SPACE GENERATION
ADVISORY COUNCIL

ANNUAL REPORT
EXECUTIVE SUMMARY

SPACE GENERATION ADVISORY COUNCIL 2016

In Support of the United Nations Programme on Space Applications

In Support of the United Nations Programme
on Space Applications

c/o European Space Policy Institute (ESPI)
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SPONSORS & PARTNERS

The Space Generation Advisory Council (SGAC) is very grateful for the continued 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 2016.

SGAC would like to thank all sponsors and partners once again for their contribution to one of the most successful years in SGAC history.

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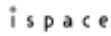
Florida Institute of Technology

HE Space

International Development Alliance (IDA)

Joerg Kreisel International Consultants



iSpace

International Space University

The Tauri Group

OHB Space Systems

Overlook Systems

Católica del Perú

RHEA Group

Satrec Initiative

Virgin Galactic

Society of Satellite Professionals International

Young ESA

Partners

A

Analytical Graphics Inc.

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Australian Youth Aerospace Association

Austrian Network for Higher Education

C

Czech Space Office

Copernicus

E

European Commission

European Space Policy Institute

F

Austrian Research Promotion Agency (FFG)

Future Space Leaders Foundation (FSLF)

H

Hungarian Astronautical Society

Heinlein Prize Trust

I

International Association for the advancement of space Safety (IAASS)

The Economic Forum in Krynica

I

International Space University (ISU)

The Institute for Eastern Studies, Economic Forum

L

Lunar Mission One

M

McGill Institute of Air and Space Law

MONA GIS

N

Netherlands Space Society (NVR)

Night Sky

O

Austrian Space Forum (OWeF)

Q

QB50 project - The Von Karman Institute

S

Sapienza Aerospace Student Association (SASA)

Secure World Foundation (SWF)

Skolkovo Institute of Science and Technology (Skoltech)

SkyWard Experimental Rocketry

SpaceNews

Space Foundation

SpaceRef.com

Space Safety Magazine

Students in Aerospace

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

T

Toronto Students for the Advancement of Aerospace (TSAA)

U

UK Students for the Exploration and Development of Space (UKSEDS)

Young Ukrainian Space Industry Workers (CYUSIW)

UNAVCO

University of Toronto Aerospace Team (UTAT)

W

World Space Week Association (WSWA)

Women in Aerospace Europe

Washington Space Business Roundtable (WSBR)

Y

Young ESA

Yuri's Night

National Agencies

Agencia Espacial Mexicana (AEM)

Agenzia Spaziale Italiana (ASI)

Canadian Space Agency (CSA)

Centre National d'Études Spatiales (CNES)

Deutschen Zentrums für Luft- und Raumfahrt (DLR)

European Space Agency (ESA)

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National Air and Space Administration (NASA)

EXECUTIVE COUNCIL MEMBERS

Chairpersons

Stephanie Wan *(USA)*	Chair
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Executive Office

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Samantha Marquart-Bainard *(USA)*	Space Generation Fusion Forum Manager

Regional Coordinators

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Guzel Kamaletdinova *(Russia)*	Europe
Matteo Emanuelli *(Italy)*	Europe
Behnoosh Meskoob *(Iran)*	Middle East
Hamed Gamal *(Egypt)*	Middle East
Kavya Manyapu *(USA)*	North, Central America & Caribbean
Juan Gramajo *(Guatemala)*	North, Central America & Caribbean
Avid Roman Gonazalez *(Peru)*	South America
Marco Cabero *(Bolivia)*	South America

**Note: Members as of December 2016. Note that some members ended their terms during the year, and they may not be named here. On the same note, Volunteers that are team members are not listed here, but represented by their leads or coordinators in the Executive Office.*

LETTER FROM THE CO-CHAIRS

Dear SGAC members and Friends of the Organisation,

The Space Generation Advisory Council has been fortunate to have another year of growth. We, as well as our sponsors and partners, continue to be impressed with the passion and energy of our members, who dedicate hours each and every week to ensure quality output that contributes to the youth's voice in space policy. 2016 was a busy and rewarding year for growth, both in our activities and outreach.

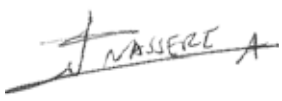
There were a total of 21 events directly organised by SGAC this year: 3 international, 3 regional, and 15 national; as well as many more activities you can learn more about in this report. We organised several young professional workshops, continued the success of the Asia Pacific Space Generation Regional Workshop (SGW) and the South American SGW, and organised the first European SGW. Adding to our list of new events included a TEDx inspired talks from space industry leaders called SGx, held in conjunction with the Satellite Conference. This was followed by the 5th Space Generation Fusion Forum (SGFF), which created opportunities for participants to discuss disruptive developments in the space sector with professionals and key players.

The Space Generation Congress (SGC) continues to be a sold-out event for the third year in a row. A mix of new faces and old SGAC friends filled the seats of the event: United Nations COPUOS Chair, Dr. David Kendall, Lockheed Martin's Ms. Wanda Sigur, NASA Administrator Bolden, and our speakers. We were honoured to have additional distinguished Heads of Space Agency guests from the German Aerospace Center (DLR), Canadian Space Agency (CSA), European Space Agency (ESA), and the Centre National d'Études Spatiales (CNES). As these events continue to grow in number and talent, we are ever more thankful to the event managers and their teams, all volunteers, for planning the details necessary to make the events memorable.

In 2016, we also increased the number of volunteer opportunities and were able to offer 20% more scholarships and funding opportunities to our members. Our social media reach increased by 30%, reaching more potential members and sponsors. The national and regional activities, as well as the Project Groups, would not have been possible without the leadership of each team.

The enthusiasm and energy from SGC has fuelled our work in the remaining months of the year, as we finished it with the General Assembly and planning of activities for 2017. As you read through our Annual Report, remember that this work would not have been possible without the impressive dedication, creativity, and volunteer hours from our talented members, the ongoing support of our sponsors and partners, and the collective passion to guide the next generation of space leaders.

Stephanie Wan
Chair
(USA)



Ali Nasseri
Co-Chair
(Canada/Iran)

LETTER FROM THE EXECUTIVE DIRECTOR

Dear SGAC members, partners, supporters, and colleagues,

The Space Generation Advisory Council 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.

In 2016, SGAC worked with our sponsors and partners to give 132 scholarships and awards to the next generation of space professionals, which represents a 50% increase since 2014 and a further 15% increase since 2015. 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 21 congresses, workshops, and events around the world (a 30% increase since 2015), including the first SGx event, the 15th Space Generation Congress, the fifth Space Generation Fusion Forum, and the Space Generation Workshops series. Moreover, the eight SGAC Project Groups continued to publish educational and technical material on different space topics throughout the year, with a total of 24 presentations and publications in 2016.

Over the course of the year, SGAC has continued to support the United Nations by actively participating at UNCOPUOS meetings, UN ECOSOC, and other events by the United Nations Office for Outer Space Affairs (UNOOSA).

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, propelling the voice of the next generation of space leaders. 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 toward growing SGAC.

Best Regards,

Minoo Rathnasabapathy
SGAC Executive Director

Space Generation Fusion Forum (SGFF) 2016

Space Generation Congress (SGC) 2016

More photos available at: http://www.flickr.com/spacegeneration

OUTPUT AT A GLANCE

SCHOLARSHIPS AND AWARDS (132)

- $pace is Business! Technical Paper Competition (1)
- Australian Youth Aerospace Association (AYAA) Australian Futures Award (4)
- Space Solar Power Technical Paper Competition (1)
- Move an Asteroid Technical Paper Competition (1)
- Embry Riddle Scholarship(1)
- Italian Space Agency (ASI) Grant (5)
- German Aerospace Center (DLR) Standout Student Scholarship (2)
- Society of Satellite Professionals International (SSPI) Satellite Futures Scholarship (3)
- NASA Space Communications and Navigation (SCaN) Scholarship (2)
- NASA AES Scholarship (1)
- Space Generation Leadership Award (5)
- SGAC-IAASS Space Safety Competition (3)
- Space Generation Advisory Council Global Grants Programme (4)
- International Lunar Exploration Working Group (ILEWG) Young Lunar Explorer Scholarship (1)
- Space Generation Congress 2017 Logo Competition (1)
- ispace Competition (1)
- OHB Competition - Future of Radar Based Earth Observation (2)
- Young ESA – SGAC Diversity Scholarship (1)
- SGAC-AEM Mexican Scholarships (20)
- SATELLITE 2016 Essay Competition (30)

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:

- Future Space Leaders Award *(9)*
- International Astronautical Federation (IAF) Emerging Space Leaders Awards *(14)*
- Space Symposium Complimentary Registrations *(20)*

CONFERENCES, WORKSHOPS, AND EVENTS ORGANISED (21)

- SGxIsrael 2017, Israel
- 1st European Space Generation Congress (E-SGW), Hungary
- SGx2016, USA
- SATELLITE 2016 Speed Mentoring Event, USA
- Space Generation Fusion Forum (SGFF), USA
- SGAC CubeSat and SpaceOps Workshop, USA
- SpaceUp GLIS, Switzerland
- SpaceUp Barcelona, Spain
- SpaceUp Milan, Italy
- SpaceUp Sweden, Sweden
- Space Career Day @ ETH, Switzerland

- 2nd South American Space Generation Workshop (SA-SGW), Peru
- Space Generation Rising Leaders Workshop, USA
- SG[Bolivia] 2016, Bolivia
- SGC 2016 Workshop for Moderators and Rapporteurs, Mexico
- 15th Space Generation Congress (SGC), Mexico
- SGAC Mars Analogue Simulation Workshop, Mexico
- SGAC Global Networking Forum: Technology Transfer - How to Make the Most of It?, Mexico
- YoungESA-SGAC Exchanges on Diversity in the Space Sector - First Diversity Award Ceremony, Mexico
- SGAC Organised Astronaut Talk at the IAC: Sandy Magnus, Mexico
- 3rd Asia Pacific Space Generation Workshop 2015 (AP-SGW), Philippines
- SGAC Poland Mars Analogue Mission Meeting, Prague

FORMALISED PARTNERSHIPS (8)

- SATELLITE2016 and SGx2016
- Crowd2Space
- Fisher Institute of Air and Space Strategic Studies
- DLR Standout Student Scholarship 2016 Agreement
- Space Ventures GmBH
- DALHART Informatikai Zrt. (Web Hosting)
- Aerospace Engineering Department of the University of Applied Sciences Wiener Neustadt (FHWN)
- Young Ukrainian Space Industry Workers (CYUSIW)

PAPERS, PRESENTATIONS, AND PUBLICATIONS (24)

PROJECT GROUPS

- Space Law and Policy Project Group:
  - C Reyes-Mantilla *(Colombia)*, J Gramajo *(Guatemala)*. Collaboration and Policy for Environmental Security in the Latin American and Caribbean Region from the Space Perspective. Poster Presentation. UN-IAF Workshop on Space Technology for Socio-Economic Benefits. Guadalajara, Mexico.
  - Technical Presentation, 55th Session of the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space (UNCOPUOS), Austria.
  - M Aliberti, *(Italy)*, L Napier *(USA)*; C Beischl *(Germany)*. Orbital Congestion: Assessing the Prospects for Effective Governance Structure through Regime Theory. Paper and Interactive Presentation. 67th International Astronautical Congress. Guadalajara, Mexico.
  - C Reyes-Mantilla *(Colombia)*, J Gramajo *(Guatemala)*, D Bazaldua *(Mexico)*, C Gallardo *(Mexico)*. Collaboration and Policy for Environmental Security in the Latin American and Caribbean Region from the Space Perspective. Poster Presentation. UN-IAF Workshop on Space Technology for Socio-Economic Benefits. Guadalajara, Mexico.
  - T Cheney *(UK)*. Reactions to the US Space Act 2015: Statements at COPUOS, Symposium on Legal Aspects of Space Resource Utilisation. Presentation. Leiden University, Leiden, The Netherlands.

