixed infrastructure for localization**
 - Container dynamic landscape
- **Noise due to presence and proximity of metal**
 - Reflection, scattering and blockage of comms & sensor signals
 - Degraded GPS
- **Operation complexity**
 - High requirement of braking accuracy ($<10\text{cm}$)
 - Single lift/Twin lift
 - Coning/deconing ops
 - Different twistlocks
 - Heavy load at height
- **Traffic**
 - Hard environment involving heavy equipment
- **Integration**
 - Cooperation with 3rd party vendors (TOS, CHE etc)



Smart City AV Deployment



Robotaxi



Roadblock Avoidance



Mixed Traffic Scenarios



Cold Chain



Barrier Lifting



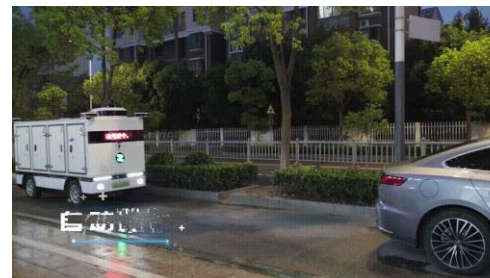
Rain Weather Conditions



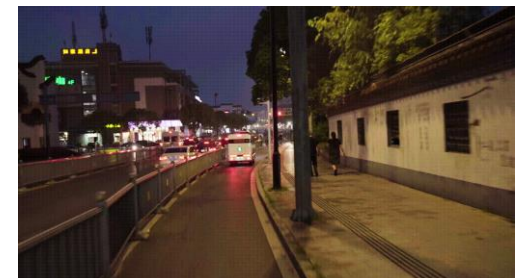
Multiple Drop-offs



Autonomous U-turn



Edge Computing



Night Driving

Logistics warehouse deployment



Interlogistics transportation



Key milestones in Asia (Besides AV mass deployment in China)

Thailand LCB Terminal

Electric Autonomous Trucks

Singapore Pasir Panjang Port

Electric AGVs

Singapore Pasir Panjang Port

Retrofitted diesel Autonomous Trucks + electric Autonomous Trucks

Singapore Tuas Port

Electric AGVs

Japan Tobishima Port

Electric AGVs

China Qingdao Port

Electric AGVs

China Yangshan Port

AGVs + electric Autonomous Trucks

China Ningbo Port

AGVs + electric Autonomous Trucks

Singapore Changi Airport

Electric baggage tractor

Malaysia Cyberjaya

Autonomous RoboVan public road testing

Singapore Public Roads

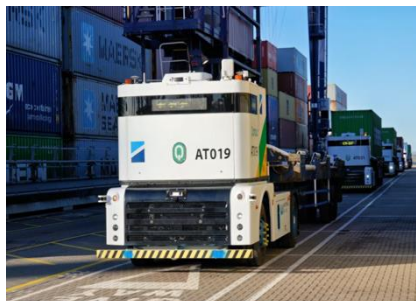
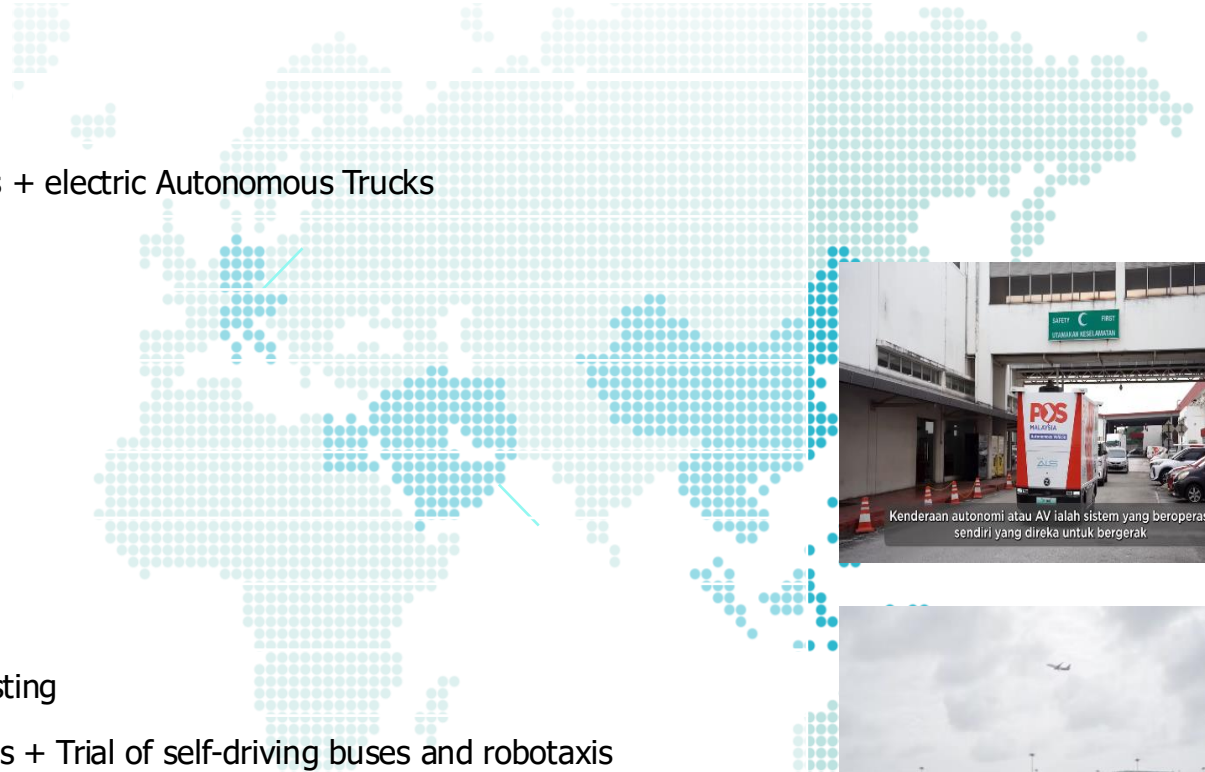
Live deployment of logistics RoboVans + Trial of self-driving buses and robotaxis

South Korea, Seoul

Robotaxi trials in Gangnam/Seoul

Japan, Tokyo

Long haul autonomous trucking Second Tomei Expressway corridor (Tokyo – Nagoya)



Any more questions? Feel free to reach out via LinkedIn 😊



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