Engaging with Stakeholders in Preparation for UNISPACE+50

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1. Introduction

In 2015 the United Nations defined a new agenda, Agenda 2030, for achieving the "Sustainable Development Goals" by 2030. In this period, the space sector is also on the verge of a new revolution, which is linked to the increased digitalization of the industrial and services sectors, and the increasing availability of large amounts of free and open data on planet Earth. This context opens up new opportunities for overcoming the many challenges ahead, and this report underlines the importance of acting together, pulling resources and information from a variety of key actors, and integrating them in a holistic approach towards the full implementation of Agenda 2030.

This report summarizes the findings and recommendations that stem from the activities undertaken in 2016 by the European Space Policy Institute in regard to Agenda 2030, with a particular focus on the 10th Autumn Conference "Space for Sustainable Development". It also looks forward to UNISPACE+50, the United Nations conference that will take place in 2018, with the aim of giving new impulse to the mandate of the COPUOS for the years to come. In both cases the relevance of these activities depends on the engagement of the key stakeholders involved, and this report presents a non-exhaustive overview of those stakeholders that have been engaged by the European Space Policy Institute in the last year.

Clearly, the implementation of the Sustainable Development Goals worldwide is still a long way ahead, but the space sector can provide extremely valuable and unique assets for this purpose, starting now. The UNISPACE+50 process is an ideal platform for defining the new boundaries, opportunities and the challenges that this sector will face in the years to come, including the greater involvement of new space actors, non-governmental organizations and civil society.

The remainder of the report is organised as follows:

- Chapter 2 introduces the relation between Sustainable Development and Space, underlining the importance of a structured dialogue with all the relevant stakeholders, with a particular focus on the ones directly engaged in the field.
- Chapter 3 presents the UN framework for UNISPACE +50, highlighting the sustainable development goals and the corresponding role for space, the thematic priorities, the involvement of external actors, and in particular how ESPI has contributed to this process over the last couple of years.
- Chapter 4, zooms into the main ESPI contribution, namely the 10th ESPI Autumn Conference on Space for sustainable development. It highlights the key outcomes in the form of recommendations on how stakeholders can be involved in better utilising space to support sustainable development efforts.
- Chapters 5 through 9 each focus on additional contributions of ESPI, reaching out to major fora, conferences and events to discuss the role of space as an enabler of sustainable development, culminating in the participation to the United Nations/United Arab Emirates High Level Forum on Space as a Driver for Socio-Economic Sustainable Development, as part of the preparatory activities leading up to UNISPACE+50.
- Chapter 10 presents the concluding remarks.
2. The Need for Dialogue with the Field

The changing challenges, requirements, and solutions in development and humanitarian work has been an emergent theme for actors in these fields in recent years, and one which has recurred with increasing frequency. Evidence of this can be found in the titles of conferences held for development and humanitarian organisations, both governmental, non-governmental, and international.

The title of the Annual Conference of European Commission Humanitarian Aid Partners in 2015, coordinated by the Directorate for Humanitarian Aid and Civil Protection (DG-ECHO), was "Humanitarian Assistance in a Changing World". Other organisations have focused on the potential of new technologies to address evolving challenges: the Swiss Foundation for Mine Action held a stakeholder consultation on "Drones in Humanitarian Action" in March 2016.

Most of all, however, the realization that the global landscape of development is changing is encapsulated in the Sustainable Development Goals (SDGs) which were endorsed by the United Nations General Assembly in September 2015. The SDGs are intended to act as the successor to the Millennium Development Goals (MDGs). Although not legally binding, the MDGs came to be seen as a guideline for action by the UN, its Member States and non-government actors, aiming “to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty.”

The expiry of the goals with the end of 2015 necessitated an evaluation of their successes and shortcomings, as well as the creation of a Post-2015 Development Agenda, with the resultant drafting of the SDGs as part of the Post-2015 Agenda for Development (now the 2030 Agenda for Sustainable Development).

The Sustainable Development Goals address three key challenges which have emerged in the final years of the MDG framework. The first of these is that the MDGs have had a mixed record. Some goals, including those on reducing poverty and hunger, have had marked successes, with the proportion of people whose income is less than $1.25 falling from 47% to 14% in developing regions between 1990 and 2011, far beyond the target. Others, such as improving maternal health and access to contraception, have fallen short. The most important shortcoming of the goals is their failure to achieve a reduction in global emissions, as outlined under Goal 7. The effects of climate change have become significantly more pronounced in the intervening years, and pose an acute societal and economic challenge. Another point of criticism is that the MDGs, targeting developing countries, have produced uneven effects, with rural populations, women, and Sub-Saharan Africa witnessing fewer improvements that elsewhere.

The second challenge is the changing landscape of development and humanitarian aid. The World Economic Forum publishes an annual outlook on key trends for the coming year, and has identified growing global inequality, rising pollution and increasing global insecurity as some of the main issues facing the world today. These same issues affect not only how organisations conduct their development and humanitarian work, but the strategic priorities of projects and their efficacy. Cases in point are the continuing unrest in the Middle East and the ensuing global refugee crisis of unprecedented scale, increasing poverty in developed states, and a rise in extreme weather events linked to climate change.

The final point is that the Millennium Development Goals failed to adequately acknowledge the interrelated nature of societies, economies, and the environment, as well as the continuity between humanitarian and development aid. Once again, climate change is a pertinent illustration: reducing extreme weather and natural disasters exacerbated by climate change may be a long-term development goal with significant societal and economic effects, but the immediate impact is felt most strongly in humanitarian relief operations, as illustrated

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2 Ibid. 20.
3 Ibid. 38-42.
by Cyclone Pam, which hit the Pacific island state of Vanuatu in 2015.

The effort to adopt integrated and circumspect solutions to development and humanitarian challenges has been a cornerstone of the Post-2015 Development Agenda. During the Third United Nations Conference on Sustainable Development in Rio de Janeiro, 2012, one of the key summits leading to the creation of the SDGs, participants called for a post-2015 agenda that included goals based on the principle of sustainable development, which "meets the needs of the present without compromising the ability of future generations to meet their own needs", respects the planet’s limits and considers the interrelated nature of the economies, societies, and the environment.\(^4\)

The focus on sustainability is a central component of the SDGs, and addresses the three challenges outlined above. For one, the goals set ‘zero-targets’ which do not focus on reduction of poverty of infant mortality, but rather on elimination. The scope of the SDGs is broader, comprising 17 goals instead of 8, and their reach is not limited to the developing world, but rather is defined in global terms. Secondly, emergent problematic areas such as governance and the environment are given greater emphasis within the goals. Lastly, more development-related fields are integrated into the Agenda.\(^5\) In parallel to the negotiations on the Post-2015 Agenda, high-level summits were held in the fields of climate change and disaster risk reduction. The UN World Conference on Disaster Risk Reduction and the 21st Conference of Parties on Climate Change produced new framework agreements on their respective subjects which have been referenced in the SDGs.\(^6\) The Agenda calls for a two-way interaction between these frameworks and the SDGs by noting that the frameworks are the primary fora for negotiations on climate change and disaster management, but that the SDGs provide guidelines for sustainable implementation.\(^7\)

Overall, the Sustainable Development Goals express a readiness to embrace new, circumspect solutions that bring new momentum to the international development field. As with any new approach, however, the goals will present challenges in their implementation, particularly for actors on the ground which, in large part, are NGOs. One issue is how targets set under the SDGs will be met in the field, and how far the targets respond to needs and opportunities identified on the ground. Zero-targets may be seen more as an ideal set by international bodies and state-level decision makers than a realistic assessment of what is possible in the coming decade and a half, and a better synchronisation between field-level needs and state-level goals may be necessary.

Procedures are now evolving for the monitoring of the SDGs. The United Nations Statistical Commission met in March 2016 to review the draft global indicator framework on the SDGs created by a specialized Inter-Agency and Expert Group. Composed of Member States, with observing regional and international agencies, the Group proposed 231 global indicators. These indicators are to inform the monitoring process across four levels: national, regional, global, and thematic. Within this hierarchy, Member States will be the primary monitoring bodies, with complementary national indicators to be developed to complement the global indicators. Reports will then be submitted to regional and global levels to aggregate results. Civil society and NGOs will contribute primarily to gathering information on implementation, particularly in specialized thematic areas.

While procedures on monitoring the SDGs are being established, it is less clear how implementation itself will occur. As mentioned, field-level needs and state-level targets are not necessarily compatible. Particularly in developing regions, where state infrastructures are lacking, the primary providers of development and relief efforts are NGOs, and we may thus expect that the burden of achieving the SDG targets will fall in large part on these non-state actors.

Conducting sustainable development which integrates environmental, societal, and economic development poses new challenges to these actors, as development activities must be conducted with a thought towards the global impact of regional or local projects. The complexity of engaging in development and humanitarian work is thus increasing both due to the changes in the development landscape and the concomitant growing sophistication of solutions implemented. These solutions will necessarily involve the utilisation and integration of a number of information sources, to assess, for instance, the environmental impact of a refugee camp on local water supply.

This emergent need for innovative solutions to humanitarian and development challenges which integrate a variety of information sources is one which Space is well equipped to address. The main services which the Space

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\(^5\) Veit, Elisabeth. “From MDGs to SDGs: why now is the time to further integrate space into development.” ESPI Perspectives 74. 22 Jan. 2016 <http://www.espi.or.at/images/stories/dokumente/studies/Perspective_74.pdf>.

\(^6\) Ibid.

\(^7\) Ibid.
sector is able to offer, earth observation, telecommunications, and position, navigation, and timing, are highly relevant for the implementation of projects as well as for project coordination and monitoring. The EU and WMO together with Eumetsat have successfully conducted demand driven initiatives including the PUMA, AMESD, and MESA projects, which demonstrate the potential benefits of Space involvement in the development field. Further evidence of Space’s beneficial potential comes from pilot projects such as CNES’s Emergesat humanitarian relief container, developed for the French humanitarian foundation Casques Rouges and deployed at a UNHCR operated camp for Darfur refugees in 2007. The container provided telephone, internet, videoconferencing and data transfer links, and included a telemedicine kit as well as triage and mapping tools. There are many more examples in which Space-enabled services and tools have demonstrated their utility, or may have a significant potential impact. These include mapping, telemedicine, tele-epidemiology, and tele-education, which may be useful in both humanitarian disaster and longer-term development contexts. In fact, the United Nations Office for Outer Space Affairs has determined that Space already has a direct role to play in 11 of the 17 Sustainable Development Goals, and an indirect role in all others. The primary lesson here is that there is both a potential, and a need, for Space to support NGOs in development activities, now more than ever.

How can this be done? The successful embedding of Space services and tools within the structures of the Sustainable Development Goals and its integration with the NGO community can be achieved only if certain programmatic guidelines are followed. Firstly, the NGO community must be heard. While effective demand driven initiatives have been conducted as outlined above, industry experts have noted that the Space community runs the risk of looking for problems which fit pre-existing Space service solutions, rather than creating tailored tools and services for specific on-the-ground requirements. Hence secondly, the requirements for solutions must be defined by NGOs and others within the development community. An understanding of Space as an enabler and the end user NGO community as the driver is key in allowing both parties to acknowledge that Space may not always be the right tool, and avoiding an unnecessary utilization of high-tech solutions where low-tech options may be more effective.

The establishment of effective communication channels is, thirdly, the key to enable a dialogue between the sectors. The NGO community has traditionally hesitated to embrace Space technology due to a perception of military connotations, high costs, and long lead times. Transparency and confidence building measures (TCBMs), which depend on constructive dialogue, are key to building a successful relationship. Humanitarian and development actors must not only be aware of the availability of space-enabled tools and services, but have faith in their appropriateness and efficacy. A rigorous dialogue mechanism which opens the floor to user inputs and feedback can help to discourage Space actors from seeking development contexts which may be made to fit the requirements of existing technologies. The mechanisms for this dialogue, lastly, should be as holistic as possible to account for the fragmented nature of both the Space and development sector, both constituted by governmental and non-governmental actors. Coordination of the interaction between Space and development actors is instrumental in avoiding an unnecessary duplication of efforts and to facilitate knowledge sharing between actors.

These programmatic boundary conditions suggest that the most effective way to establish a successful interaction and to avoid the associated pitfalls is through the creation of a dedicated platform connecting Space and high-tech sectors with users, especially NGOs. It is important that this platform is structured as a forum in which views may be exchanged between multiple parties, rather than bilaterally.

Two existing organisations have attempted to provide such a forum connecting space applications and users in the field of disaster risk reduction and management, and emergency response. The first is the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), an organ of the Office for Outer Space Affairs, which aims to improve access to specialized technologies with applications for the management of disasters and the reduction of disaster risks. A key component of this goal is knowledge management, providing a channel from data to information to knowledge; UN-SPIDER acts as a bridge between the heterogeneous stakeholders of the

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user and provider side. Another component, beyond the acute need for information in disaster situations, is the building of technical capacity in developing countries. To accomplish this, UN-SPIDER holds expert meetings and conferences regularly, but also maintains a network of Regional Support Offices and National Focal Points, which are funded by host states and run by space agencies, research centres, universities, or civil protection agencies.11

The second organisation is the International Charter Space and Major Disasters, a collaboration of space agencies across the world to provide satellite-derived information and products to relevant stakeholders in disaster response. Authorised users, comprised of disaster management authorities of countries whose space agencies are members of the charter, but also UNOOSA and UNITAR/UNOSAT, may request activation of the Charter for themselves, or on behalf of cooperating countries of UN organizations. After activation, archive and acquisition plans are created using available satellite resources and satellite images are acquired as necessary, processed, and passed on to the activating party.12

Both of these organisations make a significant contribution to disaster management efforts in crisis-affected areas, as evidenced for instance by the frequency of Charter activation. Recent examples include the search for missing Malaysia Airlines Flight 370 in March 2014, the monitoring of the Ebola outbreak in West Africa in 2014, and the mapping of the Fort McMurray wildfire in Canada in May 2016.13 However, both organisations face key limitations which curb their impact. The first is that both are the result of UN initiatives, and hence focus primarily on the Member State level and on states’ subsidiary government organisations. UN-SPIDER is embedded within UNOOSA, and the Charter was created as a result of the UNISPACE III conference in Vienna in 1999 and is a collaborative project between space agencies.

This emphasis on the governmental levels limits the access of non-governmental organisations to these services, many of which are key actors in managing disaster situations. The second is the limited scope of both initiatives. Both focus exclusively on disaster situations, as well as risk management, and hence maintain the artificial divide between humanitarian and development activities. The final element is that both organisations focus on placing existing services at the disposal of organisations and states. While this effort is laudable, as a consequence little effort is devoted to developing new and specialized solutions for user communities, and thus the scope for innovation is limited. While the initiatives thus provide valuable inputs to disaster management, it appears that both may be better incorporated into a wider platform for information exchange and cooperation, rather than being expanded to constitute such a platform. A key issue is thus identifying existing mechanisms which may serve as a blueprint for a platform connecting Space and high-tech with user communities in the humanitarian and development sectors.

One initiative with the potential to act as a platform is conducted by the European Union. The European Commission’s Directorate for Humanitarian Aid and Civil Protection (DG-ECHO) has created a network of Humanitarian Aid Partners, composed of over 200 non-governmental organisations (NGOs), international organisations, United Nations agencies, and specialised agencies of EU Member States, to facilitate cooperation on policy issues as well as the management of humanitarian operations.14

Partners are brought together annually for the Humanitarian Aid Partners Conference to discuss developments and challenges in the humanitarian field, as well as to exchange experience and participate in workshops. In so doing, ECHO creates a cross-sectoral platform for humanitarian organisations of great institutional variety to discuss and develop an informed and circumspect consensus on policy directions for humanitarian aid delivery. The large attendance of the annual conferences vouch for the mechanism’s popularity, and the network may serve as a useful model for the coordination of cross-sectoral efforts to implement the SDGs.

In the course of the year, ECHO conducts training sessions both on-site and via distance

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learning for partner organisations and prospective partners, as well as holding smaller expert meetings which lead to a continuity of dialogue between in-field actors and the EU. As well as hosting these meetings, ECHO hosts an online helpdesk which acts as an information portal for current and prospective partner organisations.¹⁵

The ECHO model differs from the UN-SPIDER and Charter model in the three key aspects outlined above. For one, the annual Partners Conference is distinguished by the broad variety of organisations which attend, which includes governmental overseas development agencies as well as humanitarian organisations like the Red Cross and MSF, as well as more development-focused organisations such as Oxfam. Participating organisations also vary considerably in size, leading to a more representative inclusion of the humanitarian and development sectors and broadening the scope of voices heard. The second aspect is that, despite a focus on humanitarian aid, the ECHO Humanitarian Partners platform includes organisations whose foremost function is not humanitarian assistance, but development activities more broadly. It hence differentiates less rigorously between the two fields. Thirdly, the format of the conference and the Partners platform allows for greater flexibility, increasing the potential for innovative solutions to be created. One pertinent example is the inclusion of ESPI in the 2015 Humanitarian Aid Partners Conference, whose ongoing project on Space for Sustainable Development was deemed to be of sufficient interest and relevance to warrant participation (although ESPI is not a Partner). Representatives from ESPI were given the opportunity to speak on the relevance of space applications in the implementation of the Sendai Framework for Disaster Risk Reduction, which led to an open and involved discussion of the potential for Space involvement and the establishment of ties between several NGOs and the Institute in further activities.

This brief chapter has attempted to give an overview not only of why Space should become integrated into the Post-2015 humanitarian and development landscape, but of how this might be done. Above all, it has illustrated the key part NGOs have to play in the process of implementing the Sustainable Development Goals, and the importance of giving these actors a voice. Through a successful dialogue, NGOs and other actors may express requirements to which the Space community may provide the innovative, holistic and sustainable solutions which a successful implementation of the SDGs and beyond requires.

3. The United Nations Framework for UNISPACE+50

3.1 Space Technology for Socioeconomic Development in the Context of the United Nations Agenda 2030

In its 59th session (8-17 June 2016), the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) endorsed the recommendations and decisions of its Subcommittee 16 under the item on space technology for socio-economic development, in the context of the United Nations Conference on Sustainable Development and the post-2015 development agenda.

The Committee also recalled that the United Nations General Assembly, in its resolution 70/82, had reiterated the need to promote the benefits of space technology and its applications in the major United Nations conferences and summits on economic, social and cultural development and related fields, and had recognized that the fundamental significance of space science and technology, and their applications for global, regional, national and local sustainable development processes, should be promoted in the formulation of policies and action programmes and their implementation, including efforts towards achieving the objectives of those conferences and summits and in implementing the 2030 Agenda for Sustainable Development.

In this context, ESPI carried out a research project entitled “Space for Sustainable Development”\textsuperscript{17,18}, the outcomes of which were presented at the UN COPUOS 59\textsuperscript{th} session. The rationale for initiating this ESPI project was

\begin{figure}[h]
    \centering
    \includegraphics[width=\textwidth]{sustainable_development_goals.png}
    \caption{The UN Sustainable Development Goals (SDGs) (Source: UN)}
\end{figure}

\begin{itemize}
    \item Veit Elisabeth, "From MDGs to SDGs: Why Now is the Time to Further Integrate Space into Development", ESPI Perspectives 74, Dec 2015, Vienna.
\end{itemize}
the approval of the Sustainable Development Goals (SDGs) by the United Nations General Assembly in 2015, which was a major turning point for global development efforts.

The new goals emphasise respecting the long-term economic, social, and environmental requirements of the global community, and space will be a pivotal component in achieving these goals.

ESPI Report 59 “Space for Sustainable Development” elaborates on these highly relevant aspects, and was produced as a collective effort by Stefano Ferretti, Jörg Feustel-Büechel, Roy Gibson, Peter Hulsoj, Andreas Papp and Elisabeth Veit.

