Evolution of the Korean Transport Policy and Onward

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I. Introduction

- Korea’s transport policy must be understood within the context of the **Korean economic miracle**.

- Transport was not only a mobility tool, but a **strategic driver of productivity, market expansion, and national integration**.

- At the same time, transport growth also created risks such as **regional inequality and uneven development**.

- The chapter frames Korean transport policy as part of the broader **global evolution of economic growth and transport technology**.

1.1 Korean Economic Miracle

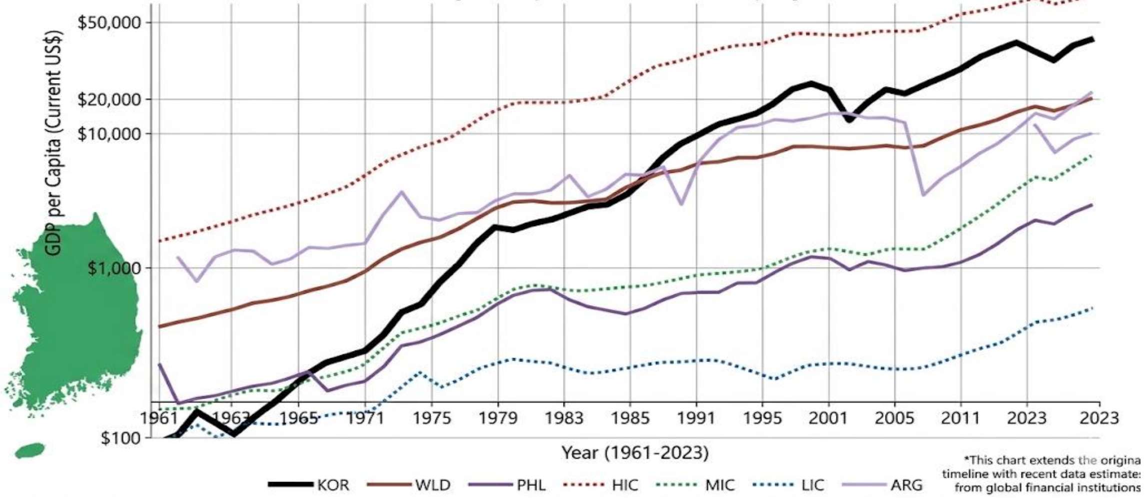
*Unemployment is estimated at as high as 25 percent of the labor force. Gross national product in 1960 was less than $2 billion and per capita income well under $100. Electric generating capacity is only one-sixth that of for example, Mexico and annual output is less than 70 kilowatt hours per capita. The only other source of energy is coal, there being no oil or natural gas. Mineral resources are deficient in several other vital categories. As much as three-fourths of the forest area is either denuded or covered with scrub growth. Exports have averaged a scant $20,000,000 annually as opposed to a volum of imports (exclusive of military items) amounting to $200,000,000 per year. Thus it can easily be seen that there is **no possibility of an economic miracle being wrought in South Korea**.*

Unemployment Rate 25%,
Per Capita GDP less than U$ 100
U$ 20M exports
U$ 200M imports

no possibility of an economic miracle in Korea
- Foreign Affairs, October 1961 -

A Miracle that Continued: Republic of Korea's Economic Ascent (1961-2023)

- average GNP growth of 7.6% for 6 decades (historical context)
- Per-capita GDP: $69 (1953) -> approx. $35,000 (2023 estimate)
- transformed from a beneficiary to a prominent world player



Source: Bank of Korea, https://ecos.bok.or.kr/

Source: Myunggu Kang, Infrastructure Development and Economic Growth: Korea's Experience, International Urban Development Collaboration, Seoul Metro Government

1.2. Economic Role of Transportation

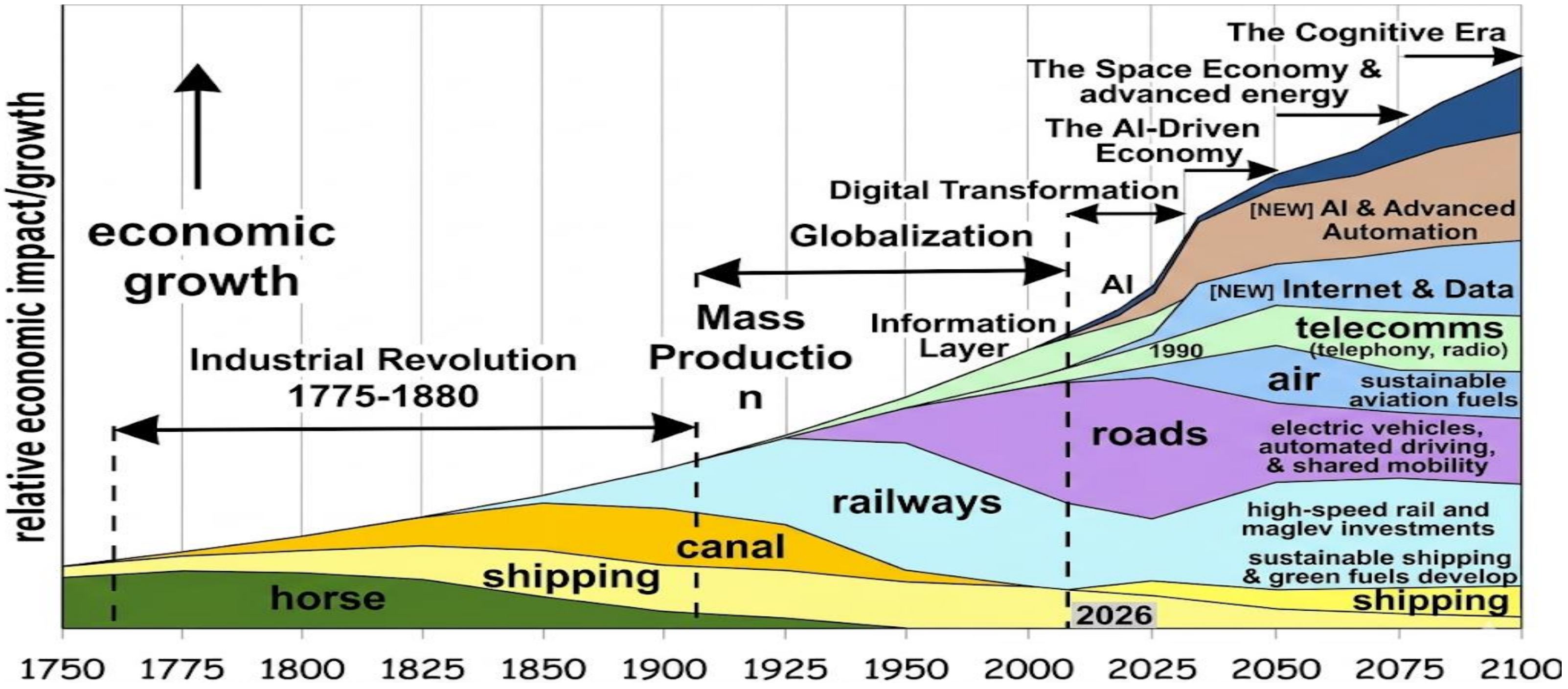
Transport plays a vital role in **shaping economies**.

Not only **reduce travel time** and **cost**, but also

supports clusters and agglomerations(Growth Pole);
increases productivity;
enhances jobs and labor market accessibility;
opens new markets for businesses; and
improve supply chain efficiency.

But should watch out on side effects such as worsening regional inequality, straw effect, and income disparity.

1.3. Evolution of Global Economic Growth



Source: Maddison, A. (2001). *The World Economy: A Millennial Perspective*. OECD Development Centre., IPCC. (2000). *Special Report on Emissions Scenarios (SRES)*. Cambridge University Press., Schwab, K. (2016). *The Fourth Industrial Revolution*. World Economic Forum.

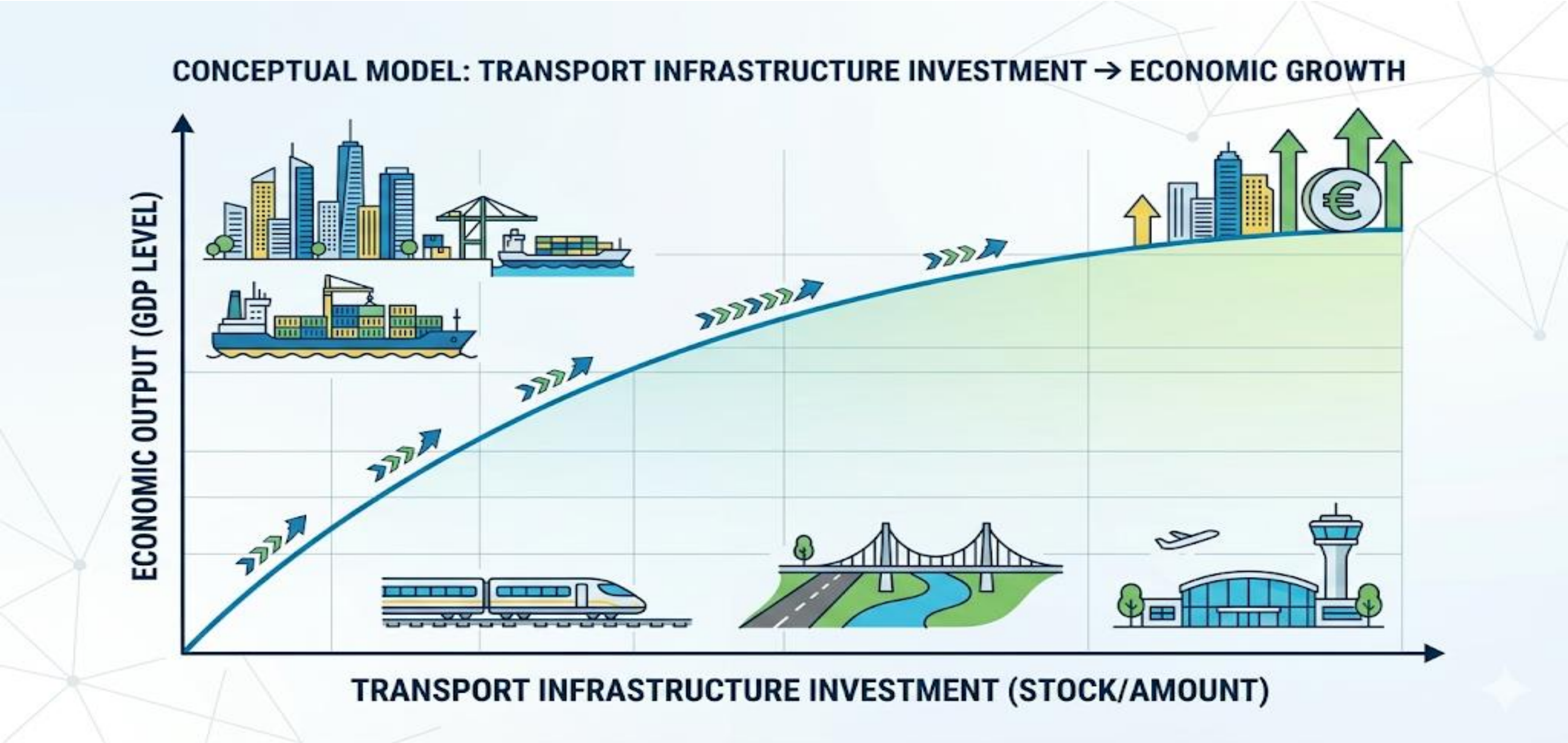
Ⅱ Economic Development(1970~): Transport Infra Investments

- **History of Major Transport Investment**
- **Seoul-Busan Expressway**
- **Seoul-Busan High-Speed Railway**
- **Incheon International Airport**
- **New Busan Seaport**
- **Urban Railway**
- **4 River National Bike Highway**

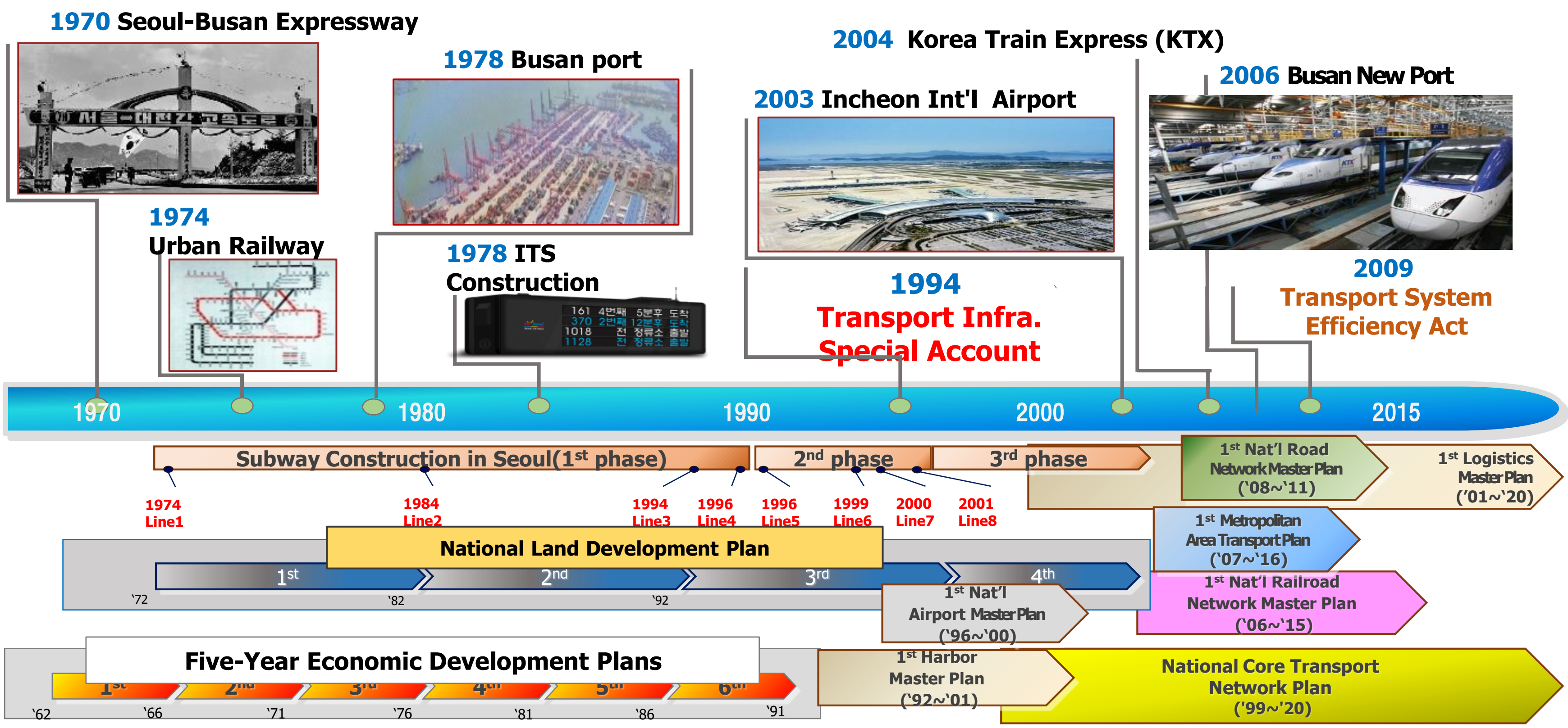
II. Economic Development (1970~): Transport Infrastructure Investment & Funding Stability

- Korea’s early transport policy was centered on **timely national infrastructure investment**.
- Major projects such as the **Seoul–Busan Expressway**, **KTX**, **Incheon International Airport**, **New Busan Port**, **and urban railways** supported industrialization and export-led growth in a flexible and rapid way.
- Infrastructure policy created the **physical backbone of national economic expansion**.
- The "Special Account for Transport Facilities" was legislated in 1994 to secure **stable investment funds** based on fuel taxes.

