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English only

**Committee on the Peaceful Uses
of Outer Space**

Vienna, 7-16 June 2017

**UNISPACE+50 Thematic Priority 1: Global partnership in
space exploration and innovation**

Note by the Secretariat

1. The present document was prepared by the Secretariat to provide an update on work undertaken in connection with UNISPACE+50 thematic priority 1: global partnership in space exploration and innovation. In accordance with the mechanism agreed by the Committee on the Peaceful Uses of Outer Space under UNISPACE+50 thematic priority 1 (A/71/20, para. 296), an Action Team on Exploration and Innovation has been established and has begun its work. Annex I contains the final terms of reference, as agreed by the Action Team members. Annex II contains a draft document showing an outline/skeleton for a report on thematic priority 1. This document is currently under consideration by the Action Team and will be developed further in accordance with the Action Team terms of reference.



Annex I

Action Team on Exploration and Innovation: Final Terms of Reference

Mandate

At its fifty-ninth session in June 2016, the Committee on the Peaceful Uses of Outer Space endorsed the seven thematic priorities of UNISPACE+50, their objectives and mechanisms.

Thematic Priority 1, Global partnership in space exploration and innovation, aims to raise awareness of space exploration and innovation as essential drivers for opening up new domains in space science and technology, trigger new partnerships, and promote cooperation which allows space exploration activities to become open and inclusive on the global scale (A/71/20, para. 296).

At its fifty-ninth session the Committee also endorsed the creation of an Action Team on Exploration and Innovation, to be led by States members of the Committee on a voluntary basis, with the Office for Outer Space Affairs to provide substantive and secretariat support. This Action Team will develop a plan of activities to be approved at UNISPACE+50 and identify a mechanism for coordinating global space exploration efforts (A/71/20, para. 296).

The activities of the Action Team should not prejudice the consideration of relevant issues under the agenda item of the Legal Subcommittee entitled “General exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources”.

Background

Space exploration represents the ultimate challenge in the quest to explore new frontiers and expanding the understanding of humanity’s place in our Universe. Space exploration and the innovation it entails are essential drivers for opening up new domains in space science and technology, triggering new partnerships, and developing capabilities that create new opportunities for addressing global challenges. Space exploration also inspires the collective imagination and motivates young people to pursue careers in science, technology, engineering and mathematics.

The contribution of space technology to sustainable development in particular, a goal of primary importance to the United Nations, cannot be overstated. Innovation and knowledge derived from space exploration furthermore contribute directly to economic growth, delivering high returns on investment and generating new opportunities for job creation, as well as underpin societal well-being. Though the precise nature of future benefits from space exploration is not easily pre-defined, current trends suggest that significant advantage may be found for areas such as new materials, health and medicine, transportation and computer technology. As the benefits of space exploration and innovation become better known, increasingly more countries and non-governmental entities are interested in engaging in exploration and innovation.

Many of the exploration and spaceflight achievements of the past half-century would not have been possible without international cooperation. Entities such as the International Astronautical Federation (IAF), the Committee on Space Research (COSPAR), the International Academy of Astronautics (IAA), the International Institute of Space Law (IISL), the International Law Association (ILA), and the American Institute of Aeronautics and Astronautics (AIAA), as well as international fora such as the International Mars Exploration Working Group (IMEWG), the International Lunar Exploration Working Group (ILEWG), the International Space

Exploration Coordination Group (ISECG), the International Space Exploration Forum (ISEF), and Global Exploration Conferences are facilitating collaboration among interested parties.

The Committee on the Peaceful Uses of Outer Space and the Office for Outer Space Affairs represent a unique international forum for international decision-making, guidance, coordination, information dissemination and sharing, studying legal problems arising from the exploration of outer space and for opening up collaboration on a global scale. The Committee has a broad membership as well as an impressive number of space-related intergovernmental and non-governmental organizations actively supporting its work. ISEF participants, for instance, acknowledged, in a declaration approved in January 2014, that the Committee is an important venue in which spacefaring and non-spacefaring nations alike can continue to discuss important issues regarding explaining humanity's horizons in space and furthering the objectives of the 1967 Outer Space Treaty.

The Committee is a natural platform for identifying a coordination mechanism to ensure that all States, both developed and developing, involving the private sector, civil society and young generations, can participate in and benefit from space exploration and innovation.

Building on past successes, the Committee decided to use the fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space as an opportunity to consider the current status, and chart the future of the contribution, of the Committee to global governance of space activities. The UNISPACE+50 Steering Committee considered the organizational and substantive preparations for the anniversary at its fifty-ninth session in June 2016, and the Committee endorsed seven thematic priorities, including Thematic Priority 1, which focuses on space exploration and innovation. The UNISPACE+50 road-map is aimed at defining concrete deliverables of Space for the development of societies under the four pillars:

- Space Economy: Space for the development of the economy;
- Space Society: Evolution of society and societal benefits stemming from space-related activities;
- Space Accessibility: Strengthening of national space infrastructures and capacity-building;
- Space Diplomacy: Building partnerships and strengthening international cooperation in space activities.

