SPACE GENERATION
ADVISORY COUNCIL

2018 ANNUAL REPORT

SPACE GENERATION
ADVISORY COUNCIL

In support of the United Nations
Programme on Space Applications

c/o European Space Policy Institute (ESPI)
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The **Space Generation Advisory Council** (SGAC) in Support of the United Nations Programme on Space Applications is a non-profit organization and professional network that represents university students and young professionals in the space sector. SGAC has permanent observer status at the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and is a member of the UN Economic and Social Council, and the International Astronautical Federation (IAF). Headquartered in Vienna, with full-time staff, the organization is supported by a volunteer network of over 15,000 members in more than 150 countries. SGAC is a registered 501(c)(3) in the United States.

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SPONSORS AND PARTNERS

The Space Generation Advisory Council (SGAC) is very grateful for the generous support of sponsors and partners. This year SGAC's sponsors and partners expanded both their financial and intellectual contributions. This has played an important role in the improved quantity and quality of SGAC's output in 2018. SGAC would like to thank all sponsors and partners once again for their contribution to one of the most successful years in SGAC history.

Platinum

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Gold

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GSA

SECURE WORLD FOUNDATION

AIRBUS

Silver


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Shaping the Future of Aerospace


AGI


ASTRANIS


AUSTROSPACE


AVASCENT


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Boulder


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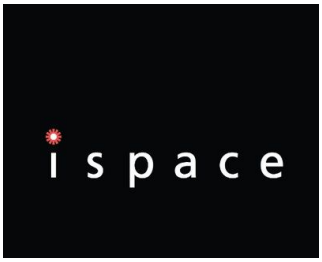
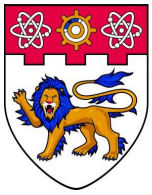
Bronze





Julio Aprea, Ken Davidian, and Ajeet Hansra

National Space Agencies

Partners

American Astronautical Society (AAS)	*Central American Association for Aeronautics and Space (ACAE)*
Africanew Space	*Arab Institute for Planning (Kuwait)*
Italian Space Agency (ASI)	*Australian Youth Aerospace Association (AYAA)*
Brooke Owens Fellowship	*Caelus Partners*
Centro de Ciencia, Liderazgo y Cultura	*Chemechon*
City of Vienna	*Copernicus Academy*
DLA Piper	*Electrical Engineering Students' European Association Local Committee (EESTEC LC) Athens*
Eurisy	*Euroavia Athens*
European Space Talks	*Austrian Research Promotion Agency (FFG)*
Fuerza Aérea Colombiana	*Greek Newspace Society*
Harokopio University	*International Astronautical Federation (IAF)*
International Astronomical Union (IAU)	*Yuri's Night*
Libre Space Foundation	*Malisetti Foundation*
Mauritius Government	*Maui Economic Development Board (MEDB)*
Moutzoura	*Mauritius Research Center (MRC)*
National Geographic	*National University of Singapore*
National Young Council Singapore	*NigcomSat*
Nayang Technological University Singapore	*Observatorio Astronómico Nacional*
Olympian Centre of Astrophysics	*Austrian Space Forum (OeWF)*
PTScientists	*Rajiv Gandhi Science Centre (RGSC)*
RUAG	*Ruta N*

SATELLITE 2018

Students for the Exploration and Development of Space (SEDS) USA

SI Cluster - a corallia initiative

Space4Humanity

SpaceOps

SpaceTeach Asia

Sparc

Society of Satellite Professionals International (SSPI)

Singapore Space and Technology Association (SSTA)

Space Tech Expo Pasadena (STE)

Streamline Marketing Group Abu Dhabi (SMG)

Technical University of Crete

Telespazio

Universidad de Antioquia

Universidad Distrital Francisco José de Caldas

Universitatea Politehnica Din Bucharesti

University of Mauritius

University of Science and Technology Hanoi

US Department of State

Vietnam National Space Center (VNCS)

Wiley Rein

Women in Aerospace (WIA) Europe

World Space Week Association (WSWA)

LETTER FROM THE EXECUTIVE DIRECTOR

Dear SGAC members, partners, supporters, and colleagues,

The Space Generation Advisory Council (SGAC) has completed another successful year as we continue to grow the SGAC network, increase the number of opportunities for the next generation, and extend our presence within the global space industry. We are proud of the achievements of the organisation and its members. SGAC has now more than 15,000 members and alumni from more than 150 countries within the six SGAC regions. In 2018, SGAC worked with sponsors and partners to offer 148 scholarships and awards (more than 20% increase compared to 2017) to the next generation of space professionals. These numbers reflect the upward trajectory of SGAC's growth and its commitment to talented next generation leaders by facilitating their participation in international conferences, meet space sector leaders, and increase their professional development.

Additionally, SGAC has organised (or co-organised) 37 congresses, workshops, and events around the world, including the 3rd SGx event, the 18th Space Generation Congress, the 7th Space Generation Fusion Forum, the Space Generation Workshops, SG[countries] series, and thematic events series. SGAC continued its effort to grow its local and regional presence. This year, SGAC organised the third African Space Generation Workshop in Port-Louis, Mauritius, and celebrated its fifth Asia-Pacific Space Generation Workshop in Singapore. Moreover, the eight SGAC Project Groups continued to publish educational and technical material on different space topics throughout the year, with a total of 29 presentations and publications in 2018. Over the course of the year, SGAC has continued to support the United Nations (UN) by actively participating at the UNCOPUOS meetings, and other events by the United Nations Office for Outer Space Affairs (UNOOSA). SGAC celebrated its creation by hosting the second Space Generation Forum, or SGF2.0 in support of UNISPACE+50. Born out of UNISPACE III, SGAC plays an important role in nurturing the dialogue pertaining to UNOOSA and to represent the voice of the young generation of students and young space professionals. SGAC also partnered with UNOOSA on the UN Youth 2030 Strategy aimed at engaging the next generation in the achievement of the Sustainable Development Goals. We would like to express our gratitude to the sponsors and supporters that allow SGAC to continue growing steadily and help increase the visibility of the next generation of space leaders within the space community. We also appreciate the support and guidance of our Advisory Board.

The groundwork laid in previous years has allowed SGAC to continue to be the largest international network of students and young professionals in the space sector. The successes of this year would not be possible without the continued hard work and dedication of our volunteer members. We are grateful for their time, effort, and dedication towards making SGAC grow.

Best regards,
Clémentine Decoopman

LETTER FROM THE CHAIRS

Dear members, colleagues, and supporters,

By the time you are reading this letter, the Space Generation Advisory Council will be in its 20th year since its inception at UNISPACE III in Vienna in 1999. We are extremely proud of the current state of the organisation, which achieved a global impact like never before in 2018. Teamwork, professionalism, and determination are the drives of our members, who are among the most passionate and enthusiastic young people in the world. They represent an evolving and globally connected space generation, and SGAC offers them a unique forum to discuss, exchange ideas and, ultimately, progress.

In 2018, SGAC got back to its roots with a special event in Vienna, the Space Generation Forum 2.0 (SGF2.0). Prominent alumni, founders, and members came together to discuss recommendations to propose for UNISPACE+50. SGF2.0 has somehow filled a generational gap, reconnecting the SGAC with its history and setting a course for the future of the organisation. Indeed, while the mandate of SGAC is to focus on students and young professionals, a big part of the SGAC network (more than 50%) constitutes those who have either aged out or who have lost contact with the organisation. SGF2.0 has seen as well the launch of the SGAC Alumni Programme to help reconnect with SGAC Alumni and use the potential of the SGAC alumni network in support of other SGAC activities.

After years of close collaboration, SGAC signed a Memorandum of Understanding with the International Astronautical Federation recognising the efforts of SGAC in representing the young generations. As a result, SGAC was publicly acknowledged in many occasions during the International Astronautical Congress 2018 in Bremen, Germany, and our own Space Generation Congress officially became part of the programme. SGAC's efforts on inclusivity and in bridging the global space community did not go unnoticed and the organisation was awarded with the IAF Excellence with 3G Diversity.

An unexpected but significant change in leadership happened as well in 2018, as Chair Alexander Gibson (USA) decided to resign due to increased work commitment before the natural end of his term. SGAC would like to thank Alexander Gibson for his passion and vision. In such unfortunate times, the SGAC leadership came together, providing stability to the organisation throughout the transition process and offering outstanding candidates for filling the vacant role.

Thank you to all of our volunteers, supporters and friends that made 2018 such a successful and incredible year! We are looking forward with even more excitement to our anniversary year.

Ad Astra!

Matteo Emanuelli
SGAC Co-Chair

Arnau Pons
SGAC Interim Chair

OUTPUT AT A GLANCE

Scholarships and awards (148)

Scholarship/Award/Competition	Event Supported	Number of Awardees
SGAC Global Grant	Space Generation Fusion Forum	5
Space Fundamentals Training Program Alumni Scholarship (Lockheed Martin)	Space Generation Fusion Forum	4
CU Boulder Scholarship	Space Generation Fusion Forum	1
Malisetti Foundation Scholarship	Space Generation Fusion Forum	1
European GNSS Agency	Space Generation Fusion Forum	1
CNES Scholarship	SpaceOps 2018	7
NASA SCaN Next Gen Scholarship	ISS R&D Conference	2
ISS Crew Fund	Space Generation Forum 2.0	4
Space Generation Leadership Award	Space Generation Congress	5
$pace is Business Competition	Space Generation Congress	1
Move an Asteroid Competition	Space Generation Congress	1
NASA AES Scholarship	Space Generation Congress	1
NASA SCaN Scholarship Pion	Space Generation Congress	3
Young ESA - SGAC Diversity Scholarship	Space Generation Congress	3
ILEWG Scholarship	Space Generation Congress	1
Italian Space Agency Grant	Space Generation Congress	3
Space Generation Congress 2018 Logo Competition	Space Generation Congress	1
AYAA Scholarship	Space Generation Congress	4
OHB Scholarship	Space Generation Congress	2
Australian Space Generation Innovators Award	Space Generation Congress	1
Embry-Riddle Scholarship	Space Generation Congress	2

University of Bremen	Space Generation Congress	5
Centre National d'Etudes Spatiales (CNES) (SGAC + IAC)	Space Generation Congress	3
Centre National d'Etudes Spatiales (CNES) (IAC)	Space Generation Congress	12
United Arab Emirates	Space Generation Congress	5
GomSpace	Space Generation Congress	1
Asia-Pacific Regional Space Leadership Award	Asia-Pacific-Space Generation Workshop	4
Africa Regional Space Leadership Award	African Space Generation Workshop	4
South America Regional Space Leadership Award	South-American-Space Generation Workshop	3

In addition to the above list, SGAC has worked with our partners to offer free registration to the Space Generation Congress as part of the following awards programme:

Scholarship/Award/Competition	Event Supported	Number of Awardees
Future Space Leaders Award	Space Generation Congress	5
Emerging Space Leaders Awards	Space Generation Congress	15
International Space Education Board - Canadian Space Agency	Space Generation Congress	5
International Space Education Board - NASA	Space Generation Congress	2
International Space Education Board - European Space Agency	Space Generation Congress	6
Space Symposium Complimentary Registrations	Space Generation Fusion Forum	25

Pioneer Award

In 2018, SGAC decided to create a new award to recognise those who truly go above and beyond in their work for our organisation. The Pioneer Award consists of a special pin with a certificate that states the accomplishments of the recipient, along with recognition on the SGAC website.

The award was named "Pioneer" since it reflects the innovative and adventurous spirit of SGAC, and the recipients are those select few who personify the values of our organisation and have consistently gone above and beyond in fulfilling our mission. These space pioneers represent

our best of the best, and are selected through a nomination process and independent review board, with a handful of SGAC members ultimately being eligible for the award.

Pioneer Awards are assessed twice a year.

2018 Pioneer Award Recipients:

- Chantelle Dubois (Canada) - Awarded at 7th Space Generation Fusion Forum
- Anthony Yuen (Australia) - Awarded at 7th Space Generation Fusion Forum
- Lauren Napier (USA) - Awarded at Space Generation Forum 2.0
- Bruno Sarli (Brazil) - Awarded at 69th International Astronautical Congress

Conferences, Workshops, and Events Organised or Co-Organised (37)

Global (4)

- SGx in conjunction with Satellite 2018 (Washington DC, USA)
- Space Generation Fusion Forum (Colorado Springs, USA)
- 18th Space Generation Congress (Bremen, Germany)
- Space Generation Forum 2.0 (SGF2.0) (Vienna, Austria)

Regional (5)

- E-SGW (Bucharest, Romania)
- AF-SGW (Port-Louis, Mauritius)
- AP-SGW (Singapore, Singapore)
- SA-SGW (Bogota, Colombia)
- European Student Forum (Budapest, Hungary)

Local (13)

- EMER-GEN (Maui, USA)
- SG[Colombia] (Bogota, Colombia)
- SG[Kuwait] (Kuwait)
- SGAC/IAF Seminar (Montevideo, Peru)
- SG[Vietnam] (Hanoi, Vietnam)
- SG[ASEAN] (Singapore)
- SGAC Europe Winter Holidays Dinner (Leiden, Netherlands)
- SG[Greece] (Athens, Greece)
- SGAC Professional Development Day (Bremen, Germany)
- SGAC Space Exploration Workshop (Bremen, Germany)
- SGAC Through the Generations (Paris, France)
- SpaceOps 2018 - technical forum of the Space Mission Operations and Ground Systems (Marseille, France)
- First National Space Meet (NSM) (Khumaltarm, Nepal)

Thematic (15)

- European Space Talk (Turin, Italy)
- Astronomy School 2018 (Sri Lanka)
- WSW (Karthoum, Sudan)
- SpaceUP Peru (Lima, Peru)
- SpaceUp Barcelona II (Barcelona, Spain)
- SpaceUp London (London, UK)
- SpaceUp Nigeria (Lagos, Nigeria)
- ISS R&D (San Francisco, USA)
- Science Camp 2018 (Lisbon, Portugal)
- International Student House (Washington D.C., USA)
- International Cooperation on Human Exploration Panel (Washington DC, USA)
- Los jóvenes en la actividad espacial argentina (Buenos Aires, Argentina)
- SGAC AAS Next Generation Event 2018 (San Francisco, USA)
- Global Aerospace Summit Workshop (Abu Dhabi, UAE)
- Y-ISEF Workshop (Tokyo, Japan)

Formalised Partnerships (24)

- STE Pasadena
- Wiley Rein
- Caelus Partners
- International Astronautical Federation (IAF)
- NASA Space Communications and Navigation (SCaN)
- German Aerospace Center (DLR)
- American Institute of Aeronautics and Astronautics (AIAA)
- Austrian Ministry for Transport, Innovation and Technology (BMVIT)
- Sierra Nevada Corporation (SNC)
- United Arab Emirates Space Agency (UAESA)
- Mohammed Bin Rashid Space Center (MBRSC)
- GomSpace
- European GNSS Agency (GSA)
- DLA Piper
- SpaceOps
- Global Space Congress
- Space & Satellite Professionals International (SSPI)
- ArianeGroup
- Airbus Defense and Space
- Space in Africa
- Space4Humanity
- Maui Economic Development Board (MEDB)
- International Astronomical Union (IAU)
- GOS

Papers, Presentations, And Publications (30)

New Project Groups Call

A call for new Project Groups has been launched at the end of August 2018. The deadline has been fixed at mid September and then extended until mid October. The call has been well received. In total, the number of proposals received amounted at eleven. Among these four proposals have been shortlisted. We can already list the new Space Medicine and Life Sciences Project Group.