- Space Safety and Sustainability Project Group:
  - H Gamal *(Egypt)*, MJ Pardo Spiess *(Germany/Colombia)*, B Aliaj *(Albania/Bulgaria)*, Elizabeth Barrow *(UK)*, M Afouna *(Egypt)*. Human Exploration of Venus: a comparative study of crewed missions to Mars and Venus. Oral presentation and paper. 67th International Astronautical Congress. Guadalajara, Mexico.
  - CM Entrena Utrilla *(Spain)*, L Bettiol *(Italy)*, J Piness *(USA)*, I Revesz *(Australia)*, F Oluwafemi *(Nigeria)*, J Lousada *(Portugal)*. Safety Analysis of Spacesuit Design for Martian Surface. Oral presentation and paper. 67th International Astronautical Congress. Guadalajara, Mexico.
  - Y Porat *(Austria/Israel)*, A Rivolta *(Italy)*, C Thro *(France/Germany)*, SA Nasseri *(Iran/Canada)*, J Chan-Hao Wang *(Canada)*, J Lousada *(Portugal)*, Nicolò Carletti *(Italy)*, Nikita Chiu *(UK/Hong-Kong)*. Analysis on spacecraft safety enhancement through on-orbit servicing. 67th International Astronautical Congress. Guadalajara, Mexico.
  - A Rivolta *(Italy)*, Y Porat *(Austria/Israel)*, C Thro *(France/Germany)*, SA Nasseri *(Iran/Canada)*, J Chan-Hao Wang *(Canada)*, J Lousada *(Portugal)*, Nicolò Carletti *(Italy)*, Nikita Chiu *(UK/Hong-Kong)*, M Emanuelli *(Italy)*. Analysis on spacecraft safety enhancement through on-orbit servicing. 8th IAASS Conference. Melbourne, USA.
  - A Rivolta *(Italy)*, J Lousada *(Portugal)*, SA Nasseri *(Iran/Canada)*. Identification of Hazards Associated with a One-way Human Mission to Mars. 8th IAASS Conference. Melbourne, USA.
  - A Nasseri *(Iran/Canada)*, A Rivolta *(Italy)*. Space Safety and Sustainability. Oral presentation. Space Up Milan, Italy.
  - A Rivolta *(Italy)*. SSS Project Group Overview and Work. Oral presentation. Space Up Milan, Italy.
  - A Rivolta *(Italy)*, J Lousada *(Portugal)*, SA Nasseri *(Iran/Canada)*, D Patel *(India)*, A-S Martin *(France)*, N Chiu *(UK/Hong Kong)*. Report on National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems of their Collision with Space Debris. 53rd Session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space (UNCOPUOS), Austria.

- Space *Exploration Project Group:*
  - H Ghassabian *(Italy)*, A Calzada Diaz *(Spain)*. Expandable Dome Design for Future Lunar Outposts. Oral presentation. International Symposium on Moon 2020-2030
  - A Calzada Diaz *(Spain)*, H Ghassabian *(Italy)*. SGAC & SEPG Presentation. Oral presentation. ESA Moon Village Workshop. Leiden, The Netherlands.
  - S Hettrich *(Germany)*. The Poland Mars Analogue sImulation 2017. Oral presentation. ESA Moon Village Workshop. Leiden, The Netherlands.
  - S Hettrich *(Germany)*, A Babatunde *(Nigeria)*, A Alizadeh *(Iran)*, L Ghasemzadeh *(Iran)*, H Ghassabian *(Iran)*, S Karmakar *(India)*, L Wanslaw *(Poland)*, E Salteri *(Turkey)*, M Takla *(Egypt)*, M Wokciechowska *(Poland)*, I Wojciechowski *(Poland)*. Analog Planetary Research as a Tool for Effective Space Education. Oral presentation and paper. 1st symposium on Space Educational Activities.
  - H Ghassabian *(Italy)*, A Calzada Diaz *(Spain)*, S Hettrich *(Germany)*, N DeQuattro *(Italy)*, A Antonello *(Italy)*, D Bielicki *(Poland)*. Alcides: A Novel Lunar Mission Concept Study for the Demonstration of Enabling Technologies in Deep-Space Exploration and Human-Robots Interaction. Oral presentation and paper. 67th International Astronautical Congress. Guadalajara, Mexico.
  - K Inamadar *(India)*, H Ghassabian *(Italy)*, N DeQuattro *(Italy)*, A Antonello *(Italy)*. Cubesats As Platform For Remote Sensing Applications With Satellite Navigation Signal. Oral presentation and paper. 67th International Astronautical Congress. Guadalajara, Mexico.
  - D Bielicki *(Poland)*, A Calzada Diaz *(Spain)*, S Hettrich *(Germany)*, C Goodwin *(Australia)*, H Ghassabian *(Italy)*, A Kolodziejczyk *(Poland)*. Analog Simulation of a Mission to Mars - A Case Study in Poland. Oral presentation and paper. 67th International Astronautical Congress. Guadalajara, Mexico.
  - A Garcia Burgos *(USA)*. Study of Plant Regrowth under the Effects of Perchlorate and its Radiolysis Products on Martian Regolith. Oral presentation and paper. 67th International Astronautical Congress. Guadalajara, Mexico.
  - H Ghassabian *(Italy)*. SEPG & PMAS17 Presentation. Oral presentation. SpaceUp Milan, Italy.
  - S Hettrich *(Germany)*. SEPG & PMAS17 Presentation. Oral presentation. PMAS 2017 Science and Operation Workshop. Prague, Czech Republic.
  - C Felix *(Mexico)*, C Salicrup *(Mexico)*, L Davidova *(Czech Republic)*. SGAC Mars Analogue Workshop. Oral presentation. 67th International Astronautical Congress. Guadalajara, Mexico.

OTHER (41)

- M Rathnasabapathy *(Australia/South Africa)*. Role Models for Women in Space. Ben Gurion University, Israel.
- M Rathnasabapathy *(Australia/South Africa)*. Panelist. Innovation, Education, and Disruptive Technologies: The Keys to Attracting the Workforce of the Future". SATELLITE 2016, USA
- J Esteban Gramajo Gonzalez *(Guatemala)*. Space Generation Advisory Council. World Space Week Event, Guatemala.
- S Tabasco Vargas *(Spain)*. SGAC and 2nd E-SGW. SpaceUp Barcelona, Spain.
- Z Zhu *(China)*. Space Generation Advisory Council (SGAC) in Asia-Pacific Region to Grow Future Space Leaders. SpaceUp Australia, Australia.
- Z Zhu *(China)*. Space Generation Advisory Council(SGAC) impacts on Asia-Pacific Region towards Sustainable Space Networks. 23rd Asia-Pacific Regional Space Agency Forum, Philippines.
- S Wan *(USA)*. The Future of GNSS - Working Group. 23rd Asia-Pacific Regional Space Agency Forum, Philippines.
- L Keogh *(Ireland)*. Space Generation Advisory Council (SGAC). SpaceUp Ireland, Ireland
- M Scher *(USA)*. Beyond Localisation: The Cultural and Economic Evolution of Commercial Space. H100 Space Business conference, China.
- A Roman-Gonzalez *(Peru)*. Space Generation Advisory Council - SGAC. 2nd Aerospace Bolivian Conference – ABC 2016. Bolivia.
- N Vargas-Cuentas *(Bolivia)*. Basura Espacial. 2nd Aerospace Bolivian Conference – ABC 2016. Bolivia.
- A Nasseri *(Iran/Canada)*. SGAC In Europe. SpaceUp Milan, Italy.
- A Nasseri *(Iran/Canada)*. SGAC: How to Get Involved. SpaceUp Milan, Italy.
- B Meskoob *(Iran)*, B Salem Condory *(Iran)*, M Rezaei *(Iran)*, H Gamal *(Egypt)*, M Takla *(Egypt)*, A Aldass *(Jordan)*, M Sallam *(Jordan)*, G Alotaibi *(Kuwait)*, Z Alsalhi *(Oman)*, A Saleous *(Palestine)*, B Yaglioglu *(Turkey)*. Space Outreach Activities in Middle East, One Step Forward. 67th International Astronautical Congress. Guadalajara, Mexico.
- L Bacsardi *(Hungary)*. SGAC @ SpaceUpGLIS. SpaceUp GLIS 2016. Switzerland.
- E Funmilayo *(Nigeria)*. SGAC: About us Presentation. Why Space Event, Nigeria.
- E Funmilayo *(Nigeria)*. Why Space - Reaching Out to Young People and the Public. 67th International Astronautical Congress. Guadalajara, Mexico.
- L Bettiol *(Italy)*. SGAC: An Introduction. Industrial Engineering Department at the University of Padova, Italy.
- B Aliaj *(Albania)*. Get involved with SGAC and STEM Outreach Albania. Epoka University, Albania.
- B Aliaj *(Albania)*. NASA Space App Challenge Tirana 2016, Albania.
- M Rathnasabapathy *(Australia/South Africa)*. Shared Vision, Common Action - Stronger Capacity Building to Support a Sustainable Society. UNISPACE+50 High Level Forum, UAE.
- C Felix *(Mexico)*. Panelist. Making the Moon Village and Mars Journey Accessible and Affordable for All. 67th International Astronautical Congress. Guadalajara, Mexico.
- SGAC Exchange of Views Statement at the Scientific and Technical Subcommittee of UNCOPUOS.
- SGAC Exchange of Views Statement at the Legal Subcommittee of UNCOPUOS.
- SGAC Exchange of Views Statement at the General Assembly of UNCOPUOS.
- SGAC Technical Presentation at the Scientific and Technical Subcommittee of UNCOPUOS.
- SGAC Technical Presentation at the Legal Subcommittee of UNCOPUOS.
- SGAC Technical Presentation at the General Assembly of UNCOPUOS.
- Space Generation Fusion Forum 2016 Final Report.
- Space Generation Congress 2016 Final Report.
- Space Generation Fusion Forum 2016 Summary Video.
- M Rathnasabapathy *(Australia/South Africa)*. Women of the Space Generation. Panelist. Women in Aerospace GNF Panel. 67th International Astronautical Congress. Guadalajara, Mexico.
- M Rathnasabapathy *(Australia/South Africa)*. Heads of Agency Panel. Moderator. 67th International Astronautical Congress. Guadalajara, Mexico.
- A Nasseri *(Iran/Canada)*. Panelist. Young ESA Diversity Event. 67th International Astronautical Congress. Guadalajara, Mexico.
- M Rathnasabapathy *(Australia/South Africa)*. Speaker. IAF 3G Diversity Luncheon. 67th International Astronautical Congress. Guadalajara, Mexico.
- S Marquart-Brainard *(USA)*, M Rathnasabapathy *(Australia/South Africa)*. Report on the Outcomes of the 5th Space Generation Fusion Forum. 32nd Space Symposium, Colorado Springs, USA.
- M Rathnasabapathy *(Australia/South Africa)*. Space Generation Advisory Council: How to Get M Rathnasabapathy *(Australia/South Africa)*, G Tonoli *(Italy)*. Space Generation Regional Workshops - Encouraging Regional and National Discussions. 67th International Astronautical Congress. Guadalajara, Mexico.
- A Rivolta *(Italy)*, M Emanuelli *(Italy)*, B Edwards *(Australia)*, M Driedger *(Canada)*, J Atchison *(USA)*, J Sotudeh *(USA)*,

G Lapilli *(Argentina)*, M Grulich *(Germany)*, L Bettiol *(Italy)*, C Thro *(Germany/France)*, E Gorur *(Australia)*, L De Witt *(South Africa)*, A Davidi *(Israel)*, S Gautam *(Nepal)*, S Bandla *(USA)*, J Gramajo *(Guatemala)*, M Mijovic (Serbia), L León Perez *(Spain)*, C Dubois *(Canada)*, E David *(France)*, M Pariente *(Israel)*, C Johnson *(USA)*. Policy Challenges Related to Nanosatellites. 8th IAASS Conference. Melbourne, USA.

