SKT Journey to Urban Air Mobility

SK telecom

Presenter

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SKT Journey
to
Urban Air Mobility

UAM

Intro

“ UAM? ”

Transportation that carries passengers/cargo
over the urban area

Cutting-Edge solution for traffic congestion and pollution in city area
by using **electric-powered eVTOL*** with zero emission.
* electrical Vertical Take-Off and Landing

eVTOL Key Elements

Vertical Take-off/Landing

Reliability (Multi-rotor)

High Speed (approx. 300km/h)

Low Noise (55~65dBA) * 60dBA: Normal conversation

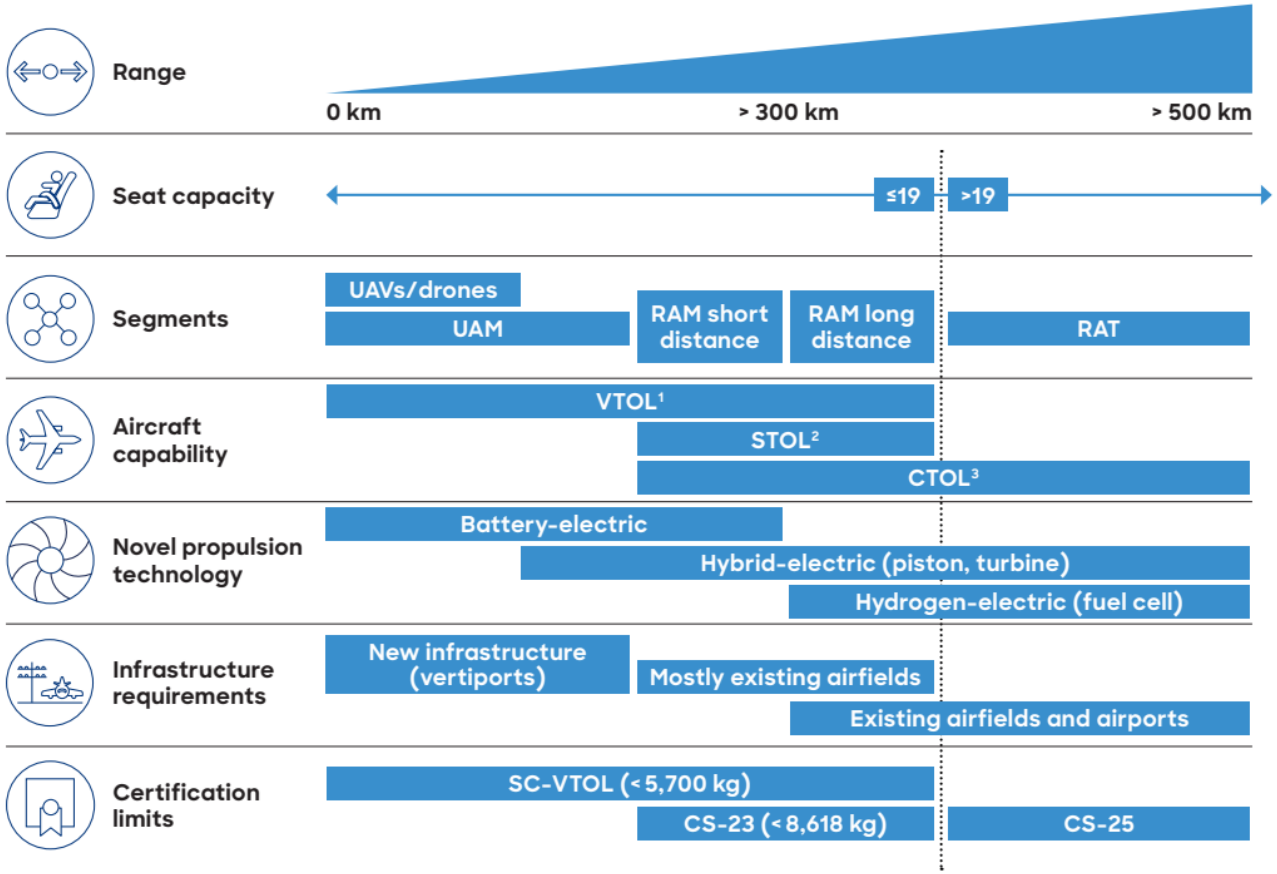
Low Altitude (300~600m)

Electric-Powered (Zero Emission)

Overview of Advanced Air Mobility market segments

Intro

Different types of aircraft and propulsion systems for a variety of use cases



1 Vertical Take-Off and Landing 2 Short Take-Off and Landing 3 Conventional Take-Off and Landing

Source: Bauhaus Luftfahrt, Roland Berger

Government and Policy Trend

Intro

Jun, 2020	Mar, 2021	Mar, 2021	Feb, 2022	Apr, 2022	Aug, 2022	2023~	2025~
K-UAM Roadmap	K-UAM Tech Roadmap	K-UAM ConOps	GC-1 Participation Announcement	UAM Working Group (MOLIT)	'UAM Special Act' in motion	GC-1 & GC-2 Testing	**UAM service Initial launch**

Issues

UAM Selected as one of South Korea Presidential Agendas

- To establish infrastructure, regulation and testbed for UAM commercialization in 2025

UAM Special Act (Oct 2023)

- Inducing active participation by establishing regulatory exceptions and business support for UAM (Assembly Approval / Oct 2023)

Head Ministrative: 국토교통부 Ministry of Land, Infrastructure and Transport

R&D Project

- K-UAM technology development projects carry out by 5 ministries
- SK Telecom is participating as part of consortium

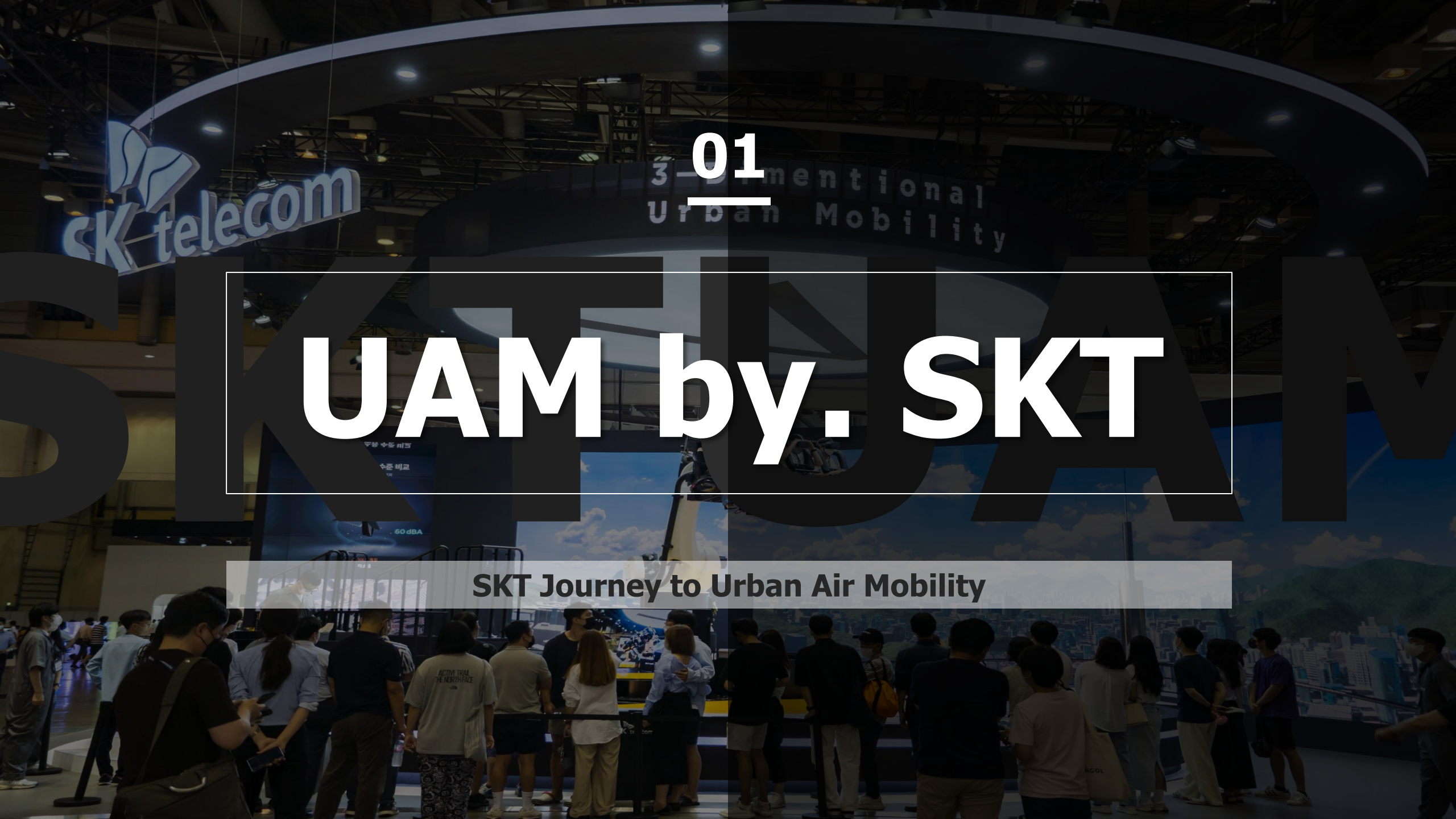
Organizing Agency: KARI 한국항공우주연구원 Korea Aerospace Research Institute

