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GUARDIANS OF THE GALAXY: NAVIGATING THE BALANCE BETWEEN SECURITY AND HUMANITY IN SPACE

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Introduction

In contemporary military operations, the utilization of technology enabled by space systems has become indispensable, with armed forces leveraging satellite capabilities across various domains. Critical operations performed by these space systems include precise targeting, navigation for military aircraft, worldwide command and control via satellite communications, and surveillance via remote sensors and monitoring systems. However, worries over the stability and security of the space domain have been raised by the growing militarization of space and the advancement of counter space capabilities. As space is increasingly being militarized by major nations and designated as an "operational domain," specific space defence plans and commands are being developed.

Electronic warfare, cyber operations, directed energy operations, and anti-satellite missiles are only a few of the serious dangers to space systems posed by the expansion of kinetic and non-kinetic counter space capabilities. Furthermore, there are more risks and dependencies because many space systems serve both military and civilian purposes. Furthermore, the use of space systems goes beyond military uses to include vital civilian functions necessary for disaster relief and humanitarian missions. Disruptions to space systems during an armed conflict may have a domino effect on civilian operations; for example, damage to satellites may result in the production of space debris and the suspension of vital services. Further exacerbating the vulnerability of civilian operations dependent on space infrastructure is the increasing danger to dual-use systems.[1] The rules regulating the conduct of hostilities apply to military space operations even if international humanitarian law (IHL) does not expressly recognize space as a

[1] 'War, law and outer space reducing human cost of space operations' (*Humanitarian Law & Policy Blog*) <https://blogs.icrc.org/law-and-policy/2023/08/15/war-law-outer-space-reduce-human-cost-of-military-space-operations/#:~:text=IHL%20rules%20on%20the%20conduct,outer%20space%20during%20armed%20conflicts> accessed 31 March 2024.

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sphere of battle. The essential principles of international humanitarian law (IHL) that govern the moral and legal aspects of military operations in space are distinction, proportionality, and prudence.[2]

International humanitarian law (IHL) stands as a crucial framework designed to mitigate the devastating impact of armed conflicts on vulnerable populations worldwide. Often overshadowed or confused with human rights law, it is imperative to delineate their distinctions. While both share some commonalities in their principles, they operate within separate legal frameworks enshrined in distinct treaties. Unlike human rights law, which predominantly applies during peacetime, IHL specifically addresses the exigencies of armed conflict.

At its core, international humanitarian law is guided by the imperative of safeguarding individuals who are either not involved in hostilities or have ceased their participation, aiming to minimise their exposure to the brutality of war. Moreover, it imposes limitations on the means and methods of warfare, seeking to uphold ethical standards in armed engagements. This dual focus underscores IHL's commitment to protecting both civilians and combatants, regardless of the conflict's origin or the parties involved. Crucially, IHL is applicable solely within the context of armed conflict, excluding internal disturbances or sporadic acts of violence. It comes into effect once hostilities commence and applies universally to all parties involved, irrespective of their role in initiating the conflict. By encompassing the protection of non-combatants and regulating the conduct of warfare, international humanitarian law strives to engender a modicum of humanity even amid the chaos of armed confrontations.

The first part of the paper will examine the militarization of space, evaluate its effects, and discuss how international humanitarian law (IHL) applies to space-related operations. In addition, it will look at how satellite systems and global navigation function in both military and civilian contexts today, highlighting the difficulties brought on by space technology's dual purpose. Further, the second part of the paper examines these problems, the paper hopes to provide incisive analysis and workable answers to reduce the dangers of space weaponization and protect the stability and security of the space domain. This study aims to deepen our understanding of the complex issues facing space governance by examining the intricacies of space militarization, the application of

2 ‘How would IHL apply to hostilities in outer space?’ (Humanitarian Law & Policy Blog) <https://blogs.icrc.org/law-and-policy/2023/11/02/how-would-ihl-apply-to-hostilities-in-outer-space/> accessed 31 March 2024.

