

**37th Virtual UNISEC-Global Meeting**

# **A New Approach for Promoting the CubeSat Market in Taiwan**

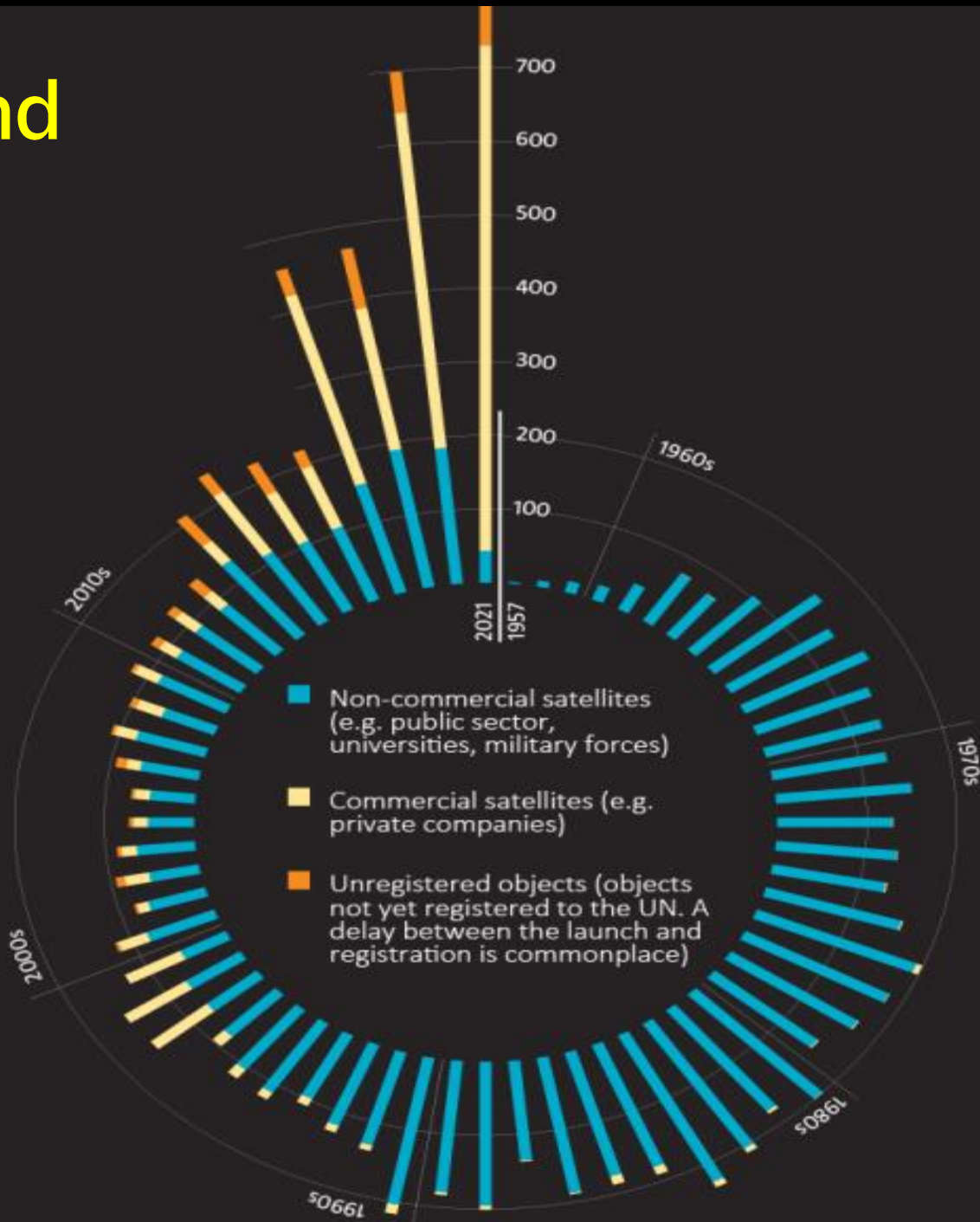
**Dr. Chia-Ray Chen**

**CubeSat Program Director**

**2023.09.16**

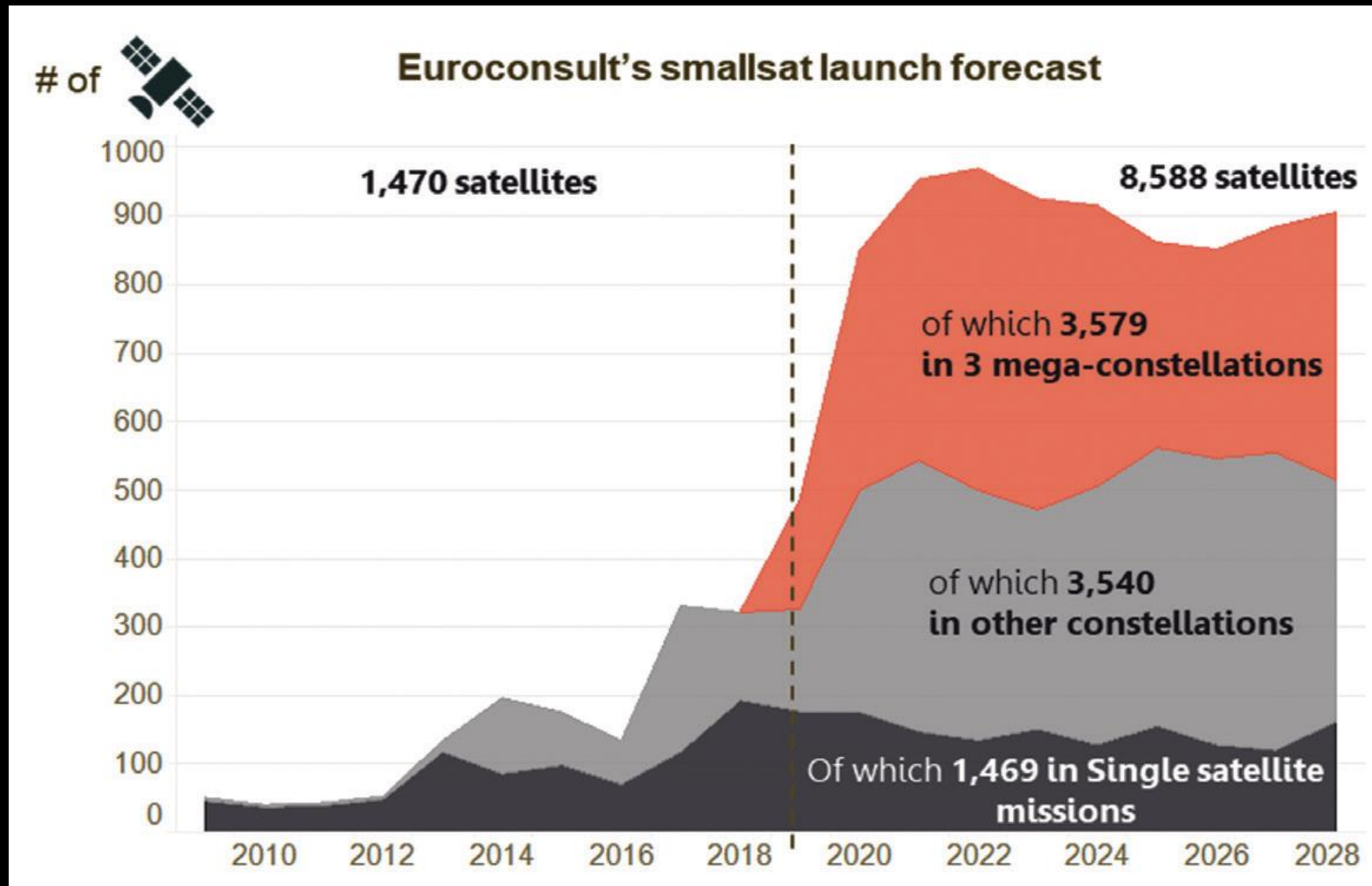
# Satellite Industry Trend

Non-commercial  
↓  
Commercial



<https://millenniumprize.org/news-articles/news/ever-more-ever-smaller-satellite-industry-trends-for-2020-2029/>

