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Research report

Forum:	UNCOPUOS
Issue:	Enhancing policies to promote equal access to space-based technologies and resources for underserved communities, with the aim of ensuring inclusivity in space-related research and innovation.
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Introduction

According to the United Nations Office for Outer Space Affairs (UNOOSA), as of June 2023 11330 satellites have been launched into space and are currently orbiting earth. 8334 of those satellites belong to only 2 nations, the USA and Russia (former USSR). Throughout history, the space sector has typically remained an exclusive sector, primarily accessible to the most developed and powerful nations capable of affording investments in government-led space programs. This means that when the development of space programs started in 1955, only 3 major space organizations were formed, NASA, ESA and the Soviet Space Program (now Roscosmos), leaving the rest of the world with a lack of access to space. Over the years more space agencies have been developed, with the formation of major space programs such as the Chinese space program (CNSA) and Japanese space program (JAXA). However the problem remains that in this rapidly developing world, only countries with powerful economies and advanced technologies get a say in how the space sector is developed and get to reap the benefits of it. Prioritizing space exploration in developing countries offers several compelling advantages. Firstly, it can bridge technological disparities between developed and developing regions. Secondly, it stimulates economic growth, fostering new industries and jobs. Additionally, it facilitates global economic participation. Lastly, it enhances the quality of life by providing access to advanced technologies and knowledge. Investing in space infrastructure yields long-lasting benefits for future generations.

One of the 5 UN core behavioral values is to Connect and Collaborate, meaning that all nations in the UN should be as transparent as possible to each other and work for each other's benefit. To fix this problem requires the collaboration of all major space agencies and countries with majority stake in the space sector.

Definitions of key terms

Underserved communities

Groups that have limited or no access to resources or that are otherwise disenfranchised, in this context, groups of people who have very limited access to space-based technology.

Space sector

The space sector, also known as the space industry or space domain, encompasses all activities related to the exploration, development, and utilization of outer space and its associated technologies.

Space based technology

Space-based technology refers to the use of advanced tools, equipment, and systems that operate in outer space or are based on assets located in space.

Space agency

A government agency engaged in activities related to outer space and space exploration. This includes organizations such as NASA, Roscosmos and ESA but not companies such as Blue Origin and SpaceX.

General overview

The problem of unequal access to space has been prevalent throughout the history of space exploration. It is an undeniable problem that expands the rift between undeveloped and developed nations. The effects of this rift are clearly visible in the distribution of power among nations today. To understand the problem at hand, we must first understand how the space sector works and how it is divided among different parties, as well as it's past and how it influences the modern day.

Past

Space travel first started taking shape in the 1955, during the start of the space race during the cold war. The space race was a race between the USA and former state of USSR in the development of their respective space sectors. This race lead to the formation of NASA and the USSR space program. During this time tensions were high between the east and the west meaning that the transfer of information was limited and nations classified most of their documents and research. This was done to stay competitive and due to the high political tension between the two sides. As time went on more space agencies were formed such as ESA in 1975 and CNSA in 1993, as each nation tried to join and profit the exploration of space. In 1991 the USSR collapsed, officially ending the cold war, however, the impact of the cold war remained. Countries and agencies continued to have limited transfer of information, and only between other big agencies. Little was done to facilitate the development of space sectors in less developed countries as information was still kept confidential and most countries didn't have government lead space programs. This meant that certain countries and agencies had a massive advantage over others in terms of research, experience and resources.

Present

In recent times the space sector has become slightly more diverse as new powerful space agencies join the sector. These include JAXA, CNSA and ISRO. The exchange of information has increased between agencies as multilateral projects such as the ISS and James Web Telescope expanded opportunities for collaboration and transfer of knowledge. While collaboration between large space agencies has increased, and the number of countries that have space programs remain relatively low, with 77 worldwide and only 16 having launching capabilities. This is largely caused by imbalances in resources and education. All major space agencies originate in countries that have a strong economy and good facilities of education. Many nations do not have the money or administration required to provide adequate training and education for STEM specialists or to invest into a space agency. This is caused by a myriad of factors that are unique to each nation. Another problem plaguing the development of new space agencies is the monopolization of the space sector by already existing ones. Launching payloads and building satellites has become increasingly cheap to do overseas in other space agencies such as NASA or private companies such as SpaceX or Blue Origin due to their progressively more developed technology. Another

factor that prohibits the exchange of space-based technology is safety. The nature of space-based technology means that it can be very powerful and destructive, making many nations skeptical of sharing them with others.

