Introduction to CubeSat Salon

Mengu Cho
Laboratory of Lean Satellite Enterprises and In-Orbit Experiments
Kyushu Institute of Technology, Kitakyushu, Japan

June 21, 2025
UNISEC Global Virtual Meeting

UNISEC's Mission Assurance Activities

- It started with the pandemic (Spring, 2020)

Source: Nikkei Shinbun

Utilization of the time that suddenly became available

UNISEC's Mission Assurance Activities

- Remote sessions on lessons learned from university satellite

参加者写真

- Survey on the lessons learned w/r/t mission assurance
  - Sponsored by JAXA
  - Report (439 pages!, sorry Japanese only) on
    - Analysis about the success and failure cases and their causes.
    - Extraction of requirements for mission assurance

UNISEC's Mission Assurance Activities

- Following the activities in 2020, in 2021 UNISEC members worked on
  - Root cause analysis of the failure cases
  - Based on the activities, "Mission Assurance Handbook for the University-built Lean Satellite" was published in March 2022.
  - Currently 4th version (published in March 2025)

To download use this link

CubeSat Salon

- During the Mission Assurance (MA) activity of FY 2021, discussed the best way to assist university satellite MA and identified
  - ”Assisting the mission definition phase in the early stage of the project is effective”
- Earlier than conceptual design phase
  - –Frankly point out
    - Can you do it?
    - How do you make a satellite to achieve your mission
    - How are you going to make your satellite
  - –Give advice
    - Perhaps, this is doable
    - Where to go to ask for a help
    - It is not doable
  - –Relaxed environment over a cup of coffee/tea, etc.
    - Naming “CubeSat Salon”

CubeSat Salon

- Newcomers (university and companies) need helps
- Advices by external reviewers are very effective at the mission definition phase
  - Mission planning
  - Mission feasibility
  - Optimum satellite bus selection for a given mission
  - System lifecycle planning
  - Introduction of helpers and collaborators
- A place to provide consultation for the newcomers
  - A very low barrier for knocking the door
  - *CubeSat Salon*
- **Started July 2024**
  - Joint activity by Kyushu Institute of Technology and JAXA
  - UNISEC as a secretary

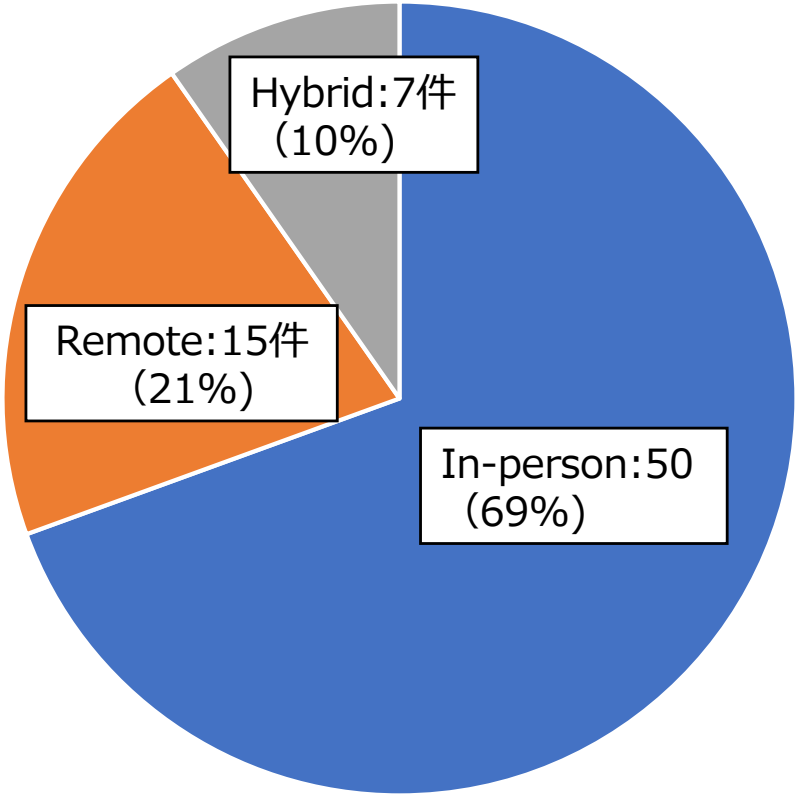
CubeSat Salon

- Keeping the door wide open
- Relaxed atmosphere over tea/coffee
- **All free**

At Nihonbashi
（Walking distance from Tokyo station)

