**2021 World Aviation Conference** 

# Korea's policy case study for the Advanced Aerial Mobility





# 1. Introduction



# **✓** Before starting ····

- > Emergence of various future transportation, Drone, PAV, UAM, AAM etc.
- > As a means of solving urban ground traffic congestion and responding to changes in the transportation paradigm
- > Korea is forwarding with focus, phase, and long-term through industryacademia-research collaboration on future aerial mobility



# Today's presentation topic is ...

- Korea's current status of laws, institutions, and infrastructure for early adoption of future aerial mobility
- Major national policies, cases, and achievements for future aerial mobility
- > Approach plan and preparation for UAM, AAM Soft-landing
  - Tasks and plans for overcoming complications



# 2. Government Roadmap



Basic plan for the drone industry development (2017~2026)

- Initiate: 2017.12.~
- Purpose: Drone industry competitiveness through building drone industry ecosystem, public demand, and infrastructure
- Objective: Domestic market size→ 4.4 trillion won, entering the world's top 5 in technological competitiveness, etc.
- Contents
  - Promoting early markets based on public demand
  - Create Korean style, K-Drone System(UTM Based)
  - Support for promoting commercialization through regulatory innovation and sandbox pilot projects
  - **Establish infrastructure** for development/certification/license
  - Support drone SMEs(small-medium enterprises)



# 2. Government Roadmap



# **▼** Korean Urban Air Mobility(K-UAM) roadmap

- Initiate: 2020.5.~
- Purpose: Unification of UAM national capabilities, promoting consistent policies
- Objective
  - Demonstration in 2022 Commercialization start in 2025 Full scale commercialization in 2030
  - 10 routes in 2030, 100 routes in 2035
- Contents
  - **Establish a rational system** for securing safety
  - Creating an environment to secure and reinforce private sector
  - Achievement of services to expand public acceptance
  - Establishment of infrastructure and connected transportation





# 2. Government Roadmap



# Plan for Aviation Industry Development (2021~2030)

- Initiate: 2021.3.~
- Purpose: Establishment of a comprehensive basic plan for 10 years term to support the aviation industry
  - PAV, AAM(Advanced Air mobility), etc. Reflective plan to create a new concept of aircraft environment for future aviation
- Contents
  - Development of core part
  - Preparation of standardization system
  - **Secure core technology** and establish roadmap
  - Development of high-performance platform
  - Construction of ground/flight test infrastructure

제3차 항공산업발전 기본계획('21~'30)

2021. 2.

관계부처 합동



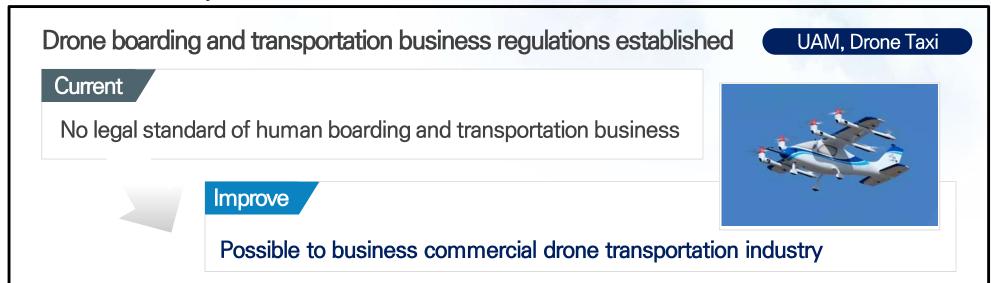


Drone Utilization Promotion and Foundation Establishment Act (Drone law)

- ➤ Initiate : 2020.5.~
- Purpose: Establishment of basis for systematic support for promotion of drone utilization and foundation
- Object : Aerial Vehicle capable of flying without a pilot on board
  - Remote, autonomous, and automatically navigated aircraft
  - Future Aerial Mobility(PAV, Drone Taxi etc.) vehicle
- Contents
  - Establishment of the basic plan for the development of the drone industry
  - Drone industry regulation special operation
    (designated and operated as a special drone flying zone)
  - Startup and R&D support (costs, equipment, facilities, etc.)
  - UAS Traffic Management system (UTM) establishment and operation



