

WSWA-UNOOSA ESSAY CONTEST UNISPACE+50: Space and Society

Introduction

Human existence and systems is now integrated with space. The way we live and work continues to change in tandem with space advancement. This essay discusses the role of space in solving the myriad of global problems, possible progress in space exploration, as well as ways to increase human engagement in space activities.

Role of Space as a Solution to Global Challenges on Earth

The United Nations has identified global challenges and designed a framework of goals and targets called 'Sustainable Development Goals (SDGs)' to address these challenges. The SDGs include: no poverty; zero hunger; good health and well-being; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice and strong institutions; as well as partnerships for the goals. In view of the myriad challenges facing nations globally, Space-derived solutions are available or can be initiated for most of the SDGs. The sustainable development goals aptly provide a guide for developing nations to make the world a better place for their citizens.

Space integrated services or platforms provide better and more efficient means of relief, mitigation, planning and coordination during natural and man-made disasters. Programmes such as the United Nations Platform for Disaster Management and Emergency Response (UN-SPIDER) and the International Charter on Space and Major Disasters, provide satellite data, information and technologies to support the full disaster management cycle. These have saved lives and properties from the devastating effects of hurricanes, tsunamis, earthquakes, floods, wildfires, and oil spills, just to mention a few. Similarly, the International Cospas-Sarsat Programme utilises satellites to send detected alerts from persons, ships or aircrafts in distress, to appropriate rescue organisations or government agencies. Space-derived applications, such as the POWERCUBE, provide shelter, emergency hospital, water, telecommunications during disaster relief efforts.

Providing education to all people, irrespective of gender, race, colour, location or social status, is one of the major goals of the UN. Satellites are employed in the provision of the most basic education, distance learning, tele-education, and mobile education. Satellites provide connectivity to residents of remote

locations. This enables children living in remote areas to have access to education, residents get health-care from health professionals living in urban areas, and people are aware of happenings in their localities and around the world. With increased government's investment in services made possible by space technology, more people could be served.

Satellites have greatly improved our understanding of atmospheric and ocean processes. They are used in monitoring meteorological variables, weather forecasting, and climate studies. Such information are applied in farming, irrigation, transportation and communication. This will ensure food security, availability of water, safe transportation systems and better communication systems. Monitoring of the atmosphere has helped in combating pollution, thus providing cleaner and healthier communities and cities.

Satellites enable collaborative research across national borders, leading to ground-breaking discoveries for the treatment of global health challenges like cancer, diabetes and obesity. Information about new techniques or research findings are instantly made available across the world via the Internet.

Combining the capabilities of space with human ingenuity will aid in developing smarter technologies which will make the world a more secure place and combat terrorism more effectively. With communication and navigation satellites, sleeper cells or potential cells are identified and neutralized.

Progress humankind would have made in exploring new worlds in Space in 2030

Socrates (469-399 BC) said "man must rise above Earth - to the top of the atmosphere and beyond - for only thus will he fully understand the world in which he lives." In other words, human's understanding of the processes of the Earth and utilisation of its resources, is premised on the understanding of the atmosphere and other worlds. This has largely being accomplished with the deployment of different kinds of satellites for Earth observation, weather forecast, radio occultation, communication and science missions.

Beyond the intent of understanding other worlds is the possibility of humans living and thriving in other worlds. The International Space Station (ISS) is a first step in this direction. Since its completion, over 500 persons have visited the ISS, with stays ranging from 10 days to a year. Private companies, like Bigelow Aerospace, are developing inflatable platforms, which could house persons in Low-Earth Orbit (LEO). Also, the SHEE project (Self-Deployable Habitats for Extreme Environments) co-funded by the European Union's 7th Framework programme is designed as a background for further development of deep space habitats. It is also envisioned for use in extreme conditions and during disasters here on earth. Beyond LEO, the next destination appears to

be the Moon. Several missions are planned for the moon, such as creation of a 'moon village'. The Moon is also seen as the lead-way to Mars (which is called Earth's twin because of their similar characteristics). China, India, United Arab Emirates (UAE), the United States of America (USA), as well as the European Space Agency (ESA) are developing future missions to Mars. Mars One, a private company is planning to establish a permanent human presence on the planet.