Grand Challenge

- Safety and operability demonstration with public/private joint demonstration program
- SK Telecom is one of the participants joining Grand Challenge partnering with Joby Aviation

Vehicle Certification: KIAST

Contents



01

UAM by. SKT

SKT Journey to Urban Air Mobility

UAM Business Goal

UAM by. SKT

SKT

Leap to a Global AI Company through the AI Pyramid Strategy centered on the three areas of AI Infra, AIX, and AI Service

AI Service

AI personal assistant service 'A.Dot'

Global Top level PAA

AIX

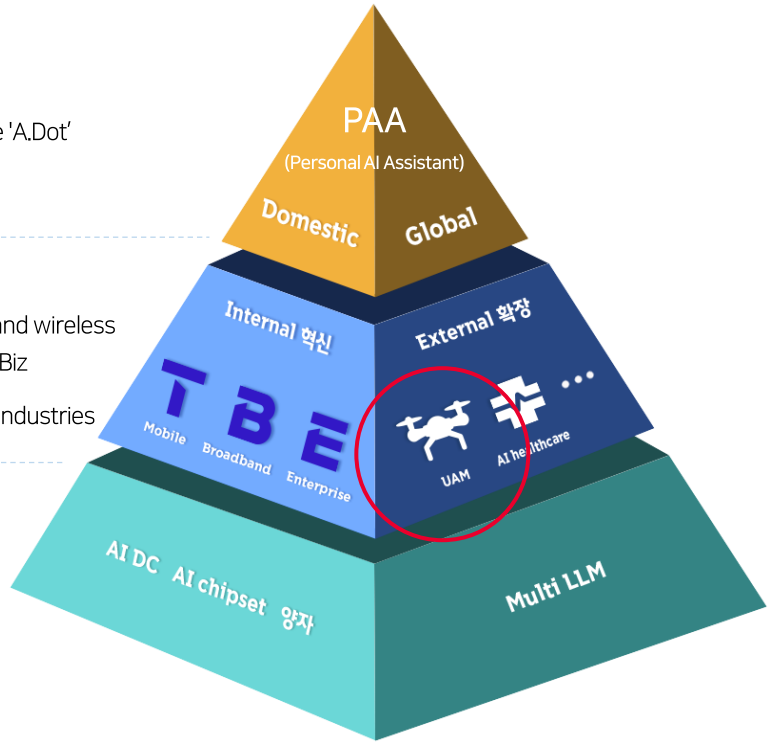
AI transformation of Wired and wireless communication, Enterprise Biz

Expanding AI capabilities to industries such as UAM

AI Infra

AI DC, AI semiconductors,

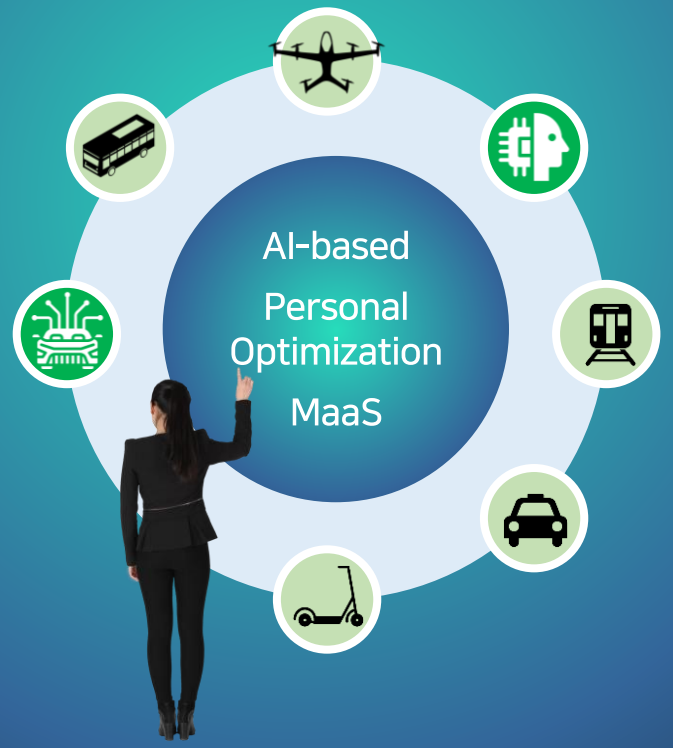
On-device AI, LLM…



SKT's UAM

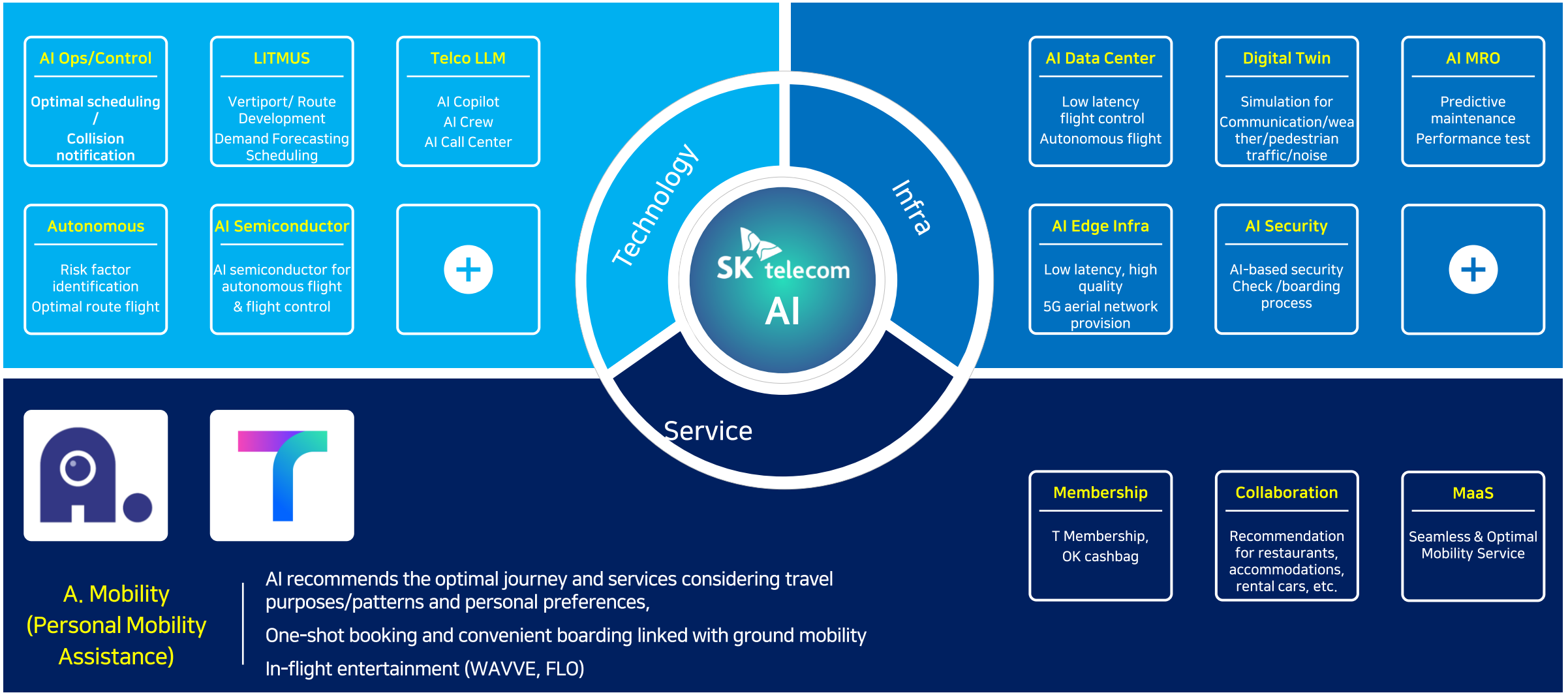
Expanding SKT's differentiated AI capabilities to UAM

