



UNISEC-Global The 7th Virtual Meeting

March 20, 2021 22:00-00:00
(Standard Japan time GMT +9)



The following report prepared by UNISEC-Global Secretariat
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Japan

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1. Welcome and Opening remarks

Shinichi Nakasuka, the University of Tokyo

Professor Nakasuka graduated from the Graduate School of Univ. of Tokyo, Doctor Course in 1988, and got Ph.D. in Aeronautics. He joined IBM Research in 1988, joined Univ. of Tokyo in 1990 as a lecturer, and has been an Associate Professor of Dept. of Aeronautics and Astronautics since 1993. His research fields include space systems design and operation, navigation, guidance and control, small satellites, autonomy and intelligence for space systems, space robotics and machine learning.



Pictured: Professor Shinichi Nakasuka and colleagues prepare to launch at the first ARLISS event.

Highlights:

- Introduction ARLISS (A Rocket Launch for International Student Satellites) with 20th anniversary reached in 2018.
- More than 12 universities have developed satellites in Japan with more than 50 UNISEC associated launches.
- Many students train using CanSats (born in 1998 by Prof. Robert Twiggs)
- CanSat launch organized with AeroPAC via High-power rocket that can lift 1.8 kg to 12,000 ft at a cost of \$400 per flight.
- 120 students have been trained through ARLISS13 Satellites launched by University of Tokyo.



Pictured: CubeSat/Micro-Sat fleet launched by the University of Tokyo many of which the development of many can be attributed to ARLISS training.

2. Presentation “ARLISS: A Rocket Launch for International Student Satellites”

Ken Biba, AeroPAC

Ken Biba holds a B.S Physics and Operational Research and a M.S of Computer Science from Case Western Reserve University and has worked in leadership positions within the Aerospace sector for many years. Mr. Biba is currently the Managing Director of Novarum Inc, and the Education Director of AeroPac Inc having served on the Board of Directors since 2005. Ken wanted to be an astronaut but at the time it was a requirement that astronauts must be trained fighter pilots, so Ken decided to pursue other interests instead such as robots. A highlight of his career is that he played a key role in development of WiFi and Cable Modems



Pictured: Ken Biba introduces the ARLISS program and its 20+ year history featuring Prof. Twiggs.

Highlights:

- ARLISS focusses on the integration of all components and has flown over 700 mission with thousands of students participating.
- Mission to educate themselves and students of all ages about rocketry.
- Requires a cross-disciplinary approach for mission planning and projects in rockets, robotics, and STEM.
- Training should be focused on payloads, not just rockets.
- Swarms of satellites can perform better than larger ones.
- Commercial electronics work well in LEO, ARLISS was to train for space closer to the ground.
- Several ARLISS projects: Classic, Virtual Classroom, Extreme, S4, Lite.
- *ARLISS Classic*: Payload <1 kg, 12,000 ft - payload is autonomous satellite that make their way back to coordinate. HOR rockets on K & M motors deployment at 3-4 km.
- *Virtual classroom*: ARLISS to the internet telemetry operations (retired) using a van with satellite and internet, WiFi, UHF/VHF voice gateway and tracking.
- *Instrumented Deployment*: Flight stresses on payloads and metrics for shock, acceleration and vibration profiles.
- *ARLISS EXtreme*: ARLIS toward the Karman Line reusable amateur sounding rocket, science missions to 40-80 km with 3x1p PocketQubes.
- *S4*: Small satellites for secondary students - 5cm PocketQube package using ARM/Arduino.
- Resources, publications and demonstration links in the PDF presentation file available for download.



Pictured: Footage from a typical ARLISS flight such as the classic Comeback competition.

Q&A

Fahdi: How much money and time does it cost to build an ARLISS rocket (for each S4 launcher if possible)?

A: Depends on the size.

Fionagh: How are you approaching the recycle, reuse and repair approach towards small sats. (in short, the sustainability agenda).

A: The idea of all the rockets is that it doesn't count until you recover and fly them again. Train for safety, safe recovery and fly it again (required for certification). Recycle, re-use and repair.

George: What do you mean when you say "rocket motor" and why are they uninteresting to you?

A: Several types of propellant used in the rocket motor to make it go. Liquids have been more difficult but we are seeing revolutionary motors that can be 3D printed. Ken doesn't find the chemistry interesting but sees them as a tool.

