### Fw

#### In order to achieve morality, the standard maximizing expected wellbeing. That means my opponent and I must both use consequentialism.

### NC

#### Contention 1: Indian hegemony

#### Private appropriation for Indian private entities is key for investor confidence.

**Sen 20** [Nilanjan Sen, who is an experienced lawyer, specialising in International Law and Arbitration, 07-26-2020,Business Insider,https://www.businessinsider.in/science/space/news/the-fault-in-our-stars-indias-bid-at-privatizing-space/articleshow/77182064.cms, 12-7-2021 amrita]

With the creation of the Indian National Committee for Space Research (now ISRO) in 1962, India has been an active patron to mankind’s space efforts. From Aryabhata to Chandrayaan-2, India has launched 113 satellites, including the first privately built and funded satellite ExceedSat-1 which was launched from USA, as a part of Elon Musk’s Space X project Falcon-9. Up **until 2016, India’**s space activities **have been the exclusive domain of the State, however, the launch of the IRNSS-1H** in 2017 was the herald of a new era in India’s Space endeavours. The IRNSS-1H **marked the** beginning of **privatisation in this area** by being the first Indian satellite, to be designed in collaboration with the private parties. In the following year, the ExseedSat-1 was to become the first privately funded and built satellite launched in collaboration with the private Space X project. Interestingly, **up until now**, all **missions have been conducted for** purposes of research, reconnaissance as well as for augmenting communication systems since there wa**s a substantial State monopoly**. With the recent announcement ofthe creation of the Indian National Space Promotion and Authorization Centre or IN-SPACeby the Government of India as part of its atma nirbhar Bharat scheme, which aims at providing a “level playing field” and a supportive regulatory regime to allow Indian private enterprises to grow and carve their own niche in the so-called “fast-growing global space sector”**, India has** in fact **shown an inclination to capitalise** on the US strategy of opening up the avidly touted space “sector” to private participation. While the initiative **sounds exhilarating** and will definitely go a long way in defining India’s image as an emerging global technology powerhouse**, it is** extremely **difficult to fathom why private players, would** be willing to readily come forward and **invest billions,** by confining their activities for research purposes alone, **without any expectation of commercial gains** or simply, return on their investment. This is so because, matters concerning space and space exploration are subject of a special branch of customary international law, that are mainly centred around five treaties and eleven agreements. The most significant of these is the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies or the Outer Space Treaty (OST) which India ratified in 1967, and which specifically lays down under Article I that outer space and space exploration including that on the moon and other celestial bodies, are to be carried out solely for, and in the interest of all countries, and that they are the province of all mankind. **Article II restricts** claims of sovereignty and national **appropriation** by any means whatsoever, Article VI **places international responsibility on all activities carried on by** governmental or by **non-governmental entities**, as well as mandates authorization and continuing supervision by the appropriate State Party. While there is considerable debate surrounding the applicability of the OST especially Article VI to private parties, since the US Supreme Court ‘s ruling in Medellin v Texas (2008) which held that Article VI is not self-executing in nature, regard must be had to the fact that these are domestic Court rulings and the fact that Space law is part of Customary International law which is affirmed by decades of State practise, cannot be denied, and neither can the fact that it is settled principle of international law that a State cannot, under the excuse of changes in domestic law, including subsequent Court rulings, renege from treaty obligations once ratified. In effect, the OST places strict checks upon the objectives behind exploring this uncharted territory by State and Non-State actors, far less allowing the possibility of even claiming rights of any kind. Moreover, it is no secret that **private corporations operate predominantly with** the object of individual gains **and** unless driven by the zeal to serve mankind and share profits with all countries, **chances are** that the **investments** made by private parties **will have little** to nil **returns,** far less any substantive protection**.**

#### Investor confidence is necessary for strong Indian private space-tech—that spills over, boosts Indian military heg, and turns case.

**Prasad 16** [Narayan Prasad has a Master of Space & Telecommunications Law, May 2016, National Academy of Legal Studies and Research University of Law Hyderabad, https://www.researchgate.net/publication/305402089\_A\_POLICY\_REVIEW\_TOWARDS\_THE\_DEVELOPMENT\_OF\_A\_SPACE\_INDUSTRY\_ECOSYSTEM\_IN\_INDIA/link/578dbd2908ae5c86c9a65d05/download, 12-8-2021 amrita]

