



'Shucle' and the Potential of Urban Demand-Responsive Transport

March 14, 2023

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Smart mobility technology of HMC for Improved Quality of Life

Urban Air Mobility



Mobility Hub

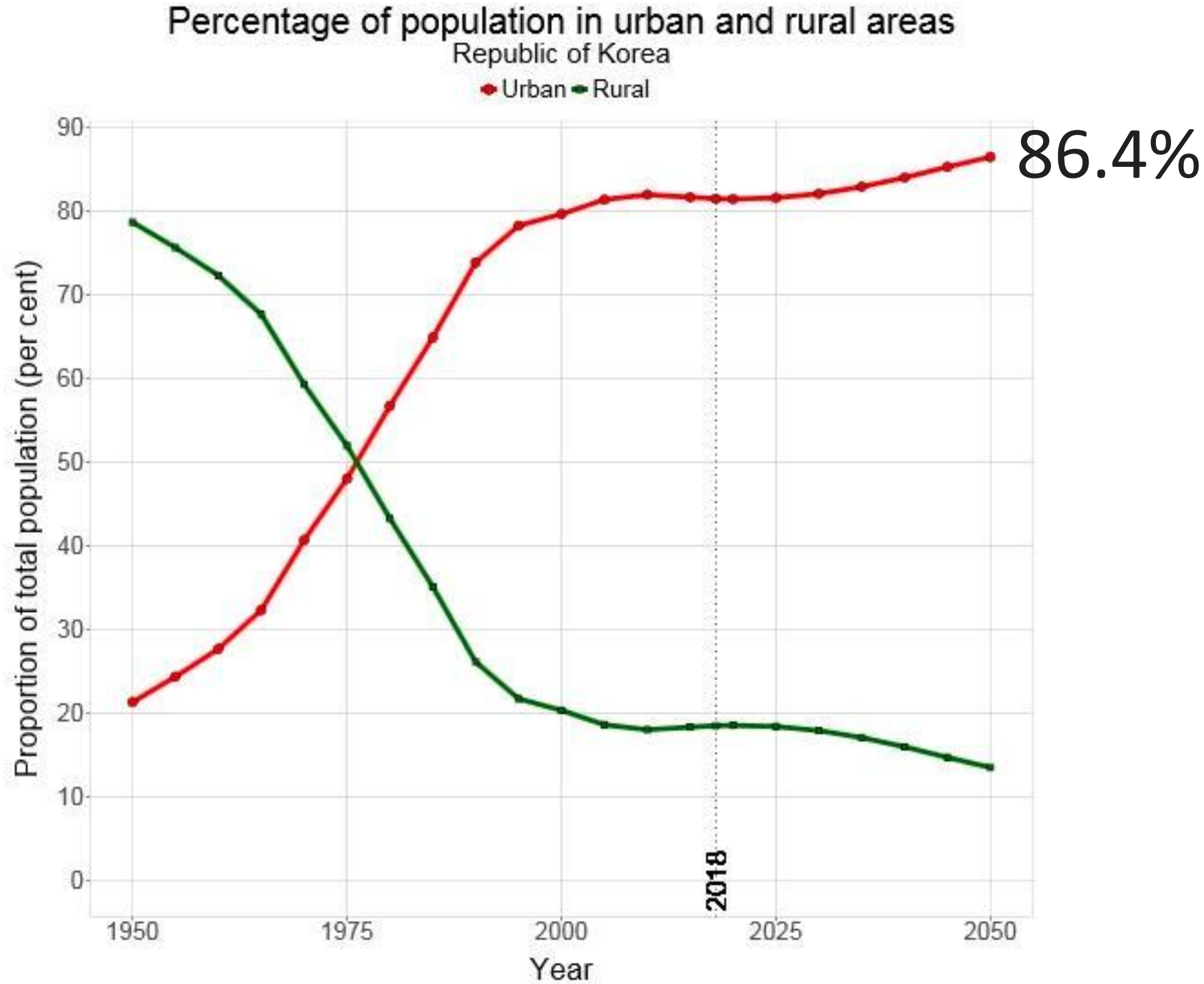


Autonomous Vehicle



출처 = HMG 저널 <https://news.hmgjournal.com/Group-Story/?p=161756>

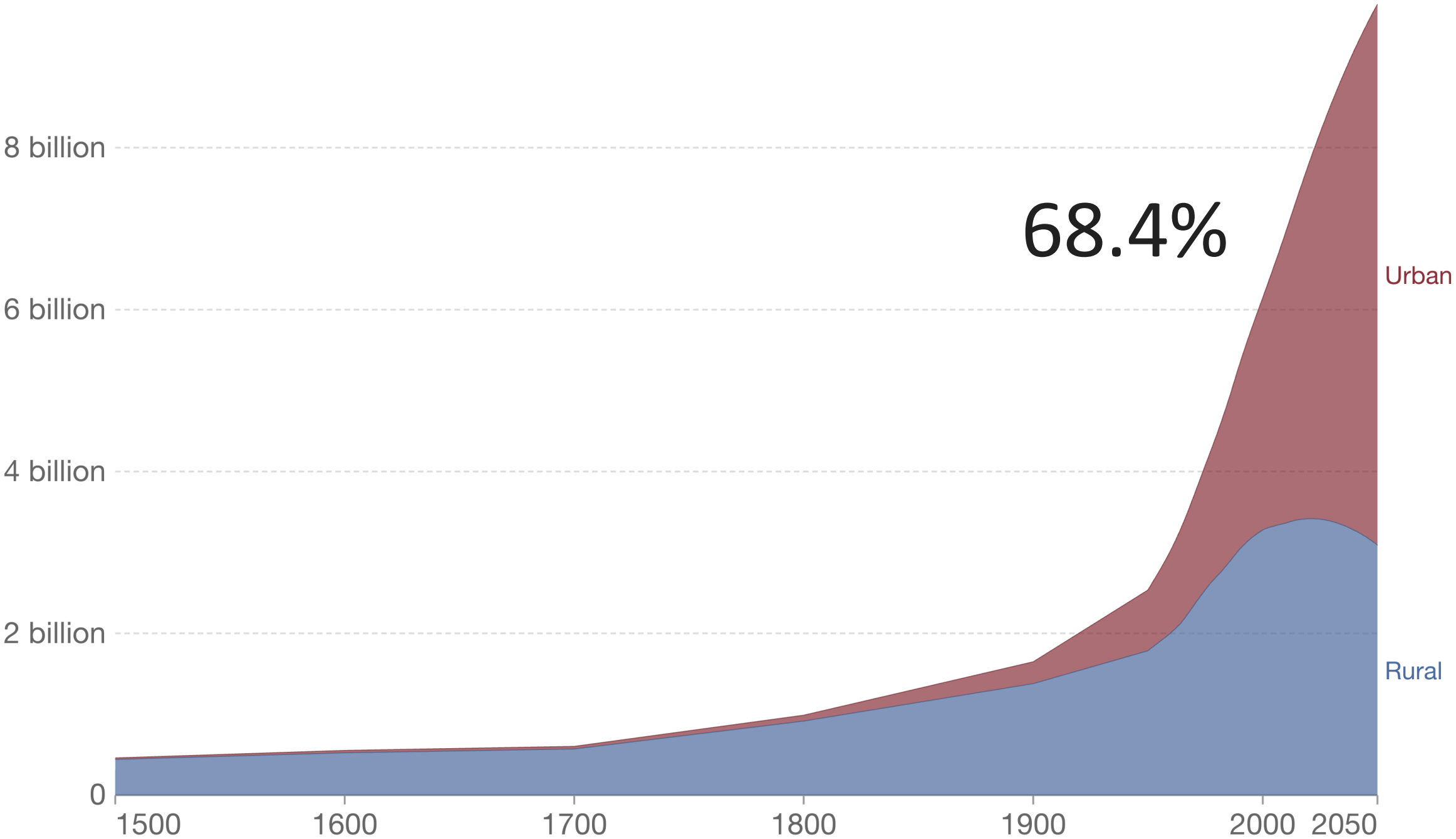
9 Out of 10 Koreans Live in Urban areas



<https://population.un.org/wup/>

Urban and rural population projected to 2050, World, 1500 to 2050

Total urban and rural population, given as estimates to 2016, and UN projections to 2050. Projections are based on the UN World Urbanization Prospects and its median fertility scenario.



Source: OWID based on UN World Urbanization Prospects 2018 and historical sources (see Sources) OurWorldInData.org/urbanization • CC BY

<https://ourworldindata.org/urbanization>

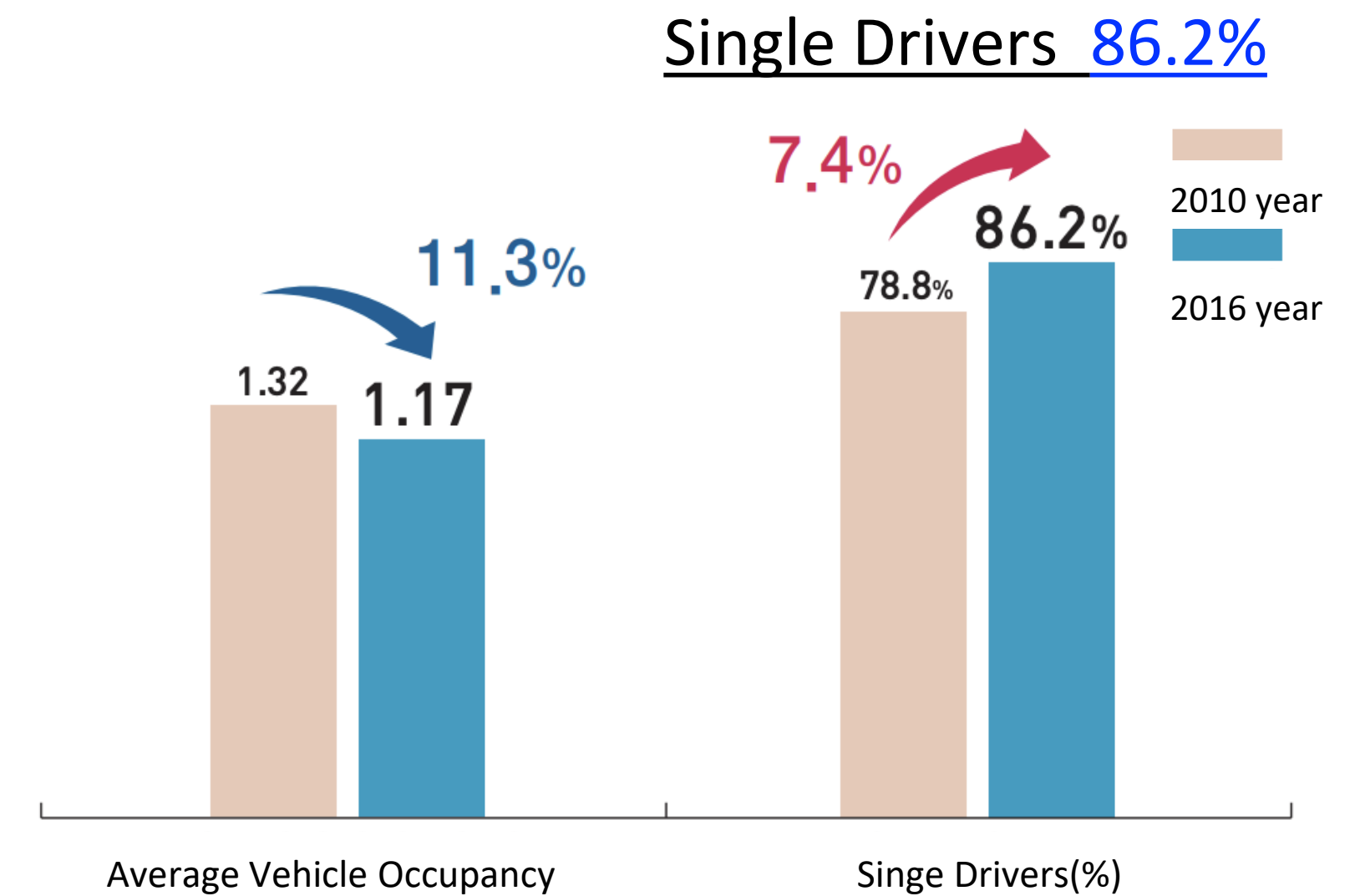
52.5 Mil. USD Yearly Traffic Congestion Cost in the Seoul Metropolitan Area

Korea Transport Institute(KOTI), 2018



News on 2021.7.15 : joongang.co.kr/article/24105798#home

- 462,000 USD National Average Traffic Congestion Cost/km
- 3.6 Mil. USD Average Traffic Congestion Cost in Seoul/km
- 1.17 Average Vehicle Occupancy (Metropolitan Cities)



