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1. Introduction

The Millennium Development Goals were a successful catalyst of global efforts to alleviate poverty, and was a significant mobiliser of actors with a role to play in this endeavour. In September 2015 the successor initiative, the Sustainable Development Goals (SDGs), were agreed at a meeting of heads of state and government in New York. In contrast to the Millennium Development Goals, which were addressing the conditions specifically of developing countries, the Sustainable Development Goals address concerns of the entire global community.

The Sustainable Development Goals are, like the Millennium Development Goals before them, calling upon all possible contributors, be they national, regional, or international, be they governmental or non-governmental, be they industrial or service-focused, be they large or small, low or high tech, to become active and bundle their efforts in the service of meeting the vital objectives of the SDGs. The SDGs are thus addressed also to the space community, and the new impetus introduced by their endorsement should incentivise the space community to focus on how space can become an ever more important enabler of user-driven sustainable development, particularly in developing countries.

The objective of the current report is to look in a broad fashion at how space has contributed to sustainable development in the past, at the untapped potential in this respect, and at how this untapped potential can be unlocked. A special focus of the report is thus going to be an endeavour to define how dialogue and cooperation mechanisms can be set up between the various space and sustainable development actors. How such mechanisms can be set up in such a fashion that space will become an optimum enabler of sustainable development efforts driven by the 'demand side' - represented by those who are implementing the SDGs and those who are facing all the practical challenges of activities 'on the ground'.

Before going into the substance of these issues it is worth reflecting on the meaning of the terms 'space' and 'space community'. 'Space' is often taken to refer to space infrastructure, and hence when discussions are had on the contributions space can make to sustainable development they will often be focused on the needs for new space infrastructure, particularly new satellites. Yet, this misleads. There may in some situations be a need for new satellites, but this will be the exception. The general issue for the space community is how to make the plethora of satellites and functionalities more useful for sustainable development particularly in developing countries; it becomes an issue of the transformation of infrastructure and data into services that are targeted to 'on the ground' needs of development actors. The term 'space' must thus be understood broadly, and particularly as a source of services, rather than just new in-orbit infrastructure.

The term 'space community' might suggest a unitary body of great homogeneity. Nothing can be farther from the truth. The space community consists of a multitude of sectors and actors with very different interests, specialisations, backgrounds, and institutional character, and only an attachment to space, in the wide sense, is the common denominator. In the current report 'space community' is used to signal the 'supply side' of the development equation.

Space technology has accompanied economic development efforts for a long time – and has played an important role. This is true both in industrialised and developing countries. In the developing world India has been a leader in deploying space for economic development and remote health care, but numerous international assistance programmes involving space have also been implemented, such as GMES and Africa and the Tiger Programme, both in the field of Earth Observation. Telecoms initiatives have often been undertaken by commercial actors, O3B for example, and many projects currently exist for ensuring connectivity for every citizen of the world, one of the most ambitious being that of OneWeb.

In developing countries where terrestrial infrastructures are often insufficient or absent space services offer great advantages because they largely eliminate the need for such infrastructures. This is true for telecoms, where space services can work hand-in-hand with wireless functionalities, but it is also true for many Earth Observation applications where space based observation to some extent might substitute for absent in-situ

measurements. Space based navigation does not eliminate the need for roads, but assists in utilising the available infrastructure in the best possible fashion and can be central to defining alternative routing when specific routes become unnavigable.

In some situations Earth Observation satellites are the only possible source of information even in industrialised countries, and often they are central to proper societal management. This is, for instance, true for data that is central to coastal and fisheries management and for pollution monitoring, domains where developing countries can be particularly challenged. Well-functioning banking systems rely extensively on space based telecommunication and timing information derived from navigation satellites, and the ability of telecoms satellites to make distance irrelevant is central for functionalities such as tele-education and telehealth.