As India ramps up its space defence capabilities, **lack of a mature space industrial base will** potentially **hurt** its ambitions**.** **India** counts among the top nations in the world in terms of government space investment 4 , but **is far behind** when it comes to **creating successful private industry** that is globally reputed. India’s space budget has increased in size (Figure 2) and is one of the largest space budgets in the world; however, the lack of an active space industry at turnkey level might have an immense opportunity cost for India in manufacturing satellites and launch vehicles to service the global market.5 This in effect is also due to absence of a single Indian company among the top space companies in the world (which in itself is an alarming statistic) that needs to be addressed urgently through policy push under the several grand schemes announced by the current government, such as ‘Make in India’ and ‘Digital India’. Most of **the apprehensions** for private investment in space industry **come from** the **requirements** of high capital investment, **and** the long gestation periods of space projects to get substantial Return on Investment (RoI) for the investors. These trends have been put aside by a new breed of space companies calling themselves ‘NewSpace’, which thrive on new business models of low cost access to space by capitalising on the advancements made in recent years in small satellite technology, consumer electronics, and computing power. Tiny modular satellites called ‘CubeSats’, weighing 1-4 kgs and costing under $100,000 have revolutionised the way space products and services are delivered to end users. The movement began in Europe and US simultaneously as a by-product of university and space agency collaborated research, but it was the US which took the lead in successfully commercialising these technologies developed in laboratories. Figure 3 shows the forecast of nano satellites weighing between 1-50 kg, which are scheduled to be launched during 2014-16 globally.6The high number arises from the fact that such nano satellites have short development timelines, and provide the necessary agility for satellite operators to develop large constellations that can cater to a larger customer base with high service quality. These NewSpace companies have ushered in widespread changes in the traditional satellite manufacturing and launch services industry, with companies like RocketLabs and Firefly Systems building new launchers cheaply using innovative techniques like additive manufacturing, to reduce the cost to orbit for these satellites. The impact of these companies has been felt within the space industry, as practices from these ‘NewSpace’companies have been adopted to keep the costs low and have a factory type approach in building systems in order to cater to the increasing demand. The NewSpace revolution has now led to companies such as Google, Virgin, and Qualcomm investing in small satellite-based communication technologies. India, however, has remained shielded from the rapid changes that have happened in the global space industry over the past decade. **ISRO** has been **slow to respond on** both **commercial** and academic **fronts,** with only a handful of university-level small satellite missions being launched during the same period, none of which could transform into a full-fledged commercial opportunity for the people involved in these projects. Lack of clarity on space policy in India is to blame, and partly the lack of willingness of DoS to take up additional responsibility of creating an ecosystem that disrupts their own traditional one, without any visible incentives. In the following sections, the need and motivation to develop a strong private industry ecosystem is detailed with necessary arguments. 1.2 Motivations to Develop a Private Industry Ecosystem in India Presently, **India has inherent advantages** over other countries **due** the availability of **skilled workforce**, a stable and business friendly **government,** positive investor climate and low cost of operations**.** Because India was an early mover in space technology, it is **poised to become a major space power albeit** slight policy push towards **greater commercialisation** of the industry. Table 1 shows the PESTLE analysis of India, in lieu of the motivation to develop a strong private space industry. The PESTLE analysis shows high suitability for services-based business models to operate out of India. The government’s encouragement for private space industry within the country to develop capacity and capability in pursuing space activities should thereby be directed to both the spectrums across the industry value chain. A focused space policy mandate can have multiple direct and fringe benefits to the government, especially in the defence sector which has been the current government’s area of interest through its ‘Make in India’ initiative. Some of the direct and indirect benefits of space technology include: Civilian and Commercial **Space industry has the potential to emerge as the third** technological **success** front following the successes of the Information Technology (IT) and Biotechnology in the country. Space **has an important role in** the overall **economic development** of the country **and** in the success of the government initiatives such as Digital India and Make in India. The development of the private space industry shall **aid in rural connectivity, e-governance and** setting up of **manufacturing facilities** base for products of high technology in India, creating headways in the overall emergence of the country at the world stage. The success of the space industry will enhance capacities within the country and complement the government-driven programme, which has been historically proven in advanced space faring countries such as the US. Capacity building in the private industry at a turnkey level for both upstream and downstream shall assist theeconomic development of the country by keeping up to the pace of requirement of the marketplace (e.g. Direct-to-Home TV, Broadband Internet), while reducing the inherent dependence on foreign assets. For example, as per a recent Comptroller and Auditor General (CAG) report, only one among the seven DTH providers is leasing transponder from the INSAT system**. The** primary **reason for this disparity is** the **slow pace** at which **ISRO has added** satellite transponders **to the commercial market.** The net effect is that the DTH providers are incurring higher transponder costs on foreign satellites when INSAT could have been an equally reliable, and more cost efficient, alternative. Space has its bearings over the imagination of youth and a strong emerging local industry can revolutionise the mindset of the national talent pool and can potentially aid in reversal of brain drain from the country. Public outreach, awareness, and STEM education are some of the intangible impact that investment in space technology produces. The capacity built up within the industry shall foster Business-to-Business (B2B) collaborations within the country and with enterprises across the globe and create also a strong focus on Business-to-Customer (B2C) applications which moves from the traditional Government-to-Government (G2G) flow of development of capacity and application of technology. The B2B, B2C ecosystem in the space industry has immense potential of tapping the much successful IT infrastructure of the country and extending the IT knowledge base to core software based applications of spacebased information such as Geographical Information Systems (GIS).It shall create an environment of technological innovation which when supported and encouraged can sustain to create a secondary source of development of high-tech hardware, software and applications for the government. An ecosystem of technological innovation in space technology has the potential of creating the next generation Small and Medium Scale Enterprises (SMEs) in India which shall 17 leverage the frugal nature of engineering and can create products and services independently for local and global requirements. Military **In the development of space technology with several dual use capabilities, there exists a case for the building up a sustained indigenous industry ecosystem that shall support the safety and security apparatus of the country**. These range **from development of capabilities in upstream** such as satellite, launch vehicle development **to** creating specific downstream applicationssuch as Automatic Identification of Ships (AIS), Electronic Intelligence (ELINIT), Communication Intelligence (COMMINT) and other Command, Control, Communications, Computers, Intelligence, Information, Surveillance, and Reconnaissance (C4I2SR) applications. Space Situational Awareness (SSA) is **the ability to view, understand and predict the physical location of natural and man-made objects orbiting the Earth. SSA is a prominent concern for both military and commercial systems, mainly because of the increasing military reliance on space assets**. The debris created by the anti-satellite testing by China in 2007 and the Kosmos-Iridium collision in 2009 has raised additional concerns about the safety of space assets. India currently relies on NASA’s data, and will operationalise its own system of Multi Object Tracking Radar (MOTR) by 2017.7 Meanwhile in the US, commercial operators have established the Space Data Association (SDA) for providing satellite operators reliable and efficient data for increased safety of satellite operations; this is in addition to the Department of Defense’s (DoD) own surveillance network. **The changing space security environment and the rising international concerns over the rapid growth of military assets in space makes space security one of the most important issues to address.** The need to have a space security policy is being 7 increasingly debated in India **and** the IDSA Task force in 2009 produced a report which attempted to conceptualise such a policy. However, there is reluctance to talk about use of space for national security needs including its military applications. Though efforts are being made to synchronize the activities of ISRO which is responsible for India’s civilian space programme and the Defence Research and Development Organisation (DRDO) which works on the use of space for national security needs, **the lack of a strong private industry that can meet heightened needs for such sophisticated missions hampers the progress in this direction,** apart from the bureaucratic delay that is normally associated when two high security government agencies interact. Capacity building within the space industry shall not only drive commercial applications, but shall aid the government in situations of emergencies (e.g. natural disasters, intelligence gathering for fighting against terrorism) and can eventually develop into a foundation that could potentially contribute as a part of a strong foreign policy drive. Studying the impact of space technology on civilian life is a complicated task, especially when it comes to quantifying the tangible and intangible impact. **The spill-over of space technology is in sectors as varied as defence, agriculture and education.** There exist many ways to show the impact of investment in space technology; some of them illustrated above. **Thus, the technological and knowledge backbone for space technology creates opportunities in the marketplace to create and explore commercial applications on a global scale, which** traditionally might not be the fundamental focus a governmental space agency, as well as **create multiple intangible impacts** across various sectors such as defence, education, agriculture, energy, transportation and environment**.** India has made substantial investment in its government space programme over the years, but it is **a sustained policy push towards investments in the private space industry ecosystem that will create commercial space applications**, complementing the societal benefits motivation currently being pursued by the government.