This report discusses how space has been involved with sustainable development projects in the past, as well as where possible space contributions to development solutions have been under-utilised, with an eye towards identifying possible pathways for bringing the space and development communities into closer cooperation.

After providing an overview of the changes precipitated by the SDGs, and current and potential future areas of interaction, the report creates a map of stakeholders relevant to bringing the two fields closer together. It emphasises that demand-side actors, including governments, UN organisations, and NGOs, must be given the driving seat in determining the requirements for successful projects. Supply-side actors, in the space sector, must engage in increased dialogue to foster consensus building for a unified approach. The report critically analyses current dialogue mechanisms and identifies practical tools for increasing cooperation between space and development actors. The report concludes by encouraging the creation of space programmes targeting sustainable development.

This study aims to inform and provide recommendations to actors in a broad range of fields in the development and space sectors, but is also intended to engage all persons interested in the social impact of space.

### 3.2 Fiftieth Anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space

At its fifty-eighth session in June 2015, the Committee on the Peaceful Uses of Outer Space (COPUOS) also endorsed the work plan for UNISPACE+50\(^{19}\), that will take place in 2018, marking the 50th anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space.

UNISPACE+50 will review the contributions that the three previous UNISPACE conferences (UNISPACE I, held in 1968, UNISPACE II, held in 1982, and UNISPACE III, held in 1999) have made to global space governance.

In line with the 2030 Agenda for Sustainable Development, and the sustainable development goals, UNISPACE+50 aims to chart the future role of COPUOS, its subsidiary bodies and the United Nations Office of Outer Space Affairs, at a time of an evolving and more complex space agenda in which more participants, both governmental and non-governmental, are becoming increasingly involved in ventures to explore space and carry out space activities.

### 3.3 UNISPACE+50 Preparatory Activities and Thematic Priorities

At the 71st COPUOS meeting, the Chair of the UNISPACE+50 Steering Committee reported

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\(^{19}\) In accordance with the plan of work endorsed by the Committee at its fifty-eighth session in 2015 (A/AC.105/L.297), in order to allow for timely and efficient preparations for UNISPACE+50 by the Committee, its subsidiary bodies and the Office for Outer Space Affairs. The Committee took note of A/AC.105/2016/CRP.3, prepared by the Secretariat in accordance with the above-mentioned plan of work of UNISPACE+50, “Fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space”. The Committee had before it the following:

(a) Note by the Secretariat entitled “Fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space: theme of the sessions of the Committee on the Peaceful Uses of Outer Space, its Scientific and Technical Subcommittee and its Legal Subcommittee in 2018” (A/AC.105/L.297);

(b) Conference room paper entitled “UNISPACE+50: thematic priorities and the way ahead towards 2018” (A/AC.105/2016/CRP.3);

(c) Conference room paper entitled “Fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space: the Committee on the Peaceful Uses of Outer Space and global space governance” (A/AC.105/2016/CRP.4);

(d) Proposal by Italy entitled “Open Universe proposal, an initiative under the auspices of the Committee on the Peaceful Uses of Outer Space for expanding availability of and accessibility to open source space science data” (A/AC.105/2016/CRP.6);

(e) Statement by the Director of the Office for Outer Space Affairs on behalf of the UNISPACE+50 Steering Committee.
Engaging with Stakeholders in Preparation for UNISPACE+50

1. Global partnership in space exploration and innovation

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.

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. The Action team is 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.

2. Legal regime of outer space and global space governance: current and future perspectives

Objective: Promote the universality of the five United Nations treaties on outer space. Assess the state of affairs of those treaties and their relationship with other relevant international instruments, such as principles, resolutions and guidelines governing space activities. Analyse the effectiveness of the legal regime of outer space in the twenty-first century, with a view to identifying areas that may require additional regulation. Conduct an evaluation by:

a. Developing the questionnaire of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space to encompass an assessment of the legal regime of outer space as a pillar of global space governance. The questionnaire should be used in the period leading up to 2018 to assist the Legal Subcommittee in addressing the status and scope of, and assessing and, as appropriate, addressing possible gaps in, the legal regime of outer space;

b. Studying potential future legal and institutional initiatives intended to ensure that outer space is explored and used for peaceful purposes and that access to outer space remains open and free for the benefit of all countries, in order to ensure that international space law is a relevant part of global space governance in the twenty-first century in the light of the significant scientific developments and technical advances that have affected space activities;

c. Studying legal mechanisms to foster an international regime of responsibility and liability to cope with present and future challenges to the safety, security and sustainability of outer space activities and the safety of space operations, perspectives of space traffic management and an enhanced exchange of information on space objects and events. Specific consideration is to be given to current practical concerns of the international community, such as in-orbit collisions and interferences. In particular, there should be an assessment of the need for enhanced registration and notification procedures and their institutional requirements under the registration and notification platform maintained by the Office for Outer Space Affairs;

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d. Identifying, by 2018, approaches and possible criteria for developing, by 2020, a guidance document to be issued by the Committee on the Peaceful Uses of Outer Space with essential information on the state of affairs of the legal regime governing outer space, including relevant instruments applied through national regulatory frameworks and international mechanisms for cooperation. Such a document should serve as valuable guidance for States wishing to become a party to the five United Nations treaties on outer space;

e. Considering means to strengthen the Legal Subcommittee as the prime multilateral body with a mandate to promote the progressive development of international space law, including procedural and institutional improvements and closer cooperation with the Scientific and Technical Subcommittee.

Mechanism: Existing Working Group on the Status and Application of the Five United Nations Treaties on Outer Space of the Legal Subcommittee, which should coordinate its work with the Working Group on the Long-term Sustainability of Outer Space Activities of the Scientific and Technical Subcommittee.

3. Enhanced information exchange on space objects and events

Objective: Define and develop requirements for enhanced information exchange and notification procedures under the United Nations Register of Objects Launched into Outer Space, taking into account the recommendations contained in the report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities\(^2\) and the future guidelines for the long-term sustainability of outer space activities specifically addressing risk-reduction notification needs. Identify cooperation mechanisms to support this objective. Encourage capacity building and outreach activities on transparency and confidence-building measures.

Mechanism: At its fifty-fourth session in 2017, the Scientific and Technical Subcommittee is to consider a new agenda item entitled “Enhanced information exchange on space objects and events”, for the establishment of a working group under a multi-year work plan covering the period 2018-2020 that will coordinate its work with the Legal Subcommittee and the Working Group on the Long-term Sustainability of Outer Space Activities of the Scientific and Technical Subcommittee.

4. International framework for space weather services

Objective: Strengthen the reliability of space systems and their ability to respond to the impact of adverse space weather. Develop a space weather road map for international coordination and information exchange on space weather events and their mitigation, through risk analysis and assessment of user needs. Recognize space weather as a global challenge and the need to address the vulnerability of society as a whole. Increase awareness through developed communication, capacity building and outreach. Identify governance and cooperation mechanisms to support this objective.

Mechanism: Existing Expert Group on Space Weather of the Scientific and Technical Subcommittee to be substantively supported by the Office for Outer Space Affairs. Space weather-related activities to be implemented also through the capacity-building activities of the Office and through the role of the Office as the executive secretariat of ICG, taking into account the existing work plan of the Expert Group\(^2\).

5. Strengthened space cooperation for global health

Objective: Improve the use of space technologies and space-based information and systems in the global health domain. Promote enhanced cooperation and sharing of information in emergencies, epidemics and early warning events, as well as on environmental parameters. Enhance capability in integrating health data in disaster management plans. Strengthen capacity building in advancing space technologies for global health efforts. Identify governance and cooperation mechanisms to support this objective.

Mechanism: Existing Expert Group on Space and Global Health of the Scientific and Technical Subcommittee, to be substantively supported by the Office for Outer Space Affairs. Space and global health-related activities to be implemented also through the capacity-build-

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6. International cooperation towards low-emission and resilient societies

Objective: Define synergies between climate change mitigation efforts, disaster risk reduction, global development and emissions reduction by replacing carbon energy with renewable energy. Develop a road map for enhanced resiliency of space-based systems and the affiliation of current and future Earth observation, global navigation satellite systems and telecommunication constellations for disaster risk reduction and climate change monitoring and mitigation. Improve integrated space applications approaches and the interoperability of space-based systems and ground/in situ systems. Provide requirements to new developers for coverage in geographical areas not sufficiently monitored or applications that need further development. Identify governance and cooperation mechanisms to support this objective.

Mechanism: The Office for Outer Space Affairs to undertake the work under this thematic priority and report regularly to the Committee and its Subcommittees on the work under this thematic priority.

7. Capacity-building for the twenty-first century

Objective: Define new innovative and effective approaches to overall capacity building and development needs as a fundamental pillar of global space governance. Strengthen comprehensive capacity-building and outreach activities of the Office for Outer Space Affairs. Develop infrastructure for cross-sectoral and integrated applications, with combined scientific, technical, legal and policy outputs. Enhance existing partnerships and forge new ones to strengthen and deliver targeted capacity building and technical advisory activities based on needs assessments. Promote efforts to encourage science, technology, engineering and mathematics education, especially for women in developing countries.

Mechanism: The Office for Outer Space Affairs to undertake the work under this thematic priority and report regularly to the Committee and its Subcommittees on the work under this thematic priority.

3.4 External Contributions to the UNISPACE+50 Process

The COPUOS Committee welcomed the emphasis on the outreach component of UNISPACE+50 that aimed to engage all relevant stakeholders, including States that were not yet members of the Committee, permanent observers, the private sector, as appropriate, civil society and the media, in an all-inclusive manner to foster global space governance for the twenty-first century.

In that regard, the Committee encouraged the Office for Outer Space Affairs and the UNISPACE+50 Steering Committee to continue their outreach efforts through participation at conferences, lectures and other awareness-raising activities in order to present UNISPACE+50 through its thematic priorities and their deliverables to a wider audience. In this context, the Office for Outer Space Affairs invited States Members and Permanent Observers of the Committee to support the Multi-Donor Strategic Support initiative in order to prepare, structure and implement activities on the promotion of space-based applications and technologies for innovative and timely actions to support Member States in meeting the objectives of the global development agenda.

3.5 The European Space Policy Institute’s Contributions

The European Space Policy Institute, a permanent observer of the COPUOS, had already started working on the UNISPACE+50 preparatory activities by:

a. Presenting the project “Space for Sustainable Development” on the fourth day of the 59th session of the UN Committee on the Peaceful Uses of Outer Space in June 2016


23Ibid. annex I, par. 7.

3.5.1 The European Space Policy Institute at COPUOS

At the COPUOS, Dr. Stefano Ferretti highlighted the major findings of the ESPI project “Space for Sustainable Development”\(^{24}\).

The report aims to provide key stakeholders with an overview of the current and potential contributions of space to the achievement of the Sustainable Development Goals. It argues that a fruitful and close dialogue among all the development actors and the space community should be established in order to exploit the full potential of space assets and services.

Space services can be targeted to the specific needs of society and become embedded in diverse user activities. Where terrestrial infrastructures are insufficient, space services offer great advantages: connectivity can be provided without the need for landlines; Earth Observation applications can substitute for in-situ measurements; and navigation satellite services allow for precise positioning and tracking. Integrated services can aid coastal and fisheries management, open new ways for pollution monitoring, and enable a new set of tele-education and e-health services.

The presentation\(^ {25}\) was well received by COPUOS delegates and representatives, and opened promising avenues for cooperation with the broader stakeholder community.


4. The 10th ESPI Autumn Conference: “Space for Sustainable Development”

On the 15th and 16th of September 2016, ESPI hosted its 10th Autumn Conference, entitled “Space for Sustainable Development”.

The Autumn Conference provided the venue to present views, positions and programmes around the topic of “Space for Sustainable Development”.

The various stakeholders had the opportunity to establish an interdisciplinary network of policy advisors, space agencies, the wider development community, academia, industrial and other new private actors, European and international institutions.

There was also the opportunity to discuss, around practical demonstrations, the use of space for sustainable development, with the involvement of field actors, and to share needs and solutions in an interactive format.

Participants in the conference included leaders from both the development community and the space community.

Representatives from prestigious institutions, international organisations, and academia set the scene and provided inputs to the discussions, which involved citizens, non-governmental organizations, new space actors and the media.

Figure 2. ESPI 10th Autumn Conference "Space For Sustainable Development" (SOURCE: ESPI)
4.1 Letter of the ESPI Director to the International Community

An overview of the main outcomes of the conference was sent to all relevant parties in the international community. Following is the text of the ESPI director’s accompanying letter.

Dear Friends of ESPI,

I would like to briefly inform you about the 10th annual Autumn Conference of the European Space Policy Institute, which was held in our premises from 15th to 16th September. The two-day event brought together professionals from a wide range of sectors to give presentations, present case studies, participate in panel discussions and strengthen their networks in informal talks on the theme of “Space for Sustainable Development”.

The speakers, which included professionals from space agencies, the wider development community, academia, industry and new private actors, as well as European and international institutions, addressed different facets of this topic in three sessions on “Space as an Enabler”, “Sustainable Development and Space”, and “Financial and Non-Financial Aspects of Sustainable Development”.

The panels provided a valuable opportunity to engage field actors in the development sectors in discussions frequently dominated by theorists and space actors. Speakers noted the importance of continuing to pursue such an interdisciplinary format, and stressed the relevance of the Sustainable Development Goals (SDGs), while highlighting the key role of connectivity in their future evolution. They cautioned, however, on the lack of central dialogue mechanisms.

The space sector is well-placed to fill in this gap, building on existing examples, such as ISRO’s use of tele-medicine and tele-education as well as the NASA-USAID SERVIR partnership that demonstrate that space can actually benefit international development. In particular, space’s strong capacity for monitoring and evaluating, as well as building situational awareness, were noted. However, several key prerequisites for a successful contribution of space activities to the Sustainable Development Goals were identified:

- Space actors were urged to adopt an end-to-end approach with comprehensive exploratory work on identifying user needs to avoid an inadvertent perpetuation of inequality and prevent ‘technology push’ scenarios. To this end, a greater inter-sectoral, inter-institutional (e.g. state and NGO), and international cooperation and information sharing shall be sought.

- The space sector should play a proactive role in increasing the availability of space resources, while IGOs, NGOs, and states should improve their technology awareness to strengthen capacity building, improve infrastructures as well as reduce environmental impacts. To this end, speakers expressed a desire for a formalized cross-sectoral dialogue platform, as well as for an up-to-date archive on earth observation images incorporating the capacity for near-real time map building.

- Best practices in the field should also be compiled so that basic common requirements serving the SDGs for the next generation of space infrastructure might be devised. In this context the African Union presented its Space Policy and Strategy which aims to create a well-coordinated and integrated African programme, while addressing user needs and improving access to space services, also by enhancing international cooperation.

While the rise of the private sector in this domain was praised, further calls for action concerned the development of local markets for space services, open to public and private actors, relying on good governance mechanisms and in particular including a sound and fair tax policy on space related facilities.

The promotion of a strong STEM curriculum was also deemed essential, eventually leading to wider technology awareness in the society. Several key institutional players showed that they were taking steps to structure, coordinate and enhance the role of space in order to implement the SDGs.

Speakers agreed that a stronger coordination among space agencies, IGOs, NGOs, the private sector, academia, and sustainable development actors is advisable. In this context, UNOOSA is organising high level fora, a sort of "Davos for Space", addressing cross cutting areas and outlining UNISPACE +50 thematic priorities within the framework of the SDGs, involving also the (new) private sector.

The conference closed in a spirit of optimism and with the expressed intention to follow up with concrete proposals for improved dialogue and cooperation. Vittorio Prodi gave voice to this sentiment in his opening address, in which he noted "It is time to consider what we are going to lose if we don’t act together."

The outline above has given a highly abbreviated summary of the findings of the ESPI conference which was praised by participants as an innovative and successful step, following a
year-long project which addressed sustainable development and the use of space technologies and services in global efforts. This has included discussing existing applications, identifying gaps in leveraging of technologies, delineating limitations and challenges in governance, cooperation and technical implementation, and discussing ways forward for space and development.

The findings of the conference will be presented at the United Nations/United Arab Emirates High Level Forum: “Space as a Driver for Socio-Economic Sustainable Development” in Dubai in November and, in the medium term, be carried forward in the framework of UNISPACE + 50 preparatory activities. The Institute hopes that they will prove to be a valuable input into furthering discussions of the role of space in shaping our global society for the better.

If you are interested in receiving more information about the Autumn Conference, the “Space for Sustainable Development” activities, or other projects of the European Space Policy Institute, you are invited to contact the Institute directly, or to visit our website which includes digital copies of most ESPI publications.

In the meantime, I remain

Sincerely yours,

Jean-Jacques Tortora, ESPI Director

**BOX 1: The European Space Policy Institute**

The European Space Policy Institute (ESPI) provides decision-makers with an informed view on mid- to long-term issues relevant to Europe’s space activities. In this context, ESPI acts as an independent platform for developing positions and strategies.

The creation of ESPI dates back to 2002, following a decision by the Council of the European Space Agency (ESA), as a joint venture together with the Austrian Research Promotion Agency (FFG). Today the Institute is supported by several Members, including institutions drawn from European Agencies, operators and private companies, and the European Commission.

ESPI activities focus on promoting European space policy on a global level, by assessing needs, capabilities and long-term prospects in space activities. It facilitates research, academic interaction and definition of long-term European orientations in astronautics, also by establishing an international cross-disciplinary network of experts and by identifying areas for further European space policy development, addressing proposals and recommendations to European decision-makers and institutions.

ESPI also serves as a leading source of information for key stakeholders, decision makers, scholars, scientists, professionals and students, facilitating the exchange of information and opinions through publications, workshops and conferences.

![Fig. 3 Jean Jacques Tortora, ESPI Director, during the first day of the Conference "Space for Sustainable Development". (SOURCE: ESPI)](image-url)
4.2 Highlights of the 10th ESPI Autumn Conference

At the start of the conference, the ESPI Director, Jean-Jacques Tortora, gave the welcoming address, underlining the importance of using space technology for sustainable development with reference to the UN Agenda 2030 and its Sustainable Development Goals.

Additional conference highlights included:

a. Dialogue with the most relevant stakeholders, including both development and space actors.

b. Presentation of the African Union Space Policy and Strategy released in 2016

c. UN Agenda 2030: the role of UNOOSA and Space Agencies in supporting Sustainable Development

d. New entrants in space and their relation to sustainable development: telecommunications, drones, Additive Layer Manufacturing, and cubesats.

While the impact of the private sector in this domain was praised, further calls for action concerned the development of local markets for space services, open to public and private actors, relying on good governance mechanisms.

![Figure 4. "The spatial dimension in the SDGs". (SOURCE: Marcel Jortay, Director for Regional and Sectoral Statistics, Eurostat, European Commission)](image)

4.3 Detailed Conference Report

4.3.1 Background

Throughout this year, ESPI has written and researched extensively on why and how space assets and services should be integrated into renewed and reinvigorated global development efforts, and on why the international space community should take notice.

It is clear that many key prerequisites for a peaceful and prosperous society are facing hefty challenges. Issues concerning the climate, the environment, political stability, and economic growth have featured heavily in global news headlines of the past year, which have showcased the increasing complexity of making progress in these fields. Many more of the chronic and emergent issues in international development are familiar only to those working in the sector. To tackle these challenges as a global society, we must think outside of traditional delineations between developed and developing states or between development-oriented and non-development oriented economic, industrial, and technological sectors.

With this goal in mind, policy advisors and stakeholders from space agencies, the wider development community, academia, industrial and new private actors, European and international institutions were brought together to present views, positions and programmes around the topic of "Space for Sustainable Development" at the ESPI offices in Vienna.