It can certainly be said that developing countries currently benefit significantly from space services, yet often the needs of developing countries are an afterthought compared to the great efforts made in industrialised countries to ensure that all the useful data and functionality coming from space are put to the best use for their societal purposes. So one of the ways to tap further the potential of space for sustainable development in developing countries is to make sure that space services are also customized and targeted to the specific needs of their societies. But there is another critical challenge to consider and that is to make sure that space services are embedded in the best possible fashion in development user communities. Space services will not always be plug-and-play, but may require extensive and continuous training in order to be useful, and there is a need to make sure that terrestrial equipment is properly maintained and upgraded. In order to make sure that space services are created and deployed in an optimum fashion, and to make sure that terrestrial infrastructure is useable in a sustainable fashion, there is a strong need for the space community and policymakers to have the ear close to the ground, so that the true needs are identified and the best and truly sustainable solutions for developing countries are found. The centrality of good dialogue and cooperation mechanisms is underscored.

Europe has a special role to play in all of this based on history, current wealth and capability, and the fact that many European space assets already contain data and functionality of high relevance for developing countries, particularly in Africa. The position of the Meteosat satellites on the geostationary arc is ideal for providing data for weather forecasting in Africa, for instance. But also the rise of the economic importance of developing countries provide a motive of self-interest for Europe to become more deeply involved with the developing world. Many of the new markets of the future will be in developing countries, and this means not only possibilities of supply of space functionality and equipment in the short term but the possibility to become a trusted partner of rising powers for the long term. It is important to note, however, that in order to become a true and trusted partner Europe must demonstrate that what it seeks to provide are the best solutions for the actual needs of developing countries and their diverse communities. Mindless technology push is neither right nor useful for Europe.

2. The Sustainable Development Goals and Space

The Sustainable Development Goals express global ambitions and exhorts all possible contributors of whatever stripe to assist in meeting its challenges. Given the important role already played by the space domain in development efforts and the great opportunity for increasing its contribution, space actors are called upon to seize the momentum of the SDGs to focus not only on how they can further contribute, but also on how they can become a more integral part of the community dealing with development in the greater societal context and thereby optimise effectiveness and contribution. For European actors this poses the question of how coordination with non-space European stakeholders can be organized in the best possible fashion, as well as how European actors can leverage their global networks of contacts for this effort and achieve overall coherence with the broader global development community and its activities.

The importance of seizing the moment is demonstrated by the experience with the Millennium Development Goals. The eight Millennium Development Goals created in 2000 have shaped international development cooperation for the past fifteen years. Although the goals were not legally binding, they were widely accepted as the ultimate 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." With the end of the year 2015, however, the goals have expired, necessitating an evaluation of their successes and shortcomings, as well as the creation of a Post-2015 Development Agenda.

Overall the Millennium Development Goals have been extremely successful in the sense of focusing attention on the need for concrete action. Yet, the goals were also very ambitious, meaning that not all goals were, or could be, met. Some goals, such as eradicating extreme poverty and hunger (Goal 1), have marked considerable successes, with the proportion of people whose income is less than $1.25 a day falling from 47% to 14% in developing regions between 1990 and 2011, far better than the target. Others, such as improving maternal health and access to contraception, have fallen short. In particular, the effects of climate change have become more acute, despite the global emissions targets set under Goal 7. Furthermore, the impacts of development efforts have been felt unevenly, with rural populations, women, and the population of Sub-Saharan Africa witnessing fewer improvements than others. Sub-Saharan Africa especially is experiencing a growing concentration of extreme poverty as it fails to keep pace with global improvements.

Awareness of these issues, as well as related developments such as growing global inequality, rising pollution due to industrialization and increased global political insecurity, has framed debates on the formulation of a Post-2015 Development Agenda from the start. The Third United Nations Conference on Sustainable Development in Rio de Janeiro called for goals within the United Nations Development Agenda beyond 2015 to be based on the principle of sustainable development, that is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", that respects the planet's limits and considers the interrelated nature of the economies, societies, and the environment. The SDGs are thus of global application.

The emphasis on sustainability has permeated the Post-2015 Development Agenda. The core component, the SDGs, not only adopt a broadened scope (17 Goals as compared to 8 MDGs), more ambitious targets ("eliminating" issues rather than reducing them), and place greater emphasis on the environment and governance, but integrate more fields into the Agenda. The UN World Conference on Disaster Risk Reduction in Sendai, Japan, and the 21st Conference of Parties on Climate Change in Paris, France were held in 2015 to produce new framework agreements on disaster risk reduction and climate change respectively, and these agreements have been referenced in the SDGs. The Goals acknowledge that these conferences are the primary fora for negotiations in their respective fields, but note that the implementation of agreed frameworks should occur on a sustainable basis in conformity with the SDGs, creating a two-way interaction between fields that were previ-

ously 'siloed' and functioned largely in isolation from each other.