#### Indian space military heg checks and limits Chinese heg in the Indo-Pacific.

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Regardless of the Americans protestations about the Russian test**, there are important underlying implications for India particularly in the context of Chinas’ growing space and counterspace capabilities as well as the repercussions that are likely to ensue if New Delhi were to pursue a weak response to Chinese space military power.** India will need a whole set of additional KEW tests. This author made the case for sea-launched and air launched KEWs in an extensive analysis. However, it was focused mostly on earth to space KEW systems and Directed Energy Weapons (DEWs). Confining India to the acquisition of KEWS and Directed Energy Weapons (DEWs) or cyber and electronic weapons can be expanded to include co-orbital KEWs. The Russian test also illustrates why co-orbital KEWs are also critical. Investment in additional KEW capabilities assumes considerable importance especially for India because of the long-term defence related challenges presented by the People’s Republic of China (PRC). **The ongoing boundary crisis should only lend greater urgency to India’s space weapons programme, simply because space assets in India’s inventory are vital to the prosecution of a potential military campaign whether on land, sea or air against the People’s Republic China (PRC).** The PRC is known to have developed the accoutrements necessary to conduct co-orbital test. For instance, in 2008 the Chinese BX-1 microsatellite while orbiting in close proximity to its mother satellite, executed a maneuver within 45 kilometers of the International Space Station (ISS). While BX-1 did not definitively establish a PRC co-orbital ASAT capability, it did indicate the PRC’s latent capability to conduct co-orbital kinetic tests and mount attacks against a potential adversary’ space assets. India must avoid what one leading Indian space analyst prior to India’s March 2019 KEW test observed: “To date, India’s interests in space have been restricted to using space assets for reconnaissance, navigation and communication. However, China’s ASAT test could influence India’s policies in the field of counter-space capabilities. To address the concerns raised at the regional and global level about this Chinese bravado, the best option for India could be to follow the disarmament and arms control route.” The statement is a non-sequitur, **while India has conducted only but one direct ascent KEW test, it has not matched China** in developing and executing non-destructive earth to space KEW tests, let alone fully match Chinese KEW, DEW, electronic and cyber weapon capabilities to target space assets. **Pursuing the arms control and disarmament route by India will be premature** in response to the PRC’s extensive development of space **and** counterspace capabilities**.** Reinforcing this point is that the PRC’s current and evolving space weapons programme deserve a sustained response. Bringing closure to the development of space and counterspace capabilities **would imply surrender that is completely unwarranted in light of Beijing’s recent and ongoing aggressiveness,** which India is evidently bearing the brunt. Very likely Beijing will be emboldened even more in deducing that India’s skittish response to its space weapons programme should be treated as weakness **and India subjected to further aggression, not just terrestrially, but equally in space.** The External Affairs Minister S. Jaishankar stated there is an imperative for India and China to achieve some “equilibrium”, although he never fully elaborated what exactly it would look like. However, if equilibrium or more precisely a stable balance of power is to be achieved in the Indo-Pacific, military power is crucial. **Space military power has grown in importance** from reconnaissance, navigation and communications to space weapons **and will be crucial to generating an equilibrium.** Ignoring the eventual deployment of weapons in space would be foolhardy for a state such as India when pitted against the PRC**. Consequently, space military power is a key constituent element in India’s capacity to contribute to the Asian balance of power**. Thus, **investing in a direct ascent and co-orbital KEWs as well as DEWS and cyber and electronic weapons geared for destroying or disabling spacecraft is crucial**. If India were to deprive itself of offensive space weapons to take Chinese or other enemy spacecraft, New Delhi would be putting itself at a considerable disadvantage by leaving it at the mercy of a wide variety of Chinese counterspace capabilities and measures against its Imagery Intelligence (IMINT), Communications (COMMINT), Electronic Intelligence (ELINT) and Synthetic Aperture Radar (SAR) satellites. Indeed, it is perplexing to see arguments that call for India to restrain itself, strive for disarmament and arms control when China makes no significant effort to do so beyond rhetorical commitments. The Russian co-orbital test has underlined the importance of space borne weapons despite entreaties for the non-weaponisation of space. The Modi government must see the emerging space military competition as an opportunity to bolster India’s counterspace capabilities. **It will help cement India as a major space military power and prevent Chinese hegemony over the Indo-Pacific.** Chinese hegemony on the other hand will become a certainty, if New Delhi lapses into self-doubt and remains unduly restrained in the testing, integration and deployment of space weapons.