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international humanitarian law, and our dependence on satellite systems. It also proposes policies that encourage responsible behaviour and the peaceful use of space resources.

Navigating The Complexities Of Space: Militarization And Weaponization

Humanity has entered a domain in which the lines separating acts involving force from peaceful endeavours are increasingly blurred. Once believed to be the realm of exploration and discovery, the sky above us is today the scene of geopolitical rivalry and strategic manoeuvring.[3] The ideas of weaponization and militarization of space become central themes in this dynamic narrative, inspiring critical thinking about the ramifications for the future of mankind as a whole. The difference between militarization and weaponization is essential to this discussion. Although these phrases are used in conjunction with one another when discussing space operations, these minor differences have a significant impact on how human endeavours beyond Earth proceed. [4]

The act of deploying harmful space-based equipment is known as weaponization, because it puts the complex network of civilian infrastructure dependent on space technology under danger in addition to competing spacecraft. [5] On the other hand, militarization refers to the use of space for military objectives, including communication, surveillance, and strategic command and control. A major concern as we traverse the intricate terrain of space affairs is ethical issues. Space became militarized without being explicitly declared as a result of the deployment of military communication satellites. Since then, satellites have been used by armies all around the world for a variety of purposes. Early warning offers crucial information on missile launches, aids in force protection, and helps ascertain the adversary's intentions and the movement of their troops. Detecting and informing about missile strikes is one of the most important jobs that satellites carry out, allowing for the planning of offensive or defensive manoeuvres in response. Ground-based radars confirm the assault and provide further information after a launch, whereas space-based sensors often give the first sign of a launch. Situational awareness, which encompasses the present knowledge of the position of enemy troops on land, in the air, on the sea, or in space, as well as the capacity to monitor and anticipate their future location, is mostly dependent on

[3]'Critical issues' (*Home - Reaching Critical Will*) <www.reachingcriticalwill.org/resources/fact-sheets/critical-issues/5448-outer-space> accessed 31 March 2024.
[4] 'Space Law and Weapons in Space' (*Oxford Research Encyclopedia of Planetary Science*) <https://doi.org/10.1093/acrefore/9780190647926.013.74> accessed 31 March 2024.
[5]'Critical issues' (*Home - Reaching Critical Will*) <www.reachingcriticalwill.org/resources/fact-sheets/critical-issues/5448-outer-space> accessed 31 March 2024.

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intelligence, surveillance, and reconnaissance (ISR). It also entails being aware of the purpose. Space-based assets are essential for supporting the critical activities of planning and decision-making.

The possibility of kinetic or non-kinetic space weapons poses serious ethical concerns regarding the value of human life and the maintenance of cosmic peace.[6] The placement of nuclear weapons and other weapons of mass destruction (WMD) in space is prohibited under the Outer Space Treaty of 1967. It also forbids the use of force on celestial planets, but it permits enforceable regulations for the peaceful exploration and utilization of space. The pact allows the firing of ballistic missiles, which are capable of carrying any kind of payload, and does not define "weapons of mass destruction." Space can be used by transitory vehicles equipped with nuclear bombs, WMD, electronic systems, energy platforms, or kinetic systems due to these gaps or omissions. During the flight time, these movable vehicles have the ability to transform into weapon platforms. It seems counterintuitive that the concept of a weapon in the context of space is still unclear because any item moving through space can be turned into a weapon. Is it really worth it for mankind to risk the collateral damage that may result from strikes on critical space infrastructure in order to expand the realm of combat beyond Earth?

Furthermore, how can we balance the militarization of space with the principles of scientific collaboration and exploration that have traditionally characterized our ambitions for space travel? In the middle of these moral conundrums, the legal structure controlling space operations becomes crucial. The difficulty of controlling the militarization and possible weaponization of space is one that international law, which is based on the ideas of peaceful cooperation and the avoidance of war, faces. Although the framework for managing space affairs is provided by the treaties and accords now in place, there is a pressing need for updated legal instruments that can effectively address the intricacies of contemporary space warfare due to gaps in enforcement and interpretation.