Mobility Leader realizing 3D connections between sky and ground



Urban 'AI' Mobility by. SKT

UAM by. SKT



A. Mobility (Personal Mobility Assistance)

AI recommends the optimal journey and services considering travel purposes/patterns and personal preferences,

One-shot booking and convenient boarding linked with ground mobility

In-flight entertainment (WAVVE, FLO)

Connected Intelligence

UAM by. SKT

Connecting players within the UAM industry through SKT's Connected Intelligence to provide a seamless integrated service from UAM reservation, boarding, flight, to ground transportation

Global Top UAM Aircraft

Global No.1 aircraft manufacturer

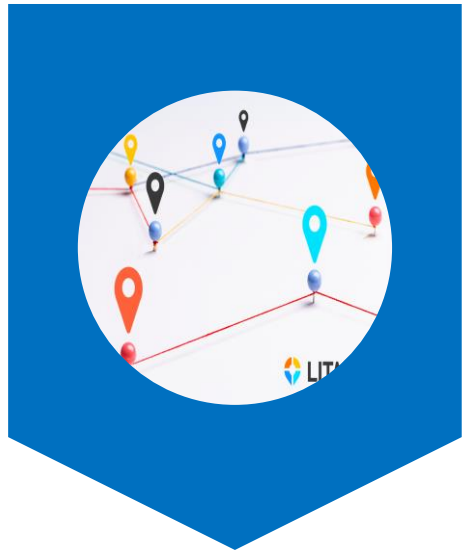
Exclusive partnership with Joby

Full-range operating system development

SKT's own Operation/Traffic Management System

Consolidated MaaS P/F

All-in-One platform for UAM and public transportation/rental cars/parking



AI based Analysis Solution

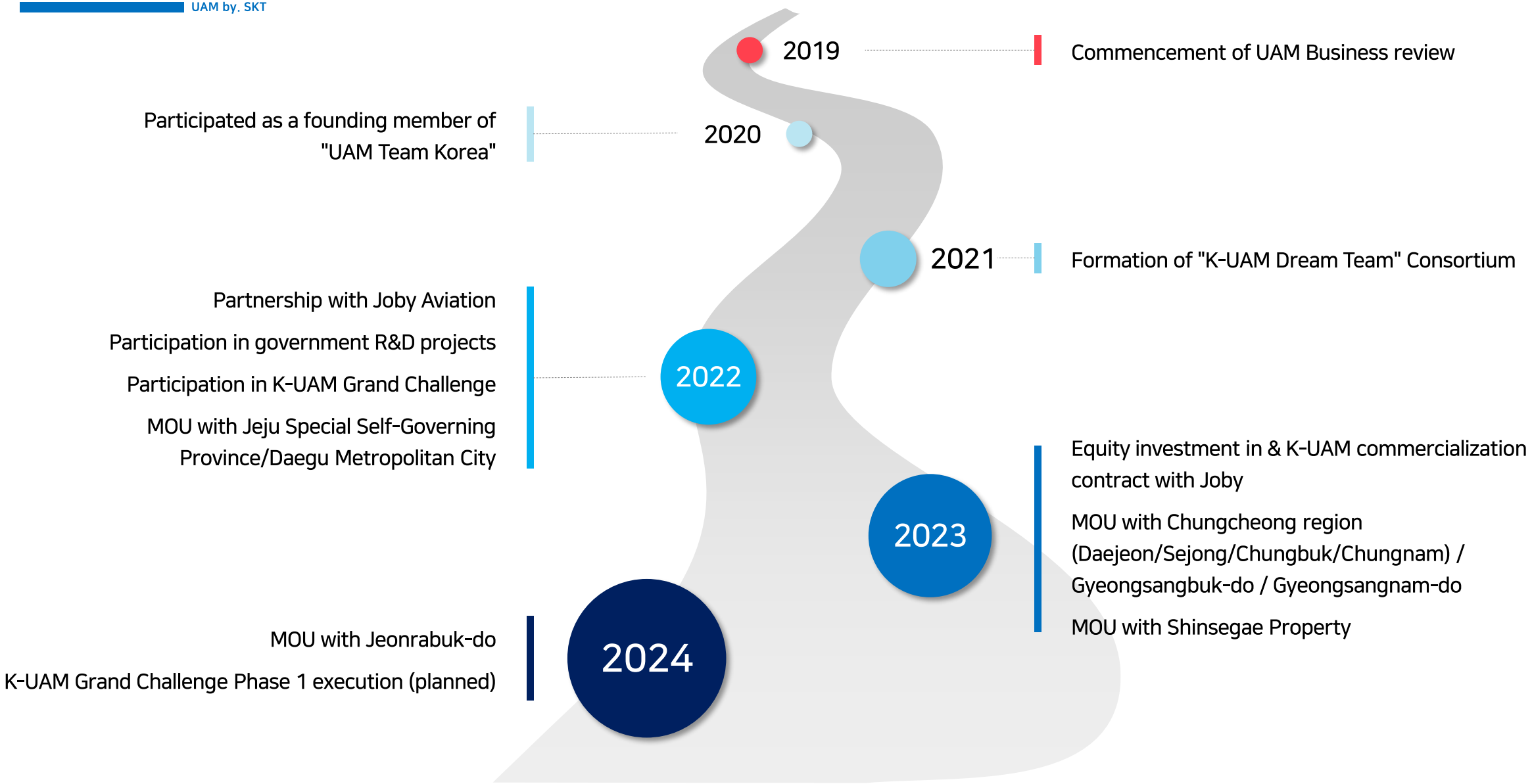
Optimal location/route analysis based on AI & Big Data technology

UAM Aerial Network

Development of aerial network technology for autonomous flight/seamless communication

History

UAM by. SKT



Highlights ① Partnership with Joby

UAM by. SKT

Strong Collaboration across aircraft, service, system, etc.

Joint participation in K-UAM Grand Challenge

Cooperation for UAM demand analysis (with Tmap Mobility)

Joby

- First Completion of FAA type certification stage 3
- Cooperation with NASA and the US Air Force
- First flight for NASA Demonstration
- First airworthiness certification of US Air Force Agility Prime eVTOL
- Acquisition of Air Operation Certificate Part 135 / Maintenance Certification Part 145
- In habited flight demonstration in Manhattan, New York (Nov. '23)

Highlights ② K-UAM Dream Team(Consortium)

UAM by. SKT

SK telecom

Operation / Aircraft (Joby Aviation)

