40th Virtual UNISEC Global Meeting

Tohoku University, Associate Professor Dr. –Ing. Toshinori Kuwahara
UNISEC-Japan, Chairperson

January 20, 2024

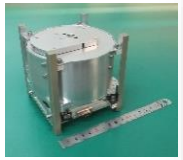
UNISEC-Japan 20th Anniversary Ceremony

CubeSat 20th Anniversary Symposium

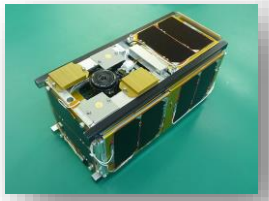
UNISEC-Global

- 10th Anniversary (@2023)
- 9th UNISEC-Global Meeting (On Site), X-NIHONBASHI, NIHONBASHI, Tokyo
- 40th Virtual UNISEC-Global Meeting

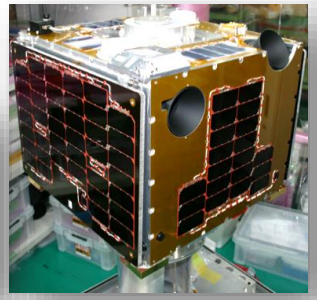
Speaker Introduction



FREEDOM



RAIKO



RISESAT

ALE-1 © ALE

ALE-2 © ALE

ELS-R500 © ElevationSpace

Toshinori Kuwahara, Dr. –Ing.

2015 - Associate Professor, Department of Aerospace Engineering, Tohoku University

2017 - Technical Advisor, Nakashimada Engineering Works, Ltd.

2017 - Technical Advisor, ALE Co., Ltd.

2020 - Chairperson, University Space Engineering Consortium Japan (UNISEC)

2021 - Co-founder/Director, ElevationSpace Inc.

UNISEC
University Space Engineering Consortium

Research Topics:

Space Development, Utilization, and Exploration by Small Spacecraft Technologies

UNISEC: University Space Engineering Consortium

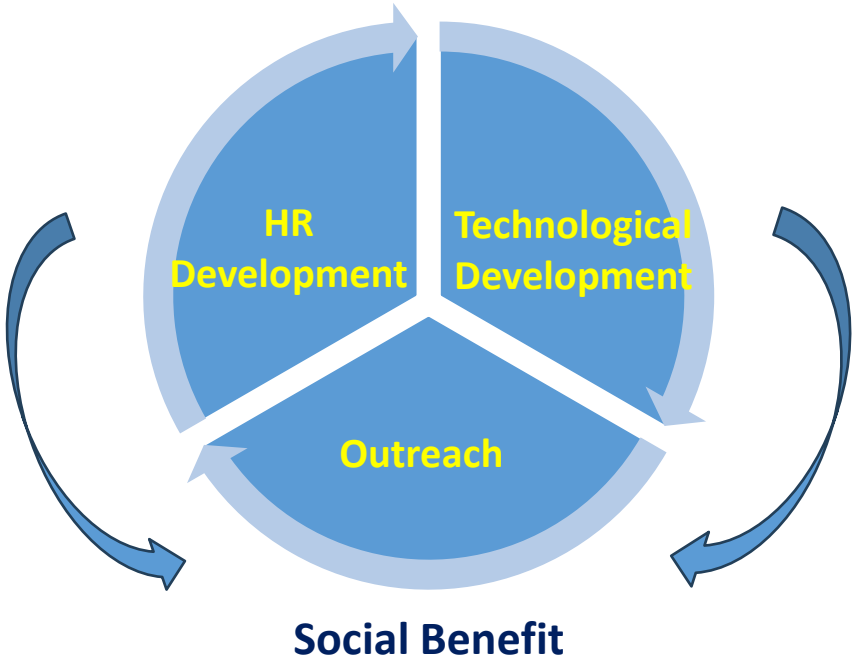
UNISEC-Japan – Japanese Non-Profit Organization

- Three main subjects: *Human Resource Development*, *Technological Development*, and *Outreach*.

- UNISEC-Japan consists of
  - 39 Universities and research institutions
  - 54 organizations
  - 805 student members
  - 246 individual and 28 cooperate members
  - alumni members

July, 2023

- UNISEC-Japan members maintain cooperative relationships in conducting practical space development and utilization.



Space Engineering and Capacity Building Activities of UNISEC

Activities

Hands-on Training

- CANSAT, CLTP (CANSAT Leader Training Program)
- HEPTA-Sat Training
- Hybrid Rocket
- ARLISS: A Rocket Launch for International Student Satellites

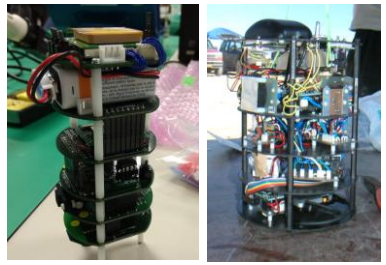
Practical Implementation

- CANSAT Working Group
- **Rocket Working Group** ⇨ **Commercial Rocket**
- **Satellite Working Group** ⇨ **Commercial Micro-satellites**