#### China heg is revisionist and offensive-- in the Indo-Pacific that causes draw-in.

**Brands 19** [Hal Brands is the Henry A. Kissinger Distinguished Professor of Global Affairs at the Johns Hopkins School of Advanced International Studies, a senior fellow at the Center for Strategic and Budgetary Assessments. Zack Cooper is a research fellow at the American Enterprise Institute, an associate at Armitage International, and an adjunct assistant professor at Georgetown University, "After the Responsible Stakeholder, What? Debating America’s China Strategy." Texas National Security Review. Volume 2, Issue 2. February 2019k <https://tnsr.org/2019/02/after-the-responsible-stakeholder-what-debating-americas-china-strategy-2/> 12-10-2021 amrita]

The responsible-stakeholder paradigm offered a coherent “theory of victory”: It identified a desired outcome and employed all elements of American power to bring about that outcome. Over time, the strategy produced greater Sino-American cooperation on a range of issues, from counter-piracy to climate change. **It is increasingly clear, however, that the responsible-stakeholder strategy failed. Two of its core assumptions now appear misplaced: the idea that China’s intentions would become more benign over time, and the belief that Washington had the power to keep Chinese ambitions in check until that shift occurred.** What happened instead was that, as China rose, the Chinese Communist Party became more willing to use its newfound power in coercive and disruptive ways.3 Confounding Western hopes that China would liberalize, **the Chinese Communist Party embraced more repressive policies**, especially after Xi Jinping became general secretary in 2012. **Meanwhile, Beijing sought to control the Indo-Pacific region by** coercing its neighbors, undermining U.S. alliances, practicing mercantilist policies, steadily **increasing its presence** and influence in the South China Sea**, and modernizing its military. In the Indo-Pacific and beyond, moreover, China has engaged in a range of behaviors that challenge American interests: supporting authoritarian regimes, engaging in widespread corruption, pursuing predatory trade practices and major geo-economic projects meant to project Chinese influence further afield,** seeking to stifle international criticism of its human rights abuses, practicing massive intellectual property theft, and striving for technological dominance in critical emerging fields such as artificial intelligence.Recently, China’s confidence has been on display, with Xi stating in 2018 that “no one is in a position to dictate to the Chinese people,” after declaring in 2017 that China is ready to “take center stage in the world.”4 Rather than becoming a responsible stakeholder in a U.S.-led system, **China appears increasingly determined to compete with Washington for primacy in the Indo-Pacific and beyond.** These more assertive policies have been made possible by China’s surprisingly rapid growth**.** Between 1990 and 2016, China’s constant-dollar gross domestic product increased roughly twelve-fold and its military spending grew tenfold.5 The People’s Liberation Army rapidly developed the tools — anti-ship missiles, quiet submarines, advanced fighter aircraft, and integrated air defenses — needed to contest American supremacy in the Western Pacific and give China greater ability to shape events in its region and beyond. Surging national wealth also led to an explosion of Chinese trade, lending, and investment abroad, which enabled far more ambitious geo-economic statecraft**.** All told, **this expansion of Chinese national power is unprecedented in modern history.** It has dramatically narrowed the gap between China and the United States and made it far more difficult for Washington to shape Beijing’s behavior. No strategy can survive the invalidation of its central premises: By the end of the Obama presidency, the responsible-stakeholder concept was living on borrowed time. The Trump administration drove the final stake through the concept in its 2017 National Security Strategy. The document slammed Beijing for attempting to “shape a world antithetical to U.S. values and interests” and declared the failure of China’s “integration into the post-war international order.”6 In particular, **China’s behavior increasingly threatens three enduring U.S. interests. First, the United States seeks to maintain a favorable balance of power in the Indo-Pacific region** and to deter a military conflict — over Taiwan, Korea, or maritime Asia — that could undermine the regional order and cost American or allied lives. Second, **U.S. leaders have an interest in ensuring an open international economy conducive to American prosperity and competitiveness.** Third, **the United States seeks to preserve an international environment in which democracy, human rights, and the rule of law can** flourish, and it seeks to **strengthen** — where possible — the prevalence of those practices abroad. As Chinese power has grown and Chinese behavior has become more assertive, U.S. policymakers have come to see all three of these interests as being imperiled.

#### Contention 2: resources

#### Private sector innovation in the commercial space industry is high now.

**Smith 18** [Matthew Smith, 6-11-2018, "Commercialized Space and You," Science in the News, https://sitn.hms.harvard.edu/flash/2018/commercialized-space-and-you/]//DDPT

Step aside, NASA. The 20th century model of space exploration is running out of fuel, and private companies are now leading the race for human expansion across the galaxy. Elon Musk, Richard Branson, and Jeff Bezos are three of the billionaires leading this extraterrestrial adventure with their respective companies, SpaceX, Virgin Galactic, and Blue Origin. Bezos, the founder of Amazon and currently the wealthiest person in the world, has a vision of sending autonomous rovers to the Moon and helping to eventually create a Moon Village. He has explained that collaborations with the National Aeronautics and Space Administration (NASA) and other government agencies are encouraged and appreciated, but are no longer essential to achieve his goal. [Musk](https://www.geekwire.com/2018/jeff-bezos-blue-origin-space-venture-go-moon-settlements/), who co-founded Tesla, has already launched nine rockets within the first five months of 2018, one of which was the most powerful private spacecraft [ever sent into orbit](http://sitn.hms.harvard.edu/flash/2018/spacex-launches-falcon-heavy-rocket-successfully/). Looking forward, SpaceX aims to complete its first manned mission to Mars in 2024, almost a decade earlier than NASA’s projections. Even the current US president is encouraging this shift to private companies driving [innovation in space](https://www.washingtonpost.com/news/the-switch/wp/2018/02/11/the-trump-administration-wants-to-turn-the-international-space-station-into-a-commercially-run-venture/?noredirect=on&utm_term=.d2c1eccab4ca). With almost [$1 billion](https://www.forbes.com/sites/alexknapp/2018/04/10/nearly-1-billion-was-invested-in-space-startups-in-1q2018-new-report-says/#5fdd019b285c) invested in space-focused startups in the first quarter of 2018, the commercialized space industry shows no sign of slowing down.

#### Private space appropriation is uniquely key to ensuring ongoing innovation towards space exploration and colonization.