한화시스템

Traffic Management

KAC 한국공항공사 KOREA AIRPORTS CORPORATION

Vertiport/Traffic Management

K-UAM Dream Team

Consortium

TMAP MOBILITY

MaaS Platform

KMI 한국기상산업기술원 Korea Meteorological Institute

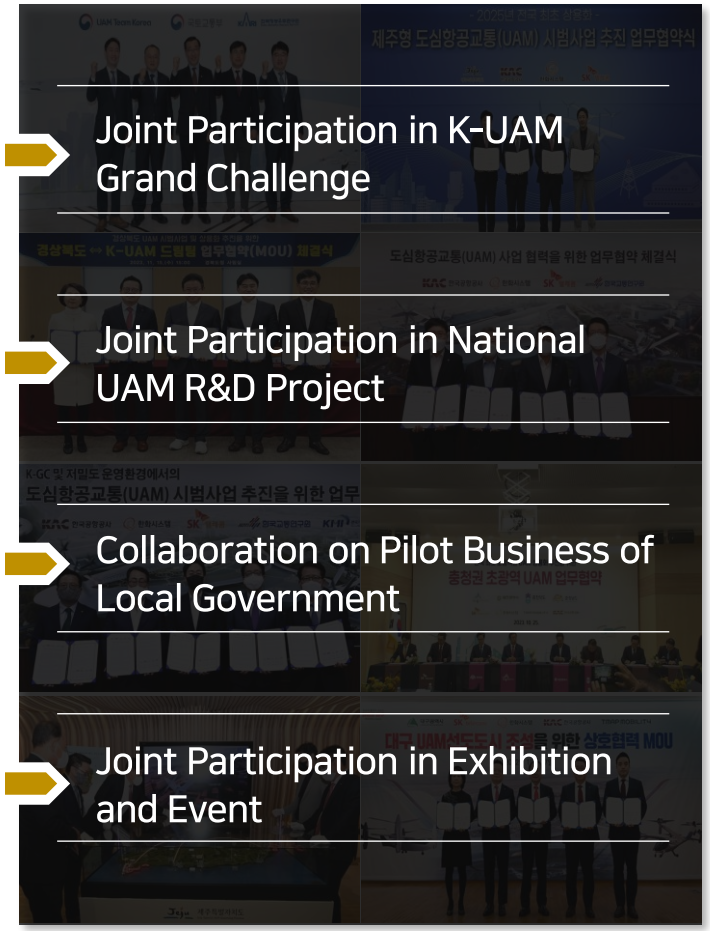
Weather information and forecasts

KOTI 한국교통연구원 THE KOREA TRANSPORT INSTITUTE

Legal/Institutional, Demand Analysis

LX 한국국토정보공사

Precision topo and spatial information



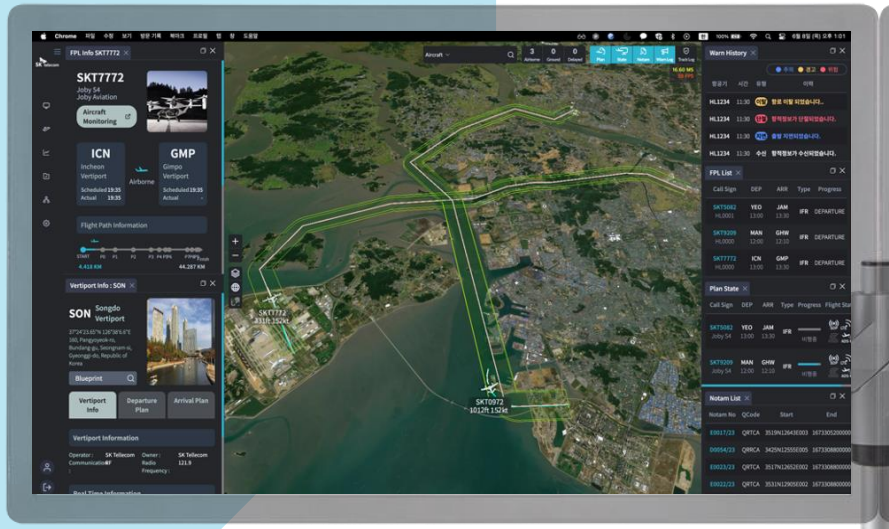
- Joint Participation in K-UAM Grand Challenge
- Joint Participation in National UAM R&D Project
- Collaboration on Pilot Business of Local Government
- Joint Participation in Exhibition and Event

Highlights ③ SKT UAM Operation / Traffic Management System

UAM by. SKT

Operation Management System

Safe low-altitude urban operations



Configuration of Play-back function for pre-flight verification and post-flight analysis of flight plans

Latest GIS-based 2D/3D Map: 4D trajectory monitoring, improved visibility of flight information

Ensuring flight safety through route deviation alarms

Traffic Management System

Utilizing AI to increase operational efficiency and convenience

Integration of flight planning/operation monitoring into a single operation management system

Increase operational management efficiency through simplification/automation of flight plan information input

Ensure punctuality through departure/arrival management based on 4DT* flight path/time prediction

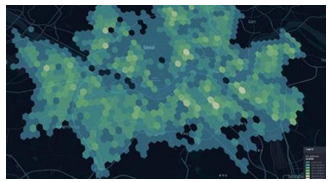
Highlights ④ AI based Demand Forecasting Model – “LITMUS”

UAM by. SKT

SKT possesses AIX technology that analyzes transportation means (bus/subway, etc.) and purposes (commuting/travel, etc.) using location data.

Through AI & Data Transformation, it realizes optimal vertiport location, aircraft operation efficiency, and improved customer convenience

Location-intelligent data



Potential Customer Group Modeling

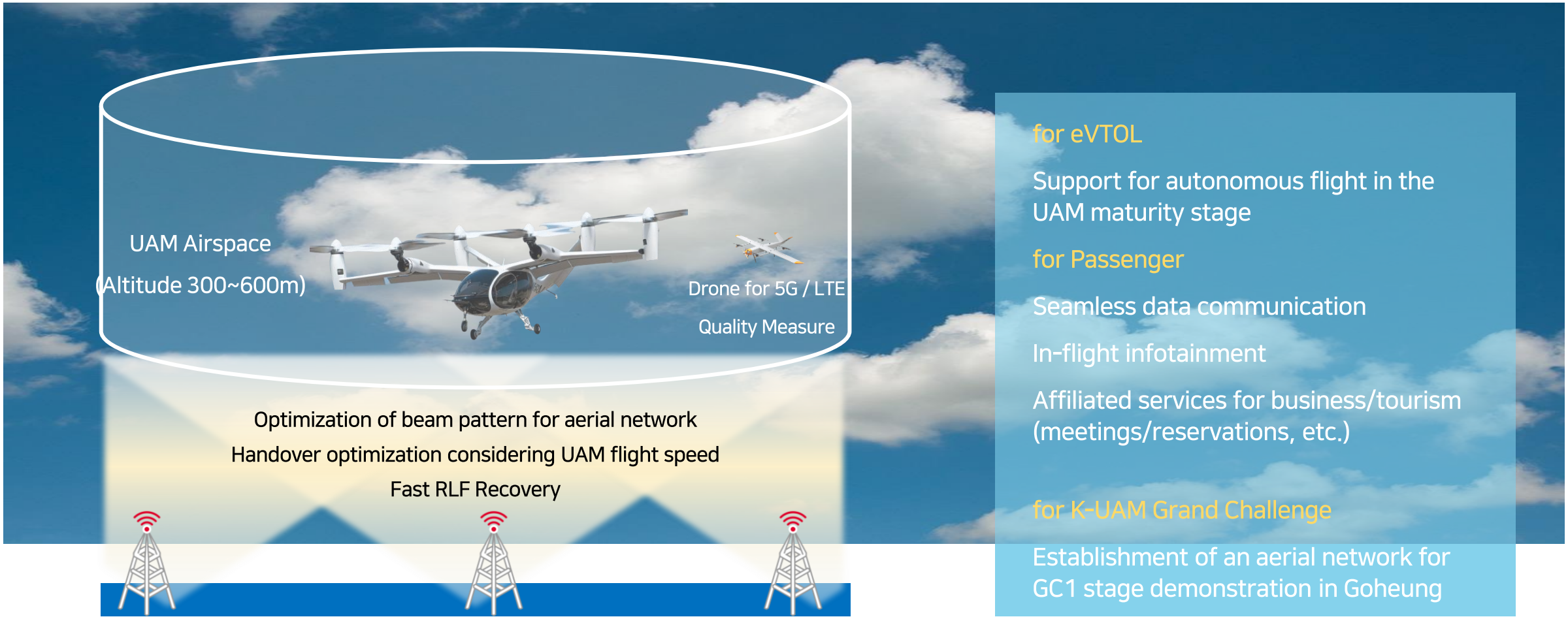
Demand Analysis Modeling per Target Segment

UAM Customer Benefit Analysis Modeling

Vertiport Location Modeling

Highlights ⑤ Aerial Network Technology

UAM by. SKT



Aerial Network Design: Tilting Construction Method

for eVTOL

Support for autonomous flight in the UAM maturity stage

for Passenger

Seamless data communication

In-flight infotainment

Affiliated services for business/tourism (meetings/reservations, etc.)

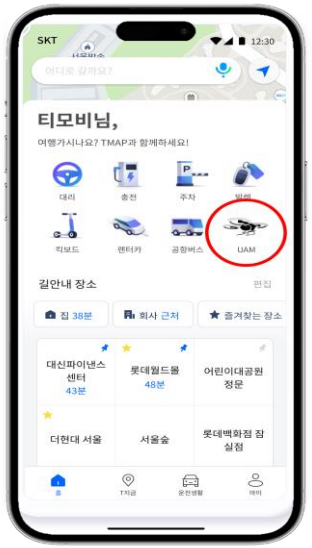
for K-UAM Grand Challenge

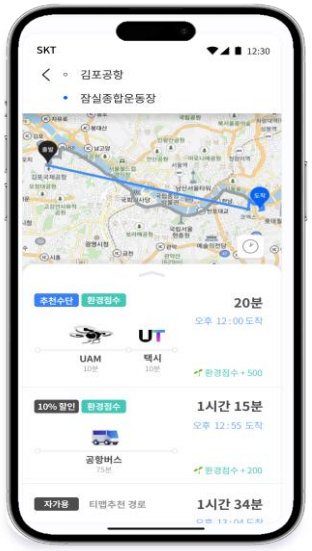
Establishment of an aerial network for GC1 stage demonstration in Goheung

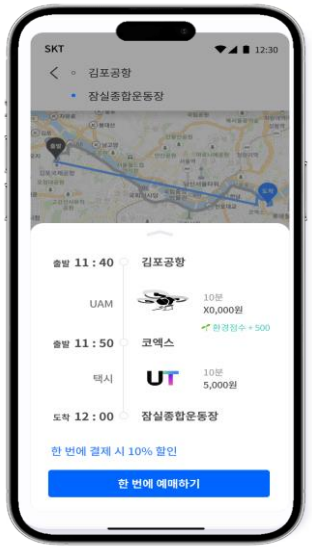
Highlights ⑤ MaaS(Mobility as a Service) Platform

UAM by. SKT

TMAP MOBILITY







All-in-One Platform

Integration of various means of transportation such as UAM-public transportation-rental cars-parking, etc.