The militarization and weaponization of space urge us to go on a collective odyssey of introspection and contemplation as we stand on the brink of a new frontier. How can we recognize the strategic importance of national security and still protect peaceful space exploration? Is it

[6] International Committee of the Red Cross, 'The Potential Human Cost of the Use of Weapons in Outer Space and the Protection Afforded by International Humanitarian Law' (*International Committee of the Red Cross*, 9 April 2021) <www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection> accessed 31 March 2024.

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possible to create a future strategy that strikes a compromise between the need for defence and maintaining space as a field for research and innovation? In addition to solutions, these concerns call for a determined effort to steer space travel in a way that preserves the ideals of harmony, collaboration, and moral stewardship.

Placing International Humanitarian Law Into Action In Space: A Critical Investigation Of Ethical And Legal Constraints

International humanitarian law (IHL), also referred to as the law of armed conflict or jus in bello, is a body of legislation that, among other things, sets guidelines for how hostilities should be conducted in order to lessen the impacts of armed conflict for humanitarian purposes. [7] IHL does not approve of the application of neither the use of force nor the militarization or weaponization of space. As the Resolution 9 reiterates, the international community's long-term goal is to liberate space "from an arms race and conflict." However, in the case of armed conflict, the only purpose of IHL is to retain a semblance of humanity, particularly to protect people. [8] Further, environmental requirements are required by Additional Protocol I's Articles 35(3) and 55. These duties are owed to the environment in general in the former case, and to the environment in which there is a relative risk to "the health or survival of the population" in the second case.[9]

The goal of IHL's regulations governing the conduct of hostilities is to shield Earth's civilian population from the impact of military actions in or related to space during armed conflicts. Among these are the ban against indiscriminate and disproportionate assaults (Article 51, Additional Protocol I; Rules 11–14, ICRC Customary IHL Study), the duty to uphold the principle of difference (Article 48, Additional Protocol I; Rules 1 and 7, ICRC Customary IHL Study), and the requirement to take all feasible precautions in attack (Article 57, Additional Protocol I; Rules 15-21, ICRC Customary IHL Study). [10] When implementing these regulations,

[7] International Committee of the Red Cross, 'The Potential Human Cost of the Use of Weapons in Outer Space and the Protection Afforded by International Humanitarian Law' (*International Committee of the Red Cross*, 9 April 2021) <www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection> accessed 31 March 2024.
[8] International Committee of the Red Cross, 'The Potential Human Cost of the Use of Weapons in Outer Space and the Protection Afforded by International Humanitarian Law' (*International Committee of the Red Cross*, 9 April 2021) <www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection> accessed 31 March 2024.
[9] International Committee of the Red Cross, 'The Potential Human Cost of the Use of Weapons in Outer Space and the Protection Afforded by International Humanitarian Law' (*International Committee of the Red Cross*, 9 April 2021) <www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection> accessed 31 March 2024.
[10] International Committee of the Red Cross, 'The Potential Human Cost of the Use of Weapons in Outer Space and

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it is also necessary to take into account the possibility of producing debris and the cumulative risks that debris presents to civilian space objects. Some things and people in armed conflict are also given special protection under international law, especially IHL. Medical personnel, activities, and facilities are examples of specifically protected people and items that must always be respected and safeguarded, even when conducting military space operations against the space systems required to maintain the safety and proper operation of these people and objects.[11] The natural environment, civil defence organizations, astronauts (as defined by Article V of the Outer Space Treaty), and goods and individuals used in humanitarian aid are among the other groups of people and things that are expressly protected by international law. The Outer Space Treaty acknowledges that the advancement of space exploration and peaceful uses is in the collective interest of all people. Article IV of the treaty forbids the installation of weapons of mass destruction, including nuclear weapons, in orbit. [12] The pact also mandates that the moon and other celestial bodies be utilized only for peaceful purposes and prohibits the construction of military bases, facilities, and fortifications as well as the testing of all weapons and military manoeuvres on them.[13]The UN Charter, which forbids the use of force or threat of force unless approved by the UN Security Council under Chapter VII and in cases of self-defence under Article 51, regulates when it is legal for States to use force against one another. Additionally, the UN Charter requires Member States to resolve their international disagreements using nonviolent methods.[14]