**Cheng 20** [Dean Cheng, 09-16-2020, "Outer Space and Private Property," Heritage Foundation, https://www.heritage.org/space-policy/commentary/outer-space-and-private-property]//DDPT

Fully 53 years after the Outer Space Treaty, however, this has begun to change. The success of SpaceX, Blue Origin, Virgin Galactic, and other private companies has led to what has been termed Space 2.0.

The Obama administration’s decision to rely on commercial space-launch services to resupply the International Space Station opened the door to expanding private enterprise’s role in space.

The innovation exhibited in the various Falcon launches, including the ability to reuse the booster rockets, has seen a significant drop in the cost of placing payloads into orbit. As a result, a real opportunity exists for companies to begin thinking about how to use space not simply to improve terrestrial operations, but to make money from space and its physical resources.

The uncertainty associated with private property rights, however, has had a constraining effect on the ability to exploit space more extensively. Companies are unlikely to be willing to risk capital and assets if they are not sure that they will be able to profit from their investments.

#### The private sector is the key internal link to space exploration and colonization.

**Sharma 9/7** [Maanas Sharma, 9-7-2021, "The Space Review: The privatized frontier: the ethical implications and role of private companies in space exploration," The Space Review, https://www.thespacereview.com/article/4238/1]//DDPT

In recent years, private companies have taken on a larger role in the space exploration system. With lower costs and faster production times, they have displaced some functions of government space agencies. Though many have levied criticism against privatized space exploration, it also allows room for more altruistic actions by government space agencies and the benefits from increased space exploration as a whole. Thus, we should encourage this development, as the process is net ethical in the end. Especially if performed in conjunction with adequate government action on the topic, private space exploration can overcome possible shortcomings in its risky and capitalistic nature and ensure a positive contribution to the general public on Earth.

The implications of commercial space exploration have been thrust into the limelight with the successes and failures of billionaire Elon Musk’s company SpaceX. While private companies are not new to space exploration, their prominence in American space exploration efforts has increased rapidly in recent years, fueled by technological innovations, reductions in cost, and readily available funding from government and private sources.[1] In May 2020, SpaceX brought American astronauts to space from American soil for the first time in almost 10 years.[2] Recognizing the greatly reduced costs of space exploration in private companies, NASA’s budget has shifted to significantly relying on private companies.[3] However, private space companies are unique from government space agencies in the way they experience unique sets of market pressures that influence their decision-making process. Hence, the expansion of private control in the space sector turns into a multifaceted contestation of its ethicality.

The most obvious ethical concern is the loss of human life. Critics contend that companies must answer to their shareholders and justify their profits. This contributes to a larger overall psyche that prioritizes cost and speed above all else, resulting in significantly increased risks.[4] However, the possible increase in mishaps is largely overstated. Companies recognize the need for safety aboard their expeditions themselves.[5] After all, the potential backlash from a mishap could destroy the company’s reputation and significantly harm their prospects. According to Dr. Nayef Al-Rodhan, Head of the Geneva Centre for Security Policy’s Geopolitics and Global Futures Programme, “because there were no alternatives to government space programs, accidents were seen to some degree as par for the course… By comparison, private companies actually have a far more difficult set of issues to face in the case of a mishap. In a worst case scenario, a private company could make an easy scapegoat.” [6]

Another large ethical concern is the prominence capitalism may have in the future of private space exploration and the impacts thereof. The growth of private space companies in recent years has been closely intertwined with capitalism. Companies have largely focused on the most profitable projects, such as space travel and the business of space.[7] Many companies are funded by individual billionaires, such as dearMoon, SpaceX’s upcoming mission to the Moon.[8] Congress has also passed multiple acts for the purpose of reducing regulations on private space companies and securing private access to space. From this, many immediately jump to the conclusion that capitalism in space will recreate the same conditions in outer space that plague Earth today, especially with the increasing push to create a “space-for-space” economy, such as space tourism and new technologies to mine the Moon and asteroids. Critics, such as Jordan Pearson of VICE, believe that promises of “virtually unlimited resources” are only for the rich, and will perpetuate the growing wealth inequality that plagues the world today.[9]

However, others contend that just because private space exploration has some capitalist elements, it is by no means an embodiment of unrestricted capitalism. A healthy balance of restricted capitalism—for example, private space companies working through contracts with government agencies or independently under monitoring and regulation by national and international agreements—will avoid the pitfalls that capitalist colonialism faced down here on Earth. Even those who are generally against excessive government regulation should see the benefits of them in space. Lacking any consensus on definitions and rights in space will create undue competition between corporations as well as governments that will harm everyone rather than helping anyone. To create a conducive environment for new space-for-space exploration, one without confrontation but with protection for corporate astronauts, infrastructure, and other interests, governments must create key policies such as a framework for property rights on asteroids, the Moon, and Mars.[7,10]

Another key matter to note is restricted capitalism in space “could also be our salvation.”[11] Private space exploration could reap increased access to resources and other benefits that can be used to solve the very problems on Earth that critics of capitalism identify. Since governments offset some of their projects to private companies, government agencies can focus on altruistic projects that otherwise would not fit in the budget before and do not have the immediate commercial use that private companies look for. Scott Hubbard, an adjunct professor of aeronautics and astronautics at Stanford University, discusses how “this strategy allows the space agency to continue ‘exploring the fringe where there really is no business case’” but still has important impacts on people down on Earth.[12]

Indeed, this idea is a particularly powerful one when considering the ideal future of private companies in space exploration. Though there is no one set way governments will interact with companies, the consensus is that they must radically reimagine their main purpose as the role of private space exploration continues to grow. As governments utilize services from private space companies, “[i]nstead of being bogged down by the routine application of old research, NASA can prioritize their limited budget to work more on research of other unknowns and development of new long-term space travel technologies.”[13] According to the Council on Foreign Relations, such technologies have far-reaching benefits on Earth as well. Past developments obviously include communications satellites, by themselves a massive benefit to society, but also “refinements in artificial hearts; improved mammograms; and laser eye surgery… thermoelectric coolers for microchips; high-temperature lubricants; and a means for mass-producing carbon nanotubes, a material with significant engineering potential; [and h]ousehold products.”[2] Agencies like NASA are the only actors able to pursue the next game-changing missions, “where the profit motive is not as evident and where the barriers to entry are still too high for the private sector to really make a compelling business case.”[8] These technologies have revolutionized millions, if not billions, of lives, demonstrating the remarkable benefits of space exploration. It follows then that it is net ethical to prioritize these benefits.