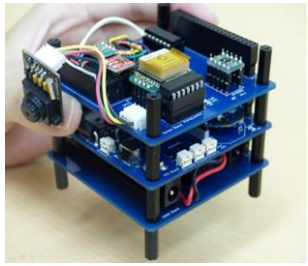
Academic Research Advancement

- UNISEC Academy – Space Engineering Lecture Series
- UNISEC Space Takumi Conference / Journal
- Micro and Nano-satellite Lessons Learned Research Group
- Publications

- MIC: Mission Idea Contest
- Workshop
- Safety Assurance Support
- Frequency Allocation Support (for satellites)
- Various diverse events (Such as Space Job Fair)



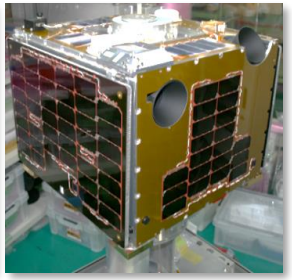
CANSAT



HEPTA-SAT

ARLISS

CANSAT



Satellite

Rocket

UNISEC: University Space Engineering Consortium

UNISEC's Satellite Projects and Space Engineering Education Activities

Space R&D activities at universities enabled a variety of space exploration, development and utilization!

UNISEC: University Space Engineering Consortium

History of UNISEC, UNISEC-Global, and cooperation between JAXA and UNISEC

2003 - Establishment of Non-Profit Organization UNISEC in Japan (UNISEC-Japan)

2013 - Establishment of UNISEC-Global

2017 - Permanent Observer Status of COPUOS (UNISEC-Global)

2020 - ◆ **UNISEC Academy**: space engineering lecture series (in Japanese)

2020 - ◆ **Mission Assurance Working Group** for micro-satellites

2021 - Comprehensive cooperation agreement with JAXA on

" ***Academic use and human resource development using microsatellite releases opportunities from the Japanese Experiment Module of the International Space Station Kibo*** "

◆ **KiboCUBE Program**: JAXA/UNOOSA capacity building including CubeSat release from the ISS.

◆ **KiboCUBE Academy**: JAXA/UNOOSA/UNISEC International space engineering lecture series.

◆ **J-CUBE Program**: JAXA/UNISEC capacity building for Jap. univ. and international partners.

2023 - Celebration of 20th Anniversary

Future Outlook of Small Satellite Technologies

UNISEC's Engineering Road Map

UNISEC-Japan's Engineering Road Map

1. Setting **new frontier development goals** and further promoting the **practical development, utilization, and exploration of space**. This includes Moon, planet, and deep space exploration.
2. Assuring the **S&MA (Safety & Mission Assurance) technology level** of space systems. Improve the success rate of academic/industrial space missions in order to enhance NewSpace businesses and international space education and capacity building.
3. Enhancing **cooperation between different space engineering R&D fields**, such as satellite system, rocket motors, electric propulsions, planetary rovers, space architectures, etc.

Best engineering missions provides best educations to young engineers.

http://unisec.jp/unisecen/presidenten (En)

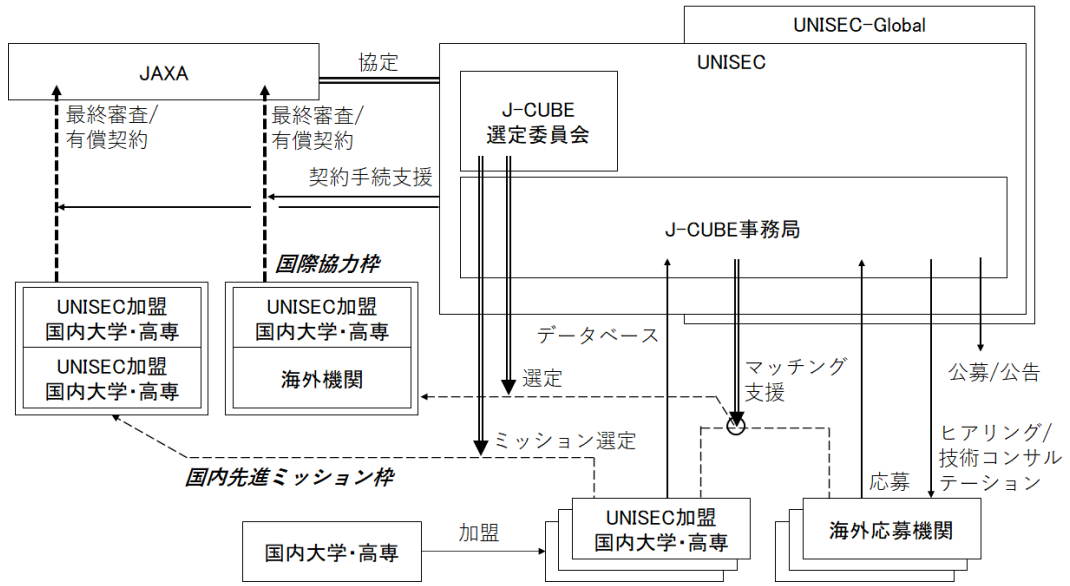
Future Outlook of Small Satellite Technologies

Road Map 1: Setting **Practical development, utilization, and exploration of space**

- KiboCUBE: United Nations/Japan Cooperation Program on CubeSat Deployment from the ISS-Kibo for educational or research institutions from developing countries of United Nations membership.
- UNISEC supported KiboCUBE Academy implementation providing online space engineering lectures.
- J-CUBE: Provides CubeSat release opportunities from ISS, organized by JAXA supported by UNISEC.