# Constellations



# Constellations



## Communication

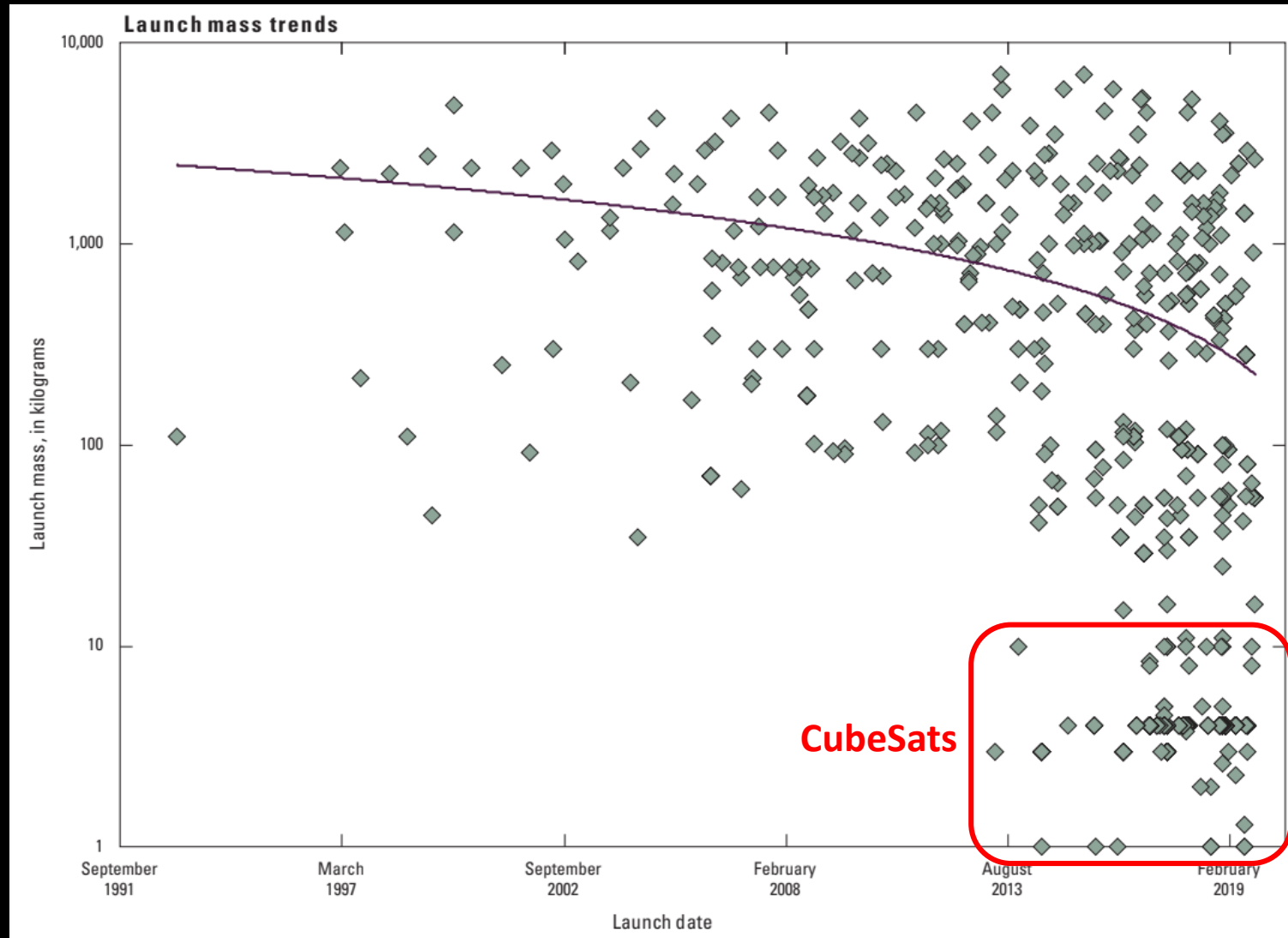
Ref. <https://www.airbus.com/en/space/telecom/constellations>



## Remote Sensing

Ref. <https://www.eoportal.org/satellite-missions/planet#passenger-payloads-53-of-the-vega-rideshare-mission>

# Trend of Earth Observation Satellite Launch Mass



# Why CubeSats?

- **Cheaper?** Yes. Constellation is affordable.
- **Faster?** Normally yes. Constellation of CubeSats can be deployed in a short time.
- **Easier?** Not really. All the processes from CubeSats design to launch are similar to those of traditional satellites.

The sparrow may be small but it has all the vital organs.

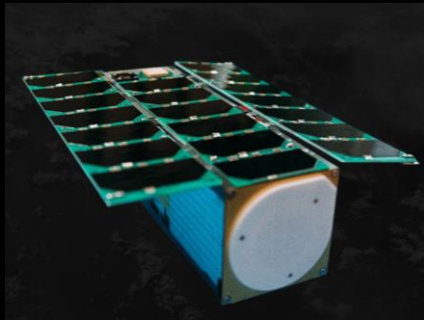
麻雀雖小，五臟俱全





# Initiative CubeSat Program (2017~2022)

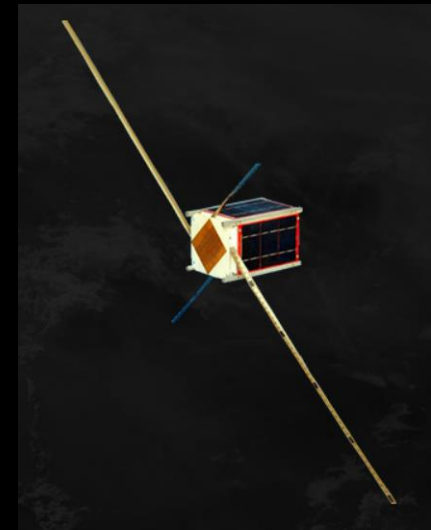
- To build a sustainable Taiwanese space industry, Taiwan Space Industry Development Initiative - Micro-satellite Development Program, including CubeSat program, has been executed by Taiwan Space Agency (TASA).
- The purpose for this CubeSat program is to cultivate new generation talents for space technologies and to generate CubeSat commercial products.
- This CubeSat program has started since 2017 and aimed to launch 3 CubeSats in 2021~2022.