The importance of the SDGs is thus that they formulate a new approach to development which has the potential to be more circumspect, but also more comprehensive in its actions. This emphasis on intelligent development solutions presents new challenges to current development actors, and is driving a search for improved solutions. But this emphasis plays to the strengths of space.

Assessing the potential of space relative to the SDGs in a very general and non-exhaustive fashion the following mapping can be suggested (see Table 1):

SDG topic	Actual or possible contribution of space
SDG 1: No Poverty	Improved communications and more environmental data as a driver of growth, better logistics management by the use of sat/nav
SDG 2: Zero Hunger	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
SDG 3: Good Health and Well-Being	E-health, including telemedicine and medical tele-training and learning
SDG 4: Quality Education	Tele-learning
SDG 5: Gender Equality	Female empowerment by telecoms links to the Information Society, tele-learning, telecoms enabling small businesses of women.
SDG 6: Clean Water and Sanitation	Earth Observation data for water management, water detection, and water pollution monitoring
SDG 7: Affordable & Clean Energy	Earth Observation data for renewable energy management, grid management
SDG 8: Decent Work and Economic Growth	Space services as enabler of economic growth and high quality jobs in all economic sectors
SDG 9: Industry, Innovation & Infrastructure	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 important for best use of transport infrastructure and banking systems
SDG 10: Reduced Inequalities	Access to Information Society through telecoms is a leveller, fosters transparency and hence helps fight against corruption, space services as an enabler of work opportunity
SDG 11: Sustainable Cities and Communities	Earth Observation data for pollution monitoring, energy management and land use planning, sat/nav for traffic management, telecoms for efficient information exchange
SDG 12: Responsible consumption and production	Earth Observation data for optimised supply management, energy management, sat/nav for logistics management in production
SDG 13: Climate Action	Earth Observation data key for climate change monitoring and definition of mitigation strategies
SDG 14: Life below Water	Earth Observation data key for monitoring the health of oceans and other water systems, for fisheries management and policing
SDG 15: Life on Land	Earth Observation data for bio-diversity monitoring, pollution monitoring, land use management and policing
SDG 16: Peace and Justice - Strong Institutions	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,
SDG 17: Partnerships	Space community is part of an international fabric of partnerships. Possibilities of reinforcement of links with development actors

Table 1 – Actual or Possible Contributions of Space to SDGs

Space is not starting from zero in any of the mentioned domains, far from it, but it is clear that much more can be contributed by the space sector when needs are better understood and when additional resources are mobilized.

In order to harvest all the benefits of space for sustainable development 'siloed' approaches must be avoided, thus allowing to embed space even more in integrated approaches where the only measure is the adoption of the solutions that serve sustainable development best in the short as well as the long term.

3. The Demand Side

The actors that can benefit from space services in the development field can roughly be grouped into seven categories: national governmental actors of developing countries, citizens in developing countries, non-governmental actors in developing countries, governmental aid organisations operating in developing countries, intergovernmental organisations in the field, the Office of the UN Special Representative for the SDGs, development consultancy firms.

National governmental actors of developing countries

The national governments of developing countries are central to any development effort as they both have policy making and regulatory powers and provide, or are supposed to provide, essential services to their citizens. Development projects that are not supported, integrated, or coordinated with national governments and local authorities will mostly fail if they are not designed to be mere one-offs. National governmental actors are key enablers and with their knowledge of local conditions and policies they are important sources of information for those seeking to assist.

Citizens of developing countries

The object of all development efforts are always the citizens of a country. However, citizens are often not heard properly when development activities are planned. The assumption is, perhaps, that local governments will give voice to the needs and perspectives of the citizens, but particularly in countries with more rudimentary governance schemes this is often only imperfectly the case. Given the great emphasis commercial companies in the industrialised world puts on canvassing consumers and surveying consumption trends it should be remembered to ensure direct voices for citizens also when designing development and assistance programmes. This is true also for programmes involving space services, even if citizens cannot be assumed to be space technology experts.