Neighborhood-Oriented Urban Visions,

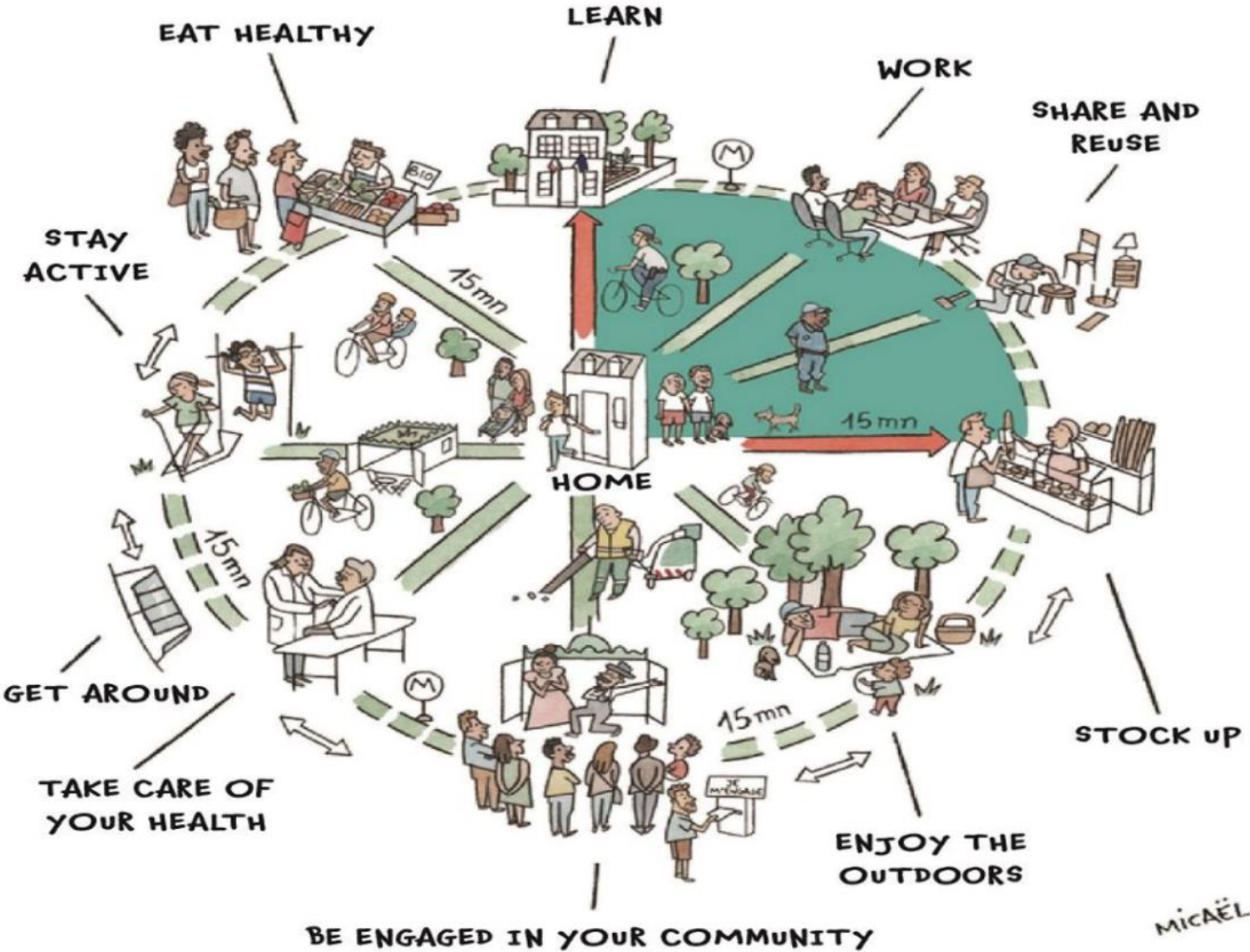
Sustainable & Easily Accessible Urban Transportation System in Neighborhood-Oriented Urban Planning for Improved Community Infrastructure & Better Quality of Life

Ville du quart d’heure

(15minute-city / Anne Hidalgo, Mayor of Paris, 2020)

Urban infrastructure offering all everyday-life facilities within a **15-minute walking distance from the residence**

Thus eliminating automobile travel in the city, replaced by **walking, cycling, and public transit**



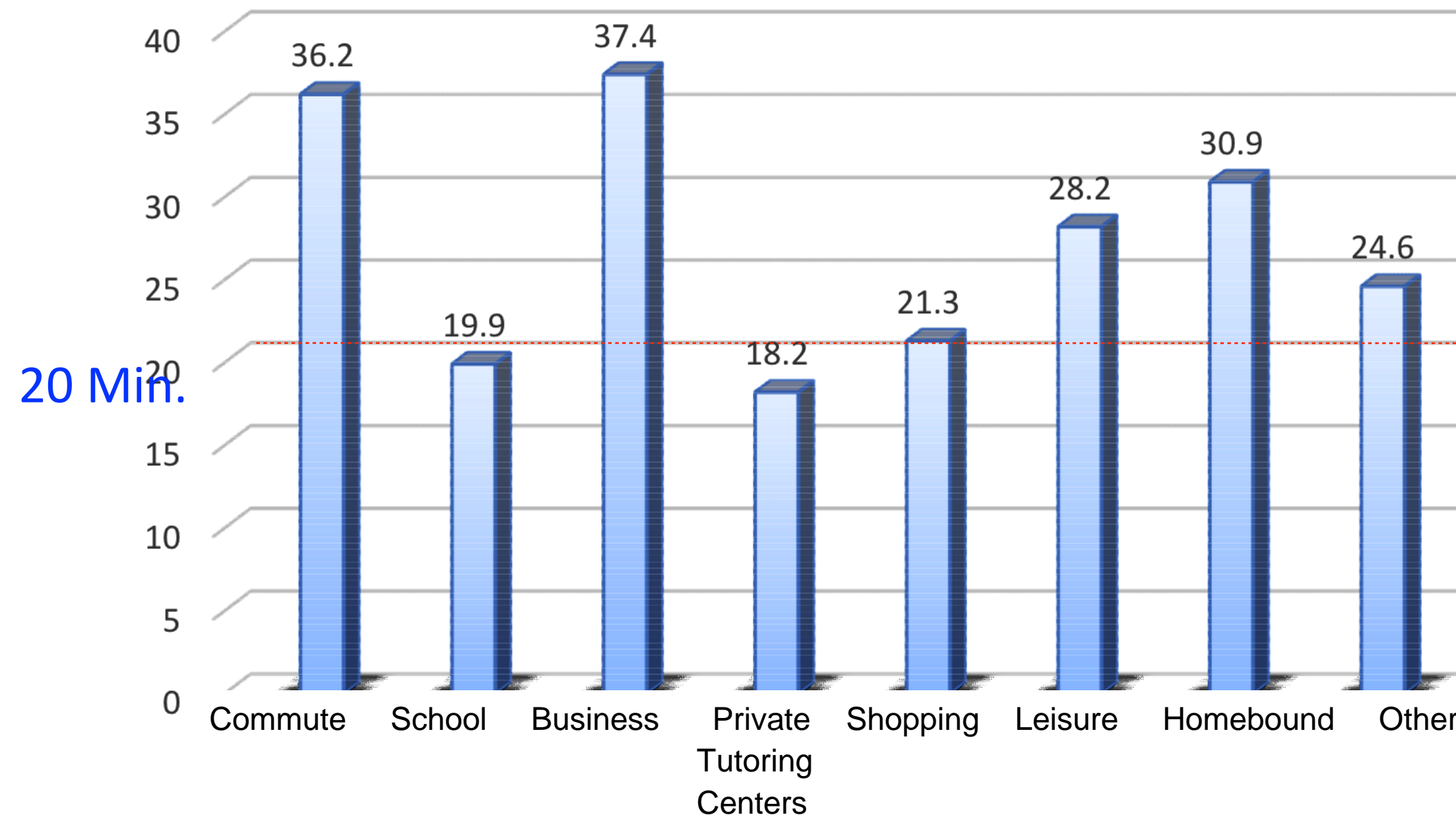
15-Minute City Paris (Anne Hidalgo, Le Paris du quart d’heure, 2020)

Long Trip Time & Declining Share of Public Transit

With the nationwide **average trip time at 29.2 minutes**, **car** is the most used of all modes of transport(excl. walking), and the **share of public transportation is declining every year**.

(MOLIT, 2020 Public Transportation Investigation, 2021)

< Average Trip Length by Travel Purpose >



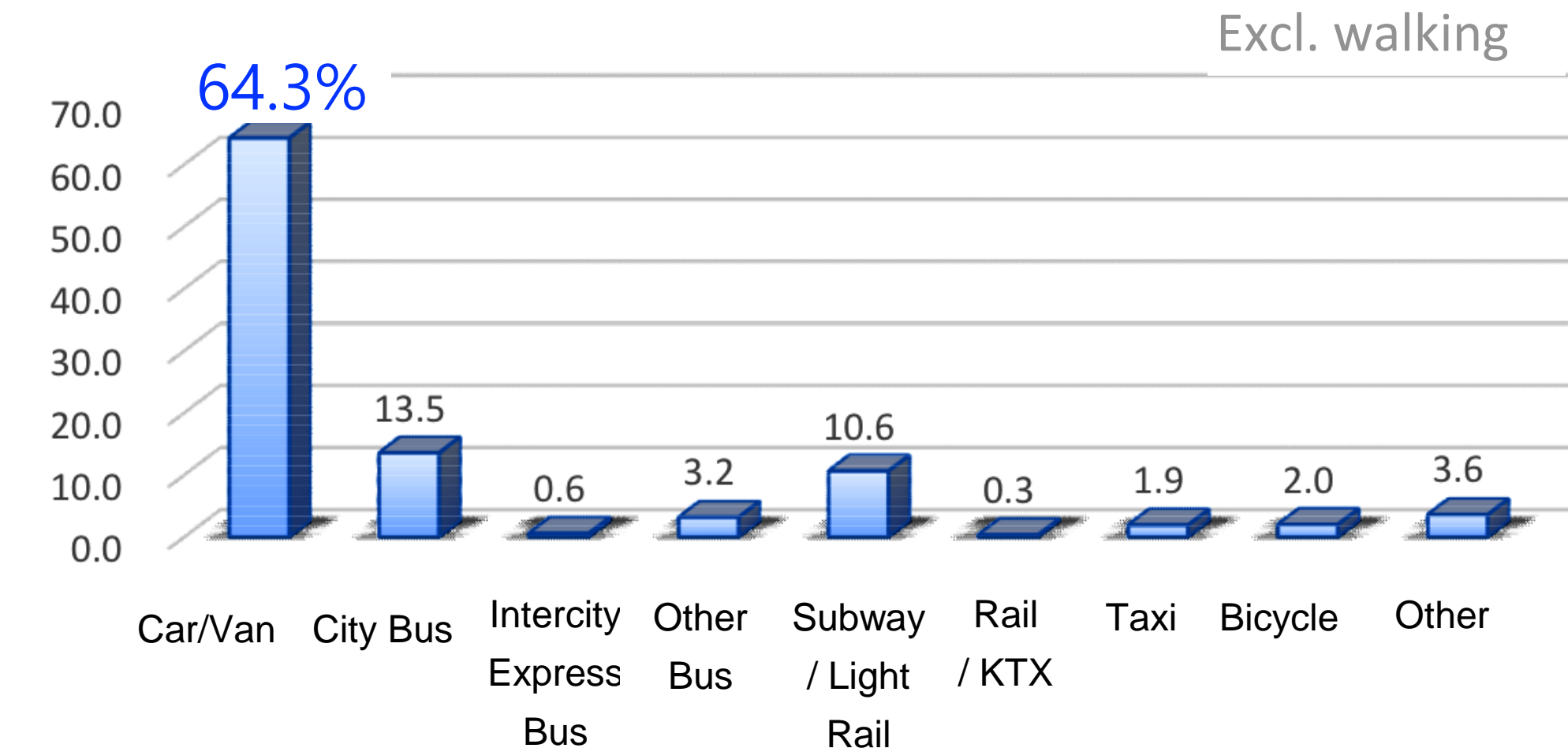
< Domestic Transport Modal Share >

Unit: percent(%)

Mode	2013	2014	2015	2016	2017	
Road	Car	54.8	55.1	55.6	55.6	56.1
	Taxi	12.2	12.1	12.0	10.9	10.6
	Bus	20.5	20.2	20.0	18.2	17.9
Rail	12.3	12.4	12.2	15.1	15.3	
Air	0.1	0.1	0.1	0.1	0.1	
Maritime	0.1	0.0	0.0	0.1	0.1	

2018 National Traffic Survey - Domestic (2019, MOLIT-KOTI)

< Modal Share >



Shucle's Target Population Group

Residents in New Towns with Inconvenient Public Transportation System Tend to Rely on Cars

The biggest traffic problem in the new city

- Lack of public transportation 36.4%
- Parking difficulty 23.7%
- Traffic congestion 22.2%

Problems when using the new city subway

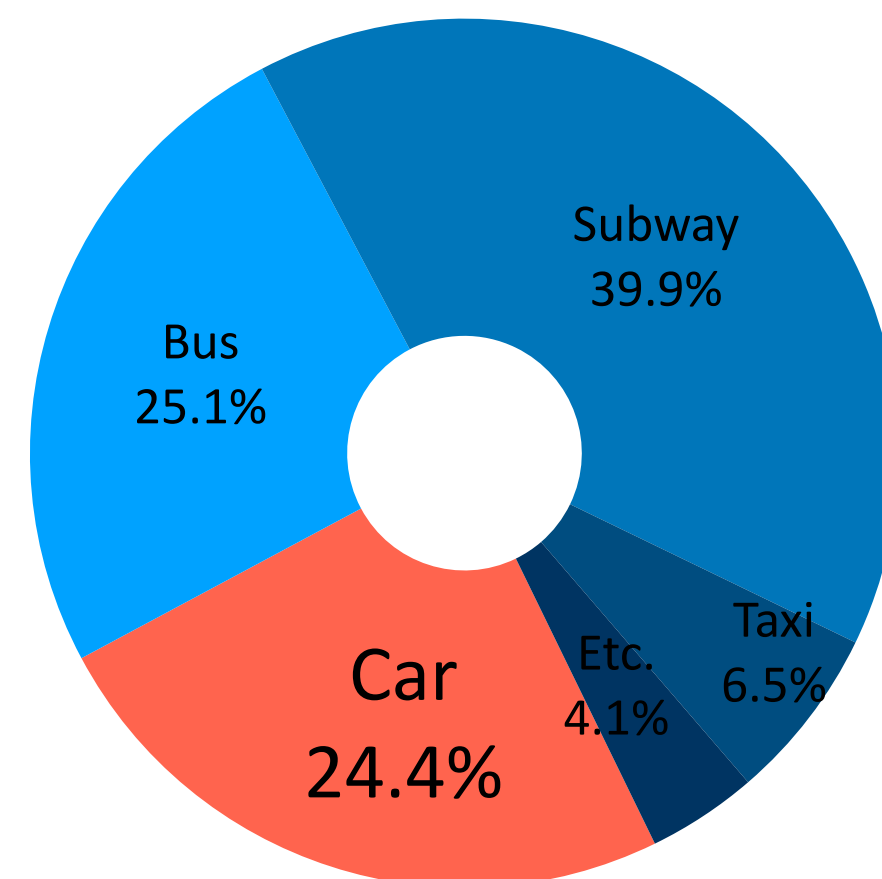
- Long distance to the station 42.4%
- Long waiting time 17.5%
- No connection between buses 12.6%

