

# The Future Of Unmanned Aerial Systems (UAS)

*Sean Cassidy*  
*Director, Safety & Regulatory Affairs*  
*Amazon Prime Air*

*Clark Lin*  
*Director Flight Standards*  
*CAA Taiwan*

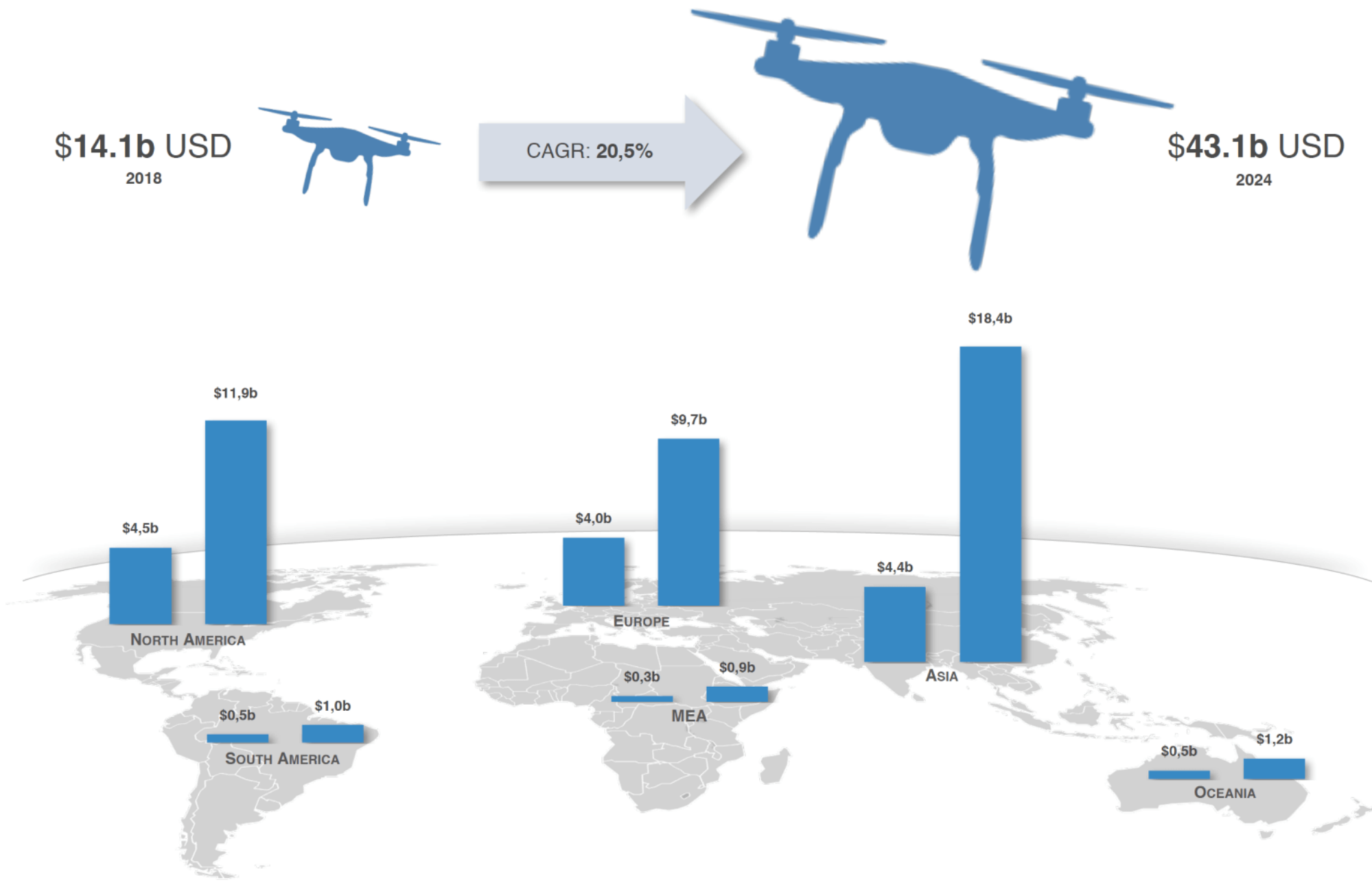
*Akbar Sultan*  
*Director, Airspace Operations and Safety Programs*  
*NASA*