Over the course of two days, and in three dedicated sessions, they discussed the use of space for sustainable development with the involvement of field actors who shared their
views on needs and solutions in an interactive format along with practical demonstrations.

The conference aimed to cover many major innovations in the space-development interaction of recent years, including the USAID-NASA partnership, the African Union’s Space Policy, NGOs’ partnerships with GIS organisations to leverage satellite imagery, the World Bank’s use of drones and earth observation and the creation of private companies operating at this intersection, as well as supporting academic discourse and theory.

After the opening speeches by ESPI Director Jean-Jacques Tortora and Vittorio Prodi outlining the relevance of space technology in everyday life, speakers in the first session, “Space as an enabler”, critically assessed the role of space within the United Nations Sustainable Development Goals (SDGs) and within global development efforts.

**4.3.2 First Session: Space as an Enabler**

In the first session of the conference, challenges in development and the role of space were discussed, reviewing the different development assistance models and their relation to space, and concluding with reflections on the European approach to sustainable development.

**BOX 2: UN Agenda 2030**

The UN Agenda 2030 centres on the concept of sustainable development. The principle was born out of a 1987 report by the World Commission on Environment and Development, which defined it as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Respecting the planet’s limits and social justice, sustainable development addresses economic, social and environmental areas. Finally, the SDGs stress the inter-linkages between previously separate development related fields, including disaster risk reduction and climate change.
Justin Loiseau of the MIT J-PAL provided the results of randomized evaluations of the effectiveness of programmes aimed at reducing poverty and presented innovative solutions for capacity building. His speech was followed by the presentation of the NASA-USAID SERVIR programme by Jennifer Frankel-Reed of USAID. She informed the audience about the relations between the two governmental agencies in this joint project, which aims at strengthening the ability of governments and other development stakeholders to incorporate Earth observations and geospatial technologies to respond to natural disasters, improve food security, safeguard human health, and manage water and natural resources.

We conduct randomized evaluations to test the effectiveness of programs aimed at reducing poverty

Petra Dannecker of the University of Vienna showed the current gaps and challenges in the implementation of the SDGs, confirming the potential benefits that space could bring to developing countries. She also highlighted the importance of setting up new development models and stronger cooperation between the various actors.

B.S. Bhatia, the former Director of Development and Educational Communication Unit at the Indian Space Research Organisation (ISRO), described India’s use of space applications, particularly in the fields of health and education.

The first session was closed by the speech of Amb. Didier Lenoir of the European External Action Service, who summarized the European approach to sustainable development, also in reference to the Copernicus and Galileo flagship programmes of the European Union.

The speakers identified the need for an end-to-end approach that targets universal coverage and the use of generated knowledge as key objectives, while stressing the need for extensive scoping and exploratory work to identify user needs as well as careful assessments of impact and goal-oriented project design as essential requirements.

One of the major hurdles recognised by the speakers is the need for coordination in the implementation of Agenda 2030, due to the fact that the process is left to member states that lack overall guidance and compliance. For this reason, in order to fulfil the SDGs, the necessity to develop a more inclusive approach that involves a wide variety of actors was highlighted.

A new approach towards development is advisable to avoid a “business as usual” approach, and in this context space actors can make a significant contribution. Cooperation between space and development actors is possible, as was shown by Jennifer Frankel-Reed. In fact the NASA-USAID partnership incorporates the idea that space could be beneficial to society in a wider sense and that there is a natural link between the two. Space data and services can be brought to developing regions, while new international partnerships can be expanded to also include space actors.
BOX 3: Development Models and the Sustainable Development Goals

The Sustainable Development Goals (SDGs) heralded a shift and a new phase in international development, which followed the Millennium Development Goals (MDGs). The changing landscape of development politics and aid as well as global economic, environmental and social transformations have structured not only the negotiation processes of the SDGs but also the 2030 agenda, which is based upon them. This innovative approach poses new challenges as well as opportunities at various levels (political, methodological and practical) that need to be critically assessed.

Whether the SDGs challenge the current development discourse and/or can become a new development paradigm, and a new space for global transformations, is one of the key questions.

Figure 10. The Sustainability Compass and the SDGs (Source: AtKisson Inc.)

A key recommendation that surfaced from panel discussions is that it is highly advisable to not let development programmes become remedies for symptoms rather than solutions for root problems associated with development. Therefore extensive scoping and exploratory work to identify user needs in the field is a necessary prerequisite to avoid an inadvertent perpetuation of inequality.

Key Recommendation 1

Space actors were urged to adopt an end-to-end approach with comprehensive exploratory work on identifying user needs to avoid an inadvertent perpetuation of inequality and prevent ‘technology push’ scenarios. To this end, greater inter-sectorial, inter-institutional (e.g. state and NGOs), and international cooperation and information sharing shall be sought.
4.3.2.1 Implementing the SDGs Using Space: Health and Education at ISRO

So far, using space applications for development, following an end-to-end approach, based upon sharing of needs, requirements and training between developers and users, has proven to be extremely successful.

ISRO, the Indian Space Research Organisation, has followed this approach in order to bring benefits to remote areas while accelerating the pace of national development. The main focus of these efforts has been in the fields of education and health, building upon initial experiments at the beginning of the sixties, which aimed at reaching out to the rural and remote areas of India to guarantee the transmission of school educational programmes.

The evolution and institutionalisation of these experiments has grown into one of the largest satellite-based infrastructures to support education, EDUSAT. The partnership of ISRO with both the Ministry of Information and Broadcasting and the Ministry of Education, along with other national agencies, demonstrated the importance of an end-to-end approach.

The synergies among the agencies responsible for education were evident in particular with the adoption of the SITE (Satellite Instructional Television Experiment) and the creation of other platforms for primary school and higher education in collaboration with the Indian Space Research Organisation.

ISRO also promoted the application of space technologies in telemedicine thanks to collaboration among private software providers, private hospitals and government hospitals. The application of telemedicine got a boost thanks
to the support of ISRO, which provided the connectivity and facilities for using dedicated networks. In particular, ISRO helped in providing connectivity to rural government hospitals. Despite what had happened within the education field, institutional actors were not involved at large, thus impeding the institutionalisation of Telemedicine. According to Professor Bhatia, a possible reason why Telemedicine has not been institutionalised could be the missed involvement of ISRO in the development of the telemedicine software. However, telemedicine continues to be used in India by private hospitals, NGOs and governmental hospitals in rural and remote areas, even without becoming part of the government health system.

**BOX 4: NASA/USAID SERVIR**

SERVIR is a joint project developed in 2004 between NASA and the U.S. Agency for International Development. The venture provides state-of-the-art, satellite-based Earth monitoring, imaging and mapping data, geospatial information, predictive models and science applications to help improve environmental decision-making among developing nations in eastern and southern Africa, the Hindu-Kush region of the Himalayas and the lower Mekong River Basin in Southeast Asia. SERVIR strengthens the ability of governments and other development stakeholders to use Earth observations and geospatial technologies to respond to natural disasters, improved food security, safeguard human health, and manage water and natural resources. Hubs in each region focus on issues and needs most critical to local populations. SERVIR is today a global network of leading regional knowledge centres and it relies on other agencies for expertise in scientific research and international development.

![Figure 13. USAID-NASA SERVIR (SOURCE: USAID)](image-url)
4.3.3 Second Session: Sustainable Development and Space

The second day of the conference focused on the approach taken by international organisations in incorporating space into development, presenting also the experiences of NGOs, humanitarian, and private actors in using space technology for disaster preparedness and response.

Simonetta di Pippo, Director of UNOOSA and Mahama Ouedraogo, Chair of Space policy and strategy at the African Union Commission, presented their respective institutional perspectives and noted the importance of establishing effective dialogue platforms and forums to bring stakeholders together.

The keynote speech of Mrs Di Pippo addressed the topic of Space and the UN 2030 Agenda on Sustainable Development. She was followed by Luc St-Pierre (UNOOSA) who chaired Session 2 of the Conference, revolving around the theme “Sustainable Development and Space”, and introduced Mahama Ouedraogo (African Union), who presented the new African space policy and strategy.

**BOX 5: African Union Policy**

The essence of the African Union (AU) Space Policy and Strategy is to harmonise and coordinate space activities in Africa and to help the promotion of an African-led space agenda at international level. The major goals of this policy are the creation of a well-coordinated and integrated African Space Programme responsive to the needs of the continent and globally competitive, and the creation of a regulatory environment to promote and support an African Agenda that could ensure the role of Africa as a responsible user of outer space. Harnessing the potential of space science and technology, strengthening space mission technology on the continent, and developing regional and international markets, Africa’s socio-economic opportunities and challenges can be better addressed via the new strategy. Thanks to the use of space science and technology, the African population will have optimal socio economic benefits that will help to improve African quality of life.

![African Union Space Policy and Strategy Roadmap](SOURCE: AFRICAN UNION)
Figure 16. Panel Discussion- Second Session "Sustainable Development and Space" (SOURCE: ESPI)

Figure 17. How NGOs use Space (SOURCE: MEDICINES SANS FRONTIERS)
The experiences of NGOs in the field were then presented by Andreas Papp (SOS Children Villages) and Edith Rogenhofer (MSF), describing the use of Earth Observation as a support tool for working in the field, in cooperation with space agencies, academies and private companies, such as DLR, the University of Salzburg and DHL. They both stressed the importance of data accessibility, interoperability and free, full and open policy, and reaffirmed the need for effective dialogue.

Josef Aschbacher, Director of Earth Observation at the European Space Agency, closed the session with a presentation of ESA’s activities in sustainable development. He also explained how Earth Observation can support the sustainable development goals of zero hunger, clean water and sanitation, sustainable cities and communities, climate action, life below water, and life on land.

The panel discussion and informal debates that followed the session consolidated the findings presented by speakers into defined priorities, challenges, and programmatic requirements. They focused primarily on the need to create effective dialogue on an institutional level, including designated forums, in order to make development actors aware of the potential of space technology and to familiarize space actors with the needs of the development community.

In this context, participants suggested that a "Davos for Space" was needed, stressing the need for end-to-end service design and dialogue in project design, noting that technology push and the introduction of poorly suited technologies and tools risked perpetuating inequalities by addressing symptoms rather than root causes of development issues, and was thus a major challenge to the successful interaction of the sectors.

Within the UN vision to bring the benefits of space to humankind, as intimated by Ban Ki Moon’s statement that “satellite technology can help us to protect people and the planet”, it was concluded UNOOSA should play a coordination role among space agencies, IGOs, NGOs, the private sector, and academics involved in space related activities and sustainable development.

This approach would eventually lead us also to rethink our capacity building approach for the 21st century, as an objective of UNISPACE +50 in June 2018 that comprises four pillars: space society, space accessibility & improved communication, space diplomacy & mechanisms of governance, space economy. As part of this process it is time to think of a new strategy for dealing with the (new) space private sector and with regional unions that have an increasingly important role in space policies, strategies and programmes.

The African Union has 55 Member States working together to identify common priorities, while developing policies and strategies. At the conference the discussion focused around the recently released African Union Space Policy and Strategy, which aims at creating a well-coordinated and integrated African program, including a roadmap with a 50-year timeframe, strategic partnership initiatives and looking towards developing a new space economy. Its main strategic objectives are: to address user needs, access space services, develop markets, promote good governance, coordinate the African arena, and promote international cooperation.

Another key element that surfaced in the panel discussion was the importance of creating technology awareness within NGOs, while improving communication exchange with the space community, in order to strengthen capacity building, and improve infrastructures as well as reducing environmental impacts. Addressing the challenges in the field would call for data and services where needed, and in this framework speakers highlighted the importance of having both an up-to-date archive and a capacity for building maps in near real time upon request, particularly where services need to be tailored, for example in rapidly growing refugee camps, according to the experiences of MSF.

Figure 18. United Nations Conference on Climate Change COP21 (SOURCE: UN)
The European Space Agency confirmed that it considers sustainable development highly relevant and proposes to further enhance its role by funding dedicated activities, particularly in the Earth Observation domain.

Space has a key role in addressing the needs of users but also in measuring the effectiveness of actions taken to address sustainable development and climate change. It is therefore always advisable to implement an end-to-end approach to find solutions that address the root causes.
The exploratory work on user needs is therefore a prerequisite to avoid perpetuating inequality: there is indeed a need for greater coordination, share of information regarding availability of space resources, and combining EO systems (e.g. GEO, CEOSS) with telecom and new private actors’ services.

And it is necessary to put together best practices in the field to devise basic common requirements serving the SDGs for fully exploiting current space assets and planning effectively for the next generation of space infrastructures.

**Key Recommendation 2**

*The space sector should play a proactive role in increasing the availability of space resources, while IGOs, NGOs, and states should improve their technology awareness to strengthen capacity building, improve infrastructures as well as reduce environmental impacts.* To this end, speakers expressed a desire for a formalized cross-sectoral dialogue platform, as well as for an up-to-date archive on earth observation images incorporating the capacity for near-real time map building.

**4.3.4 Third Session: Financial and Non-Financial Aspects of Sustainable Development**

The concluding panel of the Conference, chaired by Alfredo Roma (ESPI), dealt with the “Financial and non-financial aspects of sustainable development” and gathered actors from academia, institutions, and representatives from the private sector.

Professor Yun Zhao from the Centre for Chinese Law of Hong Kong University affirmed that the key issue to obtain remarkable results in sustainable development is international cooperation. China was presented as an example to follow, by promoting economic and social development, improving infrastructures, and strengthening capacity building and reinforcing environmental protection. The country set up dedicated programmes for development, in particular at regional level through the creation of its regional platforms. In this respect, Professor Zhao outlined the China-Brazil cooperation programme to better explain the assistance programs provided by China to developing countries.

Professor Zhao’s presentation was followed by Edward Anderson of the World Bank. He explained the involvement of the World Bank in supporting developing countries and its relation with governments. Following this, Mr Anderson presented the project “Ramani huria-free man”, which shows how the World Bank is responding to the SDG Goal 11 “Make cities inclusive, safe, resilient and sustainable”. The case study illustrated the social and economic value of the use of drones for the mapping of agricultural field boundaries.

Voices from the private sector presented their approach to sustainable development and the importance of implementing stakeholders’ partnerships that can encourage and promote effective public-private cooperation with civil society. Jean Francois Bureau of Eutelsat underlined the importance of satellite-based services for sustainable development activities. In particular, he discussed the necessity of having long-term investments delivered by service providers, with coherent returns on investments, and avoiding depending exclusively on public subsidies for sustainable development programmes.

**BOX 6: China-Brazil Cooperation**

Cooperation between China and Brazil began in 1974. In 1986 the China-Brazil Earth Resource Satellite (CBERS) was set up. Following this, in 1988 the Protocol on Research and Production of the Earth Resource Satellite was signed. CBERS-1 was launched in 1999, following which several protocols were signed for more satellites. Cooperation is focused on precise areas such as the facilitation of the entry and exit of equipment and materials required for the implementation of the project, and the provision of appropriate documentation for citizens to enter, exit and reside in order to carry out relevant activities. In the early stage of this relationship, China took up 70% of the investments. As of 2002 the two countries have been sharing the total investment. Both parties reap equal benefits from the satellites; data acquired can be employed for domestic uses. In 2004 a data policy for the use of CBERS data outside both countries was agreed, followed by an international price list for images. This assures an equal share of revenues from the distribution of data to third parties.

![Figure 21. Financing for Development](SOURCE: WORLD BANK)
The next speaker was Dara Dotz, co-founder of Field Ready, who described how 3D printing technology transfer from space could offer valuable solutions to logistical challenges in remote areas of the world. She underlined how space can help in finding solutions for a more sustainable planet.

In Africa today, only 16% of the population has access to the Internet, but it is expected that in 2025 around 50% will have such access. If we compare this to developed countries, the digital divide seems to be unbridgeable. Satellites can work as a communication enabler. For instance, telecommunication satellites could help to resolve the digital divide, through the provision of services to more rural areas. Satellite connectivity thus offers a tool to satisfy the basic needs of the, thus making important contributions to commerce, health, education and economic growth. Christine Leurquin of SES explained how the company is involved in sustainable development in relation to the activities of O3B, and how SES is contributing to e-education and e-health. Connectivity is, in fact, especially important for improving the quality of health and reducing the cost of access to medical services, connecting populations in remote areas with the main cities. Connectivity also helps to increase the literacy rate in developing countries through ad hoc e-learning programmes to cover the lack of teachers in remote villages.

The session was closed by the contribution of Andrew Zolli of Planet. His speech showed the business case for space in development for both not-for-profit and commercial private actors. Zolli described the activities of Planet and their challenge of imaging the whole earth every day. This highlighted the importance of using space to help life on Earth. Making global change visible, accessible and actionable is the first objective of Planet. To reach this goal, it is highly recommendable to enhance international partnerships at every level, bringing institutional actors, stakeholders and civil society together in this effort.

The provision of increasingly large quantities of satellite data could benefit from the adoption of an open data policy that could allow the creation of open data innovation platforms and new downstream services.

Moreover, speakers recognised the existence of obstacles to sustainable development represented by the presence of market access issues related to a lack of legal frameworks and rules. To go beyond this, space needs to develop local markets and to set up tax policies for new services targeting sustainable development.

Satellite capacity is relatively expensive, so it is advisable to implement business models that ensure that all providers offer affordable access for those on low incomes. Space industries and operators are currently providing services to developing countries, but more investments are needed for the development of rural areas. In the field of security, the space industry is developing mobility services to ensure better monitoring of territories.

In sum, we are now assisting to a double revolution: an insight revolution and an information revolution. The information revolution includes increasingly precise and global data from space that can act as an enabler of new sustainable development solutions. The insight revolution sees the involvement of machine learning and artificial intelligence that helps to extract sophisticated information from raw information. This gives us updated and stable indicators that allow us to build new valuable instruments that can be used as societal, political, and economic tools.

Key Recommendation 3

Best practices in the field should also be compiled so that basic common requirements serving the SDGs for the next generation of space infrastructure might be devised. In this context the African Union presented its Space Policy and Strategy which aims to create a well-coordinated and integrated African programme, while addressing user needs and improving access to space services, also by enhancing international cooperation.
Internet connectivity has a strong impact on people’s lives, thanks to its social and economic benefits. Extending connectivity to developing countries would help them to empower their communities and guarantee access to basic needs with an added value. In fact, the lack of connectivity in developing countries is a substantial obstacle to the improvement of the socio-economic conditions. The percentage of the African population that has Internet access is low. The need to increase this percentage and to reduce the gap between developed and developing countries has been recognised by the International community and international stakeholders. The contribution of satellites can accelerate national development by helping the exploitation of local capabilities. The use of satellite connectivity has been already demonstrated through dedicated programmes in the fields of e-education, e-health, communications, crisis management and weather forecasting.

![Figure 23. Societal needs and Space (SOURCE: SES)](image)

**4.3.5 Conference Concluding Remarks**

The conference closed in a spirit of optimism and with the expressed intention of speakers to follow up with concrete proposals for improved dialogue and cooperation. Vittorio Prodi gave voice to this sentiment in his opening address, in which he noted “it is time to consider what we are going to lose if we don’t act together.”

For ESPI, the Conference marks the culmination of an extensive, year-long project with the aim of addressing the major themes in using space technologies and services in global development efforts in the context of the launch of the Sustainable Development Goals by the United Nations General Assembly in September 2015.

This included discussing existing applications, identifying gaps in leveraging of technologies, delineating limitations and challenges in governance, cooperation and technical implementation, and discussing ways forward for space and development.