Prof. Nakasuka: Can we do a Comeback competition for the rocket rather than the payload?

A: It is possible. SpaceX has inspired landing-on-tail comeback, but we can do other targeted precision recovery. At AeroPAC there is a programmable launch pad with stepper motors that could be used to calculate optimum launch angle.

3. Breakout discussion and sharing.

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



UNISEC-Global The 7th Virtual Meeting Breakout Discussion

Time: **25 minutes**

Tasks:

- I. Set the leader.
- II. Discuss:
 - a. What does the democratization of space mean for human space activity?
 - b. How do competitive space markets and collaborations influence the democratization of space?
 - o (Examples: students competing for scholarships/placements/jobs; labs and companies competing for grants/skilled hires/contracts; Countries/regions competing market-share/assets, resources, and data, international aid and collaboration).
 - c. How can UNISEC-Global effectively contribute to the democratization of space?

After closure of Breakout session

- III. Leader to share your ideas:
 - 1 minute to summarize your discussion (timer on-screen).

Please keep to the 1 minute timer to ensure everyone can speak!

Pictured: The topic subject for the breakout session regarding hands-on training.

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

Room/Member	Comments
1. Fionagh, Arno, Dr Gopalakrishnan, Hiroki Uto-san, Kazuo Shimada-san, Nikhil	Democracy is about the majority but who are they in NewSpace? Private organizations universities and companies together. It can be a shared agreement with many good things less focus on commodity more about collaboration. Should be a view of the nirvana of space.
2. Catalin, Kuang - Han, Kawashima-san, Tarun	More people more opportunity (students as the goal). Open to everyone students can experiment. Competition means more ideas can surface and develop and innovation through workshops and competitions accessibility. Reduce cost.
3. Chawalwat, Dr. Mahendra, Yukihisa Otani-san, Yusuke Shimoda-san	Democratization means more humans can access and benefit from space. Competitive markets bring advance in technology and more jobs through demand. More researchers engineers and scientists. UNISEC is responsible to help educate young people.
4. Sainath, Eyoas, Hoda, Jerry, Ken, Yasir	Relative value of development of space. Bring it to as many people as possible. Competition drives speed and cost. Need both. Co-opetition encompasses both.
5. Maisun, Chris, Jonathan, Somboon	Need more people and different activities. Not just companies or powerful nations but smaller. We lack communication between organizations. UNISEC can help by localization.
6. Fahd, Dr. Thirukkumaran, ESAI, Marek, Kurosu-san	Democratization is access to all no-one left behind. Address sustainable goals. Not have restriction from limitation of resources. Collaborations to minimize costs. Diversify and promote new ideas. More people

4. Regional Report: UNISEC-India

Nikhil Riyaz, TSC Technologies

Nikhil Riyaz is the Founding Director and CEO at TSC Technologies Pvt. Ltd. an aerospace company based in Bangalore, India. He is the team lead for the UNITYSat project, consisting of a constellation of three IoT satellites built by a consortium of Indian Universities and launched by ISRO in Feb 2021. The UNITYSat project aims to develop a constellation of networked satellites with a variety of scientific payloads for space research.

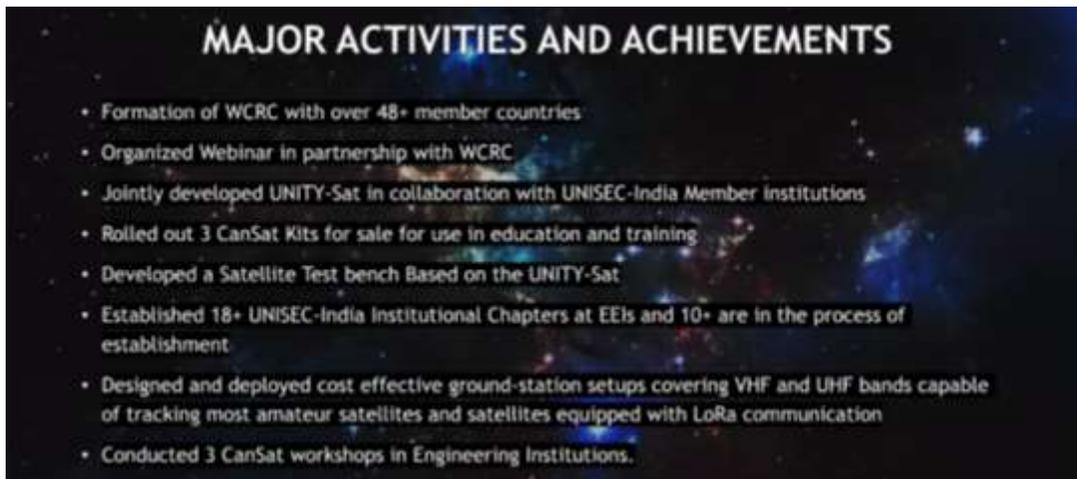
Nikhil did his bachelor's in Electronics and Communication Engineering in NHCE and is currently pursuing his master's in Embedded Systems. His research interests lie in Robotics, Artificial Intelligence, Rapid Prototyping, and Space Systems Engineering.