- L Bettiol *(Italy)*, M Grulich *(Germany)*, M Emanuelli *(Italy)*, J Esteban Gramajo Gonzalez *(Guatemala)*, J Atchinson *(USA)*, L León Perez *(Spain)*, J Sotudeh *(USA)*. Nanosatellites and their Demand for Changes in Space Policy. 67th International Astronautical Congress. Guadalajara, Mexico.
- C Bach *(Germany)*, R Di Battista *(Italy)*, A Pellegrino *(Italy)*, E Toson *(Italy)*. Importance and Challenges of Hands-On-Experience in Astronautical Education. 67th International Astronautical Congress. Guadalajara, Mexico.

CONFERENCES AND EVENTS WITH OFFICIAL SGAC REPRESENTATION (66)

- AIAA SciTech Forum and Exposition, USA
- 11th Illan Ramon Conference, Israel
- 53rd Session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space (UNCOPUOS), Austria
- American Astronautical Society (AAS) Goddard Space Symposium, USA
- National Space Club Goddard Memorial Dinner, USA
- SATELLITE 2016, USA
- IAF Spring Meeting, France
- H-SPACE 2016, Hungary
- 32nd Space Symposium, USA
- 55th Session of the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space (UNCOPUOS), Austria
- SmallSat Symposium 2016, USA
- 59th Annual General Assembly of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), Austria
- SpaceOps 2016, South Korea
- International Space Security Conference, Czech Republic
- Global Conference on Space and the Information Society, Switzerland
- European Space Solutions Conference, The Netherlands
- Future Space Leaders Event, USA
- ESPI Autumn Conference, Austria
- Space Studies Programme 2016, International Space University, Israel
- World Space Week celebrations around the world
- Yuri's Night Celebrations around the world
- 67th International Astronautical Congress (IAC), Mexico
- IAC Young ESA Reception, Mexico
- IAC Global Networking Forum (GNF), Mexico
- American Institute of Aeronautics and Astronautics (AIAA) SPACE 2016, USA
- 11th Meeting of the International Committee on Global Navigation Satellite Systems (ICG), USA
- 29th Planetary Congress - Association of Space Explorers, Austria
- 14th Reinventing Space Conference, UK
- UNISPACE+50 High Level Forum, UAE
- High Level Forum (HLF) Women in Space Breakfast, UAE
- 23rd Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-20), Indonesia
- ESA Moon Village Workshop, Netherlands
- UN ECOSOC Meetings, New York, USA
- SpaceUp Australia, Australia
- SpaceUp Ireland, Ireland
- SpaceUp Milan, Italy
- SpaceUp Barcelona, Spain
- SpaceUp GLIS, Switzerland
- Why Space Event, Nigeria
- Hangout with an Astronaut (With Prof. Jeff Hoffman and Nicole Stott), Nigeria
- Astronomy Barbeque, Nigeria
- 2nd Aerospace Bolivian Conference, Bolivia
- H100 Space Business conference, China

- Space and Missile Defense Symposium, USA
- Greater Huntsville chapter of the AIAA Young Professionals Symposium, USA
- NASA in the Park, USA
- SCITA Second Astrofans Conference, USA
- Space Career Day @ ETH, Switzerland
- ESA/ECSL Summer Course on Space Law and Policy
- Science and Technology for Society Forum 2016, Sri Lanka
- Annual Conference of Contextual Behavioral Science, USA
- TuniSPACE Days, Tunisia
- Space Panel by Trinity Space Society
- ABA Air and Space Law Forum: Space Law Symposium, USA
- Asteroid Day, Global
- Business and Regulatory Workshop, European Centre for Space Law (ECSL), Poland
- ECSL Practitioners Forum, France
- ECSL Young Lawyers' Symposium, France
- Graz Space Day, Austria
- NewSpace Tech, USA
- Space Law Symposium, Austria
- Symposium on Legal Aspects of Space Resource Utilisation, the Netherlands
- UN/International Astronautical Federation Workshop (UN-IAF) on Space Technology for Socio-Economic Benefits, Mexico
- UN Office of Outer Space Affairs Space Law Workshop, Austria
- Washington Space Business Roundtable, USA

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.

SGAC Executive Committee Meeting at the International Astronautical Congress, September 2016

ACTIVITY HIGHLIGHTS

GENERAL HIGHLIGHTS SGAC

- SGAC signed seven new MoUs including with Fisher Institute of Air and Space Strategic Studies, Crowd2Space, Space Ventures GmBH and Young Ukrainian Space Industry Workers (CYUSIW).
- In 2016, SGAC worked with partners and sponsors to award 132 scholarships and awards to SGAC members to attend international conferences, in addition to complimentary registration for numerous conferences.
- SGAC awarded four Global Grant awards to Adam Vigneron *(Canada)*, Ana Raposo *(Portugal)*, Danielle DeLatte *(USA)*, and Siddharth Pandey *(India)*
- SGAC awarded five Young Leaders awards to Daniel Brack (Israel/USA), Ramasamy Venugopal *(India)*, Chantelle Dubois *(Canada)*, Hansley Noruthun *(Mauritius/UK)*, and Henry Ibitolu *(Nigeria)*
- SGAC organised 21 conferences, workshops, and events around the world. SGAC members attended 66 conferences with official SGAC representation.
- The eight SGAC Project Groups produced 24 papers and publications during 2016.
- SGAC hosted the first SGx event, held in conjunction with Future Space Leaders Foundation and Access Intelligence - a one date event bringing together 21 speakers in a new TED-talk style format during SATELLITE 2016.
- SGAC organised the fifth Space Generation Fusion Forum in conjunction with the 33rd Space Symposium.
- SGAC held the first European Space Generation Workshop (E-SGW), second South American Space Generation Workshop (SA-SGW), and third Asia Pacific Space Generation Workshop (AP-SGW) as part of its regional workshop series. In addition, SGAC began its local country events such as SG[Bolivia].
- SGAC hosted the 15th Space Generation Congress in Guadalajara, Mexico held in conjunction with the 67th International Astronautical Congress.
- The annual SGC Closing Gala Dinner hosted 250 guests with keynote speeches from Administrator Charlie Bolden (NASA) and Dr. David Kendall (Chair, UNCOPUOS).
- SGAC achieved remarkable participation at the I67th International Astronautical Congress. SGAC organised several events during the IAC including the SGAC Poland Mars Analogue Simulation Workshop, Next Gen Reception (together with ISU and Workforce Development/Young Professionals Programme Committee), and the Global Networking Forum Panel “Technology Transfer – How to Make the Most of It?”.
- SGAC Members also participated in events such as the IAC Plenary and several IAF Committees.

- SGAC increased its ties with the UNOOSA and hosted partner events with World Space Week Association (WSWA), Future Space Leaders Foundation and AIAA Young Professionals Committee.

EXECUTIVE OFFICE HIGHLIGHTS

- Stephanie Wan *(USA)* succeeded Victoria Alonsoperez *(Uruguay)* as new Chair of SGAC. SGAC welcomed a new Co-Chair, Ali Nasseri *(Canada/Iran)*.

- SGAC appointed PJ Valenzuela *(USA)* as the SGAC Operations Manager.

- SGAC welcomed two interns, Alberto Rueda *(Spain)* and Luladay Mengistie *(USA)*.

- SGAC expanded the number of volunteer positions, opening new positions in the Executive Office including Reports Coordinator, Alumni Coordinator, Regional Events Coordinator, Local Events Coordinator, SGx Manager, Deputy SGC Manager and Deputy SGFF Manager.

- Five new Regional Coordinators were elected:
  - South America: Avid Roman-Gonzalez *(Peru)*
  - Middle East: Behnoosh Meskoob *(Iran)*
  - Europe: Matteo Emanuelli *(Italy)*
  - North, Central America and the Caribbean: Juan Esteban Gramajo González *(Guatemala)*, Alexander Gibson *(USA)*

- Samantha Marquart Brainard *(USA)* was appointed as the fifth Space Generation Fusion Forum Manager. Carmen Felix *(Mexico)* was appointed as the Space Generation Congress 2016 Manager.

- SGAC delivered Statement of Views at UNCOPUOS including three technical presentations at the 53rd Session of the Scientific and Technical Subcommittee, 55th Session of the Legal Subcommittee and 59th Annual General Assembly of UNCOPUOS.

- SGFF Manager Samantha Marquart Brainard *(USA)* and SGAC Executive Director Minoo Rathnasabapathy *(Australia/South Africa)* presented the conclusions of the fourth Space Generation Fusion Forum Panel at the 32nd Space Symposium.

- SGAC Chair Stephanie Wan *(USA)* was involved in the following activities:
  - Satellite 2016 Speed Mentoring Event. Moderator. March 2016. Washington DC.
  - SGAC Introduction to SpaceOps. Oral presentation. Space Ops 2016 Workshop. South Korea. May 2016.
  - Master Moderator, 32nd Space Symposium. Colorado Springs, USA. April 2016.
  - SGAC Introduction to NASA Space Communications and Navigation Summer Intern Programme. Oral Presentation. NASA Glenn Research Center and Goddard Space Flight Center. July 2017.
  - International Programme and Management Committee Workshop, Participant, 67th International Astronautical Congress. Guadalajara, Mexico.
  - Innovative Space Enterprise & Space Gen Leadership Mentoring, Moderator, Asia Pacific Regional

Space Agency Forum. Manila, Philippines. November 2016.
- SGAC Introduction to Multi-GNSS Asia. Oral Presentation. Multi-GNSS Asia. Manila, Philippines. May 2016.

- SGAC Co-Chair Ali Nasseri *(Canada/Iran)* participated in the following conferences/panels:
  - Young ESA Diversity Event. Panelist. 67th International Astronautical Congress. Guadalajara, Mexico
  - SGAC In Europe. SpaceUp Milan, Italy
  - SGAC: How to get involved. SpaceUp Milan, Italy
  - Space Safety and Sustainability. SpaceUp Milan, Italy

- SGAC Executive Director Minoo Rathnasabapathy *(Australia/South Africa)* participated in the following conferences/panels:
  - Innovation, Education, and Disruptive Technologies: The Keys to Attracting the Workforce of the Future. Panelist. SATELLITE 2016. Washington DC, USA.
  - Shared Vision, Common Action - Stronger Capacity Building to Support a Sustainable Society. Oral Presentation. UNISPACE+50 High Level Forum. Dubai, UAE.
  - Women of the Space Generation. Panelist. Women in Aerospace GNF Panel. 67th International Astronautical Congress. Guadalajara, Mexico
  - Heads of Agency Panel. Moderator. 67th International Astronautical Congress. Guadalajara, Mexico
  - IAF 3G Diversity Luncheon. Speaker. 67th International Astronautical Congress. Guadalajara, Mexico.

