UNISEC-Global The 4th Virtual Meeting

December 12, 2020 22:00-00:00
(Standard Japan time GMT +9)

The following report prepared by UNISEC-Global Secretariat
December 14, 2020
Japan

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1. Welcome and Opening remarks

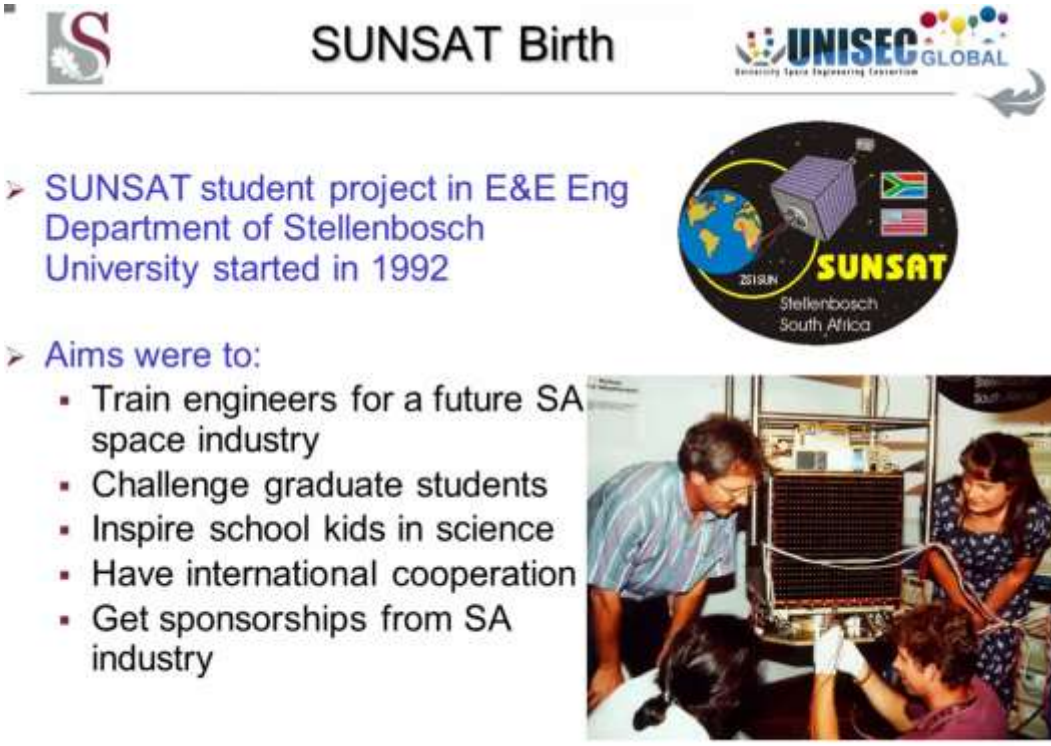
Herman Steyn, Stellenbosch University, UNISEC-SAR.

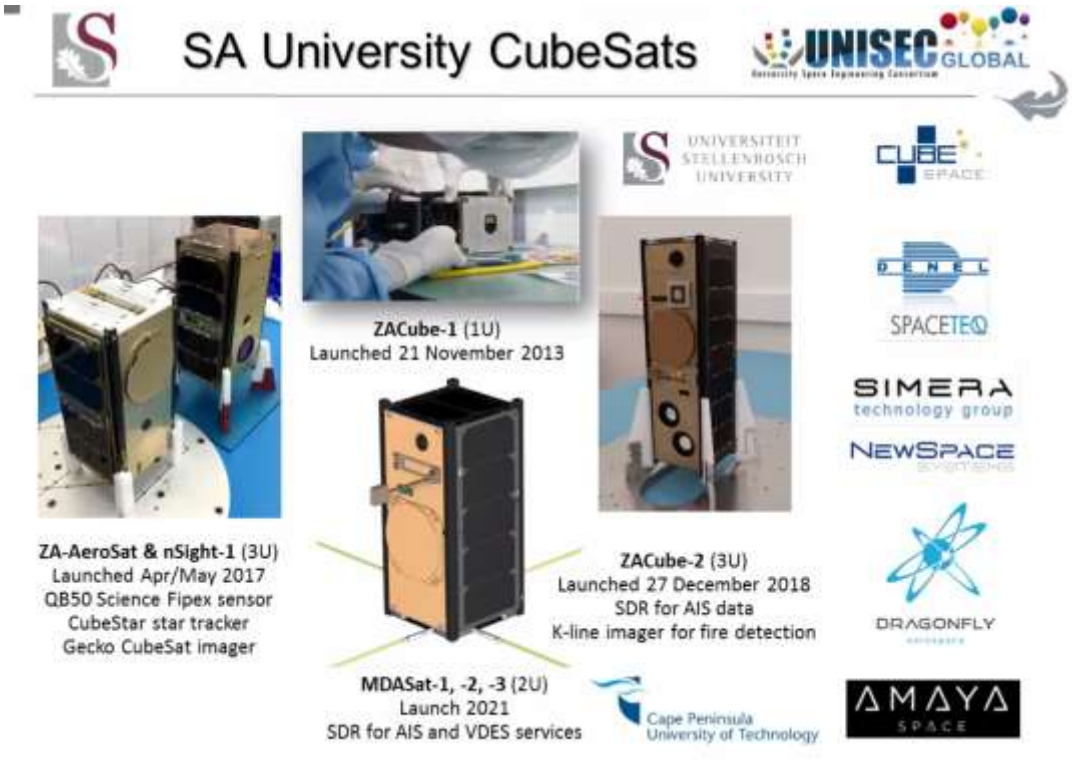
To our delight and pleasure we welcomed Professor Herman Steyn to deliver opening remarks for our final UNISEC-Global meeting for 2020 (the fourth virtual meeting). Herman Steyn is a professor at the University of Stellenbosch in South Africa and an expert in small satellites. He was the prime designer of the ADCS system for SUNSAT, the first microsatellite with full three-axis control capability and a high resolution pushbroom imager. Currently, he is head of the Computer and Control Group in the Department Electronic Engineering, leading the development and design of all commercial AODCS systems, as well as a reviewer for the UNISEC Mission Idea contest.