At the first High Level Forum: Space as a driver for socio-economic sustainable development, participants discussed several related themes. The need for broadening access to space was recognized, including in the context of achieving the Sustainable Development Goals. The increase in commercial and private activities in space was also noted, particularly in connection with increasing demands for regulatory certainty. Most relevantly, participants of first the High Level Forum asserted that exploration is a long-term driver for innovation, strengthening international cooperation on an all-inclusive basis among nations and that this area could benefit from the establishment of an exploration and innovation coordination mechanism at the global level.

The Office, which services the Committee, has proven experience in implementing frameworks for cooperation. The Office, for instance, acts as the executive secretariat of the International Committee on Global Navigation Satellite System (ICG), which was established by an Action Team coming out of UNISPACE III, and also recently became the permanent secretariat for the Space Mission Planning Advisory Group (SMPAG).

Additionally, the Office has broad involvement in technical activities linked to exploration and innovation. The following activities not only provide examples of this work, but also demonstrate the interlinkages between global partnerships in

space exploration and innovation; UNISPACE+50 Thematic Priority 7, Capacity-building for the twenty-first century (likely including the Open Universe initiative); and the need for broadening access to space:

- A dedicated collaboration exists between the Office and the Japanese Aerospace Exploration Agency (JAXA), whereby developing countries have an opportunity to access space, deploying cube satellites from the International Space Station (ISS) Kibo experimental module.
- The Office has signed a cooperation agreement with the China Manned Space Agency (CMSA) to provide opportunities for developing countries to utilise China's forthcoming manned space station.
- The Office and the Sierra Nevada Corporation have signed a memorandum of understanding, making official plans to work together to provide affordable opportunities for Member States, particularly non-spacefaring nations, to conduct experiments in space.
- The Drop Tower Experiment Series is a fellowship programme of the Office, through which students can learn and study microgravity science. In collaboration with the Centre of Applied Space Technology and Microgravity (ZARM) and the German Aerospace Centre (DLR), the fellowship programme offers a selected research team the opportunity to conduct its own microgravity experiments at the Bremen Drop Tower.
- The Office is in the process of signing a letter of intent with the Life, Physical Sciences and Life Support Laboratory (LPS) of the European Space Agency (ESA). Collaboration is envisaged which will provide opportunities for teams from developing countries to undertake a series of experiments on the Large Diameter Centrifuge of ESA's Life Support Laboratory.

Activities in low Earth orbit will continue to be important in the quest for exploration, and the Office has also been developing experience in this field.

The Director of the Office participated in the 1st Ministerial Level International Forum on "Space Science and Academics for Global Challenges" in Trento, Italy in 2016, where the importance of space exploration was again emphasized. A 2nd meeting is being organized and will be held in Kenya in 2017.

Best practices and lessons learned from these experiences in international cooperation may inform the work of the Action Team on Exploration and Innovation.

Establishment of the Action Team

In July 2016 a note verbale was dispatched by the Office asking States members of the Committee for nominations for participation in the new Action Team. States nominated participants for the Action Team, with three States indicating their interest in acting as Co-Chairs. A follow up information circular was sent to States in October 2016.

In December 2016 a communication was sent to Permanent Observer Organizations of the Committee on the Peaceful Uses of Outer Space and relevant United Nations entities inviting them to also become members of the Action Team.

Action Team on Exploration and Innovation	
Membership in the Action Team (as communicated to the Office of Outer Space Affairs)	<p>Austria, Canada, China, France, Germany, India, Italy, Japan, Jordan, Luxembourg, Pakistan, Poland, Qatar, Romania, Russian Federation, Saudi Arabia, South Africa, Switzerland, Tunisia, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, COSPAR, European Space Agency, Inter-Islamic Network on Space Sciences & Technology, International Law Association, National Space Society, and the United Nations Environment Program are members of the Action Team.</p> <p>Note: Membership remains open to all States members of the Committee and Permanent Observers of the Committee. The Action Team will also consider how to include the views of non-Action Team entities with relevant expertise.</p>
Member States leading the Action Team	China, Jordan and the United States will act as Co-Chairs
Thematic Priority 1 Objective (A/71/20, para. 296)	<p>Objective: Raise awareness of space exploration and innovation as essential drivers for opening up new domains in space science and technology, triggering new partnerships and developing capabilities that create new opportunities for addressing global challenges. Foster dialogue with the space industry and the private sector. Promote cooperation between spacefaring nations and emerging space nations. Allow space exploration activities to become open and inclusive on a global scale. Identify governance and cooperation mechanisms to support this objective.</p> <p>Mechanism: A new action team to be established to develop a plan of activities to be approved at UNISPACE+50 in 2018 and to identify a mechanism for coordinating global space exploration efforts. Action team, to be led by States members of the Committee on a voluntary basis, with the Office for Outer Space Affairs to provide substantive and secretariat support. The Office can build on successful experiences dealing with international mechanisms, for example in acting as the executive secretariat of ICG, which was established by an action team originating from UNISPACE III.</p>
Main Goals	<p>Space exploration, in the context of this Action Team, involves humans and robots venturing beyond the Earth. It is the ongoing discovery of outer space by the means of continually growing and evolving space technology. Space exploration represents the ultimate challenge in the quest to explore new frontiers and expand the collective sense of humanity's place in the universe.</p> <p>In this context, innovation involves developing new knowledge, capabilities and infrastructures required for space exploration activities. Such innovation has substantial benefits to humanity and provides contributions to economic growth and societal well-being.</p> <p>The goal of the Action Team is to provide recommendations towards UNISPACE+50 that:</p> <ul style="list-style-type: none"> • Raise awareness of and further advance space exploration and innovation, as essential drivers for opening up new domains in space science and technology; • Advance proposals aimed at triggering new partnerships and models of partnership; • Advance proposals facilitating a shared vision for space exploration that is synergistic with that of existing international space exploration fora;