72nd annual

INTERNATIONAL AIR SAFETY SUMMIT

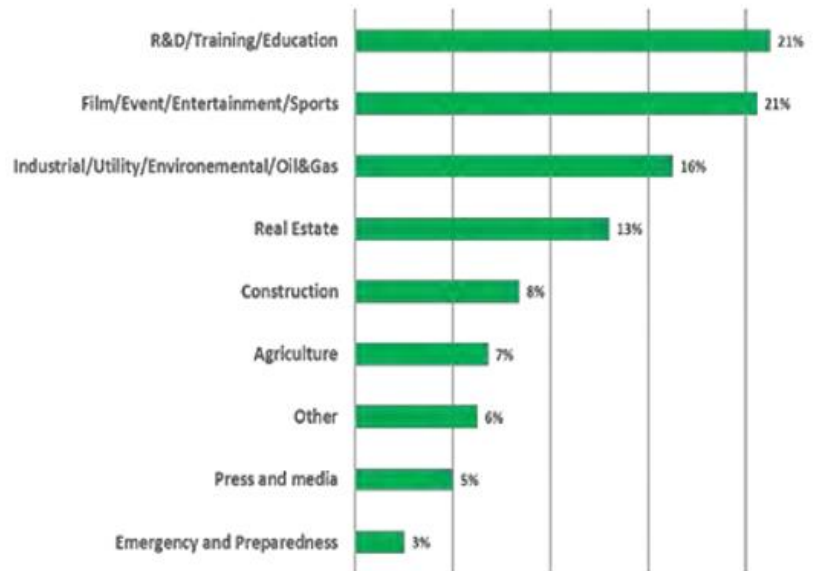
**IASS** 2019

# Drone Market Size and Growth

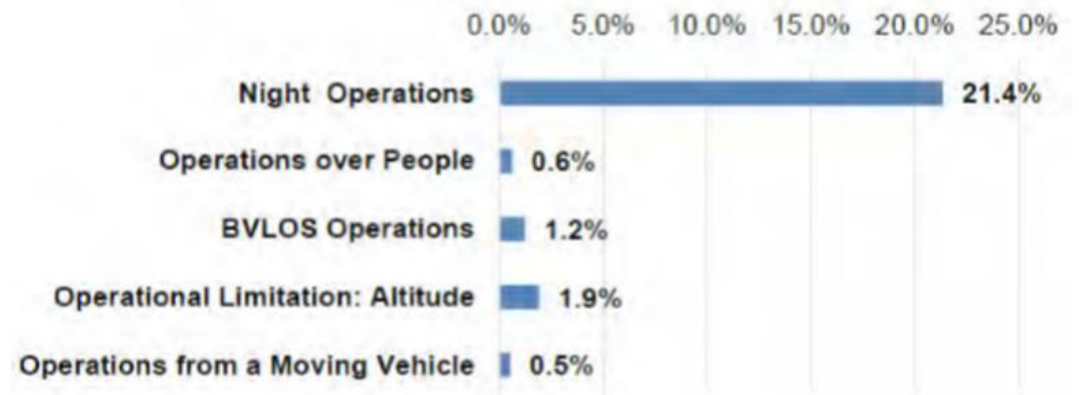


# UAS Demand Signal (US)

## Distribution of Missions



## Percentage of Approved Waiver Requests

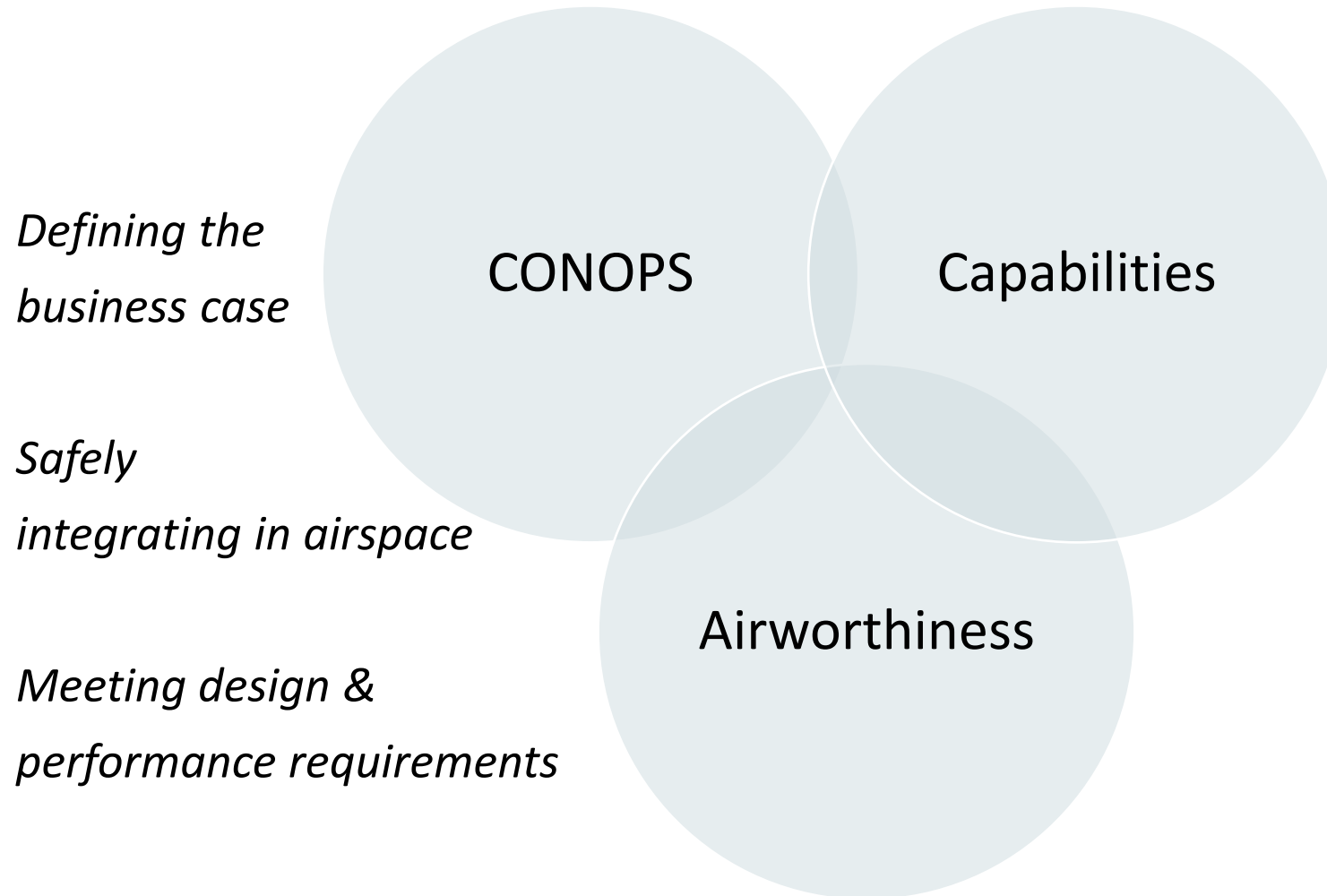


## Projected Commercial Fleet Growth

	Total non-Model Fleet		
	(no. of '000 units)		
year	Low	Base	High
2018	277	277	277
2019	369	400	426
2020	460	545	638
2021	552	711	932
2022	588	789	1,112
2023	603	835	1,290

Source: FAA FY2019-2039 Global Forecast

# Determining Safe Access



# Industry Challenges

## Regulatory Framework

Clarity, Harmony

## Public Acceptance & Confidence

Place, Manner, Time of Use

Making the Safety Case: Explaining the Risk Offset

## Current and Emerging Tech

Remote Identification, UAS Traffic Management (UTM), BVLOS Operations

## Integration

Role of Legacy ANSP, New Service Suppliers and Legacy Operations

# Flying UAVs and Safety Oversight in Taiwan

UOMIS Operations Management  
Information System

Clark Lin  
Director of Flight Standards Division  
CAA Taiwan

72nd annual

INTERNATIONAL AIR SAFETY SUMMIT

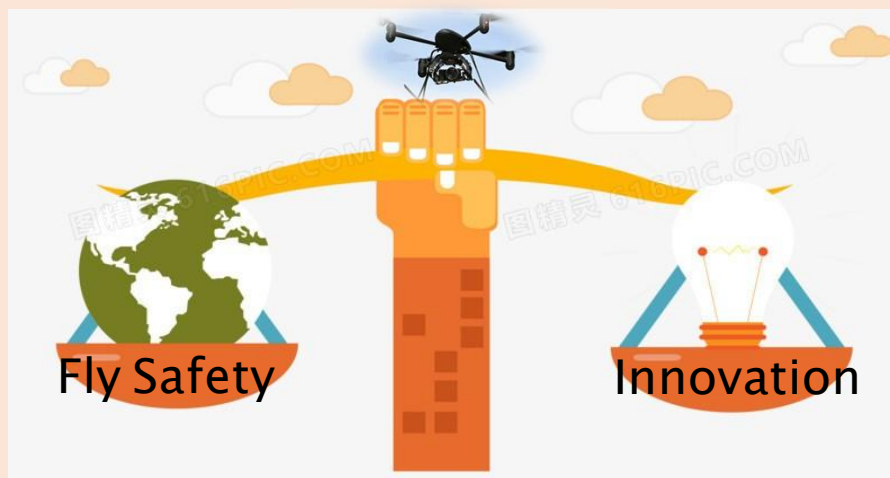
**IASS** 2019

72nd International Air Safety Summit, Taipei



## ➤ UAV Operating Regulations

### Safety and Innovation Risk Based Regulation



- CAA Act - UAV Chapter Amended
  - UAV Operations Regulation
  - UAV Organization Designation Authorization Regulation