The application of international humanitarian law (IHL) to space becomes a frontier of moral and legal research in the great scheme of human endeavour. How do we make sure that the values of humanity and compassion lead us through the difficulties of interstellar conflict as we travel across the great reaches of space? The solutions are found in our shared will to create a future in which the heavens give testimony to our highest goals of peace and harmony, as well as in our

the Protection Afforded by International Humanitarian Law' (*International Committee of the Red Cross*, 9 April 2021) <www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection> accessed 31 March 2024.

[11] 'Conflicts in space: International humanitarian law and its application to space warfare' XXXX.

[12]'How would IHL apply to hostilities in outer space?' (*Humanitarian Law & Policy Blog*) <https://blogs.icrc.org/law-and-policy/2023/11/02/how-would-ihl-apply-to-hostilities-in-outer-space/> accessed 31 March 2024..

13 'How would IHL apply to hostilities in outer space?' (Humanitarian Law & Policy Blog) <https://blogs.icrc.org/law-and-policy/2023/11/02/how-would-ihl-apply-to-hostilities-in-outer-space/> accessed 31 March 2024.

[14]International Committee of the Red Cross, 'The Potential Human Cost of the Use of Weapons in Outer Space and the Protection Afforded by International Humanitarian Law' (*International Committee of the Red Cross*, 9 April 2021) <www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection> accessed 31 March 2024.

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dedication to respecting the principles of international humanitarian law.

Global Navigation Satellite Systems (Gnss): Dual-Use Dynamics: Ethical, Strategic, And Legal Aspects

Global Navigation Satellite Systems (GNSS) represent a critical component of modern navigation and timing infrastructure, offering precise positioning and timing data to users worldwide. Consisting of several satellite constellations, GNSS utilize radio frequencies in the L-Band to transmit signals, with each constellation employing different frequencies and labels for their signals. [15]While there are four primary constellations and two regional constellations, the US Global Positioning System (GPS) stands out as the most frequently deployed GNSS internationally, playing a crucial role in both military and civilian applications.[16] GPS was first created as a military tool to improve aiming and navigational accuracy. Over time, it has expanded to serve a wide range of civilian purposes and is now a vital component of many modern technologies, including navigation and precise time synchronization. It is impossible to exaggerate the importance of GPS in modern culture, as civilian frequencies are vital to many common navigation systems and electronic gadgets.

The application of GPS technology improves the accuracy and effectiveness of search and rescue operations by helping teams locate downed aircrew members. GPS speeds up rescue efforts and improves situational awareness by giving responders access to real-time position data. This can possibly save lives by cutting down on response times. The CSEL system's integration of GPS receivers and communication radios is an example of how technology is convergent to meet essential operational demands. The CSEL system provides search and rescue teams with a comprehensive set of tools for identifying and communicating with individuals in trouble in distant or dangerous locations by fusing GPS functionality with communication capabilities.[17]

In addition, the creation and implementation of GPS-enabled rescue and emergency response

[15] 'Debate on Disarmament Aspects of Outer Space Exposes First Committee Rift over Ways to Sustain Space Security, Prevent Domain's Weaponization | Meetings Coverage and Press Releases' (*Meetings Coverage and Press Releases | Meetings Coverage and Press Releases*) <https://press.un.org/en/2023/gadis3723.doc.htm> accessed 31 March 2024.
[16] 'COPUOS' (*UNOOSA*) <www.unoosa.org/oosa/en/ourwork/copuos/index.html> accessed 31 March 2024.
[17] 'What are Global Navigation Satellite Systems?' (*GPS & GNSS Equipment, Products & Solutions | NovAtel*) <https://novatel.com/tech-talk/an-introduction-to-gnss/what-are-global-navigation-satellite-systems-gnss> accessed 31 March 2024.