Project Groups

Space Exploration Project Group

- Z. Rana et.al, Detection of the redshifted 21cm radiation line: a mission concept study for the establishment of a lunar radio telescope array in the Schrodinger basin. Presented at the IAF Space Exploration Symposium, International Astronautical Congress 2018, Bremen, Germany.
- B. Schlegelmilch, A framework for safe system design in space launch vehicles. Presented at 51st IAA Symposium on Safety, quality, and knowledge management in space activities.
- E. Mwobobia, Internet of Space Things: the New Space game changer?, Innovative Concepts and Technologies, Presented at the International Astronautical Congress 2018, Bremen, Germany.
- J. Lancee, Medical autonomy as prerequisite for deep space travel will benefit from terrestrial healthcare innovation, 21st IAA Symposium on Human Exploration of the Solar System (A5) Human Exploration of Mars, International Astronautical Congress 2018, Bremen, Germany.
- R. Mykhalchyshyn, Reusable cruise rocket for urgent cargo delivery in case of disaster, IAF Space Transportation Solutions and Innovations Symposium (D2) Upper Stages, Space Transfer, Entry and Landing Systems, International Astronautical Congress 2018, Bremen, Germany.
- A. Baghchehsara et. al, Autonomous operations for spaceflight mission control: challenges and benefits, IAF Space Operations Symposium (B6), New space Operations Concepts and Advanced Systems, International Astronautical Congress 2018, Bremen, Germany.
- N. Souhair et.al, Structural analysis and feasibility study of kinetic structures for a possible use as lunar surface habitats, 16th IAA Symposium on Building Blocks for Future Space Exploration and Development (D3) Systems and Infrastructures to Implement Future Building Blocks in Space Exploration and Development, International Astronautical Congress 2018, Bremen, Germany.
- S. Karmakar, Joint International Platform for Aerospace Startup Building and Growth Strategies, Business Innovation Symposium (E6) Entrepreneurship and Innovation: the Practitioners' Perspectives, International Astronautical Congress 2018, Bremen, Germany.

Small Satellite Project Group

- Technical Knowledge Gaps in Niche Use Cases of Small Satellites, 4th IAA Conference on University Satellite Missions and CubeSat Workshop, 4th-7th December 2017, Rome, Italy.
- Why and How Small Satellites can be relevant for scientific research?, 4th IAA Conference on University Satellite Missions and CubeSat Workshop, 4th-7th December 2017, Rome, Italy.

Space Technology for Disaster Management

- Dr. Doreen Agaba presented on 'Space and Achieving Sustainable Development' at the Africa Space Community Workshop for the youth, alongside the AARSE Conference in Alexandria, Egypt. (October 27, 2018).
- Oladeji Damilola presented on 'Space Business in Africa' during the Youth Perception on Capacity Building, Space Technology and Business Session at the African Leadership Congress on Space Science and Technology (ALC) in Abuja, Nigeria (November, 6th 2018).
- Maryanne Muriuki, SGAC statement at the International Space Forum: African Ministerial Forum (February 13, 2018) held in Kenya.
- Maryanne Muriuki, 'Introduction to Earth Observation and Satellite Data for the Next Generation of Girls and Women in Kenya' at the Mt. Kinangop Girls' Secondary School's Science Week event (June 9, 2018).
- Maryanne Muriuki, 'Building the Next Generation of Space Scientists and Policy Makers' at the 2nd International RCMRD Conference (August 15, 2018) at the Regional Centre for Mapping of Resources for Development (RCMRD), Kenya.
- Maryanne Muriuki, 'Robotics, Space and Disaster Management at the Lego: MoonMission launch event, held at the GEMS Cambridge International School Nairobi (September 15, 2018).

Space Law and Policy Project Group

- Lauren Napier, Thomas Cheney, Kathryn Robison, Karina Perez, Anne-Sophie Martin, 'Enabling Private Sector Success - A Space Generation Perspective' (2018) 14 Room 52.
- The project group has entered a response to The Hague Space Resources Governance Working Group's request for feedback on the draft building blocks. Note: It won't be officially published by the to The Hague Space Resources Governance Working Group.
- Co-Lead Thomas Cheney gave a technical presentation at the UNCOPUOS Legal Subcommittee:
  Thomas Cheney, 'The Space Generation Advisory Council: Views and Activities of the Space Law and Policy Project Group', UN Committee on the Peaceful Uses of Outer Space, Legal Subcommittee, Vienna, Austria, 12 April 2018.

Space Safety and Sustainability Project Group

- Lai, J., Neduncheran, A., Uppalapati, S., Arunan, S., Creech, J., Gamal, H., Potrivitu, G.C. and Rivolta, A., Proposal for a Floating Habitat Design for Manned Missions to Venus, IAC-18, B3, IP, 14, x47579 (paper presented at the International Astronautical Congress 2018, Bremen, Germany).
- Neduncheran A. 2018, Study of Venus Cloud movements by comparative analysis with Terrestrial Planets, EPSC 2018-875 (poster presented at European Planetary Science Congress 2018, Berlin, Germany).
- Oluwafemi, F., Dhital, B., Afolayan, E., Abdelbaki, R., De La Torre, A., Olalekan-Ajayi, B., Mora, J., Neduncheran, A., Space Food and Nutrition in a Long Term Manned Mission, IAC-18, A1, IP, 40, x44094 (paper presented at the International Astronautical Congress 2018, Bremen, Germany).
- Oluwafemi, F., Dhital, B., Afolayan, E., Abdelbaki, R., De La Torre, A., Olalekan-Ajayi, B., and Mora, J., Astronautical Hygiene: A Communal Discipline to Space Medicine and a Preventive Measure to Space Diseases, IAC-18, A1, 3, 16, x44086 (paper presented at the International Astronautical Congress 2018, Bremen, Germany).
- Oluwafemi, F., Dhital, B., Afolayan, E., Abdelbaki, R., De La Torre, A., Olalekan-Ajayi, B., and Mora, J., Space Food and Nutrition in a Long Term Manned MissionI, Advances in Astronautics Science and Technology (2018) 1:1-21, Journal Special Issue.
- Bhattacherjee, S., Mirji, S., Karnal, M., Akniyazov, C., Ferreira, J. and Karthika, R., De-orbiting Small Space Debris Through Space-based Laser System: the Case of Nano- and Pico-satellites Fleet, IAC-18, A6, 4, 9, x45111 (paper presented at the International Astronautical Congress 2018, Bremen, Germany).
- Kamaletdinova, G., Bettiol, L., De La Torre, A., Patel, D., Oluwafemi, F., Lakmal, Y., Heshani, U., Singh, R., Rivolta, A. and Sorokin, A., Manned Mars Mission Risk Evaluation, IAC-18, B3, 9-GTS.2, 5, x45079 (paper presented at the International Astronautical Congress 2018, Bremen, Germany).

Commercial Space Project Group

- V. Aloia, A. Bhattacharya, D. Reynolds, K. Gruszecka. A Technical, Legal, and Political Approach to Challenges Regarding the Sustainability of Large Satellite Constellations. 11th Annual Dupont Summit on Science, Technology, and Environmental Policy. December 2018.

YGNSS Project Group

- H.R. Ramavaram, S. Kotichintala, S. Naik, J. Critchley-Marrows, T. I. Oniosun, M. Pittala, S. Wan, D. Irorere, Tracking ocean plastics using Aerial and Space-bourne platforms: Overview of techniques and challenges. Paper presented at the IAF Earth Observation Symposium (B1), International Astronautical Congress 2018, Bremen, Germany.
- S. Kotichintala, A. Vernile, SGAC Activities in Developing Countries: the socio-economic benefits of space technology applied to the blue economy. Presentation at the 26th UN-IAF Workshop 'Space Technology for Socio-Economic Benefits: Industry, Innovation and Infrastructure for Development (3Is4D)', Bremen, Germany, September 2018.

NEO Project Group

- NEO 2030: assessing the future of Near-Earth Objects and Young People's role in this field.

Conferences and Events with Official SGAC Representation (17)

- 55th session of the Scientific and Technical Subcommittee (STSC) of UNCOPUOS, 19th January - 9th February 2018, Vienna, Austria.
- Global Aerospace Summit, 27th - 28th February 2018, Abu Dhabi, United Arab Emirates
- SATELLITE 2018, 12th - 15th March 2018, Washington DC, United States.
- International Astronautical Federation Spring Meetings 2018, 26th - 28th March 2018, Paris, France.
- 57th session of the Legal Subcommittee of UNCOPUOS, 9th - 20th April 2018 , Vienna, Austria.
- 34th Space Symposium, 16th - 19th April 2018, Colorado Springs, United States.
- 15th International Conference on Space Operations (SpaceOps 2018), 28th May - 1st June 2018, Marseille, France.
- UNISPACE+50 Symposium, 18th - 19th June 2081, Vienna, Austria.
- UNISPACE+50 High Level Segment, 20th - 21st June 2081, Vienna, Austria.
- COPUOS General Assembly, 22nd - 29th June 2018, Vienna, Austria.
- International Astronomical Union General Assembly, 20th - 31st of August 2018, Vienna, Austria.
- UN/Austria Symposium on Space for the Sustainable Development Goals: Stronger Partnerships and strengthened cooperation for 2030 and beyond, 17th - 19th September 2018, Graz, Austria.
- Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference, 17th - 20th September 2018, Hawaii (Maui), United States.
- 69th International Astronautical Congress, 1st - 5th October 2018, Bremen, Germany
- 25th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-25), 6th - 9th November 2018, Singapore.
- United Nations / Germany High Level Forum: The way forward after UNISPACE+50 and on Space2030, 13th - 16th November 2018, Bonn, Germany.
- Young Professional in Space, 17th - 21st July 2018, Barcelona, Spain.

Although they are not all listed here, SGAC members have also attended and helped to organise numerous events in their home countries, especially for World Space Week and Yuri's Night.

EXECUTIVE COMMITTEE MEMBERS

Chairpersons	
Ali Nasseri (Canada/Iran)	Outgoing Chair
Alexander Gibson (USA)	Outgoing Chair
Matteo Emanuelli (Italy)	Incoming Chair
Arnau Pons (Spain)	Incoming Interim Chair
Executive Office	
Clémentine Decoopman (France)	Executive Director
Lauren Napier (USA)	Consultant
Arnau Pons (USA)	Outgoing Treasurer
Anthony Yuen (Australia)	Incoming Treasurer
Jonathan Fitzgerald (USA)	Executive Co-Secretary
McLee Kerolle (USA)	Executive Co-Secretary
Elizabeth Esther (USA)	Outgoing Communications PR Coordinator
Monica Pascanu (Romania)	Communications PR Coordinator
Bethany Downer (Canada)	Incoming Communications PR Coordinator
Ciro Farinelli (Italy)	Project Group Coordinator
Kathryn Robison (USA)	Outgoing Project Group Coordinator
Alessandra Vernile (Italy)	Incoming Project Group Coordinator
Maria Grulich (Germany)	Incoming Scholarships Coordinator
Anthony Yuen (Australia)	Outgoing Web Coordinator
Dan Malgran (USA)	Web Coordinator
Eric Mwobobia (Kenya)	Incoming Web Coordinator
Andrew Wilson (Scotland)	Reports Coordinator
Marta Lebron (Belgium)	Editing Team Coordinator
Henry Ibitolu (Nigeria)	Membership Manager
Pauline Delande (France)	Membership Manager
Caroline Thro (France)	Regional Events Coordinator
Bruno Sarli (Brazil)	Local Events Coordinator
Ariane Bouilly (France)	Local Events Coordinator
Mitchell Scher (USA)	Strategic Partnerships Coordinator
Harriet Brettle (UK)	Strategic Partnerships Coordinator
Kathryn Robison (USA)	Recruitment Manager
Florian Ruhhammer (Germany)	Data Management Coordinator
Samanvay Karambhe (Australia)	Data Management Coordinator
Lucie Cordier (France)	Legal Team Coordinator
David Hurst (USA)	Legal Team Coordinator
Florian Ruhhammer (Germany)	Space Generation Congress 2018 Manager
Chantelle Dubois (Canada)	Space Generation Fusion Forum 2018 Manager

EXECUTIVE COUNCIL MEMBERS

Regional Coordinators	
Oniosun Temidayo Isaiah (Nigeria)	Africa
Beza Tesfaye (Ethiopia)	Africa (Outgoing)
Senior Shimhanda (Namibia)	Africa (Incoming)
Suresh Battharai (Nepal)	Asia Pacific (Outgoing)
Zihua Zhu (China)	Asia Pacific
Shashank Khurana (India)	Asia Pacific (Incoming)
Matteo Emanuelli (Italy)	Europe (Outgoing)
João Lousada (Portugal)	Europe
Alexandra Jercaianu (Romania)	Europe (Incoming)
Behnoosh Meskoob (Iran)	Middle East (Outgoing)
Leila Ghasemzadeh (Iran)	Middle East (Outgoing)
Abulkarim Murad Mohamad (UAE)	Middle East (Outgoing)
Ghanim Alotaibi (Kuwait)	Middle East (Incoming)
Ozan Kara (Turkey)	Middle East (Incoming)
Kavya Manyapu (USA)	North, Central America & Caribbean
Juan Gramajo (Guatemala)	North, Central America & Caribbean
Avid Roman Gonzalez (Peru)	South America
Natalia Vargas (Bolivia)	South America

ACTIVITY HIGHLIGHTS

General Highlights

- Alexander Gibson (USA) succeeded Ali Nasseri (Canada/Iran) as the new Chair of SGAC.
- SGAC welcomed a new Co-Chair, Matteo Emanuelli (Italy).
- Alexander Gibson (USA) unfortunately had to resign from his role as Chair.
- SGAC welcomed a new interim Co-Chair, Arnau Pons (Spain).
- SGAC welcomed a SGAC Consultant, Lauren Napier (USA).
- Brittany Zajic (USA) unfortunately had to resign from her role as Executive Secretary.
- SGAC appointed Jonathan Fitzgerald (USA) as the new Executive Secretary.
- McLee Kerolle (USA) and Jonathan Fitzgerald (USA) unfortunately had to resign from their role as Executive Secretary.
- John Conafay (USA) unfortunately had to resign from his role as Treasurer.
- SGAC appointed Anthony Yuen (Australia) as the new Treasurer.
- SGAC appointed Bethany Downer (Canada) as the new PR and Communication Co-Coordinator.
- SGAC appointed Alessandra Vernile (Italy) as the new Project Group Coordinator.
- SGAC appointed Eric Mwobobia (Kenya) as the new Web Coordinator.
- SGAC appointed Ariane Bouilly (France) as the new Local/Thematic Events Coordinator.
- SGAC reached out a network size of more than 15,000 members and alumni in 150 countries.
- SGAC successfully organised its 3rd SGx event in collaboration with the Future Space Leaders Foundation and Satellite 2018 with more than 200 attendees.
- SGFF2018 was sold out and was the most successful to date with a total of 75 selectively chosen delegates from 17 different nationalities and a total of 20 organisations and agencies represented.
- SGAC held the anniversary event Space Generation Forum 2.0 (SGF2.0) in support of UNISPACE+50 in order to celebrate the Space Generation Forum at UNISPACE III in 1999.

- SGAC was actively involved at UNISPACE+50 and had a booth at the UNISPACE+50 Exhibition area.
- SGC2018 was sold out (over 320 applications received) and was the most successful to date in terms of number of attendees (150), national diversity of attendees (45 nationalities), scholarships given (78 scholarships), caliber of speakers, and overall conference professionalism.
- SGC2018 Closing Dinner was sold out, with the dinner being the largest ever organised, with more than 290 guests.
- SGAC achieved remarkable participation at the IAC 2018 in Bremen, Germany. SGAC members presented more than 83 technical papers covering varying areas of interest, and participated in panel discussions and organised incredibly successful outreach events.
- SGAC and its partners offered more than 148 scholarships in 2018 for participation in SGAC events and events organised by our partners (an increase of more than 20% compared to last year).
- SGAC collaborated with more than 70 partners, and 11 national and regional space agencies in 2017.
- SGAC had 30 papers, presentations and publications in 2018.
- SGAC held 4 regional events and 12 local and thematic events around the globe.
- The main SGAC website is now updated.

Executive Office Highlights

- SGAC Executive Director Clementine Decoopman presented SGAC's general statement at the 55th session of the Scientific and Technical Subcommittee (STSC) of UNCOPUOS.
- SGAC Executive Director Clementine Decoopman gave a statement at the 57th Legal Subcommittee of UNCOPUOS.
- SGAC Executive Director Clementine Decoopman presented 'SGAC, a model for Capacity Building' during the Space and Youth Panel with former astronaut Scott Kelly at UNISPACE+50.
- SGAC Chair Matteo Emanuelli gave a statement at the 61st Session of the UN Committee on the Peaceful Uses of Outer Space.
- SGAC Executive Director Clementine Decoopman gave a statement on the Conference Room Paper entitled 'Recommendations from the Space Generation Forum 2.0 and the Space Generation Advisory Council in support of UNISPACE+50' and can be found on the unoosa.org website under A/AC.105/2018/CRP.16.
- SGAC Executive Director was a panelist at the UN/Austria Symposium on Sustainable

Development Goals on the topic of Capacity Building and the SDGs.