# ➤ UAV Operating Regulations



## Accountability- 2 Authorities

CAA -Above 400FT, Airport, Airspace, Prohibited or Restricted areas

City/County Government – Below 400FT



### CAA Authority



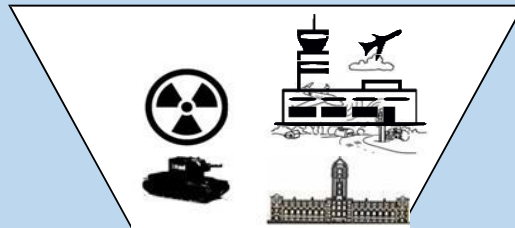
- Regulations/Standards
- Operator Authorization
- Fly Permits System

400 ft

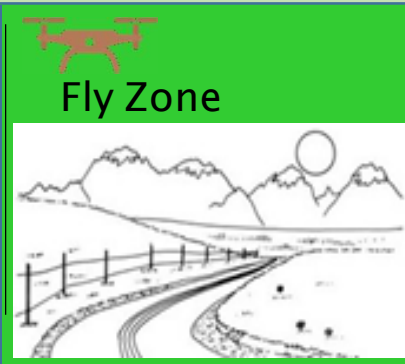
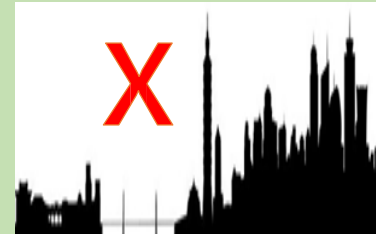
400 ft



- Airport
- Airspace Prohibited, Restricted areas



City/County Government  
No Fly Zone



### City/County Government Authority

- Announce Fly Zone/No Fly Zone
- Enforce the Bans







# ➤ UAV Operating Regulations



## Risk Based- 2 Tier management

### Individual Person

#### Recreation Purposes

- Below 400FT
- In Fly Zones
- Line of sight
- Day Time
- One Operation



### UAV Operators

#### Authorization Required

Commercial/Government/Research/Agriculture  
Logistic/Autonomous Management...

- Above 400FT
- Beyond Visual Line of Sight (BVLOS) Operations
- Night Time
- Flying Over Groups of People, Public Events
- Drops/Spray/Carry Goods...





# UAV Oversight System- UOMIS UAV Operations Management Information System

## Registration



交通部民用航空局  
Civil Aeronautics Administration, MOTC

## UAV Operations Regulation



- UAV >250g
- +16 Years Old
- ID card is required



- Label Required
- QR Code



- Valid for 2 years



### Failure to register/label:

NT\$30,000~150,000 fine (US\$1,000~5,000)

Drone may also be confiscated.



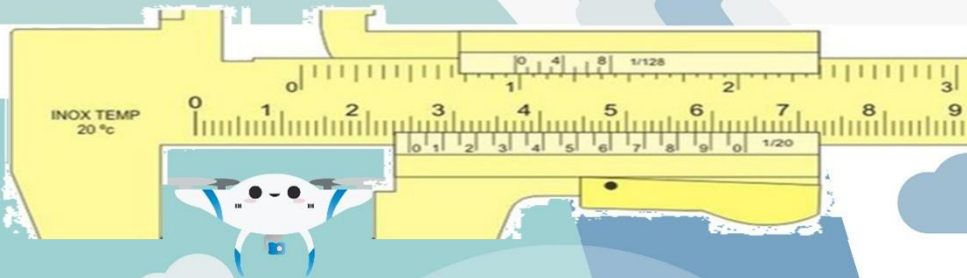
# UAV Oversight System- UOMIS UAV Operations Management Information System

## Certification



交通部民用航空局  
Civil Aeronautics Administration, MOTC

## UAV Operations Regulation



Certification

Type  
Certification

Special  
Certification

Experimental

No Required	Type Certification	Special Certification	Experimental
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25KG ↓



25KG ↑



Type  
Certification

Designer or Manufacturer

Special  
Certification

3 Years

Experimental

3 Years

### Violation of general regulations:

NT\$10,000~1,500,000 fine (US\$3,000~500,000)

Drone may also be confiscated.





# UAV Oversight System- UOMIS UAV Operations Management Information System

## Remote Pilot License (RPL)



Under 2kg

No RPL required



16+ of age

Apply for Student RPL



18+ of age

Written test  
General RPL



18+ of age

Written and Practical test and physical examination  
Basic level



18+ of age

Written and Practical test and physical examination  
Higher level

Professional RPL

All RPL valid for **2 years**.

Purpose Weight	Recreation only	Professional RPL	
		Basic level	Higher level
Under 2kg	No RPL required	I	Ia
2kg↑ ~ 15kg	General RPL		Ib
15kg↑ ~ 25kg	II		IIc
25kg↑ ~ 150kg			
150kg↑	III		IIId

Fly UAV without RPL:  
NT\$60,000~300,000 fine (US\$2,000~10,000).  
Drone may be confiscated.



# UAV Oversight System- UOMIS UAV Operations Management Information System

## Operation Authorization



交通部民用航空局  
Civil Aeronautics Administration, MOTC

UAV Operations Regulation

### Operators

#### Authorization

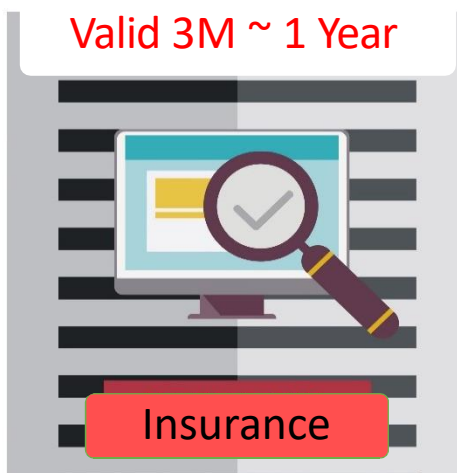
Valid 2 Years



1. Entity Certificate
2. UAV/RPL list
3. Operations Manual

#### Fly Permits

Valid 3M ~ 1 Year

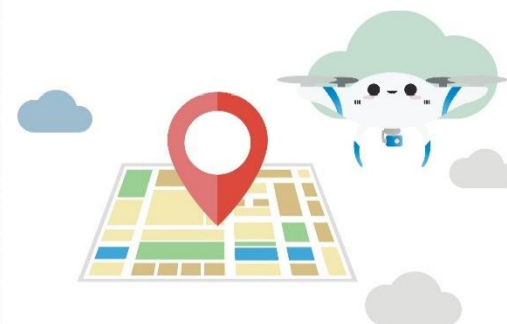


#### Insurance

- Valid 3 month in General
- Extend 1 Year for Special Permits

#### Log In/Out

Each Flight



Before T/O and After Landing

#### Violation at NoFlyZone:

NT\$30,000~150,000 fine (US\$1,000~5,000).