IDEASSat (3U)



NutSat (2U)



YUSAT (1.5U)

# Initiative CubeSat Program (2017~2022)

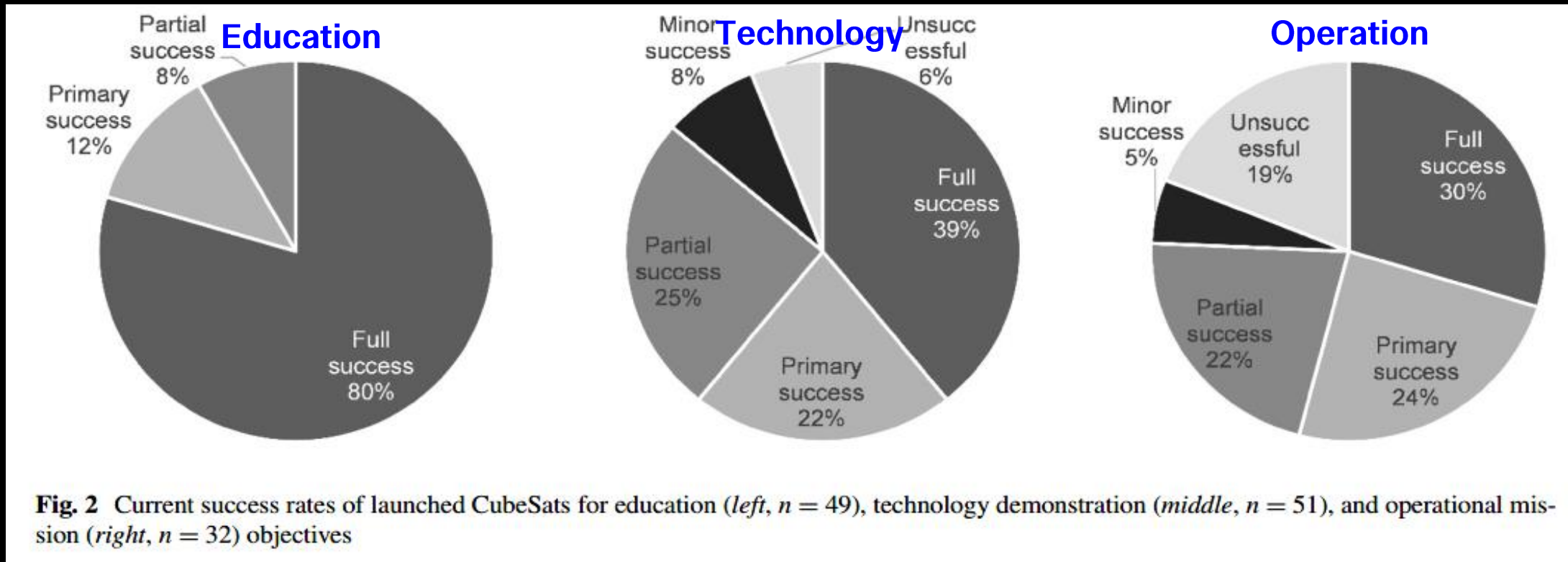
- Three CubeSat project teams were formed in this program.
- From education point of view, we had good achievements because all teams got valuable lessons learned and had CubeSat follow-on activities.
- From commercial point of view, the local space industry was not changed too much.

*Why?*



# Lessons Learned Initiative CubeSat Program

- The mission objective of each project is important because it will influence the final result. Educational, technology demonstration, and operational missions will have different requirements in the design, manufacture, tests, and mission operation.



# How to promote the space industry? (1/3)

## Satellite component :

- It's easy for a company to develop a satellite component with their domain know-how. However, it's hard to find the chance of flight demonstration because it cannot work without a bus platform.
- For satellite components, flight heritage is important because we cannot fix hardware in space.
- Because there are lots of flight-proven components in the world, the new component is hard to be competitive unless it has special features or good performance.