Mobility service optimized for traffic congestion, weather, personal preferences, etc.

Subscription-based Mobility services such as integrated commuting plans, weekend-only plans, etc.

02

Roadmap

SKT Journey to Urban Air Mobility

Use cases

Roadmap

Passenger

Airport Shuttle	Inter City	Intra City	(On-demand) City Taxi	Sight Seeing

Public

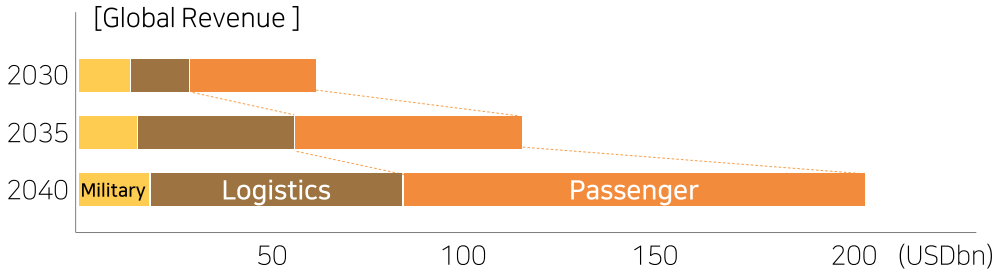
Emergency	PSO	Fire/ Disaster	Traffic Monitoring
Security	Military	VIP	+∝ (Measurement, etc.)

Logistics

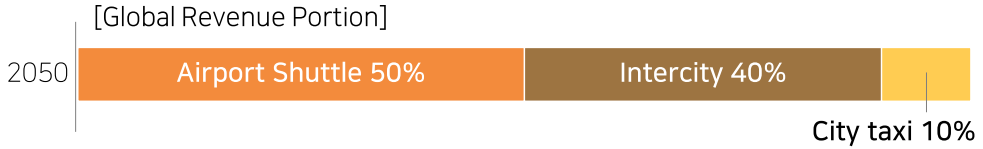
B2B

Charter	Infra Mgmt.

UAM can be utilized for various purposes and uses, and Passenger will become the largest and fastest-growing use case [1)]



In particular, the Airport Shuttle among Passenger is expected to be the most promising market [2)]



However, due to limitations in safety/infrastructure/social acceptance, it is more likely that tourism/public use cases will be implemented before urban transportation

The EU also noted the high social acceptance of public use cases and is researching emergency medical services using UAM through the 'AiRMOUR' project

1) KPMG('22. 4), Passenger use cases in the Advanced Air Mobility revolution
2) Roland Berger('20. 11), The high-flying industry_Urban Air Mobility takes off
3) Main projects of the 'UAM Projects and Initiatives Community', the EU's UAM development platform

K-UAM Grand Challenge

Roadmap

Hosted by MOLIT
Sponsored by KARI

K-UAM Grand Challenge

GC1	GC2-1	GC2-2
Open Field	Suburban	Urban
Dec, ’24 (Goheung)	Feb, ’25 (Incheon)	1Q, ’25

Introduction of Joby’s full-scale aircraft from GC1 stage

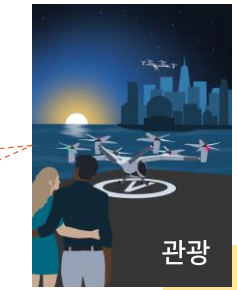
SK telecom

Completion of UAM operation management system development (Oct ’23)
→ Consortium integration test in progress

Operation schedule management system under development for GC2 stage

Collaboration with Local government

Roadmap



제주특별자치도 | 대구광역시 | 경상북도 GYEONGSANGBUK-DO | 경상남도 GYEONGNAM

SKT is collaborating with key local governments that have various resources to develop optimal routes for each region

세종특별자치시 | 대전광역시 DAEJEON METROPOLITAN CITY | 충청북도 | 충청남도 | 전북특별자치도

Image Source : COMMERCIAL UAV NEWS

Commercialization Roadmap

Roadmap

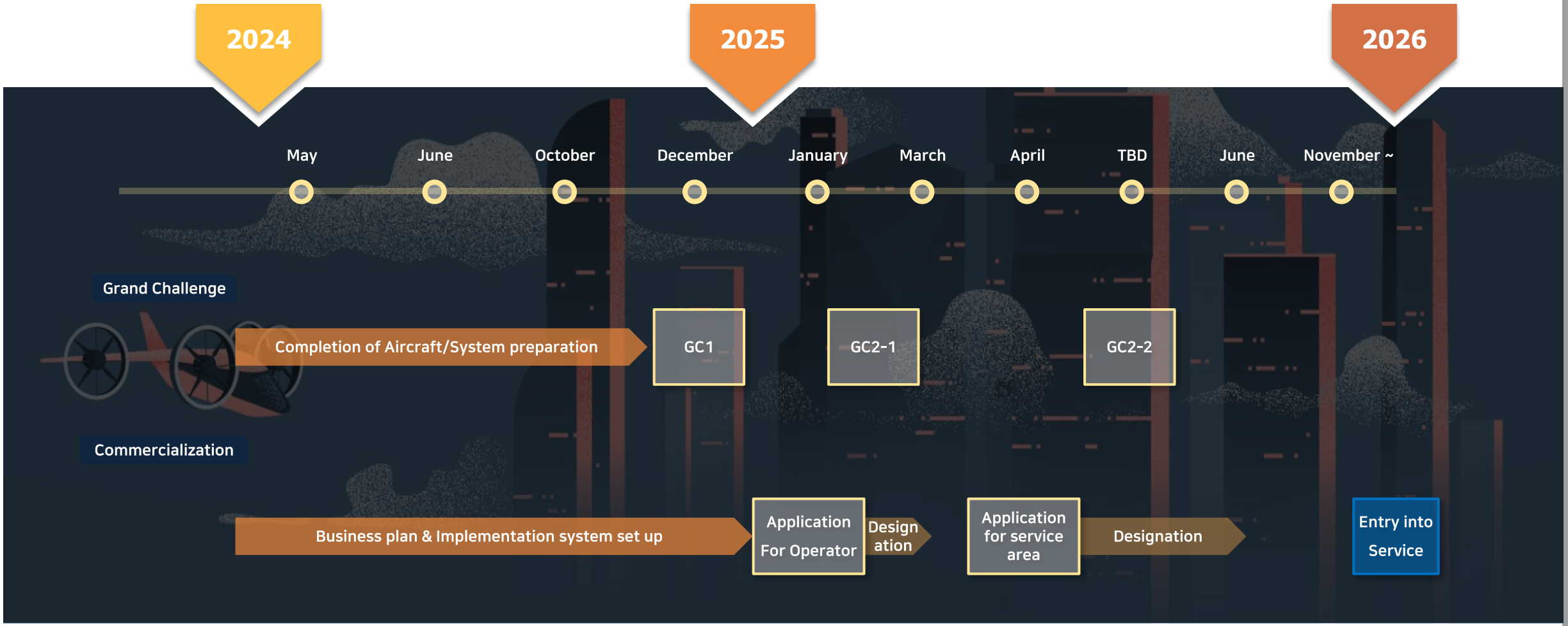
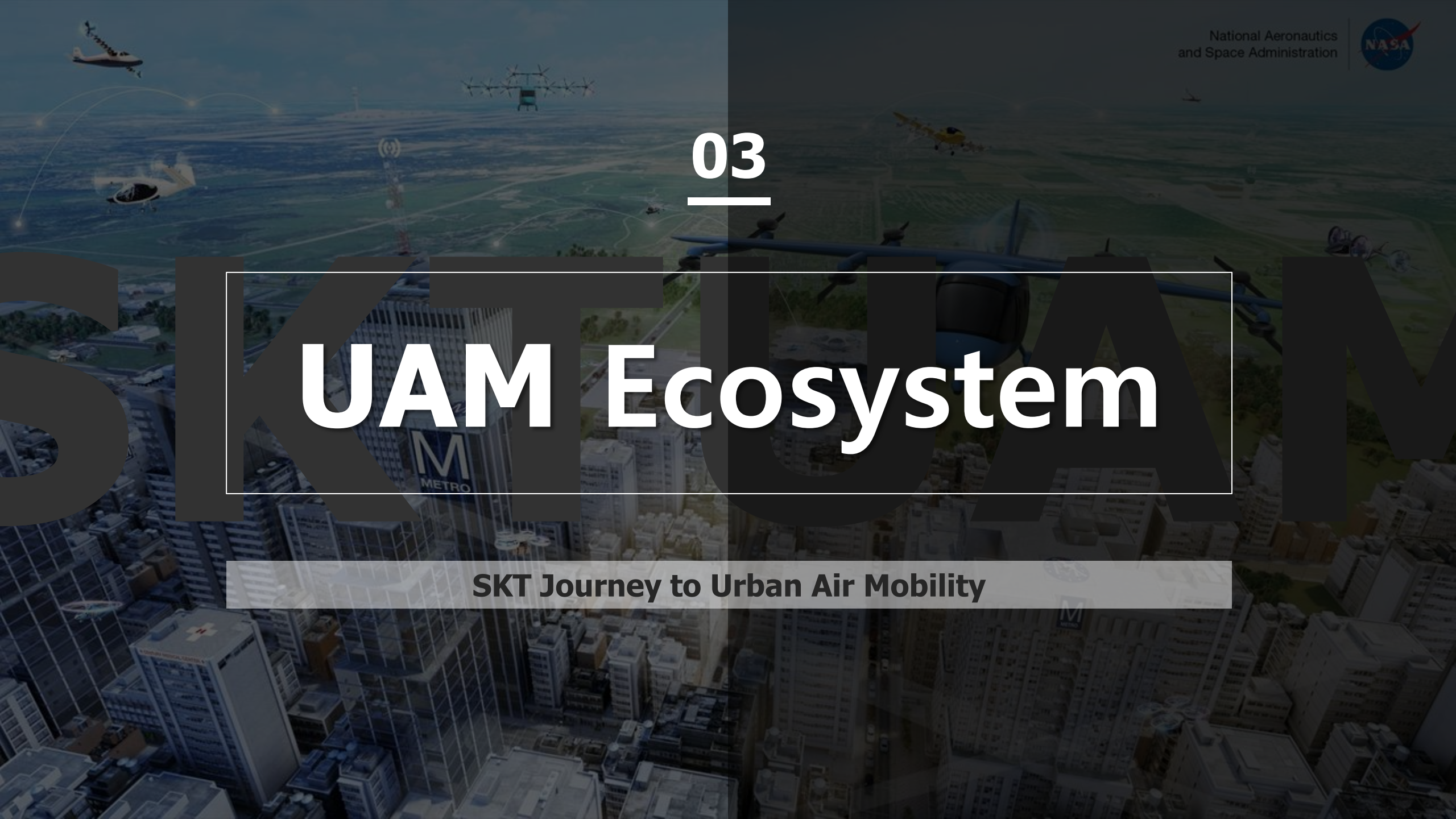