SGAC delegation at the UN COPUOS Scientific and Technical Subcommittee, February 2016


SGAC Space Generation Leadership Award (SGLA) winners at the IAF 3G Diversity Luncheon

AFRICA HIGHLIGHTS

- Beza Tesfaye *(Ethiopia)* was re-elected as African Regional Coordinator, beginning her second term in this position
- SGAC Africa currently represents 15 countries (Algeria, Cameroon, Ethiopia, Ghana, Lesotho, Libya, Kenya, Mauritius, Morocco, Nigeria, South Africa, Sudan, Tunisia, Uganda, Zambia, Zimbabwe) and is actively growing.
- To promote science and education, SGAC members organised several space teamed events and activities These events include:
- Astronomy Barbeque: Date with the Stars, Yuri's Night tagged "Why" Space and Hangout with Astronaut (SGAC Nigeria).
- Yuri's Night 2016, World Space Week Celebrations, Space Camp and stargazing event (SGAC Ethiopia).
- SGAC members participated in the following events:
- European Space Generation Workshop 2016.
    - 17th Astronomy Festival of Marrakech .
    - 17th Astronomy Festival of Ifrane.
    - 17th Astronomy Festival of Rabat.
- Nicolas Kawasi Appiah (NPoC Ghana) gave an interview to the Ghana Space Science Technology Institute on how Ghana can tap into the resources of the developed and developing space nations.

ASIA-PACIFIC HIGHLIGHTS

- Ten NPoCs were appointed in the region: Lisa Stojanovski *(Australia)*, Istvan Revesz *(Australia)*, Shashank Khurana *(India)*, David Lit Xian HO (Malaysia), Hamza Hameed (Pakistan), Adrian Josele G. Quional (Philippines), Shakir Othman (Singapore), Minwoo Lee (South Korea), Eranga Jayashantha (Sri Lanka), and Quoc-Trung Pham (Vietnam).

- The 3rd Asia-Pacific Space Generation Workshop in partnership with Philippine National Space Development Programme (NSDP) was held on November 12- 13th in Los Banos, Philippines as an official side event of the 23rd Asia-Pacific Regional Space Agency Forum (APRSAF-23), November 15-18th in Manila, Philippines.

- Three new national mailing lists were established: Australia, India, and Indonesia.

- SGAC Members in South Korea organised SpaceOps 2016 Cubesat Space Operations Student Workshop on 15th May 2016 in Daejeon, South Korea in collaboration with KARI.

- The 3rd Australian SpaceUp was held in Melbourne, at Final Frontier Festival, July 3rd, 2016.

- SGAC members celebrated Yuri's Night and World Space Week across the region with programmes to engage students and young professionals.

- Former Regional Coordinator, Mr Yusuke Muraki presented at Next Generation Plenary on Innovative Solutions for Making Space Accessible and Affordable at IAC2016 in Guadalajara, Mexico.

- Five SGAC members won Emerging Space Leaders Grant including Lisa Stojanovski *(Australia)*, Upasana Dasgupta *(India)*, Mahesh Thakuri *(Nepal)*, and Manisha Dwa *(Nepal)*.

- Memorandums of understanding (MoU) were under development with Korea Aerospace Research Institute (KARI), Philippine National Space Development Programme (NSDP), and National Institute of Aeronautics and Space of Indonesia (LAPAN).

3rd Asia Pacific Space Generation Workshop (AP-SGW) held in Los Baños, hilippines, November 2016

EUROPE HIGHLIGHTS

- SGAC Europe launched the 1st edition of the Space Generation Workshop (E-SGW) in Budapest.
- 2nd ESGW will take place at ESA HQ in Paris, in March, 24-25, 2017.
- 1st SG event in Europe, SG [Greece] will be organised in Athens in February, 18-19, 2017.
- SGAC has signed Memorandum of Understandings with Fachhochschule Wiener Neustadt and the Council of Young Ukrainian Space Industry Workers.
- Many European students and young professionals attended SGC 2016 in Guadalajara *(Mexico)* especially thanks to the efforts of European NPoCs (Italy, Germany) who helped set up national scholarships.
- The number of European representatives at SGC 2016 was high as well as there is an increasing interest in SGAC activities and in general an increased number of members within Europe.
- Guzel Kamaletdinova (RC Europe) and many NPoCs presented during International Astronautical Congress 2016 including Bora Aliaj (NPoC Albania), Emmanuelle David (NPoC France), Istvan Arnocz *(Hungary)*, Laura Bettiol *(Italy)*, Peter Batenburg (Netherlands), Tadeusz Kocman *(Poland)*, Joao Lousada *(Portugal)*, Tomas Hrozensky (Slovakia), and Milan Mijovic (former NPoC Serbia).
- NPoCs and SGAC members represented the organisation on European conferences and meetings.
- Many European SGAC members started preparations for Poland Mars Analogue Simulation Workshop (PMAS).
- NPoCs and SGAC members organised different local events:
  - SpaceUp events (i.e. SpaceUp Milan, SpaceUp Barcelona, SpaceUp Sweden, SpaceUp Ireland)
  - World Space Week events including presentations for kids during World Space Week together with Ciencia Viva in Portugal
  - Workshops (Workshop on the European Space Strategy (Slovakia), Cities in Space at the Museum of Technology (Sweden))
  - Networking events (e.g. Discover Your Space in the Netherlands)
  - Local events and summer schools (Hungarian Space Academy, Summer Space School in Russia)

First European Space Generation Workshop, February 2016

MIDDLE EAST HIGHLIGHTS

- Ali Nasseri *(Iran/Canada)* elected as Co-chairperson.

- The Middle East region has currently 14 National Points of Contact (NPoCs), with 15% increase in comparison to 2015.

- Paper submission at 67th International Astronautical Congress, Guadalajara, Mexico, 2016, titled "Space Outreach Activities in Middle East, One Step Forward" was authored by several SGAC members in the region including B. Meskoob, H. Gamal, B. Salem, M. Rezaei, M. Takla, A. Alda'as, M. Sallam, G. Alotaibi, Z. Alsalhi, A. Saleous, and B. Yaglioglu.

- To promote science and education among Cyprus' public, SGAC-Cyprus organised four types of activities such as presentations, observations, scientic courses and workshops, and public outreach. SGAC helped contact and provide information to scienti c communities and organisations, and in turn, these organisations distributed the information to the public.

- Iran NPoCs got Iranian Space Agency's nancial aid and support to organise the rst National Funding Round of Manfred Lachs Moot Court Competition
- The 1st SGx-Israel conference (to be named SG[Israel] in future years) was held in January, adjacent to the International Space Conference in honour of Ilan Ramon. A MOU agreement was signed between the Fisher Institute of Air and Strategic Students and SGAC. The intention of both parties is to turn SG[Israel] into an annual event.

- In September, 2016: SGAC members attended a two-day space education workshop for Palestinian children to discuss, explore, and create a shuttle prototype. The workshop helped them imagine a safe place to live by finding the solutions for everyday life.

- Yuri's night, World Space Week, and Astronomy Day programmes were held in most of the region's countries.

The inaugural SGx-Israel conference (now called SG[Israel]) held in conjunction with the International Space Conference in honour of Ilan Ramon, January 2016

NORTH CENTRAL AMERICA AND THE CARIBBEAN HIGHLIGHTS

- Ali Nasseri *(Iran/Canada)* elected as Co-chairperson.

- In 2016 the region welcomed 5 new NPoCs: Lauren Smith *(USA)*, Michelle Knox *(USA)*, Bradley Farquar *(Canada)*, Tania Robles *(Mexico)*, Brenda Ulate Gamboa (Costa Rica), and Luis Enrique Salverria (El Salvador), the latter being the first SGAC representative in the country.

- The Space Generation Fusion Forum was held in Colorado Springs, USA, in conjunction with the Space Foundation's Space Symposium. It was managed by Samantha Marquart-Brainard *(USA)*, it received record numbers of applications, and it incorporated new group discussion tracks.

- The first joint SGAC event with AIAA, Rising Space Leaders, was held at AIAA-Space in California, led by Lauren Smith and Chris Nie, with over 50 Young Professionals in attendance.

- Canadian Space Summit was a huge success in Winnipeg, attended by both Canada NPOC's and other SGAC members.

- This year, SGAC conducted another highly successful Space Generation Congress. It took place in Guadalajara, Mexico. The congress gathered more than 132 delegates from 32 nationalities across 6 continents. A total of 75 scholarships were awarded. This platform, as well as the IAC, served as an opportunity to promote SGAC and the benefits of space in Mexico and the rest of Latin American countries.

- The Mexican Space Agency, in collaboration with SGAC, granted 20 scholarships to Mexican students and professionals with a notorious trajectory in the topics related to space.

- In Guatemala, the first World Space Week event took place. In collaboration with Universidad del Valle, a two-day event was conducted in order to promote the potential of space as means of development for the country.

- The Aerospace Engineering Group (GIA), in collaboration with SGAC, organised certification courses: levels one and two for members of TRIPOLI Rocketry Association, an international non-profit organisation dedicated to the advancement and operation of amateur high power rocketry.

Space Generation Rising Leaders Workshop as part of AIAA Space, September 2016

SOUTH AMERICA HIGHLIGHTS

- The South America region got two new NPoCs this 2016:
  - Santiago Enriquez *(Argentina)* elected on March 2016.
  - Paola Andrea Escobari Vargas (Bolivia) elected on March 2016.

- Some SGAC members in the region were awarded for their activities and achievements:
  - In October 2016, Natalia Indira Vargas Cuentas and Paola Andrea Escobari Vargas, both NPoCs of Bolivia, were elected as Member of the Month SGAC.
  - In October, Natalia Indira Vargas Cuentas received the Julio Sanjinés Goytia Distinction from the Military School of Engineering (EMI), Bolivia.
  - In November 2016, Camilo Andres Reyes Mantilla, from Colombia, was elected Member of the Month SGAC.

- South American SGAC members participated in different scientific and academic events such as:
  - 2nd Aerospace Bolivian Conference - ABC 2016.XXIII International Congress of Electronic, Electrical, and Computer Engineering INTERCON 2016.
  - United Nations/International Astronautical Federation (IAF) Workshop on Space Technology for Socio-Economic Benefits: Integrated Space Technologies and Applications for a Better Society.
  - 67th International Astronautical Congress (IAC) 2016.

- The list of papers presented at the IAC 2016 by members of the SGAC South America were:
  - Nano-Satellite as a Capacity Building Tool for Chile's Space Capabilities
  - Artificial Gravity Conceptual Orbiting Station Design
  - Designing a Web Platform Paradigm for Satellite Images Based on User Preferences
  - Nanosatellites: Actual Mission that can Perform
  - INCA Programme for Developing a Nanosatellite at the UCH
  - Space Market Facing the Economic Growth in South American Countries

- Furthermore, two posters were presented at United Nations (UN) Workshop:
  - The Importance of the Aerospace Technology in Bolivia
  - The Importance of the Aerospace Technology in Peruvian Society

2nd South American Space Generation Workshop (SA-SGW) held in Lima, Peru, August 2016

SGX 2016

In partnership with Future Space Leaders Foundation (FSLF) and SATELLITE 2016, SGAC hosted its first 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.

The aim of SGx was to engage and intrigue the audience with fast-paced lightning talks that focused on storytelling rather than business pitches in order to communicate about technology that matters most in the satellite industry. The one-day event brought together 21 speakers including Matt O'Connell (CEO, OneWeb), Michael Brett (CEO, QxBranch), Phil Smith (Senior Space Analyst, The Tauri Group), Ariane Cornell (Business Development & Strategy, Blue Origin) and many more.