KiboCUBE

J-CUBE



* https://www.jaxa.jp/about/president/presslec/202104_j.html

UNISEC: University Space Engineering Consortium

UNISEC-Global

- UNISEC-Global is an international nonprofit, non-governmental organization, consisting of local-chapters.
- Aim to create a world where space science and technology is used by individuals and institutions in every country and offers opportunities across the whole structure of society for peaceful purposes and for the benefit of humankind.

24 Local Chapters with 65 POC.

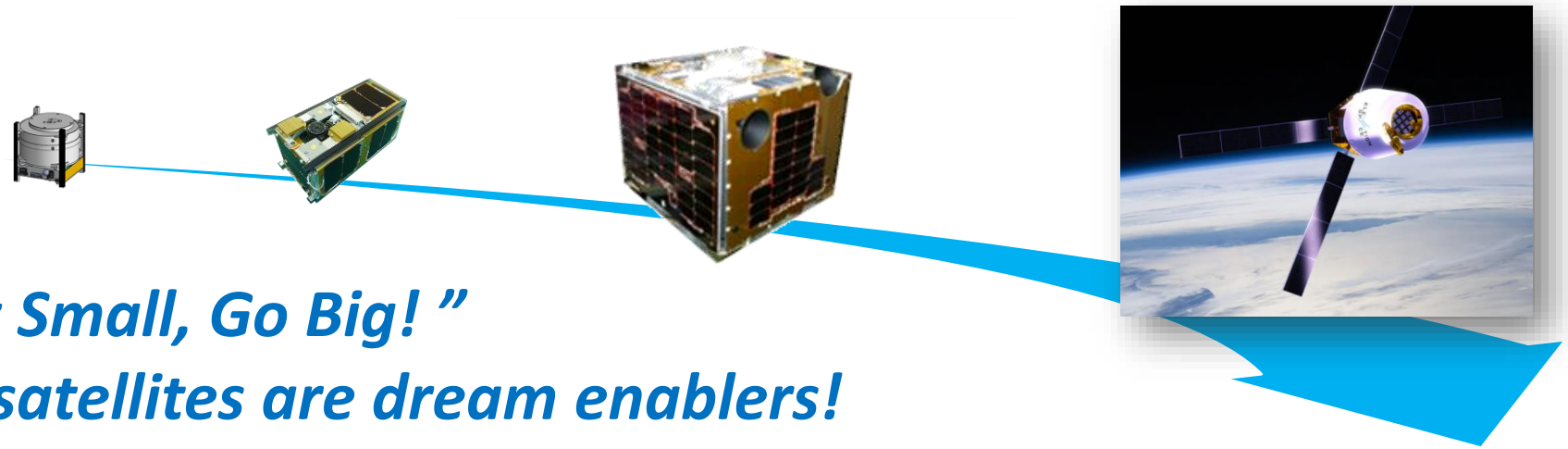
July, 2023

Vision 2030-All

"By the end of 2030, let's create a world where university students can participate in practical space projects in all countries."

Concluding Remarks

- Japanese universities are contributing to international space education and human capacity building activities through practical small satellite projects, collaboratively working together with international partners, students, and NewSpace companies. **Small satellites have become a major game-changer** in the world.
- UNISEC / UNISEC-Global is playing an important role in **international capacity building with 20 years of history** and dozens of small satellite projects. UNISEC is providing international capacity building trainings, space education lectures, arrangement of launch opportunities, and technological road map to the community.
- Japanese **Industry-Academia-Government (-NGO/NPO) cooperation** is contributing to international space capacity building with attractive features of collaborative hands-on R&D, comprehensive space education, governmental support programs, and flexible launch opportunities.



" Start Small, Go Big! "

Small satellites are dream enablers!

UNISEC Academy: https://unisec.jp/service/lecture (JP)

Mission Assurance WG: https://ma.unisec.jp/ (JP)

KiboCUBE Program: https://www.unoosa.org/oosa/en/ourwork/access2space4all/KiboCUBE/KiboCUBE_Index.html

KiboCUBE Academy: https://www.unoosa.org/oosa/en/ourwork/access2space4all/KiboCUBE_Academy_Webinars.html

J-CUBE Program: https://humans-in-space.jaxa.jp/kibouser/pickout/73227.html (JP)
https://unisec.jp/service/j-cube (JP)

Thank you very much.

For more Information:

: Prof_Kuwahara (Japanese)

: profkuwahara (English)