Image Source : WSP



03

UAM Ecosystem

SKT Journey to Urban Air Mobility

Challenges to address

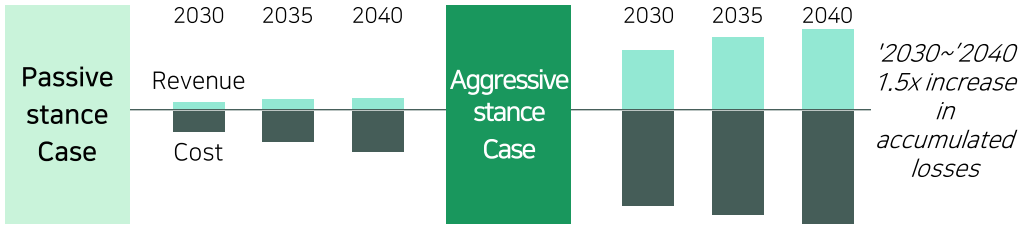
UAM Ecosystem

In the long term, UAM is expected to experience high growth,

but inevitably incur losses until it reaches maturity due to massive investments and uncertain demand

> The initial development of the aircraft and the construction of terminals (Vertiport) will require large-scale costs,
> and the first turnaround to profitability is expected to take about 10 years after the start of the business
>
> - K-UAM Roadmap ('20.5)

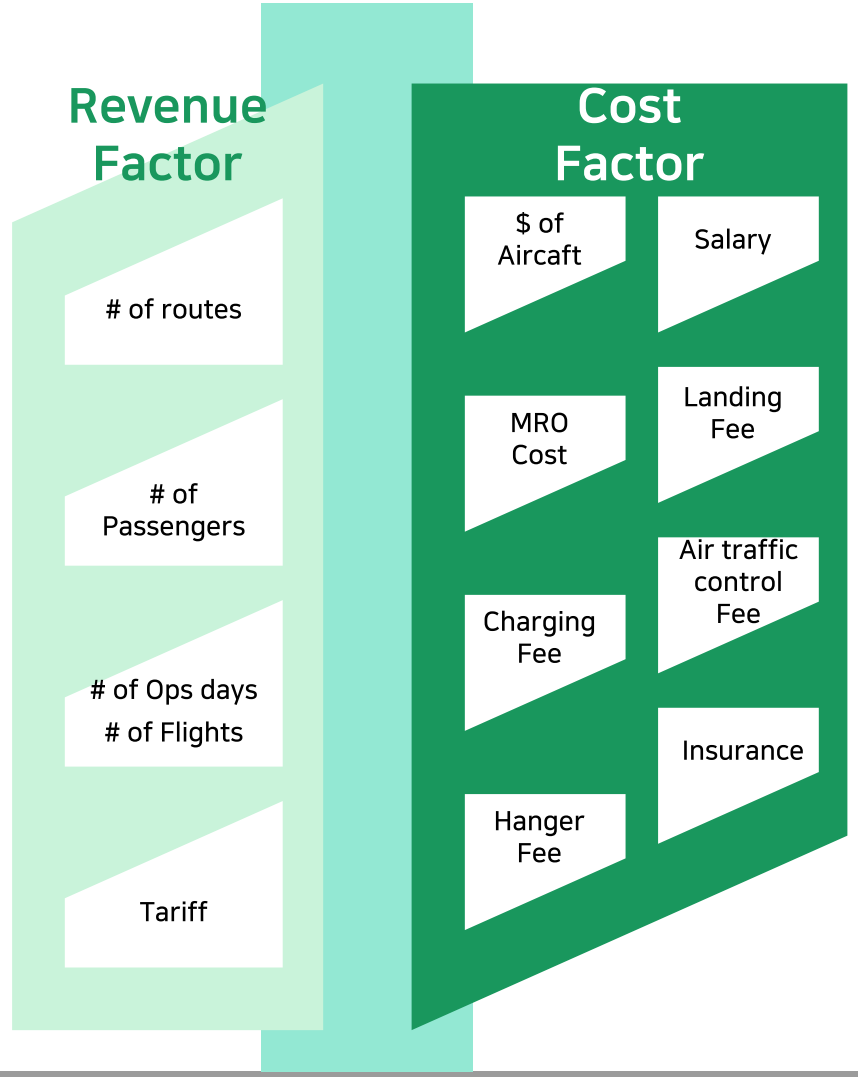
Making it difficult to expect profits through bold investments because focus only on initial external growth at initial stage, losses will increase further,



SKT 자체 사업성 분석 (Roland Berger)

UAM has a wide and complex value chain, making it impossible to improve the market structure alone.