Pictured: Professor Herman Steyn ***"UNISEC-Global is giving a unique opportunity to students all over the world to exchange knowledge and space expertise."***

<u>Highlights:</u>

- History of UNISEC-Global including the role of UNISEC, highlighting CLTP, HEPTA-Sat, BIRDS, MICs.
- The world 30 years ago was very different from today. A can-do attitude is critical.
- SUNSET example
    - Student project in E&E Eng Department of Stellenbosch University (1992).
    - The space industry in South Africa did not exist at this stage.
    - The satellite produced more than 100 Masters and PhD degrees.
    - It was Africa's first indigenous (locally built) orbiting satellite.
    - Most components were developed in-house.
    - The program was the genesis of a vibrant, new industry in South Africa.





Pictured: Professor Herman Steyn presenting a demonstration of student activities (top) and the South African University CubeSats (bottom).

2. Presentation "Hybrid Rockets are a Game-changing Technology for In-Space Transportation"

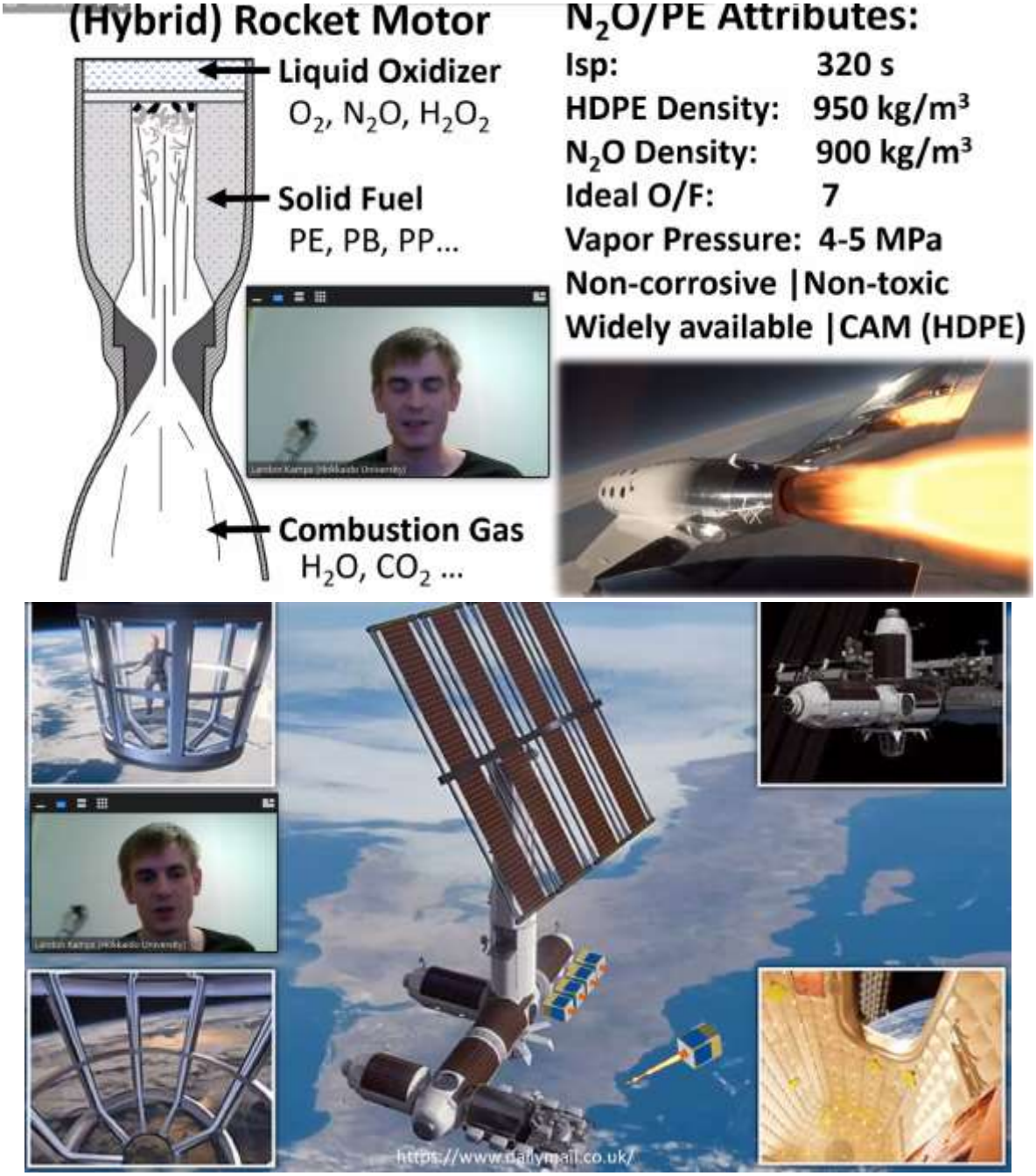
Landon Kamps, Hokkaido University

Landon Kamps is a specially appointed assistant professor at Hokkaido university holding a PhD in Aerospace, Aeronautical and Astronautical/Space Engineering. He imagines a future where "flying" around in space is like flying an airplane on the Earth. His objective is to radically increase the safety and reduce the cost of (in-)space transportation by innovating existing hybrid rocket technologies having created, and published, a comprehensive hybrid rocket testing and diagnostic software suite as well as inventing a re ignition system for hybrid rockets that allows them to out-maneuver conventional liquid rockets.

Pictured: Landon Kamps completed his Masters and PhD at Hokkaido University on hybrid rockets for in-space transportation. He enjoyed the research and decided to continue in a position at the university.

Highlights:

- The current market sees several large players who provide launch services for satellites with dozens of new-space companies vying for market share.
- Launch providers are launching by creating ride-share services. However, with the miniaturization of satellites the ability to propel satellites is reduced.