2.0. Theory behind Transport Infra Investment



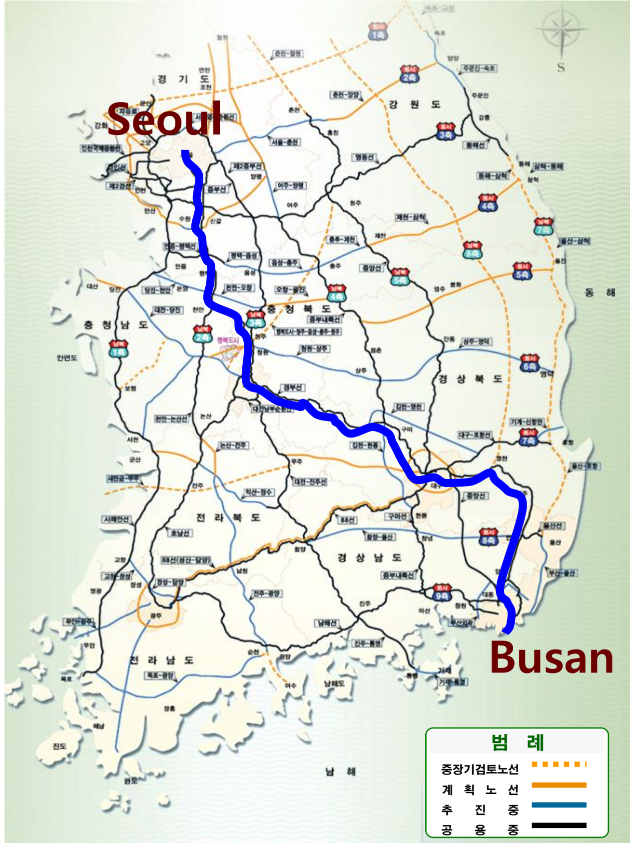
2.1. History of Major Transport Investments



2.2. Seoul-Busan Expressway(SBE) (1970)

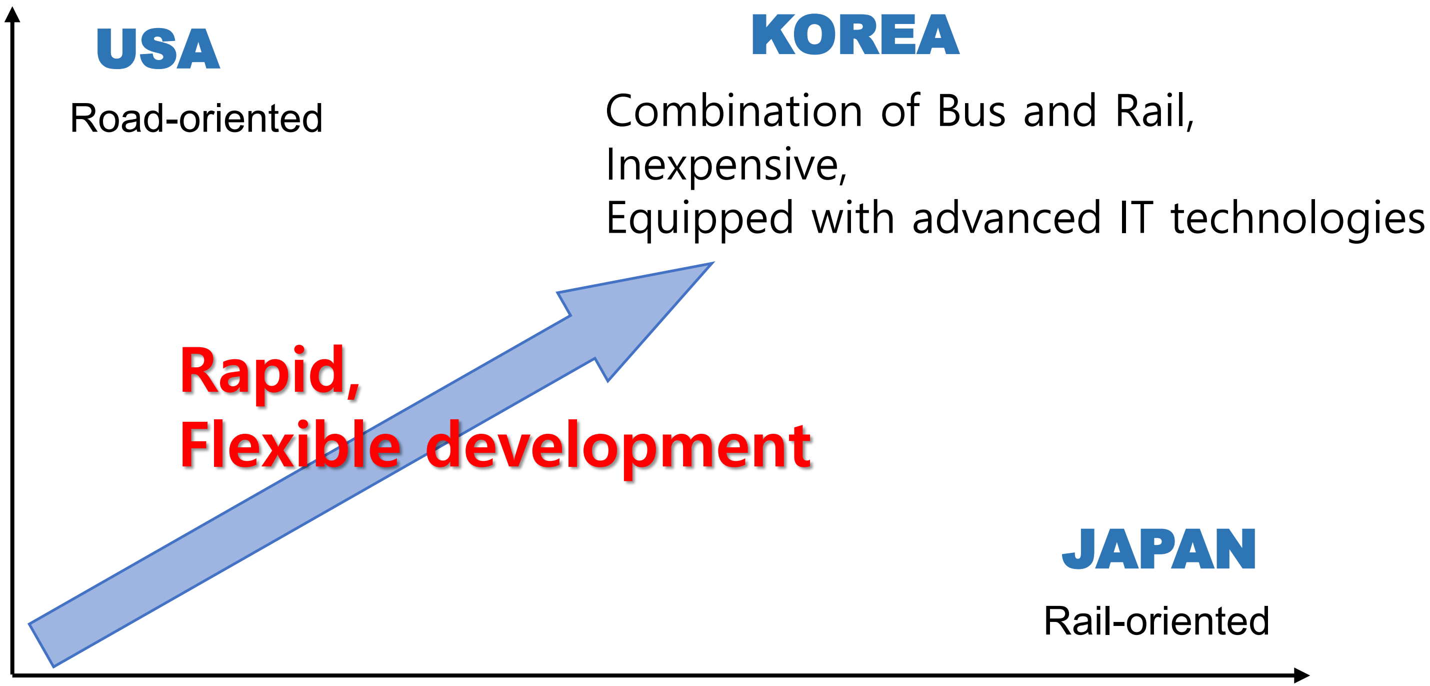
❖ 7X9 National Highway Network

- To support SB growth axis
- To access the national artery road network within 30 minutes from everywhere
- 42.97 billion won investment 23.6% of the nation’s 1968 annual budget
- 29 months to complete
- For 7X9, over 90% completed by 2023
- Currently, Hwy network expanded to 10X10



Segment	Length (km)	Opening Date	Current Condition
Seoul – Suwon	23.7	1968.12.21	8 Lanes
Suwon – Osan	14.1	1968.12.30	8 Lanes
Osan – Cheonan	38.1	1969.09.29	8 Lanes
Cheonan – Daejeon	68.2	1969.12.10	8,6 Lanes
Daejeon – Daegu	149.8	1970.07.07	8,6,4 Lanes
Daegu – Busan	122.1	1969.12.19	8,6,4 Lanes
Total	416.0		

Harmonization of Highway and Rail



2.3. Seoul-Busan High-Speed Railway (2004)

❖ KTX Expansion Plan

- **High-speed rail network: 406km**('10) → **700km**('26)
- **Gyeongbu HSR**(Seoul-Busan)
  Honam HSR(Seoul-Mokpo)
- Enhancing the **annual freight capa of the old Gyeongbu line 8.6 times** with **passenger capa increased 2.5 times**

2.4. Incheon International Airport (2003)

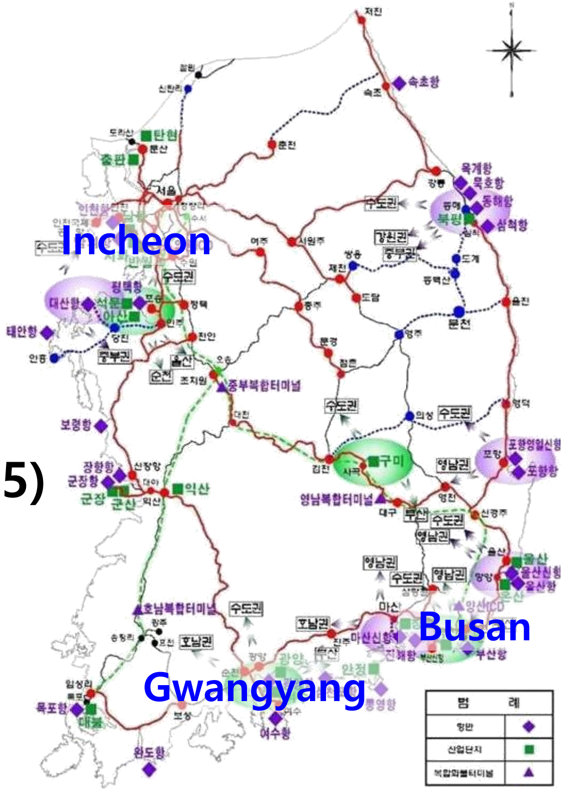
- ❖ Built on reclaimed land:
  - 106 million of passenger capa (World #3)
  - part of Incheon Econ. Free Zone

- ❖ Achieved an ACI's "Best Airport Wolrdwide Award" 14 years in a row for its service excellence
  - Transfer rate: 11.4%('01) → 17-18%('25)

2.5. New Busan Seaport (2006)

❖ Built on a reclaimed land in One of the world’s largest container ports

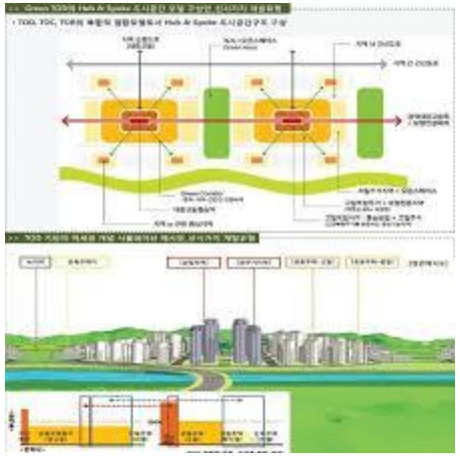
- Annual container traffic exceeding 250 million tons(‘25)
- 66% of total exports and imports



2.6. Urban Railways (from 1974) & Transit Oriented Development

❖ **Metropolitan Area's Urban Railway Service**

- Seoul Metro Area: 24 lines (1,250km)
- Busan: 6 lines(116km)
- Daegu: 3 lines(91km)
- Gwangju: 1 line(20km)
- Daejeon 1 line(23km)



2.7. 4 River National Bike Highways (Starting from 2010)

Current Stocks of Transport Infrastructure

- Highway: 382,000km(2025)
- Railway: 4,800km
- Airport: 16 (capacity: 160 million passenger capa)
- Port capacity: 28.50 million TEU

Transport Infrastructure Special Account

- ❖ Securing stable financial resources
- ❖ Legislating Transport Infra. Special Account (1994)
- ❖ Based on the revenue from ear-marked oil tax

Financial Resource Allocation by Mode

Year	Road (%)	Rail (%)	Airport (%)	Port (%)	Others/Logistics (%)	Total Budget (Trillion KRW)
1994	62.6	21.5	7.1	8.8	0.0	4.53
2008	52.8	27.4	1.7	13.1	5.1	13.22
2024 (Fixed)	**36.2**	**38.8**	**3.5**	**6.7**	**14.8**	**~20.1**
2025 (Proposal)	**34.8**	**40.1**	**4.2**	**6.5**	**14.4**	**~21.4**

Ⅲ Green Growth(1994~): TDM & Traffic Calming

- High Occupancy Vehicle Lane(1994)
- Namsan Tunnel Congestion Pricing(1996)
- Bus Rapid Transit(2004)
- Utilization of ICT for Public Transport
- Cheonggye Stream Restoration & Traffic Calming
- Overpass Demolition

III. Green Growth (1996~): TDM and Traffic Calming

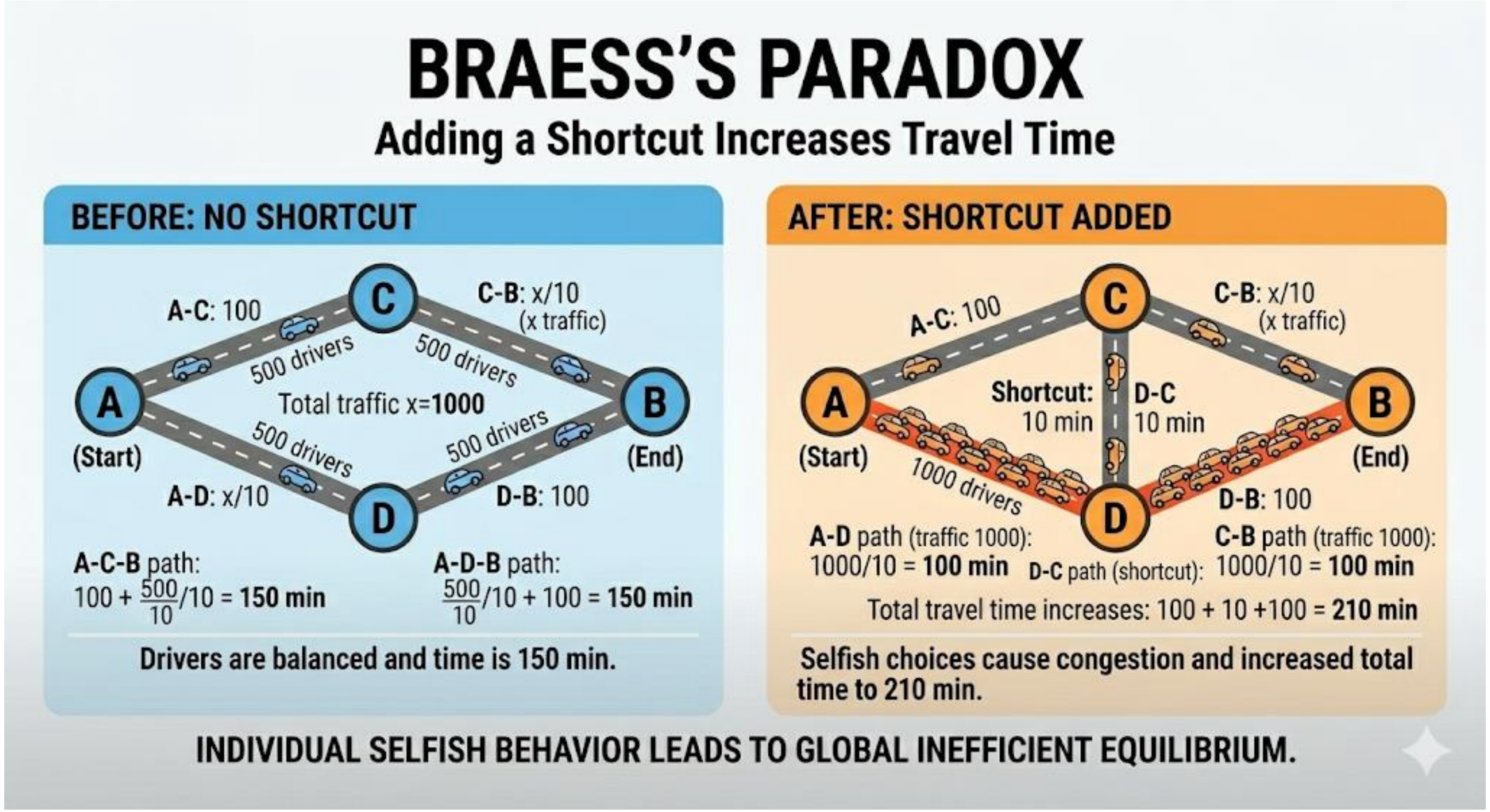
- As congestion and environmental costs increased, policy shifted from road expansion to **demand management and sustainable mobility**.

- Key tools included **HOV lanes, congestion pricing, BRT, integrated smart-card fares, traffic calming, and overpass demolition**.

- projects such as **Cheonggye Stream restoration & the removal of overpass** symbolized the move from car-centric planning to **people-oriented urban space**.

- Green growth in transport meant combining **efficiency, public transport, and urban livability**.