Finally, the ESPI Director summarised the conclusions of this event, reporting the findings of Stefano Ferretti, Elisabeth Veit, and Alessandra Vernile, and remarking how the Conference had achieved all its objectives.
BOX 8: New Space & SDGs

Sustainable Development Goal 8 states: “Develop a global partnership for development”. Achieving this goal is a challenge that some private companies are looking forward to engaging with, for example by joining Public-Private Partnerships (PPP), to move towards more sustainable business models, capitalizing on better regulatory frameworks and new public incentives.

The private sector at large and new space in particular, can play a relevant role by supporting investments in services for sustainable development, particularly in countries where the involvement of public institutions is not easy because of regulatory environments and geopolitical risk factors.

The development of new downstream services can exploit existing space assets in the domains of telecommunications, Earth observation, navigation and integrated applications.

Figure 25. Planet Labs’ Dove (SOURCE: PLANET LABS)

4.4 ESPI Autumn Conference Speeches

4.4.1 Opening Key Note Speech – Prof. Vittorio Prodi

Ladies and Gentlemen,

First of all let me thank the European Space Policy Institute and Dr. Jean-Jacques Tortora for having invited me to speak today. As former Chair of the Sky and Space Intergroup of the European Parliament I have had the occasion to attend some ESPI events and to come back here gives me the pleasure to verify how ambitious our vision for a European space policy has been.

In my engagement at the European Parliament (EP) in my two mandates I had a growing interest in space studies for the wealth of applications and promising tools that were being developed. So I became increasingly involved and I ended my work at the EP with the assignment of speaker for the Copernicus funding legislation. My direct interests were in environmental problems, and it was clear that space observation was becoming an indispensable tool for understanding environmental problems and obtaining quantitative observation of an increasing number of parameters with increasing accuracy and effectiveness.

The concept of sustainability has been around for some time. While searching for the first use of the word, I found an interesting story: the term ‘sustainability’ originally comes from the field of forestry in Germany: in 1713, Hans Carl von Carlowitz from Saxony, the Chief Mining Administrator in Freiberg, thought about how to guarantee a permanent supply of timber, which was needed to build silver mines. His idea was not to fell more trees than could grow back. He spoke of ‘nachhaltende Nutzung’, a term that began to be used in works on forestry and was translated into English as ‘sustainable use’. From this economic standpoint, an independent discourse developed within the scientific community. The term ‘sustainability’ did not really catch on until 1987, however, when the former Norwegian Prime Minister Gro Harlem Brundtland submitted her Brundtland Report for the United Nations. The report contained a definition of sustainability that many politicians and scientists still agree with today, namely that development is sustainable if it ‘meets the needs of the present without compromising the ability of future generations to meet their own needs.’

I have spent a great part of my political career in promoting wider awareness of what sustainable development means and entails. As a scientist, my interpretation of the concept cannot be decoupled from the search for a larger observation point of the existing dynamics, a higher dimension, so to speak, that can only be attained from space. Everyone here today shares this perspective, I guess.
As a believer, I am certain that only from up there the inspiration will come to us for the solution of very complex problems like adaptation to climate change.

Many of you will remember our efforts to set up, from a declaration known as the "Baveno manifesto", the GMES Initial operations programme, transforming some scientific demonstration projects into a fully-fledged scientific programmes, destined to become the most advanced space industrial programme: Copernicus. The motivation was originally to ensure environmental and citizens' safety through the monitoring of land, air and sea. Galileo and EGNOS added to the European space ambitions the project of a European navigation system. We also faced concern for satellite security, with the SST programme, a system for tracking all space debris. It was also the time for addressing at global level the issue of sharing the use of outer space, through several attempts to agree on an international space code of conduct. As Chair of the European Delegation for relations with Southern Africa I also supported the implementation of the specific project "GMES and Africa", aimed at giving African countries the chance to harness the benefits of space systems for their development. Communication satellites, on the other side, can make remote areas accessible and link their inhabitants with the rest of the world.

I will not linger on the success of these tools. I have been convinced for a long time that there is no development if there is no "maintenance" of our planet, deeply linked with the role of stewardship, hence the care for existing and future generations, which is the core of sustainability. Space technologies can be of tremendous help in this mission: they can support the implementation of several policies, from urban development to maritime traffic, to energy solutions, tourism, health and much more.

In the light of the recent dramatic earthquakes in central Italy, I was thinking how useful the Copernicus satellites have been for assistance to the relief teams, but also how precious is the information that their regular monitoring of the surface can produce: maybe, from the registration of soil modification, water basin changes, animal behaviour, some pre-warning signs can be obtained for the timely alert of populations in case of danger.

The first set of data after the quake of April 2009 has in some areas shown a vertical displacement of 30 cm and an East to West displacement of 16 cm, with 1 cm accuracy. The tectonic displacement in the area is of the order of 5 mm/year, which is the range of sensitivity of the technology. It is therefore very important to follow other phenomena that could be related to mounting earthquakes, and again we point to space. Encouraging results have been obtained by detecting variations in the ionosphere, as electromagnetic fields and particles, probably due to very low frequency electromagnetic emission from the Earth's crust. Cooperation between Italy and China is now underway. The first satellite will be launched in China next year and two years later a second one. And then we have to wait. I don't know what to wish for - an early or a late quake?

Satellite observations can tell us much about the conditions of our cultural heritage, to prevent or recover from disasters. I am not only referring to ancient temples or old palaces, but also to our cultural identity, stemming from our lands, our rivers, our towns, our mountains shaped through human history and activities. To make peoples aware of this lens means to provide them with a tool for evolution.

I share the proposal of the Sustainable Development goals to empower developing countries to master and facilitate access to space observation as a precondition to environment management.

But now we have to consider the new challenges that we have to confront, substantially summarized in global warming and the ensuing climate change that pose new problems to both developing and developed countries. Therefore, access to space infrastructures is of primary importance to all continents and countries. The main changes in climate we can expect can be summarized as less but more intense rains, that imply also longer dry periods. Intense rains mean higher chances of land erosion, landslides. Longer droughts mean a higher risk of desertification on the one side and the higher risk of fires, especially for forests. A constant flow of data is necessary then to orient the territorial care that is specifically requested. A basic need is to increase the retention times for water, e.g. with widespread use of terraces that enable the deeper penetration of water into the soil to the benefit of vegetation and to mitigate soil erosion. The amount of water can be forecast and estimated and the data used for downstream areas preparation that could include rivers and brooks for possible further increases in water retention. This is specifically important in areas prone to desertification in conjunction with planting drought resistant plants.

For forests, satellite data could be extremely useful for fire alarms and early action, but even more for risk control. This implies continuous monitoring of the amount of biomass accumulated that represents the fire load. The
forests in addition should be cleared of fallen trees and branches. These characteristics can be monitored. And data could be used to clean and thin the forest.

I think that this is particularly important if there is the possibility of collecting the biomass and feeding it gasification plants, thus making possible the production of clean and sustainable energy. Satellite data can supply the information on carbon sequestration and keep the process positive, even in fire risk control, with an overall environmental advantage. Preliminary estimates point to a potential of more than 1 ton of oil equivalent per hectare per year.

Clearly, energy exploitation is not the only option: biomass could be used sequentially for construction and furniture production, then for chemistry (as a replacement for oil) and then for energy production, that could further guarantee the overall sustainability of the process.

Similarly, satellite observation of rainforests enables measurement of the amount of carbon stored and the level of conservation, which enables measurement of this for the entire globe. This could be the basis of compensation, e.g. from carbon taxes, to recognize in concrete this global service.

Now “A Space Strategy for Europe” is in preparation and it is a time for choices: the contributions of space to Commission priorities are listed:

a. A deeper and fairer internal market with a strengthened industrial base;

b. Jobs, Growth and Investment (space and all industries building on satellite services);

c. Energy Union (climate, transport, energy);

d. The Digital Single Market (telecommunication, data economy);

e. Migration, border control, global disaster and crisis management;

f. The EU as a stronger global actor.

I’ll not go into detail, but I think that the two options summarize the choices. Option 1 we could entitle “business as usual” and Option 2, which I definitely prefer, expresses a broader vision and involvement, and I hope that this direction will be taken. Let me also recall that our involvement could include developing countries that could profit from our data, without a substantial burden for us, but with very substantial aid to them.

These developments, though, are inevitably related to our research and industry role and success, both at domestic and international level. Does it make sense, I wonder, to promote the model of a "new space economy", where private initiative can undermine our collective efforts to guarantee a European independent access to space? The space endeavour, in terms of European programmes, made sense just because it was finally possible to unite national traditions and resources towards the common goal of ensuring a European Earth observation capability: if now we listen to the sirens singing "private is beautiful", are we not going to waste or put in danger those very resources? Indeed in my opinion, resources should be beefed up, linking the European space policy to a dedicated European economic fund of long duration.

Of course we should also give more opportunities for start-ups and young entrepreneurs to develop new products: space is a sector congenial for the digital society! Granted, we should better support our industry and research, maybe by supplying more economic stability, more defined plans for the future, legal certainties, including more protection at international level. Why is the space sector, now that it has become so popular around the world, not subject to any trade rules? This is the way to defend our European standards of excellence and make them a model for the rest of the world.

Growth and jobs, the mantra of these days, are not new resolutions: all we did in the past was certainly geared towards the creation of everybody's wellbeing. Maybe, today, we can offer much more: by taking stock of what we have, by recognising our strengths and our weaknesses, and by creating the conditions to preserve this world, we are helping humankind towards a harmonious evolution. At least, this is the hope I see when I look at the sky.
ratified the Paris Agreement and this is a great event.

The G20 represents the majority of the world’s population, the global economy and global greenhouse gas emissions. The G20 has shown that it can act fast and decisively on global matters, most prominently on financial stability. The G20 can be the right forum to lead the crucially important mainstreaming of climate in the economy.

Just the day before the G20 summit in Beijing, Climate Transparency published its report “BROWN TO GREEN”, which describes the Paris Agreement’s mission – and what we are doing to support it - in simple terms. The world must turn its back on destroying the climate through burning “brown” fossil fuels, and transition to a “green” low-carbon economy. The report shows some encouraging signs that decarbonisation is progressing, but also that progress often moves at a snail’s pace, sideways, or even backwards.

Decarbonisation is certainly one of the key issues towards sustainable development. This objective of this conference is to identify the role of space for sustainable development. Our topic today is to examine the “Financial and non-financial aspects” of sustainable development. Several prominent international experts from the public and private sectors will help us to analyse these aspects to understand the present situation and the concrete actions that can be taken to help the global development process in a sustainable, harmonised and effective way. And, as the subject of this conference states, the role of space in this process.

Sustainable development is certainly a broad concept that can include everything and nothing. As recalled by Vittorio Prodi, sustainability is widely understood as meaning economic development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This highlights the responsibility of today’s generations towards future generations.

The Millennium Development Goals created in 2000 can help us to understand what sustainable development means. Personally, I strongly believe that investing in schools and culture would bring an enormous return in terms of: health improvement, hunger reduction, inequality reduction (that is one of the main reasons why Europe has a minimal economic growth – inequality that was created by the total free market and uncontrolled globalisation), development of economic activities in situ (reducing therefore migration), development of clean energy, and reduction of terrorist acts.

Space, of course, can substantially contribute to these goals through its infrastructures. Earth observation for optimising agriculture and pollution monitoring – Telemedicine for remote intervention and learning – Telecoms for e-learning and access to information – GNSS for improving transports – GNSS, COPERNICUS and TLC for improving security. Even drones guided through space infrastructures can play a positive role. And these are but a few examples.

The actors in this process are: the UN, national governments and national space agencies, the EU, ESA, Eumetsat and the manufacturing industry and operators. The key issue is “international cooperation”, in accordance with the basic principle of the Space Treaties that space belongs to all human beings who are also the beneficiaries of all advantages coming from space exploitation.

Now the main question is: who is going to finance the development/production of new space infrastructures – or the exploitation of current ones, to enable space to contribute to the sustainable development process?

4.5 ESPI 10th Autumn Conference Web-Page

In order to ensure a wider awareness about the content and the outcome of the 10th ESPI Autumn Conference, “Space for Sustainable Development”, ESPI created a dedicated web-page which contains detailed information about the programme, speakers’ presentations, audio recordings, and other outreach material. The page can be accessed at:

http://www.espi.or.at/10th-autumn-conf
4.6 ESPI 10th Autumn Conference Programme

10th ESPI Autumn Conference
“Space for Sustainable Development”
15 – 16 September 2016
ESPI, Vienna

Day 1 (afternoon) – 15 September 2016

| 13:30  | Registration and Welcoming Coffee |

Opening (14:00 – 14:45)

| Opening remarks | Jean-Jacques Tortora, Director, ESPI |
| Key Note Speech | Vittorio Prodi |

Supported by:

ESPI European Space Policy Institute
Schwarzenbergplatz 8 (Entrance: Zaunergasse 1-3)
A-1030 Wien
Tel: +43 (0) 1 718 11 16-0
www.espi.or.at
# Session 1: Space as an Enabler (14:45 – 18:00)

**Chair:** Jean-Jacques Tortora, Director, ESPI  
**Rapporteur:** Elisabeth Veit, ESPI

<table>
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| 1.  | 14:45      | The Challenges in Development and the Role of Space | Justin Loiseau  
Senior Policy Associate, Massachusetts Institute of Technology (MIT)  
J-PAL Global  
Jennifer Frankel-Reed  
Senior Climate Change Specialist, US Agency for International Development |
|     | 15:45      |                                           |                                                                          |
| 2.  | 15:45      | The Different Development Assistance Models and Space | The different models & the Sustainable Development Goals  
Petra Dannecker  
Head of Department Development Studies, University of Vienna  
Governmental Implementation  
B.S. Bhatia  
Programme Director Space Education, Vikram Sarabhai Community Science Centre, Ahmedabad  
Former Director of Development and Educational Communication Unit (DECU), Indian Space Research Organisation (ISRO) |
|     | 16:45      |                                           |                                                                          |
|     | 17:00      | Coffee break                              |                                                                          |
| 3.  | 17:00      | The European Approach                     | Didier Lenoir  
Head of European Union Delegation to the International Organisations in Vienna, European External Action Service (EEAS) |
|     | 17:30      |                                           |                                                                          |
|     | 18:00      | Panel discussion                           | Questions and answers  
Panel 1 Wrap-up                                                          |
| 18:15 | Evening event | sponsored by FFG | Guided bus tour of Vienna  
Buffet dinner at FFG Forum                                               |
### Day 2 (morning) – 16 September 2016 (9:30 – 13:00)

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<td>5</td>
<td>10:00</td>
<td>Embedding Space in Developing Countries’ Strategies</td>
<td>Mahama Ouedraogo Head of division science and technology, Chair Space Policy African Union Commission</td>
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<td>10:30</td>
<td>Coffee break</td>
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<td>6</td>
<td>11:00</td>
<td>NGOs – the On-the-Ground Perspective</td>
<td>Andreas Papp International Director, SOS Children Villages</td>
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<td>12:00</td>
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<td>Edith Rogenhofer Médecins Sans Frontières (MSF)</td>
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<td>7</td>
<td>12:00</td>
<td>Space Agencies’ perspective on Space for Sustainable Development</td>
<td>Josef Aschbacher Director Earth Observation, European Space Agency (ESA)</td>
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<td></td>
<td>12:30</td>
<td>Panel discussion</td>
<td>Questions and answers Panel 2 Wrap-up</td>
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<td>13:00</td>
<td>Buffet lunch</td>
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Day 2 (afternoon) – 16 September 2016 (14:00 – 17:00)

Session 3: Financial and Non-Financial Aspects of Sustainable Development
Chair: Dr. Alfredo Roma, ESPRI Advisory Council
Rapporteur: Alessandra Vernile, ESPRI

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| 8.  | 14:00    | Emerging Approaches in Development Efforts      | Yun Zhao  
Director  
Centre for Chinese Law, Hong Kong                                            |
|     | 14:30    |                                                 |                                                                          |
| 9.  | 14:30    | International Financial Institutions in Space   | Edward Anderson  
Senior Technology and Innovation Specialist, World Bank                 |
|     | 15:00    |                                                 |                                                                          |
| 10. | 15:00    | The Private Actors                              | Jean-François Bureau  
Director of Institutional & International Affairs, Eutelsat                |
|     | 16:30    |                                                 | Dara Dotz  
Co-Founder, Field Ready                                                     |
|     | 16:45    |                                                 | Christine Leurquin  
Vice President of Institutional Relations, SES S.A.                        |
|     | 16:30    | Panel discussion                                | Andrew Zolli  
Panel Labs                                                              |
|     | 16:45    |                                                 | Questions and answers  
Panel 3 Wrap-up                                                          |

Conclusions and Recommendations with all Panels (16:45 – 17:00)
Moderated by Jean-Jacques Tortora, Director, ESPRI
Rapporteurs: Stefano Ferretti, Elisabeth Veit, Alessandra Vernile, ESPRI

Closing (17:00)
Jean-Jacques Tortora, Director, ESPRI
4.7 Speaker’s Biographies

Vittorio Prodi
Professor, University of Bologna

Degree (laurea) in Physics, Dec. 1959, Fellowship of the IAEA at Argonne National Lab., Argonne, Ill., Assistant and Professor at the Physics Institute of the University of Bologna. Subjects of research were: Nuclear Physics, Radiation Protection, and specifically the physical mechanisms of aerosol particles deposition in the lungs, thus contributing to the standards of aerosol deposition PM 10 and PM 2.5. Elected President of the Province of Bologna from 1995 to 2004 (with particular interest in the organisation and care of the territory). Elected to the European Parliament in 2004 and re-elected in 2009. In these 10 years was a member (full and substitute) of the ENVI (environment, public health and food safety) and ITRE (Industry research and energy) committees, aiming at understanding the Energy and Environment system. President of the inter-institutional group Sky & Space with specific interests in satellite observation of the Earth. Speaker of the funding legislation of the Copernicus Constellation. At present Vittorio Prodi has a personal engagement with the synergy between biomass exploitation through gasification and climate change adaptation.

Session 1: Space as an Enabler

Chair:

Jean-Jacques Tortora
Director
European Space Policy Institute

Jean-Jacques Tortora has been Director of ESPI since June 2016. Before this, he served as the Secretary General of ASD-Eurospace. From 2004 to mid-2007, he was head of the French Space Agency (CNES) office in North America and the Attaché for Space and Aeronautics at the Embassy of France in Washington, D.C. Previously he was Deputy Director for Strategy and Programs, responsible for the Industrial Strategy of CNES, the French Space Agency. Prior to that, he was France’s representative on the ESA Industrial Policy Committee and Joint Communication Board. From 1998 to 2000, Mr Tortora was adviser to the French Ministry of Research for Industrial Policy Funds management, aimed at supporting industry competitiveness and the development and promotion of new space applications and services.

Rapporteur:

Elisabeth Veit
Junior Researcher,
European Space Policy Institute

Elisabeth Veit holds a Master of Advanced International Studies from the Diplomatic Academy of Vienna, and a BA in History from Emmanuel College, Cambridge. Since 2015, she has been conducting research on space policy and sustainable development at the European Space Policy Institute. Before this, she was with the Permanent Representation of Afghanistan in Vienna and coordinated implementation of public health initiatives for secondary schools in Malawi.
The Challenges in Development and the Role of Space

Justin Loiseau
Senior Policy Associate, Massachusetts Institute of Technology (MIT) J-PAL Global

Justin Loiseau is a Senior Policy Associate at J-PAL, where he supports J-PAL’s Crime and Finance sectors and is the lead regional liaison to the Africa office. As a member of the policy group, Mr Loiseau works with NGOs, foundations, governments, and others to cultivate research partnerships and ensure that program and policy decision-making is informed by scientific evidence. He is the author of J-PAL publications on microcredit and early childhood stimulation. Justin holds an M.A. in Economics from the University of Auckland and dual B.A.'s in Economics and Environmental Studies from the University of North Carolina at Chapel Hill.