Drone may also be confiscated

#### Violation at Airport/Above 400Ft:

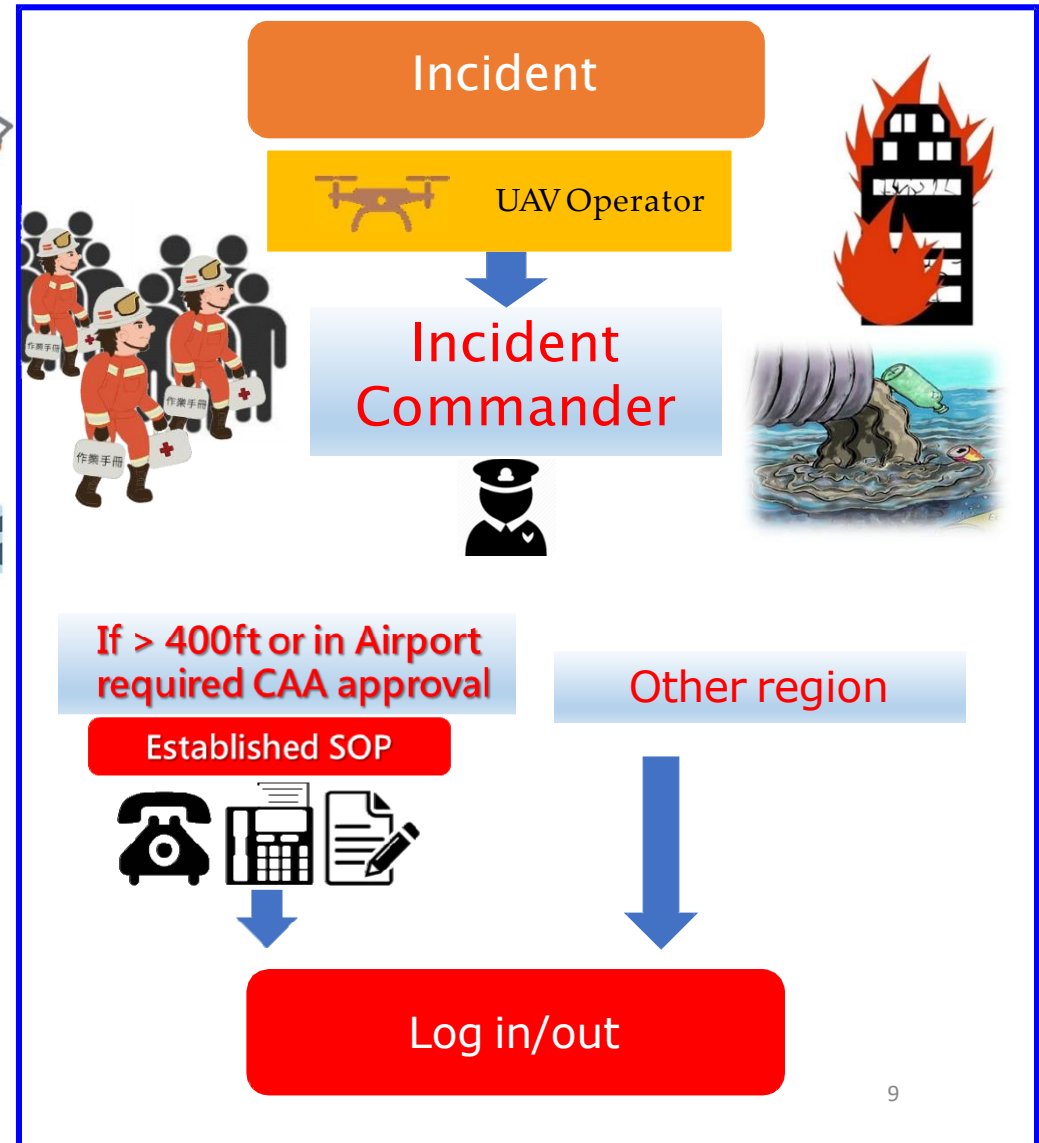
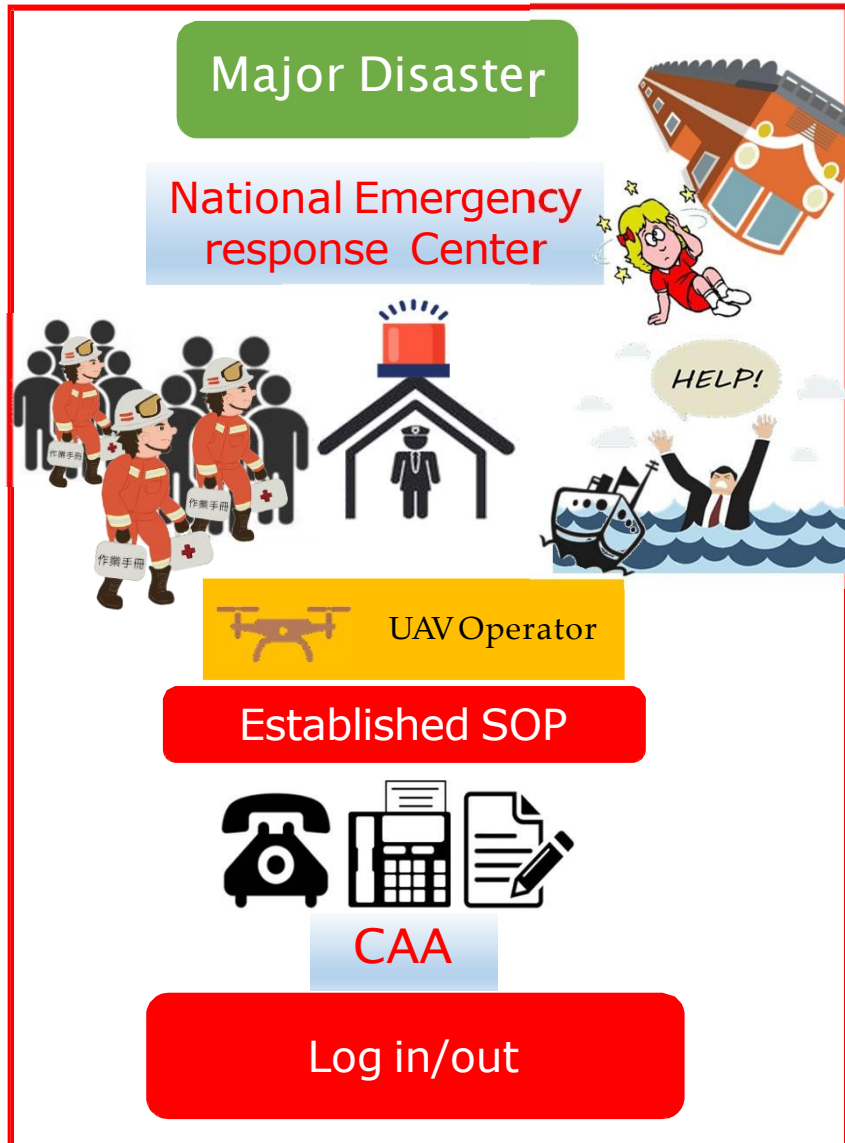
NT\$300,000~1,500,000 fine (US\$10,000~50,000).