- SGAC Executive Director Clementine Decoopman was a panelist at the High-Level Forum 2018 in Bonn, Germany, and presented on 'The Space Generation Advisory Council and Capacity Building: From UNISPACE+50 Toward the Space 2030 Agenda'.
- SGAC Executive Director and Chairs took part of the STARPATHS Consortium for Horizon 2020, which unfortunately was not selected by the European Commission.
- SGAC Executive Director and outgoing Chair, Ali Nasseri, attended the International Astronautical Federation (IAF) Spring Meetings in Paris, France and signed a formalised agreement with the IAF to become official partner of the organisation.
- SGAC Executive Director and Space Generation Fusion Forum Deputy Manager, Lauren Smith, presented the outcomes of the event at the 34th Space Symposium.
- SGAC Executive Director was a panelist at the Global Aerospace Summit in Abu Dhabi, United Arab Emirates, and talked about how SGAC contributes to improving life on Earth.
- SGAC Executive Director chaired a session at SpaceOps 2018 on Human Factor and Behaviors.
- SGAC Co-Chair Arnau Pons chaired the Joint Session between the International Academy of Astronautics and the International Astronautical Federation for Small Satellite Propulsion Systems at the International Astronautical Congress 2018 in Bremen, Germany.
- The IAF awarded the outgoing Chair, Ali Nasseri (Canada/Iran), the 2018 Young Space Leader (YSL) Recognition Award.
- SGAC was awarded the International Astronautical Federation Excellence in 3G Diversity Award at the International Astronautical Congress 2018 in Bremen, Germany. SGAC co-organised together with Women in Aerospace Europe, Young ESA, and the International Astronautical Federation, a speed mentoring session at the International Astronautical Congress 2018 in Bremen, Germany.
- SGAC Executive Director was appointed as lead for the International Astronautical Federation Napolitano Award.

SGx2018

Washington D.C., USA
12 March 2018

In partnership with the Future Space Leaders Foundation (FSLF) and SATELLITE 2018, SGAC hosted its third technology-focused event, SGx, bringing together experts in the industry and government leaders to discuss pressing issues and innovative ideas in a brand new way.

SGx is a one-day thought-leadership and networking event that brings together young professionals, industry experts, and government leaders to discuss pressing issues that impact the global space community in an innovative way. The presentations are fast-paced and seek to inspire the next generation of space leaders to solve global challenges through the application of space technologies.

Speakers and Mentors

Speakers	**Mentors**
Lisa Callahan Lockheed Martin Space Systems Company	Gale Allen NASA Advanced Exploration Systems
Dr. Gale Allen NASA Advanced Exploration Systems	Jenny Barna Spire
Brian Weeden Secure World Foundation	Brendan Curry Space Foundation
Jim Simpson ABS	Sam Dinte Dinte Resources

Adam Smith
Descartes Labs

Tory Bruno
United Launch Alliance

Chirag Parikh
National Geospatial-Intelligence Agency

Alex Greenberg
Loft Orbital

Jenny Barna
Spire

Erika Wagner
Blue Origin

Justin Kugler
Made in Space

Matt Daniels
Office of Net Assessment

Saúl Reza Arcelus
AeroMexico

Randy Segal
Hogan Lovells

Tanya Harrison
Arizona State University

Mark Boggett
Seraphim Capital

Joe Mascaro
Planet

Nathan Kundtz
Kymeta

David Payne
Analytical Space

Joe Vealencis
Ball Aerospace

Mike French
Bryce Space and Technology

Janet Karika
Jacobs

Michelle Kley
MAXAR Technologies

Justin Kugler
Made in Space

Travis Langster
Analytical Graphics Incorporated

Robert Bell
Society of Satellite Professionals International

Nancy Colleton
Institute for Global Environmental Strategies

Carie Lemack
DreamUp

Rich Leshner
Planet

Phil Liebrecht
NASA SCaN

Michael Lopez-Alegria
MLA Space

Alex MacDonald
NASA

David Payne
Analytical Space

Frank Slazer
Aerospace Industries Association

Justin Park Intergalactic Education	

SGx2018 Sponsors and Partners

Sponsors

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SPACE GENERATION FUSION FORUM

Colorado Springs, USA
15-16 April 2018

Speakers and Moderators

- Kyle Acierno, Managing Director, iSpace Europe.
- Jonathan Arenberg, Space Science Missions Chief Engineer, Space Center of Excellence, Northrop Grumman Aerospace Systems.
- Allison Barto, Program Manager, James Webb Space Telescope, Ball Aerospace.
- Carleen R. Beste, DIrector, Global Corporate Citizenship and Manager, Northrop Grumman Foundation, Northrop Grumman Corporation.
- Lisa B. Callahan, Vice President and General Manager, Commercial Civil Space, Lockheed Martin Space Systems Company.
- Robert Chambers, Director, Human Spaceflight Strategy and Business Development, Lockheed Martin.
- Rodrigo da Costa, Galileo Services Programme Manager, European Global Navigation Satellite Systems Agency (GSA).
- Carlo des Dorides, Executive Director, European Global Navigation Satellite Systems Agency (GSA).
- Steve Eisenhart, Senior Vice President, Strategic & International Affairs, Space Foundation.
- Pascale Ehrenfreund, Chair, DLR Executive Board.
- Debra D. Faktor, Vice President and General Strategic Operations, Ball Aerospace.
- Martin Frederick, Corporate Director, Civil Space Programs, Northrop Grumman Corporation.

- Richard J. Hieb (Rick), Astronaut (Retired), NASA.
- Peter Hays, Adjunct Professor, George Washington University Space Policy Institute Senior Space Policy Analyst, Falcon Research.
- Stephen Jurczyk, Associate Administrator, NASA Space Technology Mission Directorate.
- Clay Mowry, VP for Global Sales, Marketing and Customer Experience, Blue Origin.
- Victoria Samson, Washington Office Director, Secure World Foundation.
- Robbie Schingler, Co-founder and Chief Strategy Officer, Planet.
- Taryn Tomlinson, Senior Engineer, Chief of Staff, Canadian Space Agency.
- Dr. Jan Woerner, Director General, European Space Agency.

Discussion Track 1: Innovative Influences of Space on Earth

Sponsored by the European GNSS Agency (GSA)
Moderator: Mr. Rodrigo da Costa, Galileo Services Programme Manager, GSA

What do we make of the Apollo moment?

The successful landing of Apollo 11 on the Moon generated great public interest in the space programme, and it is said to be responsible for the growth of advanced degrees in engineering and related fields throughout the second half of the 20th century. The question around this debate was thus about whether there would ever be a new Apollo moment, and if so, what will this be.

Delegates noted the historical idiosyncrasies of the Apollo programme and the first crewed mission to the Moon. While another Apollo moment is possible, the historical and political circumstances that allowed for the successful Apollo missions are probably unique to their time.

One discussant noted that slower processes such as global climate change and increasing global inequality might be pushing our generation to solutions provided by space-based technologies. In this sense there may not be Apollo moments, but longer-term processes providing inspiration.

Other discussants provided the example of the launch of the Falcon Heavy Rocket in 2018 as an inspirational moment within the space community as well as beyond. This reflection notes the potential for activities by non-state actors to provide inspirational moments that turn public attention towards the space sector. It was then discussed as to how much nationalism and the conditions of the Soviet-American rivalry were necessary for much of the cultural impact of the Apollo missions. Discussants questioned whether private actors' accomplishments would be as inspiring as those of national governments.

Another example provided was the one-year orbital flight of Scott Kelly: that was agreed to be an inspiring moment in space, but delegates debated as to whether that truly had significant cultural impact beyond the space sector.

Ultimately, discussants agreed that outreach and communication from within the space community was needed to reiterate the value of space technology and exploration to their lives.

Group members also promoted the value of the inspirational nature of space accomplishments, as both cultural moments of pride as well as drivers of technological and political progress.

The roles of public and private actors

Discussion then moved to the roles of public (government) and private (for profit) actors in outer space and the future of space.

Discussants noted that a unique component of the private sector was the innovation and risk-taking capacity of profit seeking firms. This was contrasted with the slower speed of government processes. Nevertheless, it was also suggested that some space assets are perhaps best thought of as crucial public infrastructure akin to highways and sewer systems. In this sense there is a role for government in providing basic public good from space-based infrastructure, such as navigation systems, communication and Earth observation processes as part of national infrastructure for all citizens.

Conversely, discussants were unsure whether there was value in, or an ethical claim for, ever privatising certain aspects of public space infrastructure.

The topic was archived by the common view that private interests have always benefited from initial public investment, and that a powerful role for government in outer space was to provide the pathway for private actors to experiment and innovate.

Promoting the Value of Space on Earth

Discussants moved to explore common issues surrounding space advocacy and the challenges of promoting the value of space-based technology on Earth. Particular attention was placed on communicating space benefits in accessible language to both the public and interdisciplinary audiences. Group members felt that many in the space community have a difficult time sharing their work and insights across disciplines such as astronomy, engineering, and business.

In order for space advocates to develop stronger communication skills, the value of interdisciplinary learning and networking opportunities was stressed as key to allowing members of the space sector to bring space to the mainstream. Participants noted that functions such as the SGFF help people become familiar with and sort out the cultural and language differences between disciplines.

The ability to show the impact of space technology for business, education, science, and people's daily lives was noted as a useful strategy in making connections between the space sector (or space bubble) and other sectors of society yet to integrate space into their practices. Promotion of space education to young people was also identified as a key goal for mainstreaming space awareness.

Finding New Places where Space can Innovate

The last discussion focused on how people within the space sector can identify societal problems outside of those which we are already familiar.

Ultimately group members discussed the value of listening to the insights from people in other fields with an open mind towards what we know that might be able to help them. The notion of promoting solutions, as well as listening to problems was seen as crucial for linking space applications to societal issues. The value of cross-disciplinary learning was highlighted, such as attending conferences outside of the space sector to identify academic, scientific or business problems that may benefit from the introduction of space applications.

Discussion Track 2: Entrepreneurship in the Space Industry

Moderator: Ms. Taryn Tomlinson, Chief of Staff, Canadian Space Agency

What policies would be most beneficial to future space entrepreneurs as space becomes more mainstream?

The delegates of the DT2 started by acknowledging that policies and regulations can be both positive and negative. Some regulations, as Trade Agreements and free trade, COTS, CATALYST, stimulate entrepreneurial activities. Similarly, some regulations instead hinder entrepreneurs: ITAR, for instance, remain a speed bump for many companies, both within and outside the US.

Delegates agreed on the need to focus on the opportunities that do provide a stimulus to businesses and leverage them to collaborate internationally. If it takes too long for the government to act, then companies could be creative. Delegates brought Virgin Orbit's Vox Space subsidiary as an example of creative solution.

Some examples discussed that hamper innovation and entrepreneurship were restrictions in rendezvous, proximity operations and docking in space; the too wide range of actors and agencies to be consulted in order to receive authorization to launch and operate in space.

Delegates agreed on the need for advocacy of entrepreneurial-friendly programmes in policy, remembering to not advocate for programs that deter entrepreneurs, such as government contracts that require shared intellectual property and data rights between the government and company.

Similarly, delegates discussed on the need to clarify the Outer Space Treaty in regard to the utilization of outer space resources, as well as profiting from them. Currently the Treaty requests that any resources taken from space is equally shared between all countries on Earth. Luxembourg and US have taken progressive stances on this, but all countries need to be involved in this decision. Not to hinder entrepreneurial activities, this treaty could be changed to be more like Maritime law, where international waters are not owned by countries, but resources in them (e.g. fish) are still available to be owned and exploited.

Finally, a last discussed item under this topic was the possibility to leverage public/private partnerships to create a wider availability of financial instruments, such as equity-based transactions, convertible notes, contracts, loans.

What can NewSpace and traditional aerospace companies learn from each other?

Moving on the following discussion item, delegates agreed on the relevance of employee retention to enable innovative mindsets, as employees are a company's most important assets, and it is very important to keep top talent. From the more experienced traditional organizations, New Space companies can learn to not overwork their employee base and encourage mentorship programmes.

Discussant agreed on the need for New Space companies not to imitate the large traditional aerospace corporations, avoiding the creation of bureaucratic organizational charts that prevent interaction and sharing of knowledge. Instead, New Space companies should make cross-functional, agile teams.

Similarly, large organizations can and must learn from New Space companies, thus remain on the pulse of what's occurring in the industry. It is true that they can benefit from bootstrapping and the new space scrappiness, but large companies also risk becoming complacent with cost

plus development contracts, losing eventually to innovative start-ups that compete with fixed prices contracts and leverage every opportunity available to create revenue.
Large aerospace company are nevertheless learning from new space ventures by setting up infrastructure to mimic agile development processes. Delegates brought Boeing HorizonX and LM Ventures as examples.
Similarly, large aerospace companies need to fund R&D projects commercially when possible, thus limiting a business' risk profile to policy changes (e.g. new administration, international relations, etc.).

What are the opportunities for future innovation? Which markets are oversaturated?

Discussant started acknowledging that there's a widespread focus on the benefits of space products, while it's easier to sell the benefits of space when these are tied in to other industries, like explaining how imaging data or greenhouse gas emission monitoring can benefit an industry like, for instance, Agriculture.
From this, delegates discussed on a wide range of opportunities. Firstly, they agreed on the fact that Earth observation data is underutilized, and that there are numerous low-cost start-up opportunities available downstream of the satellite market. Earth observation data, despite being oversaturated, still is rich in opportunities, provided for instance by Artificial Intelligence.
A monetizable model for remote sensing would be creating a centralized data hub made with layers of different sensor technology, potentially using open source data, while continuing to find new ways to combine sensors to create new data and new insights.
Among other opportunities discussed there were:

- Artificial Intelligence and Machine Learning;
- Manufacturing in space for use on Earth, with examples being Pharmaceuticals, microelectronics;
- Enabling technology such as in-space servicing/logistics to manage debris, inactive satellites, space stations, lunar equipment, etc.;
- Emerging markets to fuel third world development and opportunity to shape policies within new space agencies, as it may be easier for developing countries to adopt ground breaking technologies and make an infrastructural leap before developed countries.

The delegates also discussed current oversaturated markets, with a clear focus on Rocket Launch market. This market will likely see consolidations in the near future, reaching a 4-5 major launch companies, similarly to what happened to the airline industry in the past decade. Delegates agreed on the need to be disruptive and very differentiated to be successful now.
Similarly, and as discussed earlier, delegates agreed on the potential saturation of the earth imaging market. Nevertheless, entrepreneurial mindset could find ways to fully fill the gap in EO Data utilization, as currently we only use about ~10% of the data we get from space.

Discussion Track 3: Space Technology & Innovation

Moderator: Mr. Steve Jurczyk, Associate Administrator, NASA Space Technology Mission Directorate

How do you view innovation on the Space Sector?

Delegates discussed the ongoing acceleration and expansion of products and services enabled by space systems and technology, and in particular remote sensing, communications, debris mitigation, satellite servicing, space tourism, space manufacturing, space resources, and the reduction of cost of access to space.

New Space, in particular, was agreed to be a main driver promoting innovation in the sector more than ever. New business models, approaches and opportunities are enabling innovation in applications and private investment. With a relevant factor being the overcoming of the more traditional risk-averse mentality and approach.

Delegates noted that small satellites are leveraging a broader range of technologies, lowering the cost of access to space and making space more accessible for all actors.

How will it change as technologies on Earth develop?

Delegates discussed the evolution of space tech, touching the topic of innovative solutions as algorithm-based design and other physics-based tools, the intensive use of 3D printing, rapid prototyping and agile development, the advent of Space Medicine, the development of better training tools as result of VR and AR applications, the integration of new materials for every part of the value chain of the space industry, the introduction of more optimized structures, and advances and upgrades on Systems Engineering.