This report concludes that the private sector, indeed, has a prominent role to play in the future of space exploration. Further, though private space exploration does bring the potential of increased danger and the colonization of space, these concerns can be effectively mitigated. Namely, strong government frameworks—particularly international ones—will minimize possible sources of ethical violations and ensure an optimal private sector role in space. This also allows government agencies to complete significantly more difficult, innovative projects which have transformative benefits for life on Earth.

#### Space exploration solves endless resource wars.

Collins 10 [Patrick Collins, professor of economics at Azabu University in Japan, and a Collaborating Researcher with the Institute for Space & Astronautical Science, as well as adviser to a number of companies, Adriano V. Autino is President of the Space Renaissance International; Manager, CEO/CTO, Systems Engineering Consultant / Trainer at Andromeda Systems Engineering LLC; and Supplier of methodological tools and consultancy at Intermarine S.p.A, Acta Astronautica, Volume 66, Issues 11–12, June–July 2010, “What the growth of a space tourism industry could contribute to employment, economic growth, environmental protection, education, culture and world peace”, Pages 1553–1562]

7. World peace and preservation of human civilisation

The major source of social friction, including international friction, has surely always been unequal access to resources. People fight to control the valuable resources on and under the land, and in and under the sea. The natural resources of Earth are limited in quantity, and economically accessible resources even more so. As the population grows, and demand grows for a higher material standard of living, industrial activity grows exponentially. The threat of resources becoming scarce has led to the concept of “Resource Wars”. Having begun long ago with wars to control the gold and diamonds of Africa and South America, and oil in the Middle East, the current phase is at centre stage of world events today [37]. A particular danger of “resource wars” is that, if the general public can be persuaded to support them, they may become impossible to stop as resources become increasingly scarce. Many commentators have noted the similarity of the language of US and UK government advocates of “war on terror” to the language of the novel “1984” which describes a dystopian future of endless, fraudulent war in which citizens are reduced to slaves.

7.1. Expansion into near-Earth space is the only alternative to endless “resource wars”

As an alternative to the “resource wars” already devastating many countries today, opening access to the unlimited resources of near-Earth space could clearly facilitate world peace and security. The US National Security Space Office, at the start of its report on the potential of space-based solar power (SSP) published in early 2007, stated: “Expanding human populations and declining natural resources are potential sources of local and strategic conflict in the 21st Century, and many see energy as the foremost threat to national security” [38]. The report ended by encouraging urgent research on the feasibility of SSP: “Considering the timescales that are involved, and the exponential growth of population and resource pressures within that same strategic period, it is imperative that this work for “drilling up” vs. drilling down for energy security begins immediately” [38].

Although the use of extra-terrestrial resources on a substantial scale may still be some decades away, it is important to recognise that simply acknowledging its feasibility using known technology is the surest way of ending the threat of resource wars. That is, if it is assumed that the resources available for human use are limited to those on Earth, then it can be argued that resource wars are inescapable [22] and [37]. If, by contrast, it is assumed that the resources of space are economically accessible, this not only eliminates the need for resource wars, it can also preserve the benefits of civilisation which are being eroded today by “resource war-mongers”, most notably the governments of the “Anglo-Saxon” countries and their “neo-con” advisers. It is also worth noting that the $1 trillion that these have already committed to wars in the Middle-East in the 21st century is orders of magnitude more than the public investment needed to aid companies sufficiently to start the commercial use of space resources.

Industrial and financial groups which profit from monopolistic control of terrestrial supplies of various natural resources, like those which profit from wars, have an economic interest in protecting their profitable situation. However, these groups’ continuing profits are justified neither by capitalism nor by democracy: they could be preserved only by maintaining the pretence that use of space resources is not feasible, and by preventing the development of low-cost space travel. Once the feasibility of low-cost space travel is understood, “resource wars” are clearly foolish as well as tragic. A visiting extra-terrestrial would be pityingly amused at the foolish antics of homo sapiens using long-range rockets to fight each other over dwindling terrestrial resources—rather than using the same rockets to travel in space and have the use of all the resources they need!

7.2. High return in safety from extra-terrestrial settlement

Investment in low-cost orbital access and other space infrastructure will facilitate the establishment of settlements on the Moon, Mars, asteroids and in man[/woman]-made space structures. In the first phase, development of new regulatory infrastructure in various Earth orbits, including property/usufruct rights, real estate, mortgage financing and insurance, traffic management, pilotage, policing and other services will enable the population living in Earth orbits to grow very large. Such activities aimed at making near-Earth space habitable are the logical extension of humans’ historical spread over the surface of the Earth. As trade spreads through near-Earth space, settlements are likely to follow, of which the inhabitants will add to the wealth of different cultures which humans have created in the many different environments in which they live.

Success of such extra-terrestrial settlements will have the additional benefit of reducing the danger of human extinction due to planet-wide or cosmic accidents [27]. These horrors include both man-made disasters such as nuclear war, plagues or growing pollution, and natural disasters such as super-volcanoes or asteroid impact. It is hard to think of any objective that is more important than preserving peace. Weapons developed in recent decades are so destructive, and have such horrific, long-term side-effects that their use should be discouraged as strongly as possible by the international community. Hence, reducing the incentive to use these weapons by rapidly developing the ability to use space-based resources on a large scale is surely equally important [11] and [16]. The achievement of this depends on low space travel costs which, at the present time, appear to be achievable only through the development of a vigorous space tourism industry.