- ✓ Pre-emptive regulatory innovation in the future aerial mobility
  - Initiate: 2019.10.~
  - Purpose: Predicting the trend of future aerial mobility, discovering regulatory issues for each development stage, and deriving solutions
  - Participation: 30 institutions, government, industry, academia, and research
  - Object: 35 case
    - Case Study





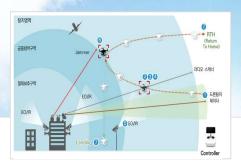


Pre-emptive regulatory innovation in the future aerial mobility

Establishing a system for introducing anti-drones

#### Current

Radio wave blocking and disturbance signals at airports and nuclear power plants is illegal.



#### **Improve**

Provision of safety devices to tactically control illegal drones

\*Revision of the Radio Wave Act and the Airport Facilities Act

Finding frequencies to support long-distance flights

Marine ecology monitoring

#### Current

Current frequency bands can't control long-distance flight



#### **Improve**

Perform a reliable long-range missions through frequency band assignment



- **▼ Drone Demonstration city** (2019~)
  - Purpose: city-zone drone Use-Case development and commercialization, expansion of public acceptance, etc.
  - System: Local gov't participating competition system, government budget support, suspension of application of related laws, etc.
  - Designation: 4 cities in 2020, 7 cities in 2021
- Drone special liberalization zone (2020~)
  - Purpose: Use-case (Drone Taxi, delivery, etc.) demonstration
  - System: Local gov't participation competition system
    - Exemption from related laws (flight permission, certification, etc.)
  - Designation: 15 cities in 2021
    - Monitoring, Delivery, anti-drone, etc.
    - **UAM(DRONE TAXI)** verification from 3 cities







### **▼ Drone regulation sandbox** (2018~)

- > Purpose : Development of new business models, safety improvement, promotion of commercialization of potential use-case, etc.
- > System : Designated public contest system for each business field, gov't budget support, suspension of application of related laws, etc.
- Designation: 13 businesses in 2020(6,851 sorties)
  - 2021: Extreme environment demonstration, 5G drone service, etc.
- Result
  - Commercialization of business models(Drone Light Show, Inspection, etc)
  - Increasing sales, sales volume, and jobs, improve laws and systems







Source: Africa Drone Forum





# 4. Infrastructure

- Flight test facility for drones (2018~)
  - > Purpose : Commercial drone technology development, performance verification, and test flight environment creation
  - Contents: airspace, test facility, test equipment, operation system
  - Construct
    - Completion & operation : 3 location (Yeongwol, Boeun, Goseong)
    - Construction: 2 location (Incheon, Hwaseong)





# 4. Infrastructure

# National flight test facility (2015~)

- > Purpose : Research on core technologies necessary for flight test execution and operation of test facilities
- Contents: Construction of ground infrastructure such as flight test ground, runway, hangar, flight test control center, etc.
- Location : Goheung

### Drone certification facility (2019~)

- > Purpose : Establishment of technical standards and related facilities and equipment to establish a national standard certification system
- Contents: Test facility, takeoff and landing area, certification test equipment construction and technical standard research
- Location: Incheon



# 5. Policy Cases and Achievements



# √ K-Drone System, UTM

- Purpose: Construction of UTM system to safely operate multiple drones
- Term: Phase I(2017~2022), Phase II(2022~, anticipated)
- Organizer/Participation: KAIA· KIAST, KARI·ETRI·KT·SNU·KAU·Ucon System.
- **Development plan and Capabilities** 
  - **UTM(FIMS+USS)** construction
  - UTID (UAS Tracking Identification) development
  - **Capabilities** 
    - **Open-API**
    - TCL 4
    - 2~3 Area
    - 20 units simultaneous flight

World 1st Case

Metropolis(Seoul), 8 units(simultaneous flight, including Drone Taxi), installing a UTID for K-UTM, performing from flight approval to UVR and landing