	<ul style="list-style-type: none"> • Contribute to developing a dialogue between governmental and non-governmental entities engaged in space exploration; • Promote cooperation, which allows space exploration activities to become open and inclusive on the global scale; • Promote capacity-building, in connection with space exploration and innovation, in particular for developing countries, and emerging space faring nations; and • Promote the engagement of youth in science, technology, engineering and mathematics within the context of space exploration and innovation, while recognizing that the benefits of such engagement extend far beyond the topic of space exploration and innovation.
<p>Space Exploration and Innovation Fields of Study Linked to Thematic Pillars</p>	<p><u>SPACE ACTIVITIES FOR PEACEFUL PURPOSES:</u> (Linked to the thematic pillars Space Diplomacy and Space Society) Rely on the potential of the Committee on the Peaceful Uses of Outer Space as a major multilateral forum for addressing outer space activities for the benefit of all humanity. Emphasis on space exploration and innovation for peaceful purposes and inclusiveness on a global scale.</p> <p><u>GLOBAL COLLABORATION:</u> (Linked to the thematic pillars Space Diplomacy, Space Economy and Space Society) Explore new international partnerships, leveraging current collaborations and building new cooperative models for exploration as such partnerships may relate to Sustainable Development Goal 17 and global governance of outer space activities.</p> <p><u>ARCHITECTURE OPENNESS AND RESILIENCE:</u> (Linked to the thematic pillars Space Accessibility and Space Society) Consider resilient architecture featuring multi-use (multi-functional), evolvable space infrastructure, minimizing the need for unique developments.</p> <p><u>INNOVATION FOCUS:</u> (Linked to the thematic pillars Space Economy and Space Society) Seek new and creative initiatives and new partnerships and new business models that could serve them. Increase involvement of youth in science, technology, engineering and mathematics. Focus sustained investment on technologies and capabilities to address challenges of future missions. Push the boundaries of research and technological development.</p> <p><u>SCIENTIFIC EXPLORATION:</u> (Linked to the thematic pillars Space Economy, Space Diplomacy and Space Society) Exploration enables science and science enables exploration; fundamental science goals in space science; leveraging the combined robotic and human potentials for exploration of the solar system; linkages to socio-economic development and capacity-building. Aims include:</p> <p>(a) Increasing deep space exploration activities to extend knowledge on the origins and evolution of life and the solar system,</p>

	<p>(b) Deepening the understanding of space and Earth sciences, and</p> <p>(c) Advancing fundamental research goals in space science.</p> <p><u>SAFE ACCESS TO SPACE:</u></p> <p>(Linked to the thematic pillars Space Accessibility, Space Society, and Space Economy)</p> <p>Consider expansion of human and robotic activity in the solar system, making use of ongoing developments in space technology and applications. Opportunities for commercial business to further enhance the space economy. Opportunities for developing countries to engage in space activities in a sustainable space economy.</p> <p><u>CAPACITY BUILDING:</u></p> <p>(Linked to the thematic pillars Space Accessibility and Space Society)</p> <p>Explore near-term opportunities of integrated human and robotic deep space exploration missions providing for an incremental build-up of capabilities for more complex missions over time. Inclusion of developing countries with emerging space capabilities.</p> <p><u>OPEN ACCESS TO SPACE DATA AND SIMULATIONS</u></p> <p>(Linked to the thematic pillar Space Accessibility)</p> <p>Analyse new tools and mechanisms that could help in making available existing open planetary data and data systems to be used for exploration, and for training and research purposes. Consider the application of remote sensing techniques to merge and visualize data as well as opening access to terrestrial field analogue simulations and experimentation.</p>
Methods of work	<p>The Action Team will work on the basis of consensus using face-to-face meetings, email, and video conferencing technology to meet its goals. It will meet on the margins of the Scientific and Technical Subcommittee and the Committee and take advantage of other opportunities, including engaging with non-governmental entities, to advance its work during intersessional periods.</p>
Product to be delivered	<p>The Action Team will produce a report to the Committee, intended to:</p> <ul style="list-style-type: none"> • Identify elements of a global vision for exploration and innovation that is synergistic with that of existing international space exploration fora and efforts. • Develop proposals on a set of actions for States to raise awareness and promote the benefits of space exploration and innovation for sustainable development. • Identify mechanisms to enhance space exploration and innovation initiatives worldwide to include emerging space nations and non-governmental entities. • Make appropriate recommendations to member States of the Committee for further consideration. <p><i>Note:</i> The report on Thematic Priority 1 will need to fall within the United Nations official document word limit: 8,500 words. A version of the report will need to be ready for the fifty-fifth session of the Scientific and Technical Subcommittee (STSC) in 2018, so any updates or revisions can be discussed by the Action Team at that time and a final version made available in all official languages of the United Nations for UNISPACE+50 in June 2018. The cut off for submission of the final report text for UNISPACE+50 will be <u>15 March 2018</u>.</p>