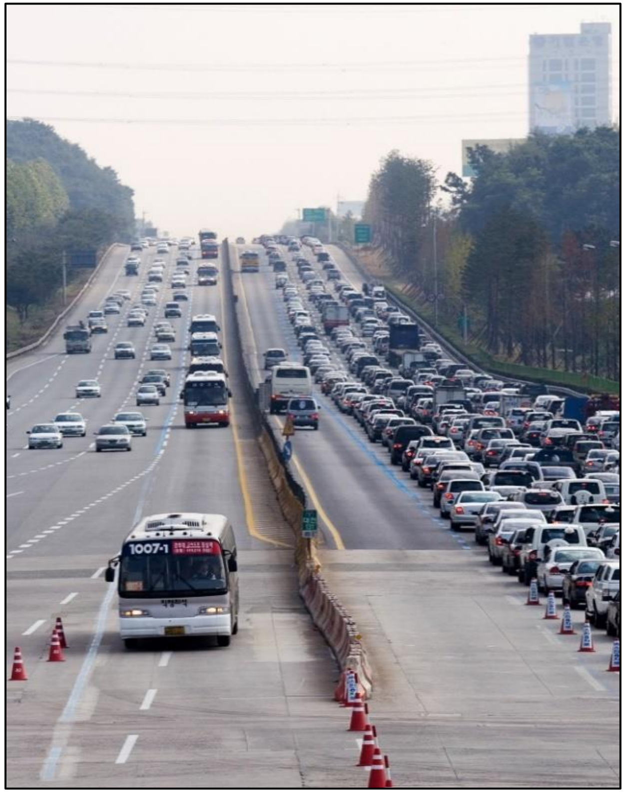
3.0. Theory behind TDM & Traffic Calming



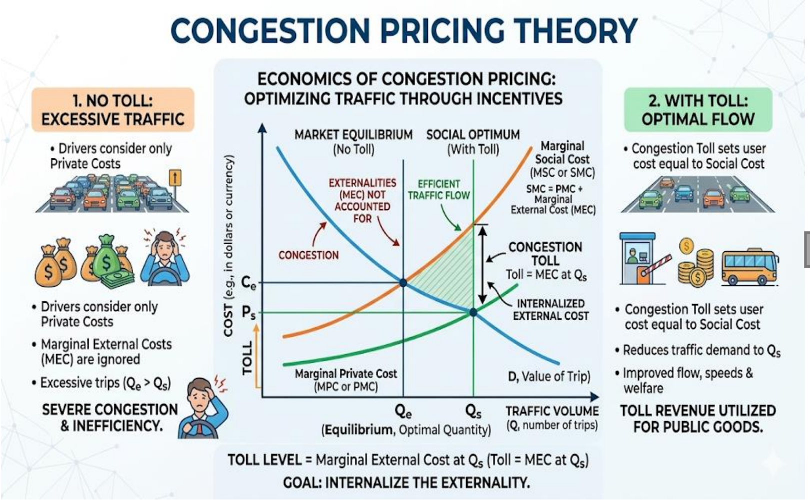
3.1. HOV lane on Expressway

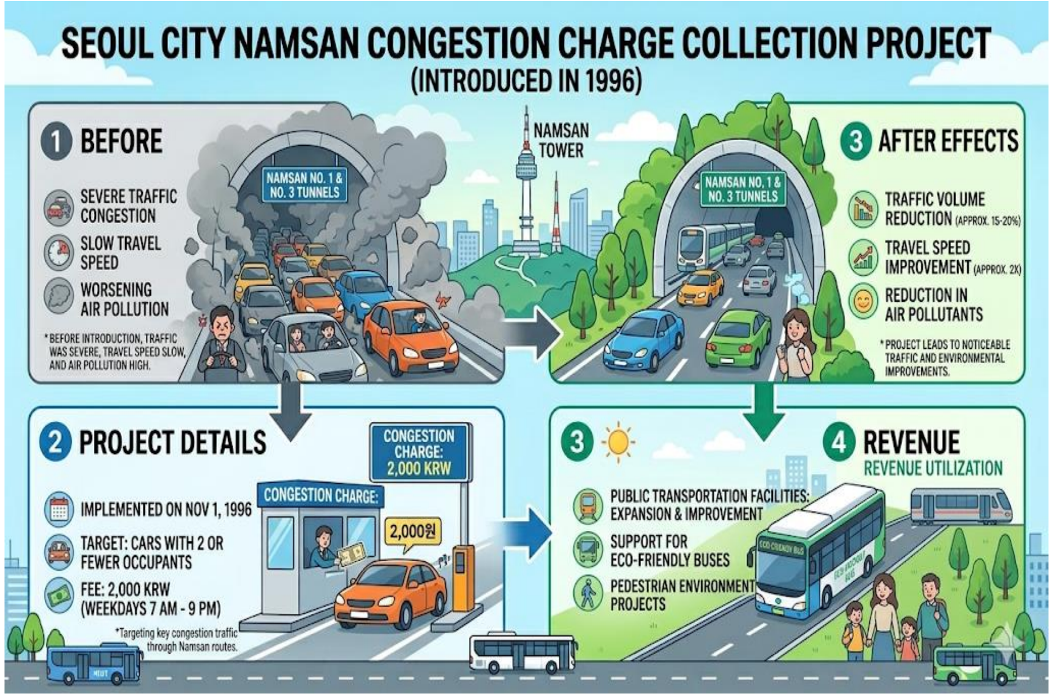
❖ **Express HOV Lane on Kyungbu Expressway**

- Introduced in 1994
- Operation hr: 07-21
- Length : 140.9km
- Bus and 9 or more seats passenger cars or vans are allowed to use (6 or more persons)



3.2. Congestion Pricing on Namsan Tunnels





3.3. Bus Rapid Transit(BRT)

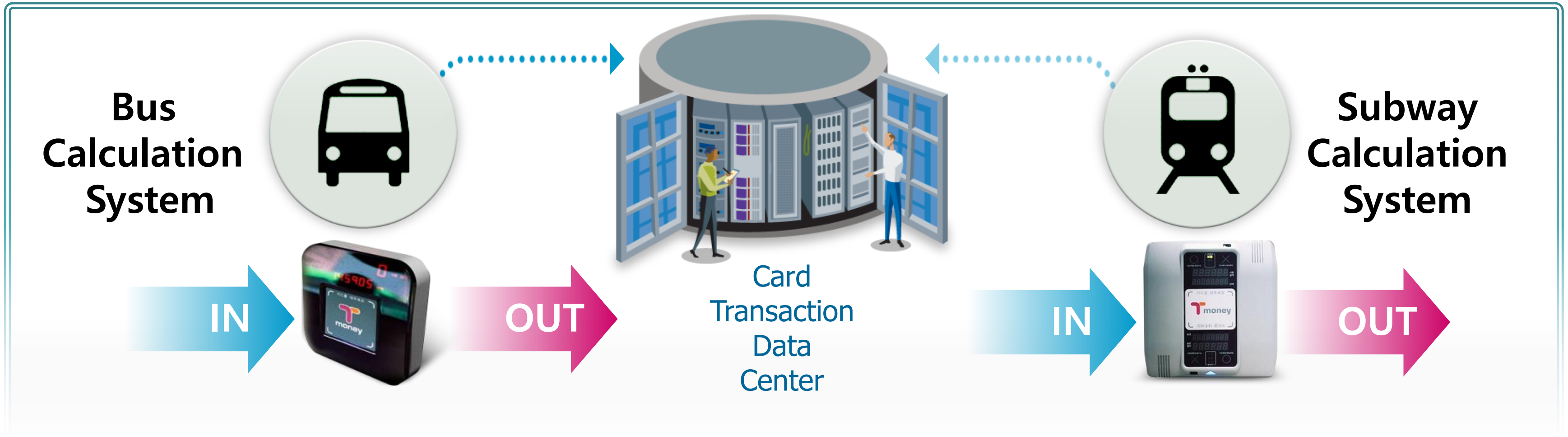
❖ **Bus Rapid Transit in Seoul Metropolitan Area (2004)**

- Transit network of Median Exclusive Bus Lane
- Seoul city: 31 corridors, 140km
- Gyeonggi province : 12 corridors, 160km
- Provides Faster and Reliable Travel Service

3.4. Utilization of ICT for Public Transportation (2004)

Smart Transport Card and Free Transfer

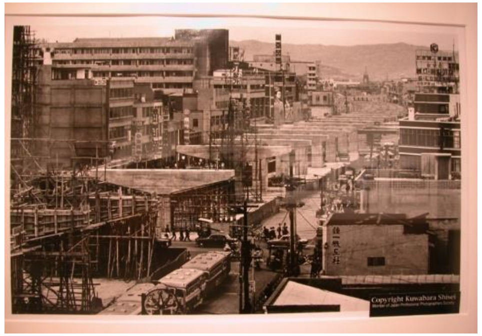
- Bus and Metro
- Maximum 4 times of transfer within a single trip
- Distance-, service-based integrated fare scheme



3.5. Cheonggye Stream Restoration & Traffic Calming (2005-now)

Before 1950

1960-1970



1950

1980-2005

Cheonggye Stream

2005

Current Images

3.5. Cheonggye Stream Restoration & Traffic Calming (2005-now)

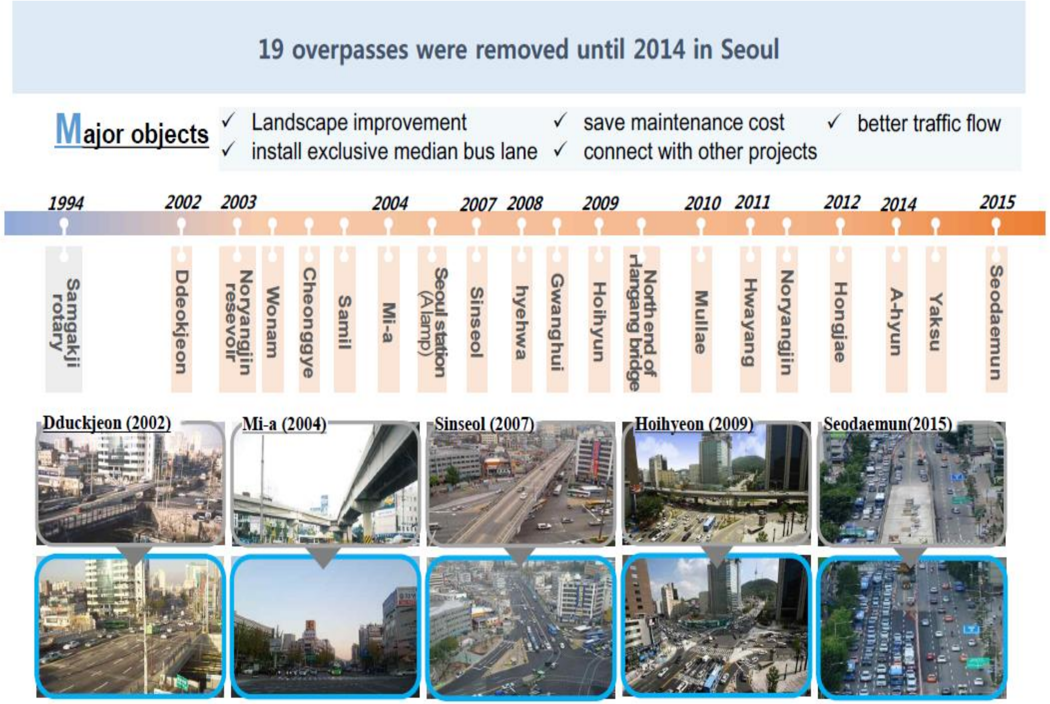
Seoul Station Overpass before after

Seoul Plaza

Kwangwhamoon Plaza

Jongno St. before after

3.7. Overpass Demolition (2002~)



Source: Jooho Ko, Integrated Public Transport System in Seoul Metropolitan Area, Sep. 2019

Ⅳ Digital Revolution(2007~): MaaS on Platform

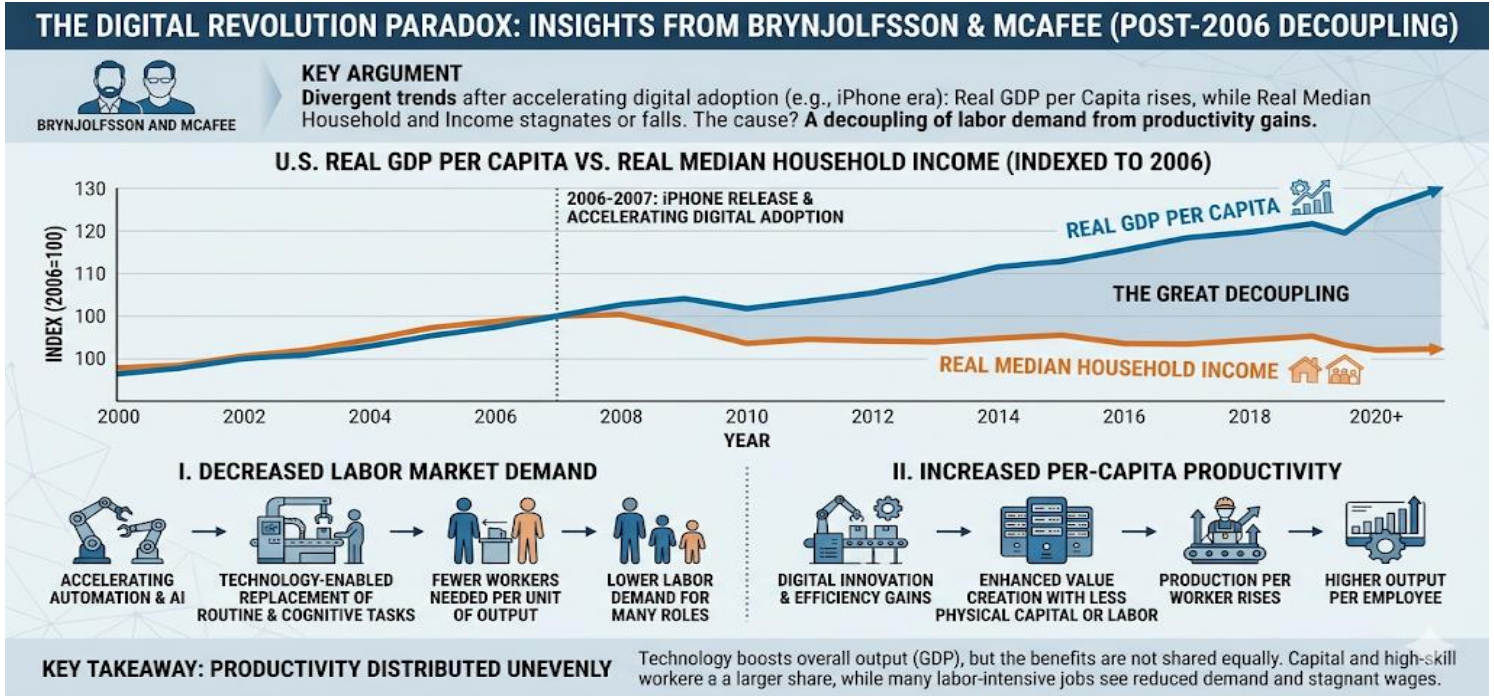
- Connected, Automated, Shared, Electrified(CASE)
- Carsharing to Taxi-app
- Mobility as a Service(MaaS)
- Lifestyle Superapp over Mobility, Delivery, & Fintech

IV. Digital Revolution (2007~): MaaS on Platform

- Smartphones and app-based platforms changed transport from infrastructure provision to **service-based mobility**.
- Korea saw the rise of **carsharing, taxi apps, MaaS, and lifestyle superapps** linking mobility with delivery and fintech.
- The **C.A.S.E.** trend—Connected, Automated, Shared, Electrified—became the new policy and market framework.
- Mobility in this era became increasingly **data-driven, platform-based, and user-centered**.

4.0. Theory behind Digital Revolution

❖ The emergence of the iPhone and the widespread adoption of app-based platform technologies have led to a decline in demand for human labor with low technological dependence.



4.1. C.A.S.E.

- **C: Connected**: **V2X technology** enables communication between moving vehicles and other vehicles or infrastructure to provide various traffic information in real time, helping prevent congestion and accidents.
- **A: Automated**: **Autonomous Vehicles** have been in testing in the United States and China. Autonomous mobility pilot projects are expanding into **shuttles, UAM, drones, and autonomous ships**.
- **S: Shared**: New mobility services emerged, including **Ttareungi (2011), Socar (2012), Kakao Taxi (2014), platform taxis (2020), and MaaS**.
- **E: Electrified**: In **2020**, domestic electric vehicle sales in Korea, including hybrids, **grew by 46% year-on-year**. Korea has set a target of **4.4 million electric vehicles by 2030**, while continuing efforts to expand subsidies and charging infrastructure.

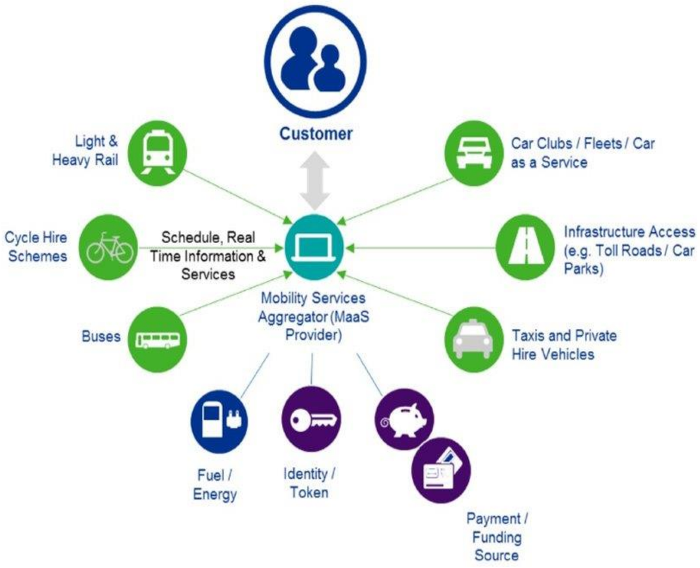



4.2. Carsharing to Taxi-app

- **September 2011:** Launch of **GreenCar** service (The first in Korea)
- **March 2012:** Launch of **SOCAR** service (Started in Jeju Island and expanded nationwide
- **March 2015:** Launch of **KakaoMobility** mobile Taxi-call app

4.3. MaaS

- ❖ **Public Transit Navigation + Last-Mile Integration (2022)**:
- ❖ **Super App Strategy (2024–Present)**: Since 2024, Naver has established a complete MaaS model that analyzes user mobility patterns through AI integration.
- ❖ **CEO of MaaS Global**, Sampo Hietanen: laying off half of its employees, closing Brazilian office acknowledged that the company's cash situation is serious.