Drone may also be confiscated



# UAV Oversight System- UOMIS UAV Operations Management Information System

## Disaster





# UAV Oversight System- UOMIS

UAV Operations Management Information System

Foreigner

Individual Person only



Apply on the UOMIS



Passport Copy



Accreditation

- ✓ Registration
- ✓ Certification
- ✓ UPL

Original Authority  
Copy



UOMIS to CAA

Valid for max to 6 month







# UAV Oversight System- UOMIS UAV Operations Management Information System

## UOMIS (UAV Operation Management Information System)

### ◆ UAV map Before Flying - APP

活動區域範圍查詢

### Check Your Spot Before Flying

City/County

臺北市

Category

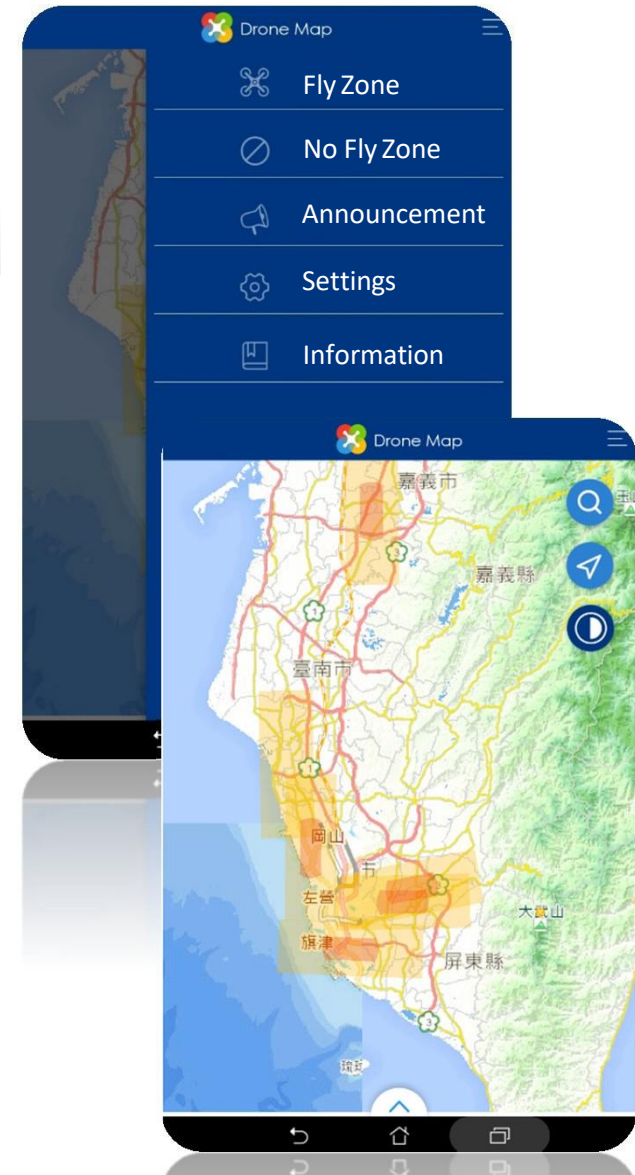
飛航情報限航區

Address

臺北市

中山區

Region







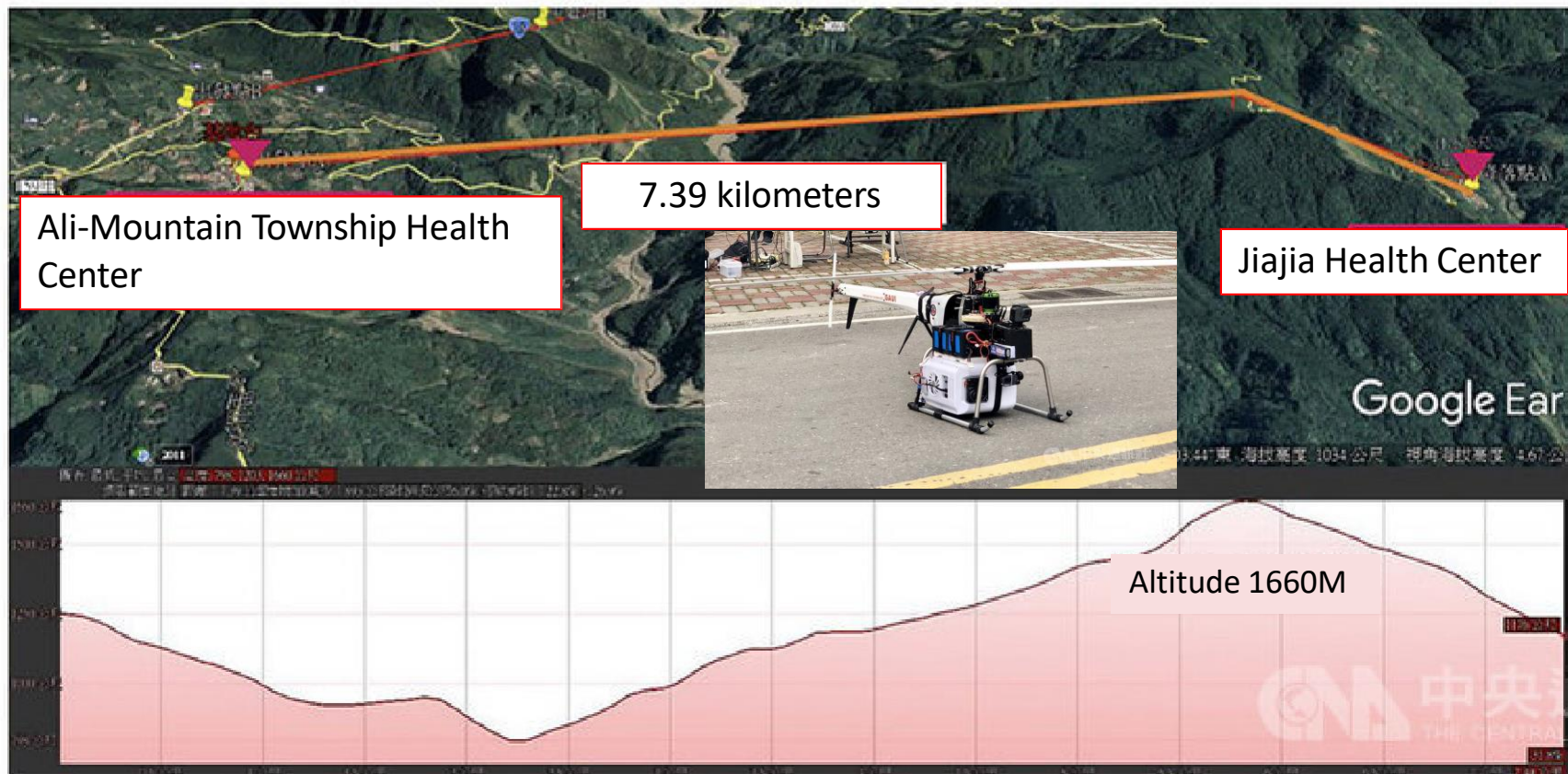
# UAV Innovation and Roadmap



## UAV Operations Test Program

"Ali-Mountain Remote Areas UAV Logistics Test" 2019

Allowing drones to fly over the valley and over a mountain to transport the snake serum to Lijia.