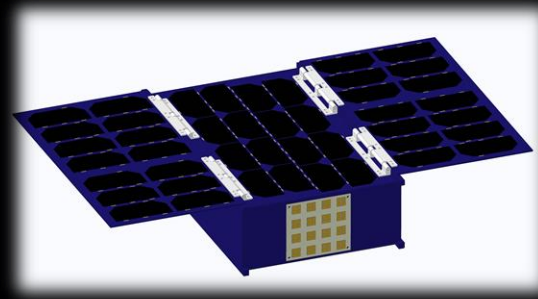


Ref. <https://www.cubesatshop.com/products>

# How to promote the space industry? (2/3)

## Satellite system :

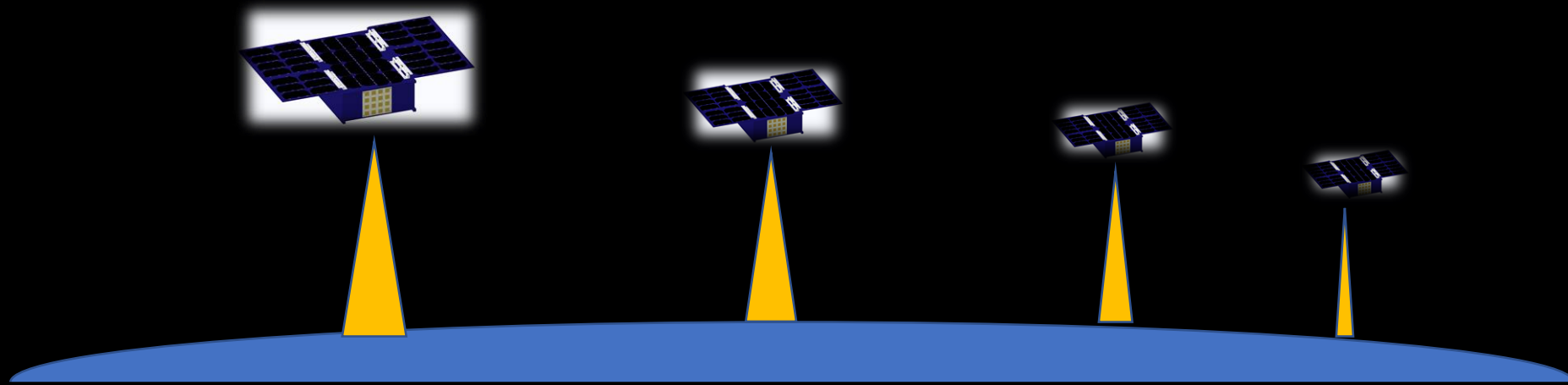
- It's not easy for a company to build a satellite alone if they don't have space product experience. However, a satellite system can fly alone.
- Similar to the case of satellite components, a new satellite system should have special features or performance in order to be competitive.



# How to promote the space industry? (3/3)

## Satellite service :

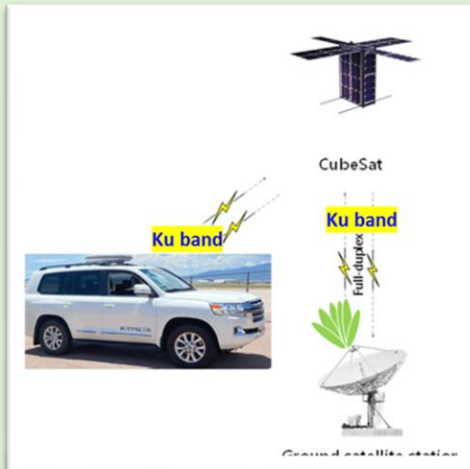
- Satellites should be able to provide constantly stable and valuable service to the customers.
- In order to meet the service requirements, a constellation of satellites is necessary and CubeSats should be a good choice.