Nikhil has been Working on small satellite development for four years. His significant contribution towards the New-Space era has been the research and development of affordable and compact CubeSat Subsystems.

Tarun Sai Reddy, TSC Technologies

Tarun has completed his undergraduate in Electronics and Communication at New Horizon College of Engineering. He is currently working at TSC Technologies Pvt Ltd as CTO (Chief Technology Officer). Prior to joining TSC, he worked as an intern at Zen Aerologiks Pvt Ltd, developed professional skills in a hands-on environment, picking up valuable knowledge in robotics, mapping and UAVs. He has been part on various projects involving UAVs, Mapping, system engineering, control systems and embedded development. He is currently involved in developing space technology.

At TSC, Tarun is responsible for PCB Design, Embedded firmware development, hardware testing.



Pictured: Just some of the activities and achievements of UNISEC-India since its inception.

Highlights:

- UNISEC-India was established in 2018.
- Goals: Vision 2030-ALL, participating in the 75 Student Satellite Mission to launch 75 by 2022 (celebrating India's 75th year of Independence).
- 3 satellites have already been launched towards the 75 Student Satellite Mission
- Established the World CanSat/Rocketry Championship (WCRC) 48+ member countries + webinar.
- Developed UNITY-Sat and 3 CanSat Kits, Satellite Test bench, 18+ Chapters, Ground station setups (VHF/UHF), 3 CanSat workshops. Teach the process of developing and building a satellite and systems.
- Seeking funding sources.
- Able to help launch payloads via ISRO PSLV platform.
- Overview provided on 0.35U UNITYsat with technology demonstration mission.
- UNITYsat includes OBC, Power supply, Communication and Power generation

subsystems.



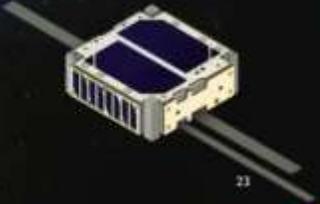
Pictured: Some of the images from UNISEC-India CanSat workshops.

EXECUTIVE SUMMARY

We, the consortium of few Engineering Colleges and University are in the process of development of the UNITYsat. These THREE Pico Satellites (each 0.3-0.35U)/SlimSats will constitute the 1U (1kg) mass together in 1U Deployer. These SlimSats are "Technology Demonstrators" at LEO and will have short orbit life (2-6 months only), there is no stabilization and deployable solar panel etc at UNITYsat. Just solar panel mounted on all the six surfaces of SlimSat only.

Specifications of our Proposed 0.35 U Sat (Amateur Frequency: 33 cm Band range of 902 - 928 MHz):
Total Mass: 460 gms
Body Material: Al7061-T6
Dimensions: 100 mm x 100 mm x 38 mm (for 0.33U)
Deployables: Antenna Elements

Institutions Working on Similar Projects: All THREE will constitute the 1U (1kg) mass together in 1U Deployer!
Jeyasekar Institute of Technology, Senguvanchattam, near Chennai, Tamilnadu (JITa)
Gait. Rajani College of Engineering, Nagpur, Maharashtra (JHRCEsat)
Shri Shakti Institute of Engineering and Technology, Coimbatore, Tamil Nadu (SSIT)



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UNISEC GLOBAL

Pictured: The specifications and executive summary of the UNITYsat developed by UNISEC-India.

