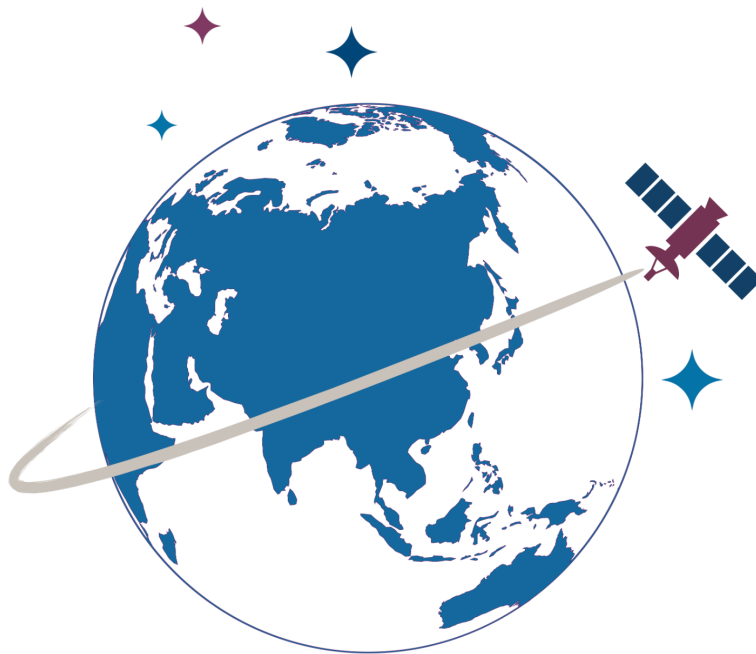


Event Report

Asia-Pacific Space Generation Online Workshop 2020



Online (through Airmeet)
28-29th November & 5-6th December, 2020



SPACE GENERATION
ADVISORY COUNCIL



SPACE GENERATION
ADVISORY COUNCIL

In support of the United Nations programme
on Space Applications

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INTRODUCTORY REMARKS

EVENT OVERVIEW

Asia-Pacific Space Generation Workshop (AP-SGW) has been a staple event conducted by SGAC for many years now. In this workshop, the next generation of space leaders explore challenges relevant to their region and gain opportunities for collaboration.

The year 2020 marked a new beginning for the workshop, as it was conducted online for the very first time due to the pandemic and was given a new name: Asia-Pacific Space Generation Online Workshop (AP-SGOW).

The workshop was conducted for four days spread over two weeks and opened new doors for the participants as they had the chance to collaborate and work along with people from different countries, all from the comfort of their own homes.

The participants were divided into four working groups which focused on key issues in the Asia-Pacific region. Cultural activities were also conducted for team building and provided the participants the chance to experience different cultures.

FROM THE EVENT MANAGER

AP-SGOW follows a proud tradition of Asia-Pacific Space Generation Workshops (AP-SGWs), the longest series of regional workshops organized and hosted by SGAC since 2014. This year, due to the Novel Coronavirus (COVID-19) outbreak, AP-SGW 2020 was transformed into an online format and the organizing team could hold it successfully enabling it to a larger audience.

This year our main goals were to strengthen the regional network of the students and young professionals in the Asia-Pacific region, to debate and discuss on key regional issues and to build a network of present leaders in the region and future space sector leaders. With the participation of highly motivated 73 delegates from 21 countries, 4 working group speakers, 15 mentors, 8 subject matter experts, we are proud to say that we could reach our goals.

After two weeks of dynamic debates, working groups came up with valuable recommendations for the betterment of the space industry in the Asia-Pacific region as well as the whole world. Our delegates will continue their research on each working group topic.

Uthpala Perera
Event Manager

Tsuyoshi Shikida
Co-Event Manager



Uthpala Perera
Event Manager



Tsuyoshi Shikida
Co-Event Manager

REGIONAL COORDINATOR FOREWORD

This year marked the 7th installment of our annual Asia-Pacific Space Generation Workshop (AP-SGW) which started with a vision of bringing together a platform for the young space generation to share ideas, have fruitful discussions, ignite collaboration and propose recommendations on current issues in the space industry.

As we are all very aware of, this year we are facing unprecedented challenges with the COVID-19 pandemic which made executing capacity-building workshops such as AP-SGW extremely difficult.

Despite all these, this wonderful initiative has been redesigned and successfully held through a virtual edition which witnessed outstanding delegates, new activities, initiatives and event platform. The Organizing Team has worked tirelessly and spent long hours for the fruition of this event. Not only was the event a success but it also showcased the ingenuity of the young generation and perseverance of the Organizing Team members in making this happen.

In order to overcome COVID-19 situation, we need to dedicate ourselves to SGAC activities more than ever. As for face-to-face events, we can deal with problems happening during the event by communicating directly with each other. However, as for online events, we need to deal with problems in real-time more quickly. We are sure that the organizing team has struggled with a lot of problems much more than expected, but they overcame all of the problems and concerns by their dedication to work and it was definitely a successful event more than ever. We really appreciate their dedication on behalf of SGAC executives. Now that it has been proven that we can lead AP-SGW to success even with an online session, we don't have any concerns for next year. However, we truly hope that we can meet in person in Vietnam next year.

We would also like to acknowledge and thank all our sponsors and partners for making this possible and extending their support for the next generation of space leaders in the Asia-Pacific.

Bernadette Detera
Regional Coordinator

Kenta Watanbe
Regional Coordinator



Bernadette Detera
*Regional
Coordinator*



Kenta Watanbe
*Regional
Coordinator*

PROGRAMME

DAY 01

Time	Programme
10:30 - 11:00	AP-SGOW Opening & Introduction
11:00 - 12:00	Meet 'N' Greet
12:00 - 12:30	Working Group Introduction
12:30 - 13:00	Break Origami Challenge
13:00 - 15:30	Working Group Session 1

DAY 02

Time	Programme
10:30 - 11:00	Day 2 Introduction
11:00 - 11:30	Working Group Speaker 1
11:30 - 12:00	Working Group Speaker 2
12:00 - 13:30	Break Space Trivia
13:30 - 15:30	Working Group Session 2

DAY 03

Time	Programme
10:30 - 11:00	Working Group Session 2
11:00 - 11:30	Working Group Speaker 3
11:30 - 12:00	Working Group Speaker 4
12:00 - 13:30	Working Group Session 3
13:30 - 15:30	Speed Networking & Mentoring

DAY 04

Time	Programme
10:30 - 11:00	Introduction
11:00 - 12:30	Working Group Presentations & Videos
12:30 - 13:00	Break Karaoke and Dance Challenge
13:00 - 15:30	AP-SGOW Closing & International Night

INVITED SPEAKERS



Dr Rogel Mari Sese (PhD) | Astrophysicist, Chair of the Department of Aerospace Engineering of the Ateneo de Davao University

Dr Rogel Mari Sese is an internationally recognized astrophysicist, educator and space expert and is the Philippines' leading advocate for space science and technology development. Currently, he is a member of the Board of Trustees and is the Chair of the Department of Aerospace Engineering of the Ateneo de Davao University. Dr Rogel Mari Sese is an internationally recognized astrophysicist,

educator and space expert and is the Philippines' leading advocate for space science and technology development. Currently, he is a member of the Board of Trustees and is the Chair of the Department of Aerospace Engineering of the Ateneo de Davao University. He obtained his undergraduate degree in Applied Physics from the University of the Philippines Los Banos, Masters in Physics from the University of the Philippines Diliman and his doctoral degree in Physics, specializing in Computational Astrophysics at the University of Tsukuba, Japan under the MEXT Japanese Government Scholarship Program. He also led the National SPACE Development Program which crafted the Philippine Space Development and Utilization Policy and proposal for the creation of the Philippine Space Agency. He wrote and spent years actively lobbying for the law that eventually became Republic Act 11363 or the Philippine Space Act, the Philippines' first space law that led to the creation of the space agency and policy. He is recognized both locally and internationally, being selected as a 2012 Emerging SpaceLeaders by the International Astronautical Federation, one of the eight Filipinos in the Top 100 Asian Scientists of 2018 by the Asian Scientist Magazine, and recognized in Senate Resolution 882 in 2019 by the Philippine Senate for his contributions to space development in the country. Dr. Sese has represented the Philippines in international gatherings and has been invited to deliver speeches in numerous local and international conferences to give insights on the perspective of emerging space nations on space science, technology, law and industry development. He has worked also with the private sector, having established Regulus SpaceTech in 2013 and served as a consultant of the Philippine Navy, Philippine Air Force and Department of National Defense for several years. He also served as the Focal Person of the Philippine Space Science Education Program of the Science Education Institute, established the Southeast Asian Young Astronomers Collaboration, member of the International Astronomical Union, National Point of Contact of the Space Generation Advisory Council and is a member of various local and international organizations.