- Increasing movement of satellites is an important step i.e. "Last Mile" transport with the kick motor as the main feature.
- Kick motors need to be non-hazardous, low-cost, powerful, controllable, and commercially available. No current kick motors possess all of these components but hybrid rockets offer a solution.
- A hybrid rocket is the hybridization of a liquid and a solid rocket. Typically oxidizers are in the liquid phase and fuel is in the solid phase.
- The compounds used are non-corrosive, non-toxic, widely available and the fuel is easy to manufacture.



Pictured: A typical hybrid rocket engine and its attributes (top) and ideas about how hybrid rockets can be used in the future including Last mile transport, space hotel transports with on-site fuel storage (bottom)

3. Presentation "TIM Ground station network and UNISEC prospects"

Mohd Bilal and Alexander Kleinschrodt, Würzburg University

Mohd Bilal received his Master's degree in Space Science & Technology from Lulea Technological University, Sweden and Cranfield University, United Kingdom in 2018. He is currently a research assistant at the University of Würzburg, Germany working on developing a ground station network for the Telematics International Mission. His interests include formation flying, astrodynamics and ground systems.

Alexander Kleinschrodt received his diploma in computer engineering at the University of Würzburg. From 2012 to 2020 he was a research assistant at the chair for robotics and telematics at the University of Würzburg and worked there in various projects. Since 2020 he is a project manager at the Center for Telematics in Würzburg.

Pictured: Mohd Bilal in collaboration with Alexander Kleinschrodt present and introduction to ground station networks for the Telematics International Mission.

Highlights:

- Ground station networks facilitate the transmission of satellite data increasing the frequency of contact time allowing more data to be received over a shorter time.
- Ground station commercial providers exist but the Telematics International Mission (TIM) requires more reliability and control over the network by the creation of a central server.
- TIM network is an international collaboration providing task and control of satellites, scheduling concepts and a server for data exchange.