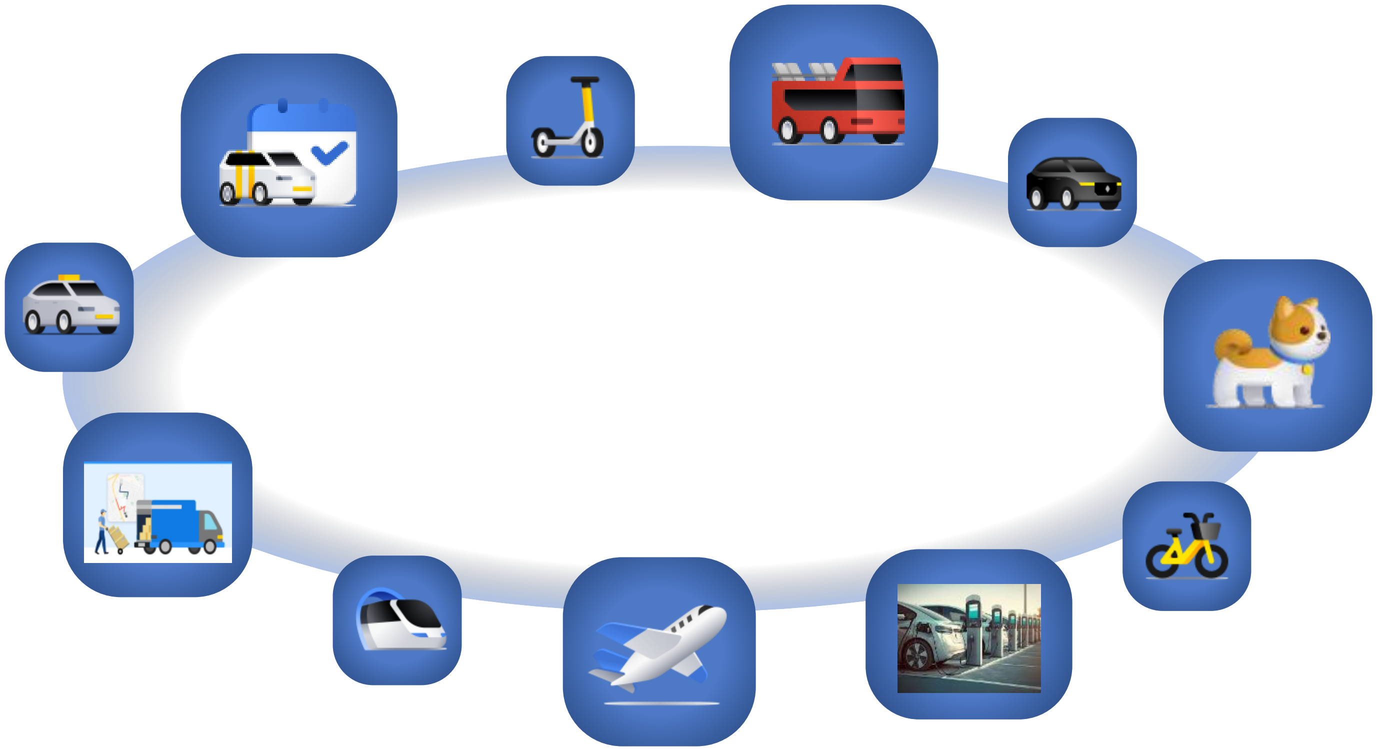


Source: https://www.researchgate.net/figure/Mobility-as-a-Service-concept-source-http-wwwtransportknowledgehuborguk_fig1_339788203

https://www.transportxtra.com/publications/local-transport-today/news/72160/maas-global-creator-of-maas-app-whim-lays-off-staff-as-it-re-organises-/

4.3. Lifestyle Superapp over Mobility, Delivery, and Fintech

- **KakaoMobility**, **venturing into Lifestyle Superapp** over Mobility, Delivery, and Fintech.
- **Expanding its presence in the global market**, presence in 30+ countries worldwide including Japan, UK, Germany, and so on



Picture Sourece: Hyewon Cho, Seamless Journey in the Connected World, Kakaomobility, presented in NEMO 2023.

V

Covid19(2019~): Work from Home(WfH) & Online Shopping

- Work From Home & Online Shopping
- Virtual Mobility
- Demand Responsive Transport(DRT)

V. Covid-19 (2019~): WfH, Virtual Mobility, and DRT

- Covid-19 caused a major break in travel behavior, with **public transport ridership falling sharply** and new forms of mobility rising.
- **Work from home, online shopping, digital nomadism, and virtual mobility** reduced some physical travel demand while reshaping logistics.
- The pandemic accelerated debate over whether cities would return to **business as usual** or move toward a **new normal**.
- **Demand Responsive Transport (DRT)** emerged as an important flexible service model in both urban and lower-density areas to respond to **soaring public bus subsidy burden**.

5.0. Historic Events resulted in Mobility Innovation

Industrial Revolution

World War I, II

Postwar Urbanization

Covid19

5.0. Hensher's Hypothesis on Mobility Innovation

David Hensher (2020) proposes two extreme scenarios regarding the future emergence of innovative mobility solutions in response to changes in the surrounding environment related to mobility

1. **Scenario 1: Business As Usual (BAU)**

- This scenario assumes that the effects of Work From Home (WFH) are temporary. Once the COVID-19 pandemic ends, cities will revert to their previous state, characterized by long-distance and long-duration commutes primarily reliant on physical movement using automobile & public transportation.

2. **Scenario 2: New Normal**

- This scenario posits that the effects of cyber-physical movement such as WFH relied on advanded digital technology will persist. Together with an increase in online shopping, cities will not fully recover to their pre-pandemic state.

source: David Hensher, M. Beck and E. Wei (2024) "Working from home and its implications for strategic transport modelling based on the early days of the COVID-19 pandemic", Journal of Transport Geography.

< COVID 19 & Travel Mode Share Change>

	2019	2020	2021	2022	2023	2024
Subway & urban Rail(%)	41.6	40.5	42.1	44.7	45.0	**45.2**
Bus (%)	24.0	22.8	21.5	20.7	20.5	**20.4**
Passenger Car (%)	24.5	26.3	28.0	29.2	29.0	**28.8**
Taxi (%)	5.9	5.4	4.8	3.3	3.5	**3.6**
Gov't Subsidy (Unit: 100 million KW)	2,915	6,610	4,561	8,114	8,915	**4,976***
# of Death by Taxi Accident	26	20	17	15	13	**12***

Source: Seoul Metropolitan Government, 2024 Annual Statistical Report and Transport Operation & Information Service (TOPIS) statistics; Seoul Economy (2025.05.10), 'KRW 2.5 trillion over four years to cover deficits… Seoul's semi-public bus operating system'; The Korea Herald (2025.05.13), 'Seoul bus ridership drops 19% in 10 years.'"

5.1. WfH & Online Shopping

1) Significant Ridership Loss in Public Transport

Public Transport

Number of passengers on weekday public transportation in the first week of March: **down 34.5% from January**

Passenger Veh

Weekday car traffic in the first week of March: **down 7.2% from January**

Bike & PM

Bike sharing increased 66.8% year-on-year between February and March. **Electric Kickboard sharing increased 5%p** from January.

Carsharing

Car sharing increased by 21% on average during the week from February to March

Source: https://www.koti.re.kr/main/covid19, 2021

In the case of **inter-regional traffic**:

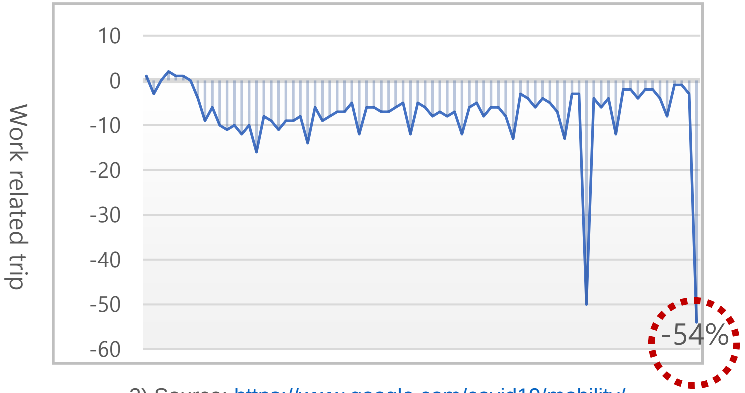
public transportation use decreases by four times that of automobile traffic using highways.

5.1. WfH & Online Shopping

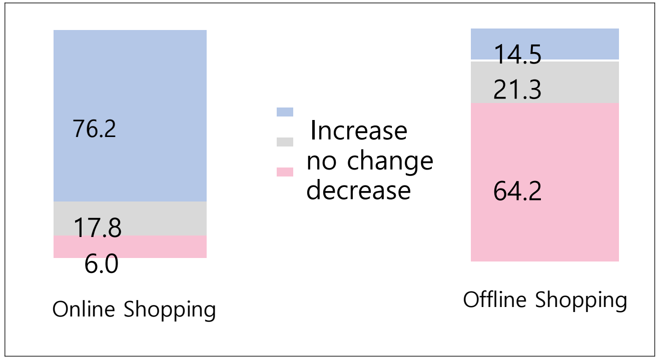
2) Increase of WFH & Online Shopping

- **The sharp decreases in work-related trips** were affected by remote work[1),2)].
- **62% of office workers** in Korea(large firms 73%) WFH, and 71% of experienced workers want to continue.
- **76% Surge in online shopping** (51.8% increase in food delivery[3)].

1) Source: De Palma, A., S. Vosough, and F. Liao (2022) "An overview of effects of COVID-19 on mobility and lifestyle: 18 months since the ourbreak," Transportation Research Part A, Vol. 159, pp. 372-397.



2) Source: https://www.google.com/covid19/mobility/



3) Source: https://www.appminder.co.kr/reportList.html

5.1. WfH & Online Shopping

3) Increase of Digital Nomad

Digital Nomad: Increasing number of people **living and working remotely in various environments with communication access rather than in workplaces** due to the acceleration of DX and lifestyle changes caused by COVID-19[1)]

1) Source: Federico Caprotti et.al.(2022) "Beyond the smart city: a typology of platform urbanism, Urban Transformations, Vol.4, No.4.

5.2. Virtual Mobility

1) Metaverse City

- Definition: Persistent virtual worlds where people can interact via avatars, enabling social, professional, and entertainment experiences **without being co-located**.

- Reducing Business Travel: As virtual interactions become more lifelike with VR/AR, organizations may conduct **more meetings and conferences online**.

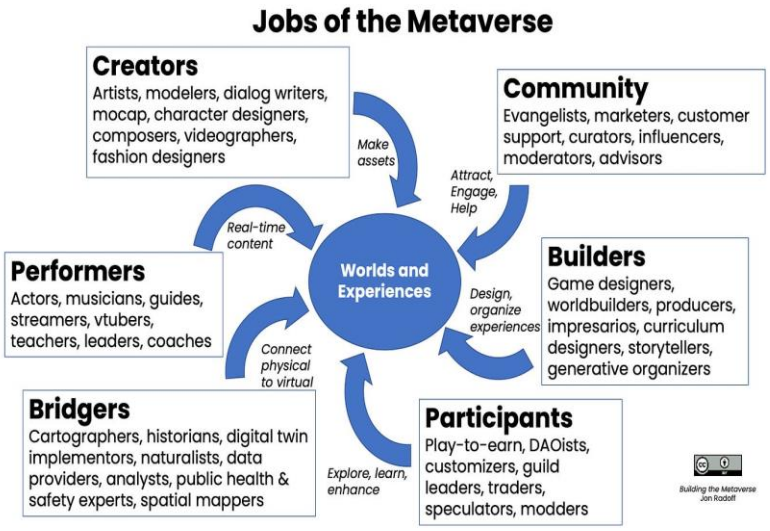
- The Vision: Futurists predict that by the 2030s, intercity business travel could be largely limited to essential trips, with companies using **high-fidelity virtual presence for most interactions.**

An overhead view of Genesis City, the "capital" of Decentraland.

Activities drive a long term land value.

5.2. Virtual Mobility

2) Jobs in the Metaverse



Source: https://medium.com/building-the-metaverse/jobs-in-the-metaverse-9395db90086

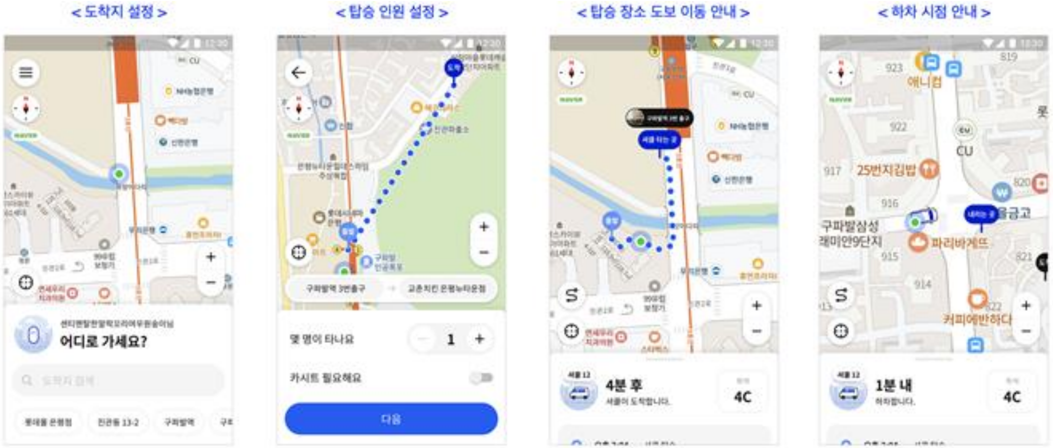
Portabl, a Belgium-based startup, and creators of the triple screen extension for laptops, is proud to be the first startup to hire for real full-time position jobs in the Metaverse

Source: https://www.businesswire.com/news/home/20220615005756/en/Portabl-Proud-to-Be-the-First-Startup-Ever-to-Hire-Full-Time-Real-Jobs-in-the-Metaverse

5.3. DRT

1) Ddokbus DRT service Kyeonggi Province

- By utilizing a mobile app, passengers can easily reserve their seats.
- Both Shucle's **sales and operating profit have continued to increase.**
  - The profit margin almost reached 18% of regular bus company's.
  - The sustained growth in operating profit demonstrates its financial viability and potential for success.
- **High level of customer satisfaction with the DRT service.**

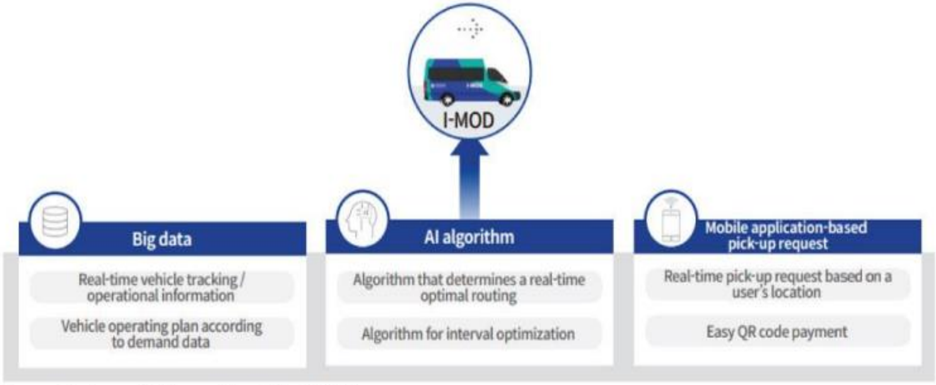


Shucle App: destination input → # of passenger → Info to boarding site → alighting site info

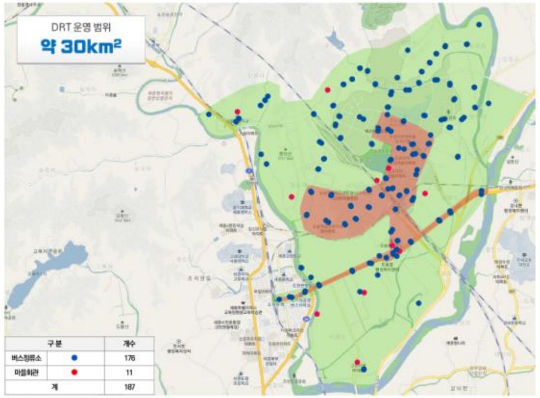
5.3. DRT

2) Korea 2: DRT service in rural and CBD areas

- Hyundai Motor and Incheon city proposed a "social participation **I-MOD service,"** **a real-time demand-response public transportation service using a van**, and carried out a pilot project in Yeongjong Island, Incheon(2019).
  - During the pilot project, an average of 759 people used it per day, but the success rate of rider matching remained only 6.5% .
- Varo DRT, operated in the Osong area of Cheongju, showed significant reduction in waiting time and cost reduction.
- In 2022, a **self-driving DRT called "TAP!" was piloted in some sections of Cheonggyecheon in Seoul**.