Dr Naoyuki Ishikita (MD, PhD) | Founder & Chief Technological Officer at STONY & Co. Medical Device Innovation Office Manager at the Clinical Research Department of National Hospital Organization, Niigata Hospital

Dr Ishikita, who is known worldwide to be the "Inventor of the printable E-mail Ventilator", graduated from Iwate Medical University School of Medicine in 2004. In 2010, he started his research when he came up with the idea of a simple inhalation anesthesia system for the initial treatment of status epilepticus. He has

invented several medical devices and technologies, including "VapoJect ®", "MicroVent ®", "Cho-shin UP! ®", and "Sputa Vacuumer ®". He has been presented the Research and Development Innovation Award for his research, entitled "3D printable medical device for long term manned space missions (VapoJET & E-mail Ventilator)", by the Aerospace Medical Association in 2018. He has also been the Medical Device Innovation Office Manager at the Clinical Research Department of National Hospital Organization Niigata Hospital since October 2019. In 2020, he was recently appointed as a leader in the "Development of 3D printable ventilator (COVIDVENTILATOR PROJECT)" by Japan's Ministry of Economy, Trade and Industry.



Dr Pham Thi Mai Thy (PhD) | Deputy Director of Space Technology Center at Vietnam National Space Center

Dr Pham Thi Mai Thy is a senior researcher majoring in remote sensing and GIS at Ho Chi Minh Space Technology Application (STAC) - Vietnam National Space Center (VNSC) - Vietnam Academy of Science and Technology (VAST). She got the PhD degree from Japan in 2013 about using satellites to detect urbanization and land cover change. She has experience on some national projects and international projects about EO applications. Besides, she is also a lecturer at universities in Ho Chi Minh City, Vietnam. From 2019, she joined the activities of WGCapD (CEOS) as Vice Chair.



Dr P v Venkitakrishnan (PhD) | Distinguished Scientist, Director, Capacity Building Programme Office, Indian Space Research Organisation

Born on 16 May 1961 in Trichur, Kerala, Dr Venkitakrishnan joined ISRO in 1983. A leader with 37 years of experience in the field of Aerospace Materials & Manufacturing, he assumed various technical and managerial positions ISRO such as Deputy Director (Materials and Mechanical Entity) and Associate Director of the Vikram Sarabhai Space Center (VSSC), Director of Vikram Sarabhai Space Center (VSSC), Director of the ISRO Propulsion Complex (IPRC), before his current position as Director of the Capacity Building Programme Office (CBPO) at ISRO Headquarters. Recipient of the National Merit Scholarship, Dr Venkitakrishnan graduated from Cochin University (V.tech.), Annamalai University (postgraduate diploma, MBA) and the IT Madras (M.Tech., PhD). He is a fellow of the Institute of Engineers (India), fellow of Indian Institute of Metals (IIM), and is Governing Council Member at the Aeronautical Society of India (AeSI).

SUBJECT-MATTER EXPERTS



Kuang-Han Ke | Founder & Chairman at Gran Systems

Kuang-Han holds an M.S. in Aeronautics and Astronautics from Stanford University. He has experience in the industry, government, research, academia, and global industry associations. In the semiconductor industry, he has over 27 years of experience encompassing a mix of industry and teaching. In New Space, he launches CubeSats and experiments in space and is the founder of the International Space Station Gateway Company in Taiwan and South-East Asia.

He is also the Founder & Chairman of Gran Systems where they engage in system integration design, think-tanks, and manufacturing in new space and medical equipment. Today, he is engaged in angel investing in startups and MakerSpaces to foster creativity and innovation in Taiwan. He runs a Space Business Incubation Center and invested in 12 companies and is involved in 3 IPOs in Taiwan.



Narayan Prasad | Chief Operations Officer at Satsearch

Narayan is the Chief Operations Officer at satsearch, chiefly responsible for helping buyers find the right products and services for their mission or service. He also serves as a Partner to SpacePark Kerala, a Government of Kerala initiative to develop a dedicated space economy hub in India.

Narayan holds a PhD in Supply Chain Management from the University of Erlangen-Nuremberg. He previously served as an Associate Research Fellow at the European Space Policy Institute where he contributed to enhancing cooperation between Europe and India in space. He has authored over 75 articles in various national and international publications and was educated in India, Germany, Sweden and France. He is also an elected member of the International Institute of Space Law, awardee of Emerging Space Leaders by the International Astronautical Federation and host of the NewSpace India podcast.



Jaime C. Montoya | Executive Director at Philippine Council for Health Research and Development

Dr Montoya is a highly trained infectious disease specialist and public health expert specialist, with an MSc and Diploma in Clinical Tropical Medicine, and MSc in Bioethics. He obtained his MSc degrees from the London School of Hygiene and Tropical Medicine, and UP Manila-College of Medicine, respectively.

He also earned his PhD in Medicine from the Juntendo University School of Medicine in Tokyo, Japan. Dr Montoya is also certified by the Royal College of Physicians (London, U.K.), the Philippine Board of Internal Medicine, and the Philippine Board of Microbiology and Infectious Diseases.

Currently, Dr Montoya is a Professor VIII at the UP Manila-College of Medicine, and the President of the Philippine Association for the Advancement of Science and Technology (PhilAAST). Dr. Montoya is also the Executive Director of the Philippine Council for Health Research and Development-Department of Science and Technology and was recently conferred the level of Career Executive Service Officer II by President Duterte last December 2019.

He has been the recipient of over 20 prestigious professional awards in the fields of medical research, education, medical writing, medical society leadership, and community service including the National Academy of the Science and Technology (NAST), Outstanding Young Scientist awardees in 1998, is the main author of this outstanding research. He spearheaded projects on tuberculosis since 1992 when he joined the TB Study Group of the UP College of Medicine as one of its founding members.



Susan Ip-Jewell MD | Co-founder & Chief Innovation Officer at AvatarMEDIC.space

Dr Susan Ip-Jewell MD, DCEG is a Space Medicine Physician-Scientist, Analog Astronaut, exponential technologist, entrepreneur. Recently appointed as an official "SPACE COACH" for AFWERK empowered by the US SPACE FORCE and US Air Force and received a "knighthood" as Dame Commander in the Order of the Eagle of the Kingdom of Georgia from the Royal House of Georgia.

Her research focuses on space medicine, health, wellness, human factors and exponential technologies. She is the CEO/Co-Founder of MMAARS, Inc (Mars-Moon Astronautics Academy & Research Science) training commercial analog astronauts and developing the first Mars-Moon Settlement training facility in Mojave Desert (close to Mojave Spaceport) in California, USA (formerly Mars Academy USA). MMAARS is offering fully immersive experiences in analog missions monthly where selected crews live, work and conduct R&D in remote, Isolated and Confined Environments (I.C.E) integrating experiential learning with exponential technologies. Dr Ip-Jewell is also Co-founder /CIO, of AvatarMEDIC.space, a company with a vision to create a new paradigm to disrupt and democratize healthcare access and medical services by converging XR/AR/AI, haptics, robotics, drones, and blockchain. AvatarMEDIC is an official team in the \$10 Million ANA Avatar XPRIZE). Dr Ip-Jewell recently graduated from Founder Institute (FI) Silicon Valley 2020 cohort and from Draper University Accelerator programs. A veteran analog astronaut, and Commander of crews deployed to austere, remote Isolated, and Confined Environments. Susan pioneered the first Mars "Station-to-Station" MARS MEDICS training missions with MAU-MDRS Crew 001, commanded missions from low-to high-fidelity locations under NEAMAE PROJECT (Nepal, Everest, Antarctica, Africa, Americas Mars Analog Astronaut Exploration Expeditions). Trained at National Institute of Health (NIH), National Cancer Institute (NCI) in clinical medicine, drug discovery/molecular therapeutics at UCLA Department of Molecular & Therapeutic Pharmacology. She is a graduate of International Space University (ISU), and a recipient of Google Scholarship to attend Singularity University's (GSP15). She graduated from Aston University, UK Ross University School of Medicine. Susan is a recipient of the "Marie Marvingt Award in "Technologies and Innovations for Space" by Aerospace Medical Association (AsMA) recognizing visionaries in space exploration. She is also a recipient of the National Space Society (NSS) "Living in Space" Award for pioneering development of Lunar & Martian settlements. She founded The Clinic LLC, an Integrated Wellness & Telemedicine Center in LA.



