United Nations Environment Programme

Response to the Invitation to participate in the Open Consultation of the CWG-Internet on "International internet-related public policy issues on harnessing new and emerging telecommunications/ICTsfor sustainable development"

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1. *How will new and emerging telecommunications/ICTs impact both the internet and sustainable development, including the digital economy?*

In the current information age era, as for almost all aspects of life, ICT is becoming a major actor in facilitating the achievement of the sustainable development goals (SDGs), including aspects related to the sustainability of the earth.

Emerging ICTs for example have dramatically improved the ways in which the well-being of Earth can be monitored. Data from new generation of powerful imaging satellites and other earth observation technologies have become much more regular, widespread, less costly and accessible. Together with scientific and technological advances such as ground sensors, internet of things (IoT) devices, cloud computing and massive data centres, and artificial intelligence / machine learning / advanced algorithms, these data offer more opportunity to observe, monitor, and predict environmental phenomena with greater efficiency and precision.

Enhanced earth observation data greatly improve the analysis, and communication of environmental issues; aid decision-making, monitoring change over time, and evaluating results. Such data are routinely used to assess changes in land cover and land use, forest extent, and land degradation, as well as the factors which may be driving these changes such as wildfire, road expansion, and natural disasters. The same is true for seascapes, where information gathered by satellites can provide information about sea level rise, coral reefs, marine ecosystems and coastal erosion.

Regarding satellite technologies, Morgan Stanley reports that advances in reusable rockets as well as miniaturization of satellites are opening-up huge business opportunities well beyond the traditional aerospace and defense industry, and into IT hardware and telecom. The global space economy is expected to reach $1 trillion or more in 2040. IT heavyweights are sending hundreds to thousands of low orbit satellites to space. Amazon's Project Kuiper will place more than 3,000 satellites to provide low-latency, high-speed broadband connectivity to unserved and underserved locations around the world; Airbus and OneWeb will place 600 satellites by 2021 to deliver affordable global high-speed internet access; SpaceX is launching Starlink to put nearly 12,000 satellites; Google has patented a new global-scale communication system that includes over 1,000 satellites; Apple has been reported covertly working on a satellite project that will beam data to its network of devices.

While ICTs are an important element in achieving a sustainable earth, particularly in mitigating and adapting to climate change, and reducing overall emissions of greenhouse gases, they are also contributors to greenhouse gas emissions, as well as a significant contributor to e-waste, and they will

very soon produce/be a source of space debris due to the massive sending of satellites to low earth orbit space.

Emerging ICTs often consume a huge amount of energy when operating, leaving behind significant environmental footprints. For example, it has been estimated that data centres, repositories for billions of gigabytes of information, globally consume more than 400 terawatt hours of electricity each year. This equals approximately 3 percent of the worldwide energy consumption. The emissions are currently level with aviation industry but the consumption at data centres is expected to double by 2025, producing more emissions than air transport. Data centers need electricity to power servers, storage equipment, backups, and power cooling infrastructure; most servers require temperatures below 25 degrees Celsius to operate, and cooling can comprise up to 40% of electricity usage in conventional data centers.

It is important therefore to understand how to reduce the environmental footprint of emerging ICTs to ensure that their usage would overall be contributing to the well-being and sustainability of Earth, and not the opposite.

International standards and guidance on measuring the environmental efficiency and performance of emerging ICTs remain lacking. As more and more of the technologies are being integrated into different aspects of everyday life, it is essential to develop international standards and metrics that would support the implementation of emerging ICTs in a sustainable manner.

UNEP is pleased to be the Vice-Chair of the ITU-T Focus Group on "Environmental Efficiency for AI and other Emerging Technologies" (FG-AI4EE), in identifying the standardization gaps related to the environmental performance of emerging ICTs and in developing technical reports and technical specifications to address the environmental efficiency, as well as water and energy consumption of emerging technologies.

The rapid advancement of ICTs means newer and more sophisticated servers, devices, mobile phones, laptops, and tablets are entering the market every day and many consumers are often disposing their older gadgets for the newer models. Product lifecycles become shorter, and many designs do not support repair or reuse. As a result, the amount of electronic and electrical equipment waste, or e-waste generated is growing rapidly. E-waste contain substances that pose considerable environmental and health risks, especially when not well disposed.

UNEP is pleased to be part of the WSIS Forum - High Level Dialogue: An end to electronic waste: Building an E-waste Coalition, to collaborate in developing best practices of global e-waste management.

While controlling the growth of the orbital population may not be very successful considering the thousands of man-made objects already orbiting, active and inactive, with varying sizes; and the tens of thousands of satellites planned to be launched, regulations and guidelines must be put in place to address the space debris threat. There is currently no international regulation for example to force operators to retrieve their debris or abandoned devices. Destroying objects in orbit is not an option as it would simply generate smaller debris. However, UNEP is currently not part of any body discussing the management of space debris.

2. What are the opportunities and challenges for the adoption and growth of the new and emerging telecommunications/ICTs and internet?

In addition to the opportunities and challenges mentioned in Question-1 in relation to emerging ICTs with the sustainability of Earth, another aspect worth pointing out is data. While emerging ICTs provide opportunities for access to more and more data, significant data gaps to effectively measure global progress against the SDGs still exist.

In a recent report produced by UNEP, it was highlighted that of the 93 environment-related SDGs indicators, there are only 22 (23 per cent) for which good progress has been made over the last 15 years. If this progress continues, it is likely that these SDGs targets will be met. However, for the other 77 per cent of the environment-related SDGs indicators, there is either not sufficient data to assess progress of the 93 environment-related SDGs indicators (68 per cent) or it is unlikely that the target will be met without upscaling action (9 per cent).