Source: Incheon Metropolitan City(2020)



Source : https://www.varodrt.com/

5.3. DRT

3) Korea 3: Diversity of DRT Services

- In Korea, large cities are based on large buses, but small and medium-sized cities adopted **app-based demand responsive e-shuttles awith diverse service functions (commuter, late night, Downtown circular**)
- According to monitoring results, the probability of **technical defects or accidents was low**, and the satisfaction level **higher over 22%,** operating costs being **lowered as much as 29%** than the conventional bus services.

	Commuter E-bus	Commuter Seat bus	Late night Call bus	Circular feeder bus	Cheongju Call Bus	Dr. T
Location	Seoul Metro Area	Seoul Metro Area (since 2020)	Seoul (since 2013)	Seoul (since 2017)	Cheongju (since 2022)	many
Service area	Suburb-> city center	Suburban-> city center	City center	City center	Peripheral	Rural area
Service duration	Morning peak	Morning peak	Mid-night	Morning (AM 7-9)	All day	All day
Service purpose	commuting	Long-distance commuting	Return home from Downtown	Circular feeder	Low demand area service	Low demand area service
Route type	flexible	fixed	flexible	fixed	flexible	flexible
Stop	fixed	fixed	variable	fixed	Variable	fixed
Reservation	App-based	App-based	App-based	App-based	App-based	Telephone

VI

Artificial Intelligence:
Autonomous Driving & Safety Technology

- Autonomous Driving
- Safety Technology

VI. Artificial Intelligence (2023~): Autonomous Driving and Safety Technology

- Transport is entering an AI era shaped by digital-only forms to **Physical AI** that interacts with the real world.

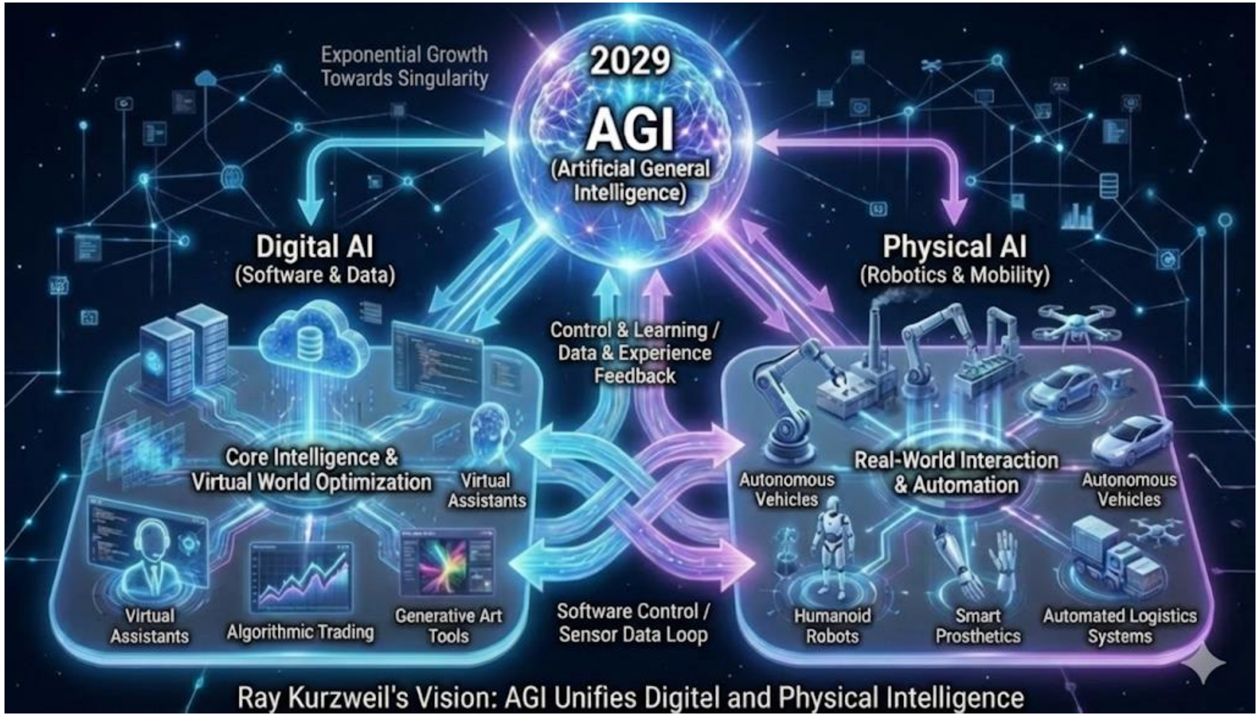
- AI is expanding from software and analytics into **autonomous vehicles, safety systems, robots, and real-world mobility operations**.

- Global competition in autonomous driving is intensifying across **China, the US, Europe, Germany, the UK, Japan, and Korea**.

- Korea’s policy direction is toward **Level 4 commercialization, large-scale pilot cities, and stronger AI mobility competitiveness**.

6.0. Progress of Artificial Intelligence

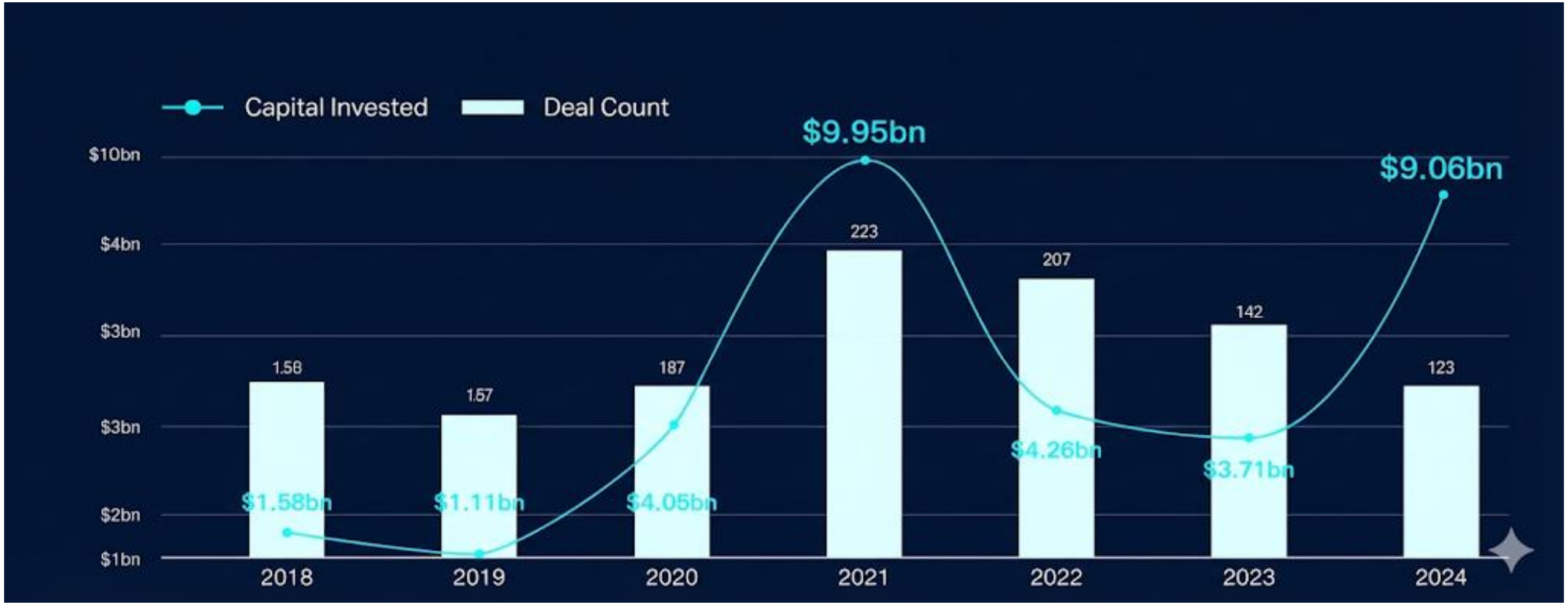
- **DIGITAL AI** Since the early 2020s, a digital innovation wave centered on generating text, images, and code.
- **PHYSICAL AI** From 2025 onward, AI takes on a physical embodiment and directly interacts with the real world across cities, logistics, and mobility
- **AGI** By 2029, combining DIGITAL AI + PHYSICAL AI reaches human-level intelligence.
- **SIGULARITY:** By 2045, non-biological intelligence (AI) reaches a singularity where it becomes billions of times more powerful than the combined intelligence of all humans.



Source: Ray Kurzweil, The Singularity Is Nearer: When We Merge with AI, 2024

6.1. Autonomous Driving

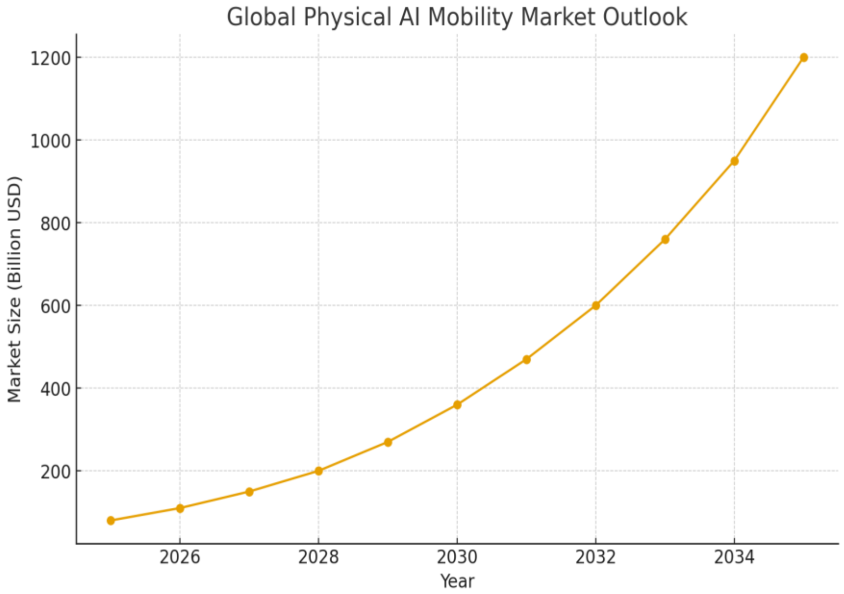
1) Where is AV located?



Source : PitchBook, VC-backed rounds in autonomous driving tech 2018-2024, https://globalventuring.com/corporate/asia/invest-autonomous-driving/, NAEK, Self-Driving Committee, Toward Global Number 1 in Autonomous Vehicle, 2025.11, unpublished report

6.1. Autonomous Driving

2) Mobility AI: Global outlook



	2025	2030	2035	출처 기반
Robotaxi	5–8B$	40–60B$	**120–160B$**	Global AV Report
A-DRT	3–5B$	15–25B$	40–60B$	same
A-Truck	12–18B$	45–70B$	100–150B$	same
Delivery Robot	2–3B$	10–15B$	25–40B$	same
Service Robot	3–4B$	9–12B$	20–30B$	same

Source: 1) PitchBook, VC-backed rounds in autonomous driving tech 2018-2024, 2024, 2) Morgan Stanley Research, Flying Cars: Investment Implications of Autonomous Urban Air Mobility, 2019, 3) Spherical Insights & Consulting, Global Smart Mobility Market Size, Share, and COVID-19 Impact Analysis, 2025

6.1. Autonomous Driving

5) Major Countries' 2030 AV Strategies (1)

	Policy name (announcement date)	Policy objectives & strategic keywords	L4 AV Fleet Size (current → 2030)	Major company (apps used)	Policy type
China	• *Green Vehicle Technology Roadmap 3.0* (2025.10.22) • *Research Report 6.0 on the Development of China's Automotive Base Software in the AIDV Era* (2025.10.16)	• World's largest autonomous-driving market & technology leader • Complete the AIOS ecosystem in the AIDV era → lead global software standard • Shift from E2E focus (2024) → mass production & commercialization of VLA • Intra-city → intercity expansion	≥ ~**3,100** (combined: Pony.ai, Baidu, WeRide) → **100,000** *(2040: 1,000,000)*	Pony.ai, Baidu, WeRide, etc. *(own apps + existing ride-sharing apps)*	**Gov't-led** strategic promotion *(co-evolution of private tech development and government regulatory reform)*
US	• *AV Framework 2025* (2025.4) • *Motor Vehicle Modernization Act* (2026.1)	• Break the "patchwork" of regulations; major regulatory shift toward safety, innovation & commercialization • Raise annual FMVSS exemption cap per OEM from **2,500** to **90,000** AVs	**Waymo 3,067, Zoox 332** *(Tesla FSD: L2)* → **Mass-production system established**	Waymo, Zoox, Tesla, etc.	**Private-market-led** / federal regulatory innovation model
EU	• *Industrial Action Plan for the European automotive sector* (2025.3)	• Restore EU leadership in AD and SDVs • Build large-scale cross-border AD testbeds including **at least 3** small/medium cities *(Cross-Border Testbeds)* • Plan: city-based piloting program "Autonomous Drive Ambition Cities"	**Current: 0** → 2030: **€400 billion economic impact**	**Baidu (Lyft), Wayve (Uber), Waymo (moove), Momenta (Uber)**, etc.	Pan-EU platform-building model

Source: "Major Countries' 2030 Autonomous Driving Strategies and Recommendations to Activate the DSP System," materials for the Korea Academy of Engineering (NAEK) 46th Future National Land Forum, 2026.02.03

6.1. Autonomous Driving

5) Major Countries' 2030 AV Strategies (2)

Country	Policy name (announcement date)	Policy objectives & strategic keywords	L4 AV Flt Size (current)	L4 AV Flt Size (2030)	Major company (ride-hailing app)	Policy type
Germany	• *Federal Autonomous Driving Strategy* (2024.09) • *Hamburg Digital Mobility Strategy & ALIKE Project* (2024.04.09)	• Establish autonomous driving as a core pillar of the **"Hamburg-Takt"** program, which guarantees access to public transport within **5 minutes** • After success in Hamburg, expand to **Berlin, Munich, and Cologne**	**Hamburg: 20-vehicle pilot** *(planned for 2026)*	**10,000 vehicles** *(urban ride-pooling)*	Volkswagen, MOIA, Holon, etc. *(hvv switch)*	**Regulation–technology harmonization**; collaboration among **federal–local government–private sector**
UK	• *Automated Vehicles Act 2024* (2024.05)	• Become the world's leading country for **autonomous-driving innovation and regulation** • Introduce **ASDE (Authorised Self-Driving Entity)** and **NUiC (No-User-in-Charge) Operator**	**Commercial service planned to start in 2026** *(taxi, shuttle, etc.)*	*(2035)* **£42.0 billion** economic impact	Wayve, Oxa, Waymo, etc.	**Regulation-first innovation**; **global openness**
Japan	• *RoAD to the L4* (2021.09) • *Mobility DX* (2024.05) / *Mobility DX International Cooperation* • *Mobility DX 2025 Upgrade* (2025.06.09) • *3rd Basic Plan on Transport Policy (2025–2030) (Cabinet decision: 2026.01.23)*	• Provide autonomous-driving services at **50+ sites by 2025 / 100+ sites by 2027** *(failed)* • Secure **30%** global market share for **Japan-made SDV vehicles (with AD functions)** by **2030 or 2035** – 2030: **~11–12 million** / 2035: **~17–19 million** vehicles • Evolve transport services using **digital and emerging technologies**	**11 vehicles**	**Nationwide target: 10,000 vehicles in operation**	TIER IV; Toyota–Waymo; Japan Taxi–Waymo; Nissan–Wayve, etc.	**Government–local government subsidy-driven cooperation**; **international collaboration**