Hiroyuki Miyazaki | Project Assistant Professor at Center for Spatial Information Science, The University of Tokyo

Dr Hiroyuki Miyazaki received a B.A. in environmental information from Keio University, Kanagawa, Japan, in 2006, and M.E.S. and Ph.D. degrees in environmental studies from The University of Tokyo, Japan, in 2008 and 2011, respectively. From 2011 to 2012, he was a JSPS Postdoctoral Fellow with the Center for Spatial Information Science, The University of Tokyo. Since 2012, he

had been a researcher with the Earth Observation Data Integration and Fusion Research Initiative, The University of Tokyo, as well as a secondee at the Asian Development Bank, Philippines. In 2016, he was appointed to Project Assistant Professor with the Center for Spatial Information Science, The University of Tokyo, and was seconded to the Asian Institute of Technology, Thailand. His research interests include geospatial information science, satellite remote sensing for socioeconomics, and applications to sustainable development.



Watcharin Unwet | Senior Space Educator at Space Zab

Watcharin is a Space Generation Advisory Council National Point of Contact for Thailand and a Senior Space Educator at Space Zab, a company conducting research in 3D Space Food Printing. He is also a Master's degree student in Medical Biochemistry and Molecular Biology from Mahidol University. For his previous experiences, he was the representative of Thailand who gave a presentation about a space probiotics experimental idea in the final round of the 6th Mission Idea Contest at the University of Tokyo, Japan. He was also one of the Thailand team who developed the proposal about optimizing the fermentation process of probiotics under space condition in order to perform in the International Space Station Bartolomeo Platform by the United Nations Office for Outer Space Affairs (UNOOSA). As a Senior Space Educator, he was the one who organized several space education events and also gave talks and conducted workshops about space related topics for students in several schools in Thailand.



Soyoung Chung | Coordinator of the International Space Exploration Coordination Group at Korea Aerospace Research Institute (KARI)

Soyoung Chung is a senior researcher at the Korea Aerospace Research Institute (KARI), South Korea's leading space R&D institute. From 2009 - 2019, she worked at KARI's space policy office, where she assisted the government office in charge of the national space policy and program.

She has taken part in numerous government commissioned space policy studies and has supported the National Space Committee for many years. She also served as a South Korean delegate for UNCOPUOS. Ms Chung currently works at KARI's Future Strategy division and works on technology strategy. She also serves as a delegate and internal coordinator for KARI's participation in ISECG and carries out internal policy studies on topics related to space exploration. Mr. Chung has a master's degree in space engineering and is working on a P.H.D thesis at the Graduate School of Science and Technology Policy at the Korea Advanced Institute of Science and Technology (KAIST).



Nandia Shatar | Foreign Affairs Officer of the Mars-V Project at Mongolian Aerospace Research and Science Association (MARSA)

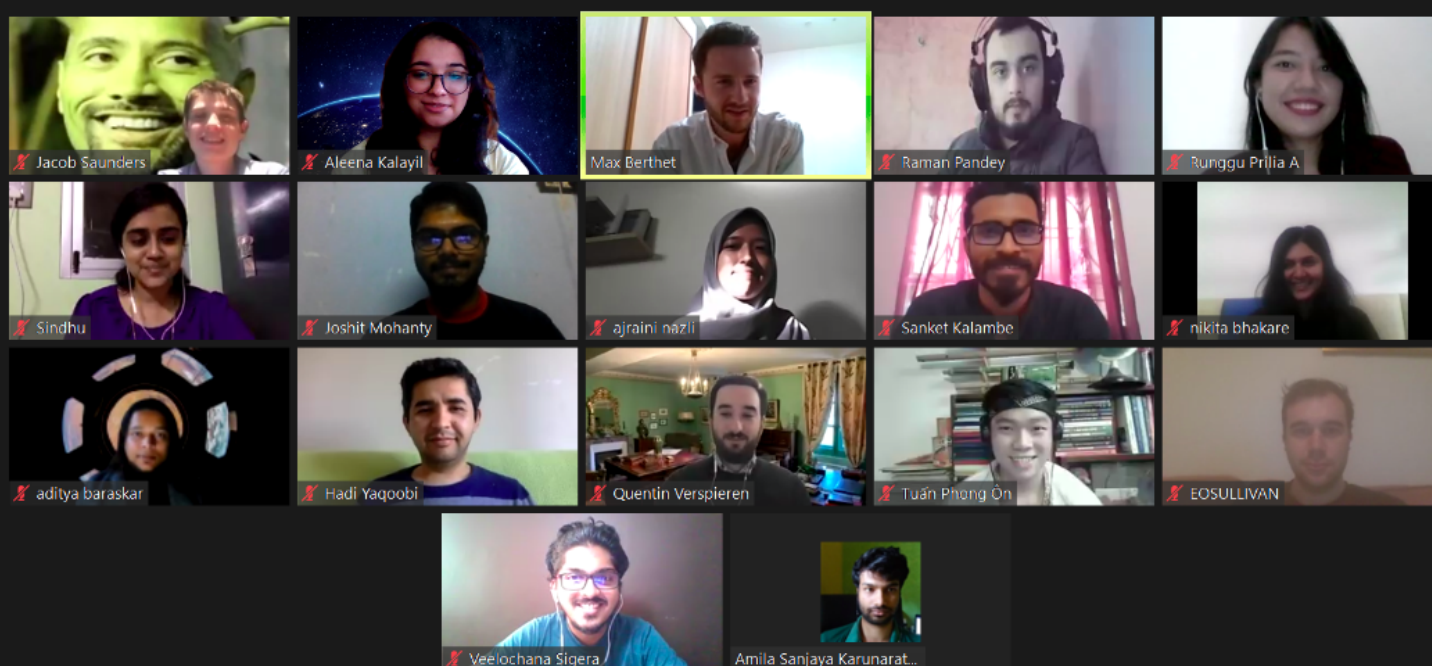
Nandin-Erdene Shatar is a Foreign Affairs Officer at the Mongolian Aerospace Research and Science Association (MARSA). After obtaining her International Relations Masters degree at Shanghai Jiao Tong University, she returned to Mongolia in 2019 and established an eco-friendly tour comp-

any, EcoOpa. Nandin-Erdene is currently working on the Mars-V project, which is designing a Mars simulation training base and academy in the Gobi desert. She previously introduced MARSA and its Mars-V project during the Mars Society's annual convention in October 2020.

EVENT HIGHLIGHTS

DAY 01

Day 01 began with introducing the purpose of the workshop and working groups to all attendees. The platform was also made familiar to all delegates. After the opening session on day 01, delegates had the opportunity to meet each other virtually. They were paired with each other and got to learn about each other through games. After that, delegates could join the 'workshop break fun challenge.' The fun challenge activity was a traditional Asian game: origami. Delegates were challenged to test their art skills and innovativeness. The name 'origami' descends from the Japanese words 'ori' and 'kami' which mean 'folding' and 'paper.' Traditional origami involves folding a single sheet of square paper into a model without cutting, gluing, taping, or even marking it. So, delegates attended and got the ultimate experience while earning points and surprise prizes. After that, delegates joined their pre-selected working groups and started working group discussions. Delegates were allocated into smaller subgroups inside a working group and two moderators and two subject matter experts were allocated to each working group. The discussions were fruitful, and each working group took focus questions one by one on to the table.