Jennifer Frankel-Reed
Senior Climate Change Specialist, US Agency for International Development

Jennifer Frankel-Reed is a Senior Climate Change Specialist at the US Agency for International Development, where she provides technical assistance on climate change adaptation to USAID’s regional and country missions and coordinates the USAID and NASA SERVIR programme. She has been a climate change consultant for leading international organisations including IRG, GIZ, GEF and the United Nations Development Programme in the United States and abroad. Jennifer holds an MEM in Global Change Science and Policy from Yale University and a BS in Environmental Science from Willamette University.

The Different Development Assistance Models and Space

The different models & the Sustainable Development Goals

Petra Dannecker
Head of Department Development Studies, University of Vienna

Petra Dannecker is Head of the Department of Development Studies at the University of Vienna. She did her PhD in Sociology (Bielefeld University, Germany) where, until 2007, she was Assistant Professor and Lecturer. Then she joined the German Development Institute in Bonn as a Senior Research Fellow responsible for coordinating research and knowledge transfer between the Federal Ministry for Economic Cooperation and Development (BMZ) and scientific communities focusing on development research in Germany. In October 2008 she became Visiting Professor for Global Studies and Development Sociology at the Department of Sociology at the University of Vienna and in 2011 Full Professor for Development Sociology. She is working on issues related to development sociology, development politics, globalization and migration processes, and gender, focusing regionally on South and Southeast Asia.
Governmental Implementation

B.S. Bhatia
Programme Director Space Education, Vikram A Sarabhai Community Science Centre, Ahmedabad.
Former Director of Development and Educational Communication Unit (DECU), Indian Space Research Organisation (ISRO)

Born in 1944, Sri Bhupendra Singh Bhatia held numerous key positions in the Indian Space Research Organization between 1971 and 2007. This included working as Director of the Development and Educational Communication Unit (DECU), and as Project Director for EDUSAT, the first dedicated "Educational Satellite" that provided satellite based two-way communication to class rooms for delivering educational materials in India. He has also been a consistent and passionate supporter of tele-medicine projects in India, which have helped to connect over a hundred rural medical centres to urban specialty centres. Among other positions, he currently serves as Programme Director Space Education at the Vikram A. Sarabhai Community Science Centre, Ahmedabad.

The European Approach

Didier Lenoir
Head of European Union Delegation to the International Organisations in Vienna, European External Action Service (EEAS)

Didier Lenoir studied History and Political Science, graduating with a BA in History from the "Institut d’étude politique de Paris" in 1984. He joined the Navy in 1984 and held various positions in France and abroad until he was selected to join the war college French Joint Staff in charge of multilateral issues in 1996. Mr Lenoir joined the French Permanent Representation to NATO in 1998 and was in charge of financial issues as well as "civil emergency planning". He left active service in 2001 to join the General Secretariat of the Council of the European Union, where he held various posts in the field of crisis management and security related issues. He was also in charge of developing relations with the EU’s partners in crisis management (UN, UNODC, OSCE). As acting director of the Crisis Management and Planning Directorate, he was in charge of the oversight of the EU Satellite Centre. He was Special Advisor to the Managing Director for Europe and Central Asia in the European External Action Service and is now Head of the Delegation of the European Union to the International Organisations in Vienna.

Session 2: Sustainable Development and Space

Chair:

Luc St-Pierre
Chief of the Space Applications Section, UNOOSA

Luc St-Pierre (M.Sc. Geography, University of Sherbrooke, Canada and M.Sc. Environmental Economics, Wye Imperial College, University of London) is a Geographer born in Quebec, Canada. He worked at developing geographic information systems for the management of the environment and natural resources in Africa, Asia and Latin America in the 1990’s before joining the United Nations in 2000. He first helped develop datasets and GISs for the UN Environment Programme (UNEP) in its work to protect marine biodiversity in the Caribbean Sea and control marine pollution. Between 2005 and 2012 he strengthened the mapping, remote sensing and GIS capabilities of the UN High Commissioner for Refugees (UNHCR) to improve support and assistance during humanitarian crisis. He joined the UN Office for Outer Space Affairs (UNOOSA) in 2012 to supervise the United Nations Platform...
for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) and has been Chief of the Space Applications Section of UNOOSA since April 2016.

**Rapporteur:**

Stefano Ferretti
Research Fellow,
European Space Policy Institute

Dr. Stefano Ferretti is an ESA Space Policy Officer, seconded to the European Space Policy Institute, where he manages the research "Space for Sustainable Development". Previously, he worked as Energy and Infrastructure Manager at ESA/ESRIN, as ISS project manager at ESA/ESTEC and at Thales Alenia Space. He is a recipient of the International Astronautical Federation Napolitano Award. He holds a PhD and a Masters in Engineering from the University of Bologna, a Masters of Space Studies from the International Space University, and has studied space policy and law, innovation, entrepreneurship, and leadership, at George Washington University and at MIT.

**Space and the 2030 Agenda for Sustainable Development**

Simonetta di Pippo
Director
UNOOSA

Simonetta Di Pippo is the Director of the United Nations Office for Outer Space Affairs (UNOOSA), which is mandated to enhance international cooperation in space activities to promote their use for humanity. Prior to joining UNOOSA in 2014, she was Head of the European Space Policy Observatory at Agenzia Spaziale Italiana (ASI) in Brussels. Ms. Di Pippo also served as Director of Human Spaceflight of the European Space Agency from 2008 to 2011, and Director of the Observation of the Universe at ASI from 2002 to 2008, where she started her career in 1986. She has been an Academician of the International Academy of Astronautics (IAA) since 2013, and since 2016 a member of the IAA Board of Trustees. Ms Di Pippo holds a Master Degree in Astrophysics and Space Physics from "La Sapienza" university in Rome and a Honoris Causa Degree in Environmental Studies from the St. John University in Vinovo. Ms. Di Pippo was knighted by the President of the Italian Republic in 2006. In 2008, the International Astronomical Union named asteroid 21887 "Dipippo" in honour of her contribution to this field.

**Embedding Space in Developing Countries’ Strategies**

Mahama Ouedraogo

Head of division science and technology, Chair Space Policy African Union Commission

Mahama Ouedraogo holds a PhD in plant breeding from Texas A&M University. He has served as acting Director of the Semi-Arid Food Grain Research and Development and Executive Secretary of the African Union Scientific Technical and Research Commission. He is currently the head of Science and Technology Division and Acting Director of the Department of Human Resources, Science and Technology (HRST), of the African Union Commission. In these capacities he oversees the implementation of various African Union decisions on Science and Technology, including the Science Technology and Innovation strategy for Africa (STISA-2024), the African Space Policy and Strategy, and the Pan African University.
NGOs – the On-the-Ground Perspective

Andreas Papp
International Director, SOS Children Villages

Andreas Papp was appointed International Director of Emergency Response at SOS Children’s Villages International (SOS-CVI) in March 2015. His professional engagement for humanitarian aid began with Médecins Sans Frontières (MSF) in 2004, where he worked as Logistics Administrator and later coordinated missions in complex emergency settings. He then served as MSF-Austria’s Delegate & Programme Director, where his tasks included the initiation and implementation of space technology projects to support field operations. In his current position at SOS-CVI, Andreas Papp oversees emergency response activities in more than two dozen countries, fostering emergency response capacity building through the use of new technologies.

Edith Rogenhofer
Médecins Sans Frontières (MSF)

Edith Rogenhofer started to work in the humanitarian field in 1991 and since 1998 has been with MSF. She has mainly worked in projects in Africa, with a few stints in Afghanistan, Pakistan, Bangladesh and Myanmar. The majority of the projects have been projects in complex emergencies, focusing on water supply and sanitation in camp settings and rural areas. She holds an MSc in Water management as well as a diploma in drilling. She has been contracted since 2011 by MSF-Austria as WatSan consultant in the Delegate and Programme Department with the specific task of developing and integrating GIS applications in MSFs work and liaising with the projects. Within the EO4HumEn project, she coordinates work related to user requirements and user validation.

Space Agencies’ perspective on Space for Sustainable Development

Josef Aschbacher
Director Earth Observation, European Space Agency (ESA)

Josef Aschbacher is the ESA Director of Earth Observation Programmes and Head of ESRIN, ESA’s centre for Earth Observation, located in Frascati, Rome. Born in Austria, he studied at the University of Innsbruck, graduating with a Masters and a Doctoral Degree in Natural Sciences. His professional career in ESA began in 1990 as a Young Graduate at ESRIN. From 1991-1993 he was seconded as ESA Representative to Southeast Asia to the Asian Institute of Technology in Bangkok, Thailand. From 1994 - 2001 he was the Scientific Assistant to the Director of the Space Applications Institute at the European Commission Joint Research Centre, Ispra, Italy. He returned to ESA HQ (Paris) in 2001 as Programme Coordinator, primarily responsible for advancing Copernicus activities within ESA. In 2006, he was nominated Head of the Copernicus Space Office, leading all activities for Copernicus within the Agency and with external partners, in particular the European Commission. In 2014, he was promoted to Head of Programme Planning and Coordination, where he was responsible for planning ESA’s Earth Observation programmes and for formulating and implementing programmatic and strategic decisions across the Directorate.
Session 3: Financial and Non-Financial Aspects of Sustainable Development

Chair:

Alfredo Roma
Advisory Council of the European Space Policy Institute

Alfredo Roma is an economist now consultant for the aerospace industry. He is a member of the Advisory Council of ESPI in Vienna. He has been member of the RPAS Steering Committee, created by the European Commission for the integration of civil drones in to the common airspace and Coordinator of the Group of Experts on social impact. He has been National Coordinator for the Galileo Project at the Italian Prime Minister Cabinet and Italian Delegate at European Space Agency. From September 1998 to July 2003 he was Chairman of ENAC, the Italian Civil Aviation Authority and from June 2000 to July 2003 also President of ECAC (European Civil Aviation Conference). He was a member of the High Level Group formed by Loyola De Palacio, Vice-president of the European Commission, for the Single Sky. From 1992 to 1998 he was CEO of ANSA. From 1975 to 1992 he was an untenured Professor of Business Finance, Faculty of Economics, University of Modena.

Rapporteur:

Alessandra Vernile
Research Fellow
European Space Policy Institute

Alessandra Vernile has been a Resident Fellow at European Space Policy Institute (ESPI) since May 2016, with a fellowship from the Italian Space Agency (ASI) and the Italian Society for International Organization. Previously she worked as Intern at the Strategy Department at the European Space Agency HQ in Paris and as Event Manager at the NATO Defence College Foundation in Rome. She has an MA in International Relations from LUMSA University, in Rome. In 2014 she attended a Master of Advanced Studies in Economic Security, Geopolitics and Intelligence at SIOI and in 2015, as a fellowship-student, she received a Master in Institutions and Space Policy at SIOI, in Rome.

Emerging Approaches in Development Efforts

Yun Zhao
Director
Centre for Chinese Law, Hong Kong

Prof. ZHAO Yun is Professor and Head of Department of Law at the University of Hong Kong; PhD (Erasmus University Rotterdam); LLM (Leiden University); LLM & LLB (China University of Political Science and Law). He is also Director of the Centre for Chinese Law. Prof. Zhao is Chen An Chair Professor in International Law at Xiamen University (2015) and Siyuan Scholar Chair Professor at Shanghai University of Foreign Trade (2012-14). He is listed as an arbitrator in several international arbitration commissions.
International Financial Institutions in Space

Edward Anderson
Senior Technology and Innovation Specialist, World Bank

Edward Anderson is a Senior Technology and Innovation Policy Specialist at the World Bank’s Global ICT unit based in Dar es Salaam, Tanzania. His work is in supporting the government’s Open Data Initiative and he is responsible for designing government modernization projects in UAV mapping, citizen data, geospatial applications and smart sensors. Mr Anderson also participates on the advisory boards of City SDK, the Code for Europe and the European Space Agency’s Open Science Committee, and the EU’s Drones in Humanitarian Action Expert Working Group. Prior to joining the Bank he worked in disaster risk management at the Inter-American Development Bank, the European Space Agency’s Science and Applications Directorate, the UN Office for Outer Space Affairs, and founded a start-up company on epidemic early warning systems in Kenya. He holds Master’s degrees in both aerospace engineering and international economics.

The Private Actors

Jean-François Bureau
Director of Institutional & International Affairs, Eutelsat

Jean-François Bureau, a graduate of the Institut d’Etudes politiques de Paris, began his career in the private office of France’s Ministry of Defence where he was technical advisor from 1983 to 1985. He subsequently carried out various responsibilities at the Ministry of the Interior, including as sub-prefect and civil administrator from 1985 to 1991. From 1991 to 1994 he worked in the secretariat-general of the Presidency of the French Republic, and from 1994 to 1998 was a rapporteur at France’s Court of Auditors (Cour des Comptes). In 1998, Jean-François Bureau set up the Communications and Information Delegation at France’s Ministry of Defence, which he managed until 2007, in addition to acting as spokesman. From 2007 to 2010, he was NATO Assistant Secretary General, in charge of public diplomacy. He was a General Controller at France’s Ministry of Defence from July 2010. Since October 2011 he has been the Director of Institutional & International Affairs in EUTELSAT.

Dara Dotz
Co-Founder, Field Ready

Dara Dotz holds a BS in Industrial Design with a minor in International Business from MSCD. Ms Dotz combines her design strategy experience and rapid ethnographic assessment to empower others through technology. With a focus on disrupting supply chains and “making” in austere environments she has co-founded Field Ready, focusing in on-demand manufacturing in post-disaster zones. Recently in Haiti, Field Ready brought 3D printers to teach locals how to make needed medical supplies and replacement parts for rural clinics. In the Bay Area, Ms Dotz also works as Human Factors Lead for Made In Space, Inc., a company that built and operates the first gravity-independent 3D printer on the International Space Station. In her free time she flies drones and is attempting to break the space-time continuum. She believes that 3D printing in space is just the beginning.
Christine Leurquin
Vice President of Institutional Relations, SES S.A.

Christine Leurquin is VP, Institutional Relations and Communications at SES S.A., positioning the company within the European Union and other European institutions, such as the European Union, ESA and OECD. She reviews regulations, provides political support, and engages in setting-up research and development and institutional projects. She follows the European Institutions’ political issues and debates of interest to her company, especially those concerning crisis management, satellite broadband and the mobile multimedia sector. She is a Steering Board member of Networld2020 and the 5G IA Association. She is also the key person in the company as regards the GNSS projects such as Galileo and Egnos. She has 30 years of experience in the satellite telecommunications field in Europe. In her previous position, she was the CEO of a company that she started which introduced new satellite services in Belgium. She turned it into a successful and profitable business. With her ability to speak several languages, Mrs Leurquin has been able to market in areas where services are not yet established and she provides SES with that extra incentive to attract clients in those regions.

Andrew Zolli
Strategic Advisor, Planet Labs

Andrew Zolli oversees the global social, climate, environmental and humanitarian portfolio of Planet Labs, a breakthrough global sensing company that is deploying the largest constellation of Earth-observing satellites in human history. Andrew is also the author of “Resilience: Why Things Bounce Back”, and writes and speaks widely on issues of resilience, complexity and systems-leadership and transformation. He is the former Curator and Executive Director of PopTech, and advises a range of social enterprises, companies, governments and institutions. He is a Board member of several leading enterprises, including the Garrison Institute, which explores the intersection between contemplative practices and engaged social change.

4.8 List of Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Title/Position</th>
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<tr>
<td>Fabrizio Aiello</td>
<td>Capitan, Italian Air Force, Italy</td>
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<tr>
<td>Cenan Al-Ekabi</td>
<td>Resident Fellow, ESPI, Austria</td>
</tr>
<tr>
<td>Fahad Alqurnas</td>
<td>Adviser to the Permanent Representative to the United Nations, Austria</td>
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<tr>
<td>Marco Aliberti</td>
<td>Resident Fellow, ESPI, Austria</td>
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<tr>
<td>Herbert Allgeier</td>
<td>Former Director General, European Commission, Germany</td>
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<tr>
<td>Edward Anderson</td>
<td>Senior Technology &amp; Innovation Specialist, World Bank, Tanzania</td>
</tr>
<tr>
<td>Gianfranco Apuzzo</td>
<td>SGAC, Italy</td>
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</tbody>
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Austria

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Head of Aeronautics and Space Agency
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Enkibox Founder
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Leadership Academy of the German Armed Forces
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Peter Jankowitsch
President, International Academy of Aeronautics
Former Austrian Federal Minister for Foreign Affairs
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Co-founder
Brimatech
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European External Action Service (EEAS)
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Belgium

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Senior Policy Associate
J-PAL Global - Massachusetts Institute of Technology (MIT)
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Thales Alenia Space
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Permanent Mission of the Republic of Turkey to the United Nations and International Organizations in Vienna
Austria
Saeed Hameed Hassan Musawi
Expert
Permanent Mission of the State of Qatar to the International Organizations in Vienna Austria

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Embassy of Estonia in Vienna Austria

Johannes Ortner
Vice-President
Eurisy Austria

Mahama Ouedraogo
Head of Science and Technology Division
African Union Commission Ethiopia

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European External Action Service in Vienna
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Jean-Jacques Tortora
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Matteo Tugnoli
Resident Fellow
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Austria

Elisabeth Veit
Junior Researcher
ESPI
Austria

Alessandra Vernile
Resident Fellow
ESPI
Austria

Wolfgang Wagner
Professor
Technical University of Vienna
Austria

Peter Zeil
Professor (retired) and Senior Project Manager
Interfaculty Department Geoinformatics ZGIS
University of Salzburg
Austria

Yun Zhao
Director
Centre for Chinese Law
Hong Kong, China
5. International Conference on Sustainable Development, New York

The International Conference on Sustainable Development 2016, titled “Moving Forward: The SDGs in Practice”\(^\text{26}\), was organized during the week of the United Nations General Assembly and took place at Columbia University in New York.

The conference, organized by Professor Jeffrey D. Sachs\(^\text{27}\), Director of the Sustainable Development Solutions Network and Director of the Center for Sustainable Development at Columbia University, provided insights to identify and share practical, evidence-based solutions that can support the achievement of the Sustainable Development Goals (SDGs). It was well attended by key stakeholders from government, academia, the United Nations, international agencies, NGOs, and grassroots organizers to share practical solutions towards the achievement of a more sustainable and inclusive society.

The speakers underlined the importance of thoughtful, conscious, directed and strategic common thinking to achieve the SDGs. Some expressed the view that all should contribute by creating a knowledge based society, while enabling transparent, participative and inclusive mechanisms.

In this context building public awareness and political consensus around the SDGs is an essential step that goes along with the objectives of improving health, education and economic growth, among the other targets. It was questioned how different societies are developing and what lessons and best practices can be shared at global level. Dialogue among all the actors is therefore essential to identifying common solutions and putting them into practice.

The key aspect that was touched upon was how to best deal with global challenges and complexity in open and innovative ways: the energy, mobility and connectivity transitions were addressed, including leapfrog approaches in developing economies, and various financial approaches and instruments for SDGs implementation were discussed.

\(^{26}\) International Conference on Sustainable Development (21-22 September 2016), New York, http://ic-sd.org/

It can be argued that sustainable development programs which make use also of space assets, would allow the achievement of the SDGs in a shorter timeframe, as they would rely on a technological leapfrog, rather than on the traditional steps that our societies went through in the past. Some good examples are given in the areas of e-health, tele-education and renewable energy, where satellite information is crucial to determine wind, water and solar energy potential during the planning and operational phases.

Considering the close link between COP21 targets and the Agenda 2030 in its holistic view, space based services targeted to developing economies in the planning phase of new energy infrastructures, would create better living conditions not only locally but all over the globe, by reducing emissions and the associated climate change effects.