- Manual operations can be performed as well as automated operations with the inclusion of REST API. The service includes a scheduling server to manage notifications and publications of schedules.
- The system works by overpasses. Each operator can select an overpass to suit their needs. Operators can accept or decline overpass requests using any programming language of their choice.
- No commercialization of the network such that a fair use of resources where all participants should profit equally is incorporated using the Jain's Fairness Index.
- Joining the network is now open to all with the requirement that a ground station operates 24/7 with Ax.25 Support.

Pictured: TIM GSN features for operators (top) and details for UNISEC member collaboration (bottom)..

4. Introduction of breakout discussion

Rei Kawashima, UNISEC-Global

How can we realize "Vision 2030-All"?

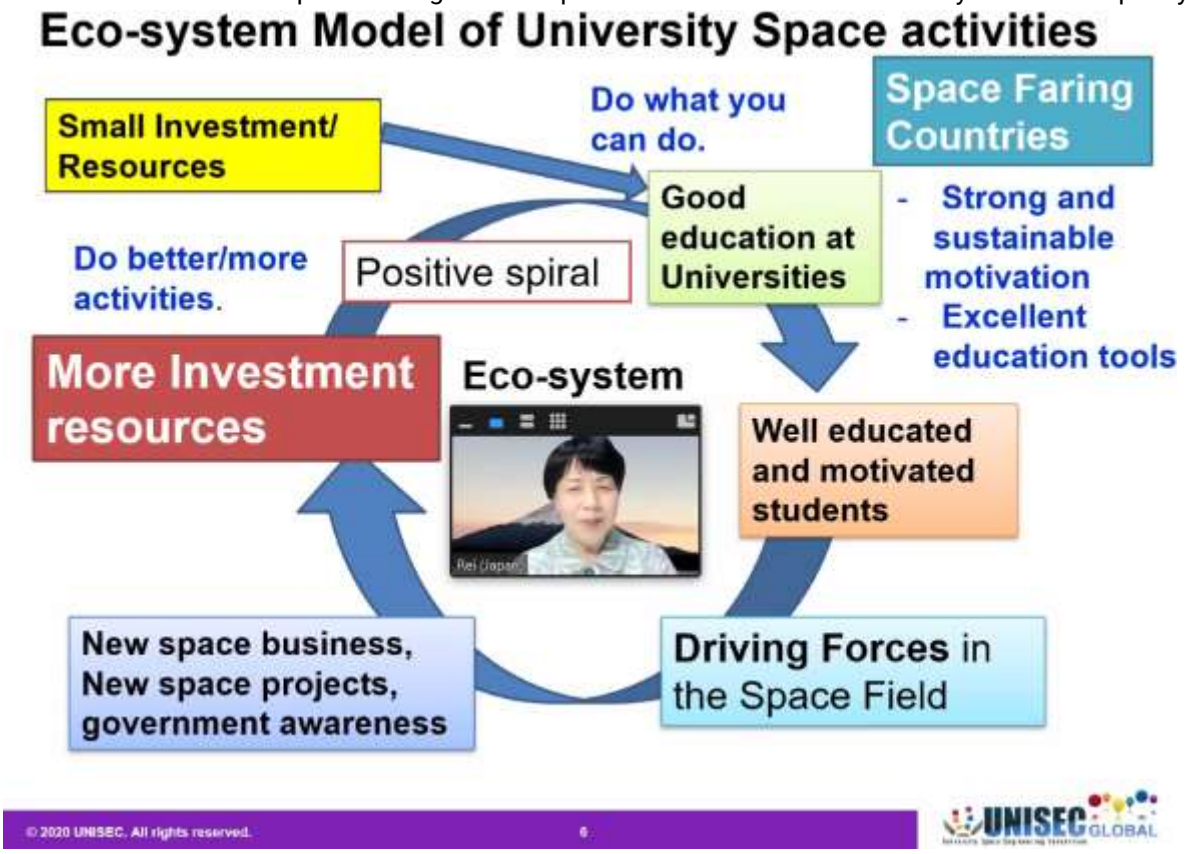
"By the end of 2030, let's create a world where university students can participate in practical space projects in all countries/regions."

<u>Highlights:</u>

- From the survey results, 30% of our respondents did not know about Vision 2030-ALL.
- Over 90% of respondents agree with Vision 2030-ALL.
- The response to achieving Vision-2030 ALL was mixed with over 30% of respondents doubtful about the realization of the goal by 2030 and 70% believing it is possible.
- The rationale behind the vision consists of three parts
    - Every country needs space-related experts to at least understand space assets and resource needs of their country.
    - A Key principle of the United Nations Sustainable Development Agenda for 2030 is that no one will be left behind (should be inclusive of all countries).
    - Gaps between space-faring and non-space-faring countries can be reduced through education.
- There is an ecosystem model of University Space Activities creating a positive spiral in space-faring countries however, no employment or funding results in a students home

country leads to no positive spiral in non-space faring countries.