DAY 02

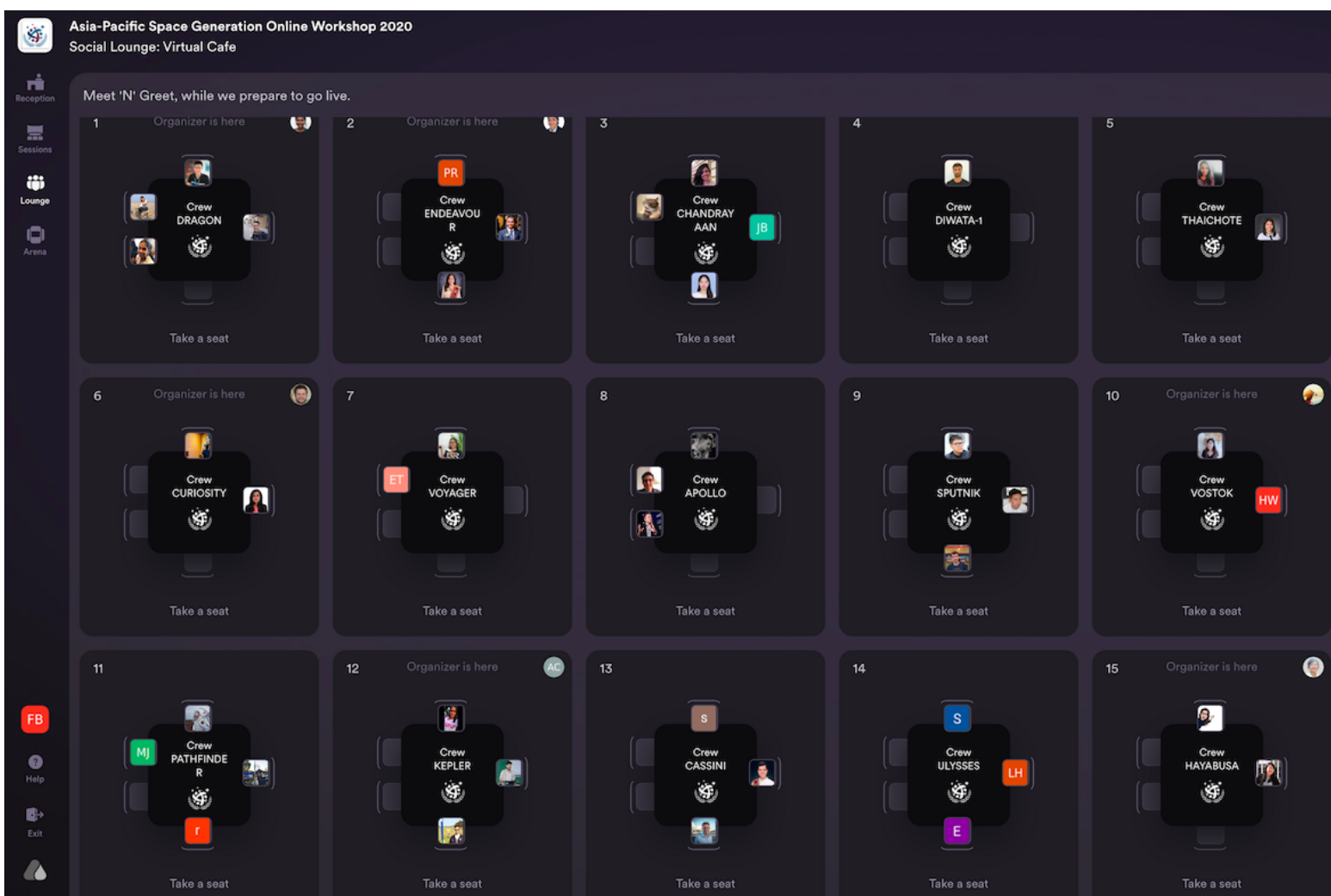
Day 02 started with the opening remarks by event managers. The cultural challenge and the fitness challenge were announced. After that keynote speeches were held. The first keynote speech of the event was by Dr. Rogel Mari Sese - an astrophysicist and Chair of the Department of Aerospace Engineering of the Ateneo de Davao University - as he recounted his journey to establishing the Philippines Space Agency. He discussed on working group topic one, specificities of Asia-Pacific space development. Second keynote speech was conducted by Dr. Naoyuki Ishikita, Founder & CTO at the STONY & Co. Medical Device Innovation Office Manager at the Clinical Research Department of the National Hospital Organization, Niigata Hospital in Japan. Dr Naoyuki Ishikita invented the “printable Email Ventilator” for the ISS, which is recently being used during the COVID-19 pandemic. He has won several awards worldwide for his invention. Dr Ishikita discussed on the working group topic two, addressing Global Health (specifically COVID-19) with Space Medicine on Earth. Both keynote speeches were telecasted live on SGAC YouTube channel.



DAY 03

Day 03 started with the opening. After that two keynote speeches were held. First keynote speech of day 03 was from Dr. Pham Thi Mai Thy - Deputy Director of Space Technology Application Center at Vietnam National Space Center as she talks about her experience in Earth Observation projects for agricultural research and applications. Her keynote was focused on the working group topic, use of space technology for agricultural development and Food Security in Asia Pacific Region. Second keynote was from Dr. P V Venkitakrishnan - Director of the Capacity Building Programme Office (CBPO) at Indian Space Research Organization (ISRO), the national space agency of the Republic of India. The keynote speeches were followed by a 15 min question and answer session.

Day 03 consists of a working group discussion as well that focuses mostly on the working group presentation. Main highlight of day 03 was the speed mentoring session. Each and every delegate had the chance of meeting mentors from the Industry/Business, Academia/Technical, and Government/Polymaking sector. Speed mentoring sessions were done virtually by moving mentors to different tables. All the delegates met all mentors, and it was a remarkable session for the delegates as well as mentors.