# APAC UCWG Meeting

(Unmanned Aircraft Certification Working Group)

- UCWG member

- FAA USA, CAAS Singapore, JCAB Japan, CASA/KARI Korea, NZ CAA, DGAC India, CASA Australia, CAA Taiwan, CAAC China

- Main Objectives

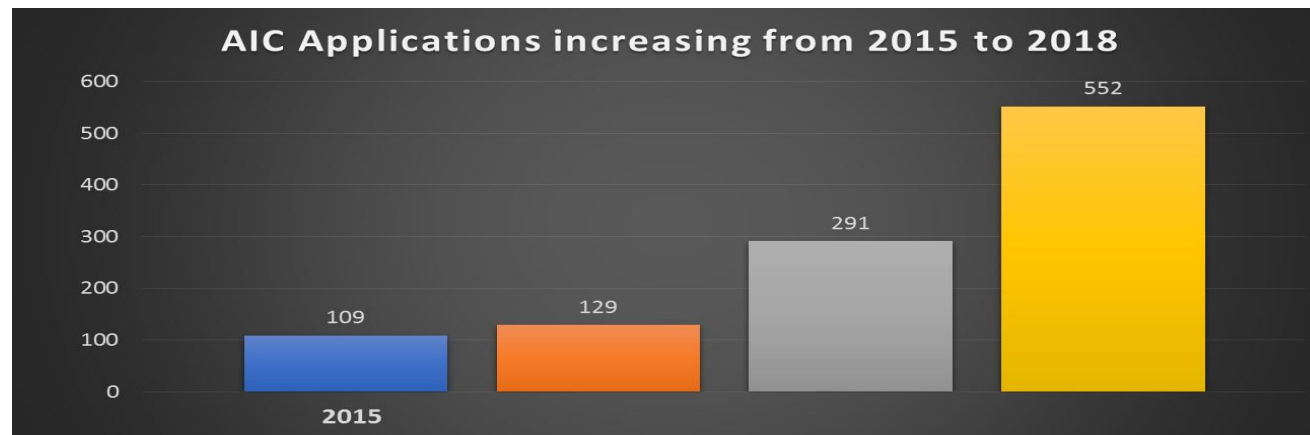
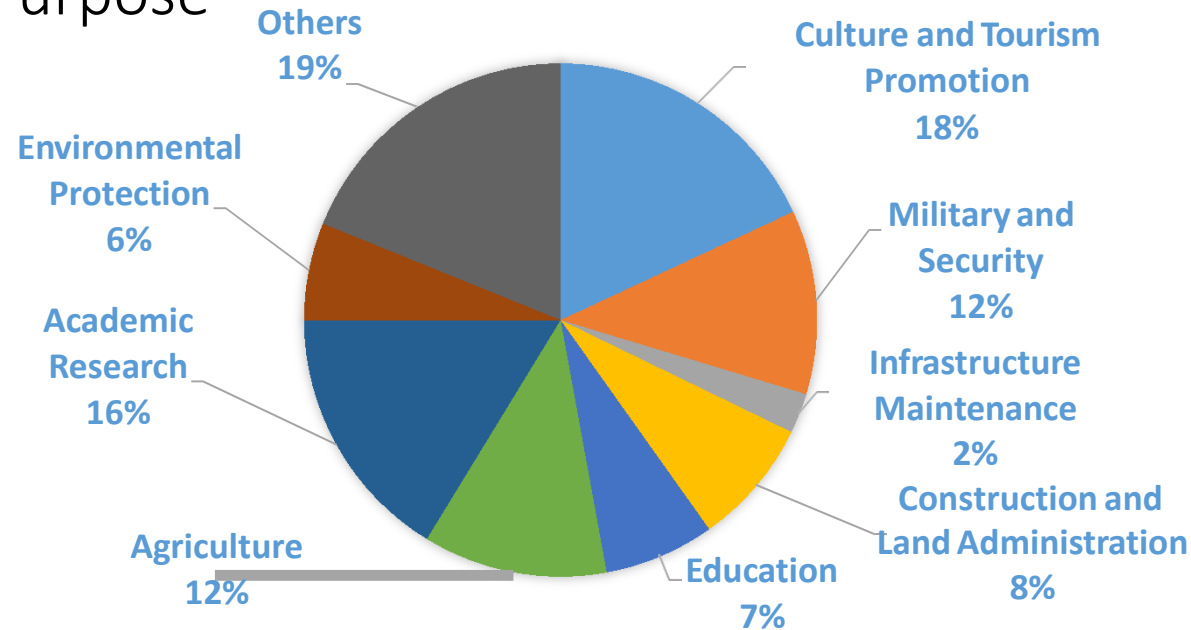
- Continue Collaboration/Harmonization of Risk-Based Certification Approach
- Discuss Progress in Each State – Changes to Regulatory Framework
- Share Methods of Implementation or Risk Analysis
- Share Regulatory and Technical Challenges



# UAV Innovation and Roadmap



## UAV Operations Status by Purpose





# UAV Roadmap

航空局  
Administration  
Communications



- MOTC Minister Lin Jialong announced the UAV Strategies and RoadMap

Pillars	Strategies	NEAR Term 2020	MID Term 2025	LONG Term 2030
Promotion	Logistics	Integrated Pilot Program, IPP	Verification	Urban Transportation
	Disaster		Monitoring	Data Link Transportation
	Traffic Data		Verification	Traffic Big Data System
	Infrastructure		Verification	Applications and Services
	Passenger		Reliability and Certification	Air Taxi
Supporting	R & D	Establish R & D / UTM Test Center		
	Global Cooperation	Integrate UAV Industries		
Environment	Regulation	Safety Risk and Innovation Oriental based		
	Training & Education	Professional Talent Training and Education System Linkage		