Source: "Major Countries' 2030 Autonomous Driving Strategies and Recommendations to Activate the DSP System," materials for the Korea Academy of Engineering (NAEK) 46th Future National Land Forum, 2026.02.03

6.2. Autonomous Driving in Korea

1) Korean Autonomous Driving Stragety

Policy name (announcement date)	Policy objectives & strategic keywords	AV fleet size (current)	AV fleet size (2030)
Measures to Enhance the Industrial Competitiveness of Autonomous Vehicles (2025.11.26)	• Commercialize **Level-4 (Lv.4) autonomous vehicles by 2027** • Become one of the world's top 3 autonomous-driving powers by 2030 • Citywide-scale demonstrations • Support E2E AI autonomous-driving R&D • Secure/support dedicated GPUs for AVs (from 2026~), build an AI training center (2029), and establish an AV production/supply chain	**132** *(including R&D veh)*	**1,000+**
M.AX Alliance (launched 2025.09.10)	• Supply an **SDV platform by 2028 • Mass-produce E2E autonomous driving by 2030**	—	—
2026 Autonomous-Driving Pilot City Development Program (2026.01)	• Develop **E2E AI–based L4 AV** – **Up to 3 companies**, 200 vehicles to be built and operated *(allocated differentially based on company capability)* – (2026) **up to KRW 55.8 billion**	—	—
2030 Mobility Innovation Growth Roadmap (Draft) *(planned announcement: early 2026)*	• **Full-scale City-wide demonstrations**: establish **pilot cities** (from 2026~ • **Expand AI infrastructure and advance technology**: **national AI mobility pilot city, data integration platform** • **R&D support**: **public-service pilot city**, cross-ministerial R&D • **Rationalize AV regulations** • **Build legal system to activate AV services**: – institutionalize **service business** – prepare special provisions under the **Passenger Transport Act** and **Freight Transport Act**, etc.	—	—

Source: "Major Countries' 2030 Autonomous Driving Strategies and Recommendations to Activate the DSP System," materials for the Korea Academy of Engineering (NAEK) 46th Future National Land Forum, 2026.02.03

6.2. Autonomous Driving in Korea

2) Korean Autonomous Driving Pilot Cases

지역	Seoul CBD	Daegu	Jeju	Seoul CBD
Service Type	**Zone-based**	**Passenger Vehicle (Free or Paid)**	**Public DRT**	**Passenger Vehicle (Free)**
Platform	kakaoT	NEMO ride	NEMO ride	kakaoT
OEM &	kakaoT	a2z AUTONOMOUS	RideFlux	HYUNDAI
Service Vehicle				
Service Area				
Operating Record	Total Call: 11,209 Completed Trips 7,218 (at ’26.01.27)	(Free) Total Calls 668 Completed Trips 629 (Paid) Total Calls 560 Completed Trips 518	Monthly Ave. Calls 257 Cumulative PXs 3,269	Total Calls 460 Daily Ave. Usage 5.9 cases

6.2. Autonomous Driving in Korea

3) Tesla FSD in Korea?

6.3. Autonomous Driving & Safety Technology

1) Two Types of Autonomous Driving

OEM (ex: Tesla)	**Startup (ex: Waymo)**
Passenger Car	**Robot Taxi** **Middle mile**
UiC (L1, L2, L3)	**NUiC (L4, L5)**
Supervisory	**Driverless**

Source 1) : NAEK, Self-Driving Committee, Toward Global Number 1 in Autonomous Vehicle, 2025.11, unpublished report,. 2) Automated Vehicle Act, 2024, UK.

6.3. Autonomous Driving & Safety Technology

2) Safety Tech: Waymo & Tesla far better than Human

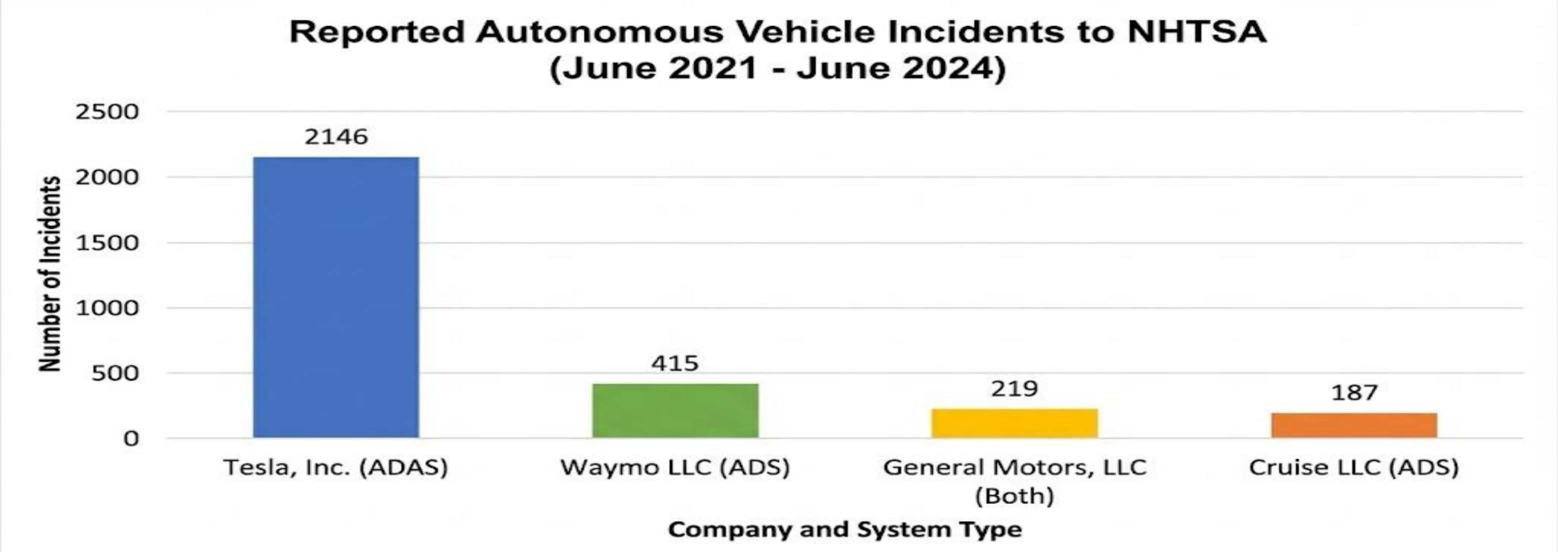
	Accident Interval (mile)	**Accident rate per 1 mil. mile**	
Tesla (Autopilot)	6.36 mil. mile	**0.16**	Mainly HWY
Tesla (FSD Supervised)	5.0 mil. mile	**0.20**	Urban Area
Waymo (Rider-Only)	-	**0.74**	100% CBD
Human Driver	0.7 mil. mile	**7.91**	USA Ave. (NHTSA)

"Source: 1) Tesla 2025 Q3 Safety Report, 2) Waymo, 2025 Sep. Safety Impact

- **Waymo:** Discloses incidents collectively, including minor contact crashes and cases where Waymo is the victim. Waymo's urban driving stability is generally rated very highly compared to Tesla.
- **Tesla:** Tends to report mainly crashes that occur right after airbag deployment or system disengagement.
- **Humans:** In severe crashes (e.g., those involving airbag deployment), both companies are statistically safer than human drivers.

6.3. Autonomous Driving & Safety Technology

2) UICs vs NUICs: NUIC better?

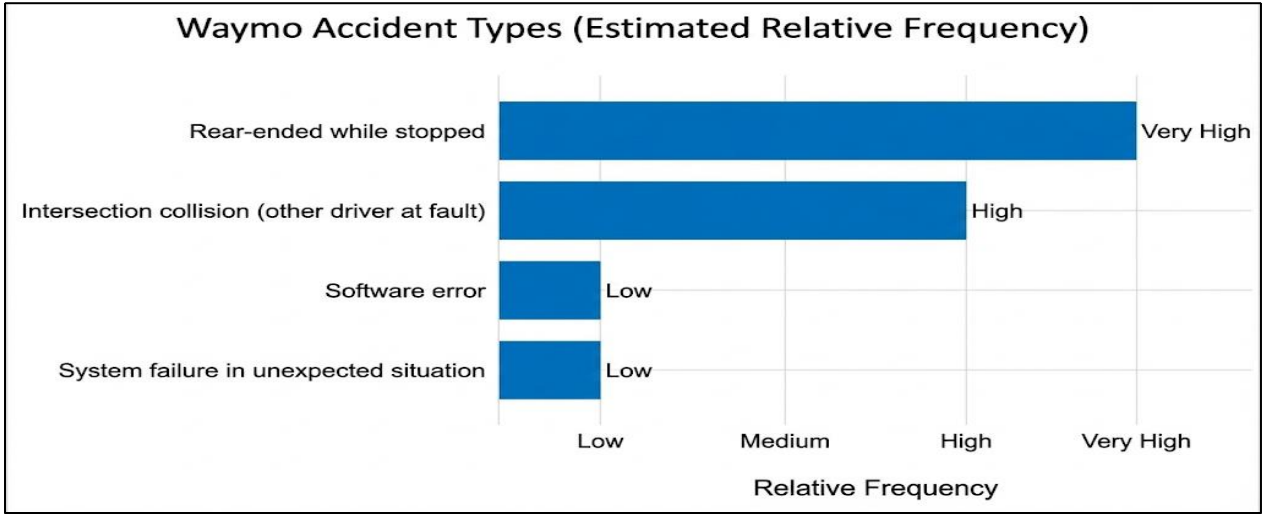


Source: Craft Law Firm analysis of NHTSA data (June 2021 - June 2024). Data includes both ADS and ADAS vehicles. Tesla vehicles were involved in 53.9% of total reported incidents.

Tesla' accident rate is 15.3 times higher than Waymo's.

6.3. Autonomous Driving & Safety Technology

3) Waymo NUICs are perfectly safe?



Crash rates vary by local road environment:

San Francisco: Waymo 0.88 vs Humans 7.91 (about 8.9× safer)
Los Angeles: Waymo 0.90 vs Humans 2.39 (about 2.6× safer)

Injury crash rates differ from human drivers, but longer driving distance doesn't automatically reduce crash rates:

- **5.67 million miles: 0.74** (Waymo) vs **3.97** (Humans) → **81% lower**
- **7.10 million miles: 0.41** (Waymo) vs **2.78** (Humans) → **85% lower**

Source: 1) Waymo, "Waymo Official Safety Impact Report", 2025, 2) Waymo, "Comparison of Waymo Rider-Only crash rates (56.7M miles), 2024, 3) Waymo, "Comparison of Waymo Rider-Only crash data(7.1M miles), 2024, , 4) Craft Law Firm analysis of NHTSA data (June 2021 - June 2024)

6.3. Autonomous Driving & Safety Technology

4) Cases leading to still Unsafe NUICs

① **TROLLEY CASE,**

② **EDGE CASE**

③ **SUDDEN INCIDENCE**

A legal operational entity is needed to

- address a small number of exceptional **long-tail scenarios**,
- provide **first-line compensation** when accidents occur, and
- conduct **data forensics** to determine root cause and liability

<Trolley Case>

<Icey Road>

<Sudden Accident>

<**SF Power outage** & Waymo stuck in traffic>

VII

Onward:

From Technology to Operation

VII. Onward (2026~): From Technology to Operation

- The next challenge is no longer technology alone, but **operation, deployment, and integration**.

- In the era of driverless mobility, "**Driving Service Providers**" who manage legal liability and real-time operations will play a crucial role.

- Evolution will move toward an **integrated ecosystem** where manufacturers, telecommunications companies, infrastructure providers, and insurers collaborate to operate intelligent mobility systems.

- Korean transport policy is therefore moving from **building infrastructure**, to **managing mobility**, to **operating intelligent systems**.

6.0. Types of Mobility Physical AI

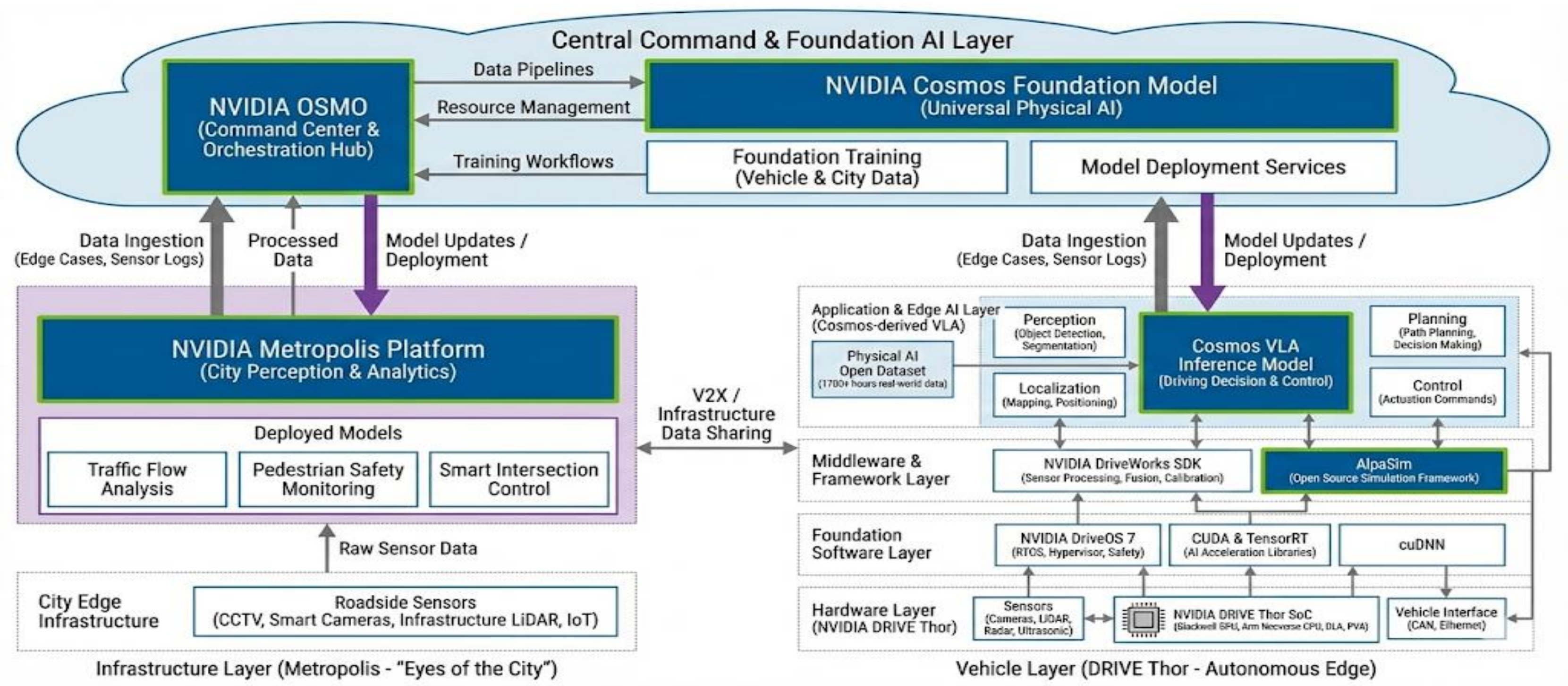
- **ROBOTAXI** On-demand autonomous passenger service in urban areas
- **AUTONOMOUS SHUTTLES/BUSES** Route-based and DRT-based public transport services
- **AUTONOMOUS TRUCKS** Middle-mile and long-haul freight
- **DELIVERY ROBOTS AMR:** Last-mile delivery and internal logistics movement within facilities
- **DRONES · UAM** 3D (aerial) mobilit
- **AUTONOMOUS SHIPS:** Unmanned vessel operations on rivers and at sea
- **SMART PARKING · AVP:** Automated valet parking, charging, and maintenance services

7.0. From Technology to Operation

1) NVIDIA Alphamayo in 2026 CES: Open-source AV SW

7.0. From Technology to Operation

2) Alphamayo System Architecture



7.1. Operator for AV Deployment

1) UK Automated Vehicle Act (2024. 5)

NUiC vs **UiC**

No user (system) in charge | user (human) in charge

Licensed NUIC Operator in Charge.

An entity that remotely supervises vehicle safety, responds to system errors or failures, and assumes legal liability in the event of an accident

Source 1) : NAEK, Self-Driving Committee, Toward Global Number 1 in Autonomous Vehicle, 2025.11, unpublished report, 2) Automated Vehicle Act, 2024, UK.

7.1. Operator for AV Deployment

2) What is the Operator?