DAY 04

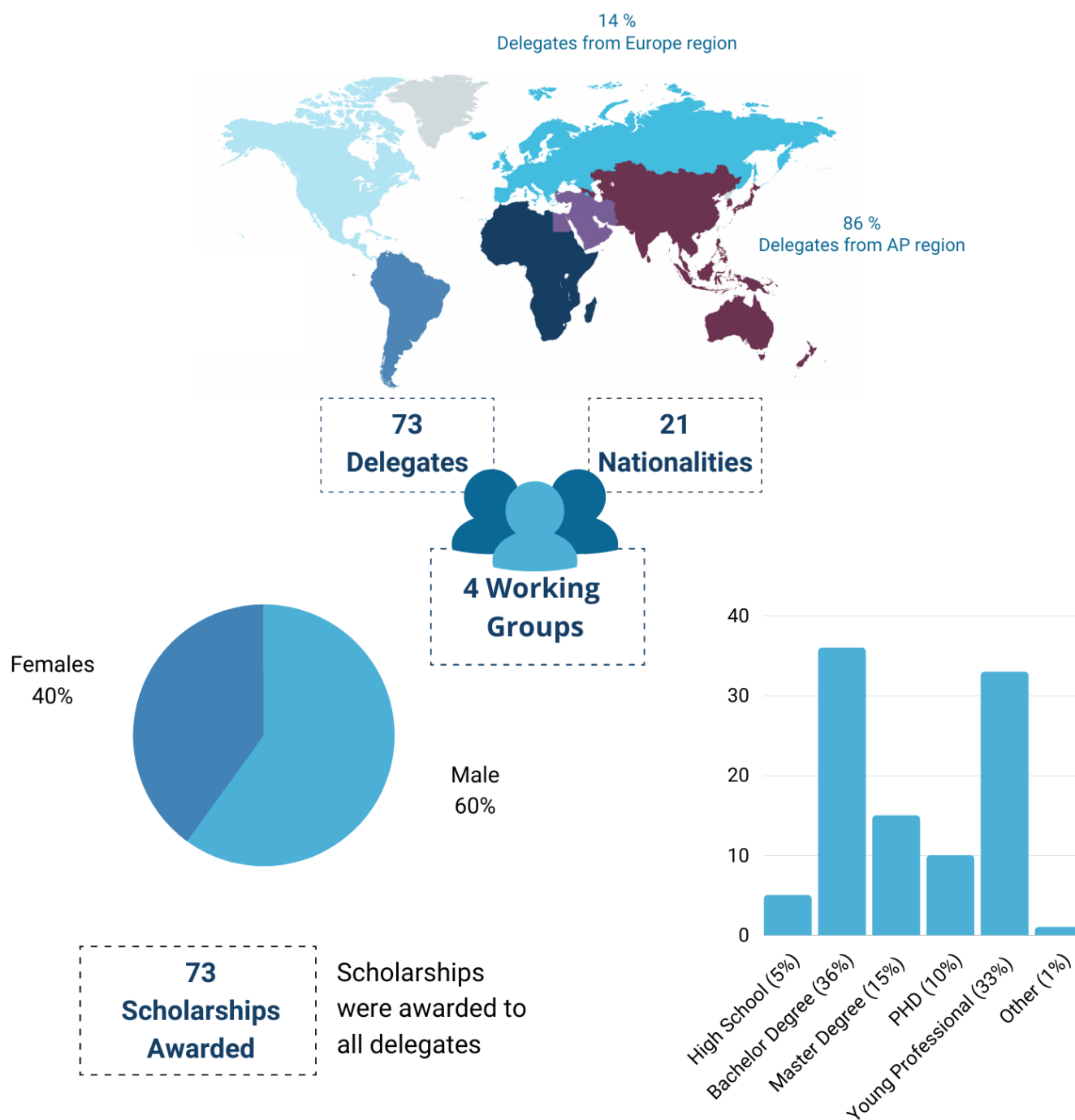
Day 04 was the last date of the event. The day started with an opening speech by event managers. Then it moved onto working group presentations. This was where all the efforts of working groups were showcased. Each working group made a presentation to demonstrate their research, findings, results, and proposal. Delegates could learn from each working group and get to know what young space leaders can do and contribute to the different areas of space in Asia-Pacific.

Karaoke and dancing challenges also happened on day 04. Karaoke is a type of interactive entertainment developed in Japan in which people sing along to recorded music using a microphone. This was also one of the utmost ventures of AP-SGOW to undertake not only the Space but also Cultural variety within the Asia Pacific region. International Nights have been a highlight of Space Generation Workshops as it showcases the diversity of Asia Pacific cultures in the space industry and within SGAC. On the last day, delegates had the chance to present cultural activities or aspects of their respective countries, as well as experience other cultures from countries throughout the Asia-Pacific region. The winners of AP-SGOW 2021 were announced, and the event concluded successfully on day 04.



EVENT STATISTICS





WORKING GROUPS

WORKING GROUP 1: Specificities of Asia-Pacific Space Development

Participants



Description

Space development in the Asia-Pacific region is extremely imbalanced. Within the same region co-exist some of the world's most advanced space powers (e.g. Japan, China and India), intermediate ones with existing space infrastructure (e.g. Indonesia, Malaysia, Thailand), newcomers having recently established a national space program (e.g. Philippines), as well as numerous non-space countries having yet to reap the benefits of space technology development and utilisation. How were space programs in the Asia-Pacific region established? What lessons can be drawn for newcomers in the region? And what are the regional particularities of space development? These are the questions we explored in this working group, with the help of regional leaders in the Asia-Pacific satellite industry.

Main Objectives

1. To reflect on how space programs in the Asia-Pacific region were established.
2. To draw useful lessons for space newcomer countries in the region.
3. To identify unique points, in Asia Pacific, of space development.

Questions

1. Why did my country create a space program?
2. Are the lessons for space development in my country applicable to other countries in Asia-Pacific?
3. Based on the previous questions, what aspects of space development could or should be addressed by regional cooperation in Asia-Pacific?
4. What should be the role of cooperation with countries beyond Asia-Pacific?
5. What aspects should countries address without any collaboration?

Conclusions

The answers to the above questions are summarized as follows:

1. Inspired individuals and visionaries in various sectors were the pillars for creating space programs in many nations. Though our countries have different characteristics relating to the current state of formalised domestic space programs, all our countries see a strong positive benefit from such a program. In particular, we share similar geographic and regional challenges, including the need for better EO to support agriculture, disaster management and mitigation, fishing, communications and security. Each of the countries views space development as a contributor to overall scientific development of their nation as well.
2. Lesson: Sometimes it will even take decades to achieve the end goal with many failures. But it is necessary to focus and work consistently on the target.

Recommendations:

- Identify the challenges, needs and resources available on a national level.
 - Choose a few, specific priorities balancing the resources and needs. One of the measures to define a priority could be the maximum impact factor on their nations' development.
 - Define the goals and targets for developing a new space program in line with national-level plans.
 - Newcomers can also get a head-start by sharing the resources and knowledge on a regional or international level.
3. APAC countries can work cooperatively towards addressing challenges in space development by focusing on common regional challenges and in unlocking the economic benefits of these. Specifically, APAC countries can formulate stronger relationships with one another to assist capability and capacity development and support strong regional cohesion. This can also lead to sharing of technical and policy capacity and capability amongst countries. APAC countries can also work together to ensure a leading role in the formation of internal STM behaviours and in the formation of customary international law, and in developing a significant voice with respect to leading space dominant powers.
 4. Multilateral cooperation between APAC countries and beyond is critical in advancing the capabilities, however, it may be difficult to achieve. Regional collaboration between the space agencies of other countries can help develop the capability and capacity, and also assist with positive policy formation. APAC states can support non-APAC countries by sharing our knowledge, resources and expertise in overcoming global challenges. Further, the cooperation should also focus on supporting education mobility, increased collaborative research on the space frontier and more importantly for achieving the SDGs of the UN.
 5. Individually, countries can take the lead in developing the local space sector. The most important component is an ecosystem of local education initiatives, such as the promotion of STEAM subjects that support space sector development, as well as opportunities for the general public to get to know space better. Another important aspect is to provide support for the development of a commercial space industry that meets specific local needs. Critical to this is the identification of local downstream industry sectors that could benefit from interaction with the space sector.

Recommendations

Recommendations to the Space Generation Advisory Council

1. Create a platform/online repository containing resources/lessons on how to establish a space program (targeted specifically at developing countries) or start a space-related business.
2. Create a platform to foster regional discussion apart from the regional space generation workshop. It could be based around "geographical" rather than "thematic" project groups.
3. Reinforce regional activities and ties with regional institutions (e.g. ASEAN, UNESCAP) rather than staying North American and European centric.

Recommendations to the United Nations Office for Outer Space Affairs

1. Create a platform/online repository containing resources/lessons on how to establish a space program (targeted specifically at developing countries) or start a space-related business.
2. Support emerging space nations in developing space development strategies tailored to their needs.
3. Support emerging space nations in developing appropriate regulatory/legal frameworks for domestic space activities.
4. Support the development of regional space cooperation initiatives, among countries sharing the same challenges and therefore requiring similar space technology applications.

Recommendations to the Sponsor(s)/Partner(s) and/or the Industry at large

1. Share best practices and lessons on how to set up a space-related business;
2. Provide more opportunities to students and young professionals from countries without a space industry. This could be the spark that leads them to develop and grow sustainable space-related businesses in their home country.

WORKING GROUP 2: Addressing Global Health (specifically Covid-19) with Space Medicine on Earth

Participants





Description

When medical facilities are not readily available, such as in remote and underdeveloped regions, the standard of diagnosis and care have to be modified according to the context and constraints of such low-resource settings. Located more than 400km away from Earth, astronauts in the International Space Station (ISS) have been utilizing medical technologies developed to accommodate various medical conditions and perform complex procedures efficiently and remotely. Through the years, some of these technologies, such as telemedicine, portable ultrasound units, and ventilators, have been used to make medical care more accessible. In times of global health issues, such as the COVID-19 pandemic, the use of such technologies can help empower local healthcare providers to provide more timely and efficient diagnosis and care.