Non-governmental organisations in developing countries

Non-governmental organisations (NGOs) play an extraordinarily important role in developing countries. NGOs tend to have unsentimental, realistic views on challenges, particularly on those they themselves encounter in the field. NGOs are often stuck in the immediacy of trying to fill urgent needs and therefore might not always take the time to take the longer view or explore the utility of new approaches or tools. Sometimes this is married to technology hesitancy, and, vis-à-vis space services, reluctance because space services are misunderstood as always expensive and often of military provenance. In any event, NGOs are reluctant to invest in technology development both because of the development risk and because donors tend to focus on short-term need alleviation

Governmental aid organisations operating in developing countries

In the same fashion as NGOs governmental organisations operating in developing countries have a good view of conditions and challenges on-the-ground. However, governmental aid organisations might be more ready to entertain longer perspectives and innovation in tools and approaches, because of their link to general policy making. This link might sometimes hamper actual operations but is also a good opportunity to try to make sure that new approaches fit in a broader context. This is important for the deployment of new space services, the introduction of which might sometimes require dialogue between donor and recipient governments, and will need to be carefully weighed as part of prioritisation processes.

Intergovernmental organisations in the field

The intergovernmental organisations in the field are mostly part of the UN family. In many respect these organisations are indistinguishable from governmental aid organisations, yet, they always feature multicultural approaches, and allow the leveraging of experiences over a wide spectrum of activities in many different settings. As has been recognized by the UN through its 'Delivering as One' initiative very good coordination is nec-

essary in order to make sure that experiences of different actors in different environments are leveraged properly across the board and that ultimately efficiency of efforts is ensured. Some UN organisations have expert knowledge and practical experience in leveraging space assets for their efforts (peace-keeping, for instance, operate a large and sophisticated satellite based telecommunication system) but, despite best efforts by the UN Office of Outer Space Affairs, it might be questioned whether these capabilities are made use of in the best possible fashion across organisational borders within the UN family. *The annual coordination meeting called UN Space is a promising forum that should be expanded and instrumentalised much more. UN Space, organized by the UN Office of Outer Space Affairs, could be an important entry point for the space community to seek dialogue with the UN system.*

Intergovernmental aid organisations not in the field

The World Bank and the Directorates General for Development and Cooperation and for Humanitarian Aid and Civil Protection of the European Commission play a key role in funding development activities in developing countries. In this sense they are critical for the establishment of relevant programmes, and their knowledge of the potential of space is often decisive for whether space assets are instrumentalised in the best fashion in the overall development effort. The importance of sensitivising such institutions to space as an enabler is further underscored by the advisory function that particularly the World Bank is often fulfilling. *This sort of institution is, like national aid authorities, well suited to invest in targeted technology development for use in the field in developing countries, and to support in-house technology capacity building in NGOs and other sustainable development actors.*

The UN Special Representative for the SDGs

The holistic approach adopted by the SDGs put a premium on good coordination at all stakeholder levels. The UN Special Representative for the SDGs play a central role, and although he necessarily must take a bird's eye view and deal with a multitude of actors and specialisations, it would seem important for space to be understood as an substantial contributor to the achievement of the SDGs, so that also the Special Representative can sensitivise relevant actors at all levels to consider whether needs might be best met by space assets in a given situation. The role of the Special Representative is in some respects to act as a conduit between the demand communities and the supply communities.

The special case of consultancy firms specializing in development

The definition and execution of development projects often rely significantly on advice provided by specialised consultancy firms. These firms might, however, sometimes be blind to the potential of space, and hence efforts should also be made to explain well to such actors how space assets might help.

4. The Supply Side

The supply side consists of the various space actors, ESA, EU for Copernicus and Galileo, Eumetsat, national space agencies, the manufacturing industry, the operators, and the value added downstream segment, UNOOSA.

ESA

ESA is a possessor of tremendous expertise not only in space technologies but in project management and in how to make international cooperation work in very different contexts.