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systems demonstrate the military's dedication to use state-of-the-art technology to improve mission efficiency and personnel security. The deployment of the CSEL system by the US Air Force serves as evidence that GPS technology is beneficial for both operational preparedness and human safety, especially in high-risk situations. [18] But the use of GNSS, especially GPS, also brings up issues with possible contestation, especially when it comes to military application. GPS is a dual-use device that can be targeted under the principle of distinction in scenarios involving armed conflict, even if it has civilian applications. This is because GPS has a military purpose that is encrypted.The intricate ethical and strategic issues involved in weighing military benefit against predicted civilian casualties determine whether or not targeting GPS devices passes the proportionality test. In order to facilitate scientific research and applications that depend on accurate Earth observations utilizing GNSS technologies—primarily GPS—the International GNSS Service (IGS) is essential. The IGS, which has more than 200 participant organizations spread over 80 countries, makes it easier to provide high-quality GNSS data and products to support a variety of socially beneficial applications, such as Earth observation and research and the preservation of terrestrial reference frames.[19] It is amazing how widely used GPS is by both military and civilian users globally, considering that it was first developed as a US military technology.

Although GPS was first primarily used by the military, civilian users have quickly overtaken them, demonstrating the system's dual-use nature and adaptability to a wide range of user needs. Notwithstanding the disparities in the severity of military and civilian requirements, the successful cohabitation of military and civilian users emphasizes the need of offering secure, easily accessible, and user-friendly services. Furthermore, other GNSS providers like GLONASS (Russian) and Galileo (European) have also adopted dual-use functions, adding to GPS's global prominence beyond its initial conception as a US system. Like GPS, GLONASS began as a military technology but has subsequently evolved to be used for civilian purposes as well. [20] In contrast, Galileo was designed with civilian usage in mind, but it's possible that the military may make use of it in the future due to the blurred lines that exist around the military-civilian divide in GNSS applications. Targeting dual-use GNSS systems in the context of military operations presents difficult moral and legal questions. Although GPS and related systems are essential

[18] Paul B Larsen, 'Issues relating to civilian and military dual uses of GNSS' (2001) 17(2) Space Policy 111, XXXX <http://dx.doi.org/10.1016/s0265-9646(01)00007-8> accessed 31 March 2024.
[19] 'GPS: A military perspective' (Geospatial World) <www.geospatialworld.net/article/gps-a-military-perspective/www.geospatialworld.net/article/gps-a-military-perspective/> accessed 31 March 2024
[20] 'GPS: A military perspective' (Geospatial World) <www.geospatialworld.net/article/gps-a-military-perspective/www.geospatialworld.net/article/gps-a-military-perspective/> accessed 31 March 2024

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components of civilian infrastructure, they are lawful targets under the principle of difference because of their military uses. Targeting such systems, however, requires careful consideration of both military goals and potential civilian casualties in determining how proportionate it is.

Suggestions

The contemporary discourse surrounding the prevention of an arms race in outer space and the development of norms, rules, and principles of responsible behaviour in space is characterized by a series of multilateral initiatives and proposals aimed at ensuring the sustainability and security of space activities. At the forefront of these efforts is the UN General Assembly Open-Ended Working Group (OEWG) on "reducing space threats through norms, rules and principles of responsible behaviours," which convened in Geneva from May 2022 to September 2023. Concurrently, a new Group of Governmental Experts (GGE) on the "prevention of an arms race in outer space" was also convened in November 2023. [21]These forums provide crucial platforms for dialogue and consensus-building among states regarding the formulation of international norms and agreements to address emerging challenges in space security.