Main Objectives

1. Identify space medicine techniques and technologies that have been or can be utilized in Asia-Pacific.
2. Formulate ways for space medicine technologies to be further adopted, especially in low-resource areas, and to be used in aiding efforts to diagnose or treat COVID-19.
3. Determine the roles of key players in advancing the utilization of space medicine technologies on Earth and further development for space.

Questions

1. What space medicine techniques and technologies have been used in Asia-Pacific?
2. What are the common challenges in adopting these technologies, and factors that are important for them to be successfully adopted?
3. What is the role of various key players (e.g. space agencies, governments, hospitals, and industries) in utilizing the benefits of such technologies for humanity, and in helping countries without space agencies to benefit from these technologies?
4. How is space medicine being used in the current COVID-19 pandemic?
5. How can research on Earth help improve further development of space medicine?

Conclusions

1. Several space medicine techniques and technologies have been used in Asia-Pacific: the most widely-used being the ISS portable ultrasound, portable ventilator, portable CT scan, and telemedicine. In our WG, we categorized these into 3 types: medical devices, emerging technologies, and health/wellness applications.
2. However, these techniques and technologies are still not widely used due to the lack of infrastructure, government support, standardization, and culture/education. The key factors for successful adoption include more collaboration, faster regulatory approval and sustainable funding. Each technology also has to be safe, durable, efficient, portable, easy to use, and sustainable.
3. Various key players have various roles in ensuring the utilization of such techniques and technologies. The most important ones are in a) facilitating collaboration among various players to support each other in research, development, testing and deploying the technologies, and b) promoting education in safe and standardized manufacturing, use, and disposal of technologies.
4. The technologies mentioned in (1) have been used in various areas to diagnose and treat COVID-19. However, they are still not widely-used when they have so much potential in helping curb the pandemic, especially in low-resource areas. The WG has also thought of ways for unused technologies and to improve the ones currently being used.

5. Research in space is logistically, technically, and financially limited, therefore, continued research on Earth is essential in further improving space medicine techniques and technologies. The integration of emerging technologies, such as artificial intelligence, machine learning, blockchain, augmented reality, and virtual reality, are indispensable in the next-generation versions of the currently used technologies.

Recommendations

Recommendations to the Space Generation Advisory Council

1. To create a regional sub-group under the Space Medicine and Life Sciences (SMLS) Project Group to encourage more participation from Asia-Pacific members since most of the timezones of the previous webinars made it challenging for Asia-Pacific members to join.
2. To facilitate a mentorship program and connect current members to successful professionals in Space Medicine to get more guidance on how to pursue a career in the various sub-fields (e.g. space biology, astrobiology, space pharmacology, space nutrition) and how to conduct experiments in space or to utilize data from space experiments.

Recommendations to the United Nations Committee on the Peaceful Uses of Outer Space

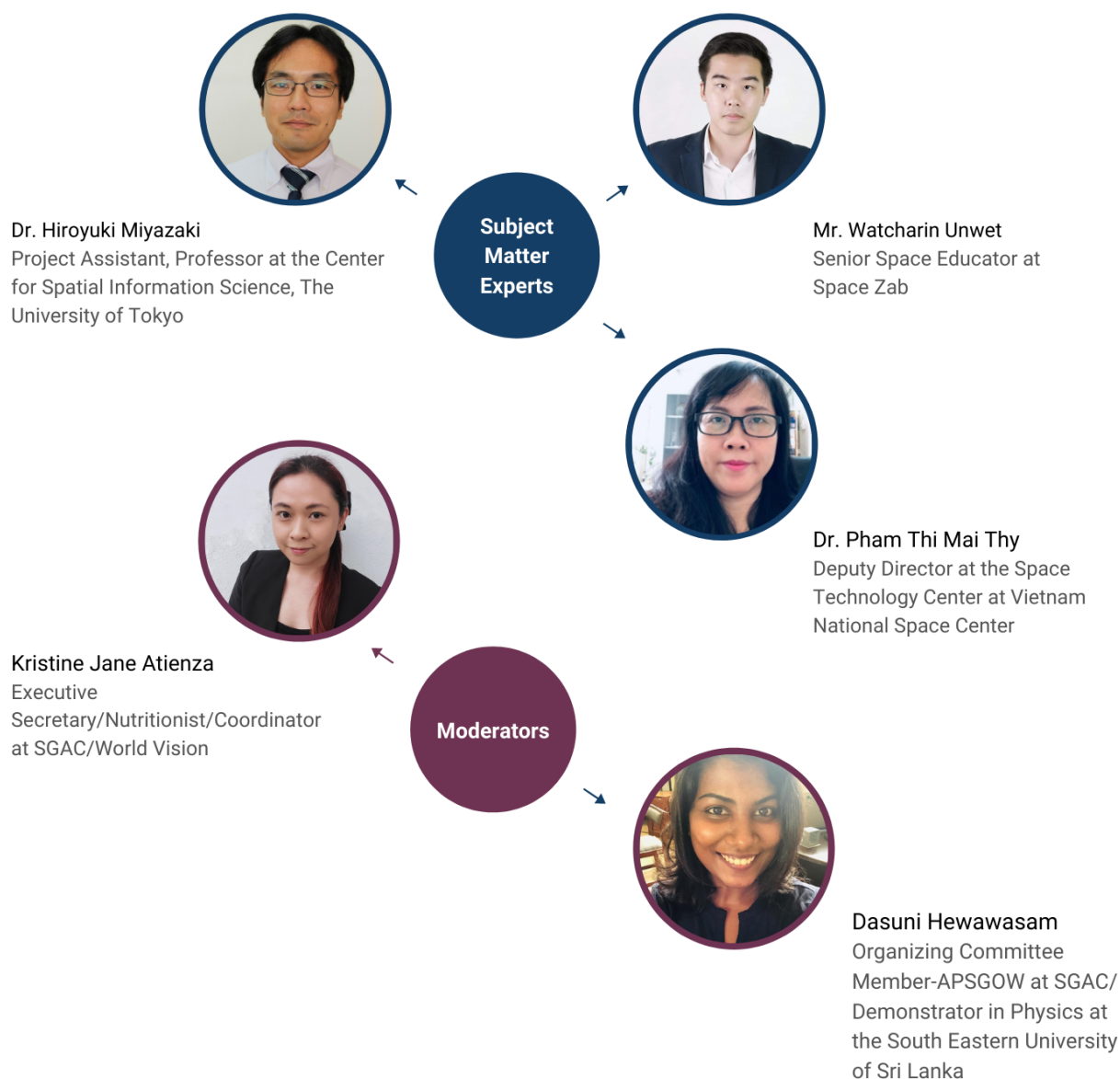
1. To coordinate with regulatory agencies (e.g. International Medical Device Regulators Forum) to create a regional guideline to accelerate standardized and safe approval of space medicine technologies.
2. To create a standing international regulatory body on standards and Ethics for the use of emerging technologies involving data and cybersecurity (e.g. artificial intelligence, machine learning) under UNOOSA auspices with a UN Security Council mandate and an arbitration function.
3. To launch an Advisory Board under UNOOSA for space sustainability and the ethical use of space data composed of engineers, technologists, tech firms, key-stakeholder representatives, and legal experts.