Public and private sectors must cooperate to create a virtuous cycle in the UAM ecosystem



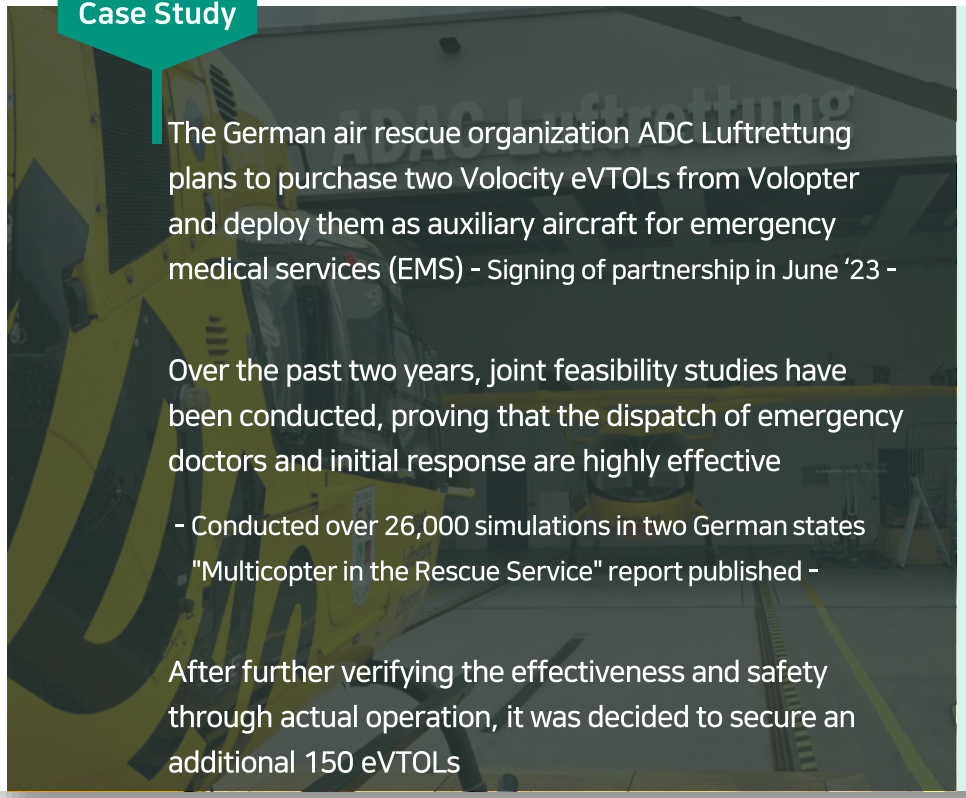
Challenges ① Public Use case as a crucial Catalyst

UAM Ecoystem

Public UAM can guarantee a definite initial demand for operators and enhance public trust in safety,

ultimately becoming a crucial catalyst for UAM to establish itself as a transportation system

Case Study



The German air rescue organization ADC Luftrettung plans to purchase two Volocity eVTOLs from Volopter and deploy them as auxiliary aircraft for emergency medical services (EMS) - Signing of partnership in June '23 -

Over the past two years, joint feasibility studies have been conducted, proving that the dispatch of emergency doctors and initial response are highly effective

- Conducted over 26,000 simulations in two German states "Multicopter in the Rescue Service" report published -

After further verifying the effectiveness and safety through actual operation, it was decided to secure an additional 150 eVTOLs

Some Barriers to tackle for Public UAM Use case development

- Restricted Awareness as new aircraft
- Limited performance compared to A helicopter
- Absence of laws/regulations applicable to Public UAM
- Huge cost burden for introducing aircraft & infrastructure

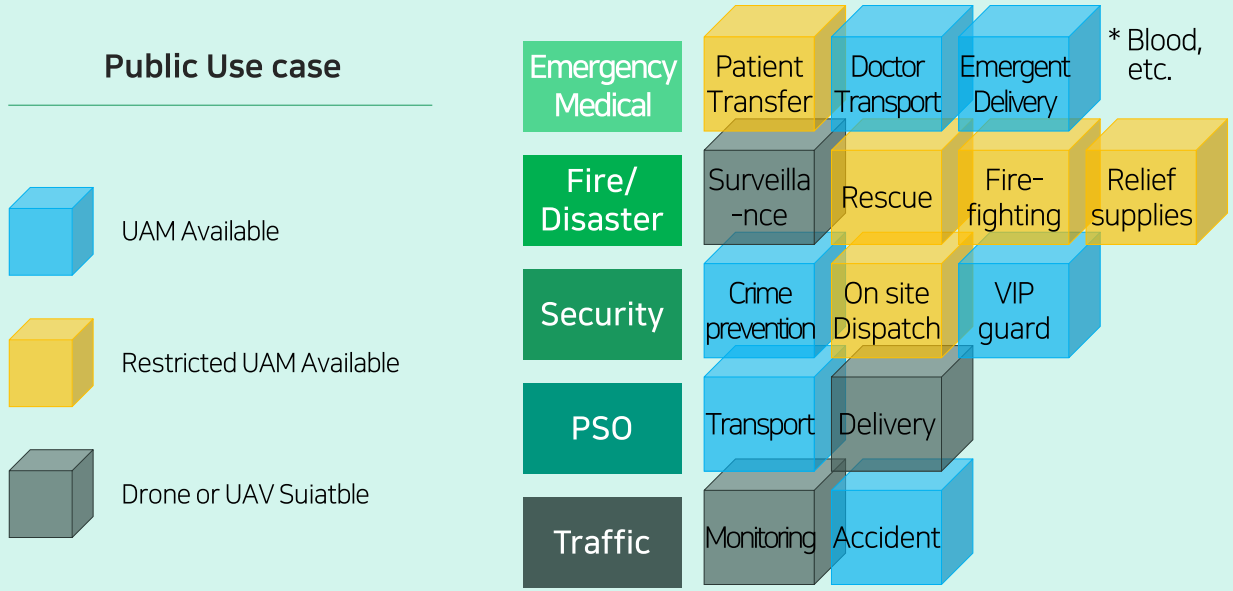


Image Source : Aviation Today (Volocopter)

Challenges ② Infrastructure Development

UAM Ecosystem

There is an absolute shortage of idle land in the city center, and given the narrow rooftop areas of buildings and the high land/real estate prices in the domestic environment,

public-private cooperation is essential to sufficiently establish vertiport infrastructure for UAM's successful Entry into Service

Vertiport Construction Support

The higher the accessibility, the more enormous costs in securing land and construction, resulting in high landing and take-off fees.

It'll make it difficult for UAM operator to be viable

Low-cost leasing of public land or construction subsidy support

* The UK plans to support 20 operators with $15m for vertiport development through the 'Future Flight Challenge'

* The US is creating $25m in construction grants through the 'AAIM Act'

Public acceptance of Vertiport

In the case of airports, compensation is provided for nearby residents (soundproof facilities, electricity bills, etc.). Although UAM is low-noise, residents near the vertiport may ask similar compensation

Compensation/support to enhance public acceptance of vertiports

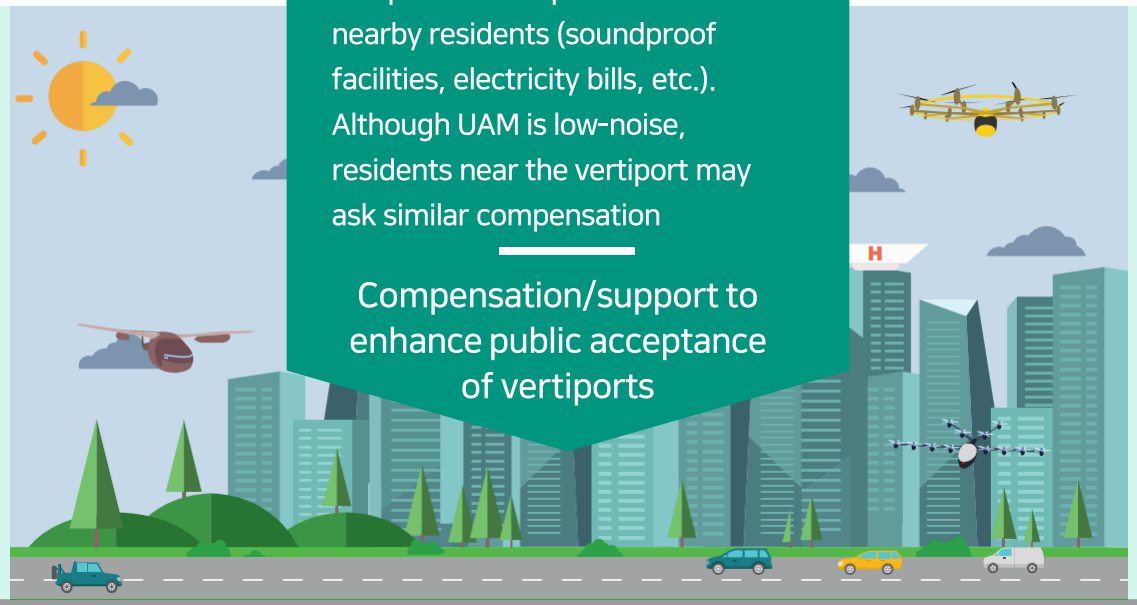


Image Source : McKinsey & Company

Public Infrastructure utilization

Building vertiports within public facilities such as terminals/train stations and fire/police stations leads to high accessibility/recognition

Installation of vertiports when constructing or renovating public institutions/facilities

Challenges ③ Fostering ‘First Mover’