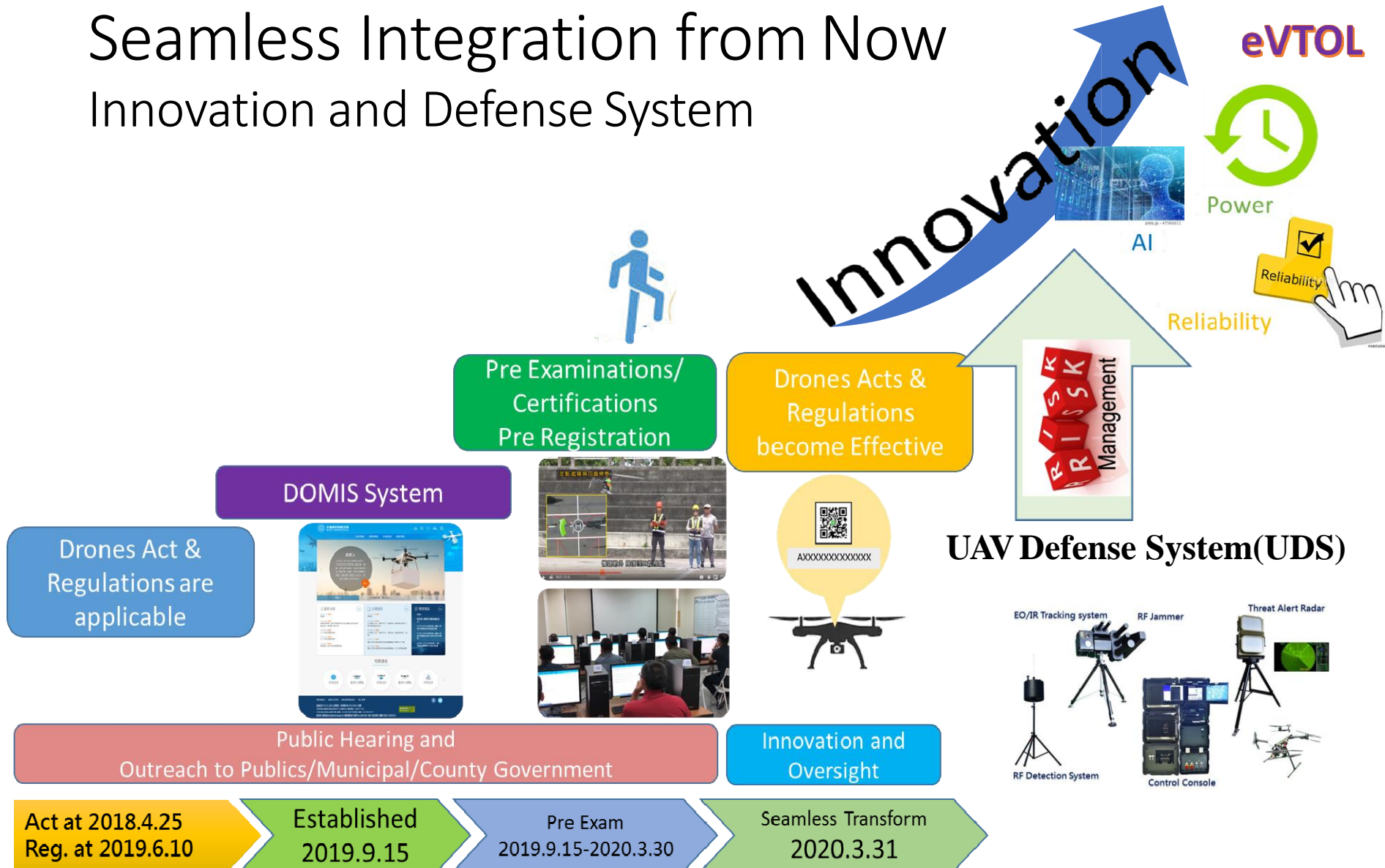




# UAV Innovation and Roadmap



Seamless Integration from Now  
Innovation and Defense System





# EXPLORE FLIGHT

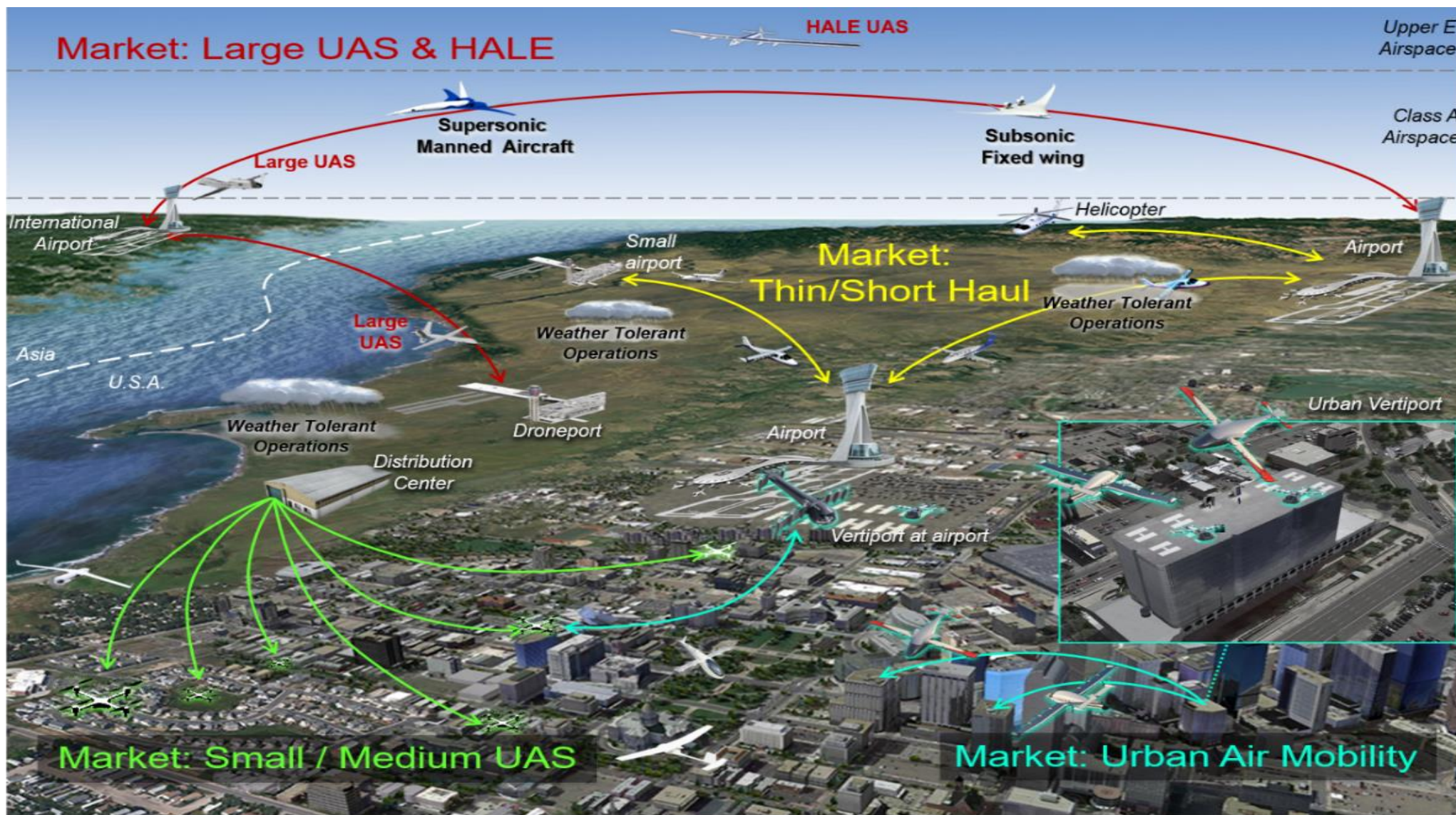
WE'RE WITH YOU WHEN YOU FLY

## Airspace Future Vision Beyond NextGen

Akbar Sultan  
Director, Airspace Operations and Safety Program  
November 4, 2019