All these qualities are already brought to bear in the context of sustainable development, but this could be done much more in the context of developing countries. ESA has a long record of being involved in various initiatives of this nature and has a powerful Integrated Applications Programme also serving such purposes, **but ESA expertise could be leveraged more through the creation of a dedicated programme on space for sustainable development in developing countries, as well as by ESA becoming an instrument for other funders and actors to define and execute sustainable development programmes and projects.**

Such new programmes could include a Space Technology Academy for NGO's and other field actors - through which field workers and coordinators could receive technology information and training in the use of space technology (more or less in-depth depending on need) and space experts could get feedback from those using space tools for sustainable development purposes. Such an academy might also provide in-house and tele-training for NGOs, arrange yearly general workshops, and feature a call-centre at which NGOs and other field institutions could get immediate operational assistance and counseling.

EU, Copernicus and Galileo

Both the Copernicus and the Galileo Programmes generate data of the greatest importance for sustainable development, as illustrated in table 1 above. And, indeed, the European Commission created a dedicated activity, GMES and Africa, which has been aiding the more effective use of Copernicus data in the region. In addition, the Commission has funded a number of terrestrial equipment and training schemes relative to the use of Earth Observation data.

In the context of Galileo less has been done in terms of outreach towards the development community, which is perhaps not surprising since the programme is not yet fully operational. However, there is a need to prioritise this aspect very soon, given the value of the data for sustainable development purposes.

What is most important, however, is that mechanisms are created that allow space related information to flow freely between the various relevant Directorates General of the Commission, so that, for instance, DEVCO and ECHO can integrate space services even better in their efforts.

Eumetsat

Eumetsat has been an earlier mover on seeking to make meteorological and climate change data from space available and useful for the sustainable development in developing countries through its involvement, for example, in the Preparation for the Use of MSG in Africa (PUMA) programme of the early 2000's. This involvement has been followed by strong participation in the African Monitoring of the Environment for Sustainable Development (AMESD) and the current Monitoring the Environment and Security (MESA) programmes. A characteristic of these programmes is that they bundle efforts and capabilities of a number of organisational actors - receiving strong financial backing by the European Commission and placing the African Union and African Regional Economic Communities centrally in the governance and implementation. These programmes can thus be seen as pathfinders for inter-institutional cooperation on sustainable development also in other fields.

National Space Agencies

Many of the national space agencies of Europe are already involved in activities supporting developing countries in their efforts. Again, this is a role that can be reinforced, and has particular relevance because such reinforcement can rely on traditional links of cooperation between given donor and recipient coun-

tries. National space agencies should also increase the links with general governmental aid institutions in their countries, so that the expertise of space agencies can be utilised in an optimum fashion for aid purposes.

The Manufacturing Industry

The satellite manufacturing industry is important for sustainable development even if existing space infrastructures might to a large extent fill current needs. Yet, the planning of new programmes will rely extensively on their expertise, and the manufacturing industry is often in a position to guide customers towards solutions that will enable sustainable development to be served in the best way. Furthermore, they might be able to guide their customers to the possibilities of opening new services of relevance for developing countries by only changing planned designs in modest ways. Often small steps can have great impact!

The Operators

The operators in the telecoms field have a crucial role to play in terms of enabling sustainable development. New markets are opening up and these can often be served without sacrificing commercial interests, partly because these new markets might be self-sustaining, partly because the operators might be able to attract development specific funding.

The Downstream Segment

To get the service providers of the downstream segment engaged in filling the needs of development actors is key for making space ever more useful for sustainable development. This is currently not an ignored market for service providers, far from it, but much more can be achieved and this will require even more focus, but also, critically, to get local entities and companies involved in service provision. Local needs and requirements can normally be identified and satisfied much better by local actors, and sustainable fulfilment of sustainable development needs will clearly require local involvement. The downstream segment can become a substantial economic activity for developing countries, also because entry barriers are relatively low in this segment.

UNOOSA

The applications programme of the UN Office of Outer Space Affairs has been very beneficial for developing countries, because it addresses how space based services are made relevant in the local environment. The recent step to set up a specific liaison function with UNOCHA and other humanitarian assistance actors is laudable!

However, UNOOSA can potentially expand its utility for sustainable development in developing countries by expanding its advisory role vis-à-vis the various branches and organisations of the UN, but also by building a dedicated advisory function, perhaps together with the World Bank, where developing countries can either get specialist advice or be referred to specialists vetted by UNOOSA.