Speakers of the inaugural SGx, March 2016

SPACE GENERATION FUSION FORUM

HUMAN SPACEFLIGHT
MODERATOR: DR. W. MICHAEL HAWES

SCIENCE, TECHNOLOGY PLANETARY EXPLORATION
MODERATOR: DR. JONATHAN ARENBERG

SPACE ENTREPRENEURSHIP AND START-UPS
MODERATOR: MR. SEAN MAHONEY

NATIONAL SECURITY SPACE
MODERATOR: MS. AUDREY SCHAFFER

SPEAKERS & MODERATORS

Jonathan Arenberg	Chief Engineer, James Webb Space Telescope Northrop Grumman
Steve Eisenhart	Director General, European Space Agency
John M. Grunsfeld	Associate Administrator for the Science Mission Directorate NASA
W. Michael Hawes, D.Sc.	Vice President & Orion Program Manager Lockheed Martin Space Systems Company
Emma Lehnhardt	Operations Research Analyst NASA
William H. Gerstenmaier	Associate Administrator, Human Exploration and Operations, NASA
Kris Lehnhardt	Attending Physician George Washington University
Debra Facktor Lepore	Vice President and General Manager, Strategic Operations Ball Aerospace & Technologies Corp
Laura Maginnis	Vice President of Custom Services United Launch Alliance (ULA)
Sean Mahoney	Chief Executive Officer Masten Space Systems
Erin Neal	McBee Strategic Consulting, LLC
Michael Simpson	Executive Director Secure World Foundation (SWF)
Audrey Schaffer	Director for Space Strategy and Plans Office of the Under Secretary of Defence for Policy in the US
Johann-Dietrich Woerner	Director General European Space Agency (ESA)
Danielle Wood	Special Assistant to the NASA Deputy Administrator

HUMAN SPACEFLIGHT

Human Space Exploration Round Robin Discussion Group

Dr. Michael Hawes *(Moderator)*

Not many in the space community dispute that we should explore, but many dispute how we should explore. What path should human exploration take in the next decade? Delegates discussed two separate aspects of this question: human-robot coordination and international collaboration. Additionally, the questions of the meaning of exploration, whether it is implicitly international, and whether disputes were also inherently international, were also addressed. The point was raised that perhaps it should instead be considered as four separate areas: political, technical, international and commercial.

The discussion group overwhelmingly agreed that it made sense to explore internationally rather than unilaterally. There are numerous benefits from this approach, including cost and risk sharing, reduced infrastructure, and increased diplomatic ties between governments. However, issues such as a higher cost for a managing partner along with loss of control of details should also be taken into account.

The point was raised that benefits need to be clearly articulated, along with clear allocation of tasks in a large project such as a Moon village or asteroid mission. Space organisations can now be very disparate entities, such that each one has its own focus. The group agreed we can focus on the interfaces between these entities, focussing on communicating between them.

The moderator brought up the point that we have different ways of solving problems and different design approaches. Essentially, we are tackling the same problems in different ways. The same issue occurs with redundancy: we have different fallback mechanisms, not just more of the same. The group continued with a discussion on the Russian and Chinese space elements, and whether it was more or less difficult to seek cooperation than in the past. The moderator explained how he recalls that at one point the US would never work with Russia, and at another time were not allowed to work with India.

The group felt that internally the US and Europe worked well with partners from both China and Russia;

however, it was the senior government officials that put up barriers to cooperation. Overall, the key was to be both flexible and opportunistic, and taking a proactive approach to circumvent upcoming problems at the programmatic levels. Additionally, there is a need to balance both the mantra (only American built) and the reality (need to cooperate/coordinate), and that sometimes there can be a hard job coordinating between partners, for example in Europe.

Questions were raised on how cooperation will go forward from here, and if geopolitics are the only real driver for such cooperation. The group felt that as China and India are members of the International Space Exploration Coordination Group (ISECG) along with smaller partners, there is a major potential for future projects. The future will come on a continual basis, not one big shift. It was additionally agreed that there is a significant commercial push to find benefits and partners in other countries, and that technology will continue to move forward, even if it is not inherently obvious in the media.

The issue of who should make the final call to go to an asteroid or the Moon was raised. While the stated political mission is to go to an asteroid, the lack of buy-in produces policy missteps. A similar issue arises with the potential for Mars missions. There can be a perception that Mars is 'too far away', so the Moon could be a stopping point, and international partners could assist with developing technologies such as a lander. The moderator said that there was more buy-in on the Moon side, and there is a significant amount to still discover there, making it a viable option for exploration. Vehicles being designed for multi-year missions are now the consensus and it is a great help to have multiple partners as multiple data sources. There also needs to be joint discussion on the intersection of humans with robots.

The group also discussed the potential of space tourism. The moderator was very excited about this as he believed it would increase public interest in space and assist by introducing different viewpoints into the business. There will also be changed perspectives when more people are in LEO, especially non-technical people. Finally, technological and psychological challenges were raised. It was noted that the biggest errors are usually human, and so more simulation should be conducted on how the significant distance from Earth can affect psychology and decision making processes.

SCIENCE, TECHNOLOGY A PLANETARY EXPLORATION

Dr. Jonathan Arenberg *(Moderator)*

This group focused on discussing several major questions: what is the most important science mission that the world's space agencies could embark on in the next decade? Should efforts be focussed on Mars, other planets, exoplanets, or something else? They stated that each discipline thinks its science is the most important. The answers to these questions change with every administration, and every generation, as every generation offers different answers which change the focus and utilise different technologies to tackle them.

Following this, the discussion turned to the following question: what technical capabilities need to be developed to discover life on another planet? As with most aspects of our sector, the answer should be given on a case by case basis. Each mission will require unique and specific instruments. The issue we face is that programmes that can take 20 years find themselves with outdated information after 10 years. Cubesats, however, offer the ability to send weaker modular instruments more frequently, and allow for cheaper adjustments and design evolution. Bigger instruments are usually made through observation and guess work, but can provide more valuable data.

What drives the methods we use to tackle our scientific projects is defined by our culture. This cultural perspective impacts all aspects of science: where should we start, what is most important, how do we tackle the problem, and what comes next? This current space race is more inclusive than ever and is creating an umbrella culture that allows us to collaborate more effectively than ever. However, goals change with every generation, and that requires science to consistently stay flexible.

SPACE ENTREPRENEURSHIP AND START-UPS

Mr. Sean Mahoney *(Moderator)*

The session began with an introduction from the moderator, who brought up the point that Space Entrepreneurship and Start-ups were the fastest growing sector in space, but also the most likely to fail. It could also be an extremely challenging industry to get into, dominated by legacy players, government, and only disrupted by billionaires. A counterpoint was brought up by the group that there were some companies who have been successful without being one of these three, such as Made In Space and Spire.

Delegates Participating in Round Robin Discussion Group

The discussion began with an exploration of the rationale behind the influx of start-ups into the space sector. Participants raised the points that there seems to be a low barrier of entry for new entrants into the market, and that there is now not only new customers, but also unprecedented government support. The group also discussed how access to technology has increased exponentially through the internet and the use of GPS, smartphones, and similar technologies.

The question was brought up of why money continues to be invested despite only a minority believing we will be flying a significant number of people to space in the near future. The moderator responded that the advantage of the start-up sector is that since it is not just a single company or application, even if 80% fail, there will still be many left, and thus the industry will be more resilient to failure than ever before. The discussion moved to the launch market before and after the Space Shuttle programme.

The discussion began with an analysis of the traditional model, which involved a broad base with multiple suppliers, versus the new vertical integration trend in industry. In the previous status quo, the supply chain had been geared towards government contractors, and had government rates that are not bending to start-ups. Even when there is scepticism about vertical integration; it says a lot if SpaceX can make it a successful philosophy, so it should be strongly considered as a new business model.

The point was raised that disruptors are often taking technology that already works in other industries; however, the counterpoint was that this may not be disruptive enough. The discussion moved to the question of standards. They are not necessarily the best way to do things, but simply the most agreed upon. The group suggested that ways to change standards include showing options for reducing risk, and giving access to something which is not available otherwise.

Overall, the discussion group believed that the key points to surviving a lull period were consolidation, partnerships, seeking business outside of space, having the ability and speed to pivot, and having significant financial reserves.

The group felt that growth areas included CubeSats, suborbital tourism, remote sensing, healthcare, open sourcing, end-user applications, space habitats, moon colonisation, in-house ground control, software and hardware companies. Shrink areas would include heavy financing, constellations, and internet based sectors. The overall prediction is that in the next five years, the bubble will burst, and ultimately only three or four companies will be left standing.

NATIONAL SECURITY SPACE

Ms. Audrey Schaffer *(Moderator)*

This group focused on one question: how do the growing space capabilities of industrialising nations' space programmes change national policies of countries that currently have established space programmes? The question we raised on how the next 50 years of national space security will be different to the previous 50 years. It was noted that the last 50 years almost seems like a child playing in a sandbox, and the proliferation of remote sensing has greatly expanded the idea of tactical space applications. There is the constant challenge of trying to adapt the new environment to the technologies coming in from other countries, and with limited human and financial resources, projects are often behind schedule and over budget.

Despite this environment, people are expected to operate with the same effectiveness. Many foreign states have the ability to track US objects, and so collaboration is a big part of the answer to these issues, both externally with other countries, but also internally with other sectors and academia. Technology can have a dual use purpose where it can benefit multiple sectors – it is helpful to be able to share data amongst interested parties, along with off-loading non-essential tasks currently conducted by the military such as humanitarian aid. It would be better to allow the military to focus on the primary task of national defence.

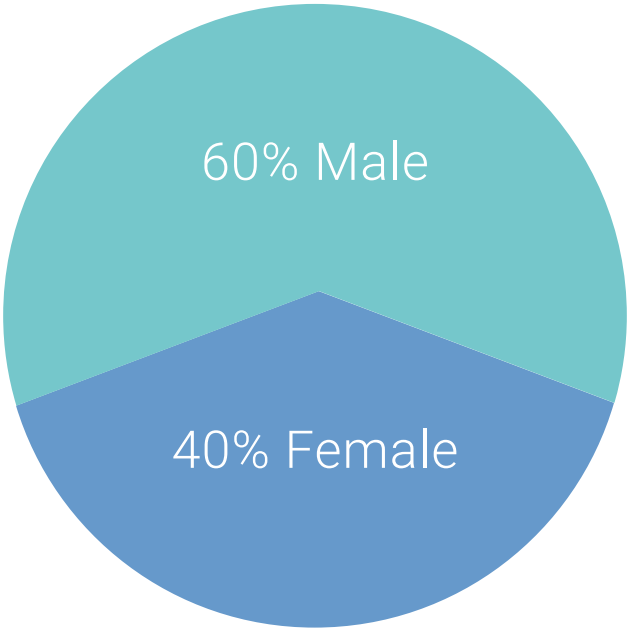
The mission between military organisations and scientific organisations is fundamentally different, the two groups having very different priorities. The Japanese model is essentially split into two groups, while in the US there is a whole slew of different agencies. It can be difficult to collaborate with other countries where there is often only one organisation that needs to be involved. Collaboration is blurring the lines between the traditional views of national space security and the commercial sector. The point was raised that the commercial space industry now has more responsibilities than it did before, and that the Air Force cannot have the expertise it would like by having a purely military structure. A lot of programmes could also be run autonomously where you can 'set it and forget it'. The group also discussed the need for leadership to determine which military tasks are essential and how they can be protected. This is a discussion that is currently happening in the Department of Defence.

The group then focussed on answering another question: what is the number one threat to space assets today? The issue of Space Situational Awareness was agreed to be a key factor in this discussion. We have to know what is out there, and to be able to comprehend and interpret that data, especially with the GEO orbit being extremely saturated. Additionally, the US and its allies need to determine what actions are intentional and what actions are not. Another threat is the lack of system procurement, since we have an incentive process that focuses on the monolithic companies, leading us to narrow the industrial base and drive up costs.

Cyber is another threat to space assets because there are lot of vulnerabilities both in space and on the ground. The challenge is that sometimes when we need something, the infrastructure to make it happen may be lacking. Another significant threat is that of lasers which could be used to damage a sensor on a satellite or an instrument. Overall, a threat is also contingent on where you are in the life cycle. for example, at the end of the life of a satellite, the biggest threat could be that the battery will run out. An additional threat is that of our own space policies. If our policies are outdated or are inflexible, then we could be shooting ourselves in the foot, showing a need for the US and other countries to create adaptable policies.