Delegates agreed on the fact that it is up to this generation of young professionals to define the challenges and expected outcomes that will drive future technological changes.

How will it change as more humans journey into space?

Delegates debated about how technology and innovation will be impacted as human spaceflight becomes routine. Granted that technology will have to evolve by necessity, an ever-increasingly spacefaring civilization will drive projects that are more long-term, high-risk, and with high-paying offs. Technologies will need to be scalable, consequently allowing for lower cost missions and the need to develop even more innovative and creative solutions

Ideally, as more humans fly to space, there will be more stand alone, self-sufficient and sustainable technologies, and innovation in sciences related to the human factor will be considered ever more relevant.

Overall, more space travel will require, and enable large scale in-space infrastructure and in-space sustainability

Which technology will be pushed from the government to the private sector? Will agencies adapt innovations from private industry?

Discussant agreed on the fact that technology in the space sector will be driven by the private industry rather than the government, and that there is a perception of slow timelines for innovation in the space industry. A suggestion is for Governments to establish initiatives promoting certain space technologies or standards widening private actors' room for action.

Delegates also raised the need for awareness on the fact that governmental regulations and international governing bodies will be challenged to keep up with innovation trends.

Thus, the delegates came up with steps that UN OOSA and other international governing bodies would need to prepare for. Firstly, there will be a need to update a common set of regulations for emerging space capabilities and activities, integrating property rights, resources and behavioural norms for the space industry. Secondly, to keep up with innovation, international organizations will need to consider more flexible and scalable mechanisms other than treaties, for instance establish voluntary standards to encourage international partnering, considering the development of certification standards and establishing and developing a governing body similar to the International Telecommunications Union.

Critical Tech or Policy areas needed to be addressed before Space can truly enter the mainstream?

While discussing the final item of the Track, delegates agreed that for Space to truly become mainstream there's a need to address – and solve – Humans' physical limitations. In fact, many issues are still related to how humans could cope with the exposure to radiation (or how to avoid such exposure), the absence of gravity for long term, and how would they deal with medical emergencies when Earth (and gravity) are not an option. Issues to be addressed are also related to enabling space crews to be healthy and productive despite being subject to different life conditions, to study life spans and mortality of crews, to the lack of real-time communications. Finally, challenges to be addressed are those related to social and psychological aspects of space travel, as well as those concerning life sustainability and the needs of astronauts in long-term missions.

Possible solutions to address these issues and challenges will be a stronger partnership between Humans and Robots, the integration of Artificial Intelligence with space activities, automation and ergonomics. More efficient and higher thrust in space transportation will be needed to shorten in-space time (while traveling to other Planets, for instance). An additional solution discussed was the utilization of exoskeletons, both for mitigation and human enhancement.

Discussion Track 4: Humans in Space

Moderator: Mr. Richard Hieb, Astronaut (Retired), NASA

As plans for the ISS come to an end, what will be the next human destination? Is it the Moon, Mars, a commercial microgravity platform, a deep space habitat or is it even a distributed network of destinations?

The discussion group advocated mostly for a cis-lunar/on-lunar surface "next step". In fact, such next step would see more arguments in its favour, namely: geopolitics and a new "space race" ignited by China; the Moon being more easily defendable or weaponizable than Mars, with countries being more interested in the former than the latter; the possibility to use the moon as testbed for both technology and health science before venturing to Mars; and the possibility to leverage resources to colonize the Moon and push forward to Mars in a more sustainable manner.

Nevertheless, some arguments were also in favour of moving toward Mars instead. There's in fact a risk to "get stuck" on/at the Moon, as investing resources for the Moon clearly prevents those resources from being invested to reach the Red Planet. Moreover, a journey to Mars would be more inspirational – thus getting more public support – than going back to the Moon. A final point in favour of Mars would be that Mars is more Earth-like, thus exploration and life on the celestial body should be easier to some extent.

How can we learn from the past and explore in a more sustainable way? How much risk are we willing to take for humans in space?

Delegates moved to this discussion item by first agreeing that it is hard to eliminate risk without taking risks first. This can be done by learning from simulations such as analogue missions.

Additionally, accidents and disasters should be reinterpreted as critical milestones to learn from, sacrifices to achieve a "greater good", rather than simply disasters. This philosophy should be assimilated by the general public and decision makers alike.

How can we organize a large number of private space tourists or workers in space? What needs to be put in place so that it doesn't become a lawless land?

Discussant approached this topic by focusing on legal and policy frameworks to keep stakeholders in check. A delegate proposed to ask manufacturers to be responsible for law enforcement and be liable otherwise.

A second suggestion was to establish an international framework, potentially with the UN governance. The framework could derive from industries that present similarities with space and space tourism, namely maritime and aviation industries. It could be reactionary and based on experience and on binding agreements whose violations could be punished.

How do we overcome the physical limitations for humans to explore space? To what degree will technology help us overcome biology?

This topical issue, common with other Discussion Tracks, was addressed by the delegates by pointing out potential solutions.

A delegate noted that medical requirements could be determined by the type of mission, thus changing spacecraft standards accordingly with crews and missions. It was conversely pointed out that medical requirements currently used for today's astronauts seem to have worked

throughout the history of human spaceflight. Surely, medical standards will be higher for professionals exposed to space for a longer time, compared to once-in-a-while tourists. A more exotic option would be to adapt the human to the space environment, rather than the spacecraft to the human needs, with potential implications of gene-editing technologies.
Surely, as per technologies, virtual Reality will have to be utilized to a great extent in matter of both training and biological and psychological adaptation. Psychology will be relevant as, for instance, not being able to see the Earth will represent a great psychological challenge. The delegates agreed on the need to develop technologies still unexplored or underutilized, with a key reference to cryogenic sleep and artificial gravity, as both will be vital for the future of long-term human spaceflight.

Discussion Track 5: Space Science

Moderator: Dr. Jonathan Arenberg, Space Science Missions Chief Engineer, Space Center of Excellence, Northrop Grumman Aerospace Systems

Can we still afford extravagant flagship missions, or would our resources be better spent on smaller missions? Would this make the industry more risk averse?

Delegates kickstarted the discussion track agreeing on the need to come together as an international community to develop a collaborative long-term vision for space science and implementation plan for how partners can and will work together. The Antarctic Treaty was identified as a good parallel for this, highlighting the need to revisit the Outer Space Treaty to help develop a legal framework.

Delegates moved discussing on the complementarity of large and small missions to achieve space science research. In fact, while large missions can surely contribute in ways not possible with small ones, the latter are vital as testbed, achieve minor objectives, and keeping costs down. Doubtlessly, large missions have to become more affordable.

The discussion group moved on the importance of public opinion, as this shapes policy and thus funding. Getting the public behind space science missions can really contribute in obtaining the right funding.

As for large flagship missions, the delegates proposed various solutions to mitigate risks. Long-term political commitment surely helps reducing uncertainty, while standardization can enable lower prices, increases reliability and sustainability.

The discussion group also analysed the relevance of international cooperation for flagship missions. Agreements and contracts with third parties grant more accountability, and space science missions could be envisioned with parallels to the ISS agreement, the Antarctic treaty, or even an international version of the US decadal survey.

Finally, a last point for this discussion item was the need for consistency and stable funding, as also connected to the importance of public support. With a particular focus on the US-side, space science would benefit from a consistent funding and policy across administrations. Delegates suggested the need for NASA budget to be moved out of the discretionary funding, as well as the need to forecast and plan ahead multiple consequent missions to allow economies of scale and bringing down expenses, by creating, for instance, multifunctional hardware.

What space science do we want to accomplish?

Delegates moved to list the achievements and goals that need to be addressed, among many, discussant debated: standardized missions to go through all large bodies of the solar system; a long-term, sustainable human living presence in space, with the need to address radiation- and psychology-related issues; the need to continuingly discover to understand the formation of our planet and the solar system.

Delegates listed also the search for life in our solar system, with a focus on the icy moons; the solar physics and the functioning of other stars and ours, also to understand nuclear fusion;

Sample-return missions, having in mind asteroid mining, space resources and closed-loop resources utilization
Finally, discussant also brought to the table the study of long-term climate change, astrophysics, genetics and biology in outer space and absence of gravity, and planetary protection.

How should the human-robotic interactions be in these missions?

For this discussion item, delegates brainstormed on potential integration and iteration between humans, robots and artificial intelligence. Granted that some automation and robotics do improve human efficiency, the discussion pivoted to when it is better to have a human than a robot/probe/rover in space.
As per space science, in fact, it is still more cost-effective to use a probe – with a team of scientists behind it on the ground – than an astronaut and expensive life support systems. Even in the case of easy and cheap access to space for humans, rovers will be ideal for exploration, in particular for what concerns planetary protection. Humans will still remain the mind behind missions, in terms of planning and strategizing, and AI/machine learning and current modern and future manufacturing (as in-situ 3D printing) will just be an incredible Human augmentation, rather than a replacement.

Final Space Science Brainstorming

Delegates discussed on the potential lessons to be learnt from industries like semiconductors, in terms of rapid development, or from to the Antarctic Treaty, as per international collaboration. In order to achieve a united long-term vision, plan, and implementation for the identified space science objectives, the delegates agreed on the need to engage the public and political systems through, among other things: an increase in the education of the general public, focusing on STEM, space, and the impact of space science on society; the development of interdisciplinary education systems for space professionals; and the development, encouragement and support of space-enthusiastic students and professionals, enabling them to engage with their political systems and step up for political roles championing for space sciences.

Discussion Track 6: National Security in International Space

Sponsored by Secure World Foundation

Moderator: Dr. Peter Hays, Adjunct Professor of Space Policy and International Affairs, GWU Space Policy Institute; Senior Space Policy Analyst, Falcon Research

Our 'National Security in International Space' group examined the current causes of instability in space and how stability in the space domain can be improved through policy changes and increased collaboration.

Throughout the world, there is increased recognition of, and focus on, the ubiquitous contributions that space capabilities make to global prosperity and security. Space plays a critical and sometimes unknown role in our daily lives. With no borders in outer space, major space actors have to manage the inherently global nature of the space environment diplomatically while protecting their critical assets and capabilities. Commercial, civil, and military actors are competing for limited resources like spectrum and orbital slots; new nations are entering space; others are formally incorporating the domain into their militaries.

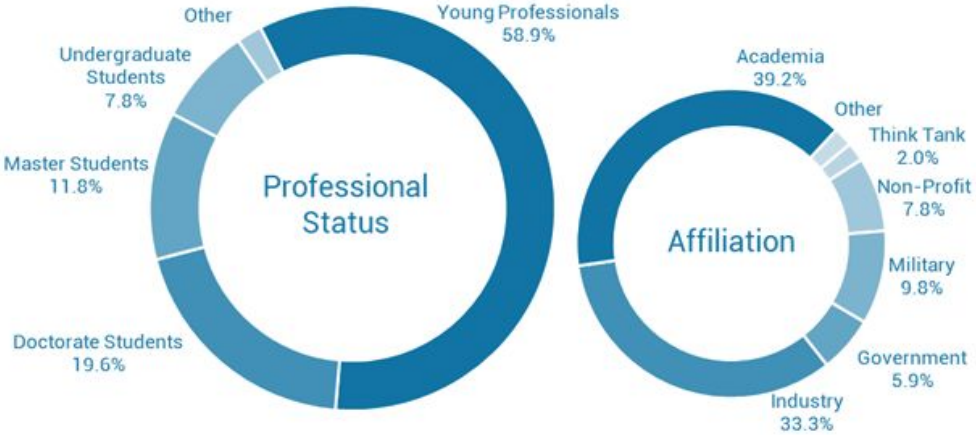
As space enters the mainstream, our generation will help determine the correct balance between diplomacy and national security.

Delegates discussed using these questions as guidelines:

- What strategies should countries employ when discussing space security internationally? Is it possible for policy and diplomacy alone to achieve space security - why or why not?
- In what ways would it be beneficial to national security for countries to be more transparent about their space activities? What are some of the inhibitors to this?
- What recommendations can the space generation make to governments regarding future actions to pursue national security in space?

Space Generation Fusion Forum Statistics

The 7th Space Generation Fusion Forum received 160 delegate applications, a record for the event. Of these applicants, 75 delegates from 17 countries around the world were accepted to attend. Of those delegates, 40% identified as female, and 60% as male. In addition to delegates, there were 15 members on the organising team, and 21 industry professionals that participated as either speakers, panellists, or discussion group moderators. Among the delegates, young professionals were the largest represented group and made up almost 60% of the attendants. As for affiliations, the biggest chunk of delegates was affiliated to academia (39.2%), followed by industry (33.3%) and the military (9.8%).
As for scholarships, 11 people were awarded, four of which via the Global Grant Programme. The GGP winners were Chiara Cocchiara (Italy), Joao Lousada (Portugal), Genaro Grajeda (Mexico), and Conor MacDonald (Australia/Ireland).



SPACE GENERATION CONGRESS

Bremen, Germany
27-29 September 2018

Speakers

- Mr. Abraham Akinwale, Space Generation Leadership Award Winner.
- Ms. Ariane Cornell, Director for New Glenn Commercial Sales – Head of Astronaut Strategy & Sales, Blue Origin.
- Mr. Carsten Sieling, President of the Senate, the Free Hanseatic City of Bremen.
- Mr. Christian Feichtinger, Executive Director, International Astronautical Federation.
- Ms. Christina Giannopapa, Head of the Political Affairs Office, European Space Agency.
- Mr. Dan Dumbacher, Executive Director, American Institute of Aeronautics and Astronautics (AIAA).
- Ms. Eva Quante-Brandt, President of the Joint Science Conference of the German Bundesländer, City of Bremen.
- Mr. Gary Martin, Senior Advisor to the Luxembourg Ministry of the Economy on Space Education and Research.
- Mr. Jan Wörner, Director General, European Space Agency (ESA).
- Mr. Jason Crusan, Director for the Advanced Exploration Systems (AES) Division with the Human Exploration and Operations Mission Directorate (HEOMD) at the National Aeronautics and Space Administration (NASA).
- Mr. Jean-Yves Le Gall, President, International Astronautical Federation (IAF).

- Mr. Jim Volp, ISS (EDR/EML) Operations Expert via Telespazio VEGA DE at DLR.
- Mr. Jose Ocasio-Christian, Chief Executive Officer of Caelus Partners.
- Mr. Ludger Frobel, National Technical Authority (NTA), Strategic Partnerships, ArianeGroup.
- Mr. Marc Avila, Executive Director of the Center of Applied Space Technology and Microgravity (ZARM) and Professor for fluid mechanics at the Faculty of Production Engineering of the University of Bremen.
- Ms. Mary Lynne Dittmar, President and CEO of the Coalition for Deep Space Exploration.
- Mr. Michael Hawes, Vice President and Orion Program Manager, Lockheed Martin.
- Ms. Minoo Rathnasabapathy, Research Engineer, Massachusetts Institute of Technology (MIT) Media Lab.
- Mr. Oliver Romberg, Head of the DLR department System Analysis Space Segment for the German Aerospace Center.
- Mr. Oliver Juckenhöfel, Vice President, On-Orbit Services and Exploration at Airbus Defence and Space.
- Ms. Pascale Ehrenfreund, Chair, German Aerospace Center (DLR).
- Mr. Patrick O'Keeffe, Managing Director, AMC Solutions.
- Mr. Seishiro Kibe, Vice President, IAF.
- Mr. Thibaud Delourme, Team Leader for Copernicus User Uptake, Unit on Space Data for Societal Challenges and Growth, European Commission.
- Mr. Thomas Hoffmeister, Academic Vice President, University of Bremen.