Preference for policies to improve public transportation systems in new cities

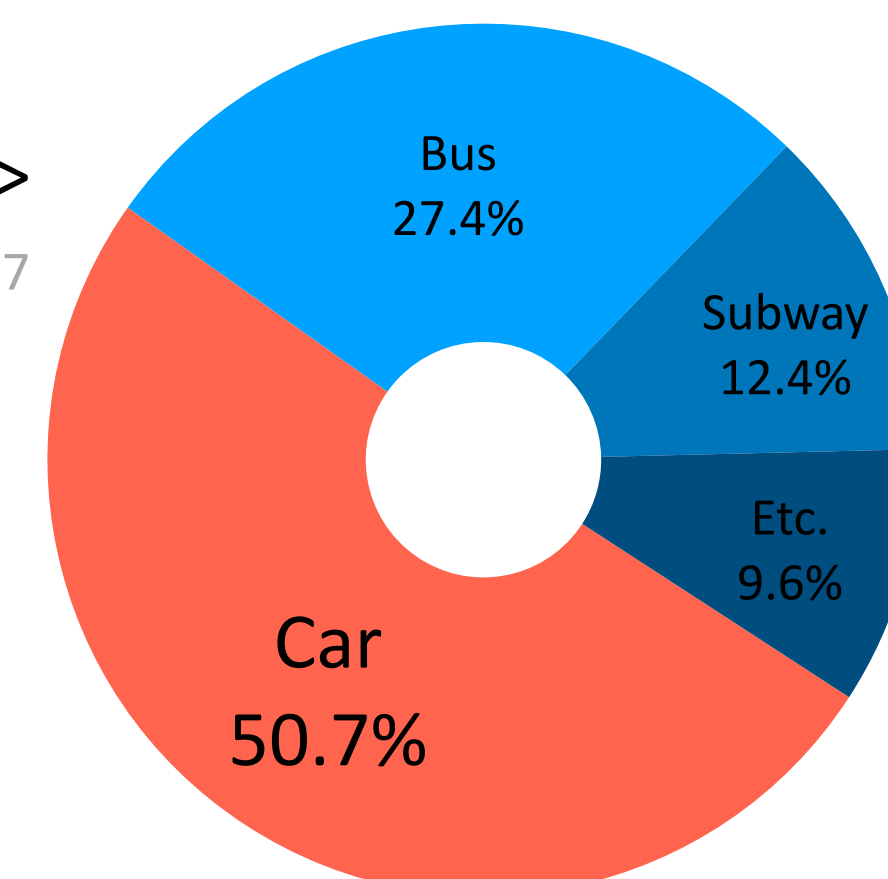
- New bus route 30.2%
- Subway network expansion 26.4%

Passenger Traffic Survey, Gyeonggido (2019)

< Seoul Modal Share >
2017



< Gyeonggido Modal Share >
2017



A New medium for short-distance travel, a community mobility service



Anywhere in Town,
Free, Safely, and Comfortably

Pleasant and Safe Trips for
Kids and Seniors Alike

Smart, Quick Trips via Optimal
Routes w/ AI Technologies

Comfort in Company,
the More, the Cleaner

Flexible daily travel within
a 2km radius living space

Short waiting time, optimal routes,
and comfortable travel service

Real-time, demand-responsive
Ride-pooling service based on
virtual stops with AI-created routes

Future urban mobility service with
optimized operation, environmental
friendliness, autonomous driving, etc.

User-Centric Flexible Transportation System, DRT

Demand Responsive Transport

*On-Demand service is acknowledged as a new possibility for urban public transportation, substituting conventional public transit with frequent dispatch intervals, convenient transfer, and better accessibility, as a first/last-mile mode connected with the conventional public transit network, and as a feeder service to mass transportation modes.

Ferro, Muñoz, and Behrens 2015; Alpkokin et al., 2016

* On-Demand : Immediate provision of goods and services in the forms desired by the consumer through mobile network or online marketplaces

< Operation Methods of Demand-Responsive Transit >

Step	Itinerary	Stop	Features
Lv.1	Fixed	Fixed	Similar to the Conventional Public Transit (On-demand)
Lv.2	Fixed	Fixed	Detour Available (Selective Stops)
Lv.3	Unspecified	Predefined	Connecting Transportation Hubs ^[SEP] (in connection with public transit)
Lv.4	Unspecified	Unspecified	Similar to Taxis

Bellini et al., 2003

< Potential future public transit systems >

	Interchange Extension	
Core, High Capacity Network	Publicly Managed Investments	Private Investments
Grade-separated heavy rail	Demand-responsive transit routes	Taxis, on-demand chauffer services, ridesharing, car sharing
Light rail Bus rapid transit Strategic/targeted local bus routes	Bike share Pedestrian realm improvements, cycle networks	Autonomous (self-driving), electric cars

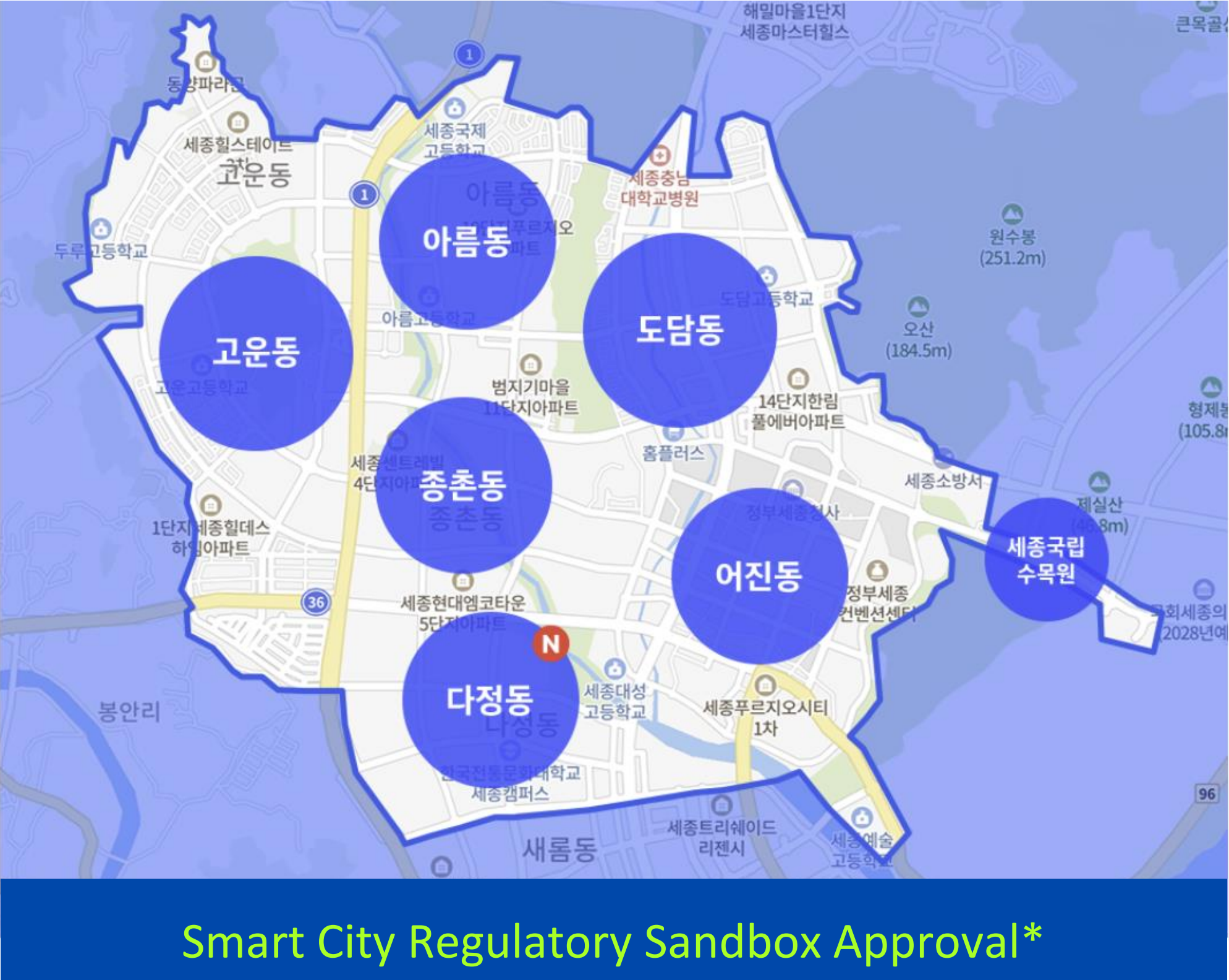
McLeod et al., 2017

Tech-Driven Real-Time Demand Responsive Transport Service

Everyday Life Easier
Shucle.

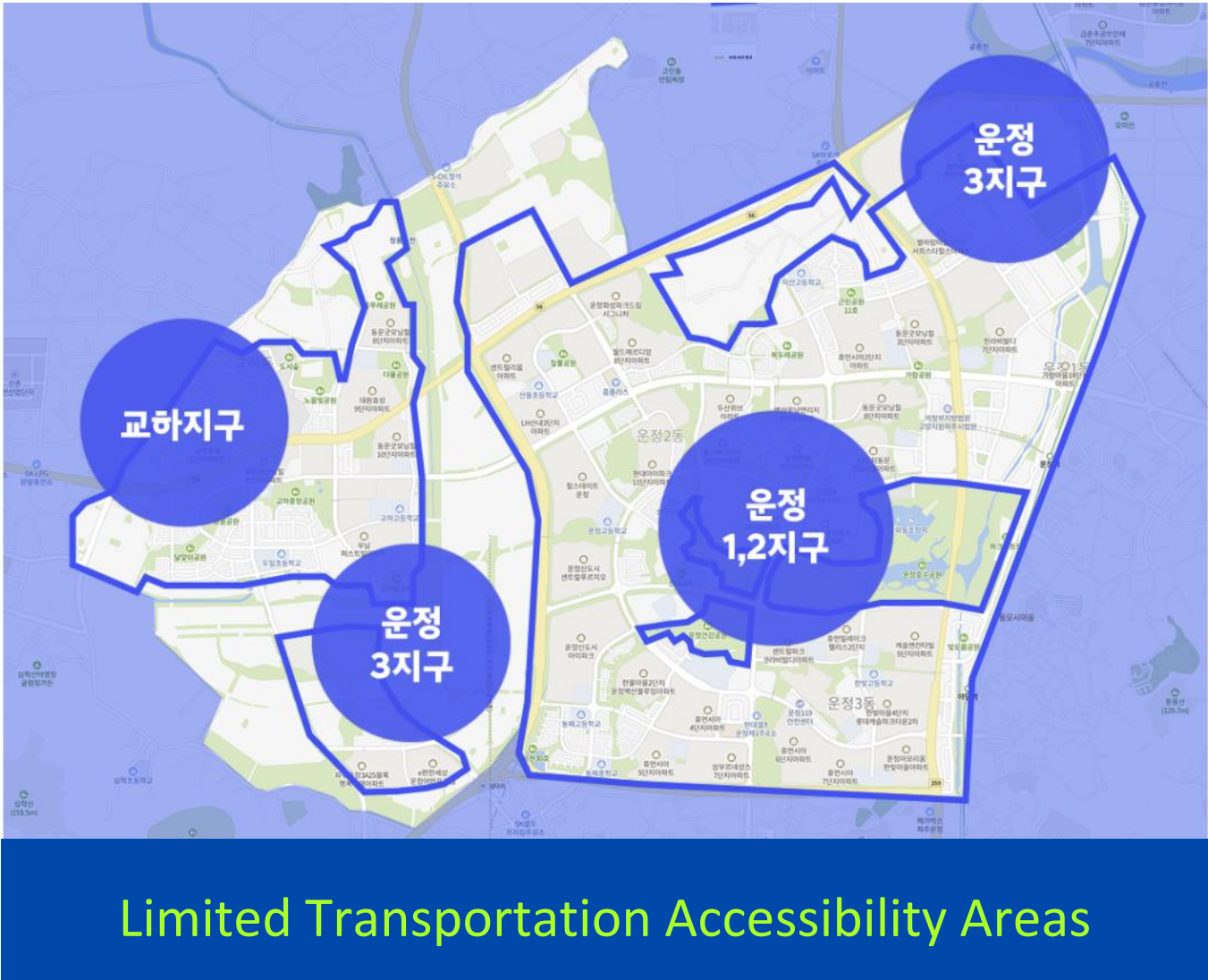
New Public Transportation Mode in New Towns with Limited Mass Transit Accessibility

Sejong City



Starting from Sejong Living Sphere 1, recently expanded into Dajeong-dong 2021. 4. 13. ~, 18 Vehicles