It is therefore time to fully exploit the potential embedded in space assets, by a structural provision of fully integrated sustainable development services to countries which would highly benefit of a high development rate in a relatively short time.

5.2 Featured Speakers

Andrew Holness, Prime Minister, Jamaica
Erna Solberg, Prime Minister, Norway
Savaş Alpay, Chief Economist, Islamic Development Bank
Diana Amini, Global Manager, H&M Foundation
Shaida Badiee, Managing Director and Co-founder, Open Data Watch, Inc.
Gidon Bromberg, Co-Founder of EcoPeace Middle East
Nicolas de Cordes, Vice President Marketing Anticipation, Orange Group
Hervé P. Duteil, Managing Director, Corporate Social Responsibility & Sustainable Finance, BNP Paribas

Hakima El Haite, Minister of Environment, Morocco, and COP22 Host
Grete Faremo, UN Under-Secretary-General and Executive Director, UNOPS
Rebeca Grynspan Mayufis, Secretary General, Ibero American Conference
Jody Heymann, Dean, Public Health School, UCLA; Founding Director, WORLD Policy Analysis Center
Mariéme Jamme, Founder and CEO, Spotone One Global Solutions
Sanjeev Khagram, John Parke Young Chair in Global Political Economy, Occidental College
Dominique Maingot, Project Officer for Solutions Initiatives, SDSN Youth
Amina Mohammed, Minister of Environment, Nigeria
Morten Nielsen, Managing Director, Sustainia
Femi Oke, Internationally-Renowned Journalist, Writer and Moderator
John Cardinal Onaiyekan, Archbishop of Abuja, Nigeria
Malcolm Preston, Global Head of Sustainability Services, PricewaterhouseCoopers
Irwin Redlener, Director, National Center for Disaster Preparedness, Columbia University Mailman School of Public Health
Jeffrey D. Sachs, Director, Sustainable Development Solutions Network
John Rutherford Seydel III, Trustee, Turner Foundation
Dhananjayan (Danny) Sriskandarajah, Secretary General, Civicus
Achim Stein, Director, Oxford Martin School
Patrick Paul Walsh, Professor of International Development Studies, University College Dublin
6. United Nations/International Astronautical Federation Workshop 2016, Mexico


The workshop was co-sponsored by the European Space Agency, with contributions from the International Academy of Astronautics (IAA), the Committee on Space Research (COSPAR) and the International Institute of Space Law (IISL), and was hosted by the Mexican Space Agency in conjunction with the 67th International Astronautical Congress.

The main objective of the workshop was to enhance the capabilities of countries in using space science, technologies and their applications in support of sustainable economic, social and environmental development.

The speakers first examined some of the relevant, affordable and accessible space-related technologies and information resources, and then discussed at large the role of space science, technology and applications in support of the 2030 Agenda for Sustainable Development, while strengthening international and regional cooperation. Various themes were discussed, such as Space and Global Challenges, Space for Economic Development, Disaster Management and Early Warning, Health and Education, Environment and Biodiversity, Connectivity for Reducing Social Divide.

The outcome of the workshop was a set of recommendations to increase awareness, among key stakeholders as well as the research and academic community, on space technology applications and to promote initiatives that integrate space solutions into policy and decision making processes, considering also associated legal and regulatory matters.

The concluding round-table, moderated by Simonetta Di Pippo (UNOOSA), was attended by Pascale Ehrenfreund (DLR), David Kendall (COPUOS), Javier Mendieta (AEM), Chiaki Mukai (JAXA) and Johann-Dietrich Woerner (ESA), and aimed to link the UN/IAF workshop to the preparations for UNISPACE+50, providing an overview on how this conference may act as a catalyst to optimizing the future use of space-based solutions to contribute to addressing the World’s challenges.

These key reflections will now be injected in the UNISPACE+50 preparatory process, which is managed by UNOOSA, and that will lead in 2018 to the organization of a new UN conference, on the 50th anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space.

The European Space Policy Institute was represented by Dr. Stefano Ferretti, who presented the outcomes of the ESPI lead initiative to create a dialogue platform between space actors and field actors. The contribution was summarized in the paper "Sustainable Development: Challenges and Opportunities for Space in Listening to the Field", and highlighted the need for a dialogue platform that enables the space community to set up innovative ways of working together with development user communities. A wide variety of stakeholders from the space, NGO and UN communities, were engaged by ESPI to develop an integrated approach that collects the needs in the field and translates them into technological solutions that support sustainable development on a global scale.

Key questions under consideration include how NGOs are currently using space assets, which requirements are filled by cooperation with space stakeholders, and how the interaction between the fields may be improved. Both theoretical reflections on a range of development activities, including health, energy, humanitarian emergencies, and security, as well as strategies on the creation and management
of Space-NGO programmes, represent possible ways forward.

This activity aims at creating a holistic approach to the filling of user needs by the use of space technology and services, in line with the Sustainable Development Goals set in the UN Agenda 2030.

6.1 Workshop Detailed Objectives

The detailed workshop objectives have been defined as follows:

a. Enhance capabilities of countries in the use of space-related technology, applications, services and information for economic, social and environmental development;

b. Examine relevant affordable and accessible space-related technologies and information resources;

c. Increase awareness among policy- and decision makers to help integrate space solutions into policy- and decision making processes;

d. Discuss the role of space solutions in support of the 2030 Agenda for Sustainable Development;

e. Strengthen international and regional cooperation in that area;

f. Present relevant capacity building initiatives;

g. Consider associated legal and regulatory matters;

h. Identify issues for consideration at UNISPACE+50.

In order to achieve the above objectives the workshop was structured around eight thematic sessions: Space and Sustainable Development, Space Technology Capacity Building, Disaster Management and Early Warning, Space for Global Health and Education, Space Solutions for Managing Growing Cities and Populations, Environment and Biodiversity, Connectivity for Reducing Social Divide, Observations and Recommendations and the Way Forward.

Participants to the workshop noted the progress with implementing the 2030 Agenda for Sustainable Development and the preparations towards UNISPACE+50, while underlining the major global issues for the planet and the challenges for achieving sustainable development.

In this context it was highlighted the need for the use of space applications to move from "business as usual" to a "sustainable development" trajectory, while considering the growing number and diversity of stakeholders in the field of space activities, and the ongoing operationalization of space technology and its applications that are opening-up unique opportunities for addressing global issues and building a better society.

The wide range of global issues, including all of the SDGs, could be addressed by space technology and its applications, starting with investing in space capacity building, given that human resource is the most precious one for sustainable development of our society.

The workshop also outlined the need for science-based data to inform policy and decision making processes in order to progress from "non-evidence and no-policy decisions" to "policy based decisions" and to "evidence based decisions", to which space data/information can make essential contributions (link to implementation of 2030 Agenda). Finally, the increasing number of successful applications of crowd-sourced data, with the potential of combining in-situ data with Earth Observation data, could also help to tackle major barriers for sustainable development, including corruption.

6.2 Sustainable Development: Challenges and Opportunities for Space in Listening to the Field

ESPI contributed to the workshop presenting the topic of “Sustainable Development: Challenges and Opportunities for Space in Listening to the Field”.

The approval of the Sustainable Development Goals (SDGs) by the UN General Assembly in 2015 marks a departure point for our theoretical approach to international development. The emphasis which the 17 goals place on consideration of the long-term economic, social and environmental requirements of beneficiary communities poses new challenges for stakeholders in the development community. To achieve these goals, multi-stakeholder, cross-cutting approaches will be necessary.

Space assets such as position, navigation and timing, telecommunications and earth observation have become increasingly embedded in the everyday lives of much of the global population, but their social impact reaches further still. A number of successful, demand-driven
initiatives using space assets have demonstrated the often untapped potential which Space has in supporting development activities (e.g. PUMA, AMESD, MESA), and recent developments suggest that we may expect this trend to grow further in coming years.

The establishment of a dialogue mechanism between the fields, which successfully defines and prioritises user requirements, will be a prerequisite of this collaboration. For the Space community, understanding the needs of stakeholders in the field is the first step towards achieving this.

The ESPI paper collates the contributions of a wide variety of stakeholders from the Space, NGO and UN communities, who participated in an ESPI workshop in May 2016 intended to present an opportunity for development actors to voice their views. It aimed at developing an integrated approach that collects the needs on the field and translates them into technological solutions that support sustainable development on a global scale. Discussions included how NGOs are currently using Space assets, which requirements are filled by cooperation with Space stakeholders, and how the interaction between the fields may be improved.

The paper includes both theoretical reflections on a range of development activities, including health, energy, humanitarian emergencies, and security, as well as presentations on the creation and management of NGO programmes. Specific case studies reflecting existing Space asset incorporation into development efforts in a variety of locations and environments, including islands, mountains and urban environments, complement the general presentations.

Together, the contributions highlight the pivotal importance of Space in achieving the Sustainable Development Goals, but point out that successful cooperation between the fields depends on continuous, open dialogue to define user requirements, and the creation of space-derived solutions tailored to specific contexts. The paper summarises these recommendations and concludes by identifying practical tools and mechanisms which provide a path forward.

6.3 Workshop Conclusions and Recommendations

In conclusion the workshop participants noted that education was the basis for establishing the necessary capacity of a country to benefit from space applications and the importance and success of hands-on training activities which are key for countries to build space capacity. Therefore they recommended that capacity building activities should be designed to include hands-on training activities, and that the continuity of programmes was key for the sustainability of capacity building activities and for deriving lasting benefits from space-related activities.

All capacity building stakeholders should aspire to provide a framework to ensure the continuity of programmes, including the necessary governance framework and measures to shield capacity building efforts from political and economic disturbances.

It was concluded that there is a need to reach out to governments, which have taken upon themselves the responsibility for leading the implementation of the 2030 Agenda, to inform them about the importance of space based solutions and the need for the coordination of the activities of space-related organizations in that regard.

In this context, UNISPACE+50 should be utilised as an opportunity to unite the activities of space-related organization, and it will be a unique opportunity to re-visit the contributions of space technology and its applications for sustainable development in light of the technical, legal, political, regulatory developments since UNISPACE III.

Participants recommended that UNISPACE+50 Thematic Priority 7 “capacity building for the 21st century” should be the framework to consider space capacity building activities fit for the coming decades to enable countries to implement the 2030 Agenda, including the role of the UN Programme on Space Applications.

They also noted that a Space Solutions Compendium (SSC), a database linked to the SDGs and containing best practices, expert contacts, recommendations, exemplary projects, would be a valuable resource for countries seeking to optimize the use of space technology and its applications.

It was recognized that a Space Capacity Index (SCI) measuring the capacity of countries to utilize space solutions would be an invaluable tool to apply results-based management to space capacity building, and it was recommended that UNOOSA should take the lead in developing a Space Solutions Compendium (SSC) and a Space Capacity Index (SCI).

The workshop conclusions and recommendations might be considered by UNOOSA in preparing a plan of work for UNISPACE+50 under its thematic priority 7, and might be brought to the attention of other relevant UN entities through the UN-SPACE framework, as a contribution to enhance coordination of space-related activities within the United Nations.
this end a United Nations General Assembly report on the Workshop will be prepared by the United Nations Office for Outer Space Affairs be made available at the Workshop webpage.

6.4 Workshop Participants

The workshop was very well attended and included more than 154 registered participants from 32 countries.

Ganiyu Agbaje, African Regional Centre for Space Science & Technology Education, Nigeria
Fernando Aguado Agelet, University of Vigo, Spain
Luis Alfaro, El Salvador, Aerospace Institute (ESAI), El Salvador
Ronny Antoine Nader, Ecuadorian Space Agency, Ecuador
Gustavo Arriaga, Mexican Space Agency
Werner Balogh, United Nations Office for Outer Space Affairs
Nickté Basurto, Mexican Space Agency, Mexico
Gerald Bawden, National Aeronautics and Space Administration (NASA), United States of America
Suresh Bhattarai, Space Generation Advisory Council/Nepal Astronomical Society, Nepal
Sergio Camacho, CRECTEALC, Mexico
Antonio Cassiano Julio Filho, National Institute for Space Research (INPE), Brazil
Julio Castillo, Mexican Space Agency
Teresa Castillo, Mexican Space Agency
Amal Chandran, University of Colorado at Boulder, United States of America
Remi Chandran, National Institute for Environmental Studies (NIES), Japan
Sergey Chernikov, Samara State Aerospace University, Austria
Mengu Cho, Kyushu Institute of Technology, Japan
Olavo de O. Bittencourt Neto, Catholic University of Santos/IISL, Brazil
Simonetta Di Pippo, United Nations Office for Outer Space Affairs
Rodrigo Dibildox, Mexican Space Agency
Karl Doetsch, Past President IAF, Canada
Isabelle Duvaux-Béchon, European Space Agency (ESA)

Jose Eduardo De La Torre Barcena, National Institute of Statistics and Geography (INEGI), Mexico
Pascale Ehrenfreund, DLR, Germany
Juan Esteban Gramajo Gonzalez, International Space University, France
Stefano Ferretti, European Space Policy Institute (ESPI), Austria
Estephania Flores, Mexico
Oswaldo Garcia, Skysset, Mexico
Lourdes García, Mexican Space Agency
Rushi Ghadawala Aryavarta, Space Organization, India/Canada
Christina Giannopapa, European Space Agency (ESA)
Misha Gopaul, FATMAP, United Kingdom
Camilo Guzman Gomez, University Sergio Arboleda, Colombia
Sam Harrison, International Space University, United Kingdom
Kiyoshi Higuchi, International Astronautical Federation
Akagi Hiroki, JAXA, Japan
Jeanne Holm, City of Los Angeles, United States of America
Pasquale Iervolino, University of Surrey, Surrey Space Centre, United Kingdom
Natalia Indira Vargas-Cuentas, Universidad de Ciencias y Humanidades - UCH, Bolivia
Donald James, National Aeronautics and Space Administration (NASA), United States of America
Francisco Javier Mendieta Jiménez, Mexican Space Agency
Shantosh Karki, UNOCHA
Rei Kawashima, UNISEC, Japan
David Kendall, Chairman UN COPUOS
Ramesh Krishnamurthy, World Health Organization (WHO)
LeRoy Larry, University of Costa Rica, Costa Rica
Christiane Lechtenboerger, DLR, Germany
Roger Mari Sese Regulus, SpaceTech/National Space Development Program, Philippines
Attila Matas, International Telecommunication Union (ITU)
Mwangia Mbuthia, University of Nairobi, Kenya
Gustavo Medina, UNAM, Mexico
Javier Mendieta, AEM
Milan Mijovic, Union University Belgrade, Serbia
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Ramirez Sandra, Universidad Autonoma del Estado de Morelos, Mexico
Giancarlo Santilli, University of Brasilia, Brazil
Arturo Serrano, CICESE, and Office for Outer Space Affairs
Fernando Stancato, Embraer, Brazil
Luc St-Pierre, United Nations Office for Outer Space Affairs
Wei Sun, Twenty First Century Aerospace Technology Co. Ltd., China
Rafael Torres, Mexican Space Agency, Mexico
Reuben Umunna, Kyushu Institute of Technology, Japan
Koichi Wakata, Japan Aerospace Exploration Agency (JAXA)
Chris Welch, IAF/International Space University
Johann-Dietrich Woerner, European Space Agency (ESA)
Danielle Wood, National Aeronautics and Space Administration (NASA), United States of America
7. International Astronautical Congress 2016, Mexico

The 2016 International Astronautical Congress, "Making Space Accessible and Affordable to All Countries", was held from 26 to 30 September in Guadalajara. The conference brings together every year the space community at large. It is a global and multidisciplinary conference, covering all space sectors and topics, while offering everyone the latest space information, developments, contacts and potential partnerships. The IAC is a platform for all the relevant stakeholders in the space domain, including:

a. Scientists, researchers and engineers
b. Space agencies
c. Industry
d. Students and young professionals
e. Policy-makers
f. Astronauts
g. Press members
h. General Public
i. Local community

ESPI contributions in the domain of “Space for Sustainable Development” included participation in IAF committees, such as CLIODN, GEOSS, the Security and Entrepreneurship & Investment committees, Global Networking Forums, and technical sessions where the outcomes of ESPI studies were presented.

Dr. Stefano Ferretti presented a number of papers, containing relevant inputs for the UNISPACE+50 preparatory activities, in the field of integrated applications, strategies for the future, space policy, regulations and economics, regional cooperation in space: policies, governance and legal tools\(^{29,30,31}\).

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\(^{29}\) Ferretti, Stefano and Alfredo Roma. "Optimizing the Interaction Between Drones and Space Infrastructures" (IAC-16-B5.2.8), Proceedings of the 67th International Astronautical Congress (IAC), Guadalajara, (26-30 September 2016).


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leading to a global migration of unprecedented proportions. [3] These increasingly complex circumstances add additional pressure to development actors to innovate in their approaches and to make programmes effective on both the economic, societal and environmental levels.

These changes, challenges and pressures to innovate are of immediate relevance to the Space community. The community itself will, in the medium to long term, have to adopt sustainable working practices itself. More importantly, however, the Space community is well positioned to address the innovation pressures of the Development community. In part, this is because the Space community has long experience with sustainable project life cycle design in the context of Human Space Flight and expertise in international cooperation and project planning which may be a valuable contribution to the Development community.

Mostly, however, it is the tools, programmes, and downstream services which the Space community produces that have direct applications for development work. The relevance of these tools and approaches is increasing, ranging from tele-epidemiology to precision agriculture, water management to natural resource protection, urban management to treaty compliance monitoring. By placing itself at the service of the Development community, the Space community not only helps to fulfill the aim of the 2030 Agenda to produce a global drive towards sustainability, but also returns to strength as a forum in which leading professionals may determine the shape of our future lives.

This paper summarises the findings of ESPI Report 59 on “Space for Sustainable Development” of June 2016. It maps areas of current or potential future contributions of Space towards the Sustainable Development Goals to illustrate the diverse range of topics within which space technology is relevant. It then continues to address the Development and Space communities specifically, identifying the main actors in each sector, defining the needs of the Development community and the benefits of Space community involvement, before suggesting practical points of action which may be taken to increase the dialogue and cooperation between these two sectors.

As of now, this dialogue is limited and complicated by misperceptions on both sides. Technology hesitancy is a particular issue for NGOs who perceive space technology as inherently militaristic and expensive, and who are wary of investing donor money into projects with uncertain medium- and long-term impact. Each section therefore includes practical recommendations for establishing improved dialogue mechanisms between the sectors. It aims to address the Why, Who, What, and How of dialogue creation in order to set in motion a rapprochement of previously siloed sectors with far-ranging consequences for the successful implementation of our new global development goals.

2. Current interactions between Space and SDGs

Directly or indirectly, space assets may contribute to the achievement of all Sustainable Development Goals. The table below lists the broad aim of each goal and describes which contributions may be made to their achievement by the use of space assets. The list is general and non-exhaustive, and describes both existing uses of space assets and potential contributions which have yet to be leveraged, but it illustrates the broad range of activities in which space may play a role.