<p>Work plan¹</p>	<p><u>30 January-10 February 2017</u>: The first in-person meetings of the Action Team took place on the margins of the fifty-fourth session of the STSC.</p> <p>Target: Discuss the Action Team’s Terms of Reference (TOR).</p> <p><u>March 2017</u>: Finalization and adoption of the TOR through email communication.</p> <p><u>27 March-7 April 2017</u>: Informal information meeting(s) to take place on the margins of the Legal Subcommittee, if/as possible.</p> <p><u>24-28 April 2017</u>: Possibility of a presentation on the Action Team at the Vienna European Geoscience Union at the session “Science and exploration towards Moon Village”.</p> <p><u>By the end of May 2017</u>: Co-Chairs to present, via email, a general vision for a report framework.</p> <p><u>6 June 2017</u>: An event to take place in coordination with the Global Space Exploration Conference (GLEX) in Beijing. Videoconference technology to be used, as the Co-Chairs of the Action Team and the Director of the Office will be in Vienna for the sixtieth session of the Committee.</p> <p>Topic: Action Team Chairs to raise awareness on and present the status of UNISPACE+50 preparations, including on Thematic Priority 1. Discuss the Action Team’s goal areas, which will feed into the draft report.</p> <p><u>7-16 June 2017</u>: The Action Team will meet extensively on the margins of the sixtieth session of the Committee.</p> <p>Target: Form a report framework. Compile ideas for and decide the lead drafters of each section of the report, consistent with the report skeleton discussed at the STSC.</p> <p><u>14-15 September 2017</u>: An event that is open to, and may involve, Action Team members to be organized in collaboration with the AIAA Space Forum in Orlando, United States. Logistics and costs are being explored.</p> <p>Topic: Exchange of ideas on the draft report.</p> <p><u>18-28 September 2017</u>: Action Team members may choose to participate, as feasible, in the European Planetary Science Congress (EPSC) 2017 in Riga, Latvia.</p> <p>Topic: Raise awareness of the work of the Action Team.</p> <p><u>25-29 September 2017</u>: An event to possibly be organized at the International Astronautical Congress (IAC) in Adelaide, Australia that may be of interest to Action Team members. Logistics and costs to be explored further. (Note: ASI will organize a Global Networking Forum at the IAC dedicated to the future of exploration. Further details will be made available to the Action Team when they become available.)</p> <p>Topic: Further exchange of ideas on the draft report.</p>
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¹ Given their sometimes overlapping nature, not all Action Team members will be able to attend all events or meetings. However, the participation of at least some members in a larger number of events will allow the Action Team to reach, and raise awareness with, the largest audience possible.

October 2017: Co-Chairs to present, through email, to members of the Action Team proposals of how best to accommodate new ideas in the draft report, and to receive feedback.

5 or 10 November 2017: A meeting of the Co-Chairs and interested Action Team members to possibly take place the day before or the day after the second High Level Forum in Dubai, United Arab Emirates.

Target: Form a draft report, to be immediately circulated, via email, among members of the Action Team for early feedback.

Note: The draft report will need to be agreed, via email, and ready to be submitted for United Nations document processing by no later than the end of November 2017.

29 January-9 February 2018: Last substantive meetings of the Action Team to take place on the margins of the fifty-fifth session of the STSC.

Target: The Action Team will review and agree on the report.

3 March 2018: Contents of the report by the Action Team will be introduced at ISEF2 in Tokyo to ensure awareness at the Ministerial level.

Target: Directly following ISEF2, the Action Team will take stock of ISEF2 products and agree on their possible incorporation into the Action Team report.

Note: The Action Team will need to reach consensus on the final version of the report by no later than the middle of March 2018. The report text should therefore be almost entirely agreed to at the fifty-fifth session of the STSC, with the only further amendments to be considered involving the outcome of ISEF2.