Paju-Unjeong New Town



In operation in Paju Unjeong New Town District 3 as one of the first public transportation modes in the area upon development for convenient mobility within District 3 and to/from Districts 1, 2, and Gyoha

2021. 12. 18.~, 9 Vehicles

Seoul-Eunpyeong New Town



1-Year Pilot Service in Jingwan-dong, Eunpyeong-gu, Seoul

2021. 3. 9.~2022.4.14, 6 Vehicles

Number of Shucle Users **Constantly Increasing** with Time

•Registered members

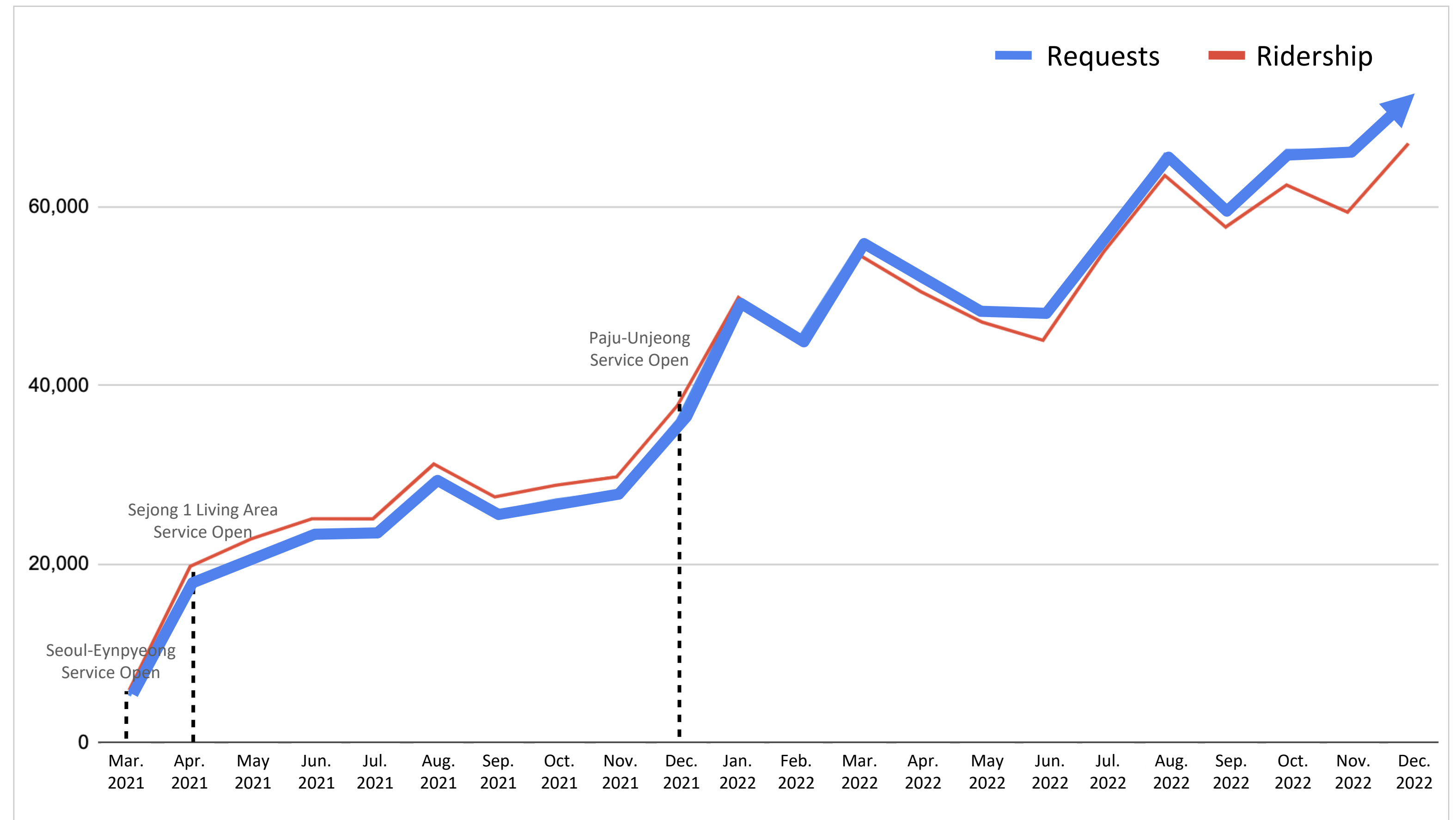
 **88,810**

•Total Requests

 **964,307**

•Total Ridership

 **949,975**

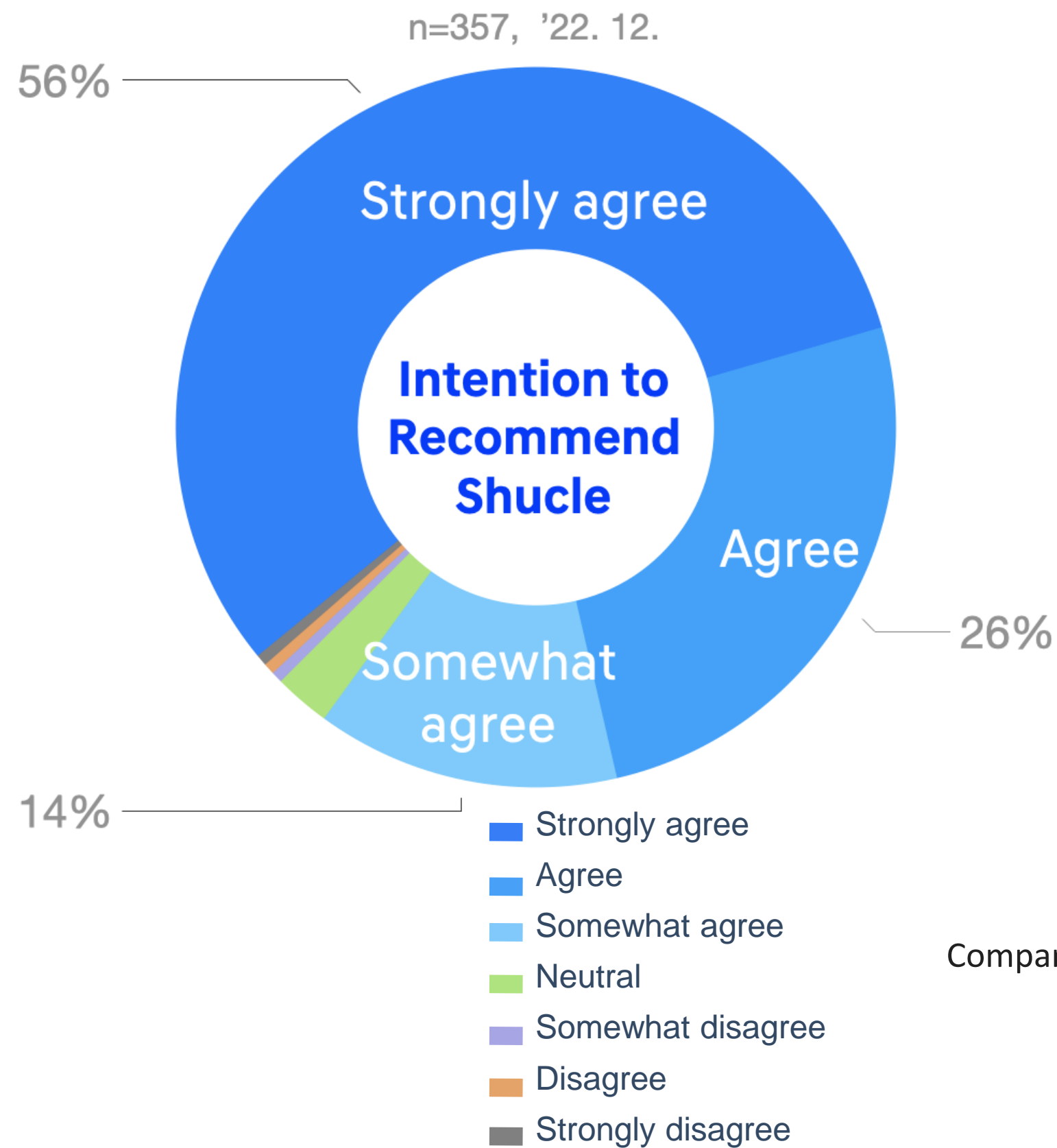


Data on 2023. 1. 18.

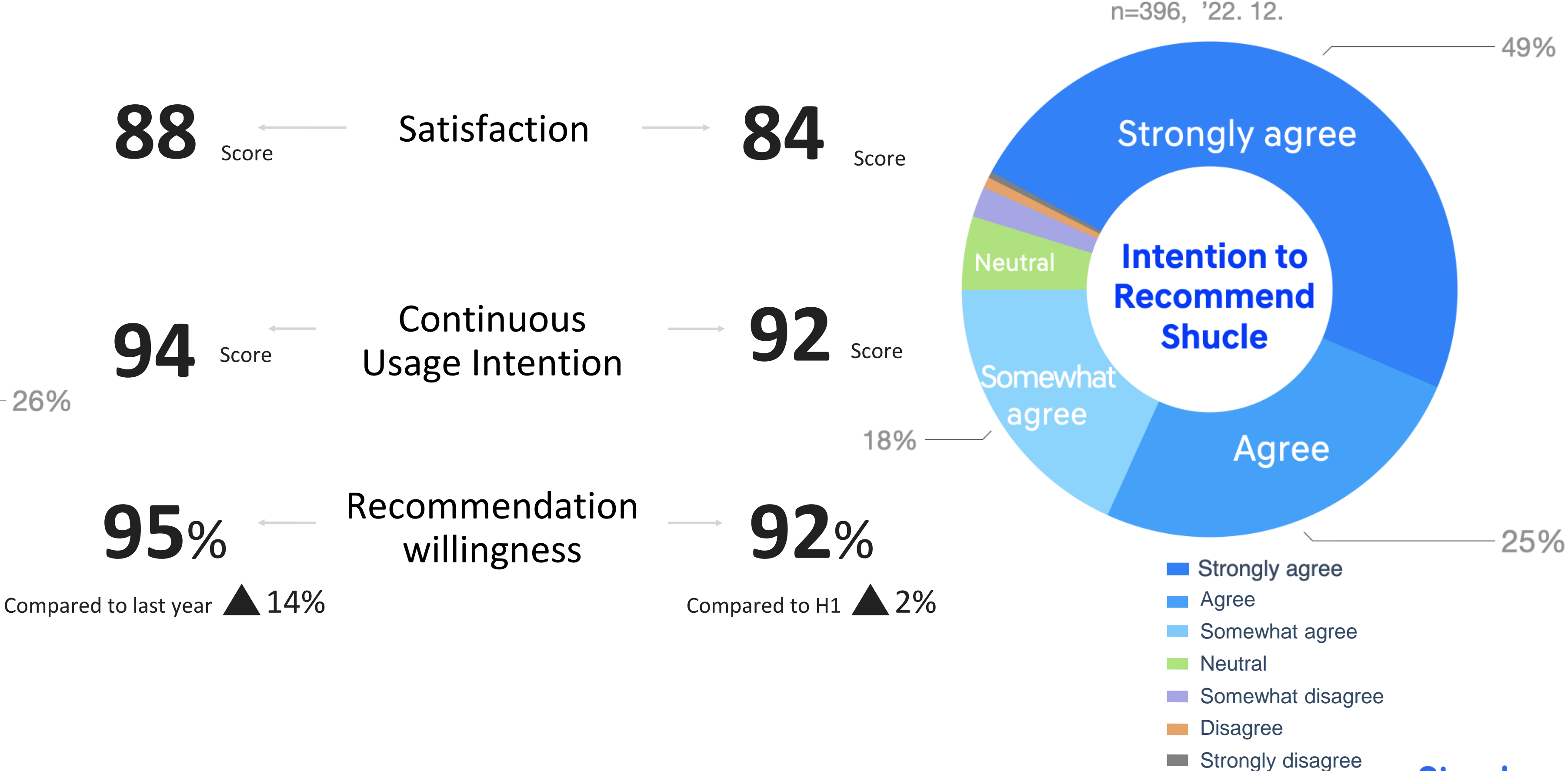
High Satisfaction and Recommendation Rate

Usage Status

< Sejong City >



< Paju-Unjeong New Town >



88 Score ← Satisfaction → **84** Score

94 Score ← Continuous Usage Intention → **92** Score

95% ← Recommendation willingness → **92%**
 Compared to last year ▲ 14% Compared to H1 ▲ 2%