Central to the discussions are notable proposals such as the Prevention of an Arms Race in Space Draft Treaty (PAROS) and the Prevention of the Placement of Weapons in Space Draft Treaty (PPWT), which have garnered support from Russia and China.[22] These initiatives underscore the recognition of the urgent need to prevent the weaponization of space and promote responsible behaviour among space-faring nations. One significant aspect of the discourse revolves around the characterization of certain satellites, such as infrared early warning satellites, as linked to strategic capabilities. The consideration of these satellites as critical assets highlights the potential consequences of interference, which may provoke unconventional retaliation. Moreover, there is growing consensus on the exploration of "keep out" or operational zones as a potential policy or non-binding norm.[23] However, the operationalization of such zones poses challenges, particularly

[21] International Committee of the Red Cross, 'The Potential Human Cost of the Use of Weapons in Outer Space and the Protection Afforded by International Humanitarian Law' (*International Committee of the Red Cross*, 9 April 2021) <www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection> accessed 31 March 2024.

[22] International Committee of the Red Cross, 'The Potential Human Cost of the Use of Weapons in Outer Space and the Protection Afforded by International Humanitarian Law' (*International Committee of the Red Cross*, 9 April 2021) <www.icrc.org/en/document/potential-human-cost-outer-space-weaponization-ihl-protection> accessed 31 March 2024.

23 'War, law and outer space reducing human cost of space operations' (Humanitarian Law & Policy Blog) <https://blogs.icrc.org/law-and-policy/2023/08/15/war-law-outer-space-reduce-human-cost-of-military-space-operations/#:~:text=IHL%20rules%20on%20the%20conduct,outer%20space%20during%20armed%20conflicts.> accessed 31 March 2024.

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concerning their compatibility with existing international legal frameworks, such as the Outer Space Treaty.

Furthermore, the discourse underscores the crucial role of trust and transparency in fostering understanding and cooperation among space actors. The lack of trust and transparency not only undermines efforts to develop operational norms but also increases the risk of miscalculation and conflict escalation in space. Therefore, building trust and promoting transparency emerge as key challenges in ensuring the peaceful and sustainable use of outer space. The ongoing academic and policy discussions surrounding space security underscore the importance of multilateral cooperation and the development of international norms and agreements to address emerging challenges in space activities. By fostering trust, promoting transparency, and exploring innovative approaches to space governance, the international community can work towards ensuring the long-term sustainability and security of outer space for the benefit of all humankind.

States must follow a set of guidelines to maintain the integrity and functionality of space systems necessary for the provision of basic civilian services and the protection of individuals and objects specifically protected by international law in order to promote responsible behaviour and ensure the sustainable use of space. These recommendations cover a number of important ideas:

First and foremost, governments must abstain from participating in or endorsing any military action meant to interfere with, demolish, physically harm, or otherwise incapacitate space systems essential for the provision of civilian services and the defence of people and property protected by international law. Maintaining the values of humanitarian law and defending the welfare and fundamental rights of people depend on this dedication.

Second, nations ought to make every effort to physically or technically divide civilian and military-operated space systems, especially those that are critical for protected entities and essential services, wherever possible. This division guarantees the continuation of vital civilian operations in times of crisis or war while reducing the possibility of collateral damage. States should also be proactive in identifying, registering, marking, announcing, or informing others about any space systems under their control or jurisdiction that need to be shielded from military actions. This open strategy improves accountability and makes it easier for stakeholders to work together effectively to protect the integrity of vital space infrastructure.