Modern technologies, such as 3-D printing of parts is enhancing deep space exploration. With experimental successes on the ISS, future space travelers will grow their food in space and be able to recycle their urine to drinking water. Technology is improving life-support systems which will enable humans will be able to travel further into space. Efforts are also on to understand other worlds. With Cassini spacecraft, whose life ended in September 2017, we now have a better understanding of the Saturn system and the possibility of life existing in it. Juno is currently orbiting Jupiter (the largest planet in our Solar system). Within the next decade, it will be joined by the Europa Clipper spacecraft and the Jupiter Icy Moons Explorer (JUICE), which will study Jupiter and some of its moons, for possibility of sustaining life. Missions to Uranus and Neptune are also in the offing, but they await available launch windows in the 2030s.

Within the next half century, space mining is expected to be yielding benefits to nations. Some countries have already developed roadmaps for mining asteroids and the moon. Developing countries are not left out in space exploration through the opportunities created by UNOOSA for conducting experiments in the International Space Station. Also, UNOOSA, in collaboration with Sierra Nevada Corporation has created opportunities for developing countries to have access to space.

Proposals for getting people in Nigeria more engaged in Space activities

The African Regional Centre for Space Science and Technology Education in English (ARCSSTE-E) in Nigeria is one of the six Regional Centres for Space Science and Technology Education established by the United Nations General Assembly, through her Office for Outer Space Affairs to develop indigenous capacity in space science and technology applications, as well as carry out outreach and awareness programmes. The Centre runs a 9-month postgraduate diploma and an 18-month master programmes in six thematic areas: remote sensing; satellite communication; satellite meteorology; atmospheric physics; global navigation satellite systems; and space law. An in-depth knowledge and experience in these fields will go a long way in addressing the global challenges that concern Africa. The Centre intends to

develop an online platform for sharing of knowledge and experience of the space-based solutions derived from participants' projects for wider reach.

As an activity centre of Nigeria's National Space Research and Development Agency (NASRDA), ARCSSTE-E carries out outreach programmes, which include workshops; establishment of space clubs; competitions; commemoration of international space days such as the World Space Week (WSW) and International Day of Human Spaceflight; and zeronaut-to-astronaut programmes. These programmes continue to inspire and sustain interests in Science, Technology, Engineering, Arts and Mathematics (STEAM).

In its capacity as an awareness creation hub, the Centre intends to get more people involved in space activities through its programmes. In this year's calendar of activities, the Centre organised a series of monthly seminars around the theme of the 2017 World Space Week, as a buildup to the main celebration in October. The management of the Obafemi Awolowo University (OAU) where ARCSSTE-E is located has agreed to establish an OAU Space Day to promote space knowledge in the University community.

The Centre, in collaboration with iLab-OAU, organises training and competitions in robotics. This led to the first participation of Nigeria in 2011 World Robotics Olympiad. The Centre intends to increase support for participating in more international competitions. Local competitions targeted at different age-groups would create a lasting and sustainable interest in space.

Road shows are organised to reach out to the public and interviews are granted to the mass media. Symposia on themes linking prevailing societal issues and space solutions help in demystifying space. A new dimension would be to organize community-based activities with the involvement of stakeholders within each community and spread to other parts of the country. These activities are to be designed based on the needs, taking cognizance of traditions and customs peculiar to each community. This will enable grassroots involvement and ownership of such space-based activities and the awareness/benefits of space technology is delivered first-hand to the man on the street.

The Centre intends to extend its reach by providing advice on affordable space solutions so as to convince target groups in the aviation, health and agricultural sectors, of the need to incorporate space technology into their activities. Demonstrating and showing space-based solutions through affordable and easy-to-duplicate pilot projects will go a long way in supporting socio-economic development in Africa.

Conclusion

There has been a huge advancement in space exploration since the dawn of the space age. Knowledge and technologies derived from space exploration have helped in solving a myriad of challenges. Efforts are on to continue exploration into deeper space and understanding of other worlds. ARCSSTE-E is facilitating the development of indigenous capacity in space science and technology. These programs will further aid the development of new innovations.

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