High Female Customer Ratio and Diversity in User Age Group

User Gender Ratio

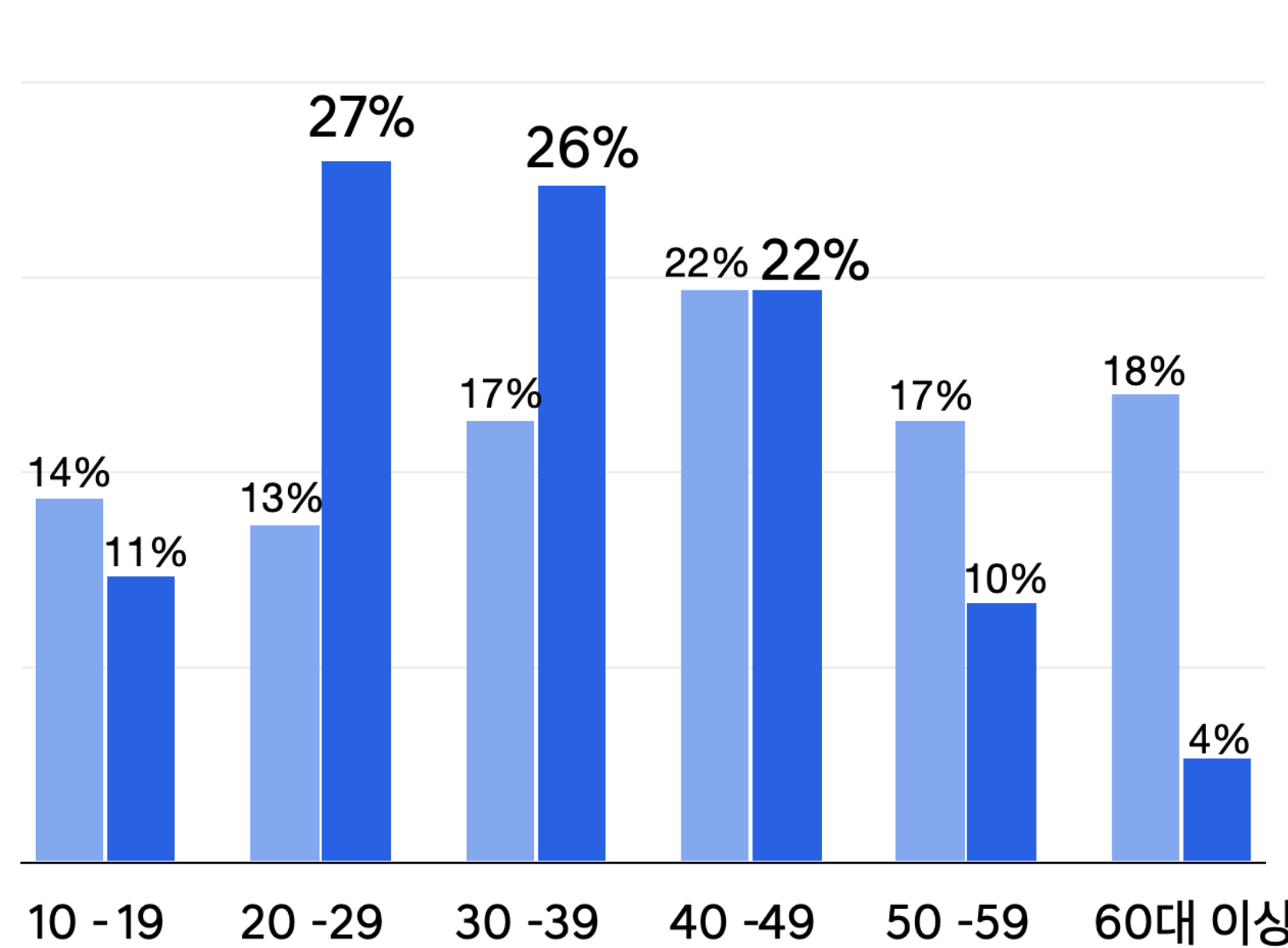


User by Age Group



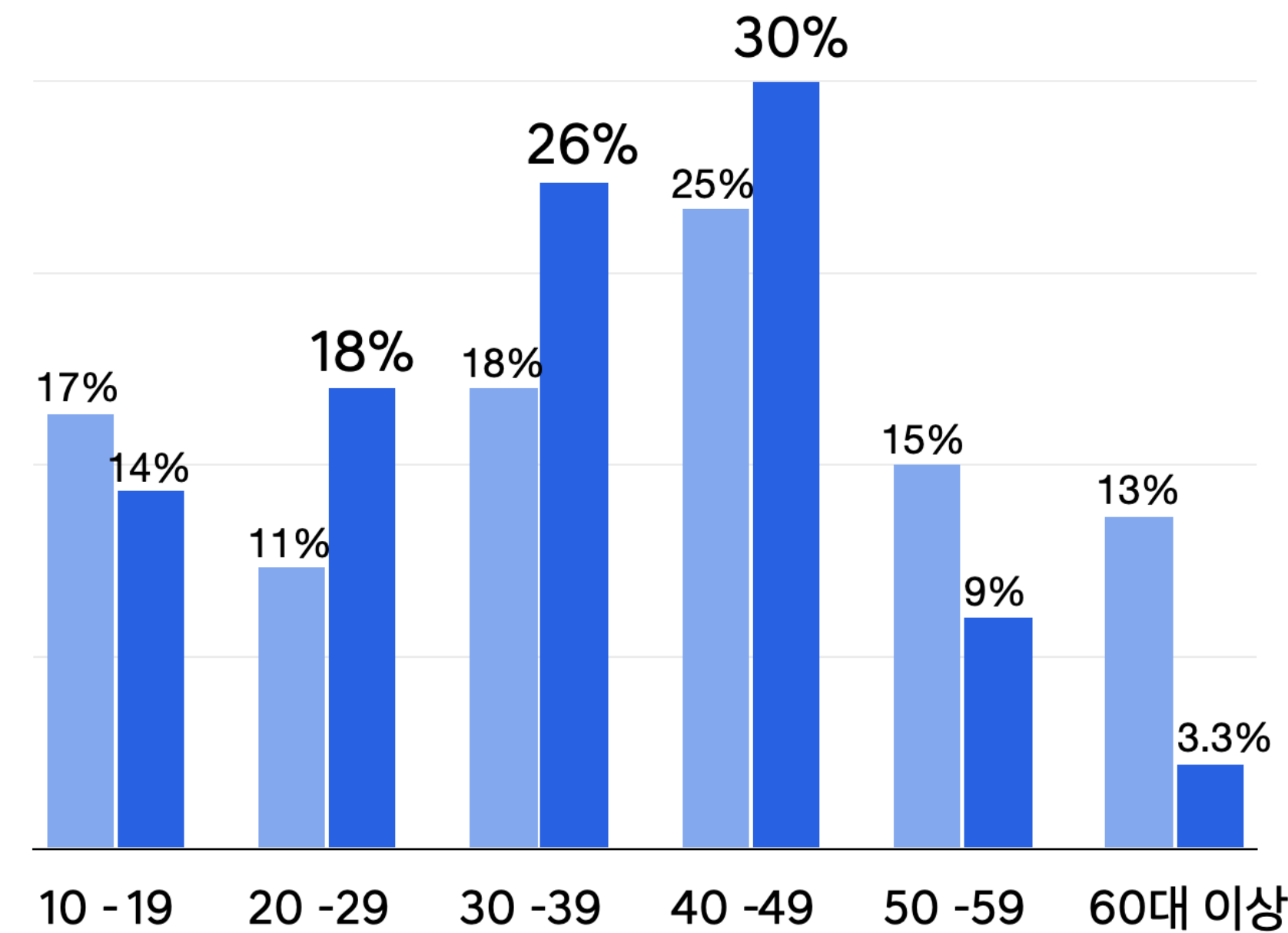
Youngest
User

9
Years of Age



Oldest
User

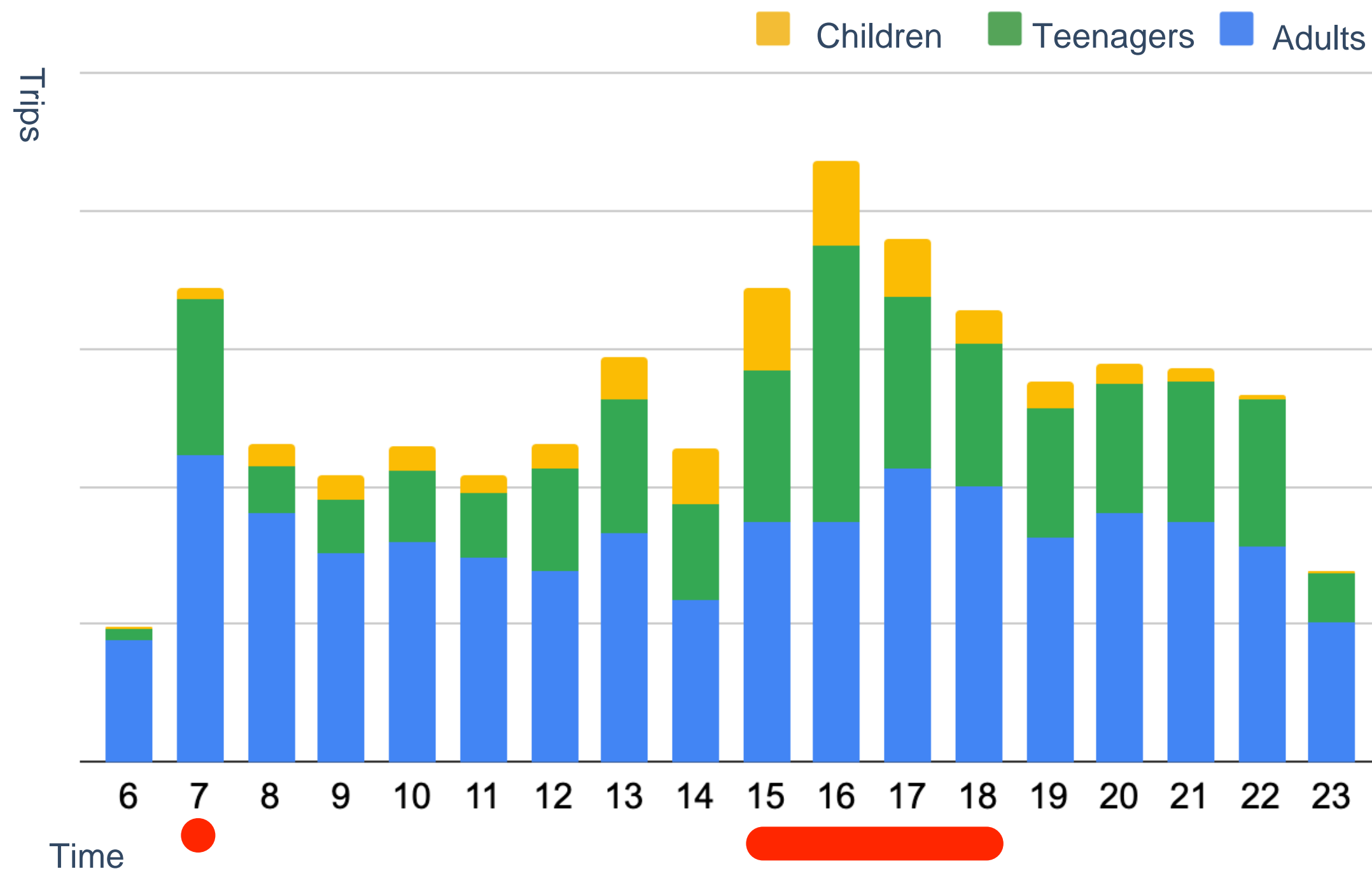
100
Years of Age



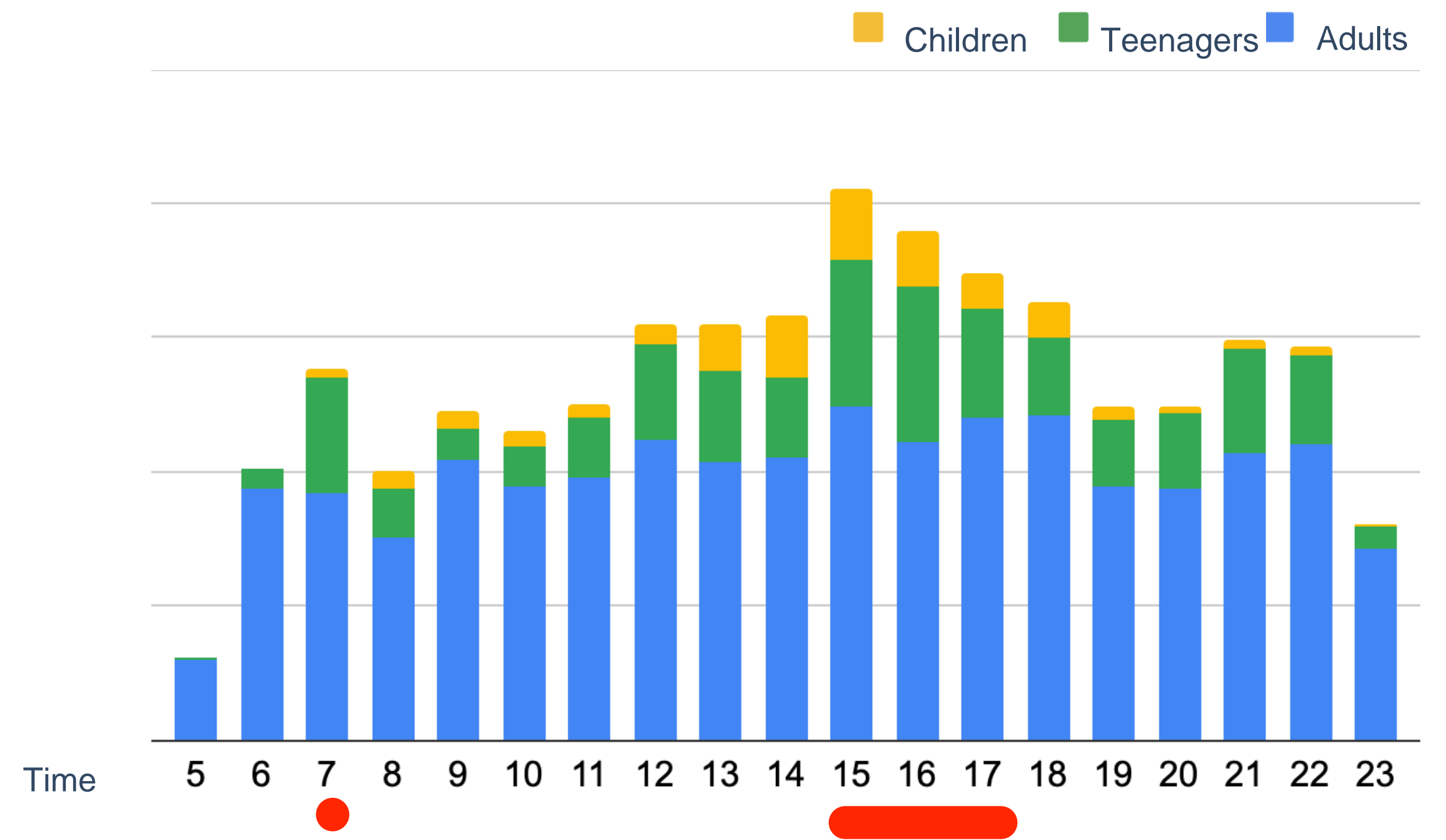
* Data as of late January, 2023

Similar pattern to the public transportation peak time periods in the commuter rush hour