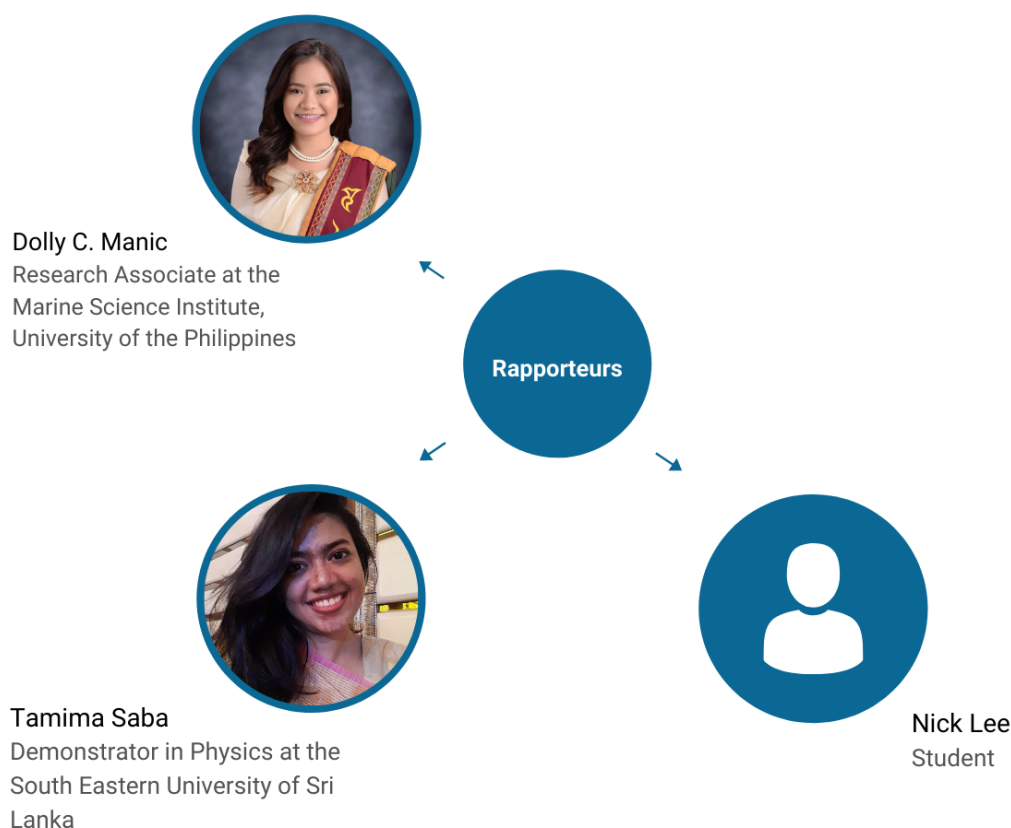
Recommendations to the Asia-Pacific Regional Space Agency Forum

1. To establish a space medicine working group that will support and facilitate the work of space agencies in Asia-Pacific to promote the utilization of space medicine technologies across the region;
2. To demonstrate the UN's SDG 17 by fostering public-private collaborations to encourage innovation, support commercialization of patented technologies, and boost Research & Development (R&D) across the region to continue the development and improvement of technologies for use in space and on Earth;
3. To work with regional medical groups (e.g. Asia Pacific Medical Technology) in advancing space medicine technologies across the region, especially to countries with no space agencies;
4. To promote awareness and motivation for the general public to adopt novel technologies.

WORKING GROUP 3: Use of Space Technology for Agricultural Development and Food Security in Asia Pacific Region

Participants





Description

The Asia Pacific region is home to over 4.2 billion people, or two thirds of the world's population and is one of the world's fastest growing and most diverse regions. Studies have shown that growth in the agriculture sector in many of these countries has led to a decline in poverty rates. Another of the region's pressing challenges is food insecurity, which is exacerbated due to many different reasons. The diversity in size, institutional structures and statistical capabilities of the countries in Asia Pacific demands a thorough, holistic and flexible response that accounts for each country's unique standing, capabilities and direction. So, the Asia Pacific region should seek to meet the challenges we have and engender progress through space technology for agricultural development and food security.

Main Objectives

To build a higher sustainable agrarian economy through Space technology for developing agriculture and food security in the Asia Pacific region.

Questions

1. The role playing of the Asia Pacific region in Agriculture compared to other regions in both crops and livestock.
2. What are the Applications of Space Technology and Geographic Information Systems for agricultural

development and Food Security within the region?

3. How can we use space technology for Disaster Risk Reduction (Both Disaster Monitoring and Early Warning) and Sustainable Development to help Agriculture development and food security within the region?
4. As a region using satellite technology how to achieve climate-smart agriculture improving the integration of agriculture and food security under global climate change? (Climate change and extreme weather events will further impact agriculture in many ways, particularly in areas vulnerable to natural disasters).

Conclusions

1. The role of Asia Pacific in Agriculture is extremely diverse, and its impact cannot be discounted. The Asia Pacific countries play a huge role in exporting agricultural produce. And to identify a single produce that Asia Pacific plays a major role in, would be to oversimplify her role in agriculture as the types of agricultural produce of a country within Asia Pacific ranges from country to country due to her diverse climate and geography. Through the insights gathered over the working group discussions, it was identified that the key exports of the region ranges from rice, tea, sugar cane, poultry, livestock and seafood, several of which, the Asia Pacific region is the largest exporter of. Therefore, it would not be premature to surmise that the security of the Asia Pacific Agricultural sector is crucial to the security of the global food system.
2. Similar to the diverse agricultural produce that is produced by Asia Pacific nations, the usage of space based technology varies across the value chain too.
3. The team began by summarising and crowd sourcing the various threats experienced by the various Asia Pacific nations. And the following recommendations were identified:

Recommendations

Recommendations to the Space Generation Advisory Council

1. Participation of university students;
2. SGAC local group to reach communities and youth.

Recommendations to the United Nations Office for Outer Space Affairs

1. Capacity building for local farmers on how to use data obtained from satellite technology;
2. Encourage member countries to launch projects to reduce the gap between farmers and researchers/experts;
3. Introduce new & tactful economic policies.

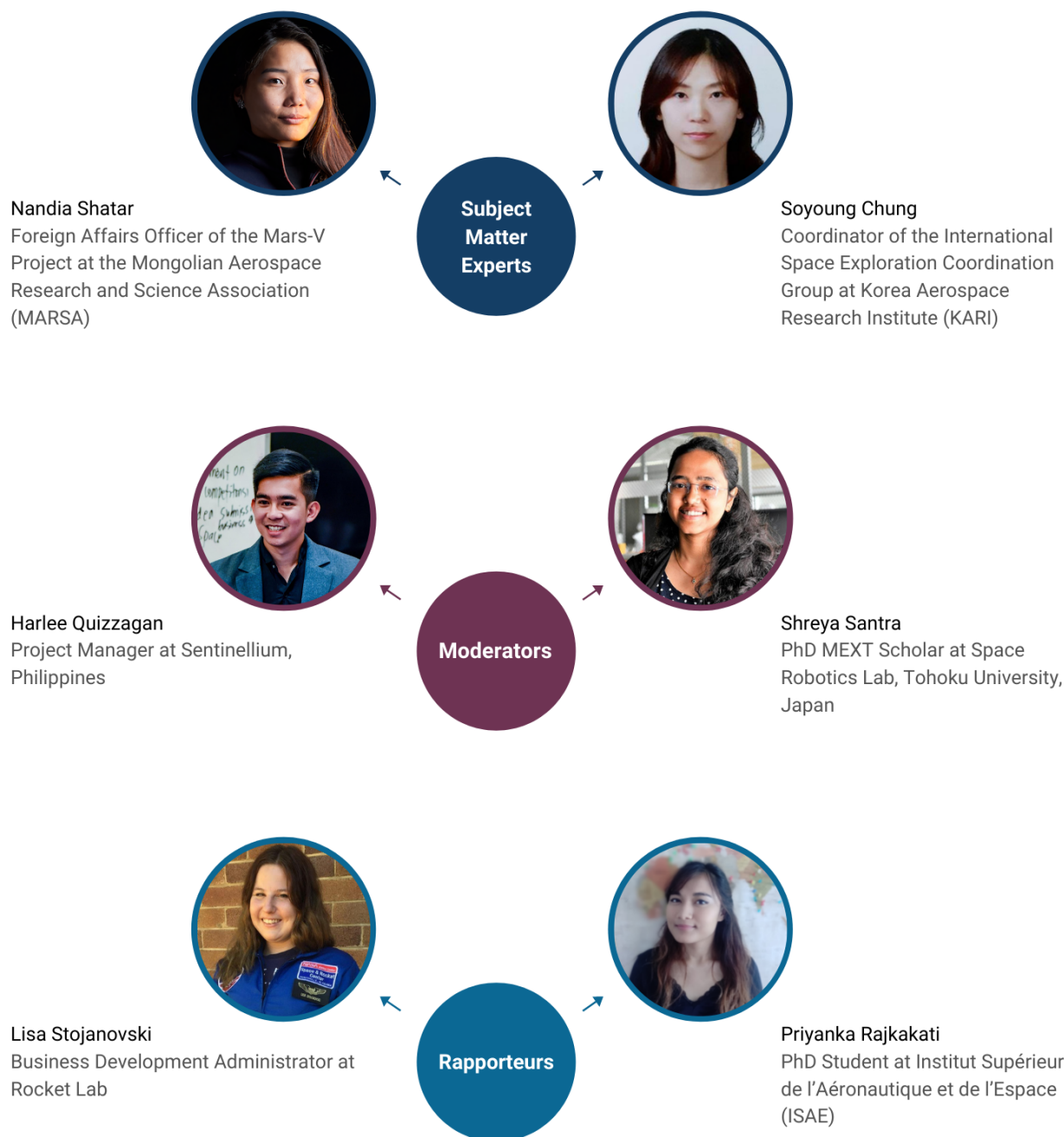
Recommendations to the Sponsor(s)/Partner(s) and/or the Industry at large