### Case

#### Legal frameworks such as the EU Horizon 2020 will be able to prevent space wars.

**Villarino 19**, José-Miguel Bello Y Villarino, 6-7-2019, "Preventing a Cold War in Space Using European Research and Innovation Programs," Science & Diplomacy,<https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs> Livingston RB

In 2018, the United States President proposed a Space Force [1](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note1) as a sixth branch of the US military.[2](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note2) In 2019, the President of India announced that his country had shot down a low-orbit satellite,[3](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note3) becoming the fourth country to test an anti-satellite (ASAT) technology in a span of twelve years. These events should come as no surprise. **There is a space cold war in the making. Russia, China, and the United States are leading the way, racing to ensure that their space-related asset**s, which play an increasingly essential role in modern warfare, can match, surpass, or counterbalance the capabilities of others. These developments present a greater threat of military confrontation than the 1983 launch of the U.S. Strategic Defense Initiative, better known as “Star Wars”. Since 1983, there had been an unspoken Pax Americana in outer space. An informal global moratorium on the testing of anti-satellite weapons had been initiated by Russia[5](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note5) and generally supported by the international community. There was a global understanding of the benefits of avoiding a weapons escalation in, and towards, space.[6](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note6) Each year, the General Assembly of the United Nations (UNGA) passed nearly unanimous[7](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note7) resolutions on the “Prevention of an Arms Race in Outer Space” (PAROS) (Res. 36/97C). There were even attempts to give these efforts legal force. In 2008, Russia and China submitted a draft Treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT) to the Conference on Disarmament. Article II is clear about the treaty’s objective: “The States Parties undertake not to place in orbit around the Earth any objects carrying any kinds of weapons, not to install such weapons on celestial bodies and not to place such weapons in outer space in any other manner, [and] not to resort to the threat or use of force against outer space objects”.[8](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note7) These declarations reflected a desire to keep space peaceful, meaning either “not militarised” [9](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note9) or “non aggressive”. Ironically, this proposal was tabled shortly after China’s confirmation in 2007 that it had destroyed one of its own satellites with a guided missile, as a test.[11](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note11) In addition to the resulting space debris problem that was generated, this action forced global powers to rethink the challenges of space security.[12](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note12) The United States quickly followed, demonstrating in 2008 its own anti-satellite system (Aegis Ballistic Missile Defense System) by shooting down its own errant spy satellite as it was falling out of orbit.[13](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note13) [14](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note14) The United States has since acknowledged having an anti-satellite system, the Counter Communications Satellite System, and it has several latent capabilities, notably its ground-based missile defense interceptors.[15](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note15) Russia has also repeatedly tested the PL-19 Nudol ballistic missile,[16](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note16) which can strike objects in orbit.[17](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note17) **There is also clear evidence that other capabilities are being developed to cripple space assets and make space infrastructure useless, including cyberattacks on satellites,**[18](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note18) lasers capable of knocking down space objects,[19](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note19) and methods to jam signals from space. As a result of this dynamic, we have today a militarized space, where a quarter of the active satellites have some military use.[21](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note21%20rel=) Space is today a theatre in war plans. From a legal point of view, this militarization was made possible through a particular interpretation of article IV of the 1967 Outer Space Treaty.[22](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note22%20rel=) This interpretation distinguishes between “peaceful purposes” – applicable to space in general – and “exclusively peaceful purposes” – restricted to certain celestial bodies. Military uses of the moon and other celestial bodies are then outrightly prohibited, but the “empty space” between celestial bodies can be militarized. This line of reasoning could also justify weaponization of that empty space, for example, placing weapons in a satellite. The only legal limit would be the ban on weapons of mass destruction in space established by the same article IV. To prevent it, the UN Assembly General passed in December 2014 UN Resolution 69/32 calling for “[n]o first placement of weapons in outer space”. This attempt to collectively agree on the non-weaponization of space received more limited support than previous PAROS resolutions. Four states voted against it and another forty-two abstained.[23,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note23%20rel=)[24](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note24%20rel=) It cannot even be excluded that militarization may have already happened. All of this is leading military actors to consider the Earth’s orbit a new “warfighting domain”.[26](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note26%20rel=) The U.S. Air Force’s “Transformation Flight Plan” of 2003 acknowledged that future adversaries could attack space assets, mainly from the ground, and that weapons in orbit may eventually be required to protect those assets.[27](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note27%20rel=) The current U.S. National Security Space Strategy refers to systems to “deny and defeat an adversary’s ability” to successfully carry out “attacks targeted at the U.S. space systems”.[28](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note28%20rel=) The most recent threat assessment of the U.S. intelligence community notes that both Russia and China “aim to have nondestructive and destructive counterspace weapons” to “reduce US and allied military effectiveness” and points to a military trend in China and Russia “designed to integrate attacks against space systems and services with military operations in other domains”. Some believed that the weaponization of space,[30](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note30%20rel=) the establishment of a space force,[31](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note31%20rel=) and other non-peaceful space-related activities were inevitable steps in the decades-long development of space warfare capabilities by the United States, China, and Russia. For these authors, this is not a race “to dominate space” but an incremental development of “a range of options to control or deny outer space in a time of open conflict”.[32](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note32%20rel=) Regardless of the view, space assets will doubtless play a role in future non-peaceful relations between space-faring nations and are already playing a deterrence role. However, a continued and escalating space-based cold war need not occur if more trust can be established among the key players. The European Union as a Broker of Trust. The mistrust that exists among China, Russia, and the United States regarding space-related activities is a logical consequence of the role of space in modern warfare described above. The inability of the participants in these weapons races to adequately assess one another’s capabilities and intentions is driving them to develop even greater capabilities to pre-empt potential adversaries. Yet it is possible to restore a certain degree of trust by allowing space powers to better assess risks, capabilities, and intentions, and break the cycle of escalation. This article contends that cooperation on space-related global challenges can build that trust. Unfortunately, leadership in the domain of space by any one of these three actors is unlikely to be accepted by the others, even if the potential results are beneficial for all. These countries too often present themselves using adversarial language, with media supporting such views.[33](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note33%20rel=) The European Union (EU) is the only global actor that has all of the tools necessary to assist in the establishment of confidence-building measures between China, Russia, and the US in the domain of space. The EU is a key actor in space [34,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note34%20rel=)[35](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note35%20rel=) despite lacking a space agency as such. Other international organization, the European Space Agency (ESA), provides technical support for the flagship EU programs.[36](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note36%20rel=) The EU has asserted its presence in international space-related policy-making and acted as a diplomatic hinge, for example, in the development of guidelines for an International Code of Conduct for Outer Space from 2008 onwards.[37](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note37%20rel=) Even though other global actors could offer similar or superior combinations of space-related technology, a skilled workforce, and budgetary capacity, only the EU has the appropriate institutional framework – a multi-country, compromise-driven system of governance – combined with a civilian-only research and innovation program.[38](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note38%20rel=) Other non-state entities, such as the ESA or the United Nations, are unable to undertake cooperative efforts to build trust among the three nations because they lack either the budgetary capacity or an adequate institutional framework to push forward a foreign affairs agenda. The EU in particular can offer a civilian, research-driven, diplomatic tool. Such a tool is already within its current legal and policy framework and would build upon previous EU-sponsored actions in space research and innovation. It would not require significant legislative change or a critical rise in expenditure. The main requirement is a clear commitment to its objectives and the political willingness to engage with international actors that may be seen as more inclined to hostile discourse or behavior than is normally promoted by the EU. An EU-driven approach would offer the image of a peace-loving, supranational entity reluctant to or incapable of acting militarily. Its decision-making process already builds in the different sensitivities among its members in relation to the other three actors. Among the EU countries some are closer to China,[39,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note39%20rel=)some to the United States,[40,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note40%20rel=)and some to Russia.[41,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note41%20rel=) While the EU might be expected to cooperate closely with the United States opposite China and Russia, the EU has in the past “recast problems the US interprets as solvable solely with the hammer of military intervention as problems of trade or diplomacy […] forging its own path in service of its ambition to be considered a global player”. [42,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note42%20rel=) Along with the ability to lead, the EU has every reason to act. Against the backdrop of escalating tensions in space, the EU and its member states appear to be peaceful bystanders. However, as one of the leaders in outer space activities, especially commercial satellite activities, the EU and its members have much to lose from an outright conflict. By bringing the three space powers together, the EU could achieve better security and reliability of space assets, which would benefit its population as well as the whole planet. Additionally, it could project its economic and research power as a powerful diplomatic tool, casting itself as a key international player and global broker in space affairs. The “smart” strategy[43,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note43%20rel=) envisioned here would combine both hard and soft power under a humble leadership that only the EU seems able to exercise. Europe would not be a resolute leader in the usual sense. Confrontation is beyond its power and not in its DNA. Instead, “[i]n a dangerous world, Europe is the holder of the balance”.[44,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note44%20rel=) In the context of space, the EU “represents a natural bridge between space competitors and possesses the track record and credibility to serve as the principal ‘middle diplomat’ of the global space community”.[45,](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note45%20rel=) The European Framework for Enhancing Cooperation. **The framework needed to foster cooperation in space between China, Russia, and the United States** (as well as other nations) **is already in place in the EU**. **The** EU’s official **position** regarding the international projection of its research and innovation **is formalized in Horizon 2020** (H2020), the Framework Programme for Research and Innovation (2014-2020).[46](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note46%20rel=) The H2020 Regulation envisions large-scale projects, carried out with international cooperation.[47](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note47%20rel=) It anticipates working with partners in third countries to address many of its objectives, particularly those relating to the Union’s external and development policies and international commitments.[48](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note48%20rel=) **It further establishes that space activities should “support the European research and innovation contribution to long term international space partnerships,” acknowledging that “space undertakings have a fundamentally global character”**.[49](https://www.sciencediplomacy.org/article/2019/preventing-cold-war-in-space-using-european-research-and-innovation-programs#note49%20rel=)