But UNOOSA could also create an optional programme structure a la ESA that would allow developing countries to agree, finance and execute space programmes in a standardised format - with the top level management done by dedicated programme management functions within UNOOSA. In other words, UNOOSA can help lower the entry threshold for developing countries by acting, in a limited fashion, as their space agency. It is noteworthy in this respect that such programmes must not concern just the establishment of new in-orbit infrastructure, but could also be a way to agree and execute new downstream service programmes.

The role of UNOOSA as a potential 'one-stop shop' for customers seeking to find out whether space can be the solution to a given problem of theirs would be welcome!

The above description of the demand and supply side does not pretend to be exhaustive, and is, admittedly rather Eurocentric. The description is an attempt to show the diversity of actors and give an impression of the extent to which untapped potential exists. It is recognized that many other relevant actors exist: charitable organisations like the Gates Foundation, the Group on Earth Observations, the World Meteorological Organization, the International Telecommunications Union, the Charter on Space and Major Disasters, many of whom defy easy definition.

The whole object of this report is to stress the importance of being open to the great diversity of actors and tools that may be relevant for sustainable development in developing countries, and to invite an effort to optimize the mechanisms for dialogue and cooperation between this multitude of relevant contributors.

Clearly the Sustainable Development Goals are ambitious and will need a significantly stepped up effort by the supply side if they are to be achieved. This requires commitment, dialogue with the demand side, and creative programmatic thinking, and the EU, ESA, the national Space Agencies are particularly called upon to define frameworks that will allow the prerequisite ambitions to be fulfilled!

6. The Tools for Dialogue and Cooperation

Optimising dialogue and cooperation mechanisms is, as repeatedly stated, central for allowing space to play its enabling role as effectively as possible vis-à-vis the sustainable development goals. This having been said it is equally important not to create new mechanisms and instruments where existing such might serve the purpose. However, dialogue and cooperation mechanisms must be heterogeneous enough to serve the diversity.

At the political very top-level of the SDG management there are the UN Secretariat and the UN General Assembly. At this level, space is mostly seen as just a branch of hi-tech. Yet, when hi-tech is addressed in relation to the SDGs, for instance in the General Assembly, space agencies have been absent. This is a mistake and the major space agencies should be represented in addition to UNOOSA. The possible perception that General Assembly meetings on these topics lack concrete results is mistaken. Addressing the enabling functions of space in high level political fora draws the attention of the implementers, and being part of the dialogue means that space becomes part of the agenda, of the menu.

As a significant contributor to the information society the space community should also make sure that it is well-represented at the meetings on the World Summit on the Information Society. The huge annual meeting is an important forum to reach sustainable development actors and be kept abreast of the developments in the hi-tech contribution to the SDGs.

The UN Secretary General has appointed a Special Representative for the SDGs. The Special Representative is central for the SDGs from a political perspective, and *efforts should be made to have an annual meeting between the Special Representative and central hi-tech representatives, such as Google and Facebook. The space community should be represented by the heads of the major space agencies and particularly focused industrial actors such as OneWeb*.

Working relationships should also be built with staff of the UN Department of Economic and Social Affairs which is deeply involved in the SDG agenda as well. However, the organisations and branches of the UN involved in the SDGs are many, and for many space would be relevant. It would be highly advantageous if the space community, in whatever configuration, could become involved in the discussions centered on new programmes or the top-level monitoring of the implementation of existing programmes across the range of UN organisations.

Good working relations with World Bank representatives should also be built and the major space agencies should be present at their high level events addressing the contribution of hi-tech to sustainable development.

A Working Group of 15-20 senior level advisors from both the supply and demand side might be a good first step in order to improve dialogue on space and sustainable development across organisational boundaries and for defining more permanent dialogue mechanisms, either within existing structures or created anew. Good stakeholder platforms are key for success!

At the national level it is recommendable that space agencies and space industry become more directly involved with the national aid agencies and aid communities, including, importantly, NGOs.

Within the European environment it is recommended that a forum be set up where once a year high level representatives of ESA and the national space agencies would meet with counterparts within the relevant Directorates General of the Commission, e.g. GROW, DEVCO, ECHO, CONNECT, ENVIRONMENT, CLIMATE ACTION and with the External Action Service.