An indication of overall SDG indicators, the UN Statistics Division reported in its SDG Report 2018 that it carried out an assessment in six countries – three in Africa and three in Asia. It revealed that, on average, the countries have data available to monitor only 20% of SDG indicators, and around 23% are considered in principle available.

A few of the opportunities of emerging ICTs to address environment -related data gaps include deployment of IoT (ground data sensors) to complement and validate the increasing availability of geospatial data from satellites; development of smartphones apps for easy and speedy citizen - generated survey data collection; development of machine learning algorithms trained for analysis or to predict with less data; development of data cubes for open and free data sharing at the global, regional, and especially at the national level; etc.

UNEP is pleased to inform that in March 2019 Ministers of the Environment called upon UNEP to develop a global environmental data strategy by 2025, reporting progress in 2021 and 2023, in cooperation with other relevant UN bodies. UNEP was also asked to promote the use, sharing and application of environmental data. Member States also requested UNEP to improve its own capacity to manage an on-line data and knowledge platform providing repository functions, and open access to the best available environmental data that is timely, quality-assured, credible and relevant.

3. How can governments and the other stakeholders harness the benefits of new and emerging telecommunications/ICTs?

First and foremost, the point to acknowledge is that with the current complexities and fast pace development of new and emerging ICTs, no single organization, including governments, can harness the technologies alone. Organizations must collaborate in partnerships with other organizations to harness the benefits of the technologies. Working in partnership starts with clearly understanding and appreciating each other's unique strengths and competitive advantages, and often require organizations to re-examine and potentially disrupt its traditional practices and old ways of operating. Few organizations do that well, but those that do, benefit enormously from the leverage that partnerships can bring in the current global state to achieve the SDGs.

Although some private sector emerging ICT actors are beginning to offer global public goods and services, this however is developing without a wider understanding of the long term business models and incentives that sustain these services. A global conversation is needed around sustaining these global public goods and services, inter-operability and quality standards, governance and financing models.

UNEP is pleased that it has established the UN Science Policy Business Forum for the Environment (UN SPBF) - https://un-spbf.org - as a platform to promote partnership among all stakeholders to maintain a balance between public and private sector interests and incentives, and to encourage innovation, including emerging ICTs, (for environment). With over 2000 members and contributors representing the science community, governments, private sector and civil societies at large this is an important space to convene science and private sector actors in a governance discussion around the emerging digital ecosystem for the planet and on how public and private sector actors can collaborate in achieving the SDGs.

The UN SPBF established a working group on "Data, Analytics and AI" in May 2018 to kick-start the global conversation. Over 100 stakeholders from the scientific and citizen-science research communities, government and policy institutions, emerging technology companies and non-governmental organizations are involved. In early 2019, the working group made a strong case for a digital ecosystem on the environment for public and private sector actors to continue building on the common goals.

The digital ecosystem is defined as 'a complex distributed network or interconnected socio-technological system'. It features adaptive properties like self-organization and scalability. Much like natural ecosystems, a digital ecosystem, is characterized by both competition and collaboration among its many diverse public and private sector components; and it is the numerous interactions and linkages between these seemingly separate or autonomous entities that make an ecosystem functional.

It is therefore important that each organization of the digital ecosystem partnership clarifies its strength and policy positions on how a digital ecosystem for the planet can be sustained. For governments, this could be in the form of establishing national strategies in areas of emerging technologies, not just specifically for environment, but for achieving the SDGs in general.

4. *What are the best practices for promoting human skills, institutional capacity, innovation and investment for new and emerging telecommunications/ICTs?*"

Addressing capacity building in general has always been challenging. This is particularly the case in the field of emerging ICTs, a domain that is developing very fast. Ensuring that skills keep pace with the technology is very challenging given the dynamic nature of ICT. The ICT product life cycle is getting shorter and shorter.

Emerging ICTs are disrupting and transforming job markets. They are impacting more and more jobs. There is an increasing trend replacing human labour with robots and other automations.

However, there are at the same time opportunities for new skills requirements for the young; and re-skilling openings for the workers that have been replaced by the technology. There are different levels

of skills required, from basic digital skills that are aimed at emerging ICT literacy and enabling use of simple applications to advanced digital skills targeted at more complex tasks.

Emerging ICTs also open opportunities in bringing innovation to learning methodologies and tools, through smart learning practices. The emerging technologies offer powerful means of enhancing and extending the learning experience. Usage of AI, machine learning, internet of things and big data analytics facilitate even further the development of smarter learning systems. These rapid changes, which are affecting the learning landscape, are enabling learners to become more engaged, innovative and empowered. With internet technology now so advanced, teaching and learning across national boundaries can easily be done, enabling learners to participate in training activities without being restricted by their geographical location or that of the teachers or experts.

Best practices for promoting human skills, institutional capacity, and innovation should take into consideration the above issues.

The point raised previously regarding needs for partnerships in harnessing emerging ICTs, due to the increased complexities and fast pace development of new and emerging ICTs, is also applicable for promoting human skills and institutional capacity for emerging ICTs. Partnerships are also an important aspect in achieving successful results for promoting human skills and institutional capacity.

In addressing the aspect of AI skill, in July 2019, UNEP launched its 6 months internal AI Roadshow, running a series of AI literacy sessions to staff members. The sessions focused on machine learning and deep learning by empowering staff members with AI fundamentals knowledge, and the ability to identify and implement small-scale AI-based projects using interactive visual algorithm modelling tools that are increasingly available. These will typically be done in-house jointly by UNEP's corporate IT team and substantive programmatic project managers or organizational functional leads.