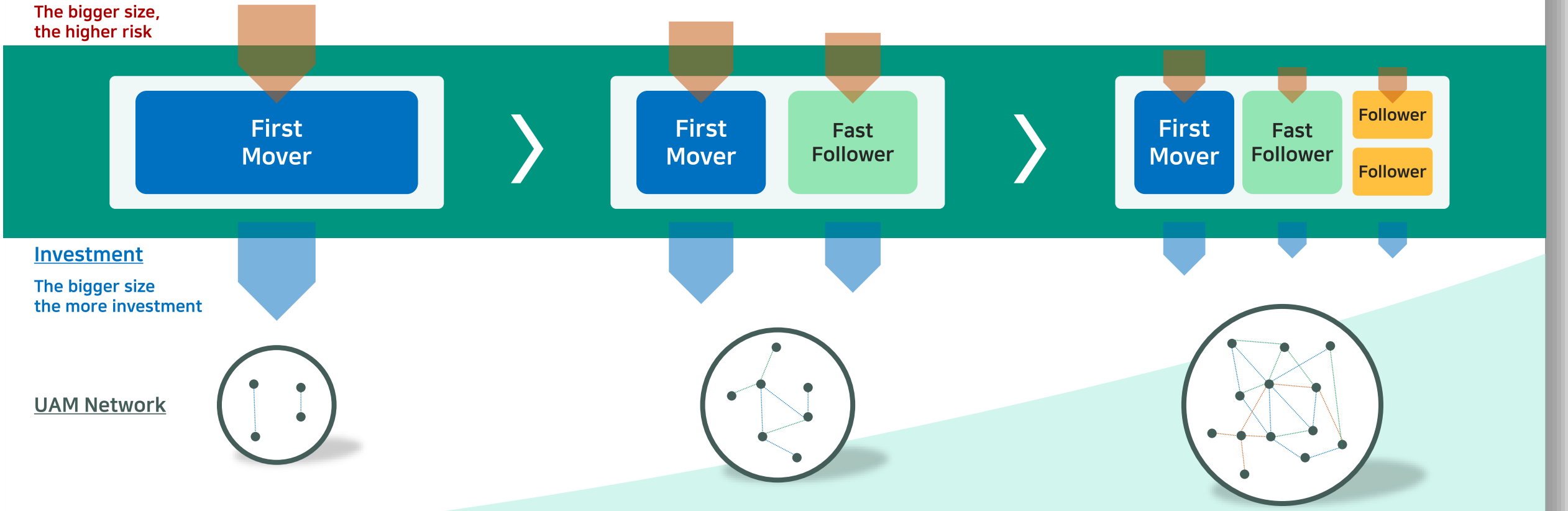
UAM Ecosysem

For the growth of the entire UAM industry,

it is critical to establish a virtuous cycle structure where *first movers, who take on risks and decide to invest, survive in the early market and reinvest their profits to expand ‘the overall market pie’*

Risk

The bigger size,
the higher risk



Investment

The bigger size
the more investment

UAM Network

Market growth & Industry Cultivation

Challenges ③ Fostering 'First Mover'

UAM Ecosystem

To create a UAM ecosystem led by the First Mover,

a minimum foundation that ensures survival is necessary

Rapid resolution of uncertainty	Establishment of business qualifications/regulations
Minimum revenue/profit guarantee at EIS stage	Limiting the number of appropriate operators, Route selection/operation rights
Financial Initiatives	Operating incentives, landing fee support, tax reductions, etc.
Advantage for Excellent Participants of Demonstration	Priority for using demonstration infrastructure, Recognition as qualifications (requirements) for tech./Biz, etc

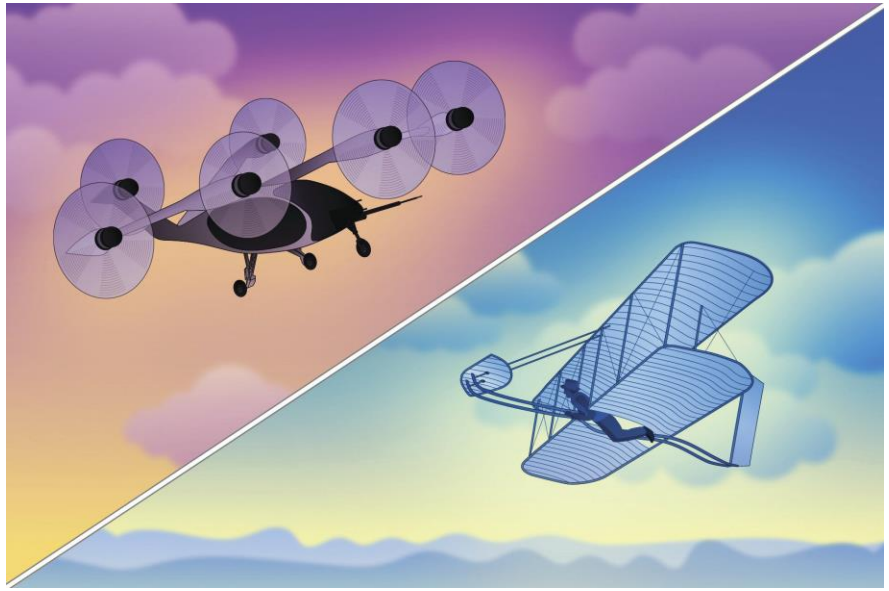


Image Source : AP Illustration/Peter Hamlin

Challenges ④ Promoting Demand & Supply

UAM Ecosystem

Pilot Training

Ultimately, it is expected that the existing pool of pilots will be utilized rather than new ones considering replaced by remote control/autonomous flight

Given the high labor costs of general aircraft pilots and the relatively higher fatigue of UAM pilots*,
it is concerned that the supply of pilots will not be enough

* Frequent takeoffs and landings, absence of crew, etc

Time to gather wisdom to promote pilot supply

1) Recognition of UAM flight as Time Building to encourage mid-level pilots to apply
2) Support recruitment of retired pilots

Connection to Airport Airside

Establishing an efficient transfer system between UAM and existing aviation *to maximize the time-saving effect of the core route Airport Shuttle*

Fast Track can stimulate demand linked to existing aviation, expected to increase the Airport Shuttle market by 1.4 X*

* SKT's own analysis (Roland Berger)

Fast Track connected to Airport Airside requires the cooperation of multiple government departments and public institutions, including security/inspection/quarantine, space design, and cargo transportation

Pricing Autonomy

UAM also needs to operate a pricing strategy (discounts/surcharges/minimum fares) similar to existing airlines/taxis/trains.

[Example] Round-trip discounts, last-minute seat discounts, peak time surcharges, short-distance base fares, etc.

*Expect a revenue increase of about 25% by increasing UAM occupancy rates**

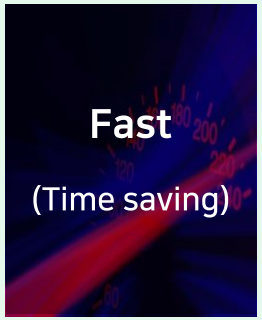
* SKT internal analysis (Roland Berger)

**Granting fare autonomy to enable timely customer acquisition
without compromising UAM's popularity**

Challenges ⑤ More Fast, More Safe, More Convenient by AI

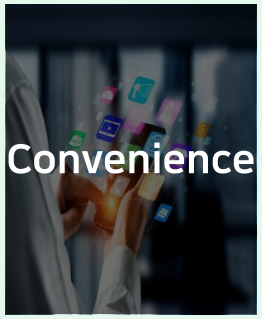
UAM Ecosystem

Customer Value



- Is there a vertiport nearby?
- Does UAM operate at the time I want?
- Does UAM seamlessly connect ground transportation?
- Can UAM respond to the traffic changes while you are on the move?

- Is the eVTOL safe?
- Will UAM be safe even in bad weather?
- Will UAM respond safely in a dangerous situation?



- Will it be convenient to make reservations/changes/cancellations/payments?
- Is the check-in/boarding process simpler than Legacy flights?
- Can I use mobile N/W during the flight? (work, media, shopping, etc.)
- Can it provide optimal recommendations related to the purpose of the trip? (rental car, accommodation, activities, etc.)

Solutions provided by SKT's AI Technology

- The optimal vertiport location through AI demand analysis (LITMUS)
- AI MaaS Platform (T map)
- UAM Operation Control system based on AI
- Supplementary Data Support system for UAM (Weather, Urban Spatial Information etc.
- Aircraft Predictive Maintenance / Performance Mgmt.
- UAM Traffic Control based on AI
- Personalized Mobility App. (AI Agent A. & T map)
- Security Check and boarding process based on AI physical/information security
- Low-latency, high-quality 5G aerial network with AI Edge Infra
- AI recommendation services integrated with SKT membership/SKT subscription service

“Only those who will risk going too far can possibly find out how far one can go”
T. S. Eliot

Thank you

SK telecom