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States shall also abstain from damaging actions against space systems that might produce space debris, as well as from creating, testing, or implementing kinetic counter-space capabilities. Such activities pose serious hazards to upcoming space missions and exploration projects in addition to endangering the sustainability and safety of space operations. Finally, it is recommended that governments work together to improve the ability of satellite systems to support emergency response and humanitarian assistance activities in times of war and other disasters. States may lessen the impact of crises on vulnerable people by combining resources and expertise to improve the ability of satellite-based systems to provide timely and efficient aid to impacted populations. Following these recommendations emphasizes how important it is for governments to stand up for the ideals of security, peace, and humanitarianism in space. Adherence to these guidelines underscores the collective responsibility of states to uphold the principles of peace, security, and humanitarianism in outer space. By embracing these principles and fostering international cooperation, states can contribute to the sustainable and peaceful use of outer space for the benefit of present and future generations.

A major source of worry for the international community is the complex dual nature of many space systems, which presents serious obstacles to space security and hinders attempts to protect space systems from possible attacks. The word "dual-use," which has caused uncertainty and confusion among stakeholders, is crucial to this debate. It is used in multilateral space security negotiations to refer to objects with diverse uses. The difference between dual-use and dual-purpose systems—two types of space systems with unique traits and implications for space security—is at the core of the problem. Systems that have two uses—militaristic and civilian/commercial—as well as military/security—either concurrently or alternately—are referred to as dual-use systems. This blurs the distinction between the two uses. These systems, which are frequently run by the military but also offer services to civilians, are prime examples of the intricate interactions that occur in the space domain between civilian interests and security requirements. On the other hand, dual-purpose systems are built with benign goals in mind, such as debris removal or on-orbit service, but they may also be used for hostile purposes like attacking other space objects.

These systems, which are mostly run by commercial and civil organizations, represent the meeting point of innovation and security issues since they have potential for being militarized and weaponized despite their seeming peaceful nature. The amalgamation of these discrete classifications under the general heading of "dual-use" has resulted in vagueness and impeded

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endeavours to proficiently govern and alleviate plausible hazards in space. Both states and non-governmental organizations have acknowledged that it may be challenging to determine the real nature of dual-natured things and the harm they pose, which makes regulatory frameworks more complex and undermines efforts to promote openness and confidence-building. It is important to distinguish between dual-use and dual-purpose systems, both theoretically and practically, in order to handle these issues. States and other stakeholders can improve the clarity and accuracy of recognizing and resolving space security issues by drawing distinct boundaries for these categories. Regulations specific to each category would also help create a more safe and profitable space sector by streamlining regulatory procedures and enabling more focused mitigation tactics. Adopting such a distinction will improve openness and attempts to develop confidence in the space domain in addition to reducing uncertainty. States may create a more resilient and sustainable space environment by encouraging a common understanding among stakeholders and matching legislative goals with the special qualities of dual-use and dual-purpose systems. Moreover, the division of dual-use and dual-purpose systems would encourage increased cooperation and inclusion between governments, businesses, academic institutions, and civil society. Regulatory frameworks may be strengthened with a variety of viewpoints and areas of expertise by involving a wide range of stakeholders in discussions and decision-making processes. This will increase the frameworks' efficacy and legitimacy.

Further, a noteworthy attempt to address the urgent need for a soft-law tool to control the military's use of space is the European Union's proposed Code of Conduct for Outer Space Activities. [24] The Code aims to improve safety and security in space by creating voluntary principles and norms that member governments have agreed upon, even though it does not have legal authority. But it soon becomes clear that the current legal system—in particular, Article IV of the Outer Space Treaty—is not up to the task of handling the intricacies and difficulties that come with the modern military use of space. There are significant ramifications for both space security and international peace from the legal void around military use of space. Lack of clear legal norms increases ambiguity and increases the likelihood of conflict escalation both in space and on Earth as the militarization of space progresses. This emphasizes how urgently coordinated global efforts are needed to solve these issues and create strong legal structures that guarantee the responsible and peaceful use of space. The legal ambiguities surrounding military operations in space are further exacerbated by the lack of cooperation amongst various arms control projects.