< Temporal trip distribution : Weekdays in Sejong >



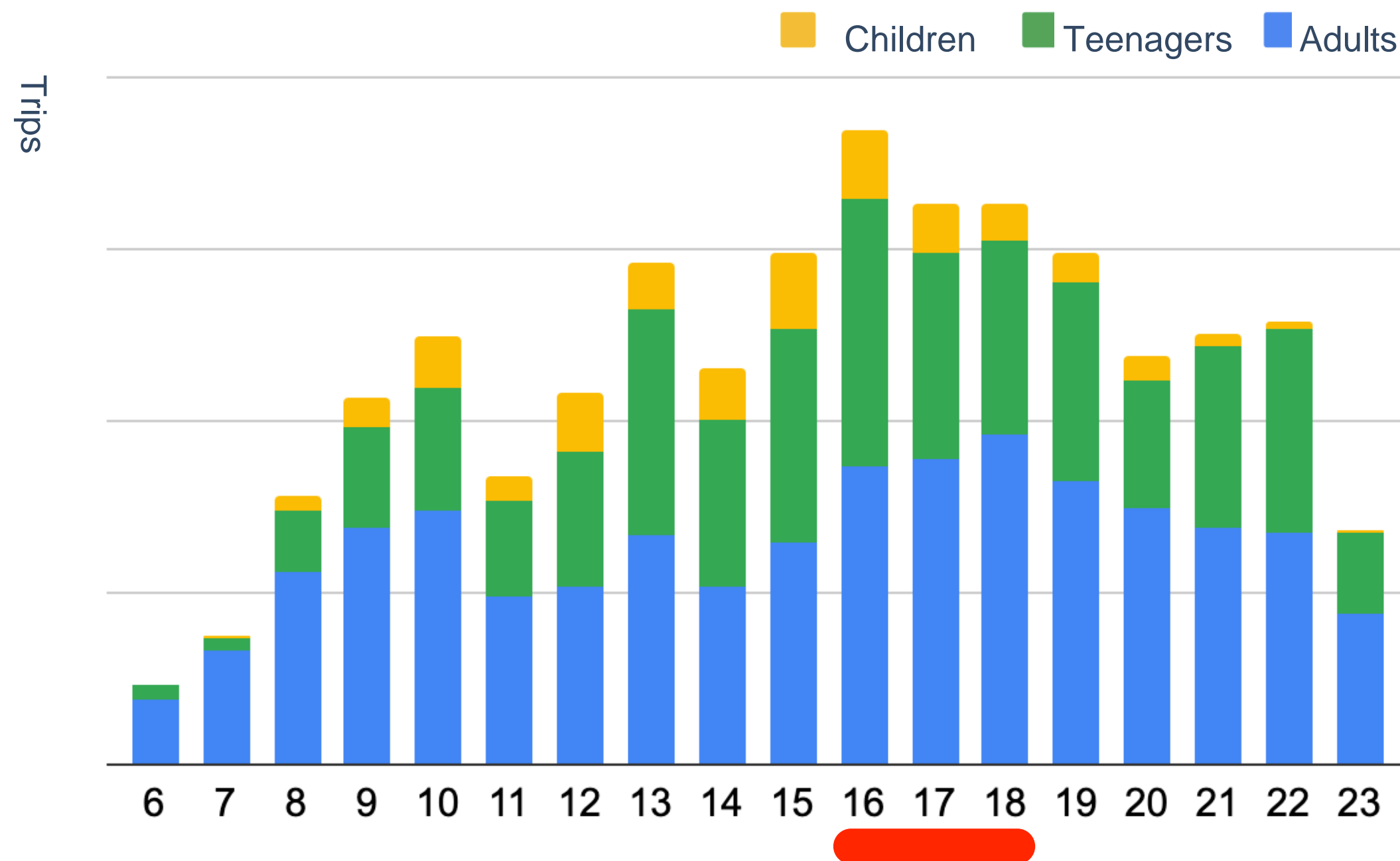
< Temporal trip distribution : Weekdays in Paju >



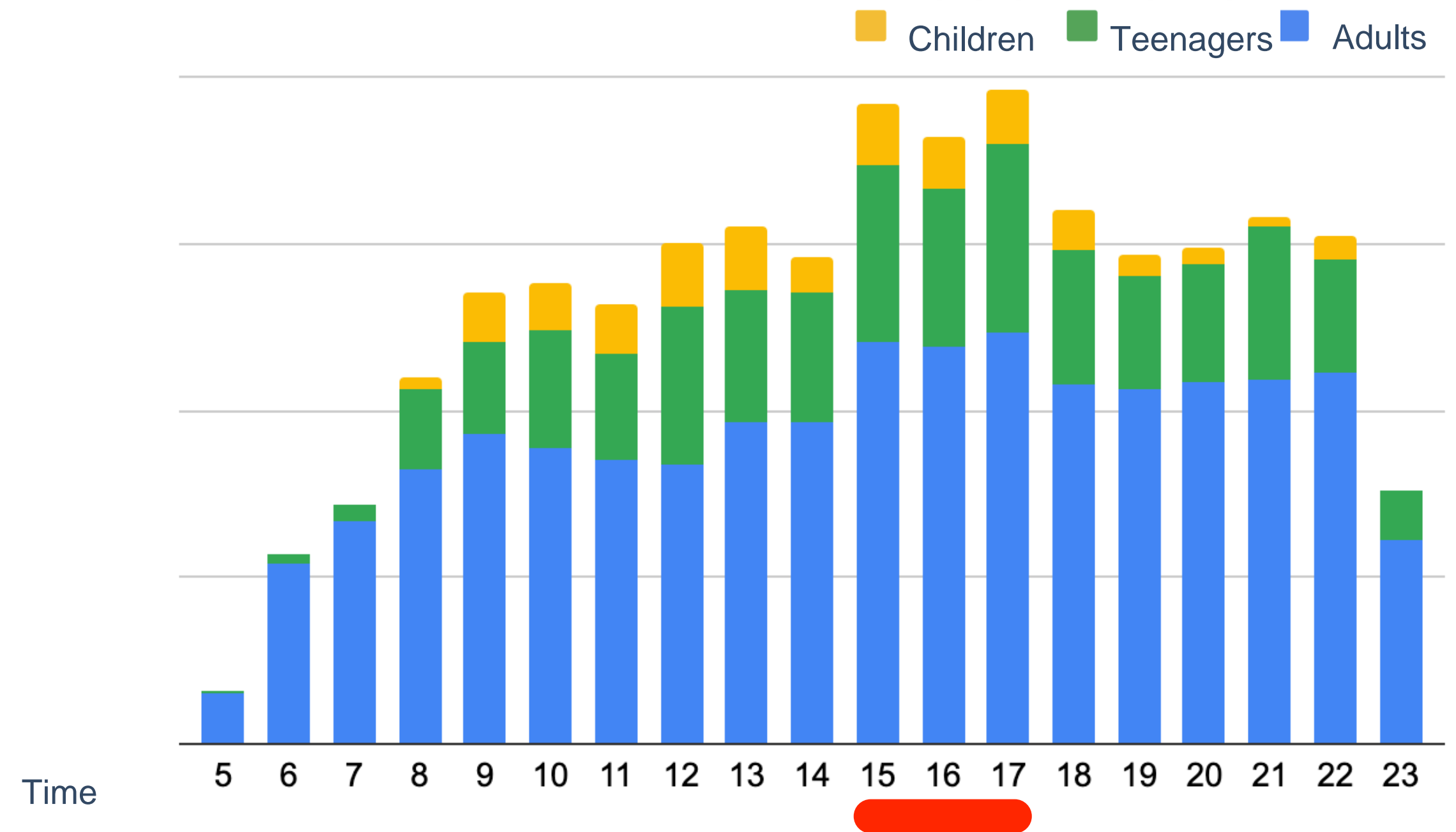
Even Temporal Distribution and High Ratio of Teenagers

expected to be intra-neighborhood travels to private tutoring centers, etc. based on teenager travel characteristics.

< Temporal trip distribution : Weekends in Sejong >



< Temporal trip distribution : Weekends in Paju >

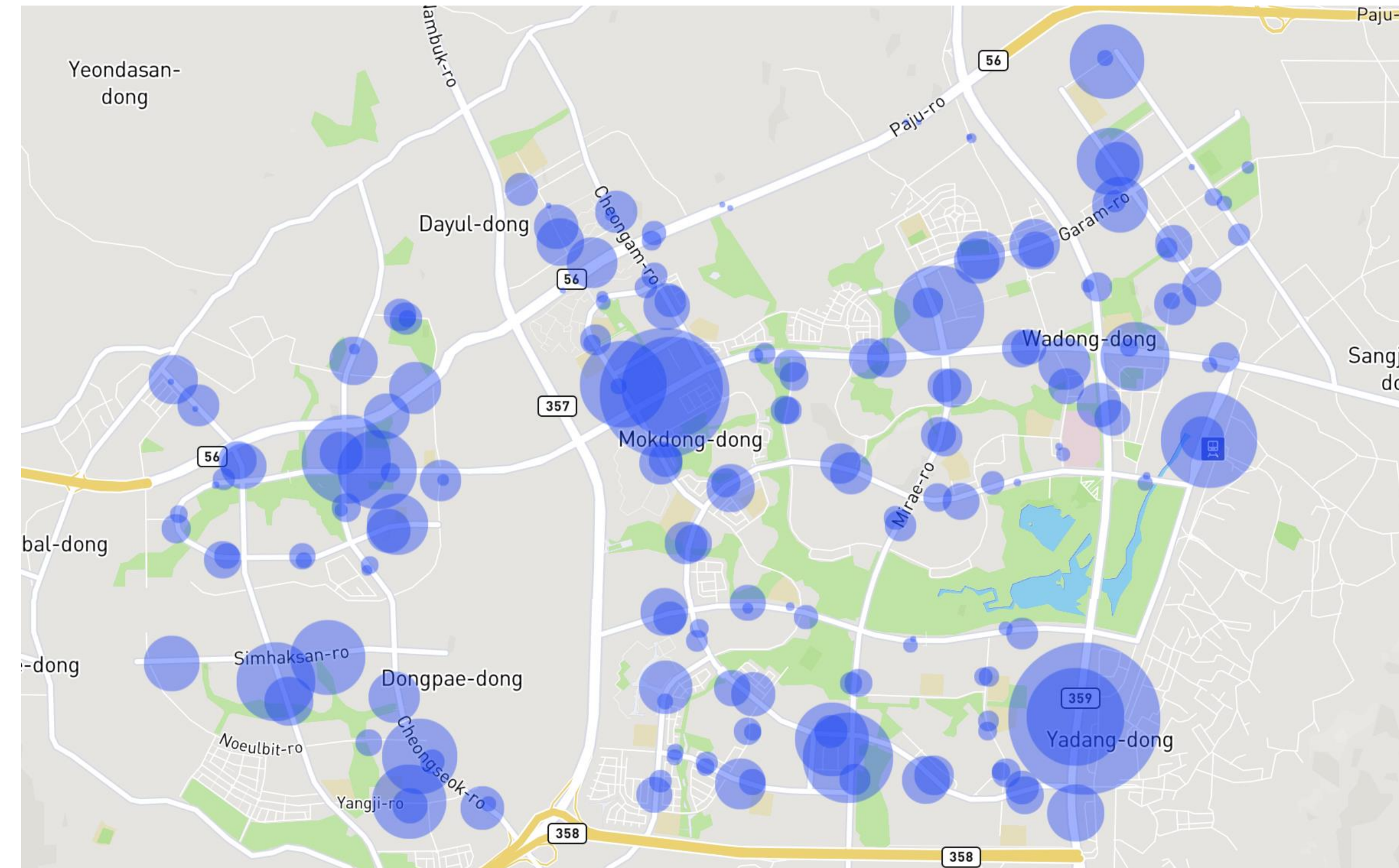
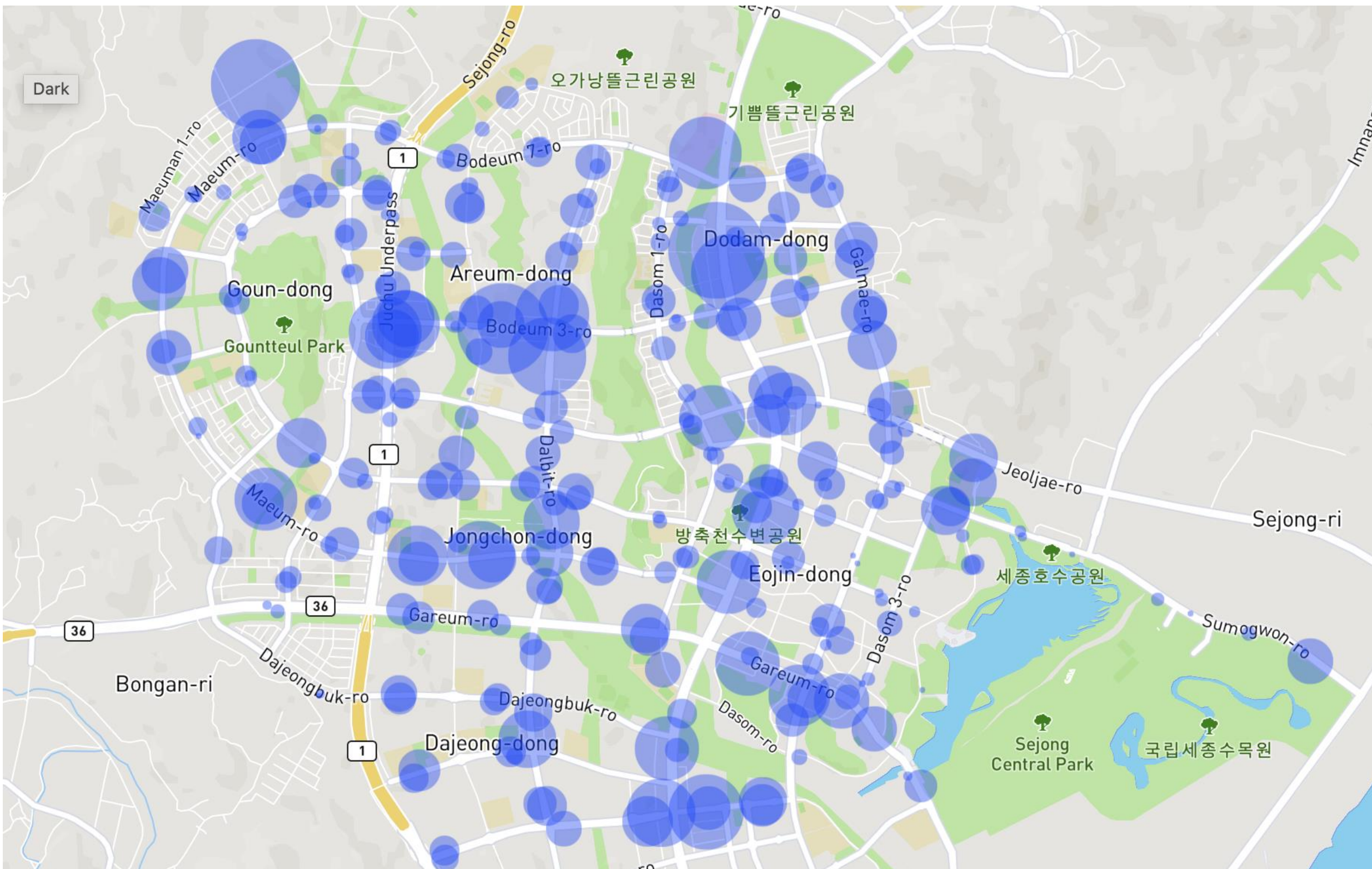