5. Regional Report: UNISEC-Thailand

Chalawat Martkamjan

Chalawat is the official president of UNISEC-Thailand. He is currently studying Aerospace Engineering at Bangkok Christian College. He has been participating as the Sub Project Manager of BCC-Sat 1 which is the first 1U Earth Observation CubeSat in the South East Asia region that was developed by high school students. Chalawat is also working as a researcher at the International Institute of Space Technology for Economic Development.

Highlights:

- Founded in October 2020 and active since February 2021 with a target group of 170,000 students.
- Four-year plan to be executed measured against key results.
- Activities: MIC7, Sputnik Bootcamp (beginner space education 2-day workshop), Inspirational talks, Academic content to simplify space for everyone, Facebook page, website.
- Thailand space activities: Thais Space Consortium - university, government, private and startup companies increasing, SSA activity Thai Robotic Telescope, CanSat-Rocket Competition by National Science Museum, 1st Spaceflight Payload Competition (1 bus/10 payloads ride-share, student payload/mission), Design contest, Satellite BCCSAT-1 Cubesat launching 20th March, Thailand Lunar Simulant, Molecular Encoded Storage.
- 3 University members currently with aim of 5 by next year.
- BCCSAT-1 high school student developed satellite for earth observations launched.



Pictured: Founding Act of UNISEC-Thailand.

Key Results:	<ul style="list-style-type: none"> - 5 universities - 50+ members - 1 Space project documentary - 3+ Space related research journals 	<ul style="list-style-type: none"> - 10 universities - 100+ members - 1 Scientific payload or technology demonstration - 1 Team Funding 	<ul style="list-style-type: none"> - 20 universities - 300+ members - First nano satellite - Open source study materials - Online courses 	<ul style="list-style-type: none"> - 50 universities - 1000+ members - Participate in Artemis - 1 Deep space exploration project
	<p>150 K (TBH)</p> 	<p>500 K (TBH)</p> 	<p>2 M (TBH)</p> 	<p>5 M (TBH)</p> 
Theme Year:	<p>2021 Set the Norm</p>	<p>2022 Catching Dreams</p>	<p>2023 Escape the G</p>	<p>2024 Moon Shot</p>

Pictured: How UNISEC-Thailand plans to reach their goals over the next four years.

6. Corporate presentation: Teaching Science & Technology Inc. (TSTI)

Dr. Jerry Sellers, TSTI CFO

Dr. Jerry Jon Sellers is a graduate of the US Air Force Academy, obtained his Master's Degree from Stanford University and his PhD from the University of Surrey. He is the author of Understanding Space: An Introduction to Astronautics, a contributing author and editor of Applied Space Systems Engineering. He has over 30 years of space systems experience including Guidance & On-board Navigation Officer in Space Shuttle Mission Control; Assistant Professor of Astronautics at the U.S. Air Force Academy; and Chief of Astronautics for the Air Force European Office of Aerospace Research & Development. He is an Associate Fellow at AIAA and the former Chairman of the Space Systems Technical Committee. Jerry is a certified Scaled Agile Program Consultant and a corresponding member of the International Academy of Astronautics. He is also an adjunct professor at Stevens Institute of Technology.

About TSTI

- **Teaching Science and Technology Inc. (TSTI)** — respected name in systems engineering workforce development for over 25 years.
- TSTI is a small business that assists companies and organizations who wish to improve their systems engineering skills as they relate to the space and other domains.
 - We present quality short courses and workshops in space systems engineering and program management to customers around the world. Our teaching style is highly interactive with emphasis on learning-by-doing and practical real-world examples and applications.
 - Our systems engineering courses provide the processes, tools, and information necessary to "jump-start" new-hires to the space business or improve the performance of mid- to senior-level engineers, systems engineers, and technical program managers.
 - In addition, we provide focused systems engineering support to organizations as they approach critical events in the development process and work as red team support.
 - We wrote the books that describe SE in the space domain, and we've all had practical SE and PM experience in the development world.
- Since 2005, TSTI has taught more than 800 courses to more than 30,000 students for NASA, ESA, DoD and industry around the world.
- **What Sets Our Courses Apart:**
 - **CREDIBILITY:** We wrote the books. We've been there, done that. We bring extensive systems engineering experience.
 - **COMPETENCE:** We're professional teachers. This is our day job. We take the complex and make it simple. We're explainers and motivators. Hands-on exercises ensure that you learn space by doing space. No death by PowerPoint.
 - **CURRICULUM:** We take you from new hire to seasoned space professional. Our on-line learning portal enables continuity through your increasing levels of expertise.
 - **COST:** We're small, with low overhead, and come to you. Your cost is 50% less – you can train twice the people for the same price.
 - **CONTRACTING:** You can get on contract in minutes! We're only a credit card purchase away.