# Pathfinder of the Startup CubeSat Program (2022~2024) ✨TASA

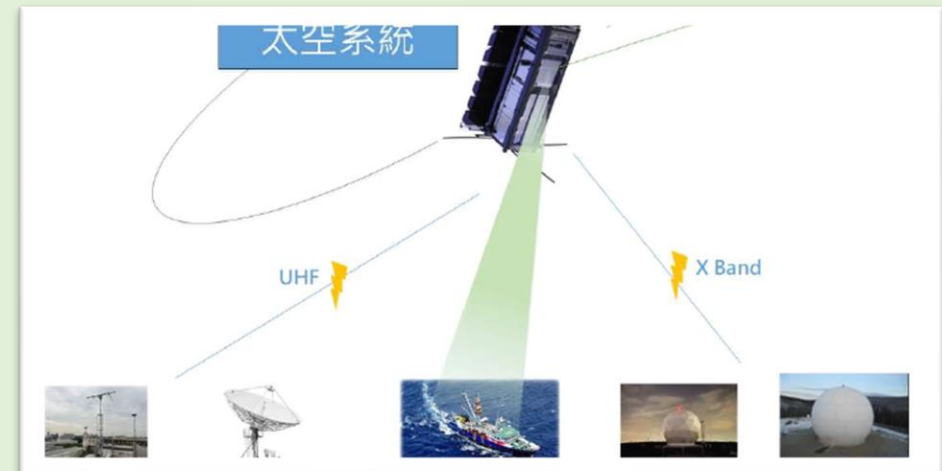
- The pathfinder of the Startup CubeSat Program was approved by the National Science and Technology Council (NSTC) in September 2022.
- There are two 3U CubeSat projects: one is for communication, and the other is for remote sensing. Both are anticipated to launch in the middle of 2024.
- It's a feasibility study of the Startup CubeSat Program (2023~2031).

- The 3U Communication CubeSat will demonstrate the function of satellite IoT for the applications such as environmental monitoring, agriculture, automobiles.



Source: Rapidtek

- The 3U remote sensing CubeSat will observe the concentration of chlorophyll on the ocean surface to assist the pelagic fisheries.