Little action has been taken to facilitate the development of space-based technologies in underserved communities, as usually that is not the main priority when it comes to aiding underserved communities. Most aids provided to underserved and underdeveloped communities consist of monetary and humanitarian aid instead of research, materials or services for space exploration. On top of that most countries priorities simply lie in other more pressing issues rather than developing their space sectors. Theses factors all contribute to the problem of lack of space based technology in underserved communities.

Major parties involved

USA/NASA

The USA is a major party involved in the space sector having the largest space industry in the world, as well as the highest global budget of $64 billion dedicated to its space sector. $64 billion exceeds the combined budgets of all other countries' space sectors. This means that the USA's government lead space agency, NASA, has access to tremendous resources that facilitate space related operations and research. In 2022 the USA launched 93% of the total payload launched into space by itself, Russia and China, the top 3 space giants in the world. The aforementioned imbalance in payload transportations is caused by a large contrast in the space-based technology that NASA has access to in comparison to other space agencies in different countries. This is thanks to its tremendous budget. NASA also has access to personnel with extensive education and experience in STEM and aerospace engineering as the USA produces 440,000 STEM graduates every year. In recent years the USA has had a massive increase of activity in the private space sector with the rise of companies such as Blue Origin, Space X and Virgin galactic, which contribute to the development of space-based technology. So far NASA has used the internet and media as a way to spread some of the technology that it has developed with intentions on educating people and transferring knowledge with other countries. It does however keep a great deal of confidentiality and generally only releases older projects that have already been completed. Private companies however, tend to have a small amount of open source projects but mostly maintain a strong emphasis on protecting its proprietary technologies and maintaining commercial confidentiality.

Russia

Russia has, for a long time, been a dominant faction in the space sector. It was the first nation to launch a man made satellite and send the first man into space when part of the USSR. Russia invests $3.8 billion per year into its space agency Roscosmos. Despite being in the top 5 preforming space agencies in the world, recently it has been in decline. This is because it has had a several failed missions such as the Luna 25 project, and due to sanctions placed by the Russo-Ukraine war, has suffered extensive budget cuts. Due to the renewed conflict with the west and political tension between different countries, Roscosmos has reduced the amount of international projects that it takes part in. An example of this would be the ISS. In 2022 Russia officially withdrew from the ISS and will no longer no longer supporting the project from 2028 onward, and instead started working on its own space station called the Russian Orbital Service Station. Roscosmos does and has collaborated with other space agencies however most of it's research and information is private and has not made much initiative to share space-based technologies with underprivileged communities.

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SpaceX

SpaceX is a private company based in the USA. It is one of the first private companies to succeed to such a great degree in the space industry and first to develop a reusable rocket. It has strong ties to NASA as it transports it's cargo and astronauts to the ISS. SpaceX is a private company, thus keeping most of its information confidential. This is done to stay competitive in the space industry market and for safety purposes. SpaceX writes technical publications on its technology with the purpose of informing the public on its progress as well as educational outreach programs such as the Hyperloop Pod Competition and the SpaceX Hyperloop test track. These initiatives encourage students and engineering teams to collaborate, innovate, and share their ideas and designs. So far SpaceX has mostly done US based projects and can only hire people that are US citizens. Companies like SpaceX do however present the possibility of cheap and accessible space services that are easier to utilize for underprivileged communities rather than developing technology themselves.