Cultivation of relations with NGOs that could benefit from space services is a neglected area, despite some efforts by DG Grow and DG ECHO. Relations might be served to some extent by participation in UN and World Bank meetings, but NGOs also arrange their own events where an appreciation of the potential of space could be useful and representation therefore desirable.

More generally, *it might be recommendable that each space agency would designate a focal point for the outreach to sustainable development actors*, since such an ambassa-

dorial function could channel space actors' expertise to the sustainable development community, and could ingest the need of development actors into space agencies and their programmes. Such focal points should be especially mindful of the need to listen closely to the voice of the NGOs and should, if necessary, create fora dedicated to frank exchanges on the possible usefulness of space services for their purposes.

The International Astronautical Federation has traditionally been a place where also the issues and needs of developing countries would be addressed. The annual International Astronautical Congresses (IAC) are the main events where space actors discuss such issues. It is noticeable, however, that at the IACs the participation is almost exclusively from the supply side. Much more should be made to draw in both the high level and the working level development actors.

Perhaps one initiative could be to create a Sustainable Development Networking Forum, similar to the Global Networking Forums, but dedicated to events bringing the space supply side together with the sustainable development actors from the demand side. This would seem to chime with a desirable evolution of the IACs to bring together more those that could benefit more from space with space experts – a concrete manifestation of 'Space for Earth'.

New tools for cooperation?

Space related activities often involves expertise or resource needs beyond individual actors' or countries' means. Pooling mechanisms therefore become a prized asset.

In this respect ESA and other space agencies should positioning themselves as welcoming hosts of third party activities serving the sustainable development of developing countries.

It would be salutary to see programs dedicated to such purposes in the space agencies and allowing funding both from the agencies themselves, from governmental or intergovernmental aid agencies and even from developing countries themselves. For narrower specific application projects mechanisms could even allow NGO funding to become involved. Obviously governance structures would have to accommodate the possible heterogeneous funding sources, but there is no good reason why the expertise of space agencies could not be instrumentalised for sustainable development in such a bundled fashion!

In a similar vein *UNOOSA could, as mentioned, also build up a programme executive arm and create optional programme structures that would allow developing countries to fund and execute joint programmes according to their wishes*, it being noted that this would normally not involve UN funding for the programmes, the UN only becoming an implementer and a force assisting the ambitions of developing countries to leverage space for economic development.

There would also be very big value in creating space incubator programmes in developing countries, or assisting in the development of such. The incubator programmes of ESA have been a success and the lessons seem to be rather directly transferable to a developing country context, thus serving the purpose also of making space a catalyst for local economic development even from the supply side. Space agencies could be mid-wives in such a process, lending expertise whilst receiving funds from aid agencies.

Further, exchange programmes could be implemented, in pursuance of which young talented engineers from developing countries would spend a year or two at the technical centres of the space agencies of industrialised countries, and where young and talented engineers from the space agencies would spend a year or two at space engineering facilities in developing countries. It is an established fact that such exchange programmes are not only high effective in terms of capacity building, but also serve to cement friendly relations between nations. They would serve sustainable development in developing countries well, but should go hand-in-hand with measures to limit the associated risk of 'brain drain'.

It is finally worth mentioning that for the past 15 years a tool has existed that has been of extreme utility for disaster management, and that is the **Charter on Space and Major Disasters**, founded by ESA and CNES, and currently with 15 members. **This tool should be expanded to cover the broader ambit of data for sustainable development in developing countries and a holistic approach should be taken.** Such an extension of scope would be a very tangible contribution to sustainable development efforts!

6. Conclusion

Achieving the sustainable development goals is mainly a question of will. Yet, not the will of one entity will decide, what is required is collective will! An important constituent of the collective will is the space community with its diverse entities.

This report has sought to demonstrate that space services, as enablers, have a very substantial role to play in implementing the SDGs, but that proactive measures must be taken in order to ensure optimum contribution. Hence, the report describes a number of measures that should be taken to facilitate information exchange and dialogue, but also makes recommendations for how the tool box for practical cooperation could be significantly expanded.

Much remains to be done and it is in the interest of everybody that implementation of the SDGs occur as quickly as possible. For this space assets have an important role to play as part of an integrated whole!

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Mission Statement of ESPI

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.

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