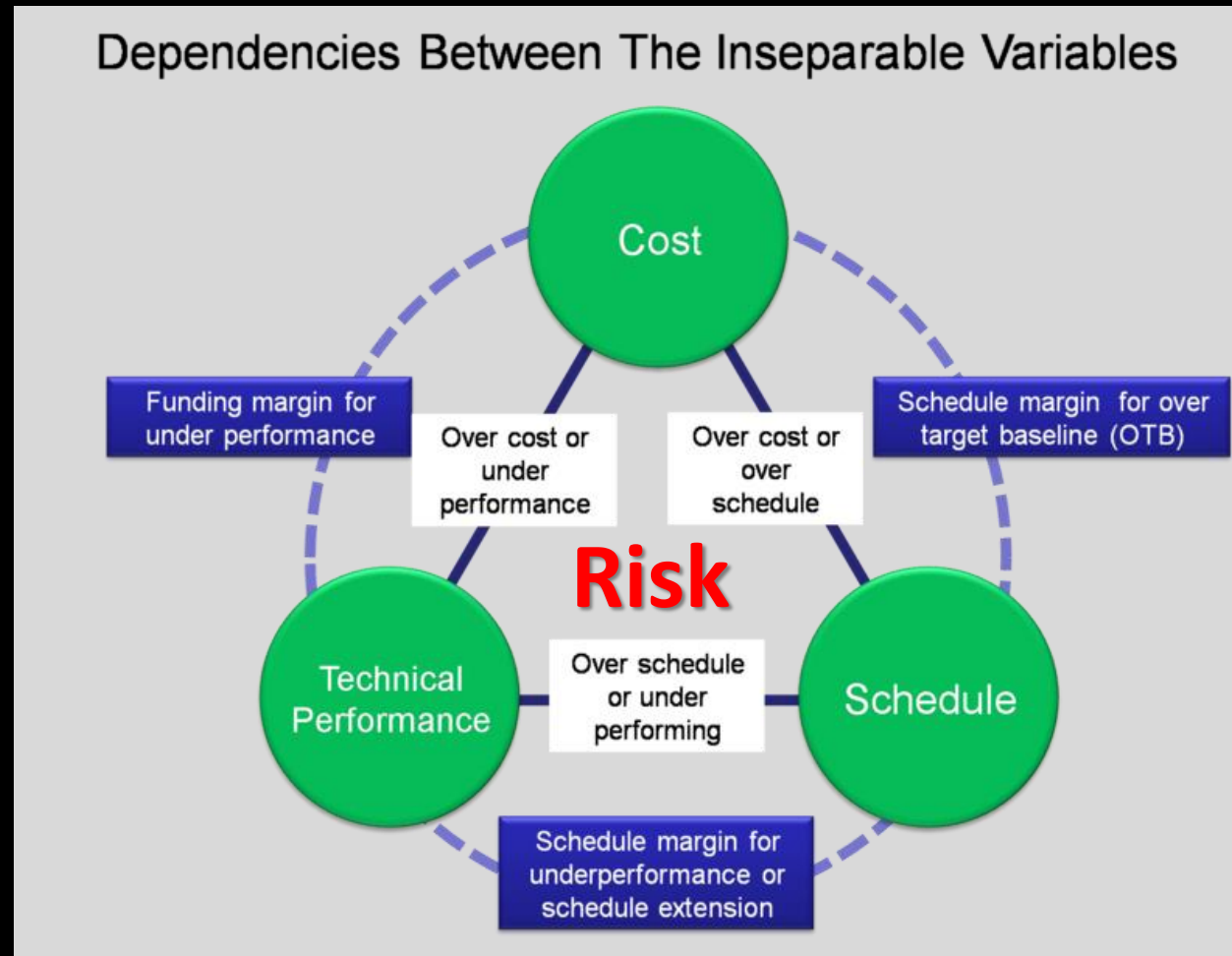
Source: Pyras

# FAQ for New Players

- **Mission Analysis:**
  - Feasibility study
- **Satellite Design and Analysis:**
  - System engineering, design rules, and analysis tools
- **Hardware Manufacture:**
  - Material selection and special processes for space products
- **Component and System Testing:**
  - Test specifications and test facilities
- **Launch and Flight Operation:**