[24] Space Law and Weapons in Space' (Oxford Research Encyclopedia of Planetary Science)<https://doi.org/10.1093/acrefore/9780190647926.013.74> accessed 31 March 2024

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Initiatives like the Russia/China Draft Treaty and the Draft EU Code of Conduct aim to close this gap, but they work in tandem with other UN initiatives like the UN Committee on Peaceful Uses of Outer Space and the Group of Government Experts on Transparency and Confidence Building Measures in Outer Space Activities. [25]This disjointed approach highlights the need for a unified worldwide platform to enable a thorough discussion on space military usage. Given this, the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) seems to be an appropriate forum for discussing the legal uncertainties and difficulties surrounding the military's use of space. UNCOPUOS has the necessary knowledge and institutional structure, together with its mandate to supervise space-related matters, to enable significant communication and collaboration between governments. [26]

Although proponents of the hard law approach support the creation of a legally enforceable instrument to govern military operations in space, the delicate nature of the matter demands the implementation of a workable temporary solution. Soft law principles can be a useful foundation for directing governments toward reaching agreements and laying the groundwork for the ultimate creation of a single, legally-binding document. Soft law instruments, taking cues from well-established models like the United Nations Convention on the Law of the Sea, can offer a flexible and all-encompassing framework for tackling the complex issues surrounding military space.

Conclusion

In conclusion, the militarization and weaponization of space pose difficult moral, legal, and strategic issues that call on the international community to take decisive action. In order to regulate space operations and lessen the possible humanitarian effects of armed conflict in space, respect for international humanitarian law (IHL) is crucial. There cannot be an efficient system to control space operations and guarantee the peaceful exploration and usage of outer space without the rule of law and reciprocity.

The current conversation on averting a space arms race emphasizes the significance of multilateral programs that support ethical conduct and sustainable space operations. However, there are major barriers to the establishment of operational rules and a higher chance of error and

[25] (*University of Pennsylvania Carey Law School*) <www.law.upenn.edu/live/files/10006-cerl-conference-summary-report-weaponization.> accessed 31 March 2024.
[26]'COPUOS'(UNOOSA)<www.unoosa.org/oosa/en/ourwork/copuos/index.html> accessed 31 March 2024

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conflict escalation in space due to the lack of trust and openness among space players. Thus, creating a culture of trust and encouraging openness become crucial tasks in guaranteeing the peaceful and sustainable use of space. States are required to follow a set of standards in order to solve these difficulties. These guidelines are meant to preserve the integrity and operation of space systems, which are essential for the provision of fundamental civilian services as well as the protection of people and property that are particularly protected by international law. This involves working together to strengthen the resilience of satellite services for disaster relief and humanitarian assistance, as well as abstaining from carrying out or endorsing military actions that interfere with, harm, or disable space equipment necessary for civilian services.

With the ability to provide accurate location and timing information to users worldwide, Global Navigation Satellite Systems (GNSS) are an essential component of today's navigation and timing infrastructure. By speeding up reaction times and increasing rescuers' situational awareness, the use of GPS technology enhances the efficacy and precision of search and rescue operations, potentially saving lives. Targeting dual-use GNSS systems during military operations, however, presents difficult moral and legal issues of proportionality and striking a balance between military goals and civilian deaths. States must carefully balance the military advantages of targeting GPS devices against the possible harm to civilians while navigating these moral and geopolitical quandaries. Despite the fact that GPS and comparable technologies support vital civilian infrastructure, the principle of difference makes them legitimate targets due to their military use. However, any choice to attack such systems needs to take into account how proportionate the action is to the expected number of civilian fatalities and the overall humanitarian consequences.

Essentially, the problems brought about by the militarization and weaponization of space highlight the necessity of coordinated global efforts to respect the fundamentals of international humanitarian law, encourage appropriate conduct in space, and guarantee the sustainable and peaceful use of space for the good of all people. The international community can successfully negotiate the challenges of space security and preserve space exploration and usage for future generations by promoting trust, openness, and collaboration among space players.