- Positive spirals strengthen the space-related activities of a country and build capacity.



Pictured: TIM GSN features for operators (top) and details for UNISEC member collaboration (bottom).

5. Breakout discussion and sharing.

Moderators: George MAEDA, Kyutech; Nate Taylor, UNISEC-Global.

Pictured: MAEDA, George (left) and Nate Taylor (right) moderating the virtual meeting and breakout session.

Highlights:

- Entire meeting is divided into 10 breakout rooms (about 4-5 people in each room).

- Participants discuss the above agenda for 25 minutes.
- Representatives of each room make a 1 min summary to the entire meeting.

Summary of breakout group discussions

Group	Speaker	Summary
Room 1	Reynel	International collaboration - Honduras needs to work with other countries for space related activities and this is key to creating more space-faring capability.
Room 2	Bilal	The role of government is very important. One issue is ways to get funding and begin the process. Private enterprises may not be interested in taking the risk and students need to leave these countries to study. Support education with projects like CANSAT as well as support via scholarships. Smaller projects are more viable.
Room 3	Sonjay	Example of the establishment of Philippines space agency academic programs raising awareness, academic programs, collaborations among universities. Produce local space scientists. Positive that we can achieve Vision 2030-ALL
Room 4	Hoda	Establish a space community – need support of government and students, international connections, and industry. Need a full cycle. Example: Mexico – undergrad programs aeronautics but not satellites, establish more companies. Philippines – programs to build satellites, and regulations to open up collaboration from other nations for capacity building. Public space awareness will increase including understanding of involvement.
Room 5	A Rustem	Make a list of countries that have no space industry; South Africa, Turkey, Saudi Arabia. Encourage high-tech industry development in these countries via government and space projects. Capacity building from engineering
Room 6	Marco	How to form an ecosystem and form a positive spiral: Need to know the current status of the country and the development plan. Create space agencies and institutes. Promote activities via communities locally, replicate activities from other examples. Promote public policies demonstrating importance.
Room 7	Charleston	Foster interest via education through multidisciplinary focus; social scientists, law, economics etc. trickle down into high-school level. Example: Philippines has the capacity/ability to push the industry further forward. Local chapter instigation knowing the issues.
Room 8	Mori-san	Everyone can get support from the government (but there are limited resources). Developed countries should help build capacity. Global organizations support local activity. Launch local projects.
Room 9	Sackdavong	It is easier for developed countries to obtain jobs/funding. In Laos this is difficult. We can try to learn from developed nations to get hands-on experience. Small projects to use as proof of concept. Local activity via models like UNISEC.
Room 10	Bryan	How to make space-related concessions, jobs funding and local support: 1. Show the value of space data – typhoon impact as an example in the Philippines easily demonstrates this.

Pictured: Reynel (top left), Bilal (top right), A. Rustem (bottom left), and Sackdavong (bottom right) sharing their breakout room discussion with the meeting.

6. Regional Report: UNISEC-Philippines

Edgar Violan, the Philippine Space Agency

Edgar Paolo Violan recently acquired his Master of Science in Aerospace Engineering degree from Tohoku University. During his stay in Japan, he was also part of the development team of the Philippines' 2nd microsatellite - Diwata-2 under the PHL-Microsat program. Before that, he obtained his BS degree in Mechanical Engineering from the University of the Philippines - Diliman.

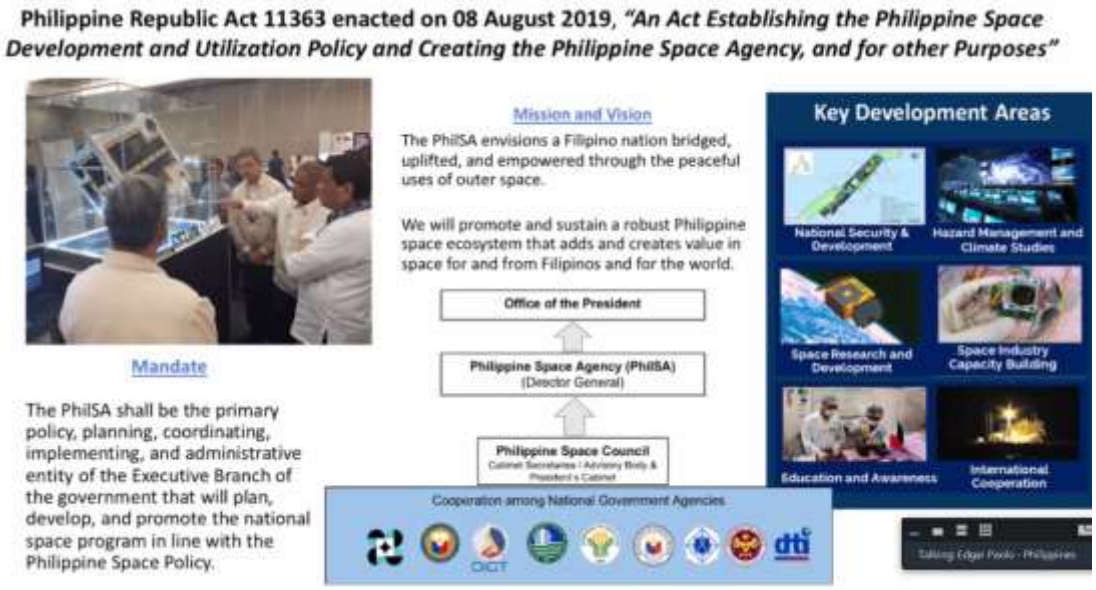
Currently, he is now an Executive Assistant under the Office of the Director General of the new Philippine Space Agency.