Space Exploration

FIRST NAME	SURNAME	ROLE	NATIONALITY
Jason	Crusan	Keynote Speaker	United States
Marshall	Smith	Subject Matter Expert	United States
Nicole	Herrmann	Moderator	United States
Jimmy	Gora	Moderator	Peru
Laura	Bettiol	Rapporteur	Italy
Kwasi	Nkansah	Rapporteur	Canada
Jeffrey	Stuart	Delegate	United States
Hannah	Petersson	Delegate	Sweden
Adrianos	Golemis	Delegate	Greece
Anna	Wieger	Delegate	United States
Elizabeth	Barrios	Delegate	United States
Oscar	Ojeda	Delegate	Colombia
Ross	Findlay	Delegate	United Kingdom
Christiane	Heinicke	Delegate	Germany
Anastasia	Stepanova	Delegate	Russia
Takahiro	Kato	Delegate	Japan
Joao	Lousada	Delegate	Portugal
Esteban	Martínez	Delegate	Costa Rica
Dragos-Alexandru	Paun	Delegate	Romania
Maximilian	Ruhe	Delegate	Germany
Tim	Schwenteck	Delegate	Germany
Martin	Losekamm	Delegate	Germany

With the 2020s rapidly approaching, space agencies and private companies around the world are preparing for bold new missions involving the Moon. The National Aeronautics and Space Administration (NASA) is currently leading the establishment of a strategic outpost in lunar orbit, called The Gateway, intended to support deep space exploration and industry endeavours in cislunar space and on the lunar surface. At the same time, the commercial spaceflight sector is becoming increasingly more capable and their contributions to human spaceflight missions are growing.

The Exploration Working Group focused on examining the current role and scope of government and commercial planning groups in deep space exploration and how these future plans will be inclusive of private players such that there will be a dynamic economy in deep space. The Working Group members were asked to identify political, economic, strategic, regulatory, and practical obstacles to cooperation and provide recommendations for evolving the current global government strategic planning activities to make them more supportive of the growing commercial industry in deep space.

Four primary recommendations were developed as summarised below.

1. Recognise different priorities, types of resources, time-scales, and unique opportunities

When exploring commercialisation and private usage of The Gateway, it is important to identify the various factors that contribute to maximising its use. This includes:

- Recognise different priorities of stakeholders:
  - government/agency: human exploration
  - academia: fundamental research
  - industry: primary contractors, investors seeking financial returns
- Distinguish between fixed resources and resources that must be replenished:
  - fixed resources will require continuous negotiation among the parties: eg. electrical power, interior/exterior volume, data storage/relay, docking ports, and robotic manipulators
  - consumables such as water, air, food, and propellant (and the associated waste products) will require additional replenishment
- Recognise that there are different time scales that evolve over the course of The Gateway:
  - crewed and uncrewed periods
  - from construction to full usage
- Identify key commercial opportunities that can solely be satisfied by a deep space Gateway and not other avenues like the ISS or stations in low Earth orbit:
  - telerobotic/human access to the lunar surface
  - easier access to deeper regions of the solar system
  - access to the lunar far-side and the full spectrum of cosmic and solar radiation
  - tourist access to lunar destinations.

2. Explore both government-led rubric and outsourced decision-making options, conduct further research on legal issues

The Working Group proposes two potential governance mechanisms, which can help to promote inclusion of commercial partners and in particular international commercial partners into The Gateway programme:

- government-led rubric: space agencies are in charge of deciding who gets access to a specific space asset, with the inclusion of smaller parties through the creation of an

'industrial advisory group', using an adapted socio-economic rubric to aid the decision making process
- outsourced decision-making: the use of the commercial-run portion of the station would be outsourced into a non-governmental operator that can sign commercial contracts with foreign companies. This entity will have the right to decide who has access to this part of the station, as well as to decide the charging mechanism (e.g. rent). Space agencies will be involved only for decisions with system-wide impacts.

In addition, many open issues have been identified in the governance area that need to be resolved, in particular related to liability, export restriction, ownership, safety and sustainability.

3. Involve industry early, permit fully commercial activities, & revisit regulatory policy

To further communicate the value of The Gateway as an outpost for industry, the following are recommended.

- Involving the industry early in development:
  - Brings economic and strategic benefits
  - Allows for the definition of interoperability standards
- Allowing for fully commercial hardware and crews: foresee profit oriented activities allowing for open architecture
- Revisiting regulatory policy to allow for profitable use of cislunar space: to make sure that industrial and commercial activities are dynamic and do not come to a standstill due to unclear or limiting regulations

4. Improve existing cooperation methods, refocus development funds, prioritise new entrants, and form an international strategy committee

The ultimate goal of The Gateway should be to unite all of humanity in deep space exploration while excluding selfish national interests. This can be done by:

- Improving efficiency of international cooperation methods
- Rethinking international development budgets
- Giving priority to projects/modules that seek to enable non-spacefaring/developing nations
- Developing an international strategy committee

With these recommendations put into practice in all levels, from regulatory policies to the technical development, it is anticipated that barriers for commercial participation in The Gateway activities will be reduced, and dynamic commercial activities in deep space can occur.

Space Commercialisation

FIRST NAME	SURNAME	ROLE	NATIONALITY
Pascale	Ehrenfreund	Keynote Speaker	Germany
Oliver	Romberg	Subject Matter Expert	Germany
Joerg	Kreisel	Subject Matter Expert	Germany
Claudia	Philpot	Subject Matter Expert	Germany
Dominik	Quantius	Subject Matter Expert	Germany
Graeme	Taylor	Subject Matter Expert	Germany
Tobias	Niederwieser	Moderator	Austria
Anthony	Yuen	Rapporteur	Australia
Abraham	Akinwale	Rapporteur	Nigeria
Wares	Chancharoen	Delegate	Thailand
Paola Andrea	Escobari Vargas	Delegate	Bolivia
Conrade	Muyambo	Delegate	Zimbabwe
Harriet	Brettle	Delegate	United Kingdom
Karl	Domjahn	Delegate	Australia
Alexander	Linossier	Delegate	Australia
Marco	Murillo	Delegate	Bolivia
Ksenia	Lisitsyna	Delegate	Russia
Temidayo	Oniosun	Delegate	Nigeria
Mohammad	Iranmanesh	Delegate	Belgium
Jan Clarence	Dee	Delegate	Canada
Pablo	Machuca	Delegate	Chile/Spain
Sven	Przywarra	Delegate	Germany
Tanya	Harrison	Delegate	United States
Rannveig	Færgestad	Delegate	Norway
Luc	Sagnières	Delegate	Canada
Christopher	Stockdale	Delegate	United States

The major drift of the space industry domination from the agencies and large corporations to private sector have given more room for commercialisation of space in the past few years. Three key focused questions were considered in the Working Group so as to properly capture the benefits of this shift in the industry: advertisement in space, collaboration between private industries and public agencies, and collaboration between space and non-space sectors. With

these key questions, the group was able to raise some benefits for startup companies commercialising the unique advantage space gives to us that the Earth cannot offer entirely in the best form. These benefits range from sustained zero G, global coverage, lack of atmosphere/vacuum, satellite support, isolation from humans and the environment, GEO fixed point in space, natural resources, and many more.

A few recommendations made are:

- Encouragement of diversification of investment sources for commercial space activities
- Use of more frequent, incremental technology demonstration missions to quickly build heritage for required technologies
- Establishment of industry groups within cohesive industry regions to advise and guide policymakers
- Advice commercial ventures to include public outreach endeavours to foster a positive public opinion about space and that particular venture,
- Develop legal framework defining basic requirements and standards for commercial space companies.

Space Policy

FIRST NAME	SURNAME	ROLE	NATIONALITY
Minoo	Rathnasabapathy	Keynote Speaker	Australia/South Africa
Krystal	Wilson	Subject Matter Expert	United States
Hannah	Lindberg	Moderator	Sweden
Ashwati	Das	Rapporteur	Australia
Prabin	Gyawali	Rapporteur	Nepal
Erdenebaatar	Dashdondog	Delegate	Mongolia
Claire	Wilhelm	Delegate	United States
Mina	Konaka	Delegate	Japan
Sergio	Bras	Delegate	Portugal
Aleksandra	Marinova	Delegate	Bulgaria
Jaclyn	Wiley	Delegate	United States
Alexandra	Jercaianu	Delegate	Romania
Kat	Robison	Delegate	United States
Thea	Flem Dethlefsen	Delegate	Denmark
Francisco	Garcia	Delegate	Spain
Daniel	Voigt	Delegate	Germany
Ben	Piggott	Delegate	Australia
Lauren	Smith	Delegate	United States
Stephanie	Booth	Delegate	United States
Hamda	Al Hosani	Delegate	United Arab Emirates

The United Nations' 2030 agenda for the Sustainable Development Goals (SDGs) is an action plan mobilised by 150 world leaders at the United Nations Sustainable Development Summit in 2015. The agenda, consisting of 169 measurable targets capture the determination of humankind to address 17 overarching goals to improve the quality of life on Earth.

The far-reaching and interconnected impact of the SDGs on fundamental global humanitarian issues necessitates committed assistance from diverse industries and organisations. Advantages such as the ability to draw objective conclusions from space-derived information positions the space industry to offer unparalleled benefits in the areas of planning, resource management, and execution of efforts to drive economic, social, and technological improvements. Space-based assets and technologies are intrinsic to delivering a better quality

of life on Earth and honoring the United Nations' 2030 agenda. The sophisticated web of space capabilities also offers collaborative opportunities with multiple stakeholders to enhance and advance the 2030 agenda.

The mapping of space-based capabilities to the SDGs is explored to illustrate the tangible benefits of exploiting space-based endeavors to pursue the 2030 agenda. The challenges to be overcome to sustainably improve the widespread use of space-based assets and their data are also identified in the following three broad areas. The recommendations to address these challenges are as follows:

a) Nurturing the Geospatial Market

The contributions of space-based assets towards addressing the SDGs are analysed via a humanitarian crisis case-study. Options to improve the visibility of such contributions, those to support the pursuit of the SDG agenda, and those to gather public recognition of the associated benefits are offered via the following recommendations respectively:

- Fund SDG focused innovation challenges
- Integrate SDG Priorities during the conception of new and emerging space companies
- Implement SDG compliant certification across the space sector

b) Sustainable Expansion of Space-Based Endeavors for Effective Decision-Making

Opportunities for improving the effectiveness of humanitarian decision-making and the expansion of space-based efforts to involve varied stakeholders are explored via the following recommendations:

- Establish opportunities such as workshops to facilitate collaborations between emerging space actors and mitigate the risks associated with working towards addressing the SDGs in their own communities.
- Implement capacity building efforts via the exchange of resources between institutions/countries, and the facilitation of financial incentives such as grants/scholarships to strengthen and sustain the local workforce focused on working towards the 2030 agenda.
- Establish representation from emerging space actors at the UN to contribute towards decision-making efforts
- Present emerging space actors with UN-prepared guidelines to ensure that lawful and acceptable avenues are followed whilst pursuing the 2030s agenda.

c) Ensure Ease of Data Access, Institutional Accountability and National Security

Address the diminished awareness of existing geospatial data, ease of access to this data and the inability to measure its reliability, and data duplication concerns via the following recommendations:

- Establish a UN-designated organisation to manage an 'International Geospatial Data Directory (IGDD)'—a resource that publishes the listings associated with all the available geospatial data, and renders services such as categorical data presentation, connection of data providers/users, data translation based on user-needs, and exploitation of

artificial intelligence (or other software techniques) to offer recommendations and identify data duplication.

Balancing national security concerns with data transparency are addressed via the following recommendations:

- Establish avenues for IGDD to offer restricted data access options to users.
- Establish the Space Generation Advisory Council (SGAC)-facilitated workshops focused on the topic of balancing national security concerns and space data sharing efforts.

Space Safety and Security

FIRST NAME	SURNAME	ROLE	COUNTRY
Christina	Giannopapa	Keynote Speaker	Italy
Lesley Jane	Smith	Subject Matter Expert	Scotland
Diane	Howard	Subject Matter Expert	United States
Ntorina	Antoni	Subject Matter Expert	Italy
Antonio Eduardo	Gutierrez Nava	Moderator	Germany
Caroline	Juang	Rapporteur	United States
Katherine	Pangalo	Rapporteur	Netherlands
Andreas	Gierse	Delegate	Germany
Adam	Vigneron	Delegate	Canada
Didunoluwa	Obilanade	Delegate	United Kingdom
Tadeusz	Kocman	Delegate	Poland
Madeleine	Bronstein	Delegate	United States
Daniel	Wischert	Delegate	Germany
Terese	Svensson	Delegate	Sweden
Kjersti	Bragstad	Delegate	Norway
Maren	Hülsmann	Delegate	Germany
Shreyas	Mirji	Delegate	India
Arnaud	Vicari	Delegate	France
Zaid	Rana	Delegate	Canada
Matthias	Heumesser	Delegate	Austria
Praskovia	Milova	Delegate	Russia
Caroline	Thro	Delegate	Germany
Victor	Casado	Delegate	Spain
Daniel	Seybold	Delegate	Germany
Andrea	de la Torre Aceves	Delegate	Mexico

For the 17th Space Generation Congress, the Working Group on Space Safety and Security discussed both topics, from two aspects: safety and security in space, and safety and security from space. The Working Group was diverse, with participants from a wide range of nationalities and backgrounds. After presentation of the subject matter experts, a discussion was held about current safety problems in outer space, such as the issue of space debris and the issue of space traffic management (STM). The Working Group was asked to focus on five questions, to

reflect on the nature of space safety and security considering the priorities of governments, industry, and space agencies drawing from readings presented before the first meeting of the Working Group as well as individual expertise. Further questions that were discussed were on the topic of lessons that could be drawn from past and current initiatives, and what the position of the stakeholders should be. From that discussion, problems came to light such as treaties that are non-binding and the lack of unified cooperation in the domain. Three strategies were recommended by the Working Group, namely:

Recommendation 1: The countries should have a national regulatory authority (NRA) that is able to comprehensively consult with stakeholders relevant to each country's interest.

Recommendation 2: All countries should evaluate a comprehensive framework for a space traffic management (STM) system and assess how their individual capacities can contribute to it. Safety and security need to be clearly defined at an international level.

Recommendation 3: All countries should provide domestic encouragement for space traffic management through incentives, including but not limited to:

- sharing data, tools, and best practices
- reduced registration fees
- preferential access to launch schedules
- research, development, engineering, and business development support from the national agencies.

The Space Generation Congress in Bremen was an enormous success, and hopefully these recommendations will benefit the future of the space sector and contribute to the space safety and security environment.

Space Society

FIRST NAME	SURNAME	ROLE	COUNTRY
Jose	Ocasio-Christian	Keynote Speaker	United States
ToTran	Nguyen	Subject Matter Expert	United States
Rania	Toukebri	Moderator	Tunisia
Tania Maria	Robles Hernandez	Rapporteur	Mexico
Sergiu Petre	Iliev	Rapporteur	Romania
Maria	Grulich	Delegate	Germany
Bernadette	Maisel	Delegate	Chile
Prapanpong	Damsongsaeng	Delegate	Thailand
Sabrina	Alam	Delegate	United Kingdom
Arunkumar	Rathinam	Delegate	India
Simranjit	Grewal	Delegate	United States
Emily	Gleeson	Delegate	Canada
Matteo	Losacco	Delegate	Italy
Sara	Ahmadian	Delegate	Canada
Francesco	Cavenago	Delegate	Italy
Georgios	Profitiliotis	Delegate	Greece
Catherine	Trainor	Delegate	United States
Christian	Bueno	Delegate	United States
Sara	Aleissaee	Delegate	United Arab Emirates

The Space Generation Congress Space Society Working Group convened in September 2018 in Bremen, Germany, and 16 young professionals and students from different countries gathered together to brainstorm how to create a global space community. The Working Group has the advantage to represent different origins, both genders, and different backgrounds. This diverse representation ensured the Working Group had a broad variety of ideas, values, and opinions to inform the final recommendations. The diverse collaboration proved to be an asset, producing ideas and recommendations that would not have been possible without the contributions of all involved.

The increased access to space in the last decades and the subsequent needs of outer space resources have raised the awareness and the notion of a space community. There is a need to connect the global community through a common understanding of the benefits and impact that space exploration has on global welfare, economy, and advancement of innovation for all of humanity. Uniting communities through the development of mutual resources for combined benefits to the space society is an impetus.

The Working Group has been asked to identify a framework that enables a global partnership between countries, scientific, technical, and legal communities as well as agencies and the private and public sector in order for us all to profit from the use of outer space resources peacefully.