15 May 2018: A pre-UNISPACE+50 version of the report to be made available in all official languages of the United Nations for linguistic verification and review at the national level.

Note: The report needs to be final prior to UNISPACE+50, as no further modification should take place during UNISPACE+50.

June 2018: Action Team report to be ready for UNISPACE+50.

Later half of 2018: An event on exploration likely to be held in Jordan. The event will be informed by the outcomes of UNISPACE+50.

Annex II

Report on Thematic Priority 1: Global partnership in space exploration and innovation (Draft Document)²

Note by the Secretariat

The present report stems from the work of the Action Team on Exploration and Innovation, established as the mechanism of UNISPACE+50 thematic priority 1 (A/71/20, para 296). The report's content was developed and discussed at in-person meetings of the Action Team, as well as through electronic channels.

I. Background

A. The human quest to explore

1. Human desire to know what is beyond Earth dates back to antiquity. The myths and legends from the ancient Chinese, such as Kuafu Chasing the sun, the Goddess Chang'e flying to the moon, show that exploring the vast cosmos is a common dream of whole human beings since ancient times. Only in modern history, however, has space exploration become a reality.
2. Space exploration represents the ultimate challenge in the quest to explore new frontiers and expand the collective sense of humanity's place in the universe.
3. Major milestones in the early years of space exploration include the 1957 Soviet launch of Sputnik 1, the first artificial satellite, into space. Four years later, in 1961, Yuri Gagarin became the first human to orbit Earth. During the 1960s unmanned spacecraft photographed and probed the moon and in 1969, Neil Armstrong was the first human to walk on the moon.
4. There is now once again a renewed interest in space exploration. This is exemplified by a number of exciting initiatives. For instance, the New Horizon explorer launched by National Aerospace Space Administration (NASA) flew by Pluto. The European Space Agency (ESA)'s Rosetta spacecraft updated human knowledge of comets. China's Chang'e series explorers left new marks on the moon. India's Mangalyaan space probe went into Mars orbit on behalf of Asia. Japan's Hayabassa 2 is on the way to another asteroid. United Arab Emirates are developing their own spacecraft to explore Mars now.
5. Exploration destinations may be different according to States' preferences, but the science needed to undertake the missions is the same.
6. Space exploration inspires the collective imagination. It motivates young people to pursue careers in science, technology, engineering and mathematics.
7. [...]

B. Scientific exploration

8. Space exploration, in the context of UNISPACE+50 thematic priority 1, is seen as involving humans and robots venturing beyond the Earth. It is the ongoing discovery of outer space by the means of continually growing and evolving space technology.

² The indicative text reflects elements and initial broad ideas that could be developed under each section. The Action Team will need to further develop the final report structure, as well as the relevant content.

9. There is a common understanding that exploration enables science and science enables exploration. What is more, both science and exploration enable technological innovation, and support economic development and human welfare.
10. There is a rich potential for space exploration to deliver benefits to people on Earth. The development of scientific knowledge, including its spin offs, have already contributed to the areas of health, medicine, public safety, computer technology and transportation.
11. Activities in low Earth orbit will continue to be important in scientific space exploration, deepening the understanding of space and Earth sciences.
12. Space exploration is unique in that while not all missions may not reach their final destinations, the scientific and technological evolution which took place as part of the process, has a strong acknowledged benefit of its own.
13. [...]

C. The role of innovation

14. Innovation involves developing new knowledge, capabilities, and infrastructures required for space exploration activities. There is an emphasis on pushing the boundaries of research and technological development.
15. Sustained investment in innovative technologies and capabilities is needed to address challenges of future missions.
16. It may be instructive for the international community to focus its innovation efforts on things it can do from space that it can't otherwise do.
17. Innovation and knowledge derived from space exploration contribute directly to economic growth, delivering high returns on investment and generating new opportunities for job creation.
18. Competition-driven innovation at the industrial and scientific levels is important for the evolution of space exploration.
19. [...]

D. Partnership

20. After the first decades of exploration, focus shifted from competition to cooperation, as exemplified by the International Space Station (ISS). The ISS partners include Canada, Japan, the Russian Federation, the United States, and eleven Member States of the European Space Agency and the first component was launched into orbit in 1998. While 2018 marks an anniversary for the ISS, moving forward new open and inclusive partnership models are the focus, which will benefit from lessons learned from the ISS project.
21. The Committee on the Peaceful Uses of Outer Space and the Office for Outer Space Affairs represent unique international fora for international decision-making, guidance, coordination, information dissemination and sharing, studying legal problems arising from the exploration of outer space and for opening up collaboration on a truly global scale. The Committee has a broad and growing membership as well as an impressive number of space-related intergovernmental and non-governmental organizations actively supporting its work. The international community should harness the potential of the Committee on the Peaceful Uses of Outer Space as the prime multilateral forum for addressing outer space activities for the benefit of all humanity as it explores ways to collaborate on space exploration and innovation.
22. The Committee on the Peaceful Uses of Outer Space and its Subcommittees have addressed space exploration and innovation in the past. For instance, States