#### 1. Space junk in our atmosphere isn’t part of outer space, Merriam webster defines outer space as “space immediately outside the earth’s atmosphere”<https://www.merriam-webster.com/dictionary/outer%20space>

#### 2. The space junk has been put there by PUBLIC entities like governments as well as private entities, even a ban on private entities in space couldn’t solve the problem. As long as anyone is launching anything it is inevitable

**Polyakov 21**, Dr. Max Polyakov, Founder, Noosphere Ventures, Firefly Aerospace, EOS Data Analytics, 5-5-2021, "Where does space junk come from – and how do we clean it up?," World Economic Forum,<https://www.weforum.org/agenda/2021/05/why-we-need-to-clean-up-space-junk-debris-low-earth-orbit-pollution-satellite-rocket-noosphere-firefly/> Livingston RB

Where does space junk come from? **As long as humans launch objects into orbit, space debris is inevitable.** Rocket launches leave boosters, fairings, interstages, and other debris in LEO. So do rocket explosions, which currently account for seven of the top 10 debris-creating events. **Human presence also creates orbital flotsam** – such as cameras, pliers, an astronaut’s glove, a wrench, a spatula, even a tool bag lost during space walks. Some debris is created naturally from the impacts of micrometeoroids – dust-sized fragments of asteroids and comets. With limited lifetimes, **operational satellites can become space debris**. Satellites run out of maneuvering fuel, batteries wear out, solar panels degrade – causing an orbital debris feedback loop, in which the problem is exacerbated when solar panels are sandblasted by micrometeoroids and tiny debris. As with rocket debris, spent satellites eventually re-enter Earth’s atmosphere and burn up, but the process can take years – and the higher they orbit above Earth, the longer those orbits take to decay.