# 5. Policy Cases and Achievements

# **▼** K-UAM

- ➤ Gov't announcement of roadmap for K-UAM promotion (20.6.)
- ➤ Grand challenge program (2022~2024)
  - Establishing flight standards, public-private joint demonstration
- **➢ Government joint UAM R&D project** (21.3.)
  - Development of commercialization technology for UAM(2022~2035)
- > Sharing UAM with private sector
  - Hyundai Motor : Vehicle development, test flight
  - Hanwha Systems: Vehicle and navigation, ICT solution development
  - Incheon International Airport Corporation / Korea Airports Corporation :
    infrastructure such as takeoff and landing (Vertiport)
  - KT·SK Telecom : Mobility platform and communication infrastructure
  - Hyundai E&C : Infrastructure for takeoff and landing sites



# 5. Policy Cases and Achievements

# AAM(Advanced Air mobility)

- > Announcement of AAM ecosystem and development plan including UAM (21.3.)
  - AAM Development of core parts and preparation of standardization system
  - AAM Secure core technology and establish roadmap
  - Construction of test flight infrastructure, promoting of demonstration projects
- ➤ Research on AAM ecosystem (2020~, KIAST)
  - Subject: Development of AAM ecosystem technology to prepare a preemptive response system for future aerial mobility
  - Contents
    - Development of AAM platform specialized for region and purpose
    - Flight operation, monitoring communication technology and network development
    - Airspace management for low altitude to stratosphere
    - Traffic control and traffic management
    - Measures to improve public acceptance, etc.



# 6. Current Issues and Solutions

- ✓ Public acceptance & convergence with existing platforms
  - > Securing public acceptance due to lack of trust in new aerial mobility
    - UAM negative perspective regards boarding(49%, KOTI)
    - Trends to perceive as new threats due to falls, collisions, malfunctions, etc.
      - **❖** Cargo → Passenger, Public Business → Private Business
      - **❖** New city and smart city pilot operation
      - Experiential tourism product development



- Co-existence solution with existing mobility
  - Conflicts due to **infrastructure construction** (space layout, sunlight, noise, pedestrians, vehicle safety, etc.)
  - Co-existence with existing transportation platform
    - Connection of building helipad and new city infrastructure
    - **Comprehensive transfer center in connection with the existing** transportation system (bus, taxi, railway, etc.)





# 6. Current Issues and Solutions



Safety (Platform, Operation, Management)

- > A certification program for vehicle that can be applied from the design and development stage is required
  - verification method for innovative development induction, etc.
  - International standard certification program
- National ConOps in consideration of urban operational environment
- **Traffic management construction** with consideration of UAM · AAM mobility
  - UTM expansion : operation altitude 150M → 300~600 M
  - Integrated management: UTM, UATM, ATM, STM
    - **❖** Mutual recognition of the certification program between countries → **Cooperation in preparing international standards**
    - **Establishment of Korean-operation standards** through demonstration projects, etc.
    - Promote progressive expansion based on UTM



# 6. Current Issues and Solutions



# Business environment development and Ecosystem support

- > Technology development
  - Aircraft development
    - Optionally Pilot PAV development(1seat, 2019~2023)
    - Mid to long distance (100~400KM, Inter-City) multi-seats aircraft development review(2030)
  - **Primary parts development** 
    - Electric propulsion device(2020~2023)
    - Hybrid and hydrogen fuel for long distance flight(2024~2030)
  - Establishment of ground and flight test infrastructure
- **Data & Economic Incentive** 
  - Startup investment support, tax reduction and various tax benefits
  - **Data provision** 
    - traffic data, weather & 3D map information in metropolitan areas



# 7. Conclusion

# Next-generation aerial mobility is big challenging

- Public acceptance, co-existence solution with existing system is essential
- Korea is responding to the coming aerial mobility issue at the national level
- Establishing relevant laws, systems, and infrastructure, and implementing effective policies that consider the entire ecosystem
- International cooperation is essential
  - Future aerial mobility is a cross-border platform, requires international co-operation
  - Require co-operation on certification, safety, infra, and ConOps
- Need for technology development and policy promotion in consideration of future Aerial Mobility
  - **Development of ConOps and Policy considering AAM**
  - UrbanAM → Intercity air traffic, Traffic Management(UTM, UATM → SpaceTM)