Pictured: Edgar Violan introducing the Philippine Space Agency to the UNISEC-Global meeting.

Highlights:

- Created in 2019 with the Philippine Space Agency as the key agency for all space related matters.
- The key objectives of the agency are:
    - National Security & Development
    - Hazard Management & Climate Studies
    - Space Research & Development
    - Education & Awareness
    - Space Industry Capacity Building
    - International Cooperation
- Prior initiatives existed in the Philippines to engage in space-related activities producing emerging

infrastructure and technology.



Pictured: The genesis of the Philippine Space Agency including mandate and reporting structure (top) and some small satellites developed and launched by the Philippines in collaboration with foreign partners.

7. Corporate presentation: CubeSpace Satellite Systems Pty Ltd

Benoit Chamot, CubeSpace (Head of Sales & Marketing)

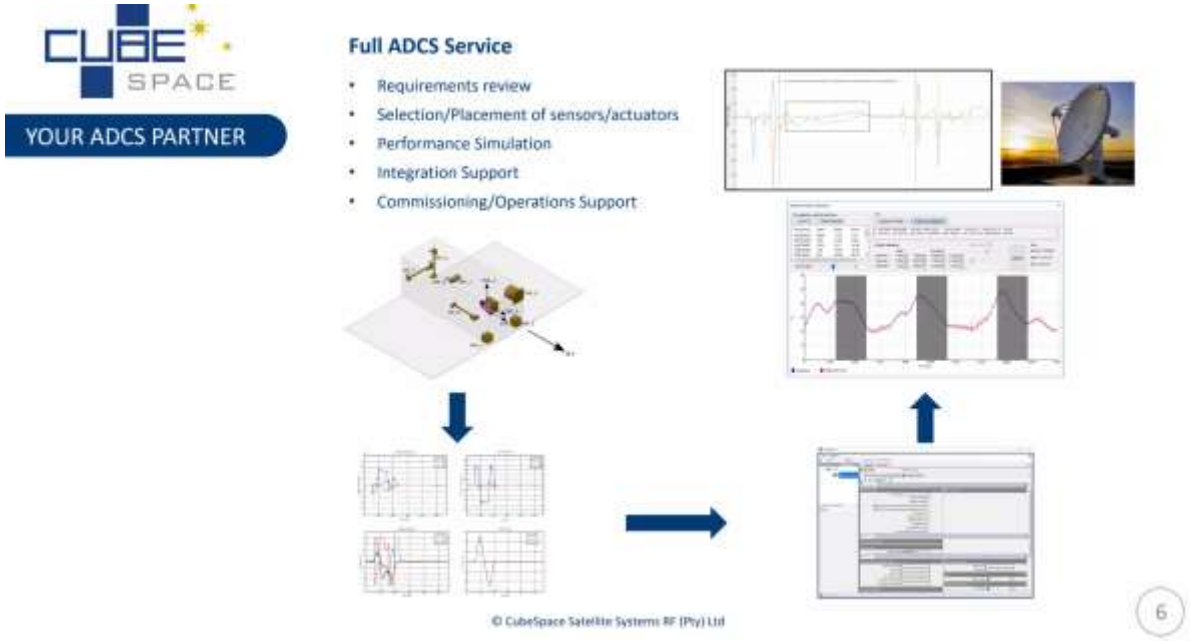
Benoit got a MSc in Robotics in 2012 and has been involved in the space industry ever since. He worked on mission design for active debris removal in Switzerland before moving to the Netherlands where he worked as an ADCS engineer and eventually as a Sales Engineer and Business Developer for a small satellite integrator. Since 2019, he is Head of Sales and Marketing for CubeSpace Satellite Systems, a small company based in South Africa who builds state-of-the-art attitude control systems for small satellites.