Activity of FY 2024

- In Fy 2024 (24/7~25/2), 72 sessions (1 hour/session)
- Repeater (multiple sessions) 14
- Company ：62%（47）、Educational：29%（18）、Others：９%（7）



Basically, we can talk anything

Contents	Sessions
CubeSat	28
Project management	9
Radiation	8
How to enter the space sector	7
Collaboration with others	6
Spacecraft charging	5
Human resource development	5
Camera	4
Print Circuit Board	4
Funding	3
Soldering	3
Space environment effect mitigation	3

Goal of Lean Satellite MA

- Improve the mission success rate of lean satellites so that they can be used more
  - Especially university and new companies
- Objectives
  - Lean satellites have the mission success rate high enough to be used for the national space program
  - Lean satellites are already used in US/Europe in the national programs
    - Cutting-edge science
    - Provision of weather data
    - Provision of images for national securities
  - Japan is a lap behind

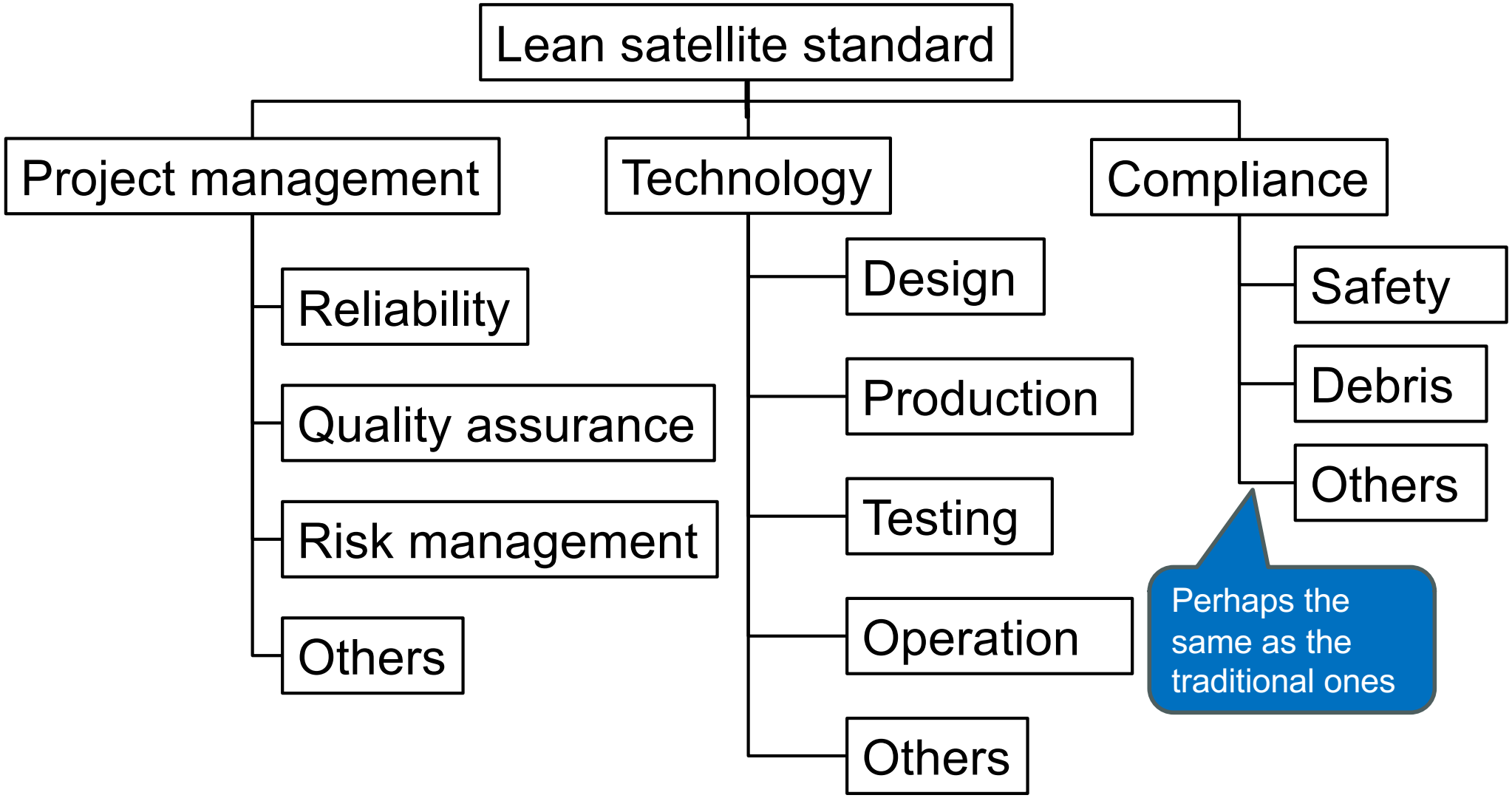
Mission classification and expected mission success rate