Pictured: An overview of TSTI given as an introduction to the company by Jerry Sellers highlighting the five C's of TSTI that set TSTI courses apart.

Highlights:

- Workplace development company with a main focus in systems engineering from CubeSats up to large projects.
- Offerings include onsite training, virtual training, project coaching, proposal development, system engineer consulting.
- Range of courses offered including:
 - Understanding space: Introductory course for the big picture of space (UNISEC discount available!).
 - Designing space systems and missions
 - Essential systems engineering
 - Mission Design workshop (hands-on design workshop)
- Several of the courses are available online.
- Scaled-Agile Framework training coaches for teams to work more effectively.
- TSTI has a proven track record with high satisfaction from student reviews.

TSTI Courses

Telling Jerry Sellers



SPACE LAUNCH AND TRANSPORTATION SYSTEMS
Launch system design and operations.

SPACE MISSION OPERATIONS
From planning to flight control.

APPLIED PROJECT MANAGEMENT FOR SPACE SYSTEMS
Achieving project goals on time, in budget with acceptable risk.

INTEGRATED CUBESAT ENGINEERING WORKSHOP
Hands-on from concept through operations with real tools, hardware and software.

MISSION DESIGN WORKSHOP
Hands-on mission design from concept through proposal.

ESSENTIAL SYSTEMS ENGINEERING
Tailoring systems engineering to the essential element for your project.

Ideal for CubeSAT project start-ups

Ideal for CubeSAT project start-ups

www.tsti.net

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Pictured: An overview of some of the training offerings of TSTI.

Point of Contact for Teaching Science & Technology Inc:

Jerry Sellers – CFO

Website: <https://www.tsti.net/>

7. New member acknowledgment, Announcements and Closing

Rei Kawashima, UNISEC-Global



2021 Planning

More opportunities will be available!

- STSC-UNCOPUOS: April 19-30, 2021
- 13th IAA Symposium on Small Satellites for Earth Observation (Virtual): April 27-29, 2021
- MIC7 abstract submission due: July 7, 2021
- UNCOPUOS: August 25 - Sep 3, 2021
- Samara Space international summer space school : August 30-Sep10, 2021
- IAC2021(Dubai): October 25-29, 2021
- MIC7 final presentation: Nov 13, 2021
- APRSAF 2021 (Nov in Vietnam)

Please let us know your event information...

Pictured: Kawashima-san details 2021 planning and upcoming events.

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>
- No new local chapter this month.
- 12 new university members (UNISEC-India):
 1. Jeppiaar Institute of Technology, Sriperumpudur, Chennai, Tamil Nadu (TN)
 2. GH Rasoni College of Engineering, Nagpur, Maharashtra
 3. Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu
 4. Nagarjuna College of Engineering, Visvesvaraya Technical University, Bangalore, Karnataka
 5. Chandigarh University, Chandigarh
 6. Galgotias University, Noida, Uttar Pradesh
 7. Hindustan Institute of Technology and Science, Hindustan University, Chennai, Tamil Nadu
 8. B.S. Abdur Rahman Crescent Institute of Science and Technology, Crescent University, Chennai, TN
 9. Karunya Institute of Technology and Sciences, Karunya University, Coimbatore, Tamil Nadu
 10. Noorul Islam Centre for Higher Education, Noorul Islam University, Thuckalay, Kumaracoil, TN

11. Maharashtra Institute of Technology, University in Pune, Pune, Maharashtra

12. Vaigai College of Engineering, Anna University, Madurai, Tamil Nadu

- New silver corporate member Nakashimada Engineering Works Ltd.
- Next meeting April 17th, Confirmed speaker Jorge Del Rio Versa from UNOSSA and U-Tokyo, UNISEC-Japan presentation.
- MIC7 Lectures Completed: Deep Space Science and Exploration with nano/micro satellites (sponsored by the University of Tokyo)
Registration: <http://www.spacemic.net/lecture.html>
Abstract due: July 7, 2021.
- UNISEC will join planning and organizing the working group of the higher education at APRSAF 2021 (held in Vietnam).
- STSC-UNCOPOUS April 19 2021.