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Fig. 1. Visualization of the interaction between Space and Development
### Table 1. Actual or Possible Contributions to the SDGs [2]

<table>
<thead>
<tr>
<th>SDG Topic</th>
<th>Actual or possible contribution of space</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDG 1: No Poverty</td>
<td>Improved communications and more environmental data as a driver of growth, better logistics management by the use of sat/nav</td>
</tr>
<tr>
<td>SDG 2: Zero Hunger</td>
<td>Earth Observation data for optimised agriculture and livestock management, more efficient crop markets through better telecommunications, better emergency responses enabled by Earth Observation data and telecoms, better delivery systems using sat/nav</td>
</tr>
<tr>
<td>SDG 3: Good Health and Well-Being</td>
<td>E-health, including telemedicine and medical tele-training and learning</td>
</tr>
<tr>
<td>SDG 4: Quality Education</td>
<td>Tele-learning</td>
</tr>
<tr>
<td>SDG 5: Gender Equality</td>
<td>Female empowerment by telecoms links to the Information Society, tele-learning, telecoms enabling small businesses of women.</td>
</tr>
<tr>
<td>SDG 6: Clean Water and Sanitation</td>
<td>Earth Observation data for water management, water detection, and water pollution monitoring</td>
</tr>
<tr>
<td>SDG 7: Affordable &amp; Clean Energy</td>
<td>Earth Observation data for renewable energy management, grid management</td>
</tr>
<tr>
<td>SDG 8: Decent Work and Economic Growth</td>
<td>Space services as enabler of economic growth and high quality jobs in all economic sectors</td>
</tr>
<tr>
<td>SDG 9: Industry, Innovation &amp; Infrastructure</td>
<td>Space as enabler of innovation both in own sector and others, space based data and communication abilities key for industrial processes, space telecoms compensates for lack of terrestrial networks, Earth Observation for lack of in-situ stations, sat/nav importance for best use of transport infrastructure and banking systems</td>
</tr>
<tr>
<td>SDG 10: Reduced Inequalities</td>
<td>Access to Information Society through telecoms is a leveller, fosters transparency and hence helps fights against corruption, space services as an enabler of work opportunity</td>
</tr>
<tr>
<td>SDG 11: Sustainable Cities and Communities</td>
<td>Earth Observation data for pollution monitoring, energy management and land use planning, sat/nav for traffic management, telecoms for efficient information exchange</td>
</tr>
<tr>
<td>SDG 12: Responsible consumption and production</td>
<td>Earth Observation data for optimised supply management, energy management, sat/nav for logistics management in production</td>
</tr>
<tr>
<td>SDG 13: Climate Action</td>
<td>Earth Observation data key for climate change monitoring and definition of mitigation strategies</td>
</tr>
<tr>
<td>SDG 14: Life below Water</td>
<td>Earth Observation data key for monitoring the health of oceans and other water systems, for fisheries management and policing</td>
</tr>
<tr>
<td>SDG 15: Life on Land</td>
<td>Earth Observation data for bio-diversity monitoring, pollution monitoring, land use management and policing</td>
</tr>
<tr>
<td>SDG 16: Peace and Justice – Strong Institutions</td>
<td>Telecoms empower civil society by connecting to the Information Society, e-voting enabled by telecoms, legal evidence, treaty compliance monitoring, security management through Earth Observation systems.</td>
</tr>
<tr>
<td>SDG 17: Partnerships</td>
<td>Space community is part of an international fabric of partnerships. Possibilities of reinforcement of links with development actors</td>
</tr>
</tbody>
</table>

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3. How the Space Community may meet the needs of the Development Community

3.1 Why become involved?

The approval of the Sustainable Development Goals by the United Nations General Assembly in 2015 refocuses attention on the need for concrete action in meeting the global development challenges of the coming decades. This should be seen as a rallying call for all possible contributors.

The SDGs will adopt a more circumspect and comprehensive approach to development, focused on sustainability. This means development actors will have to adopt new, sophisticated tools which consider the interrelated nature of economies, societies and the environment.

Space is well positioned to help actors to adopt this holistic approach by contributing to the creation of intelligent development solutions.

3.2 Who are the Main Development Actors?

There are seven main types of development actors, with specific needs and functions. Governmental actors of developed countries, as well as governmental aid organisations operating in developing countries have links to policy making and are hence well equipped to adopt innovative approaches. The support of national agencies is key to long-term success in development efforts.

Fig. 2. Main categories of development actors

Non-governmental actors are often best informed about needs of beneficiary communities on the ground, and have a more unsentimental and realistic view on challenges. However, they are hesitant to invest donor money in long-term projects. Intergovernmental aid organisations in the field are highly coordinated between agencies, through such means as the UN "Delivering as One" approach, and have the benefit of a multicultural approach. Intergovernmental organisations not in the field, including international financial institutions, are key in funding development activities, and can facilitate the adoption of space assets into programmes as well as in-house technology capacity building in NGOs. The UN Special Representative for the SDGs deals with a multitude of actors and hence plays a central coordinating role, acting as a conduit between the different communities. The Special Representative may thus also take on a liaison function between Development and Space actors.

3.3 What are the needs of development actors?

In close consultation with leading NGOs and development actors, ESPI has identified several key needs:

- Development actors must be assured that space assets may be effective and cost-efficient tools in development.
- Direct involvement in defining user requirements leading to tailored solutions.
- Fast access to telecommunications and earth observation-derived data, particularly in disaster situations.

3.4 What actions may be taken immediately?

- Each space agency may designate a focal point for outreach to sustainable development actors, and increase links with general governmental aid institutions in their countries.
- ESA and national space agencies can create dedicated programmes on space for sustainable development.
- ESA may serve as an instrument for other funders and actors to define and execute sustainable development programmes (e.g. AMESD, MESA).
- The successful ESA Business Incubator model may be expanded to developing countries.
- The manufacturing industry may guide customers towards solutions enabling sustainable development, and open new services for developing countries by implementing modest changes in planned designs. New markets may open up for these products which could be self-sustaining. The downstream segment may hence become a substantial economic activity.
- UNOOSA could create an optional programme structure modelled on ESA targeting space programmes for developing countries. This could also be a way to agree and execute new downstream service programmes.
- A Space Technology Academy should be created for field actors and coordinators, with a threefold function. 1) Showcase existing and potential space contributions in annual meetings. 2) Throughout the year, operate as a training centre for in-house and tele-training with a helpdesk for development actors.
- Include a business incubation function, e.g. as in ESA.
3.5 Which dialogue platforms may be leveraged or created?

- The UN Office of Outer Space Affairs and its annual coordination UN Space could be an important entry point for the space community in seeking a dialogue with the UN system.
- The Special Representative for the SDGs may act as a conduit between the demand and supply communities.
- The Space community should ensure good representation at the World Summit on the Information Society, which keeps sustainable development actors abreast of developments in the hi-tech contribution to the SDGs. To facilitate, annual meetings should be held between the Special Representative for the SDGs and central hi-tech and space representatives.
- A Working Group of 15-20 senior level advisers from the supply and demand sides would be a first step towards improving dialogue on space and sustainable development and to define more permanent dialogue mechanisms.
- A Sustainable Development Networking Forum modelled on the Global Networking Forums could act as a more permanent forum.
- In the European region an annual forum should be set up where high level representatives of ESA and the national space agencies meet with counterparts of the European Union Directorates General, e.g. GROW, DEVCO, ECHO, CNECT, ENVIRONMENT, CLIMATE ACTION, and the External Action Service.
- Third party funding from governmental or intergovernmental aid agencies to space agencies, and NGO funding where projects have specific applications will expedite a cooperation process.
- Space agencies would be midwives in the process, lending expertise while receiving funds from aid actors.
- The Charter on Space and Major Disasters should be expanded to cover the broader ambit of data for sustainable development in developing countries and a holistic approach should be taken.

4. Why the Development Community should look towards the Space Community for solutions

4.1 Why Space?

The approval of the Sustainable Development Goals by the United Nations General Assembly in 2015 adopt a more comprehensive approach to development. Meeting the requirements of sustainability and considering the interrelated nature of economies, societies and the environment in project programming is a considerable new challenge for development actors. The growing complexity of the global development environment is an exacerbating factor.

Meeting these challenges will require the development of intelligent and multi-faceted development solutions. This will require stakeholders to branch out from conventional approaches. Space is well positioned to redress this need for holistic and intelligent design because of its potential for applying proven tools in new contexts, and its extensive experience in sustainable project life cycle design.

4.2 Who are the Main Space Actors?

The community of Space actors is diverse, but may be broadly split into eight categories. National space agencies and ESA extensively cooperate with national and international partners from space agencies and industry, and hence have both project management and international cooperation expertise. N.B. ESA and the World Bank already cooperate on a space for development programme.

![Fig. 3. Main categories of space actors](image)

The European Union’s Copernicus and Galileo programmes generate data of high relevance for sustainable development, and the EU has created dedicated equipment and training schemes using earth observation data for development, e.g. “GMES and Africa”. Meteorological agencies such as Eumetsat have also created programmes (PUMA, AMESD, MESA) with financial backing of the European Commission and others, targeted at using data for development.

Intergovernmental bodies such as GEOSS and the International Charter Space and Major Disasters serve specific purposes with potential development applications. While the latter provides operational services, the former also engages in policy-making. UNOOSA covers both policy-making, space-based applications and capacity building and has strong links to other actors in the UN system.

Manufacturers, operators, and downstream services are client-oriented actors with strong experience in solutions based on customer requirements, and may open new services of relevance for developing countries by only applying modest changes to planned designs.
Many new space actors and private services already have specific humanitarian objectives.

4.3 What are the benefits of Space-Enabled Solutions?
ESPI has worked closely with several leading NGOs and development actors to collect the needs of actors in the field. translate these into user requirements and develop solutions with space programme designs based on successful examples of cooperation between the sectors.

- Improved reliability and access to communications through satellite telecommunications, e.g. through ARTES.
- Quick access to topographical information and images through earth observation data, including soil moisture, wetlands, subsidence, etc., for infrastructure and energy management.
- Improved short- and medium-term weather forecasting incl. for agriculture.
- Innovative water management solutions using earth observation enhanced data for agricultural, environmental and urban management projects.
- Improved social service delivery incl. tele-education and tele-medicine (e.g. ESA’s SWAY4Edu 2 programme).
- Flexibility and innovative potential of technology transfer such as 3D printing to create specialized tools for the construction, healthcare, and energy sectors.
- Growing beneficiary demand for internet and telecommunications access.

4.4 What actions may be taken?

- Development actors may designate a focal point for outreach to Space community actors, and increase links with national space agencies at home.
- UNOOSA may expand liaison functions with UNOCHA to other UN agencies including UNDESA.
- Creation of dedicated liaison officers to improve flow of information between Directorates General of the EU Commission to allow offices incl. DEVCO and ECHO to enhance integration of space services into their efforts.
- A Space Technology Academy should be created for field actors and coordinators, with a threefold function. 1) Showcase existing and potential space contributions in annual meetings. 2) Throughout the year, operate as a training centre for in-house and tele-training with a helpdesk for development actors. 3) Include a business incubation function, e.g. as in ESA.

4.5 How can dialogue be created?

- A Working Group of 15-20 senior level advisors from the supply and demand sides would be a first step towards improving dialogue on space and sustainable development and to define more permanent dialogue mechanisms.

- The UN Office of Outer Space Affairs and its annual coordination UN Space could be an important entry point for the UN system to increase involvement with the space community.
- The Special Representative for the SDGs may act as a conduit between the demand and supply communities.
- A Sustainable Development Networking Forum modelled on the Global Networking Forums could act as a more permanent forum.
- In the European region an annual forum should be set up where European Union Directorates General, e.g. GROW, DEVCO, ECHO, CNECT, ENVIRONMENT, CLIMATE ACTION, and the External Action Service meet with high level representatives of ESA and the national space agencies.
- The Charter on Space and Major Disasters should be expanded to cover the broader ambit of data for sustainable development in developing countries and a holistic approach should be taken.

6. Conclusions
A large variety of small practical steps may be taken by both the Development and Space communities to facilitate a greater degree of interaction between them. These include actions to strengthen capacity for interdisciplinary cooperation within organisations, as well as steps towards the construction of effective dialogue mechanisms, including dedicated platforms and forums. Doing so will strengthen the integration of science and technology into the current international development field.

The launch of the Sustainable Development Goals illustrates clearly the necessity of fostering this interaction now. Interdisciplinary cooperation and intelligent programme creation and solution implementation are the cornerstones of achieving sustainability in development efforts. Sustainable development itself, the UN rightly acknowledges, will be the key not only in raising standards of living in developing countries, but for ensuring the long-term success and prosperity of our global society. The Space community has always been at the forefront of what humanity may achieve through intelligent design, and it is important also for the continued high standing of the sector that Space take its role as a facilitator of global development now. This should involve:

- A new conceptualization of the Space sector not as a diffuse range of organisations and industries, but a community which is able to act as one through a designated mechanism.
• A paradigm shift in the view of the Space sector not as a siloed high-tech industry but as an enabler for positive change on earth with a social responsibility.
• Creating a dialogue platform through which development actors and space actors may come together to showcase services and discuss challenges in development activities
• Accompany showcases with year-round training activities and a helpdesk.

5. Acknowledgements
The authors would like to express their gratitude to Mr. Peter Hulsroj for his invaluable advice and support in the creation of this report and his unwavering vision of a sustainable world, and the project accompanying group: Roy Gibson, Joerg Feustel-Büechl, Andreas Papp and Thomas Stelzer.

6. List of references
The international space community conducted high political level debates earlier this year at the Forum "Space Science and Academy for Global Challenges", for the first time involving Ministries of Science, University and Research, Space Authorities, Space Agencies and International Organizations representatives, and senior space experts, from 35 countries in Africa, the Americas, Asia, and Europe.

The group gathered in Trento (Italy) at the 1st International Space Forum at Ministerial level, fostering open and productive discussions on how Space Science and Academies can concretely contribute to the sustainability of future space programmes for peaceful purposes.

The forum, which proved to be an ideal platform for discussions at political level worldwide, including the definition of future policy orientations and cooperation frameworks, was organized under the auspices of: the International Astronautical Federation (IAF), represented by its president Mr Jean-Yves Le Gall; the International Academy of Astronautics (IAA), represented by its vice-president Dr. Francisco Mendieta; and the Italian Space Agency (ASI), represented by its president Prof. Roberto Battiston.

In addition to the individual statements of each delegation, the programme also included three keynote speeches on relevant issues that require common reflection at the global level.

Dr. Josef Aschbacher, ESA Director of Earth Observation Programs and Head of ESA/ESRIN, provided the first keynote speech on Climate Change, describing the phenomenon that affects humanity in areas such as agriculture, health, sea levels and marine ecosystems, forests, and water sources.

Dr. Ellen Stofan, NASA Chief Scientist, gave the second keynote speech on Big Data Management, underlining how the volume and complexity of space systems data could provide means to explore a variety of data management methodologies.

Dr. Simonetta di Pippo, Director of the Office for Outer Space Affairs of the United Nations (UNOOSA), provided the third keynote speech on Earth Protection, explaining how our complex and fragile planet requires studies, knowledge and intervention capacity implemented on a global level.

The reflections and recommendations stemming from the Forum discussions are summarized in the Trento Space Statement.

### 8.1 Trento Space Statement: Key Recommendations

The governmental representatives and experts presented a valuable and wide range of views and experiences, which include:

- That space is not only the place beyond the earth's atmosphere, where planets, stars, and galaxies are, but also where space technology and applications pervade our daily lives;
- That space is a global environment, able to support and find adequate solutions for global problems and challenges for the benefit of humankind; which requires high level technical and scientific knowledge as well as a multidisciplinary and multitasking approach, suitable for international cooperation;
- That Universities and Academies are distributed all-over the world and they provide the opportunity to establish a worldwide network of knowledge supporting the conception, preparation and exploitation of space activities, regardless of their geographical location;
- That Universities and Academies have different disciplines, competences, technology development, geographic culture, connections to society and their ability to inspire young generations, which have influence and value

Governmental representatives and delegates:

- Noted that these issues have a global impact on the human community and could thus benefit from common understanding, innovative and responsible education, coordinated global responses;
- Considered the merit of involving National Academies and Universities in space pro-
grams and activities, in particular, to increase local and regional capacity building;

- Discussed the need to continue to cooperate in bilateral and multilateral ways through sharing, as appropriate, intellectual resources and data processing capabilities in a coherent, inclusive and balanced approach;

- Examined the possibility of a worldwide network of space knowledge and human capital by an inclusive and effective international community of Academies and Universities;

- Considered the necessity to globally connect people using space science and research, knowledge and integrated space related applications;

- Noted the preparation process in organizing the UNISPACE + 50 promoted by the Office of Outer Space Affairs of the United Nations (UNOOSA) in 2018 to celebrate the 50th anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), with the aim of focusing international attention on global space governance;

All Ministries, Heads of delegations, governmental representatives and experts welcomed the first International Space Forum, viewing it as a starting point to:

- involve, as appropriate, universities and academies in the conception;

- design and exploitation of space missions and programs, sustaining space capacity building curricula and research activities;

- develop innovative partnerships, as appropriate, by using tools and platforms to facilitate access to space strategies and policies;

- promote open and free access to space based data and information recognizing relevant international instruments and national policies and legislation;

- consider the Open Universe initiative proposed by the Italian delegation during the fifty-ninth session of the Committee on the Peaceful Uses of Outer Space in June 2016 for expanding availability of and accessibility to open source space science data;

- include universities and national academy expertise, as appropriate, in governmental agendas to contribute as key element to the global challenges;

- support, as appropriate, the development and implementation of policies towards fulfilment of 3G diversity (Gender, Geography, Generation) in space related activities;

- support, as appropriate, the development and harmonization of space curricula at local, regional and international level, paying the greatest attention to developing countries, in particular, concerning sharing of resources and opportunities for access to outer space knowledge for peaceful purposes;

- discuss means by which the academic community can contribute, on a best efforts basis, to the UNISPACE+50 process recognizing that space science can play a pivotal role in support of the Conference’s goals toward the United Nations 2030 Agenda for Sustainable Development.

The participants expressed the wish to repeat this Space Forum model at the regional level to increase the number of representatives from local scientific communities, academies and universities to prepare new generations of global space leaders.

8.2 ISF2016 Delegations

The ISF2016 was opened by the statement of the Italian Minister for Education, University and Research, followed by the ministerial delegations of Algeria, Czech Republic, Egypt, Ireland, Kenya, Malaysia, Morocco, Portugal, South Africa, Sudan, United States of America, Bulgaria, Japan, Argentina, France, Hungary, Poland, Switzerland, Armenia, Austria, Azerbaijan, Chile, China, Iraq, Iran, Mexico, Netherlands, Russian Federation, Vietnam, Canada, Lithuania, Sweden, Romania, Ukraine.
9. The United Nations/United Arab Emirates – High Level Forum: Space as a Driver for Socio-Economic Sustainable Development

The activities of the United Nations Office of Outer Space Affairs are an integral part of the UNISPACE+50 thematic cycle and are aimed at contributing to outputs under the four pillars: space economy, space society, space accessibility and space diplomacy.

The office is organizing a series of high level fora aimed at driving the debate on the role of space science and technology in fostering global development.

Each Forum, therefore, represents a unique opportunity for the collective space community to address the future global space governance leading up to the fiftieth anniversary of the First United Nations Conference on the Exploration and Peaceful Use of Outer Space "UNISPACE+50" in 2018. This also could be a fitting time to take stock of the contributions of the three UNISPACE conferences, held in 1968, 1982 and 1999 respectively, to global space governance.

The objectives of the last High Level Forum, which was organized by the United Nations and the United Arab Emirates, include the presentation of lessons learned and new ideas in the four thematic areas of space economy, space society, space accessibility and space diplomacy, and all their interactions and interlinkages. The Forum aimed at producing a declaration with a set of recommendations to further shape and position space activities as drivers for innovation, socio-economic development and diplomacy for a sustainable future. Among others, the main expected outcomes of the Forum included increased awareness about on-going space activities and trends in the use of space technology and services that aid sustainable development.

The Forum also acknowledged the relevance of the space sector for the economy, society and diplomacy of a nation, and recognised benefits from space as a core sector for socio-economic development, while identifying strategies to link space activities as a driver for socio-economic development. It was relevant to gather recommendations on how to best utilize innovative space activities to address emerging sustainable development challenges, also by establishing partnerships to aid in addressing space for sustainable development.