ESA

The European Space Agency (ESA) has steadily risen as a prominent entity within the realm of space exploration since its creation in 1974. It boasts a history of remarkable accomplishments, such as working on the Hubble telescope and the Rosetta mission. With a substantial annual budget allocation, ESA invests in an array of missions and programs, underscoring its dedication to scientific discovery and space exploration. Its collaborative initiatives, including contributions to the International Space Station (ISS) and participation in international research projects, exemplify its role as a key player in global space exploration. While ESA is actively engaged with other space agencies worldwide, it primarily maintains a collaborative stance, sharing knowledge and expertise within the international space community. Despite its focus on cooperative ventures, ESA's research and information often remain within its sphere of influence, with limited initiatives to extend space-based technologies to underprivileged communities.

China/CNSA

The China National Space Administration (CNSA) has emerged as a formidable force in the field of space exploration. With an impressive track record of achievements, China has solidified its position as a leading spacefaring nation. Notable milestones include the successful Chang'e lunar missions, the Tiangong space station program, and the Tianwen-1 mission to Mars. CNSA actively engages in international cooperation, collaborating with other space agencies and organizations on various missions, including Earth observation and space science projects. While CNSA is an active participant in international space initiatives, much of its research and information remains private, with a limited focus on sharing space-based technologies with underprivileged communities.

Timeline of Key Events

1955	Start of the space race and first satellite launched into earth's orbit
1958	Formation of NASA which plays a key role in the space sector to this day
1959	UNCOPUOS formed to regulate the peaceful use of outer space
1969	Moon landings by NASA ended the space race and brought new heights to space exploration
1975	Formation of ESA, the first internationally run space agency with multiple member nation stake holders
1991	Dissolution of the USSR making the end of the cold war and the start of a new era of space travel
1993	Founding of CNSA in China, a now powerful and influential space agency
2002	SpaceX founded, marking the beginning of private space companies rise
2011	ISS built with help from 15 nations, being the first international space structure that allowed for such multilateral collaboration
2014	CubeSat technology developed, providing easy deployment of mini satellites making satellite information easier to collect
2021	CEOS created founded to facilitate the spread of satellite collected data

Previous attempts to solve the issue

lower costs of geospatial information technology facilities have stimulated the adoption of space technologies worldwide, particularly in developing countries, through initiatives such as Open Data Cube. Open data cube is a free API that provides access to satellite information collected by 18 countries. This makes satellite data more accessible and usable for a wide range of users, including scientists, researchers, government agencies, and developers in any part of the world.

For developing countries and countries with economies in transition. The United Nations Office for Outer Space Affairs and JAXA cooperation program known as Kibo Cube offers developing countries the opportunity to deploy cube sats from the Kibo laboratory on the International Space Station. The first such satellite was developed by a team from the University of Nairobi and successfully deployed in 2018. This is the first satellite of Kenya and is a good example of how international collaboration contributes to access to space.

Similarly, the Asia-Pacific Space Cooperation Organization supports satellite development by training students and academics, supporting the development of the radiometric calibration capabilities of member countries of the organization and developing small satellites through its Joint Small Multi-Mission Satellite Constellation program. In addition, under a United Kingdom-funded global partnership to improve fire detection rates in South Africa, capacity-building will be provided by Strathclyde University to students at Cape Peninsula University of Technology for the development of a cube sat platform.

Possible solutions

The greatest obstacle for underserved communities accessing space-based technology is a lack of resources and education. For a flourishing space sector with advanced space-based technology there need to be experts and trained specialists that have adequate resources and are able to progress technology in the community. Often times countries struggle to provide these resources and education, meaning there is usually a need for some sort of humanitarian aid. For this a fund could be set up as there are currently no international funds or aid programs with the purpose of specifically enhancing access to space based-technology. As for resources, they are more difficult to distribute as they can be very expensive, however basic materials can be provided. Another consideration to keep in mind is the dangerous nature of space based technology. Sharing sensitive information and resources freely could cause power to fall into wrong hands. For this some sort of validation system could be used to seek potential areas where the development of space-based technology could be supported without risk of misuse or abuse of the technology. Solutions to underserved communities gaining access to space-based technology are usually long term ones, with long term investment into education and finances into communities. Space-based technologies are also a very sensitive type of tool that must be handled responsibly, as with great power comes great responsibility.

Further reading

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