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

8. Participant Statistics

90 registered participants from 26 countries/regions participated in the 6th Virtual UNISEC-Global Meeting.

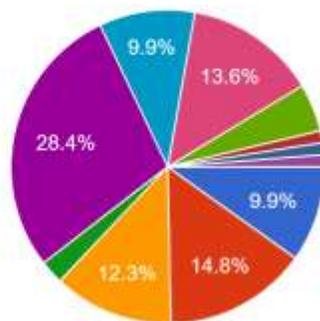
Country/Region	Number of registrants	Country/Region	Number of registrants
Angola	2	Nepal	1
Bulgaria	6	Pakistan	1
Cambodia	1	Peru	2
Egypt	2	Philippines	12
El Salvador	3	Poland	1

Finland	1	Romania	1
France	2	RWANDA	1
Germany	2	Scotland	1
Honduras	1	Singapore	1
Hungary	1	South Africa	1
India	3	Sweden	1
Japan	16	Thailand	2
Kenya	1	Tunisia	2

9. Participant Questionnaire

Student or professional?

81 responses

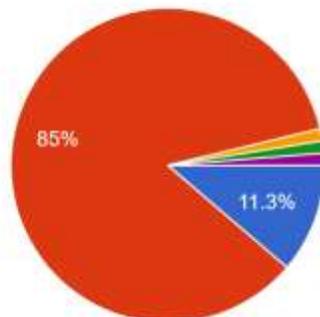


- Student (undergraduate)
- Student (master)
- Student (PhD candidate)
- Student (other)
- Professional (university)
- Professional (government, space age...)
- Professional (private company)
- Professional (NGO)

▲ 1/2 ▼

Have you ever participated in "CanSat competition"?

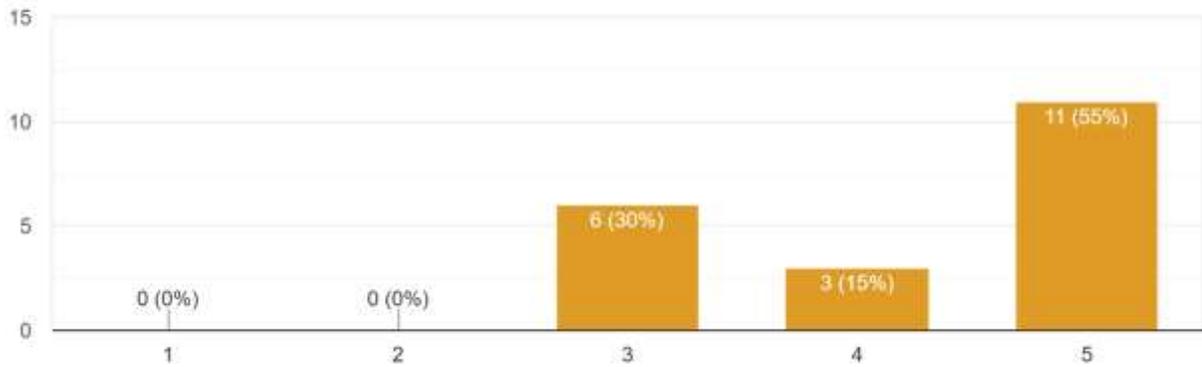
80 responses



- Yes
- No
- I had joined the CanSat contest for junior and high school students for 6 years in Japan..
- I have not participate in CanSat competition but I know about it
- None opportunity has been given!

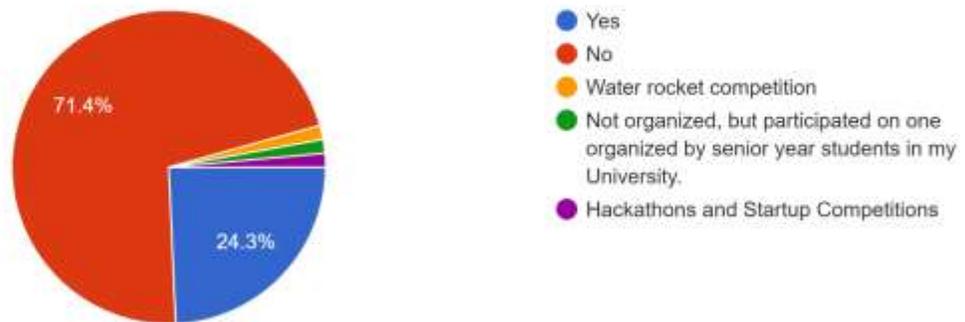
If yes, do you think the experience was good for your education?