FUSION FORUM STATISTICS

Over 70 students and young professionals from eleven countries participated in the 5th Space Generation Fusion Forum, along with nearly 40 keynote speakers, Round Robin Interactive Session moderators, Career Panel members, and industry professionals mentors who attended as guests. The 2016 Space Generation Fusion Forum had the highest number of applicants to date: 115. Four delegates were selected from a competitive pool of 35 applicants to receive Global Grants scholarships to attend the Space Generation Fusion Forum, helping broaden SGAC's international network and allowing delegates Scholarship awardees to interact with people from a variety of backgrounds. These delegates hailed from Japan, Canada, Australia, and Germany.



SGFF Applications	115
SGFF Delegates	70
Global Grant Applications	35
Global Grants Awarded	4

SPACE GENERATION CONGRESS REPORT

OVERVIEW

The Space Generation Congress (SGC) is an annual conference bringing together the next generation of space leaders from around the world to discuss key space topics. This global conference gives university students and young professionals the opportunity to network and to examine critical questions that are facing the space and international communities at large.

Aims of SGC

SGC first aims to strengthen SGAC's international network. Delegates have a chance to interact and engage with the incoming generation of space professionals from all over the world. From SGAC's perspective, it allows us to consolidate our international links in order to best represent and facilitate the voice of the next space generation.

Second, SGC aims to harness the voice of the next generation by providing input on key questions facing the space sector, and the international community, as well as international stakeholders.

Third, SGC aims to support the next generation of space leaders by giving them networking opportunities with today's space leaders and high-level speakers.

15th SGC, Guadalajara, Mexico

Through SGC, SGAC aims to offer delegates a range of activities and initiatives to engage in conversations and consider key questions that are facing the space and international community. The discussions and recommendations over the three days at SGC will be presented at the UN COPUOS Scientific and Technical sub-committee meeting in February 2017.

Held prior to the 67th IAC, SGC sold out with 132 delegates in attendance from 32 countries. Leaders from space organisations joined delegates to discuss and debate the five main themes of SGC 2016, gaining fresh, innovative, and bold perspectives from the incoming space generation.

SGAC would like to express its sincere gratitude and appreciation for its sponsors, partners, and committee of volunteers who supported activities at SGC 2016.

SPEAKERS

Charles Bolden	Administrator, National Aeronautics and Space Administration (NASA)
David Kendall	Chair of the Committee on the Peaceful Uses of Outer Space, United Nations
Francisco Javier Mendieta Jimenez	Director General, Mexican Space Agency
Kiyoshi Higuchi	President, International Astronautical Federation; Technical Counselor, Japan Aerospace Exploration Agency
Lluc Diaz	Engineer, Technology Transfer Programme Office, European Space Agency
Brett Biddington	Executive Director, IAC 2017 Local Organising Committee
W. Michael Hawes	Vice President & Orion Program Manager, Lockheed Martin Space Systems Company
Jean-Yves Le Gall	President, Centre National d'Etudes Spatiales (CNES)
Jason Crusan	Director of Advanced Exploration Systems Division, National Aeronautics and Space Administration
Rosa María Ramírez de Arellano y Haro	General Director of International Affairs and Space Security, Mexican Space Agency
Daniel Oltrogge	Senior Research Aerodynamicist, Analytical Graphics Incorporated (AGI) Center for Space Standards and innovation
Krystal Wilson	Project Manager, Secure World Foundation
Yusuke Muraki	Space Engineer, Japan Aerospace Exploration Agency

SPACE GENERATION CONGRESS WORKING GROUPS

UNISPACE +50

UNISPACE+50 is the fourth conference of the United Nations conference series on the Exploration and Peaceful Uses of Outer Space (UNISPACE), and will mark the 50th anniversary of the first conference, held in 1968. In June 2018, the international space community will be together in Vienna to articulate a new long-term vision for space around four pillars (space economy, space society, space accessibility, and space diplomacy), which will serve as a guide in shaping the future of space and in driving space investments. As a product of UNISPACE III, the Space Generation Advisory Council (SGAC) attaches great importance to this conference series and aims to enrich the debate as well as the wider strategic reflection promoted by UNOOSA in the lead-up to UNISPACE+50, by bringing into the process the views of the future generation of space leaders.

With this in mind, the UNISPACE+50: Shared Vision, Common Action Working Group was established, to, first, collect inputs from SGAC members to help foster and shape a new long-term vision for space, as envisioned by UNISPACE+50; second, offer concrete ideas for actions in support of such a vision; third, identify the role that SGAC can play in the UNISPACE+50 process, notably about how the organisation can support and frame such ideas for actions into a coherent strategy.

The vision for the future of space that the Working Group aims to pursue is to ensure the ethical, sustainable, and peaceful access to – and use and exploitation of – terrestrial and outer space environments for generating tangible societal benefits, in a manner that is consistent with the international legal framework and that enhances international cooperation.

To increase the possibility of pursuing this vision, flexibility is required while working along five different axes of actions. First, strengthening the outer space regime and the global space governance can form a pillar to guide all space actors. This includes the elaboration of ethical principles of responsible behaviour in outer space activities, more effective multilateral and bilateral cooperation, and compliance with international agreements. Second, making international cooperation the norm for future space activities and recognising it as a long-term investment for all parties involved will be important, since it can be an avenue for maximising benefits while limiting potential negative consequences. Third, there will be great value if space activities are conducted to provide a plethora of socio-economic benefits. An effective public outreach agenda will prove beneficial to raise awareness of the opportunities that space brings, and to communicate returns on space investments. Fourthly, building capacity across space markets and placing space topics on national political agendas is critical to develop solutions to specific problems and play a role in the international arena. Fifth, making space a leading force in major technology development will generate tangible societal benefits, including through technology transfer and spin-offs.

The Working Group concludes that SGAC is well placed to inform these actions and the means with which to accomplish them, as well as to engage and liaise more closely with its stakeholders and partners to ensure future buy-in and active collaboration. Not only could these actions contribute to nurturing the strategic reflection promoted by the United Nations Office for Outer Space Affairs (UNOOSA) in the framework of the UNISPACE+50 process, but they could also offer SGAC potential avenues for the future and ideas about how to evolve in partnership with its stakeholders.

Earth Observation

Earth observation (EO) data is critical to many aspects of our daily lives and the global economy. However, despite sustained investment by governments and national space agencies, market uptake of such data has been slow. To help hasten market uptake, the Earth Observation working group of the 2016 Space Generation Congress was tasked with identifying challenges faced by the earth observation industry. Through group discussions and expert consultations, the working group identified several challenges and developed a set of recommendations to address these issues.

The challenges identified span all stakeholders in the Earth observation community, including suppliers, potential customers, and regulators. One of the challenges which affects all these stakeholders is the dissemination of the data available to all potential users. Hurdles in this process include; lack of knowledge by both suppliers and potential users about the interactions possible, lack of technical infrastructure for data dissemination, and regulatory restrictions on either suppliers or users.

The leading recommendation from the working group discussion is:

> *To make Earth observation data more accessible to a wide variety of end-users with higher frequencies and better quality. One important tool that could assist in facilitating this goal is an interfaced database which will hold and disseminate the different types of raw and processed data.*

An additional recommendation is:

> *To encourage Earth observation related start-ups and innovative technologies and businesses using public and private means.*

Combined with the increased accessibility and sophistication of analytical and processing tools, Earth observation data has become more available than ever before. Governmental efforts, such as the U.S. Commercial Remote Sensing Policy of April 2003 and the EU's efforts to secure market uptake for Copernicus, has attempted to further increase the commercial prevalence of EO data. However, the private EO industry is still immature and fragmented, hence it is important to accelerate market uptake and integration of EO products in order to realise its full potential.

The SGAC 2016 Earth Observation working group, comprised of 27 members from 15 nationalities, discussed the commercial potential of the Earth observation downstream market. The working group sought to find answers by focusing on three main questions:

- What are the main obstacles faced by governments and industries to achieve effective commercialisation of EO space-based products, applications and services? What role can these actors play in removing such obstacles?
- What tools, mechanisms, and measures can support the market uptake of EO programmes and initiatives to ensure the full exploitation of downstream market segments?
- In a rapidly developing EO market, how can a compromise be found for a more competitive approach to providing services for government and private sectors alike?

* Originally reported as £640 Million, converted to USD using the 31 December 2010 exchange rate of 1.561 GBP/USD

Space Situational Awareness

The main aims of the Space Generation Congress (SGC) 2016 Space Situational Awareness (SSA) Working Group were to define SSA, review current SSA initiatives worldwide, identify technical and policy challenges, and, finally, to propose effective frameworks and cooperative mechanisms to tackle these challenges, with particular reference to data interoperability and data sharing.
The team defined SSA as the capacity to gather a sufficient understanding of the outer space environment so that useful insights regarding its future evolution can be determined. Space debris was identified as the most significant threat to the current space environment, given its potential economic impact, and as a problem that can be solved with proper policies and technology development. Three different types of stakeholders are involved with space debris:

States are the most powerful actors. They have the power to enforce international policy at a national level, and are driven by economic interests and the need for access to space.

Business and academia are driven by the need for access to space, and the possibilities of technology development for space applications. Businesses require also to achieve profitability, and would lobby for policies that favour economic activities in space.

International organisations have the capacity to design universal perspectives that are more easily respected by participating entities as norms of international behaviour. They are in principle free of national interests and can design a more cosmopolitan solution to the problem through international consensus, but are burdened by a slower decision-making process.

These three actors currently carry out a number of initiatives to deal with space debris. The United States (US) manages the Joint Space Operations Center (JSpOC) to monitor space debris and potential orbital collisions, while Russia and the European Space Agency (ESA) have their own sensors network to complement JSpOC data. The United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) and the Inter-Agency Space Debris Coordination Committee coordinate policy and technology development at an international level. Finally, private and academic initiatives include the Space Data Association, the Commercial Space Operations Center (ComSpOC), and the International Scientific Optical Network, organised by the Russian Academy of Sciences.

Existing SSA initiatives cannot deal entirely with the problem of space debris because they do not maintain a complete and unrestricted catalogue, do not allow fair access to those who need it, and/or implement standards inconsistently. To tackle the space debris problem, the Working Group recommends the creation of a global, independent entity, supported by the UN and space-faring nation states. This entity would be able to go over national interests and offer a cosmopolitan solution to space debris with the following tasks:
Collect data on space debris and spacecraft.

- Create a simulation model to improve space situational awareness.
- Offer collision warnings and orbit recommendations.
- Declare end of life plans and measurements for space debris.

Space Situational Awareness Working Group at SGC 2016

Telecommunications

The innovative solution proposed by the Working Group consisted of a one-stop-shop educational tool with resources and easy-to-understand guidelines on three focus areas: policy and regulation procedures, frequency allocation, and interference mitigation. This tool would educate and empower all space participants. The tool attempts to meet the following objectives:

- Streamline international and national processes in order to make them accessible to large and small satellite developers.
- Promote transparency on frequency availability to enhance access and equality through innovative avenues of allocation.
- Educate participants on the best-practices, techniques, and standards to minimise the risk of frequency interference.

The Working Group concluded that the proposed tool would contribute significantly in mitigating interference to maximise the use of this limited resource. Although it seems that the demand for frequencies would be increased by small satellites operators, the allocation will be feasible when the technical and safety requirements are met, therefore it will not interfere in any frequency already occupied and vice versa.

The tool would provide reliable frequency information for users where they carry out their activities and the support of high standards of quality and efficiency in data transmission. This information adds value to telecommunications companies and stakeholders defined by the Working Group, strengthening the economic activities of this sector. In short, this tool would provide invaluable information regarding the use of the transmission frequencies for either large or small users of these signals, ensure that the operations of small satellites will not cause interference in big networks or satellites constellations, and will operate in safety. If an interference occurred, since the tool would be constantly updated, the possible causes of interference would be easier to track. This would allow appropriate action to be taken in consideration of the legal framework of the country or region where the interference happened.