members of the Committee frequently disseminate information and updates on related national and collaborative initiatives through the general exchange of views, as well as reports submitted under national activities. The topic has also been considered through specific agenda items, including the agenda item “International cooperation in human spaceflight”, considered by the Scientific and Technical Subcommittee in 2000 and the agenda item “Matters relating to life sciences, including space medicine; progress in national and international space activities related to the Earth environment, in particular progress in the geosphere-biosphere (global change) programme; matters relating to planetary exploration; and matters relating to astronomy”, considered by the same Subcommittee over multiple years prior to UNISPACEIII.

23. A high-level panel on space exploration was held during the fiftieth session of the Committee in 2007. The panel discussed the revitalization of robotic and human space exploration initiatives and the multitude of motivations behind these efforts. It also provided a forum to: (a) highlight the new era of space exploration activities, including short and concise descriptions of ongoing and planned programmes and projects; (b) reflect on the driving factors behind this new phase of space exploration, including reasons founded in national motivations, international politics, the aspiration for scientific excellence and technological leadership, and the expectation of certain economic benefits; and (c) consider challenges and opportunities for international cooperation, including the participation of non-space faring countries and in particular developing countries. This may include reflections on what, if any, relevance space exploration activities have for these countries and how they could benefit, be it through the participation of their scientists or through the involvement of the younger generation, addressing issues of education and capacity-building, as well as how they could actively contribute to space exploration initiatives.

24. A symposium organized by the Office for Outer Space Affairs on the topic “The role of industry in space exploration” was held on 15 February 2016, during the fifty-third session of the Scientific and Technical Subcommittee, to strengthen partnerships with industry (A/AC.105/1109, paras. 37-39).

25. In preparation for UNISPACE+50, a series of high level fora are being organized by the Office for Outer Space Affairs to address the cross-sectorial impact of integrating economic, environmental, social, regulatory and policy dimensions of space in pursuance of global sustainable development (see further information in section III). These fora have identified four key pillars to address the broader perspective of space activities: space economy, space diplomacy, space society and space accessibility. The “Space Accessibility” pillar refers to all user communities and decision-makers being able, on an equal basis, to benefit from and use space technologies and space-based data. During the first High Level Forum, held in Dubai in November 2016, it was recognized the need for broadening access to space.

26. The Human Space Technology Initiative (HSTI) was launched in 2010 within the framework of the Programme on Space Application, and aims at involving more countries in activities related to human spaceflight and space exploration and at increasing the benefits from the outcome of such activities through international cooperation, in order to make space exploration a truly international effort.

27. The Office for Outer Space Affairs is currently developing an Access to Space Strategy under its Human Space Technology Initiative.

28. [...]

II. Raise awareness of space exploration and innovation as essential drivers for opening up new domains in space science and technology, triggering new partnerships and developing capabilities that create new opportunities for addressing global challenges

A. Global Vision

29. The international community has a global vision with regards to space exploration: to explore outer space and enhance understanding of the Earth and the cosmos and to utilize outer space for peaceful purposes, promoting human civilization and social progress for the benefit of all humankind.

30. The vision also involves implementing peaceful robotic and human space exploration to explore the solar system and beyond, discovering outer space, exploring new frontiers and expanding the collective sense of humanity's place in the universe.

31. Space activities help to define nations and their place in the world. Countries that explore space are envied as frontier nations with leading technologies. The number of countries involved in space exploration is growing steadily and we are entering a new era of historic significance, in which human presence will be extended beyond Earth's orbit, both physically and culturally.

32. [...]

B. Awareness raising

33. The general public may not understand the benefits of a sustained space exploration endeavour. The international community therefore needs to focus not only on delivering value to the public, but also on educating the public on that value.

34. At its fifty-ninth session in June 2016, the Committee agree on a first set Guidelines for the long-term sustainability of outer space activities (A/71/20, Annex). In this context, particularly as space exploration is a long-term endeavour, Guideline 26: Raise awareness of space activities may be instructive.

35. Connected to the above is the need to promote and increase access to science, technology, engineering and mathematics education and careers. It is recognized that these disciplines support space activities, which then promote and provide practical support for sustainable development, in line with the 2030 Agenda for Sustainable Development and including the 17 Sustainable Development Goals.

36. [...]

C. New domains in space science and technology

37. There is a rich potential for exploration, with manifold target destinations.

38. There is a focus on: increasing deep space exploration activities to extend our knowledge on the origins and evolution of life and the solar system; deepening the understanding of space and Earth sciences; and advancing fundamental research goals in space science.