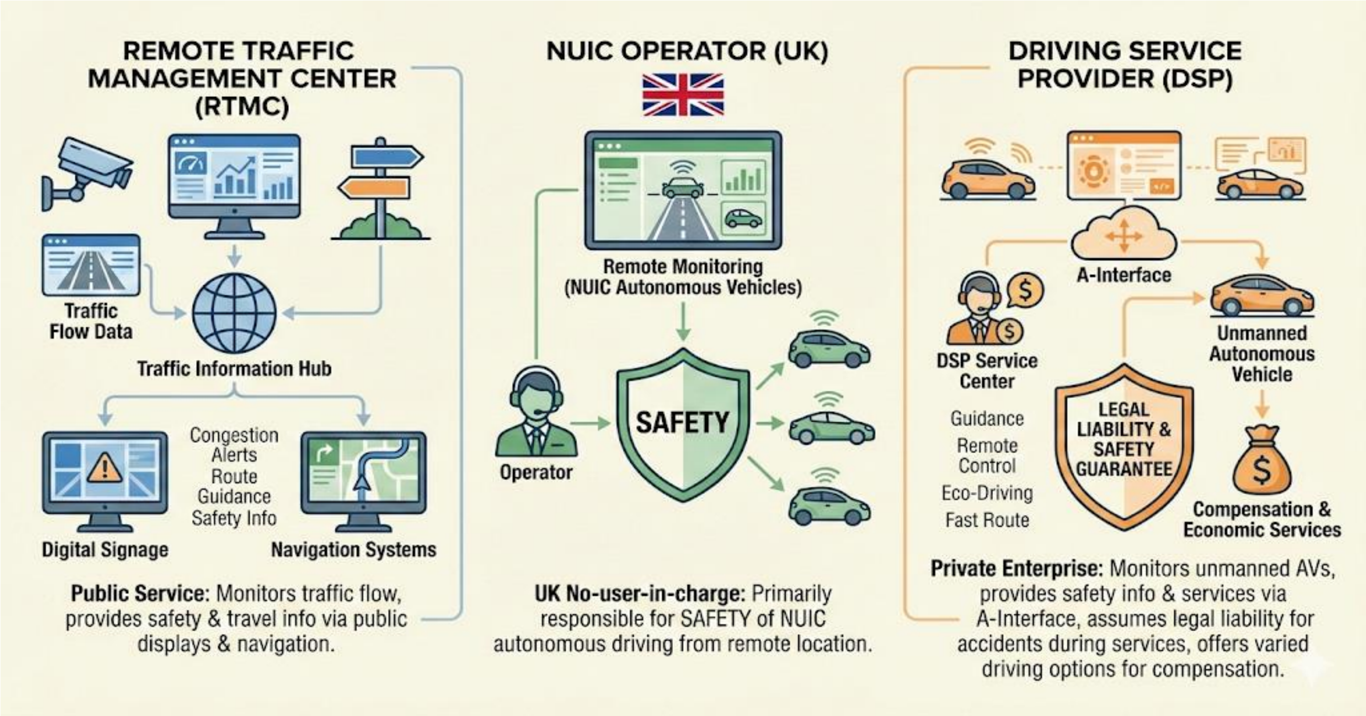
Current end-to-end (E2E) AI models face an "**explainability**" problem: when an accident occurs, it is **difficult to immediately determine** whether the root cause was sensor malfunction, an error in the perception algorithm, or a defect in the decision logic.

To swiftly protect victims and prevent social disruption when accidents occur **NUIC operator (NUICO)** is essential as a "**liability hub**"—taking primary compensation responsibility upfront before the technical cause is fully determined, and then **seeking recourse (subrogation)** from the manufacturer or telecom operator afterward.

A **DSP** extends the UK's NUIC Operator model by transitioning from public-sector safety oversight to a **for-profit business entity** designed to reduce liability burdens

7.1. Operator for AV Deployment

3) Operator Types: TMC vs NUICO vs DSP

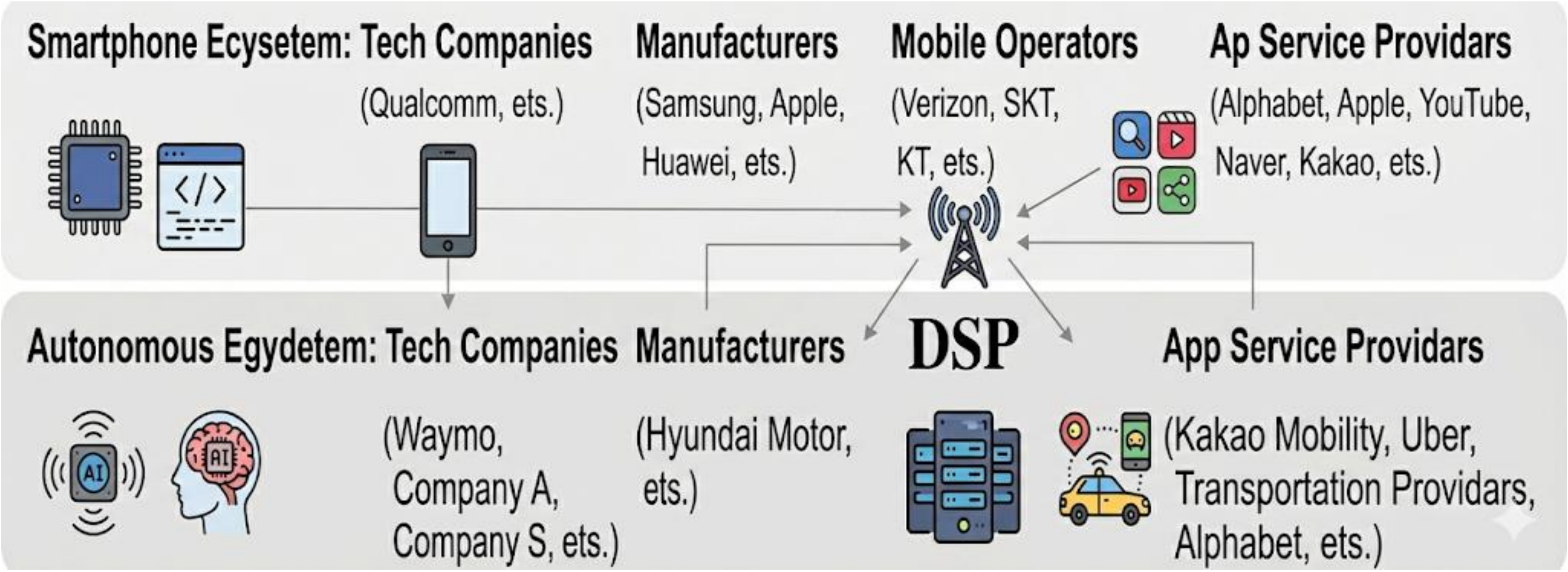


- ◆ **TMC (Public sector):** **Manages road traffic**. it focuses on whether the overall road network remains uncongested and accident-free.
- ◆ **NUIC Operator (Individual-vehicle NUIC safety management)** Plays the role of a "**supervisor/controller**." It monitors driverless vehicles individually.
- ◆ **DSP (NUIC operations & overall service provider):** Goes beyond monitoring to act as an **active service provider**.

7.1. Operator for AV Deployment

4) DSP originated from Mobile-phone Operator

< Phone Operator vs. DSP >

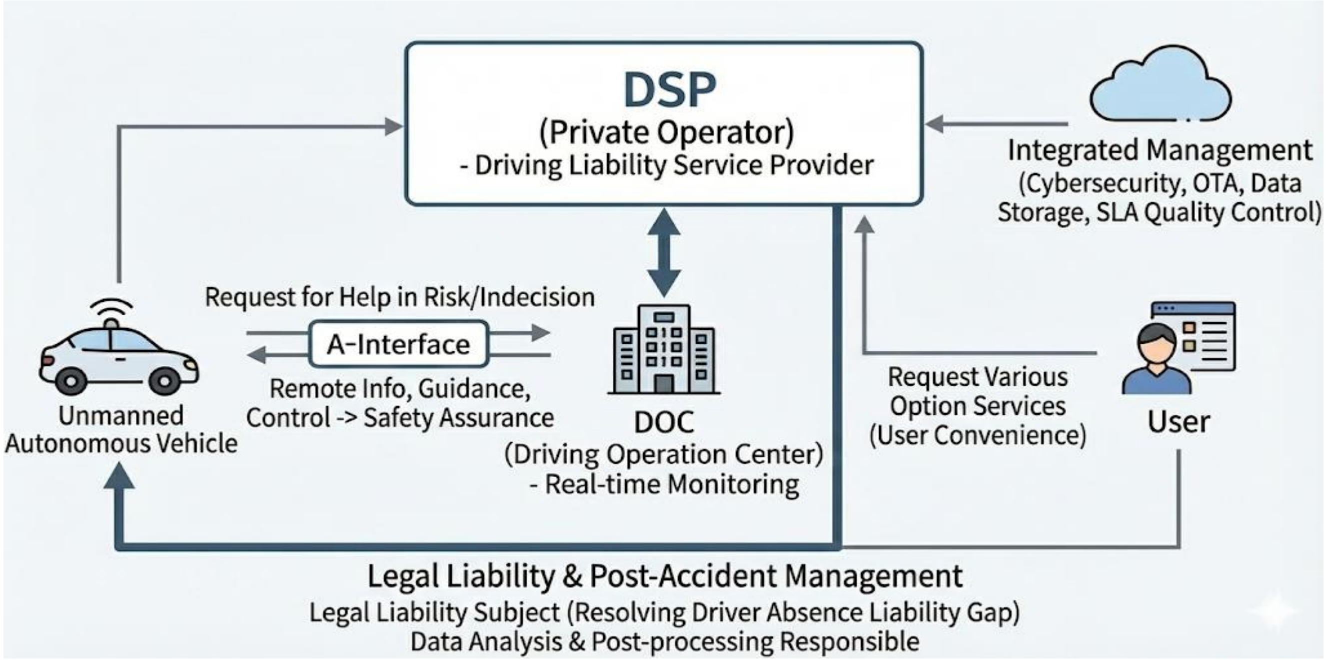


Source: NAEK Autonomous Driving Committee, Guidebook for DSP (unpublished report), 2025.11.

7.2. Korean Initiative for AV Operator: DSP

1) System Architecture of DSP

- A **private operator** that provides **“driving responsibility services”** for NUIC **autonomous driving**, acting as the **legally liable entity** in the event of an accident and closing the accountability gap created by the absence of a human driver.
- Operates a **DOC (DSP Operation Center)** that monitors and manages individual vehicles **in real time, 24/7**.
- When a vehicle requests assistance, it ensures safety through **remote information support, guidance, and control services**, and also provides various **optional services** (e.g., **Comfort**, **Fast**, etc.).



Source:) : NAEK, Self-Driving Committee, Toward Global Number 1 in Autonomous Vehicle, 2025.11, unpublished report

7.2. Korean Initiative for AV Operator: DSP

1) System Architecture of DSP

NUIC Mobility

In-vehicle AI (Terminal AI): Real-time perception, decision-making, and control using sensor data

"A" Interface

↔ Real-time Sensor Data

↔ Real-time Veh Monitor

↔ Driving Assist Request & Response

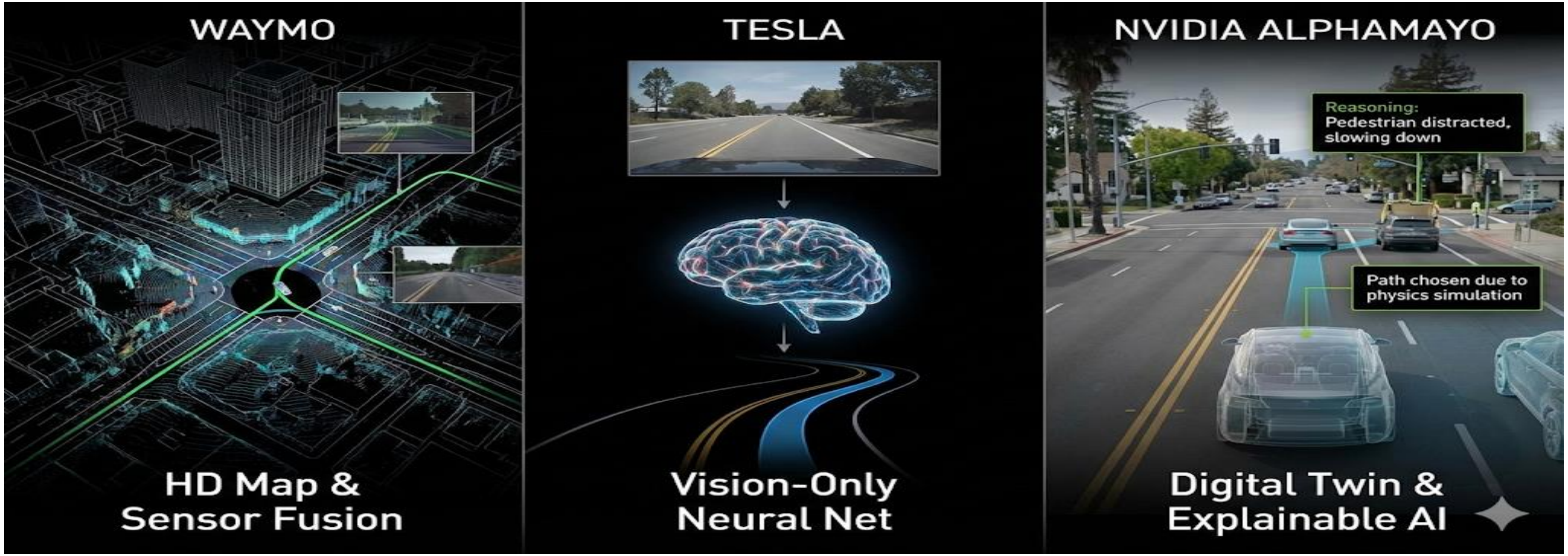
Operation Center(DOC)

Cloud AI: Risk prediction and optimization by integrating multi-vehicle, road, signal, and weather data

Source : NAEK Autonomous Driving Committee, Guidebook for DSP (unpublished report), 2025.11..