The risk for frequency interference is significantly reduced by such a tool, as a direct check for users on similar transmission frequencies could be directly implemented and risk of interference be displayed. The option to permit time sharing on a desired frequency band would increase the effective use of the natural limited RF spectrum, as multiple users are more capable of utilising a designated frequency band to the fullest in comparison to a single user.

The tool allows for the streamlining of the frequency allocation process for any stakeholder. Non-profit, amateur, and start-up entities would experience the most relief from the burden of the process, allowing their growth and productive use of frequency bands. This would also enable the fair and equal utilisation of spectrum for any stakeholder as access to it would be less limited.

The SGC 2016 Working Group on Spectrum & Operational Challenges with the Emergence of Small Satellites discussed the problems of the increasing demand of RF spectrum use, especially in regard to the increase in users caused by the trends of needing small satellites for various applications. It became clear that the bandwidth limitations of the RF spectrum, the risk of frequency interference for a higher number of users, and the reduced mission times are not compatible long-term to current processes to file for allocation of a frequency band.

During the development of this report, on October 21st 2016, the White House announced a series of initiatives addressing the issue of small satellites. Entitled ‘Harnessing the Small Satellite Revolution’, one of the proposed initiatives included a new Small Spacecraft Virtual Institute. The virtual institute is described as a ‘one-stop shop for best practices, lessons learned, and standards for all phases of smallsat development’.

Proving Ground: Using the Cislunar Proving Ground and an International Collaboration Framework to Enable Human Exploration

Efforts to pioneer space exploration and science have made remarkable progress in just these past few decades, and every year new emerging ventures are being established. As humanity looks towards making its next steps, possibly with human exploration into ever deeper reaches of our solar system, we look to our governments, private industries, and international partners to guide the way. Collaboration is essential to establish sustainable exploration activities, but there must be discussion on how to foster this international collaboration both for mission planning and governance of such grand endeavours. The Space Generation Congress (SGC), an assembly of students and young professionals, gathered in Guadalajara, Mexico, in September 2016 to discuss these topics and provide the perspective of the incoming "space generation".

The Proving Ground Working Group (WG) expanded on the theme from 2015, "Pioneering Space Exploration," by considering how to address fundamental challenges and questions surrounding deep space exploration. The primary goals were to design a mission architecture to identify and utilise global assets and to develop a global governance strategy to foster international participation. Sponsored by the National Aeronautics and Space Administration (NASA) Advanced Exploration Systems Directorate (AESD), the WG considered the context of a Cislunar Proving Ground, an environment in which to innovate, demonstrate, and validate capabilities required to pave the way for long-duration deep space exploration.

The group worked to identify essential capabilities and knowledge gaps to be addressed in the Proving Ground, and more importantly, how to prioritise them. An example mission architecture was created, and capabilities prioritised into specific segments of both crewed missions and dormancy periods, when there would be no crew aboard the systems. The group also made efforts to predict which elements and technologies could be realistically anticipated during the identified timeframe of 2020s- 2030s, including various launch vehicles, autonomy and robotics, in-space propulsion, power systems, communications systems, and other emerging technologies. These anticipated technologies are meant to be utilised to their fullest extent and to involve a number of international participants, both public and private. Perhaps most importantly, the missions in the Proving Ground will provide the platform for a diverse range of science research to be performed in cooperation with many international collaborators.

Finally, the Working Group presented a series of recommendations towards the development of a global governance strategy. In accordance with this strategy, the group recommends that both governmental and private actors with advanced plans for participation in Cislunar operations create an Inclusive Managing Committee. The focus of this committee should be international discussion, advancements in orbital allocation and situational awareness, development of common infrastructure and standards, increased efforts towards collaboration and inclusion, and finally an evolved governance. In the end, the Inclusive Managing Committee, elected from said actors, shall be given the power to supervise and facilitate the management of high level operations that impact all actors in Cislunar space.

The group recognises the ambition in such a proposal and has provided a detailed look on the vision as well as expectations of the future space generation. It is only through hard work and collaboration that humanity can take such a bold and advanced leap into expanding into the universe. We hope to bring serious consideration and inspiration for immediate action to our leaders of today and of tomorrow.

Exploration Working Group at SGC 2016

CONGRESS STATISTICS

CONGRESS STATISTICS

SGAC was pleased to welcome a diverse representation of delegates from an array of countries and regions. 132 delegates were invited to participate at SGC 2016, together with 13 speakers and six Subject Matter Experts. SGC 2016 attendees came from more than 32 countries across six continents. This diversity is a major contributor to the development of a truly international voice of the space generation that SGAC strives to represent.

This year, SGAC increased the number of scholarships awarded to its members! A total of 75 scholarships, which included technical paper competitions and SGAC Young Leaders Awards, allowed SGAC members from all over the world to attend the SGC 2016 and the IAC 2016.

These figures clearly demonstrate SGAC's international influence, and that the organisation's continued development gives SGAC the momentum to establish a distinct network highly representative of young space professionals and university students.

132
DELEGATES

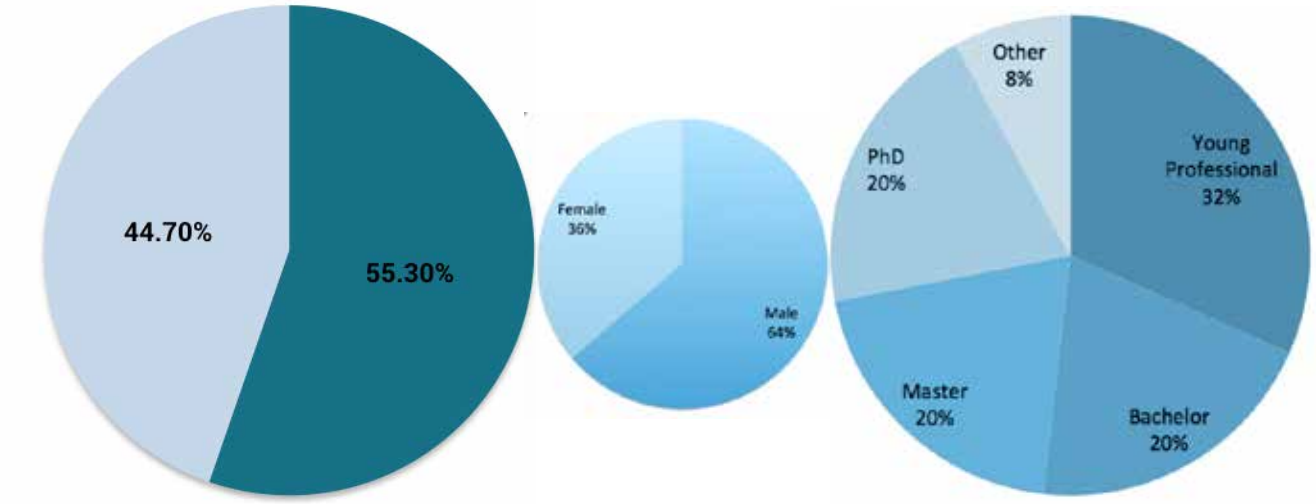
32
COUNTRIES REPRESENTED

75
SCHOLARSHIPS

13
SPEAKERS

6
SUBJECT MATTER EXPERTS

Scholarships vs. Others



NASA JSC Education

UNITED NATIONS INVOLVEMENT

UN COPUOS AND SUBCOMMITTEES

The United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) 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 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 (S&T Subcommittee) and the Legal Subcommittee, each 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.

SGAC was established as an outcome of the Vienna Declaration produced at UNISPACE-III, stating the recommendation "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..." In line with this mandate, SGAC focuses on pragmatic space policy advice to policy makers based on the interests of students and young professionals from around the world, broadly in the age range 18-35, and interested in space. SGAC is a permanent observer of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), and maintains consultative status at the United Nations Economic and Social Council (ECOSOC). The policy input of SGAC to date includes regular input to COPUOS, including to the UNISPACE-III Action Teams.

SCIENTIFIC AND TECHNICAL SUBCOMMITTEE

As a permanent observer of the Scientific and Technical (S&T) Subcommittee of the Committee on the Peaceful Uses of Outer Space (UN COPUOS), SGAC participated in the 53rd session held from the 15-26 February 2016 at the United Nations in Vienna, Austria.

SGAC Executive Director Minoo Rathnasabapathy, presented SGAC's general statement in which she covered SGAC's developments since the last session of S&T in February 2015.
The statement highlighted SGAC's achievements in 2015.

LEGAL SUBCOMMITTEE

The Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space held its 55th session on 4-15 April 2016 in Vienna, Austria.

SGAC gave a statement under General Exchange of Views about past, current and upcoming activities in SGAC, as well as a technical presentation highlighting the SGAC Space Law and Policy Project Group.

GENERAL ASSEMBLY

The United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) held its 59th session from 8 - 17 June 2016 in Vienna, Austria.
On behalf of SGAC, Executive Director Minoo Rathnasabapathy gave a statement under General Exchange of Views about the activities and events of the Space Generation Advisory Council.
All SGAC General Exchange of Views Statements and Technical Presentations can be found on the UNOOSA website. (http://www.unoosa.org/oosa/en/ourwork/copuos/current.html)

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 five regional commissions. The Council also receives reports from 11 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 Member States and the United Nations.
Since 2003, SGAC has had Consultative status at UN ECOSOC. As such, SGAC representatives can participate in meetings of the UN ECOSOC, the UN COPUOS and also of the UN General Assembly and its Committees. It can also propose inputs when relevant. SGAC UN ECOSOC Representatives have the opportunity to participate during the fall as observers in the UN General Assembly in New York.

UNIPSACE+50

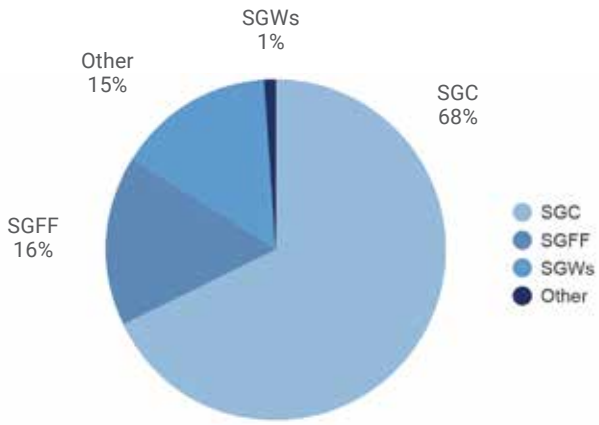
The year 2018 will mark fiftieth anniversary of the first UNISPACE conference, held in Vienna in 1968. SGAC has recently been asked to take a leading role in representing the ‘next generation’ perspectives on the thematic areas of UNISPACE+50. UNISPACE+50 will take stock of the contributions of the three UNISPACE conferences to global space governance, chart the future role of the Committee on the Peaceful Uses of Outer Space (COPUOS), its subsidiary bodies and the UN Office of Outer Space Affairs (UNOOSA), as well as strengthen efforts among all relevant stakeholders in shaping the global space governance.
SGAC has recently been asked to take a leading role in representing the ‘next generation’ perspectives on the thematic areas of UNISPACE+50.