Pictured: An overview of CubeSpace Satellite Systems Pty Ltd. given as an introduction to the company by Benoit Chamot

Highlights:

- Satellite programs at Stellenbosch University and Government help enabled the establishment.
- QB50 program instigated technology development with two satellites launched (2014)
- Focussing on attitude control systems for small satellites.
- Vision is to continuously improve the system so that satellite builders globally can benefit from an ADCS product with unmatched maturity at an affordable price.
- CubeSpace has a catalogue of products with a wide range of sensors to suit user needs.
- Products have been developed with key clients and partners including companies, government agencies and universities around the world.
- Upcoming 2nd Generation products in 2021 for satellites up to 50kgs with improved reliability and modularity.
- CubeSpace provides a full ADCS service including the ability to run simulations and support

through integration and post-launch.



Pictured: Some of the solutions CubeSpace Satellite Systems Pty Ltd. offers including ADCS, sensors, magnetorquers, and reaction wheels (top) and a description of the full ACDS service available.

Point of Contact for "CubeSpace Satellite Systems RF (Pty) Ltd":
Benoit Chamot - Head of Sales & Marketing
Website: www.cubespace.co.za | www.moon.cubespace.co.za
E-mail: benoit@cubespace.co.za

8. Space Job Fair 2020 Report

MORI Yosuke, UNISEC-Japan

Mori-san graduated from the George Washington University (D.C, USA) majoring in International Business. He has previously worked for Shizen Energy in the new business development team. Mori-san joined UNISEC this August leading the Space Job Fair team. It is his first time being involved in the space industry and he has been captivated by its endless opportunities and ability to change people's lives.

Flyer for this event

Pictured: An overview of the second UNISEC Space Job Fair that was successfully held as an online event over the 5th and 6th February 2020 as presented by Yusuke Mori (UNISEC Japan).

Highlights:

- Recorded the highest numbers of 26 exhibitors and 240 registrants participated for the Space Job Fair.
- The event was open to anyone interested in working in the space industry.
- Companies presented to participants for 20 minute sessions across four rooms.
- Lectures were given by Professor Shirasaka of Keio University and Professor Kuwahara of Tohoku University.
- Two panel discussions were held including representatives from emerging space companies (AXELSPACE, ALE, Synspective, Space BD and UNISEC) as well as established companies (NEC, JSAT, IHI Aerospace, Mitsubishi Heavy Industries, Yokogawa Electric Corporation, and Mitsubishi

Electric Corporation).

- The next challenge is to hold the 3rd Space Job fair event and expand it to a global event.

Pictured: A list of the companies giving presentations and participating in the UNISEC Space Job Fair 2020 including those that contributed to panel discussions.

9. New member acknowledgment, Announcements and Closing

Rei Kawashima, UNISEC-Global

Pictured: Kawashima-san introducing the new university member for UNISEC-Nepal and new corporate member Gran Systems Co. as well as providing an update on UNISEC-Global activities.

Highlights:

- Please contact the UNISEC-Global secretariat (KAWASHIMA Rei) if you wish to establish a new local chapter. Requirements for a new chapter:
    - 2 or more participating universities.
    - Professor and student involvement.
    - Fill out the university application and local chapter application from: http://www.unisec-global.org/localchapters.html
- New chapter member Advanced College of Engineering and Management (Nepal)
- This is the last meeting of the year. The next meeting will be held on January 16th 2021 and will feature (subject to availability) Prof Yuichi Tsuda Manager of Hayabusa 2 (JAXA).
- Mission Idea Contest 7 (MIC7) Lectures: Deep Space Science and Exploration with nano/micro satellites tentative schedule: February 9, 11, 12, 15, 17 21:00 - 22:30 (JST).
- Kuang-Han from Gran Systems Co. Ltd (new silver member) in Taiwan announced their first cubesat mission with SpaceX on January 14th.
- Kyutech announcement from MAEDA George - The United Nations Office of Outer Space Affairs have launched the Post-graduate study on nano-Satellite Technologies (PNST) 2021 to bring six

graduate students to Kyutech: https://www.unoosa.org/oosa/en/ourwork/psa/bsti/fellowships.html

Pictured: Follow us on our social media pages and get involved!

Pictured: Kuang-Han Ke from Gran systems (left) and Sultan (right) give their greetings to the meeting attendees.

10. Participant Statistics

103 registered participants from **35** countries participated in the 4th Virtual UNISEC-Global Meeting.