7.2. Korean Initiative for AV Operator: DSP

2) System Architecture of DSP(AV Operator): Vehicle



Experts in Geo-fenced Area

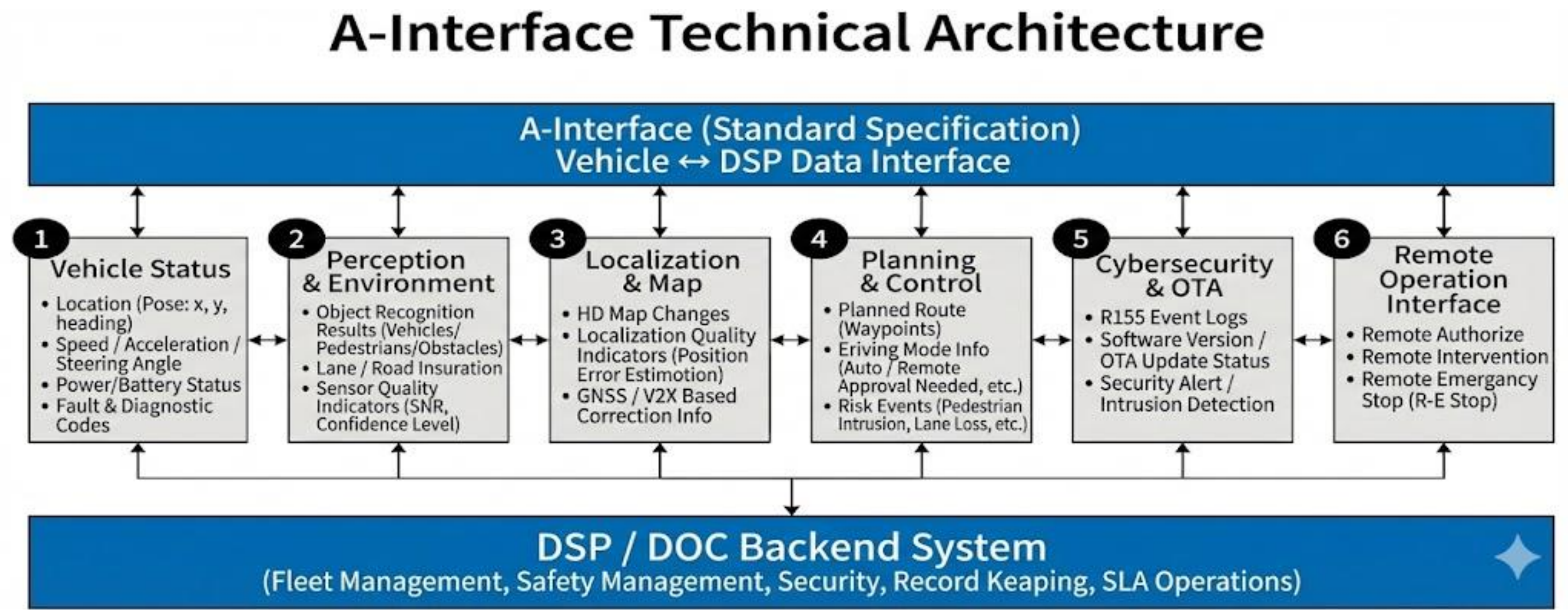
World Model based Intuitive Driver

Leveraging COSMOS AI trained on physical laws in a virtual environment (Omniverse).:

7.2. Korean Initiative for AV Operator: DSP

3) System Architecture of DSP: A-Interface

For DSPs, a standardized (documented and open) "A-Interface" is essential to **clearly establish liability** when an NUICO AV accident occurs and to pursue **recourse (subrogation)** claims



7.2. Korean Initiative for AV Operator: DSP

4) System Architecture of DSP: DSP Operation Center(DOC)

① **Communications & Network Infrastructure**
- Low latency, high reliability, long-duration/extended-operations support

② **Integrated Operations Platform (Fleet & Mission Control)**
- HD map–based visualization of all vehicles, dispatch algorithms, route optimization, demand forecasting

③ **Remote Support / Remote Control HMI & Console**
- Integrated vehicle telemetry/feeds, remote operators, dual confirmation to prevent operational errors

④ **Data & AI Infrastructure**
- Data lake/warehouse, AI-based anomaly detection models, algorithm improvement pipeline (**MLOps**)

⑤ **Safety & Security Standards Compliance**
- Vehicle/system functional safety, international cybersecurity standards,

⑥ **High Availability & Resilience**
- Redundancy for servers/storage/network/power, disaster recovery & cloud backup, failure simulation drills

⑦ **Organization & Workforce**
- Operations staff (service operations management, remote support operators, security, data analytics, etc.), qualification assessment & training, **SOPs**

7.2. Korean Initiative for AV Operator: DSP

5) System Architecture of DSP: Communication Network

To control **thousands of vehicles** with **ultra-low latency (within 1 ms)**, a **high-reliability dedicated comm. network**, separated from smartphone networks, is required.

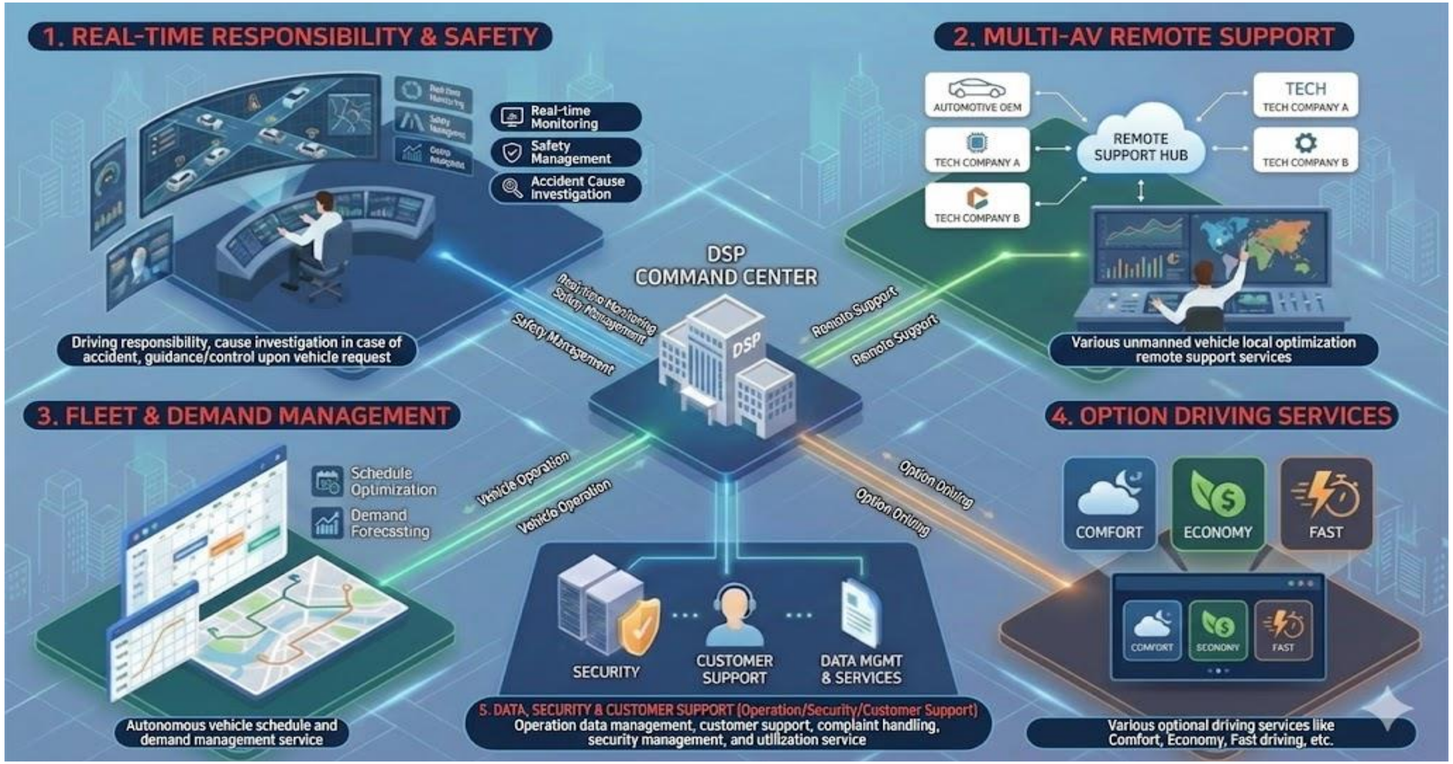
Phased scaling plan:

- **Phase 1:** Add a **DOC-dedicated slice option** on smartphone/mobile network
- **Phase 2-1:** Secure a **dedicated automotive network**
- **Phase 2-2:** Install **roadside sensors** and integrate/fuse the information

Source: NAEK Autonomous Driving Committee, Guidebook for DSP (unpublished report), 2025.11.

7.2. Korean Initiative for Operator: DSP

6) Functions of DSP(AV Operator)



Function
Primary Safety Holder
DOC Operation
A-Interface-based Veh/Infra Data Gathering and Analysis
Cyber Security·OTA (R155/R156)
Liability Bearer
Service Level Agreement
Service Optimizer for Profit

Source: NAEK Autonomous Driving Committee, Guidebook for DSP (unpublished report), 2025.11.

7.2. Korean Initiative for Operator: DSP

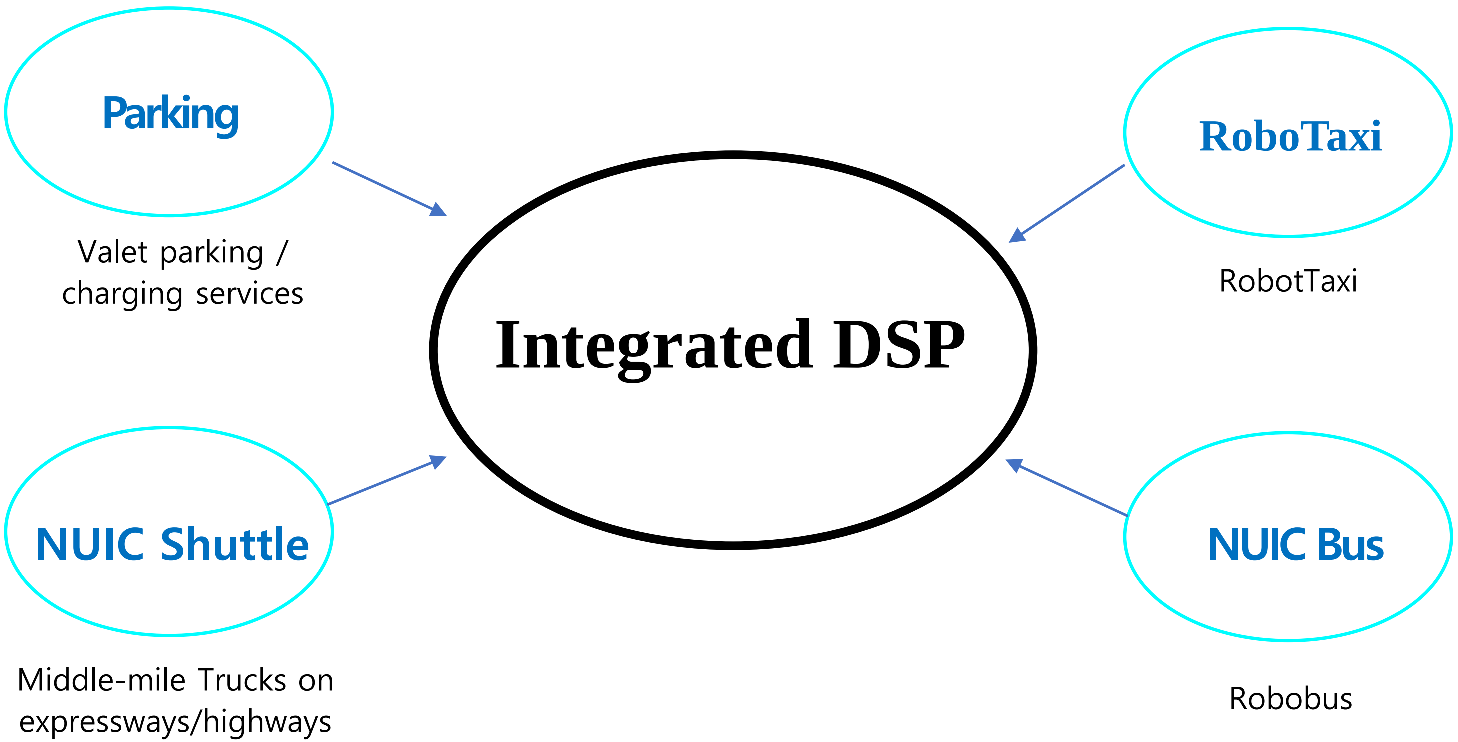
7) DSP Eco-System

< Roles of Stakeholders in the DSP Ecosystem >

- **DSP**
  - Single accountable point for operations and responsibility across monitoring, guidance, and control
  - Operates the Operation Center (data, security, SLA / Service Level Agreement)
- **Automotive OEMs & Autonomous Driving Technology Companies**
  - Vehicle platform, driving AI, safety architecture, A-Interface standards compliance
  - Vehicle diagnostics, component life prediction, OTA management
- **Infrastructure Providers (Smart City, Cloud, etc.)**
  - Provide integrated sensing, HD maps, edge computing (e.g., LG CNS, SK C&C)
  - Operation Center:data storage and AI model training (e.g., Naver Cloud, AWS)
- **Telecom Operators (Including Dedicated Networks)**
  - Provide 5G/6G ultra-low latency / high-reliability wireless (URLLC) infrastructure for remote operation and video
  - Network slicing, secure links (ex.: KT, SKT, LGU+)
- **App / Transport Service Providers (Robotaxi, Delivery, etc.)**
  - Robotaxi dispatch/call, payment, customer touchpoints
  - Driving control and service integration via DSP APIs

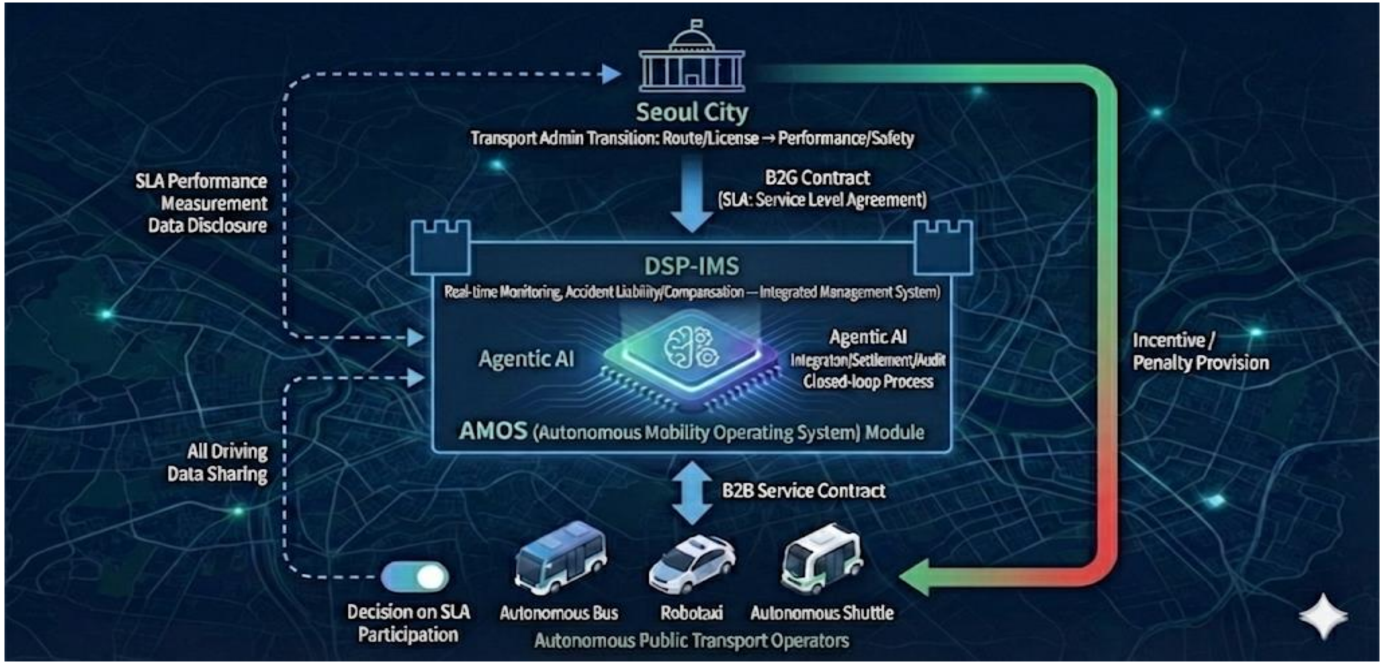
  (ex: Kakao-Mobility, T-MAP Mobility)
- **Central/Local Government & Public Agencies**
  - DSP certification schemes, permits/approvals, provide/integrate access to public data
- **Insurance / Security / Certification Bodies**
  - Integrated AV insurance, cybersecurity monitoring, interface standardization (ex: Samsung Insurance, SK-Shielders)

7.3. DSP Business Model: B2B BM



7.3. DSP Business Model: B2B+B2G BM

- **B2B+B2G DSP: Autonomous MaaS by AMOS**



- **City** will shift its public transport operating model—from **route/license-based** to **performance/safety-based**.
- The City signs a **SLA** with a **DSP-IMS**, and it adds an **AMOS execution module** to its **OC**.
- **Passenger carriers** decide whether to **join the SLA scheme**.
- If they participate, the **autonomous-operation data** measuring SLA performance is **shared with** the **City via AMOS**. Passenger carriers receive **City-incentives through the DSP**.
- **AMOS, DSP-IMS**'s **Agentic AI**, executes operations, settlement/reconciliation, and audits in a closed loop.

VIII Conclusion

Final Takeaway: From Infrastructure to Managing Mobility to Operating AV

- Korean transport policy has evolved from **infrastructure-led economic growth** to **green, digital, and AI-enabled mobility transformation**.
- Its early success was built on **timely national investment** in expressways, railways, airports, ports, and urban transit, supported by **stable financing mechanisms** such as the Transport Infrastructure Special Account.
- As congestion, environmental pressure, and urban complexity increased, policy shifted toward **TDM, public transport reform, traffic calming, integrated fares, and intermodal mobility**.
- **Covid-19** accelerated structural change through **work from home, online shopping, virtual mobility, and demand-responsive transport**, reshaping both passenger travel and urban logistics.
- The next phase will be defined by the convergence of **Digital AI and Physical AI**, moving Korean transport policy **from technology adoption to intelligent operation** through autonomous driving, safety technology, robotics, and user-centered mobility systems.

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Thank You.