Various Travel Demand Reflecting Urban Characteristics

Sejong Living Sphere 1

Boarding Stops in the Last Month

Paju-Unjeong New Town



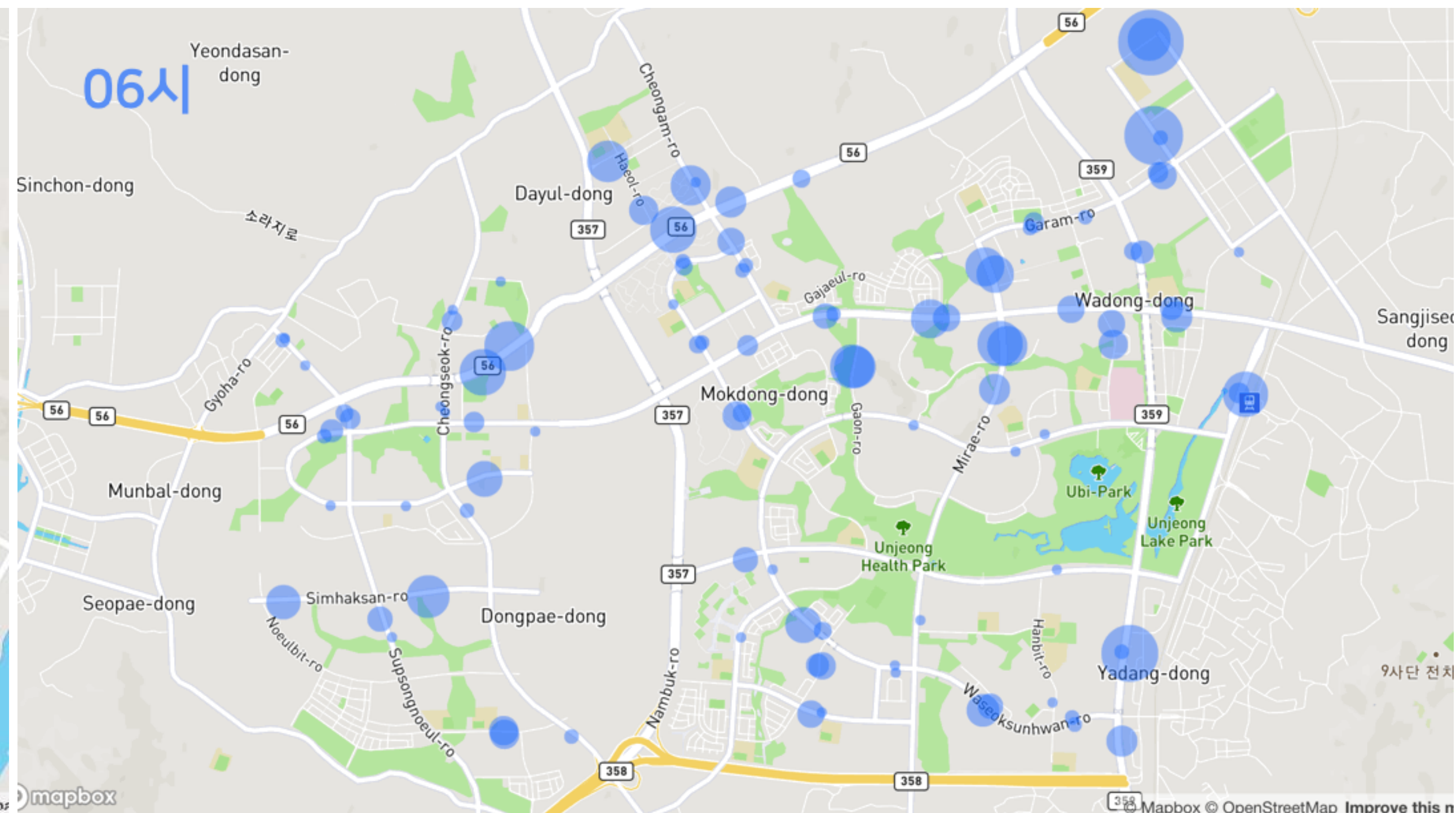
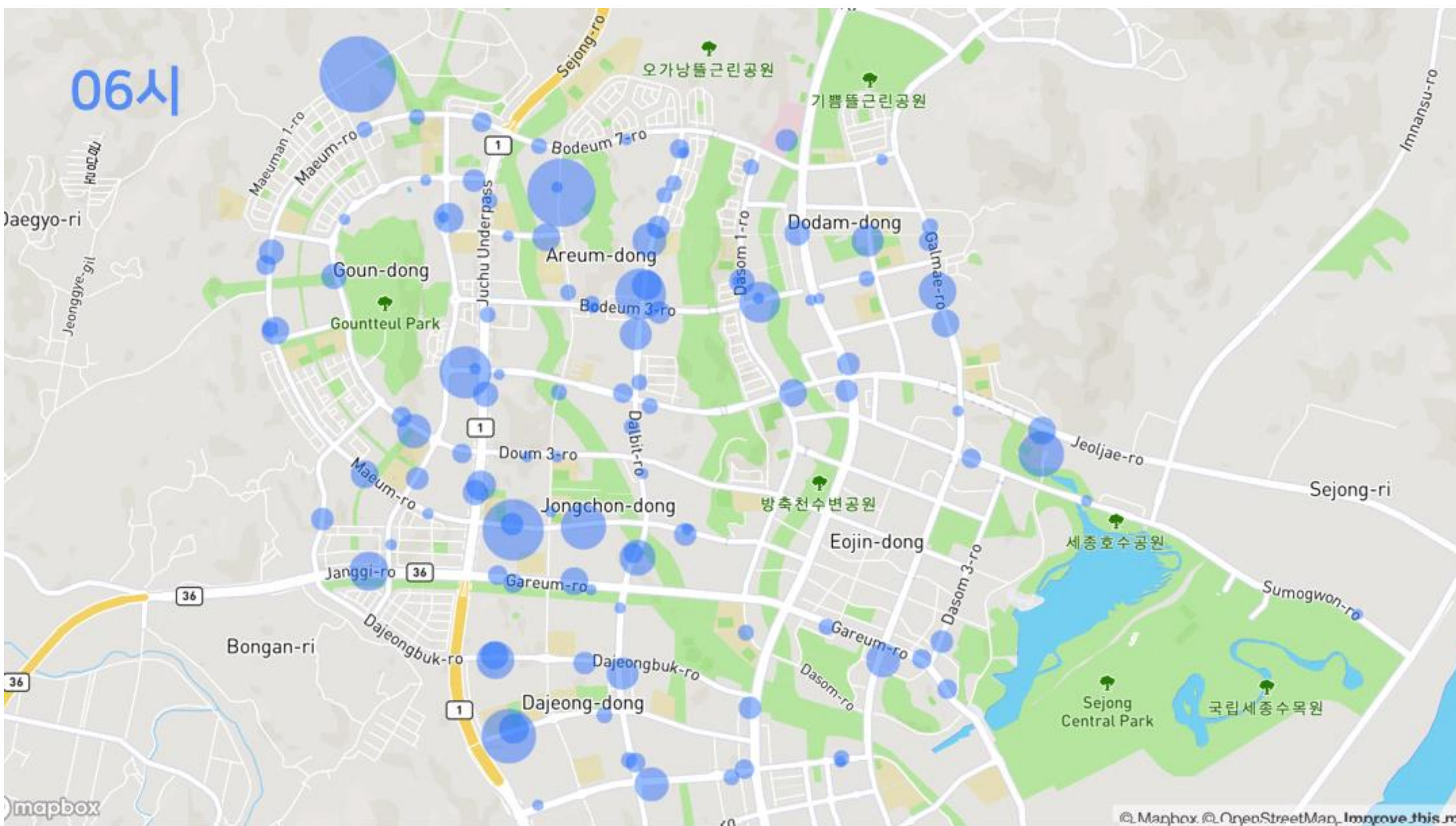
Data on 2022. 1. 17.

Various Travel Demand Reflecting Urban Characteristics

Sejong Living Sphere 1

Boarding point variation
by time on weekdays

Paju-Unjeong New Town



Data on 2022. 1. 17.