  - Interfaces, ground system, and operation guideline

# Risk Assessment

- The cost-effective approach in the CubeSat project means that we cannot follow the same rule as traditional satellites do. However, the tradeoff is a dilemma, especially for a new player.

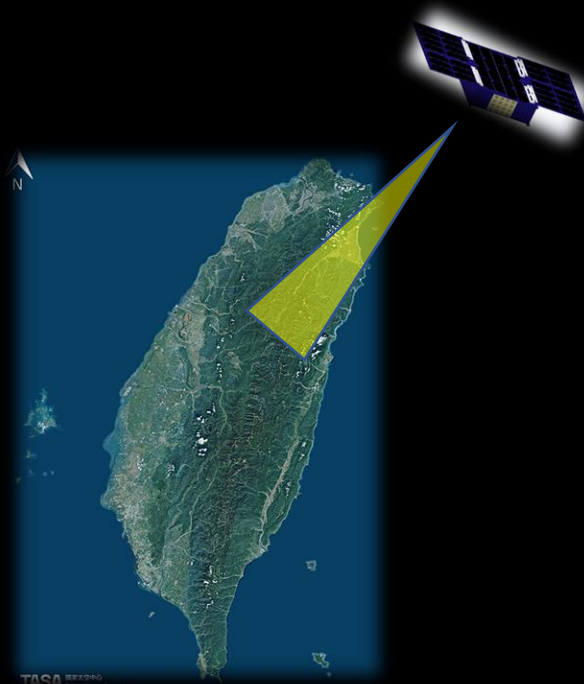


Ref. Risk Management and Project Principles and Practices



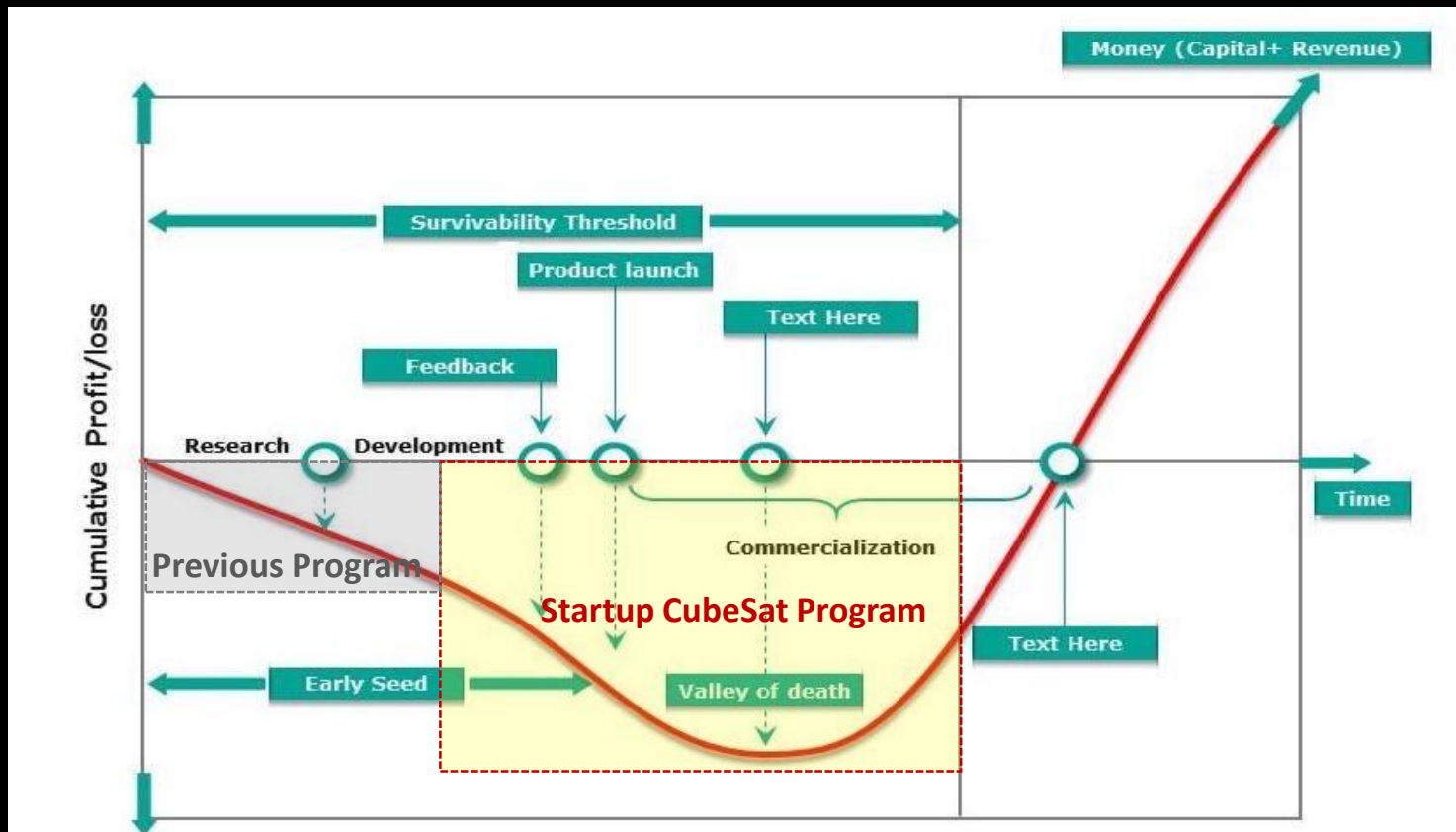
# Startup CubeSat Program (2022~2031)