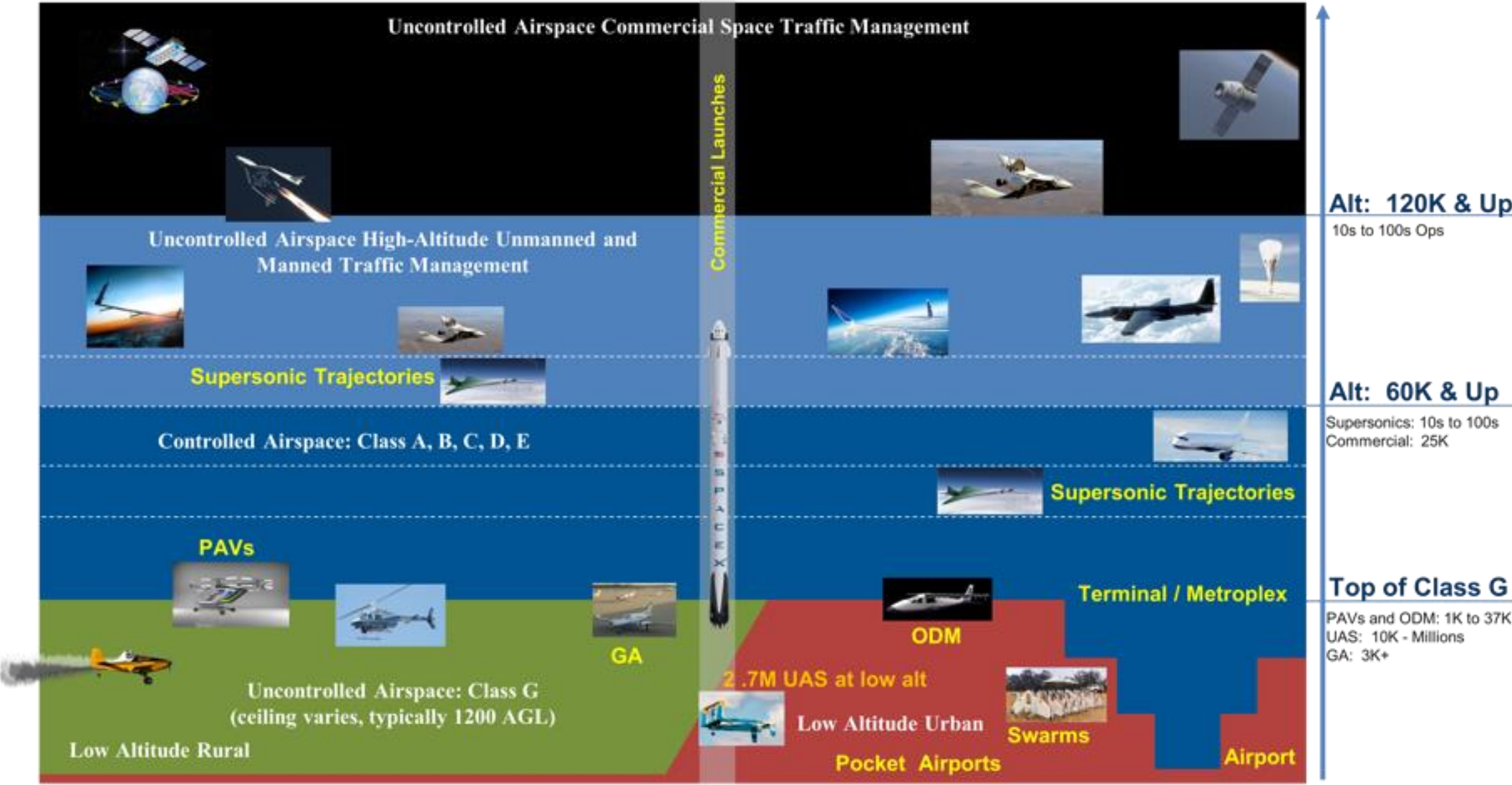


# Future Airspace

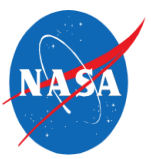




# Daily Flight Demand for All Users in 2025





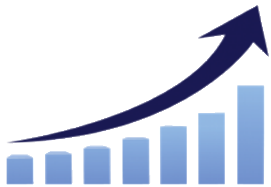


# Future System Tenets

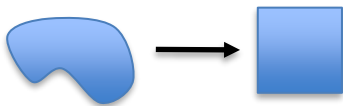
Goal: Enable safe efficient airspace access all users, vehicles, and missions by creating new airspace management concepts and technologies leveraging UTM principles



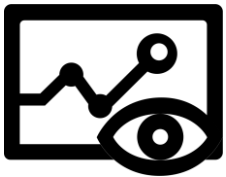
**Seamless access to the airspace** for users and missions—both on-demand (UAM, UAS) and scheduled (Supersonic, Space)



**Scalability for increased demand** across users and missions



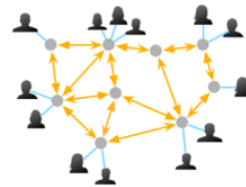
**Flexibility** whenever possible and structure only when necessary



**In-Time System Wide Safety**  
prognostic data driven  
identification of precursors  
and system V&V



**Collaboration** through integrated information exchange



**Resilience** to uncertainty, degradation, and disruptions



Increased availability and use of **user and third-party services**



**System and Data Security**  
Availability, integrity, privacy,  
transport, storage

# Conclusions

- **Authorities must harmonize the criterion of safety items, for example the category and requirements for UAV certification of safety technologies (e.g. ADS). It will promote UAV innovation and integration with manned operations**
- **Experts must convene to collect the different authorities' UAV rules. Critical information must be conveyed to foreigners who carry UAV to a specified country to ensure safe, responsible, compliant operations**
- **UAV Innovation forums must be facilitated to lead the industries and authorities sharing the safety concept. It will enhance the communication between parties**
- **Authorities must not be constrained by “this is how it has always been done” nor be told “enablers not available”. They should embrace and partner with the enablers**
- **We all must Socialize, Harmonize, Partner; We must establish safe initial margins and find the means to “Operate to Operate”**