Mission classified		Contents	Expected success rate (%)
7	National security project	Provide data to national security (defense) projects	95
6	Civil project	Provide data to national civil (e.g. weather) projects	90
5	Science	State-of-art science observation and deep space exploration.	80
4	Constellation pathfinder	Constellation pathfinder (in-orbit prototype) for space business	70
3	Outsourcing	A satellite built by outsourcing with external funding	60
2	University research	A satellite built for research purpose with university's own funding.	50
1	University education	A satellite built for education purpose	25

To improve the mission success rate of lean satellites

- Lean satellites should be used in higher-level missions
  - Chicken and egg situation
- Make stakeholders (ex: government) order the high-level mission with confidence
  - Track record of the contractor
  - Guarantee the success rate
    - Program and project management based on standard normative documents
- **Standard (normative) document**
  - Top-down (Tailoring of the current documents)
  - Bottom-up (Produce a new sets of documents)

Standard document tree



To make standards

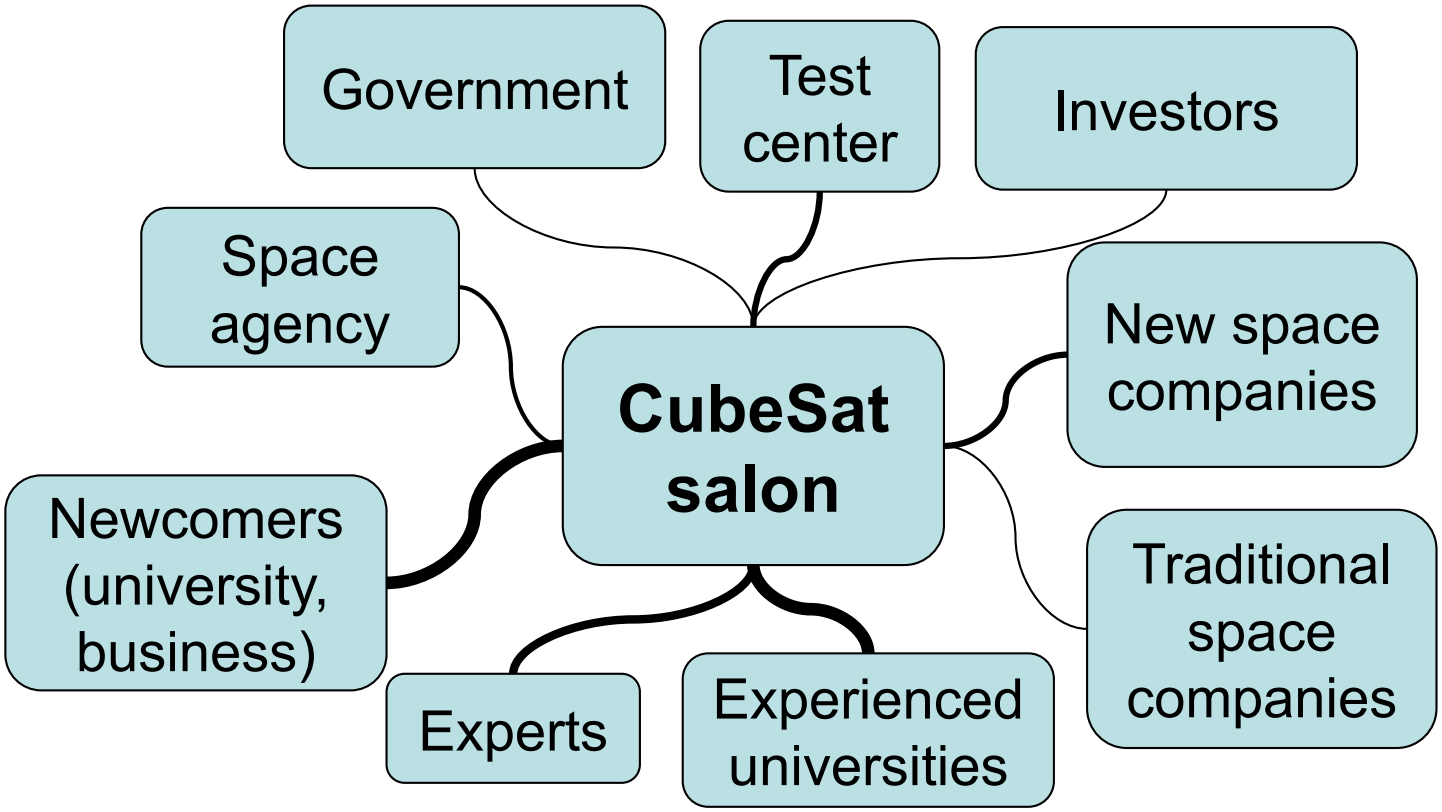
- Necessary items to make standard documents
  - Knowledge gained from the past missions
  - Theoretical background
  - Evidence obtained by experiments
- Traditional satellites
  - Based on knowledge and research since 1957
  - Space agency have the mission results
- Lean satellites
  - Research cumulation is insufficient
    - May research for development. But very little research about “This worked”, “This is risky”, etc.
  - Many flight results (more than 2600 for 10kg or smaller)
    - Many failure cases → Ideal for Machine Learning!
  - **Many small team do missions**
    - **Not enough sharing of mission results and lessons learned**
  - **Need mechanism to share the mission result and lessons learned**
    - Possible for university satellites. Others are the problems.

Same for lean satellites and traditional satellites

Use of CubeSat Salon!

CubeSat salon

- CubeSat salon can play the networking role
  - Connect between company-university, company-company, university-university
  - Introduce universities and facilities that can assist throughout the system lifecycle
  - Sharing of lessons learned
- Become the information hub of lean satellites



Overseas session

- Based on the success of FY2024 activity, the consultation service will be extended to overseas entities
  - Collect more information about lessons learned
    - Get involved with each project from the early phase
- Consultation record will be anonymized and analyzed for the purpose of data collection toward lean satellite standard making
- Two slots (2 times a month)
  - 9:30-10:30
  - 16:30-17:30
- Attended by
  - Kyutech
  - JAXA
  - UNISEC

Mengu Cho

Hiroki Akagi

Reservation page