- The Startup CubeSat Program was officially approved by the National Science and Technology Council (NSTC) in May 2023.
- The program plays the role of a space startup incubator in Taiwan.
- We are going to have communication, IoT, and remote sensing missions in the first phase of the Startup CubeSat Program, i.e. 36 months.
- The constellation of four 6U (or 8U) CubeSats on each mission can provide better services than one CubeSat does.



# Startup CubeSat Program (2022~2031)

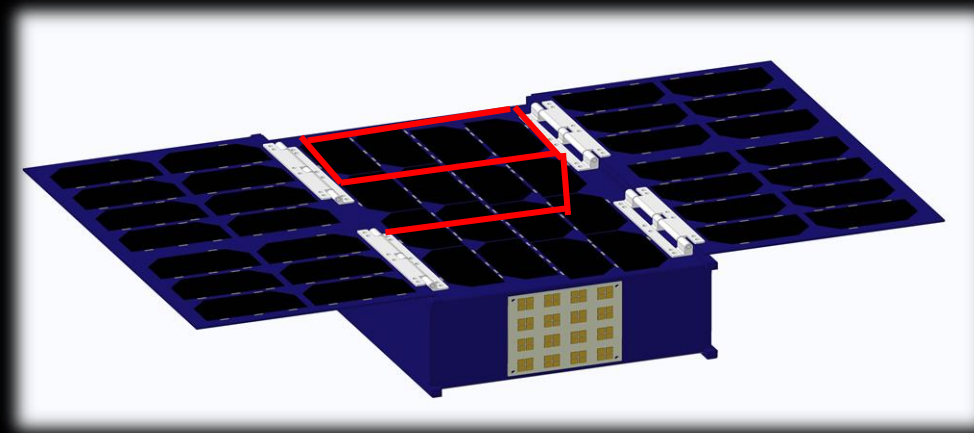
- The budget for each 6U(or 8U) project will cover the whole processes from CubeSat design, manufacture, testing, launch, and flight operation.
- The proposals should be technically feasible and the business model should be sustainable.
- TASA would like to help the local companies complete the proof of concept (POC) and survive the valley of death.



Ref. How To Survive The 'Valley of Death' as an Entrepreneur?

# Startup CubeSat Program (2022~2031)

- TASA reserves six 2U space in the first phase of the Startup CubeSat Program for the flight demonstration of new components or payloads developed in Taiwan. We would like to have more and more local space products in Taiwan.



# Summary

- From the lessons learned of the Initiative CubeSat Program from 2017 to 2022, TASA proposed a different approach for promoting the CubeSat market in Taiwan.
- The Startup CubeSat Program plays the role of a space startup incubator in Taiwan.
- We are going to have communication, IoT, and remote sensing missions in the first phase of the Startup CubeSat Program (2023~2026).
- TASA would like to help the local companies complete the proof of concept (POC) of their proposed missions and realize the business models in the near future.

*THANK YOU FOR YOUR PATIENCE*