The United Nations Of Outer Space Affairs (UNOOSA) started discussing this topic through different thematic priorities: the global partnership in space exploration and innovation, the legal regime of outer space, and global space governance in its current and future perspective. The Working Group started its discussion based on these points and developed ideas and solutions that may help build an effective framework for a global space community.

The Space Society Working Group came up with primary recommendations as a result of investigating these topics. The first is a recommendation to raise the awareness of space access and communicate its services to the different social categories. The second one is to establish a framework for a global partnership to enable an equal access to space in a sustainable way to as many entities as feasible, in order to fulfill the first condition of a balanced community and thus to be adequate with the UNOOSA objectives related to the peaceful uses of outer space. The third is to ensure that the international communities are involved in one infrastructure development process from the beginning.

Appropriate planning to accommodate partnerships is the only way to ensure the peaceful use of space resources in their maximum potential. To improve on the international collaboration that has sustained the International Space Station, the Working Group suggests establishing a neutral multinational and multi-organisational partnership governance committee to make a global coordinated effort to explore, commercialise, and use outer space. This model would help reduce the risks of inter-nation wars, and monopolisation of the use of space resources to one nation.

The Working Group discussed these ideas with the support of experts from Caelus Foundation that allowed them to have a better understanding of space collaboration and highlighted the challenges in this topic.

Space Logistics

FIRST NAME	SURNAME	ROLE	COUNTRY
Ludger	Frobel	Keynote Speaker	Germany
Menko	Wisse	Subject Matter Expert	Germany
Andre	Füser	Subject Matter Expert	Germany
Manfred	Ehresmann	Moderator	Germany
Josh	Wolny	Rapporteur	United States
Shambo	Bhattacharjee	Rapporteur	India
Lama	Aloraiman	Delegate	Kuwait
Jakub	Brož	Delegate	Czech Republic
Claudiu Mihai	Taiatu	Delegate	Romania
Roman	Mykhalchyshyn	Delegate	Ukraine
Barret	Schlegelmilch	Delegate	United States
Luisa	Buinhas	Delegate	Portugal
James	Murdza	Delegate	United States
Hannes	Bartle	Delegate	Germany
Rhiannon	Hames	Delegate	Australia
Ying	Luo	Delegate	Australia
Luke	Heffernan	Delegate	Australia
Thien	Nguyen	Delegate	Australia
Paolo	Guardabasso	Delegate	Italy
Saeed	Alhadhrami	Delegate	United Arab Emirates
Simon	Bouriat	Delegate	France

The diverse participants of the Space Logistics Working Group applied the logistics mindset to determine key logistics nodes and relevant flows of information and material to and from each of these nodes. The considered nodes were Earth orbit, lunar orbit, and the lunar surface, for their high relevance in the near future.

The future Earth orbit logistics need is considered to pivot around the topic of space debris (remove & reuse), on-orbit servicing, and constellation services. To develop this node in a sustainable way, it is recommended that an international consortium is created to assign liability for space debris creation and removal solutions. Additionally, standardised spacecraft interfaces are recommended to be defined and implemented to permit on-orbit servicing of functional and dysfunctional space vehicles. Additionally, dedicated loitering orbit—similar to graveyard orbits—are recommended to be defined for spacecraft traffic management purposes.

The lunar orbit space logistics node faces currently many challenges due to its underdeveloped state. Lacking effective high-speed communication links and requiring significant effort to reach, it is in a preliminary market phase. Developing the node will most likely rely on lunar resources, which are currently not well regulated. Thus, for developing the lunar node in space logistics terms it is highly recommended that the use of lunar resources is clearly regulated to allow a market to grow. Furthermore, it is recommended that intergovernmental collaboration for the exploration and provision for lunar data providers is encouraged. For regulating the lunar communication network, a new International Telecommunication Union (ITU) region for the Moon shall be defined.

Further into the future, developments on the lunar surface are foreseen, producing a lunar surface space logistics node. Potential of utilisation for the benefit of all humankind is great, with services such as propellant production, manufacturing of goods, data and hardware storage, and unique scientific exploration opportunities. For this purpose, it is highly recommended that the following legal challenges are solved in a way that enables a peaceful usage of the Moon: ownership of extracted resources and data, priority rights, and intellectual property rights. For making ad hoc progress, a UNCOPUOS working group shall be created in 2019 to discuss these issues. Overmore, international standards for interoperability of services and hardware shall be established. It is recommended that a dedicated MoonLab research centre is established and is accessible to all UN countries among which results are to be distributed.

Attempting to work with the space logistics mindset clearly demonstrated that, even with the limited time frame of a Space Generation Congress, a broad complex interwoven picture of future development and logistics needs of the space sector can be produced. Relevant products and services to serve the identified needs are a direct follow-on.

Special Track - Space Solutions

FIRST NAME	SURNAME	ROLE	COUNTRY
Patrick	O'Keeffe	Keynote Speaker	Germany
Giao-Minh	Nguyen	Subject Matter Expert	France
Mohamed	AlKarbi	Subject Matter Expert	United Arab Emirates
Xiaozhou	Yu	Subject Matter Expert	China
Peijie	Zhu	Subject Matter Expert	China
Peng	Li	Subject Matter Expert	China
Jackelynne	Silva Martinez	Subject Matter Expert	Peru
Sias	Mostert	Subject Matter Expert	South Africa
Toshiki	Tanaka	Subject Matter Expert	Japan
Ana Maricela	Avila Becerril	Subject Matter Expert	Costa Rica
Ken	Davidian	Subject Matter Expert	United States
Peter	Schulte	Moderator	United States
Christopher	Ogunlesi	Rapporteur	United Kingdom
Florian	Marmuse	Rapporteur	France
Daria	Stepanova	Delegate	Russia
Davide	Conte	Delegate	Italy
Anna	Jurga	Delegate	Poland
Francesco	Scarcelli	Delegate	Italy
Aris	Golemis	Delegate	Greece
Joshua	Critchley-Marrows	Delegate	Australia
Johanna	Pardo	Delegate	Germany
Radim	Badsi	Delegate	France
Nathaniel	Shearer	Delegate	Australia
Hiroshi	Furuya	Delegate	United States
Avid	Roman-Gonzalez	Delegate	Peru
Anastasiia	Prysyazhnyuk	Delegate	Canada
Emily	Petersen	Delegate	United States
Daniel	Bednar	Delegate	Canada
Lolowa	Al Kindi	Delegate	United Arab Emirates
Mohamed	Al Karbi	Delegate	United Arab Emirates

Helped by a large team of worldwide experts, the Space Generation Advisory Council (SGAC) Special Track Working Group discussed the symptoms, roots, and solutions to the Space Divide within and between large geographical regions. The specific goal of the group was to foster discussion between Space Generation Congress (SGC) delegates and Subject-Matter Experts (SMEs) from all six regions of the world. The SGC organising team aimed to involve at least one expert from each region and delegates from as many regions as possible in this session. The six regions of the world, as defined by SGAC, are North & Central America, South America, Europe, the Middle East, Africa, and Asia-Pacific. The Space Divide is defined as the gap between nations mastering space capabilities and the non-experienced and non-space-faring nations. Similar to the Digital Divide—the difference in opportunities between those who have access to information and communication technologies such as the Internet and those who do not—the gap between nations mastering space capabilities and those who do not is growing, creating a Space Divide which threatens to grow and increases inequalities in the industry. Involving both developing countries and space-faring nations and developing cross-sectoral activities is essential to closing the Space Divide and advancing the space industry.

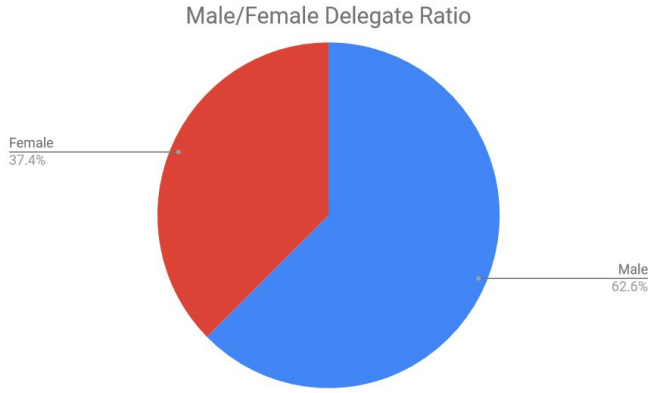
First, experts from each of the six regions provided presentations about current activities and challenges within the space sector in their region. Also, two experts gave overview presentations focusing on the commercial and political aspects of the space sector globally. After each presentation, discussion and question & answer (Q&A) time was provided for the delegates to dive deeper into each topic. In addition to many presentations, the delegates and experts were also formed into small discussion groups. First, groups were formed to focus on different aspects of interregional collaboration. Then, groups were formed to focus on the issues of each individual region. Finally, the regional groups and an interregional 'tiger team', composed of members from multiple regions, developed recommendations for how actors within each region and SGAC as a whole can work to overcome the Space Divide. One interesting finding was that the concept of region does not always apply uniformly to all countries. It cannot be expected that geographical colocation always leads to close cooperation. For example, Australia is culturally closer to Europe and the United States, and the political situation in the Middle East does not offer many potential regional partners for the United Arabs Emirates. Throughout the discussions in the Special Track, it was agreed that inequalities of access to space resources and jobs occur both between regions (for example, space is more accessible in North America than in Africa) and within regions (for example, space is more accessible in Western Europe than in Eastern Europe). The challenges identified for each individual region can be found in the report. They generally arise from a few key points: the lack of communication and access to information, the lack of financial, technical, human, and educational resources, and the complexity of the relationship between institutional and non-institutional actors in a very strategic sector.

Specific recommendations are written in the report for each region and for interregional collaboration. As expected from the Special Track Project Group, many recommendations are provided to SGAC itself so that the organisation can bolster its role in bridging the Space Divide. These recommendations to SGAC can be grouped under two main ideas: first, nearly all of the activities of SGAC are tools to bridge the Space Divide, including regional and international events, project groups, and scholarships. SGAC should continue these activities and should involve as many regions and countries as possible while doing so. Second, several actions could be taken by SGAC to increase its impact in Bridging the Space Divide. A worldwide communication platform such as Slack would allow broader networking and sharing of

information among SGAC members. A Project Group discussing how to Bridge the Space Divide would be highly beneficial and has been formally proposed to SGAC. The Project Group would facilitate frequent Working Groups on this topic at SGAC regional events. Finally, connecting as much as possible with local actors in regions where SGAC is not yet well established would maximise its impact in each region.

Space Generation Congress Statistics

This year has been a remarkable year for SGAC, as we celebrated our landmark 17th Space Generation Congress. Highlights of the 17th Space Generation Congress include:



+350 Applications

130 Delegates

78 scholarships and awards

48 Speakers and Experts

45 Nationalities

7 Working Groups

~15% increase in geographic diversity and ~20% increase in applications were achieved for SGC 2018 compared to SGC 2017.

The 17th Space Generation Congress had seven Working Group topics supported by:

- NASA - Space Exploration Working Group
- DLR - Space Commercialisation Working Group
- ESA - Space Safety Working Group
- Caelus Partners - Space Society Working Group
- Secure World Foundation - Space Policy Working Group
- ArianeGroup - Space Logistics Working Group
- SGAC Special Track - Bridging the Space Divide

This year's SGC Closing Dinner was also a chance for SGAC to highlight the unwavering support of its partners. The dinner was attended by over 300 space professionals from industry, academia, and government. SGAC was honored to welcome several heads of agency to the dinner.

SPACE GENERATION WORKSHOPS

3rd European Space Generation Workshop

Bucharest, Romania
9 - 10 March 2018

Following Budapest and Paris, the 3rd edition of the European Space Generation Workshop, gathering young professionals and students working in the space sector, took place in Bucharest, Romania on the 9th and 10th March 2018.

The two-day regional event brought together Bachelor's, Master's and Doctoral degree candidates, young professionals, experts, academia, space agencies, and industry representatives to network, exchange know-how, share best practices, and nurture the next generation's perspective on space matters.

Gathering 100 delegates (18-35 years old) from 23 different European countries, their exchanges focused on relevant and upcoming space sector challenges and opportunities, targeted to support future European and global policy initiatives, encourage youth contribution to space and enhance cross-country cooperation. From space entrepreneurship to space exploration, emerging new actors, sustainability, and applications, delegates examined critical questions facing the space and international community at large through a series of workshops, panels and guest presenters.

Link to the 3rd European Space Generation Workshop Final Report:
https://drive.google.com/file/d/129H8aNE7hwfoaBxFPjk5uHOlWFckMHpn/view

5th Asia-Pacific Space Generation Workshop

Singapore, Singapore
3 - 5 November 2018

In November 2018,SGAC celebrated the 5th year of the Asia-Pacific Space Generation Workshop or APSGW in Singapore. The workshop was generously hosted by Boeing. AP-SGW is a two-and-half day high level workshop dedicated for more than 70 competitively selected students and young professionals (between the ages of 18-35 years) in the Asia-Pacific region.The event is an associated even to the APRSAF.
In addition to working group discussions, presentations, and panel discussions, senior level speakers from government, industry, and academia of the space sector shared their expertise and involvement in the region.

This year, we had four working groups on: UNISPACE+50: What it Means to Asia-Pacific, the Rise of Small Satellites, how the Internet of Things (IoT) will Shape the Economy of the Region, gender Diversity in Space

These events are critical for SGAC and enable engagement with members within geographic regions, enabling cross pollination of ideas at regional level. The 5th AP-SGW welcomed more than 70 participants from more than 25 different countries (including countries outside Asia-Pacific such as the US, Romania, or Cyprus for instance). We had 50% of students and 50% of Young Professionals. For the first time this year, SGAC support 4 students to attend the AP-SGW by granting them the first Asia-Pacific Leadership Award. One of our core activities is to provide scholarships to students and young professionals to attend conferences around the world, we provide 4 scholarships for each regional event that we organise. The diversity of the workshop definitely contributed to its success by bringing different perspectives and views on the different working groups topics.

Link to the 5th Asia-Pacific Space Generation Workshop Final Report:
https://drive.google.com/open?id=1lIWWwU24j-FVwueUTOeldFfbfoUO6elt

4th South American Space Generation Workshop

Bogotá D.C., Colombia
9 - 10 November 2018

The 4th South American Space Generation Workshop took place on november 9 and 10 in the city of Bogotá D.C., Colombia, hosted by the Universidad Nacional de Colombia. A total of 70 participants from six Latin American countries gathered to share their knowledge, passion, and interest for the progress of the aerospace field in the South American region. The activities were centered around a programme that included both academic and social activities, allowing the participants to interact and share ideas in different contexts.

The workshop was aimed to tackle five key topics for the region, which were discussed by the different Working Groups with their respective Subject Matter Experts. These topics were: South America in Space Exploration, Space Entrepreneurship, Latin American Space Agency - Why and How, Small Satellite Applications, and Space in Society.

Link to the 4th South American Space Generation Workshop Final Report:
https://drive.google.com/drive/folders/1MB60PcsVLKd3aUV1YsVILVMlGZzonjj7?usp=sharing

2nd African Space Generation Workshop

Port-Louis, Mauritius
17 - 18 December 2018

The two-day regional workshop will bring together students, young professionals and industry representatives to examine, consider and stimulate interdisciplinary perspectives on space and scientific matters in the African region. Selected participants (around 100) will have the opportunity to interact with experts from academia, businesses and space agencies through plenary and panel sessions, keynotes and interdisciplinary working group discussions.

Exchanges will focus on critical space sector opportunities and challenges, global policy initiatives and international cooperation. The Space Generation Workshops (SGWs) are held in every region, each focusing on challenges local to the region, involving both local & regional stakeholders. The workshop was aimed to tackle four key topics for the region, which were discussed by the different Working Groups with their respective Subject Matter Experts. These topics were: Space Law and Policy, Space Business and Entrepreneurship, STEAM Outreach and Role of Youth in the Development of the African Space Sector, Capacity Building and SDGs.