Better Accessibility Compared to Public Transit and Similar Travel Purposes

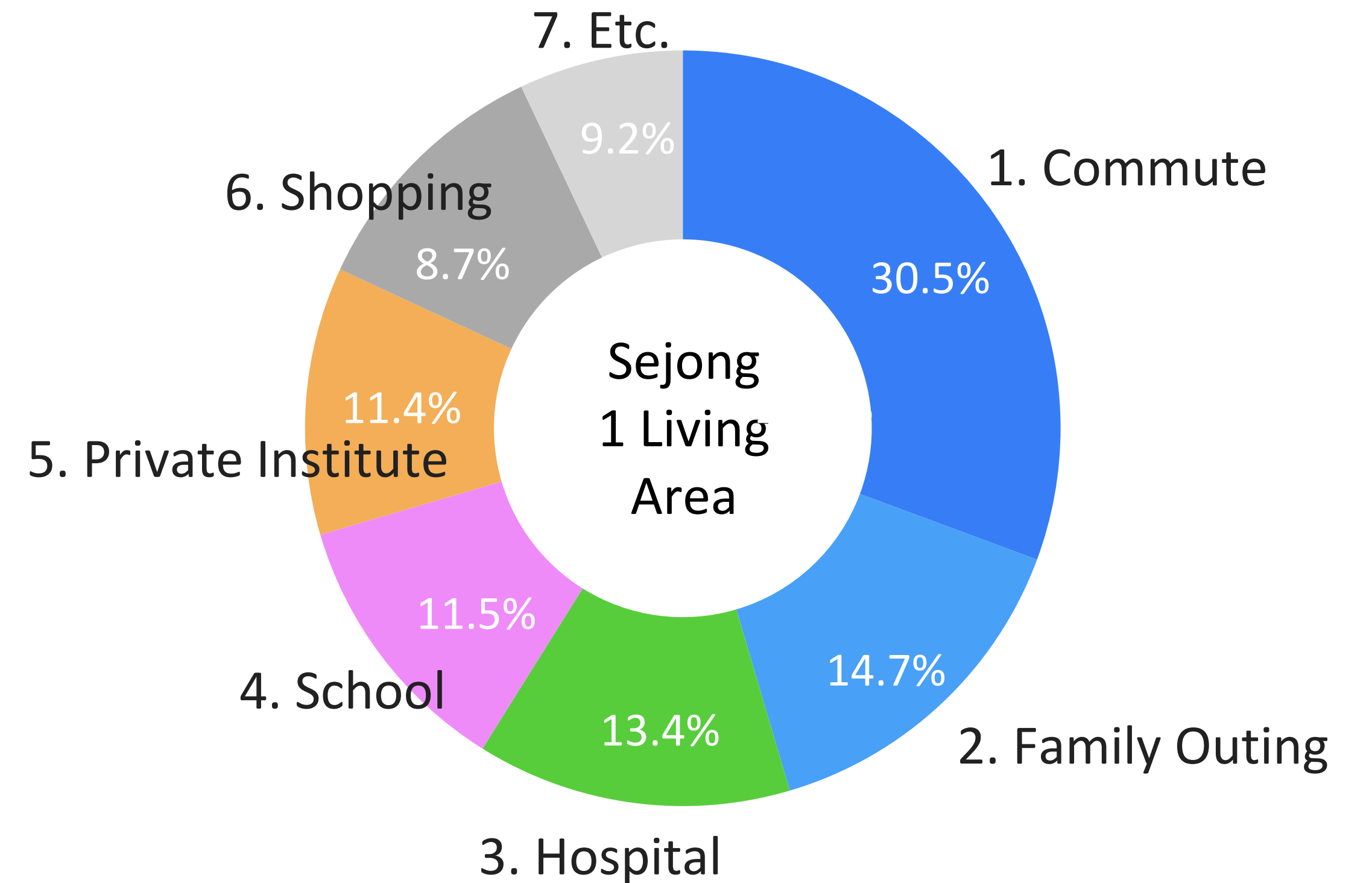
Walking time to the stop

Public Transit 7.8 min

Shucle 3 min Sejong 2.4 min, Paju 3.6 min

Traffic Purpose

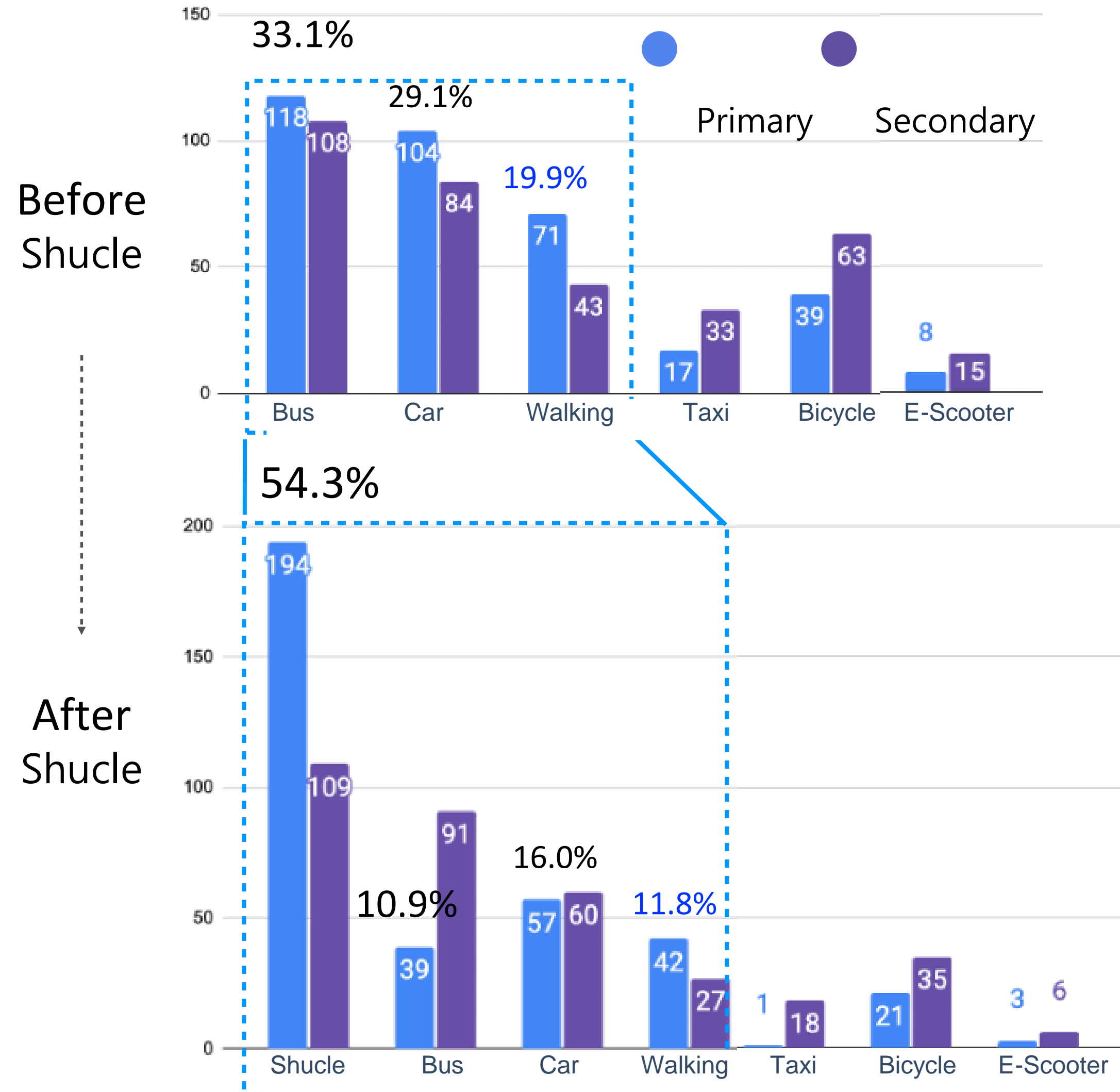
- 1. Commute 28.1%
- 2. Leisure 26.9%
- 3. Shopping 16.7%
- 4. Business 13.4%
- 5. School 11.9%
- 6. Private Educational Institute 2.4%



2020 National Traffic Survey - Domestic (2021, MOLIT)

Shucle User Survey (Dec. 2022)

Better Convenience Compared to Public Transit



Reasons for Choosing Shucle

1. No bus routes to the destination or inconvenient transfer
2. Available at any time I want
3. Faster travel via optimal route
4. Better walking accessibility to stops
5. Designated seats & comfortable in-vehicle experience

n=357, '22. 12.

No Restrictions in Daily Life for Everyone, Voices of Shucle Service Users



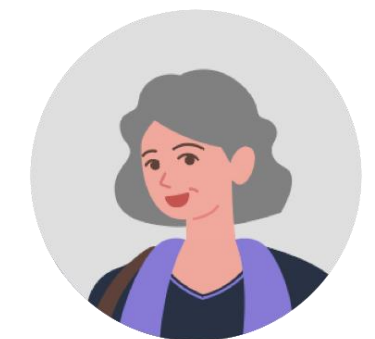
"I'm very satisfied with Shucle's dynamic routing system helping me save time~"

"It is very convenient to get to places without my own car. I feel eco-friendly, too."



"It is much easier to take my children to the doctor's office, thank you Shucle~"

"My range of activities has expanded."



Preparing for the future while Smartly solving today's Urban problems



Optimized Vehicles for Comfortable Mobility



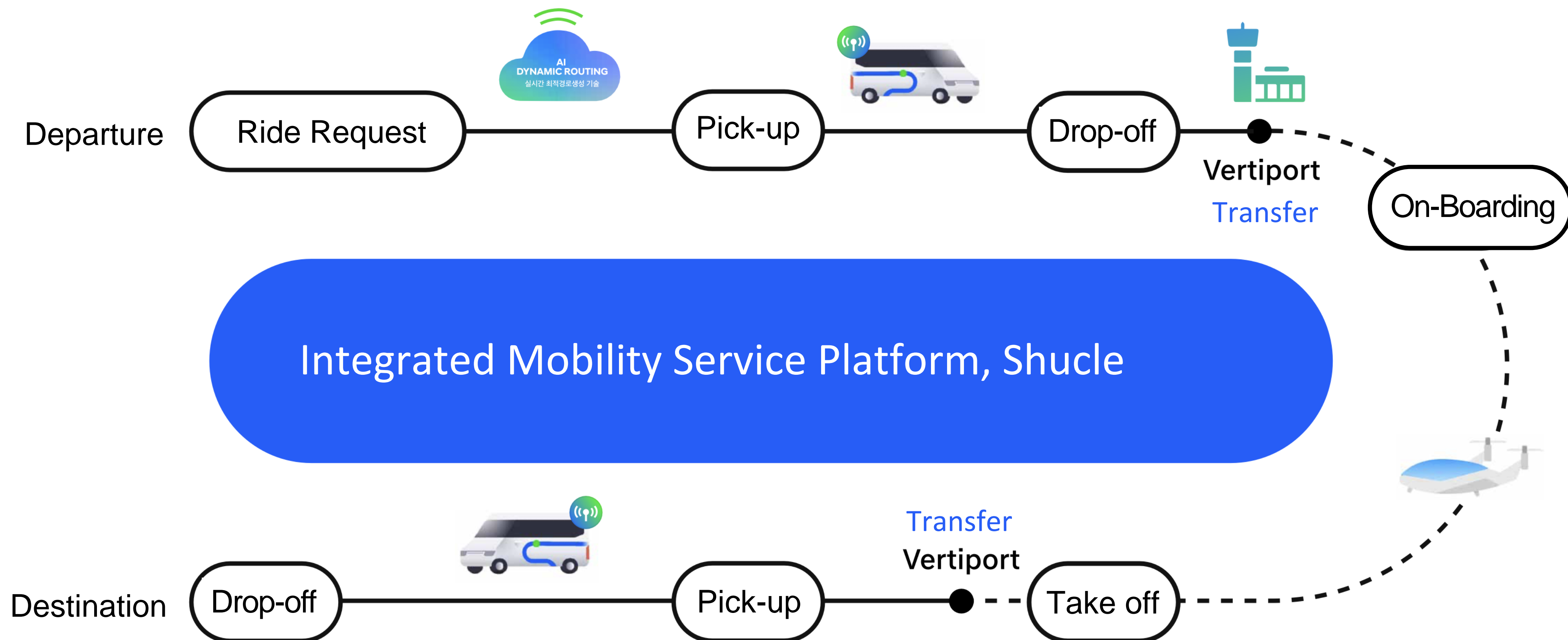
Visual AI Technology-Based
Boarding Recognition



Self-driving shuttle pilot service

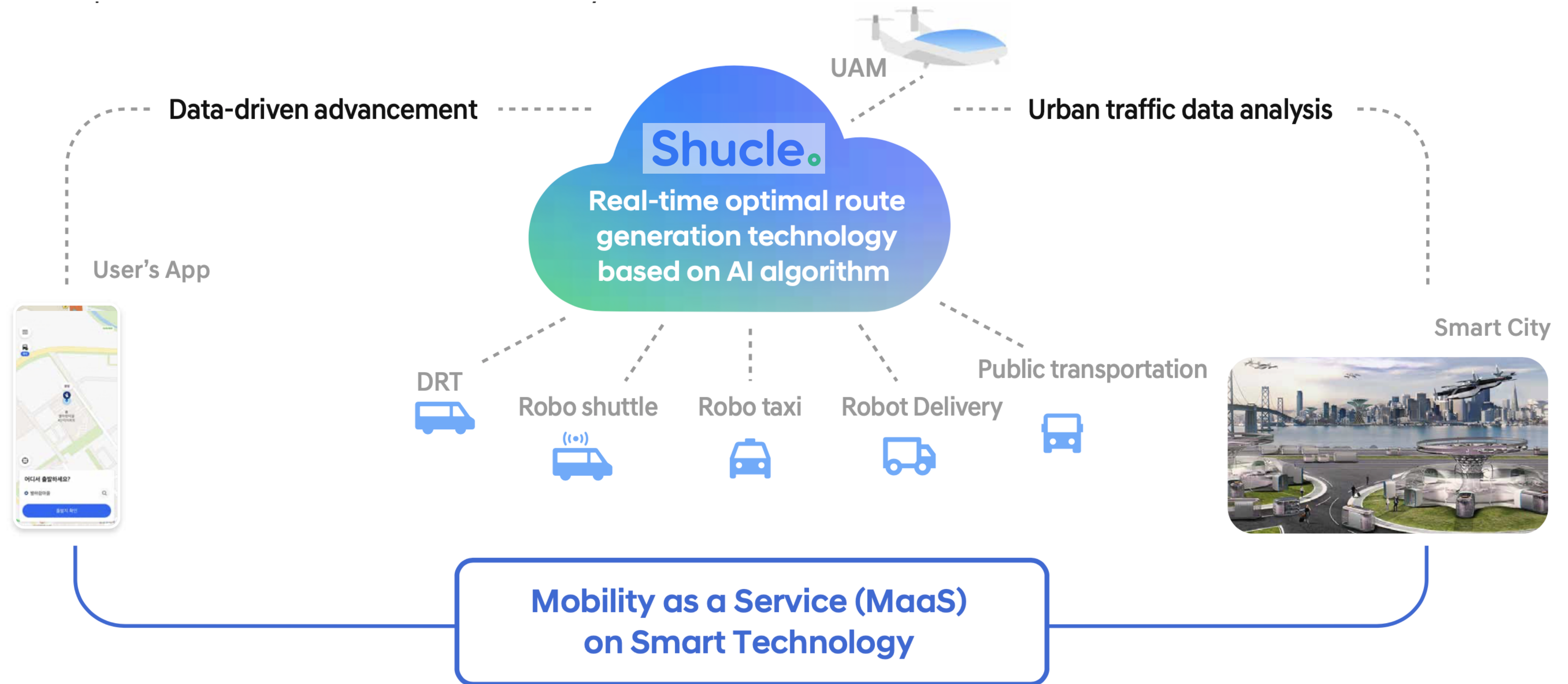
Smart Mobility for the Future of Urban Public Transportation

UAM Service Flow



NEXT STEPS

'Integrated Mobility Service Platform' as an Urban Infrastructure in Smart Cities Connected to Diverse Future Modes of Transport



E.O.D