In the lead- up to UNISPACE+50, SGAC was invited to attend the High-Level Fora (HLF) “Space as a driver for socio-economic sustainable development” providing input in two of the four pillars of UNISPACE+50, namely “Space Society: Evolution of society and societal benefits stemming from space-related activities” and “Space Accessibility: Strengthening of national space infrastructures and capacity-building”

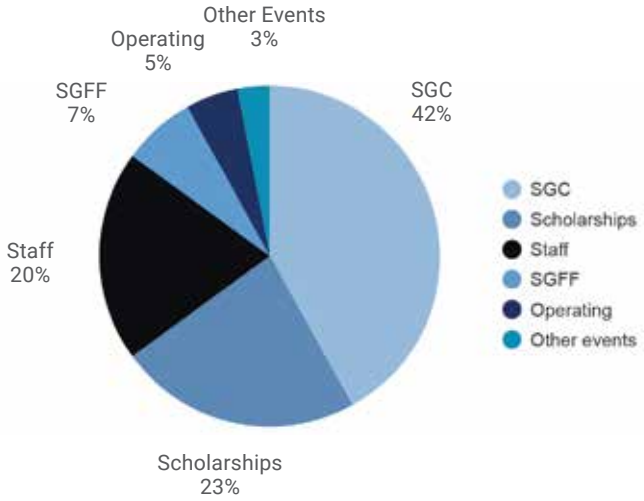
SGAC FINANCIAL SUMMARY

The financial summary was prepared by the SGAC Treasurer in accordance with required accounting principles and applicable legal requirements, to ensure transparency of the organisation at all times. They present a true and fair view of the organisation's income and expenditures.

Income



Expenses



STRATEGIC GOAL REVIEW

The SGAC Strategic Plan 2016 ambitiously outlined ten goals for the year ahead. This section of the Annual Report is the Executive Office's self-assessment of how SGAC met these goals. It is further intended to provide an additional view of the aims of SGAC's activities throughout the year and serves to inform readers about the development of the SGAC Strategic Plan for 2017.

1 - Financial stability - SGAC

Desired outcome: SGAC will improve financial stability by continuing to foster strong relationships with sponsors and additional funding resources. SGAC will develop concise individual budgets for SGAC events, PR & Communications Team, Project Groups, and competitions. The organisation will attract new sponsors from new areas of the space sector, such as satellite telecommunication companies and aerospace organisations.

The results are exemplified in the 20% increase in the number of competitions and scholarships SGAC offered for SGC 2016 compared to 2015. Many sponsors from the previous year – if not all – provided support to the organisation in 2016. SGAC has also increased the number of SGAC members focused on financial analysis by developing a Finance Team. This team worked meticulously to develop a detailed budget that highlights the expenses and revenues and the internal budgets and spending, including a more conservative internal spending to ensure fiscal responsibility and a habit of savings. The Strategic Partnerships Team has continued to hone their knowledge in SalesForce to better track potential sponsors and partnerships.

2 - Success of 2016 Space Generation Fusion Forum desired outcome: after the event, a complete financial analysis and impact assessment will be carried out to measure its effectiveness for driving the achievement of set organisational goals. SGAC will report on the execution of SGFF 2016, which will be measured by the funds raised for the event, the number of scholarships awarded, and the demography of the attendees. Furthermore the quality of both the discussions during the panels as well as the calibre of speakers, and the engagement of the SGFF delegates during the 32nd Space Symposium will be evaluated. The organisation will establish potential new partnerships for the continuation and development of this event within the general framework and purposes of SGAC's development and growth.

For the fifth annual SGFF held on April 10-11th 2016, SGAC evolved and changed the event's format to gather 70 delegates from 11 countries in round robin style discussions on Human Spaceflight, Scientific Exploration, Space Startups, and National Security. As usual, SGAC offered 4 Global Grant scholarships, with winners coming from the following countries: USA, Canada, Australia, and Germany. We were generously supported by various sponsors and partners, allowing a 57% increase in sponsorship for the event compared to 2015.

SGFF invited nearly 40 speakers, amongst whom were included: Dr. John Grunsfeld (NASA), Mr. Steve Eisenhart (Space Foundation), Dr. Johann-Dietrich Woerner (European Space Agency), Dr. Michael Simpson (Secure World Foundation), Dr. Michael Hawes (Lockheed Martin), Dr. Jonathan Arenberg (Northrop Grumman), Mr. Sean Mahoney (Masten Space Systems), Ms. Audrey Schaffer (US Department of Defense), Ms. Debra Facktor-Lepore (Ball Aerospace), Mrs. Erin Neal (McBee Strategic), Ms. Laura Maginnis (United Launch Alliance), Dr. Kris Lehnhardt (George Washington University), Dr. Danielle Wood (NASA), and Mrs. Emma Lehnhardt (NASA).

3 - Success of 2016 Space Generation Congress desired outcome: SGAC will report on the SGC event which is measured by the number of delegates, diversity in their backgrounds and country of origin, the number of scholarships, and the quality of the output: final SGC presentations and SGC Final Report. SGAC will also make an evaluation of the SGAC participation in the IAC through the amount of papers presented and members attending.

This year SGC welcomed 132 delegates, 13 speakers, and 6 subject matter experts from 32 countries to Guadalajara, Mexico. The number and calibre of applicants continues to grow, where 19% are working on their Bachelor's degree, 39% are Masters or PhD students, and 42% are young professionals. Additionally, SGAC worked with sponsors and partners to proudly offer 73 scholarships to students and YPs to attend the SGC and the International Astronautical Congress (IAC), a record number and increase by 20% from 2015. We hope to continue cultivating these partnerships to provide more opportunities in the future.

4 - Successful continuation of the Space Generation Workshops (SGW) desired outcome: SGAC will report on the SGW events, which is measured by the number of delegates, diversity in their backgrounds and country of origin, and the quality of the output.

The third Asia Pacific-SGW held in Los Banos, Philippines, as an official side event of the Asia-Pacific Regional Space Forum. 65 participants from 10 countries in the region focused on Asia-Pacific regional collaboration in the space sector.

The first European-SGW was held in Budapest, Hungary held in partnership with the Hungarian Astronautical Society. The workshop theme focused on 'Approaches to promoting European regional collaboration in the space sector – the next generation perspective', with 56 delegates from 24 countries from the region.

The second South American Space Generation Workshop was held in Lima, Peru, in conjunction with the 1st Latin American Congress of Astrobiology. The event gathered more than 75 delegates from 7 countries in the region.

5 - Deepening of relationships with partner organisations and creation of new ones desired outcome: continue to formalise the relationship with existing and new partner organisations through Memoranda of Understanding which outline the long term benefits of collaboration and provide a better visibility of SGAC in the space sector, especially in those areas where SGAC is not yet a reference, such as the telecommunications sector.

After reviewing the current list of partners and sponsors and realising the need to strengthen and utilise current collaborations, SGAC focused on reconnecting more with current partner organisations for outreach. The organisation chose to strategically engage with potential partners through activities prior to establishing a formal MoU. Therefore, while SGAC has signed 4 MoUs in 2016, we have become more engaged with partners. As an example, SGAC worked closely with the Future Space Leaders Foundation and Access Intelligence to hold a joint TEDx inspired event called SGx.

6- Continuation of SGAC membership database desired outcome: SGAC will obtain statistics from our membership information database to better understand the needs of the members. The SGAC Executive Office will also provide better insight to its internal team to ensure improved communication.

SGAC has utilised Google Analytics to receive an overview of the organisation's membership. However, there has been limited activity on developing the necessary SGAC membership database in 2016 due to the realisation the SGAC website requires an update and would be best to incorporate the item into the larger revamp. Despite this, our current website still provides a snapshot of the number of members, along with their geographic and gender distribution, which helps better understand the needs of our members. SGAC has also worked closely with the legal counsel to ensure that data collection from members around the world meet privacy and any legal concerns.

To improve internal communication within the team, SGAC introduced several documents explaining internal procedures for different team members and introduced several guidelines on budgeting and travel. We also implemented work plans as a means of understanding activities at all organisational levels. These efforts will continue in the form of internal team documentation now required as part of coordinator duties.

7- Development of the SGAC Alumni strategy and database as part of the member database desired outcome:

SGAC will develop a strategy to incorporate SGAC alumni's knowledge and expertise back into the organisation. Part of this strategy will include creating a member database and include former members, their activities, and their involvement with SGAC. SGAC will reignite relationships with those that have been out of contact, particularly in the context of SGAC events or ongoing projects.

SGAC has developed the role of Alumni Coordinator to help facilitate alumni activities and contacts, where the participant would also be part of the Strategic Partnerships Team. The strategy developed includes working with former Chairs, who are also current Advisory Board members, to coordinate the activities due to their knowledge of former members. As a result, SGAC held their second alumni event as an informal evening meetup in Guadalajara, Mexico during IAC 2016. Invitations were sent to members of our alumni database, with over 150 SGAC members, supporters, and alumni showing up, significantly increasing the number of participants reached compared to 2015. As a result, it appears going back to SGAC's roots as an informal network and providing cultural evening activities has proven to be a success in reaching new alums as well as potential new SGAC members.

8 - Strengthen relations with UN OOSA desired outcome: SGAC will initiate periodic meetings at the UN OOSA facilities outside of the annual COPUOS meetings to establish a closer relationship. SGAC will also work in the planning and participation of UNISPACE+50.

SGAC continued to contribute to the UN COPUOS sessions in 2016 through statements, technical presentations, and submissions in response to requests for input by UN OOSA. Furthermore, SGAC started to develop a paths towards contributing in UNISPACE+50 activities. This included a SGC 2016 Working Group on the UNISPACE+50. Its outputs were presented at the High Level Forum in Dubai, UAE, where the Executive Director received UN OOSA funding to attend. Additionally, SGAC invited COPUOS Chair, Dr. David Kendall, as one of the SGC Closing Dinner speakers. Internally, SGAC has started working with the Executive Council to explore how each region can funnel the inputs of NPoCs into top level UNISPACE+50 contributions in time for the June 2018 meeting.

SGAC was also present at UN/IAF workshops, where several Regional Coordinators and National Points of Contact received the opportunity to attend on the topic of Space Technology for Socio-Economic Benefits: 'Integrated Space Technologies and Applications for a Better Society'.

9- Development of a PR and Communication branding strategy desired outcome: SGAC will work closely with the PR and Communications Team to develop a yearlong communication campaign strategy in order to provide better outreach outside of our current membership base.

The PR and Communications Team membership was strengthened and stabilised this year, where talented SGAC members continually provided their expertise on approaching an outreach strategy in the current digital society. With the support of an SGAC alumni, the team furthered their knowledge in social media and the necessary tools for successful outreach. As a result, our social media presence on Facebook and Twitter has increased significantly with posts on an almost daily basis. The information not only focuses on the Executive Office, but also the SGAC member success stories and resharing partner activities. While the communications strategy continues to evolve and be perfected for internal and external audiences, the outreach has significantly increased the membership base, including an increase in applications for each volunteer positions, as well as SGAC events. #humansofsgac stories and SGAC videos have proven to be a successful form of outreach and there are plans to continue developing a digital collection of SGAC member success stories. SGAC has also improved the use of the news section of the website by reducing the number of news items posted while increasing the quality and information within the content.

10- Development of SGAC guidelines desired outcome: an internal guidelines document to be shared within the Executive Council will be created to clarify policies and good governance measures. This includes developing or updating each SGAC position's roles and responsibilities to ensure potential and current position holding members are clear of their tasks, as well as consider improved incentives for certain less recognised roles.

SGAC has worked closely with the knowledge of the Operations Manager to develop handbooks for most positions in the organisation. Written knowledge transfer was limited in the past, and with handbooks and increased on-boarding procedures with the Executive Secretaries have helped offer guidance to new members. As part of the annual General Assembly, the organisation has continued to review SGAC bylaws and statutes, where good governance procedures are being implemented, including clarification on conflicts of interest policies in Executive roles to ensure further transparency in the future. Additional clarification on scholarship selection procedures have been developed and shared with the Executive Council to ensure the increasing number of scholarship applicants and any spending on SGAC members have been fairly justified and according to transparent procedures.

In Support of the United Nations Programme
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