Link to the 2nd African Space Generation Workshop Final Report:
https://drive.google.com/a/spacegeneration.org/file/d/1TCKMCYR-GMO6IwDD3lFmuoh9YHGx5X0o/view?usp=sharing

UNITED NATIONS INVOLVEMENT

UNCOPUOS and Subcommittees

The United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) was established by the General Assembly in 1959 to review the scope of international cooperation in the peaceful uses of outer space, to devise programmes in this field to be undertaken under the United Nations auspices, to encourage continued research and the dissemination of information on outer space matters, and to study legal problems arising from the exploration of outer space. COPUOS and its two subcommittees, the Scientific and Technical Subcommittee (STSC) and the Legal Subcommittee (LSC), meet annually to consider questions put before them by the General Assembly, reports submitted to them, and issues raised by the Member States. The Committee and the Subcommittees, work on the basis of consensus and make recommendations to the General Assembly.

Scientific and Technical Subcommittee

As a permanent observer of the Scientific and Technical Subcommittee (STSC) of the Committee on the Peaceful Uses of Outer Space (UNCOPUOS), SGAC participated in the 55th session held from 29th January to 9th February 2018 at the United Nations in Vienna, Austria.

SGAC Executive Director, Clementine Decoopman, presented SGAC's general statement and technical presentation in which she covered SGAC's developments since the last session of STSC in January and February of 2017. The statement highlighted SGAC's achievements in 2017, namely:

- 2nd SGx
- 6th Space Generation Fusion Forum
- 16th Space Generation Congress in Australia
- 4 regional events: 4th Asia-Pacific Space Generation Workshop, 3rd South American Space Generation Workshop, 2nd European Space Generation Workshop, 1st African Space Generation Workshop
- 120 scholarships awarded to SGAC members in 2017
- Local and thematic events
- Project groups overview

Legal Subcommittee

The Legal Subcommittee of UNCOPUOS held its 57th session in Vienna from 9th April to 20th April 2018.

SGAC Executive Director, Clementine Decoopman, made a statement for SGAC at this session detailing the activities of his Project Group. Underlined in this speech were:

- Welcoming of new SGAC Chair, Matteo Emanuelli, from Italy
- Overview of the Space Law and Policy Project Group with the addition of the newest Co-Lead Martin Sarret (France)
- 3rd SGx
- 7th Space Generation Fusion Forum
- 3rd European Space Generation Workshop, Bucharest, Romania
- European Student Forum, Budapest, Hungary
- Upcoming 2018 local, regional and thematic events

SGAC Space Law and Policy Project Group Co-Lead Thomas Cheney presented a technical presentation to the LSC entitled: 'Views and Activities of the Space Law and Policy Project Group', with a focus on papers the PG has submitted to UNCOPUOS, the 50th anniversary of the Outer Space Treaty, and the importance of this group for students, young professionals, and young women in space.

UNISPACE+50

UNISPACE+50 was held from the 18th to the 19th June in Vienna, Austria, celebrating the 50th anniversary of the 1st United Nations Conference on the Exploration and Peaceful Uses of Outer Space. SGAC contributed with SGAC Executive Director, Clementine Decoopman, participating in a panel entitled: 'Space and Youth', where she spoke about SGAC, a Model for Capacity Building.

Additionally SGAC had a booth as part of the UNISPACE+50 Exhibition in the Rotunda at the UN in Vienna in order to drive more attention and attraction from UN level participants toward SGAC.

UNCOPUOS General Assembly

The 61st Session of the UNCOPUOS was held from the 20th to the 29th June in Vienna, Austria, directly following UNISPACE+50. SGAC, which has been a permanent observer at COPUOS since 2001, contributed with a general statement and a technical presentation.

SGAC's Chair, Matteo Emanuelli, presented an official statement for SGAC, which explained broadly the activities that SGAC has engaged in since COPUOS met in June 2017. Underlined in this speech was:

- SGx
- Space Generation Fusion Forum
- Space Generation Forum 2.0
- Space Generation Workshop series (regional events)
- Local events
- Scholarships
- Project groups

- 2017 Executive Summary/Annual Report

SGAC's Consultant, Lauren Napier, addressed COPUOS once again with a technical presentation on SGAC: From UNISPACE III to Today (including SGAC Origins, SGF 1999, SGF 2.0, SGFF 2018, and SGAC Local and Regional Events).

SGAC Executive Director, Clementine Decoopman, gave a second statement on the recommendations from the Space Generation Forum 2.0 which was held in support of UNISPACE+50. The SGAC Conference Room Paper entitled: 'Recommendations from the Space Generation Forum 2.0 and the Space Generation Advisory Council in support of UNISPACE+50' and can be found on the unoosa.org website under A/AC.105/2018/CRP.16.

UN Economic and Social Council

ECOSOC was established under the United Nations Charter as the principal organisation to coordinate economic, social, and related work of the 14 UN specialised agencies, functional commissions, and regional commissions. The Council also receives reports from eleven UN funds and programmes. The ECOSOC serves as the central forum for discussing international economic and social issues and for formulating policy recommendations addressed to the Member States and the United Nations. It is responsible for:

- Promoting higher standards of living, full employment, and economic and social progress
- Identifying solutions to international economic, social, and health problems
- Facilitating international cultural and educational cooperation
- Encouraging universal respect for human rights and fundamental freedoms
- It has the power to make or initiate studies and reports on these issues. It also has the power to assist the preparations and organisation of major international conferences in the economic, social, and related fields and to facilitate a coordinated follow-up to these conferences. With its broad mandate the Council's purview extends to over 70 percent of the human and financial resources of the entire UN.

Since 2003, SGAC has had consultative status at UNECOSOC. As such, SGAC representatives can participate in meetings of the UNECOSOC, the UNCOPUOS, and also of the UN General Assembly and its Committees. It can also propose inputs when relevant. SGAC UNECOSOC representatives have the opportunity to participate during the fall as observers in the UN General Assembly in New York.

SPACE GENERATION FORUM 2.0

Vienna, Austria
16-17 June 2018

Space Generation Forum 2.0
in support of UNISPACE+50

SGF 2.0 Sponsors and Partners

About SGF, SGF 2.0, UNOOSA/COPUOS, UNISPACE+50

In June 2018, the international community gathered in Vienna for UNISPACE+50. UNISPACE+50 will celebrate the fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space. It will also be an opportunity for the international community to gather and consider the future course of global space cooperation for the benefit of humankind. SGAC will organise activities in connection to this important moment for the international space community as they convene in Vienna for the High Level Forum, UNISPACE+50, and the sixty-first session of COPUOS.

In 1999, at UNISPACE III, the Space Generation Advisory Council was created. At this time the Space Generation Forum was held and it was recommended 'to create, within the framework of the Committee on the Peaceful Uses of Outer Space, a consultative mechanism to facilitate the continued participation of young people from all over the world, especially young people from developing countries and young women, in cooperative space-related activities'. SGAC would like to celebrate this historic event by hosting the second Space Generation Forum, now known as Space Generation Forum 2.0 (SGF 2.0), in the form of a pre-twentieth anniversary event.

SGF 2.0 aims:

- To bring together all the different SGAC generations to celebrate SGAC's creation at UNISPACE III and to discuss how SGAC's activities should continue to evolve considering the UNISPACE+50 recommendations and specific aspects related to the United Nations Office of Outer Space Affairs (UNOOSA) and the Committee on the Peaceful Uses of Outer Space (COPUOS) and its subcommittees.
- To create a capacity building event that allows SGAC members to better understand UNOOSA, COPUOS, and international aspects of space from various perspectives
- Showcase SGAC's roots and connection to the United Nations
- Create outcomes based on the four thematic pillars of UNISPACE+50 which paves the way toward Space 2030
- Present outcomes in the form of a conference room paper and technical presentation at COPUOS

UNISPACE+50 Background:

Since 1968, the United Nations has held three conferences on the exploration and peaceful uses of outer space:

- UNISPACE I, Vienna, 1968
- UNISPACE II, Vienna, 1982
- UNISPACE III, Vienna, 1999

UNISPACE+50 will mark the fiftieth anniversary of the first UNISPACE conference and take stock of the contributions to global space governance of the three UNISPACE conferences. Additionally, UNISPACE+50 will pave the way towards the "Space2030" agenda.

Thematic Priorities:

To guide preparatory work for UNISPACE+50, in June 2016, COPUOS identified and agreed on seven thematic priorities, as well as their objectives and mechanisms. The thematic priorities and their key activities and programmes of work are:

1. Global partnership in space exploration and innovation
2. Legal regime of outer space and global space governance: current and future perspectives
3. Enhanced information exchange on space objects and events
4. International framework for space weather services
5. Strengthened space cooperation for global health
6. International cooperation towards low-emission and resilient societies
7. Capacity-building for the twenty-first century

Speakers and Subject Matter Experts

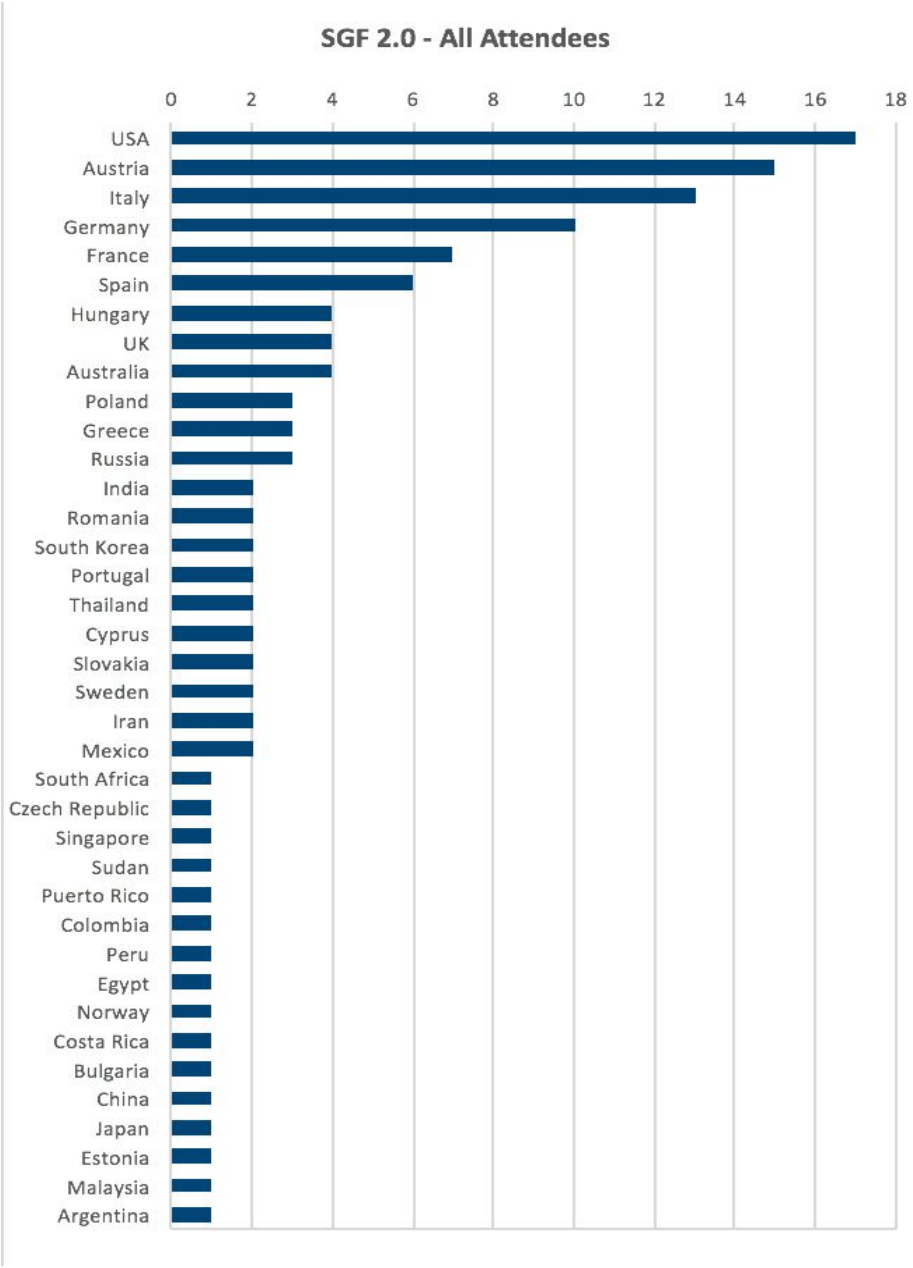
SPEAKERS AND MODERATORS		
First Name	**Surname**	**Role & Affiliation**
Lance	Bush	President and CEO, Challenger Center
Stephan	Mayer	Austrian Delegate to the ESA Industrial Policy Committee (IPC) and the ESA Space Situational Awareness (SSA) Programme Board, Austrian Representative to the Space Surveillance and Tracking (SST) Committee und the SST Expert Group of the European Commission, Austrian Research Promotion Agency (FFG)
Chris	Welch	Professor of Space Engineering, International Space University (ISU), Vice President for Education and Workforce Development, International Astronautical Federation (IAF)
Luc	St-Pierre	Chief of the Space Applications Section, United Nations Office of Outer Space Affairs (UNOOSA)
Ali	Nasseri	Advisory Board Member & Alumni Lead, Space Generation Advisory Council (SGAC)
Niklas	Hedman	Chief of Committee Services and Research Section, the United Nations Office for Outer Space Affairs (UNOOSA)
Kai-Uwe	Schrogl	Chief Strategy Officer, European Space Agency (ESA)
Werner	Balogh	Chief of the Satellite Data Utilization Division in the Space Programme Office, World Meteorological Organization (WMO)
Norbert	Frischauf	Chief Scientific Officer and Co-Founder, OffWorld

Virgiliu	Pop	Researcher, Romanian Space Agency (ROSA), Manager, European Space Education Resource Office (ESERO) Romania
Will	Marshall	Co-Founder and CEO, Planet
Chris	Johnson	Space Law Advisor, Secure World Foundation
Soyoung	Chung	Senior Researcher, Korea Aerospace Research Institute (KARI)
Alex	Karl	International Space Station Operations Engineer, Space Applications Services
Jim	Volp	International Space Station Operations Engineer & Ground Controller, Telespazio VEGA Deutschland
Agnieszka	Lukaszczyk	Director for EU Policy, Planet
Andrea	Jaime Albalat	Business Development Manager, OHB SE
JR	Edwards	Technical Assistant to the Vice President for Technology, Strategy and Innovation, Chief Technology Officer, Lockheed Martin
Catia	Cardoso	STEM Didatics Expert, European Space Agency (ESA)
Gabrialla	Arrigo	Head of International Relations, Italian Space Agency (ASI)
Steve	Eisenhart	Senior Vice President Strategic & International Affairs, Space Foundation
Carsten	Scharlemann	Head of Aerospace Engineering Department, University of Applied Sciences Wiener Neustadt (FH Wiener Neustadt)
Victoria	Schebek	Expert, Federal Ministry for Transport, Innovation and Technology (BMVIT)
Martin	Mössler	General Manager, European Space Agency Business Incubation Center Graz (ESA BIC)
Thomas	Hassler	CEO, Joysys
Gernot	Groemer	Director, Austrian Space Forum (OeWF)