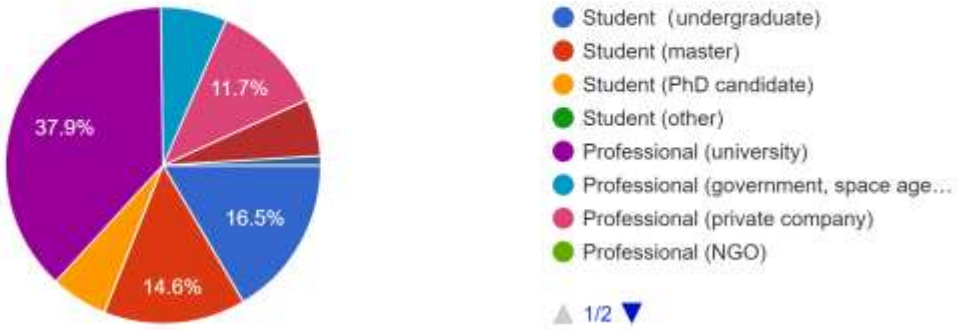
1) Argentina
2) Australia
3) Bangladesh
4) Bulgaria
5) Cambodia
6) Canada
7) Chile
8) Egypt
9) El Salvador
10) Ethiopia
11) Germany
12) Honduras
13) Japan
14) Malaysia
15) México
16) Morocco
17) Myanmar
18) Nepal
19) Pakistan
20) Peru
21) Philippines
22) Poland
23) South Africa
24) Sudan
25) Sweden
26) Switzerland
27) Taiwan
28) Thailand
29) Tokyo
30) Tunisia
31) Turkey
32) United KIngdom
33) United States
34) Zimbabwe
35) Saudi Arabia

Relationship with UNISEC	**Number**
Academic or Student	8
CLTP graduate	12
Corporate Member	1
Follower of UNIGLO SNS	20
Interested	2
ISU Alumni/Staff	6
Local Chapter member/staff	51
MIC Associate (Regional Coordinator / Reviewer)	8
Participant (other)	10
UNISEC Alumni/Staff	7
UNISEC Member	7

11. Participant Questionnaire

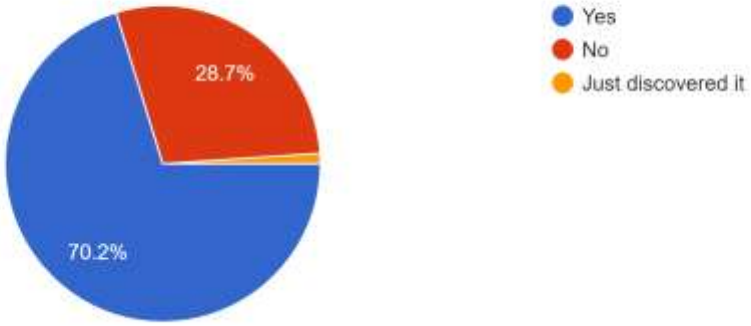
Student or professional?

103 responses



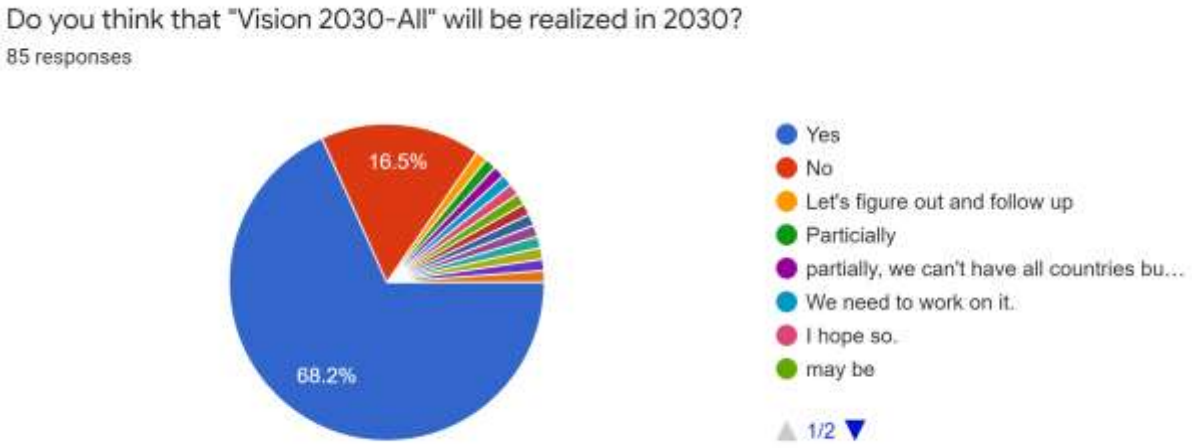
Do you know "Vision 2030-All"? (If not, please check it at http://www.unisec-global.org/)

94 responses



Do you agree with "Vision 2030-All"?

87 responses



We wish to pay our respects in passing to our beloved former UNISEC staff member Emiko Ando.

Thank you.