The final key objective of the Forum was to provide recommendations on how voluntary actions from governments, international organizations, research and development institutions, academia and other relevant stakeholders could support partnerships in the increased use of space as a driver for socio-economic development.

9.2 Working Modality

The Forum started with a High-Level Panel bringing together decision-makers and experts, followed by two days of sessions, focused on the four main pillars.

After a keynote speech by a renowned specialist, discussions developed to yield concrete recommendations.

On the final day, a Roundtable Discussion Session addressed the future global space governance theme, leading up to "UNISPACE+50" in 2018. The Forum closed with short presentations of the findings of the four breakout sessions and with the adoption of the Dubai Declaration.

The conclusions of the Forum will be presented to the Committee on the Peaceful Uses of Outer Space at its sixtieth session and its subsidiary bodies sessions, the Scientific and

Figure 29. Space as Driver for Sustainable Development (SOURCE: UNOOSA/ESA)

9.1 Objectives and Expected Outcomes
Technical Subcommittee at its fifty-fourth session and the Legal Subcommittee at its fifty-sixth session, in 2017.

9.3 The ESPI Director’s speech at the Dubai High Level Forum Organized by UNOOSA and UAE

The ESPI Director delivered a speech at the Dubai High Level Forum, entitled “Making a Difference: Working Together Towards Sustainable Space”, of which an excerpt is reported below:

Excellences, Distinguished Representatives of the Space Community, Dear Colleagues,

It is a great pleasure and honour for me to be invited to address this issue of sustainable space in the name of the European Space Policy Institute in such a prestigious framework.

Ensuring sustainability in space means ensuring that space will remain accessible and safe to operate for the next generations because space is an invaluable and irreplaceable resource, increasingly important in our daily lives, for economy, security and sustainable development on Earth.

As a matter of fact, we are just realizing how much space is a fragile environment and far from being an unlimited resource. Moreover, the situation is deteriorating, and deteriorating at an increasing speed with the on-going evolution of the global space sector:

a. New space for instance comes along with new threats with the multiplication of satellites to be launched and operated, of debris potentially generated, but also with the multiplication of actors, institutional or private

b. Spectrum management and Space Situation Awareness will become increasingly important to ensure the safety of operations in orbit, which might at a later stage develop into a Space Traffic Management international system, the image of what was done for maritime and air space management

c. Space weather will also be increasingly critical to ensuring continuity of service, and international reflections should now focus on ways to set up an operational system delivering adequate forecast to all stakeholders

d. But borders are also getting blurred between military and civil space systems

We could take the example of GPS – a military system extensively used by civilians – or of Galileo – a civil system delivering governmental services – but this is also driven by the strategic approach of many nations to space in order to access greater autonomy based on civil systems, which are cheaper, or through Public-Private Partnerships for the development and the deployment of such systems. As a consequence, the trend towards denial of access to space or to space-based services has never been so strong.

All of this comes along with challenges regarding the evolution of space law and global space governance, and the point is to make sure that we take all appropriate actions so as to ensure that the current approach based on voluntary measures and behavioural modifiers effectively mitigates the risks associated with the new situation we are facing at the moment in the sector.

This is all about the UNOOSA Space Accessibility pillar.

To revive, adapt and adopt a code of conduct and promote transparency and confidence building measures are, without any doubt, the next steps in order to come up with a clear and well identified set of rules applicable to space activities, institutional or private, and to all actors willing to access to space. For that, we will need a forum where all space stakeholders, governmental and private, can gather to discuss, negotiate and agree on such rules and regulations.

Assessing whether such an approach based on soft law will be sufficient to face the challenges ahead of us, or whether some kind of international hard law, together with the setting up of dedicated structures for the implementation of global space governance will be necessary, is an upcoming challenge since some member states prefer dealing with international security through national regulations.

This is all about the UNOOSA Space Diplomacy pillar.

But I believe that the sustainability of space basically relies on additional steps to further promote the peaceful use of space infrastructures and enlarge the basis of those directly benefiting from space-based services (and being aware that they do).

This is of course all about the UNOOSA space society pillar.

In this matter, ESPI organized in September its “Autumn Conference” on “Space and Sustainable Development”. It was focused on the concrete use of space in the field for sustainable development in a bottom-up approach,
and it produced an interesting outcome in this respect that I would like to share with you.

First, space actors were urged to adopt an end-to-end approach with comprehensive exploratory work on identifying user needs to avoid an inadvertent perpetuation of inequality and prevent pure ‘technology push’ scenarios. To this end, greater inter-sectorial, inter-institutional (e.g. state and NGOs), and international cooperation shall be sought in a more structured manner to effectively share information related to user needs and how available capacities can meet them.

Second, best practices in the field should also be compiled somewhere. This could serve as a basis for IGOs and NGOs to improve their technology awareness of what space can do, including the development of a platform to showcase the possibilities of current infrastructures and train people to enter the field. Such a platform could suggest technical requirements for the next generations of infrastructures. Because, if space infrastructures are extensively used to support the implementation of the SDGs, none of those in-the field user needs serves as an input for the definition and the development of future space systems.

Third, effective access to data is obviously essential to achieve an up-to-date archive of, for instance, Earth observation images, ultimately incorporating the capacity for near-real-time map building that does not yet exist and is necessary to actors in the field, involving governmental as well as private data providers. In this respect, I would like to salute the outstanding achievements of the Group on Earth Observation in this domain. Connectivity and access to 4G or 5G for mobile telecommunications, which was not identified as an SDG at the time they were defined, was also pointed out as a key contributor to speed up the dissemination of information and access to knowledge.

Last but not least, while the rise of the private sector in this domain was praised, it is obvious that sustainability of space must also be ensured from a purely commercial standpoint. In this respect, space needs to be considered fairly and faithfully in its endless competition against terrestrial infrastructures. In this respect, there are calls for action concerning the development of local markets for space services, open to public and private actors, relying on good governance mechanisms and in particular including a sound and fair tax policy on space related facilities. But most importantly, sustainability of commercial use of space infrastructures requires several basic conditions:

a. Demonstrated level of performance,

b. Long-term commitments to ensure delivery of services on permanent basis,

c. Security of infrastructures, which takes us back to the concerns regarding security in space.

This is of course all about the UNOOSA space economy pillar.

And I would like to conclude this intervention by quoting Mr Vittorio Prodi, former Member of the European Parliament, renowned scientist and long-time supporter of the space sector, who gave voice to this sentiment, noting that “It is time to consider what we are going to lose if we don’t act together.” Thank you for your attention.

9.4 The Dubai Declaration

Adopted at the first High Level Forum: Space as a Driver for Socio-economic Sustainable Development, Dubai, United Arab Emirates, on 24 November 2016

Expressing their appreciation to the United Nations Office for Outer Space Affairs and the Government of the United Arab Emirates for having organized the Forum, with the support of the Secure World Foundation, Sierra Nevada Corporation’s Space Systems and the International Committee on Global Navigation Satellite Systems,

Noting with appreciation the designation of former astronaut Scott Kelly as United Nations Champion for Space, who will work with the Office for Outer Space Affairs in promoting space as a tool for achieving sustainable development goals,

Noting with satisfaction the inclusion of the Women in Space Breakfast and Networking as a special event of the Forum,

Noting with interest the national declaration of the United Arab Emirates on happiness and positivity, following General Assembly resolution 65/309 on “Happiness towards a holistic approach to development”, where the use of space science and technology has much to offer in achieving those goals, and how this was taken into account in the development of its national space policy,

Reaffirming that space activities are constantly evolving and becoming more multifaceted considering the remarkable scientific and technological advancements in the space field, and in view of the broader perspective of space security,

Emphasizing, in that regard, that the Forum represented a unique opportunity for the
The participants to the Forum:

1. **Declare** the following four High Level Forum pillars as constituting an inclusive global Space2030 agenda for exploration, innovation and inspiration that calls for strengthened cooperation and governance of outer space activities:
   - **Space economy** - the development of space-derived economic benefits;
   - **Space society** - the evolution of society and societal benefits stemming from space related activities;
   - **Space accessibility** - all communities using and benefiting from space technology and applications;
   - **Space diplomacy** - building partnerships and strengthening international cooperation in space activities.

2. **Agree** that UNISPACE+50 is a milestone opportunity to further demonstrate the broad societal benefits of space as an area of innovation, inspiration, interconnectedness, integration and investment, and to strengthen unified efforts at all levels and among all relevant stakeholders of the space sector in addressing the overarching long-term development concerns of society with concrete deliverables pertaining to space for development;

3. **Recognize** the need to strengthen the Committee on the Peaceful Uses of Outer Space in its unique position as the prime intergovernmental platform for international space cooperation and the negotiation of instruments pertaining to space activities, and work towards further increasing its membership;

4. **Emphasize** the need for building stronger partnerships and international cooperation and coordination in the peaceful uses of outer space at all levels, in order to demonstrate the utility of space for the well-being of all peoples and its decisive role as a facilitator for the attainment of the global development agendas, taking into account the importance of securing appropriate financing to enable an innovative, open space economy;

5. **Recognize** the need for broadening access to space and, in that regard, call upon the Office for Outer Space Affairs to devise a dedicated programme within the framework of UNISPACE+50;

6. **Assert** that space exploration is a long-term driver for innovation, strengthening international cooperation on an all-inclusive basis among nations, and creating new opportunities for addressing global challenges, and that this area could benefit from establishing an exploration and innovation coordination mechanism at the global level, building on the model of the International Committee on Global Navigation Satellite Systems;

7. **Emphasize** that, in order to strengthen socio-economic development, an integrated approach is required among the space sector and other sectors, including environment and climate change, health, water, information and communication technology, and management of resources, to better understand and meet the needs of end-users and society at large;

8. **Stress** the importance of full and open access to space-derived data, including through promoting more flexible data licensing terms and partnerships for the development of open online search engines, towards increased discovery and use of data, information, products and services, and call upon the Office for Outer Space Affairs to facilitate such open access to data;

9. **Observe** the need for increased compatibility, standardization and integration of space systems and note with interest initiatives of inter-agency coordination of constellations of Earth observation, global navigation satellite systems and satellite telecommunications that encourage further demand-driven global coordination, and emphasize the importance of better spectrum planning, allocation, and management as key enablers to space programmes;

10. **Note** the stronger interconnectedness between actions to enhance the safety, security and sustainability of outer space activities, including the protection of space assets, space systems and critical infrastructures;

11. **Reaffirm** that the Outer Space Treaty, together with other relevant treaties and instruments, lays down the foundations of international regulation of space activities, and note that the 50th anniversary of the Outer Space Treaty in 2017 would provide an opportunity to promote universality of the Treaty and manifest the fundamental role of the legal regime of outer space...
for strengthening global governance of outer space activities;

12. Note that the increase in commercial and private activities in the space sector generates demands for regulatory certainty at the national level to meet the needs of new actors and beneficiaries of space-faring nations, space middle powers and emerging space nations;

13. Recognize the importance for States to develop space policies and regulatory frameworks at the national level in accordance with their needs and conforming to international space law, and that, in this regard, capacity-building and technical legal assistance are essential;

14. Emphasize the need for strengthened involvement of youth in Science, Technology, Engineering and Math (STEM) education and increased participation of women in space activities;

15. Underscore the need to modernize and reinforce the overall mandate and structure of the Office for Outer Space Affairs to better position the Office to assist States in using space for sustainable development, strengthen the Office’s role in disaster management and emergency response and its capacity-building, outreach and awareness-raising efforts, including integrated legal and technical assistance, and reinforce the Office’s spaceflight portfolio to allow broad access to space for achieving sustainable development goals, in particular for the benefit of developing countries;

16. Emphasize the importance for the Office for Outer Space Affairs to strengthen its cooperation with industry and the private sector to be able to deliver its mandates as the unique United Nations entity in space affairs and to assist States to attain the sustainable development goals;

17. Observe 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;

18. Agree 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;

19. Agree that the Forum becomes a permanent platform for strengthened partnerships among all relevant stakeholders in working towards Space2030;

20. Request that the Office for Outer Space Affairs present this Declaration to the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space in 2017.
10. Conclusions

UNISPACE+50 will take place in 2018 as part of the UN COPUOS June session. In addition to marking the 50th anniversary since the first UNISPACE conference in 1968, it will set the scene for the future of space activities on a global scale.

In the context of the UNISPACE+50 preparatory activities, the identification of the relevant stakeholders groups, including established groups which are already well engaged in the community and new actors, both private and non-governmental which channel the needs of civil society, is a key element in the process.

Towards this, extensive research has been conducted in different settings with the aim to define and implement effective strategies. The importance of giving greater relevance to the interests of non-shareholder stakeholders in strategy development has been underlined in order to ensure that a productive ecosystem is created around the interests of the various groups of stakeholders, balancing the value sharing of each of them to maximize the overall benefits.

The consultations conducted in the frame of this project provides a new insight on the UNISPACE+50 process and on the expectations and potential contributions of the stakeholders groups, highlighting potential gaps and missing groups.

The ESPI initiatives undertaken in 2016 around the theme of sustainable development and space, supports this direction, aiming at a greater involvement of communities engaged in development activities, but not yet fully aware of the potentialities of space. ESPI has also offered platforms to the traditional space communities to listen to the needs of civil society, and to translate them into effective services, thanks to the full exploitation of space assets and big data whose provision is made available at an increasing pace.

Some questions are left to the readers for further reflection, as we near UNISPACE+50:

- How effectively will the process create added-value to the stakeholders?
- How we looked at sustainable development from all the angles and is there any relevant actor not yet part of the process?
- Is it necessary to make trade-offs among stakeholders?
- Will the process accommodate the evolving needs of the various communities quickly enough?

This ESPI report has therefore highlighted the importance of involving a wide variety of actors and stakeholders in the preparatory activities leading to UNISPACE+50. This includes the space community at large, within which new space actors are becoming a relevant voice to be heard. From innovative ways to access space to the development of large constellations of small satellites, and from the exploitation of space resources to the creation of a profitable and sustainable downstream sector, their activities will impact at an increasing pace the strategies of future space programmes worldwide.

The importance of having civil society representatives around the table is also a pre-requisite for the successful collection of societal needs and the long-term planning of future space programmes. In particular, keeping in mind the objectives of the UNISPACE+50 process and the renewed mandate of the UNCOPUOS, an essential role will be played in the next years also by Non-Governmental Organizations, which have already demonstrated great interest in space technologies and services. Their voices will become increasingly important in civil society consultation processes.

The political dimension of the UNISPACE+50 process can be reinforced by involving actors who have not traditionally dealt with space. The International Conference on Sustainable Development, held by Columbia University in New York, provided a good example, since it involved Heads of Governments and political actors around the theme of a sustainable living on planet Earth for all. It is important that these platforms are open and somehow linked to the space communities, so that a fruitful exchange of ideas and potential solutions to upcoming and even greater challenges can be shared on a permanent basis. The engagement of regional actors and unions, e.g. the European Union and African Union, can also be seen as a driver for economic growth, social inclusion, strategic development and cross-boundary fertilization.
The workshop co-organized by the UN Office for Outer Space Affairs (UNOOSA) and the International Astronautical Federation (IAF) demonstrated that there is great potential embedded in the fabric of space activities, and that it is high time to further promote mutually beneficial exchanges and cooperation between the space community (e.g. space agencies, industry and academia) and the development community, for the achievement of the Sustainable Development Goals.

The ESPI Autumn Conference also explored the economic dimension of Space and Sustainable Development, engaging with both traditional operators from the private sector and new space actors, unfolding the financing mechanisms and perspectives of both international financial institutions and rising eastern economic powers.

The space governance aspect and the relevance of research and academia for the purpose of defining the next space agenda were debated at the International Forum at Ministerial Level and captured in its final Trento declaration of 24th October 2016.

The social aspects were debated at the UNOOSA High Level Forum, co-organized with the UAE in Dubai, and this occasion represented the stepping-stone of this year in the preparation of UNISPACE+50. The Forum represented a unique opportunity for the broader space community to address key developments linked to the Fourth Industrial Revolution, which is characterised by the fusion of new technologies and new business models that impact and benefit from outer space activities.

The UNISPACE+50 process will be instrumental in supporting the achievement of the Sustainable Development Goals of the UN Agenda 2030. In fact, these new goals emphasise the long-term economic, social, and environmental requirements of the global community, and space will be a pivotal component in achieving these goals.

In this sense, UNISPACE+50 also represents a unique opportunity to further demonstrate the broad societal benefits of space as a source of innovation, inspiration, interconnectedness, integration and investment, and to strengthen unified efforts at all levels and among all relevant stakeholders in addressing the overarching long-term development concerns of society.
### List of Acronyms

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<tr>
<th>Acronym</th>
<th>Explanation</th>
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<tr>
<td>A</td>
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<tr>
<td>AEM</td>
<td>Agencia Espacial Mexicana (Mexican Space Agency)</td>
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<td>ASI</td>
<td>Agenzia Spaziale Italiana (Italian Space Agency)</td>
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<td>C</td>
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<td>CBERS</td>
<td>China-Brazil Earth Resources Satellite</td>
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<tr>
<td>CLIODN</td>
<td>Committee for Liaison with International Organisations and Developing Nations</td>
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<td>COPUOS</td>
<td>Committee on the Peaceful Uses of Outer Space</td>
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<td>COSPAR</td>
<td>Committee on Space Research</td>
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<td>D</td>
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<td>DECU</td>
<td>Development and Educational Communication Unit (DECU)-ISRO</td>
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<td>E</td>
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<td>EDUSAT</td>
<td>Indian satellite for education</td>
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<td>EGNOS</td>
<td>European geostationary navigation overlay system</td>
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<td>EO</td>
<td>Earth Observation</td>
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<td>EP</td>
<td>European Parliament</td>
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<td>ESA</td>
<td>European Space Agency</td>
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<td>ESPI</td>
<td>European Space Policy Institute</td>
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<td>F</td>
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<td>FFG</td>
<td>Österreichische Forschungsförderungsgesellschaft m.b.H.</td>
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<tr>
<td>GEOSS</td>
<td>Global Earth Observation System of Systems</td>
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<td>GMES</td>
<td>Global Monitoring for Environment and Security</td>
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<td>I</td>
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<td>IAA</td>
<td>International Academy of Astronautics</td>
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<td>IAF</td>
<td>International Astronautical Federation</td>
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<td>ICG</td>
<td>International Committee on Global Navigation Satellite Systems</td>
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<td>IGOs</td>
<td>Intergovernmental organizations</td>
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<td>IISL</td>
<td>International Institute of Space Law</td>
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<td>ISRO</td>
<td>Indian Space Research Organisation</td>
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<td>JAXA</td>
<td>Japan Aerospace Exploration Agency</td>
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<td>J-PAL</td>
<td>Abdul Latif Jameel Poverty Action Lab</td>
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<td>M</td>
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<td>Acronym</td>
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<tr>
<td>MDGs</td>
<td>Millenium Development Goals</td>
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<td>MIT</td>
<td>Massachusetts Institute of Technology</td>
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<td>MSF</td>
<td>Médecins Sans Frontières (MSF) International</td>
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<td>N</td>
<td>National Aeronautics and Space Administration</td>
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<td>NGOs</td>
<td>Non-governmental organization</td>
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<td>S</td>
<td>Sustainable Development Goals</td>
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<td>SST</td>
<td>Space Surveillance and Tracking</td>
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<td>STEM</td>
<td>Science, Technology, Engineering and Math</td>
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<td>T</td>
<td>Telecommunications</td>
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<td>UN</td>
<td>United Nations</td>
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<td>UNOOSA</td>
<td>United Nations Office for Outer Space Affairs</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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