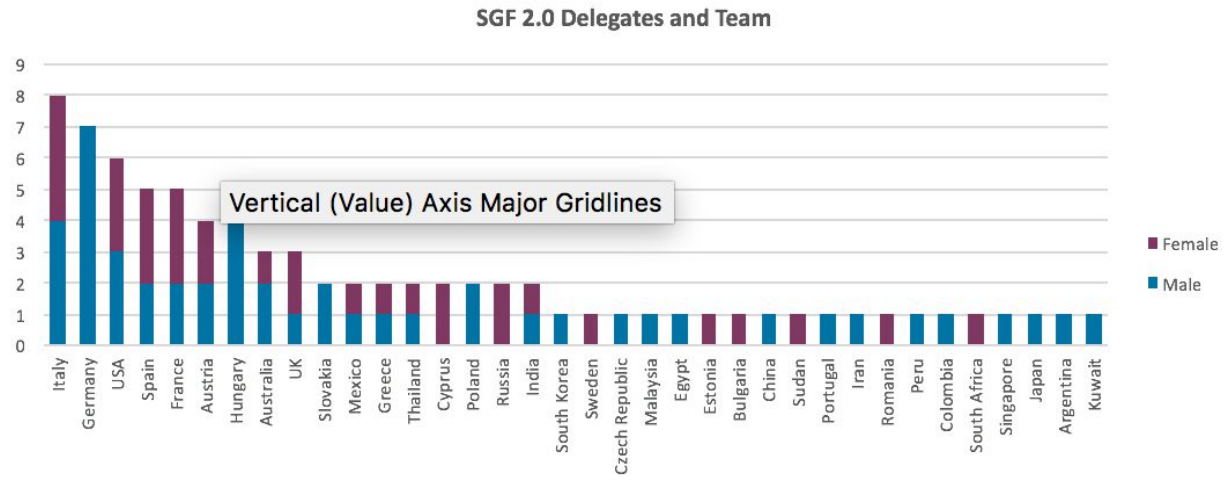
SUBJECT MATTER EXPERTS		
First Name	**Surname**	**Role & Affiliation**
Ersilia	Vaudo	Chief Diversity Officer, European Space Agency (ESA)
Diane	Howard	Assistant Professor in the Commercial Space Operations programme, Embry-Riddle Aeronautical University
Markus	Woltran	Programme Officer in the Office of the Director, United Nations Office for Outer Space Affairs (UNOOSA)
Stefano	Ferretti	Space Policy Officer, European Space Agency (ESA)
Luciano	Saccani	Senior Director for International Business Development, Sierra Nevada Corporation (SNC)
Toby	Clark	Secretary General, Eurisy
Frederik	Bendz Aarrestad	Project Officer, Eurisy
Ana	Avila Becerril	Representative to the Permanent Mission of Costa Rica for International Organisations
Carsten	Scharlemann	Head of Aerospace Engineering Department, University of Applied Sciences Wiener Neustadt (FH Wiener Neustadt)
Micah	Walter-Range	President, Caelus Partners
Kelsey	Ocasio-Christian	Chief Financial Officer (CFO), Caelus Partners
Yaireska	Collado-Vega	Physical Scientist, NASA Goddard Space Flight Center
Anna	Chulaki	Education Lead, Community Coordinated Modeling Center (CCMC)
Christina	Giannopapa	Head of Political Affairs Office in the Strategy Department of the Director General's Services, European Space Agency (ESA)
Melanie	Platz	Deputy Professor, University of Siegen
Adrianos	Golemis	Flight Surgeon, European Astronaut Centre (EAC)/ European Space Agency (ESA)

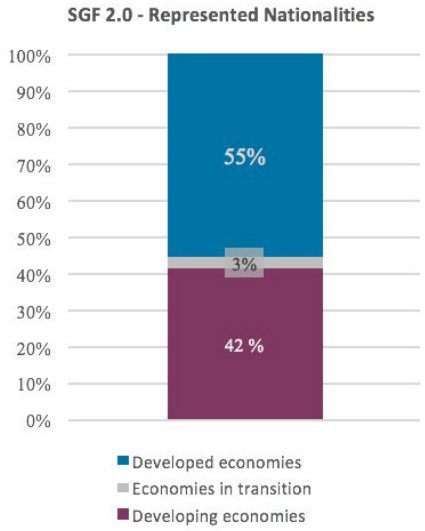
SGF 2.0 Statistics

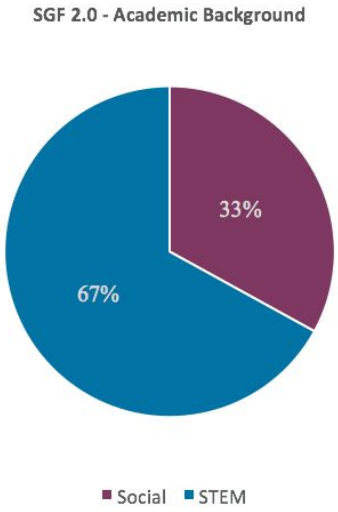
Space Generation Forum 2.0 was attended by more than 120 people from around 40 different nations, with 40 percent women versus 60 percent men overall. These numbers include: SGAC members (students, young professionals, alumni, and founders), SGF 2.0 organising team members, speakers, moderators, subject matter experts, and guests.

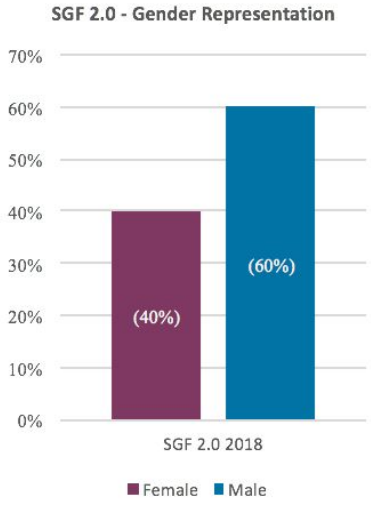


80 delegates plus team representing 36 nationalities









SGF 2.0 Working Groups

The seven Working Groups (WGs) of SGF 2.0 were created taking into consideration the four pillars (Space Economy, Space Diplomacy, Space Society, Space Accessibility) and the seven Thematic Priorities that represent the framework in which UNISPACE +50 was developed.

1. Space for Women
2. Space and the Sustainable Development Goals
3. Space for Society
4. Capacity Building in the Space Sector
5. Building Partnerships and Investment in Space with Industry and the Private Sector
6. Safety and Reliability for Space and Earth
7. Space for Global Health

The delegates to the SGF 2.0 divided into WGs, had a lively exchange between them and the invited senior leadership (Subject Matter Experts or SMEs) on key space and non-space sector issues.
The final aim of the WGs discussion was to create outcomes based on the thematic priorities of UNISPACE +50 and to develop recommendations for the future of the space sector.
As a result, the key points discussed have been presented in the conference room paper A/AC.105/2018/CRP.16 and in a technical presentation at UNISPACE +50 and during the COPUOS Plenary Session in June 2018.

Space Generation Forum 2.0 Outcomes

Overarching Recommendation:

- We recommend that SGAC and all interested COPUOS permanent observers be invited to participate in the drafting of the Agenda 2030.

Thematic Recommendations:

WG 1: Space for Women

- The establishment and promotion of an awareness campaign to highlight the importance of the issue and provide evidence for support of advocacy.
- The establishment and promotion of an SGAC mentorship programme to capitalise on SGAC's global network SGAC.
- Support for the Space for Women ambassadors' initiative recommended by the UN Report on the UN Expert Meeting on Space for Women.
- The promotion of outreach and awareness raising of SGAC among schools and space/STEM youth groups - 'Junior' SGAC.

WG2: Space and the SDGs

- We recommend the implementation of a coordination mechanism of space activities in regards to SDGs at UNOOSA and, in the long-term, focus existing efforts to establish a platform of exchange such as a permanent committee or annual symposium involving actors from the UN, UN member states, NGOs, industry, and educational entities under specific consideration of needs and interests of developing countries.

- We recommend the United Nations to define and adopt a sustainable 'space by all' policy and common [space objective] vision that encourages joint work between governments, space industry, and young professionals to kick-off space technology projects globally.

WG3: Space for Society

- We recommend the Member States and the wider international community to encourage policy implementation across member nations to make automated location sharing of mobile devices when calling the emergency number a standard.
- We recommend that the COPUOS endorse open data and open source (applications, services...) policies that incentivise making space-based services that contribute to solving societal issues in accordance with generally accepted standards.
- General Public License compliant (open source, free software...)
- We recommend the UN to dialogue with other sectors
- Open data and open source.
- Change the way space is communicated.
- Competitions and hackathons.
- Problem Solving Forum (within SGAC).

WG4: Capacity building in the space sector

- We encourage the Member States and the wider international community to intensify the support to the Office for Outer Space Affairs to create a repository of open data and open source materials, such as educational resources, career guidance, outreach, and other capacity building means.
- Incentivise corporate social responsibility to incorporate capacity building activities by providing scholarships, mentorship, competitions, and other types of opportunities like hackathons for young people in space sector.
- We encourage Member States to provide funding and effective framework for technology incubation, especially technologies that have applications that contribute to the Sustainable Development Agenda. We also encourage to incentivise corporate social responsibility to incorporate capacity building activities by providing scholarships, mentorship, competitions and other types of opportunities like hackathons for young people in space sector
- Recommend Member States to create [rationalise the existing] legal frameworks and to minimise legal and administrative obstacles to enable emerging space industries.

WG5: Building Partnership and Investments in Space and with Industry and the Private Sector

- We recommend that the 'Global Strategy and Policy on Partnerships with Industry and the Private Sector' be an agenda item and a focus group for the Agenda 2030, with one of the foci on space settlements. We recommend that SGAC and interested permanent observers are invited to this expert group.
- We recommend the UN to create and promote an effective way to incorporate space agencies and private sector into the discussion on technical and legal guidelines for space settlement and resource utilisation for innovation and sustainable development.

- COPUOS should encourage more discussions on Public Private Partnerships (PPP).
    - Modernising the Moon Treaty to reflect current prospects for human space settlements.
    - Facilitating global discussion on principles for space settlement and resource utilisation/preservation.
    - Helping define common policies to enable international cooperation and/or reduce potential for conflict.
    - Creating an effective way to incorporate space agencies and the private sector in the discussion, decision, and action.
    - Promoting access for new space-faring nations and bring non-spacefaring nations together to represent their interests as a group.
    - Promoting development of expertise among nations or multinational bodies to govern PPPs and space settlements.

WG6: Safety and Reliability for Space and Earth

- Including discussions on space weather into the COPUOS agenda.
- Bringing awareness through initiatives such as a UN Space Weather Day that will include all relevant stakeholders (energy providers and non space actors that can be affected) and encourage the establishment of national action plans and emergency procedures for mitigating the impact of space weather events.
- A space traffic management framework is needed to achieve safety and reliability of operations in outer space, as well as transportation to and from outer space and Earth, while ensuring sustainable space environment for future generations. Safety and reliability of the space environment is important to be considered when developing future STM guidelines and framework.
- Fostering the implementation of the LTS Guidelines.

WG7: Space for Global Health

- We recommend to develop a global virtual platform pooling and granting access to existing space-derived data pertinent to tackling global health issues. To facilitate individual access to such data, it is also recommended to work towards recognising digital interconnectivity as a human right.
- The current trend indicates the realisation of space-based connectivity to every individual within the near future. It is recommended that the UN builds on this capacity to accomplish the efficient use of this platform.
- Furthermore, the solution to the last mile problem, within the context of global health, needs to facilitate global interconnectivity and accessibility to bio-surveillance data via social media using space technology.
- In terms of dealing with global health, we recommend that the UNOOSA collaborates with the WHO to meet SDGs for human health through space medicine research outputs towards society.

Recommendations from the Space Generation Forum 2.0 and the Space Generation Advisory Council in support of UNISPACE+50

There are three overarching recommendations that conclusively bring together the thoughts and discussions of the SGF2.0 as a whole and are now endorsed here by the Space Generation Advisory Council.

1. The Space Generation Advisory Council recommends that SGAC be invited to participate in the development of the 'Space 2030' agenda and implementation plan as defined in document A/AC.105/L.313 and represent the voice of the next generation.
2. SGAC encourages Member States to include young professionals in their delegations at the Committee and its Subcommittees and highlight the importance of engaging the next generation to reach the Sustainable Development Goals.
3. SGAC should be invited to actively participate in action teams, working groups, and other forums in leading roles that will deliver on the 'Space 2030' Agenda.

From the seven working groups of SGF 2.0, there were thematic recommendations that were presented and are now endorsed here by the Space Generation Advisory Council.

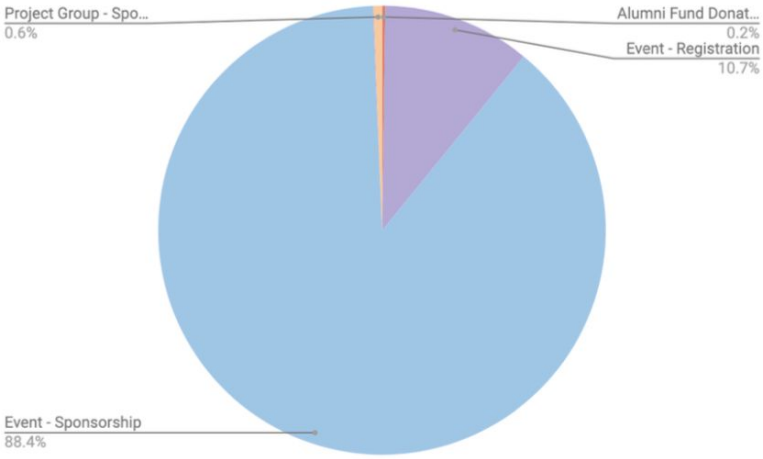
1. SGAC supports the Office's Space for Women initiative, and encourages the Office and the Member States of the Committee to further support the appointment of 'Space for Women Ambassadors' as recommended in the Report on the United Nations Expert Meeting on Space for Women (A/AC.105/1163), and to include in this initiative private sector and international representatives.
2. SGAC recognises the work done by the Office in engaging with other United Nations entities and encourages the Office to continue to exchange information on how space activities can be an asset for the sustainable development goals.
3. SGAC encourages the Office to continue to work with the Committee Members States and the Permanent Observers and to establish a platform to exchange information on programmes that emphasize space for the sustainable development goals, including the views of representatives from the next generation and emerging space nations.
4. SGAC acknowledges initiatives that encourage open data and open source resources, such as the Open Universe Initiative. SGAC encourages the Committee to build upon those existing initiatives and expand the scope outside of astronomical data to all space-related data that incentivizes solving societal issues in accordance with generally accepted standards.
5. SGAC encourages Member States and the wider international community to intensify support to the Office for Outer Space Affairs to consider the creation of a repository of open source materials, educational resources, career guidance, mentorship opportunities, outreach, and other capacity-building means.
6. SGAC recognises the role that can be played by the private sector in capacity-building, particularly in the space sector, and therefore invites Member States to work in

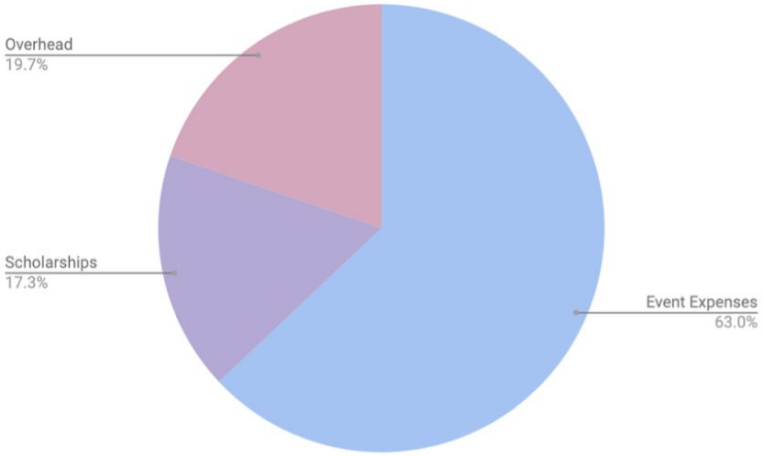
collaboration with the private sector to encourage the incorporation of Capacity-Building activities into Corporate Social Responsibility.

7. SGAC urges the Office and the Member States of the Committee to continue to engage with the Private Sector to enhance discussions that will drive the future of space activities.
8. SGAC commends the Office for establishing successful initiatives such the International Asteroid Day and encourages the Office to consider establishing a Space Weather Day to promote public awareness on Space Weather and space weather topics.
9. SGAC encourages the Committee and its Members States to exchange existing space-derived data pertinent to tackling global health issues.
10. SGAC encourages the Office to collaborate with the WHO in meeting the Sustainable Development Goals for human health in order to deal with global health.

FINANCIAL SUMMARY

Revenue	€ 405,029.41
Expenditure	€ 293,582.65
Surplus / Loss	€ 111,446.76
% Surplus / Loss	27.5 %





We'd love to stay in touch!

spacegeneration.org

SPACE GENERATION
ADVISORY COUNCIL

In support of the United Nations
Programme on Space Applications

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