1. Bilateral meeting with local farmers or agriculturists;

2. For universities to encourage participation of local farmers;
3. Orientation of the government/ civil society networks on policies for local farmers regarding;
4. Encourage more local innovations in science and technology in the AP region;
5. Funding/Investments.

WORKING GROUP 4: Cooperation (and Capacity-Building) of Asia-Pacific Countries for Space Exploration

Participants



Description

The goal of the working group was to identify how emerging space or even non-space nations can contribute and participate, at their level and based on their own assets (e.g. technical, geographical, cultural), to the space exploration programs of their advanced neighbors and through regional cooperation.

Main Objectives

1. To identify the **current state of space exploration cooperation** in the Asia-Pacific region in order to align the perspectives of everyone in the working group;
2. To inspect the **specific context of the Asia-Pacific region** in terms of cooperation and the on-going climate in the international arena (using international examples of cooperation as basis for discussion);
3. To devise **recommendations for cooperation in space exploration** for the Asia-Pacific region in the future (a blueprint or roadmap may be an ideal output for the working group with well-supported key areas);

Questions

1. What **niche area of space exploration** can be contributed to by emerging or non-space actors (e.g. Mars or Moon analog mission in desertic areas of central Asian countries)?
2. What would participation in an advanced neighbour's space exploration program **bring to an emerging or non-space country**?
3. How can national capacities be **encouraged to consider technological developments** for space exploration specifically in non-space countries?

Conclusions

The Working Group subdivided into groups to address the focus questions based on the key areas of collaboration for Space Exploration in the Asia Pacific Region. Within each core aspect, specific facets and spheres of opportunity for collaboration were identified in the form of industries, areas for development, or sectors of the space industry.

1. Uncrewed Space Exploration (including satellite building)
 - Involves Robotics Technology, Satellite building and on-orbit servicing, ISRU;
 - Space Education and Awareness is a focus for non-space faring countries;
 - Geographical advantages for launching rockets and testing robots;
 - Use-cases and spin-in technologies that can be used for space exploration.
2. Human Space Exploration (including analogues)
 - Data on Health and medical research, Food, habitat research;

- Analogue test beds in Asia Pacific region;
- Human resource exploitation, cultural advantages;
- Geopolitics of Asia Pacific and lack of funding.

3. Space-based data exploitation (including earth & planetary observation)

- Looked into satellite data sharing and ground infrastructure;
- How public and private organizations interact;
- International cooperation;
- Social gains through space-data.

Recommendations

Recommendations to the Space Generation Advisory Council

1. Provide the Asia Pacific regional coordinators an active platform for presentation and discussion at international gatherings like GLEX, IAF, APRSAF, ISECG, etc;
2. SGAC-led fund creation by regional coordinators to support initiatives of Asia-Pacific NPoCs or potential cooperative projects brainstormed during regional events to aid in translating these ideas into concrete actions.

Recommendations to the United Nations Committee on the Peaceful Uses of Outer Space

1. Space Exploration presents a positive feedback loop for the nations involved - provides employment, economic growth, and development of scientific research;
2. Established space nations should promote collaborative projects to encouraging emerging-space nations to develop a payload relevant to their country's needs;
3. International groups should encourage knowledge transfer and collaboration;
4. Industry/academic partnerships between universities;
5. Identify possible "spin-in" technologies and expertise to help with space exploration programs of space-faring nations;
6. Human Space Exploration can vastly gain and learn from the rich history and diverse cultures of APAC regions;
7. Cross-border research by different APAC nations on various aspects of human space exploration like: health, nutrition, psychology, diversity in age, gender, culture, isolation effects, etc;
8. Address the lack of data on astronauts with Asian physiology, as well as female physiology;
9. Extreme environments in the Asia-Pacific region for potential sites for analogue missions;
10. Emerging or non-space nations may develop alternative navigation methods (e.g Star Trackers instead of GPS) or machine learning or unique image/signal processing algorithms and computing

capabilities;

11. Form an Asia-Pacific body for space policy and legal frameworks with the goal of Data Standardization and Sensor Standardization;
12. Utilize the unique/diverse geography of the region for space infrastructure like - Ground Station Network (perhaps commercial optical/laser downlink sites?), Space situational awareness (Reduce reliance on US Space Com tracking data), and rocket launch sites;
13. Make sure that participation in an advanced neighbour's space exploration program can bring in advanced national security, reduction of piracy and other illegal activities, natural hazard monitoring, could allow emerging space nation to specialize in their niche, easier access to space data without having to start from scratch, building workforce in small manageable steps and training using real data;
14. Technological developments for space exploration specifically in non-space countries could be creating market opportunities for useful data products that do not already exist, data processing and acquisition expertise can be transferred to space data, the advantage of being able to start fresh with no legacy systems/old tech, retrain existing workforce and skills;
15. Educational outreach: Public engagement in schools;
16. Establish competitions like sounding rockets, CubeSats, space suit/city/habitat designs based in Asia-Pacific to evoke interest in space technologies.

REPORT CONCLUSION

Asia-Pacific Space Generation Workshop 2020 was concluded on 6th of December 2020, after two weeks of fruitful discussion. Because of the novel coronavirus (COVID-19) outbreak, AP-SGW 2020 was transformed into an online format and it was held through Airmeet successfully as the first online Asia-Pacific Space Generation Workshop, enabling it to a larger audience of 21 nationalities.

The workshop consisted of working group discussions and many other networking and knowledge sharing activities. Among them speed networking was one of the main highlights. 15 mentors representing academia, industry, government and space policy of different countries participated for speed networking and mentoring. Working group discussions were focused on four key areas that are important for space sector development in the Asia-Pacific region. Keynote speeches were based on the working group topics.

There were many fun challenges such as the fitness challenge and team space trivia to build the interaction between delegates. Online Karaoke and International night provided the opportunity for delegates to share their cultures and country information with other delegates.

We are glad to inform that we received positive feedback from delegates, speakers and mentors and we are sure that AP-SGOW 2020 was a memorable event for them. Our delegates have decided to work with their working groups to make papers for international space conferences.

Throughout the event we could meet our goals of strengthening the regional network of the students and young professionals in the Asia-Pacific region, discussing key regional issues and building a network of present leaders and future space sector leaders. The network and knowledge gathered from AP-SGOW will be surely beneficial for space sector development of the AP region.

ORGANISING TEAM

A team of dedicated volunteers makes up the organising team of the Asia-Pacific Space Generation Online Workshop.



Uthpala Perera (*Sri Lanka*)
| Event Manager



Tsuyoshi Shikida (*Japan*)
| Co- Event Manager



Samu Eshima (*Japan*)
| Risk Manager



Florence Pauline Basubas
(*Philippines*) | Program Team



Quentin Verspieren
(*France*) | Program Team



Dasuni Hewawasam
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Gracio Joyal Lobo
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