39. Developing knowledge, capabilities and infrastructure required for humans to live and work beyond low-Earth orbit requires the development and testing of advanced technologies, reliable systems and efficient operation concepts. This emphasizes extending the human presence beyond low-Earth orbit, increasing the

number of individuals that can be supported at destinations, the duration of time they can remain there, and their level of self-sufficiency while there.

40. There is also the objective of reducing the risks and increasing the productivity of future missions, for instance by looking at the effect of the space environment on human health and exploration systems.

41. The Earth's safety is enhanced by the collaborative pursuit of planetary defence and orbital debris management.

42. A common goal is to search for life present outside of Earth and understand the environments that support or supported it.

43. Developing synergies between human and robotic missions maximizes the unique contributions made by each and their collaborative contribution to common goals. Robotic missions will provide new discoveries and serve as precursors to human exploration, and will make subsequent human missions safer and more productive.

44. [...]

D. New partnerships and capabilities

45. There are multiple kinds of new partnerships to consider: partnerships between spacefaring nations and emerging space nations, as well as space nations and non-space nations; partnerships between space agencies, industries and the private sectors; and partnerships between governmental and non-governmental entities.

46. Space activities can and do promote and support sustainable development. In line with Sustainable Development Goal 17, Revitalize the Global Partnership for Sustainable Development, the benefits of partnerships between governments, the private sector and civil society are recognized. Inclusive multi-stakeholder partnerships, built upon principles and values, a shared vision, and shared goals provide unique and creative opportunities for the international community to move forward towards a better future for all.

47. No single space agency can invest robustly in all the needed technology areas that represent key challenges for space exploration missions. By developing partnerships with entities with common goals, entities with an interest in space exploration should be able to coordinate their investments and work together in ways that maximize returns on investments and enable the earlier realization of common goals and objectives. This is a fundamental premise of a Global Exploration Roadmap, such as the one championed by ISECG.

48. [...]

III. Foster dialogue with space industry and private sector

49. Technological developments by non-governmental entities, including private companies, will have direct relevance to governments that will want to focus on in-space exploration.

50. Globally the private sector is playing a growing role in space activities. [Include statistics.] Currently, in a majority of countries, space programmes are contracted out to national industry. Private industry is also increasingly making its own commercial case for space activities.

51. The series of high level fora, High Level Fora: Space as a Driver for Socio-Economic Sustainable Development, are being held in the lead-up to UNISPACE+50 and are intended to facilitate constructive dialogue between policymakers and key stakeholders from different parts of the government, civil society, business and industry to address broader perspectives of space economy,

space society, space accessibility and space diplomacy. This innovative venue allows the space industry as a whole, including the private sector, to come together outside the usual intergovernmental bodies.

52. The Dubai Declaration was adopted at the first High Level Forum: Space as a Driver for Socio-economic Sustainable Development in Dubai, United Arab Emirates, on 24 November 2016. In the Dubai Declaration participants of the High Level Forum agreed that the Forum serves as a driver for exchange to promote dialogue between governments, international organizations, industry, the private sector, academia and civil society, to connect the four pillars, UNISPACE+50 and Space2030, and to facilitate partnerships with the Office for Outer Space Affairs. They also observed the need for more coordination efforts among non-governmental organizations and the private sector to facilitate dialogue with more user communities and other entities, and increased synergies in their interaction with the Office for Outer Space Affairs and with the Committee on the Peaceful Uses of Outer Space, as appropriate.

53. [...]

IV. Promote cooperation between spacefaring nations and emerging space nations

A. Global governance of outer space activities

54. The United Nations treaties and principles are the cornerstone of the global governance of outer space activities.

55. The Outer Space Treaty provides the basic framework of international space law, including the following four fundamental principles: the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind; outer space shall be free for exploration and use by all States; outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means; the Moon and other celestial bodies shall be used exclusively for peaceful purposes.

56. In line with United Nations Sustainable Development Goal 17, it is important to enhance North-South and South-South cooperation on space exploration and innovation. There are different kinds of established mechanism on North-South and South-South cooperation, bilateral or multi-lateral, regional level or global level, which have provided experience in promoting cooperation between spacefaring nations and emerging space nations. Coordination among existing mechanisms at the United Nations level would be an indispensable requirement for sustainable development of the activities in space exploration and innovation.

57. [...]

B. Global collaboration

58. Many of the exploration and spaceflight achievements of the past half-century would not have been possible without international cooperation. Entities such as the International Astronautical Federation (IAF), the Committee on Space Research (COSPAR), the International Academy of Astronautics (IAA), the International Institute of Space Law (IISL), the International Law Association (ILA), and the American Institute of Aeronautics and Astronautics (AIAA), as well as informal international fora such as the International Mars Exploration Working Group (IMEWG), the International Lunar Exploration Working Group (ILEWG), the International Space Exploration Coordination Group (ISECG), the International Space Exploration Forum (ISEF), and Global Exploration Conferences have had success facilitating collaboration among interested parties.

59. There is a need to be aware of, and build synergies with, existing entities when proposing and developing new collaboration models.