20 responses



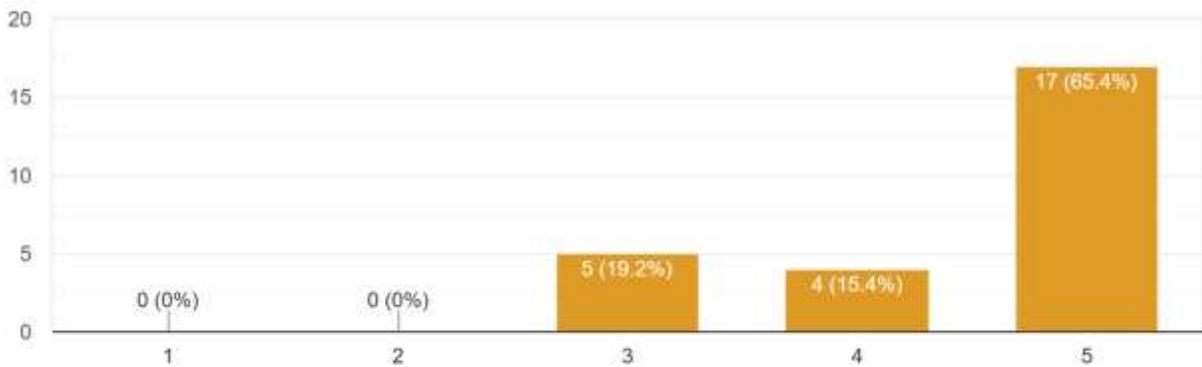
Have you ever organized a competition in the space engineering field?

70 responses



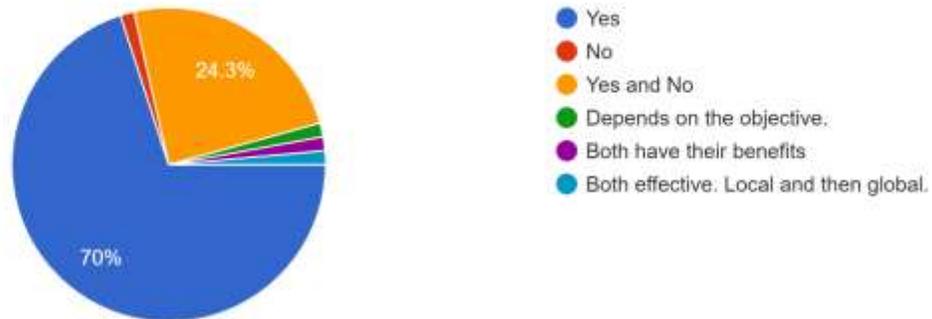
If Yes, do you think the competition was good for education of the participants?

26 responses



Do you think international competition is more effective than national competition?

70 responses



Some of your ideas regarding international vs. national competition:

For our case in PH, our space satellite industry is just starting so if local, it can get be a venue to get people more involved in the field. However, an international competition would keep us updated about satellite engineering.

In Bulgaria we sort the participants by making a national competition first and then some of the participants with the best score have the chance to go to an international competition.

It helps you to share and gain more knowledge, as well as to evaluate your competitiveness level in an international frame. Bringing together more unique and diverse ideas.

A national competition is required before an international/regional one for preparations and learning experience depends on what you intend to achieve. in some situations, it may be good to gain experience in national competitions and then go for international events, both for participants and organizers. There is a place for both national and international events. understanding the advanced technology development and the new mission era.

It allows every individual to go beyond their knowledge to compete with other people internationally, especially it challenges their skills and intellect to pursue things that implies pressure in their perspective fields.

For Global Networking and Global Benchmarking: It makes one to know his/her position in Global Skill Levels!

- 1. Showing your work to the others and they can give you positive comments*
- 2. Be connected with other international competitors*
- 3. Getting an experience of being challenged*
- 4. The way of showing your commitment and your leadership.*

Thank you.