60. There is value in a step-wise approach to exploration, enabling nations to demonstrate advanced space exploration capabilities through cooperative international missions. Such approaches allow States to meet national priorities while also achieving shared long-term goals.

61. There is a need for common principles for collaboration on future exploration. These may draw on past experiences of international projects.

62. There is a need to make sure no one is left behind when humans become a multi-planetary species.

63. [...]

V. Allow space exploration activities to become open and inclusive on a global scale

A. Safe access to space

64. The international community shall consider expansion of human and robotic activity in the solar system, making use of ongoing development in space technology and applications. Opportunities exist for commercial business to further enhance the space economy. Opportunities also exist for developing countries to engage in space activities in a sustainable space economy.

65. [...]

B. Capacity-building

66. Given the notable benefits of space exploration and innovation activities, it is desirable to fully include developing States and States with emerging space capabilities in space exploration efforts. Initially this may involve information dissemination as well as targeted capacity-building efforts.

67. Exploring near-term opportunities of integrated human and robotic deep space exploration missions may provide for an incremental build-up of capabilities for more complex missions over time.

68. The Office for Outer Space Affairs is involved in technical activities linked to capacity-building, exploration and innovation. A dedicated collaboration exists between the Office and the Japanese Aerospace Exploration Agency (JAXA), whereby developing countries have an opportunity to access space, deploying cube satellites from the International Space Station (ISS) Kibo experimental module. The Office has signed a cooperation agreement with the China Manned Space Agency (CMSA) to provide opportunities for developing countries to utilize China's forthcoming manned space station. The Office and the Sierra Nevada Corporation have signed a memorandum of understanding, making official plans to work together to provide affordable opportunities for Member States, particularly non-spacefaring nations, to conduct experiments in space. The Drop Tower Experiment Series is a fellowship programme of the Office, through which students can learn and study microgravity science. In collaboration with the Centre of Applied Space Technology and Microgravity (ZARM) and the German Aerospace Centre (DLR), the fellowship programme offers a selected research team the opportunity to conduct its own microgravity experiments at the Bremen Drop Tower. The Office is also in the process of signing a letter of intent with the Life, Physical Sciences and Life Support Laboratory (LPS) of the European Space Agency (ESA). Collaboration is envisaged which will provide opportunities for teams from developing countries to undertake a series of experiments on the Large

Diameter Centrifuge of ESA's Life Support Laboratory. These activities exemplify efforts to open up access to space.

69. [...]

C. Architecture openness and resilience

70. A focus on multi-use, evolvable space infrastructure minimizes the need for added unique developments for each mission. This assists emerging space actors, as they may have access to, work with, contribute to, and build upon existing infrastructure, without having to replicate at the national level all the in-depth, costly and time consuming background work.

71. [...]

D. Open Access to Space Data and Simulations

72. New tools and mechanisms could help promote and make more widely available existing open planetary data and data systems. These could be used for exploration itself, and for training and research purposes.

73. There are potential benefits in applying remote sensing techniques to merge and visualize data as well as in opening up access to terrestrial field analogue simulations and experimentation.

74. There is a direct link to the Open Universe Initiative ([A/70/20](#), para. 299), which aims to promote open data accessibility and transparency in astronomy and space science.

75. [...]

VI. Identify governance and cooperation mechanisms to support this objective.

76. ISEF participants acknowledged, in a declaration approved on January 2014, that the Committee on the Peaceful Uses of Outer Space "is an important venue in which spacefaring and non-spacefaring nations alike can continue to discuss important issues regarding explaining humanity's horizons in space and furthering the objectives of the 1967 Treaty on Principles and Activities of States in the Exploration and Use of Outer Space."³

77. The Committee is a natural platform for identifying a coordination mechanism to ensure that all States, both developed and developing, involving the private sector, civil society and young generations, can participate in and benefit from space exploration and innovation.

78. The Office for Outer Space Affairs, which services and provides substantive support to the Committee, has proven experience in implementing frameworks for cooperation. The Office, for instance, acts as the executive secretariat of International Committee on Global Navigation Satellite System (ICG), which was established by an Action Team coming out of UNISPACE III, and is also the permanent secretariat for the Space Mission Planning Advisory Group (SMPAG).

79. A mechanism, loosely modelled after the ICG, could be created to promote voluntary cooperation on space exploration and innovation matters of mutual interest and coordinate exploration efforts. It would strive to encourage and facilitate compatibility, interoperability and transparency and the Office for Outer Space Affairs could act as the executive secretariat.

³ The related text will be updated following ISEF2, scheduled to take place in Tokyo on 3 March 2018.

80. The Committee could consider space exploration and innovation as an agenda item, either within its Scientific and Technical Subcommittee or the Committee itself.

81. [...]

VII. Recommendations

82. The Action Team, in accordance with its Terms of Reference (CRP.[...]) has agreed on the following recommendations: (a) [...], (b) [...] etc. ...
