### Framing

#### The standard is minimizing existential risk.

#### Even the most conservative estimates prove reducing existential risk outweighs all other impacts, regardless of probability – actively prioritize our calculus since you are cognitively biased against it

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The number of people alive today pales in comparison to the number who could exist in the future. It may therefore be extremely important to ensure that human civilization flourishes far into the future, enjoying fulfilling lives free of suffering. There are a number of ways we might work to ensure a positive future for humanity. We could work to better understand and prevent extinction risks - catastrophic events that have the potential to destroy all life on this planet.[1] We may want to focus on the broader category of existential risks- events that could dramatically and irreversibly curtail humanity’s potential.[2] Or we might focus on increasing the chance that the lives of our descendants are positive in other ways: for example, improving democracy or the ability of institutions to make good decisions. Attempts to shape the long-term future seem highly neglected relative to the problems we face today. There are fewer incentives to address longer-term problems, and they can also be harder for us to take seriously. It is, of course, hard to be certain about the impact of our actions on the very long-term future. However, it does seem that there are things we can do - and given the vast scale we are talking about, these actions could therefore have an enormous impact in expectation. This profile sets out why you might want to focus your altruistic efforts on the long-term future - and why you might not. You may be particularly inclined to focus on this if you think we face serious existential threats in the next century, and if you’re comfortable accepting a reasonable amount of uncertainty about the impact you are having, especially in the short-term. The case for the long-term future as a target of altruism The case for focusing on the long-term future can be summarised as follows: The long-term future has enormous potential for good or evil: our descendants could live for billions or trillions of years, and have very high-quality lives; It seems likely there are things we can do today that will affect the long-term future in non-negligible ways; Possible ways of shaping the long-term future are currently highly neglected by individuals and society; Given points 1 to 3 above, actions aimed at shaping the long-term future seem to have extremely high expected value, higher than any actions aiming for more near-term benefits. Below we discuss each part of this argument in more detail. The long-term future has enormous potential Civilisation could continue for a billion years, until the Earth becomes uninhabitable.[3] It’s hard to say how likely this is, but it certainly seems plausible - and putting less than, say, a 1% chance on this possibility seems overconfident.[4] You may disagree that 1% is a reasonable lower bound here, but changing the figure by an order of magnitude or two would still yield an extremely impressive result. And even if civilisation only survives for another million years, that still amounts to another ~50,000 generations of people, i.e. trillions of future lives.[5] If our descendants survive for long enough, then they are likely to advance in ways we cannot currently imagine - even someone living a few hundred years ago could not possibly have imagined the technological advances we’ve made today. It is possible they might even develop technology enabling them to reach and colonise planets outside our solar system, and survive well beyond a billion years.[6] Let’s say that if we survive until the end of the Earth’s lifespan, there is a 1% chance of space colonisation. This would make the overall probability of survival beyond Earth 1 in 10,000 (1% chance of surviving to a billion years, multiplied by a 1% chance of surviving further given that). This sounds incredibly low, but suppose that space colonisation could allow our descendants to survive up to 100 trillion years[7]. This suggests we could have up to 1/10,000 x 100 trillion years = 10 billion expected years of civilisation ahead of us. If we expect life in the future to be, on average, about as good as the present, then this would make the whole of the future about 100 million times more important than everything that has happened in the last 100 years. In fact, it seems like there could be more people in the future with better lives than those living today: economic, social, and technological progress could enable us to cure diseases, lift people out of poverty, and better solve other problems. It also seems possible that people in the future will be more altruistic than people alive today[8] - which also makes it more likely that they will be motivated to create a happy and valuable world. However, it’s precisely because of this enormous potential that it’s so important to ensure that things go as well as possible. The loss of potential would be enormous if we end up on a negative trajectory. It could result in a great deal of suffering or the end of life.[9] And just as the potential to solve many of the world’s problems is growing, threats seem to be growing too. In particular, advanced technologies and increasing interconnectedness pose great risks.[10] There are things we can do today that could affect the long-term future There are a number of things we could work on today that seem likely to influence the long-term future: Reducing extinction risks: We could reduce the risk of catastrophic climate change by putting in place laws and regulations to cut carbon emissions. We could reduce the risks from new technologies by investing in research to ensure their safety. Alternatively, we could work to improve global cooperation so that we are better able to deal with unforeseen risks that might arise. Changing the values of a civilisation: Values tend to be stable in societies,[11] so attempts to shift values, whilst difficult, could have long-lasting effects. Some forms of value change, like increasing altruism, seem robustly good, and may be a way of realizing the very best possible futures. However, spreading poorly considered values could be harmful. Reducing suffering risks: Historically, technological advances have enabled great welfare improvements (e.g. through modern agriculture and medicine), but also some of the greatest sources of present-day suffering (e.g. factory farming). To prevent the worst risks from new technologies, we could improve global cooperation and work on specific problems like preventing worst-case outcomes from artificial intelligence. “Speeding up” development: Boosting technological innovation or scientific progress could have a lasting “speed up” effect on the entire future, making all future benefits happen slightly earlier than they otherwise would have. Curing a disease just a few years earlier could save millions of lives, for example. (That said, it’s not clear whether speeding up development is good or bad for existential risk - developing new technologies faster might help us to mitigate certain threats, but pose new risks of their own.) Ripple effects of our ordinary actions: Improvements in health not only benefit individuals directly but allow them to be more economically successful, meaning that society and other individuals have to invest less in supporting them. In aggregate, this could easily have substantial knock-on effects on the productivity of society, which could affect the future. Other ways we might create positive trajectory changes: These include improving education, science, and political systems. Paul Christiano also points out that even if opportunities to shape the long-term future with any degree of certainty do not exist today, they may well exist in the future. Investing in our own current capacity could have an indirect but large impact by improving our ability to take such opportunities when they do arise. Similarly, we can do research today to learn more about how we might be able to impact the long-term future. The long-term future is neglected, especially relative to its importance Attempts to shape the long-term future are neglected by individuals, organisations and governments. One reason is that there is little incentive to focus on far-off, uncertain issues compared to more certain, immediate ones. As 80,000 Hours put it, “Future generations matter, but they can’t vote, they can’t buy things, they can’t stand up for their interests.” Problems faced by future generations are also more uncertain and more abstract, making it harder for us to care about them. There is a well-established phenomenon called temporal discounting, which means that we tend to give less weight to outcomes that are far in the future. This may explain our tendency to neglect long-term risks and problems. For example, it’s a large part of why we seem to have such difficulty tackling climate change. Generally, there are diminishing returns to additional work in an area. This means that the neglectedness of the long-term future makes it more likely to be high impact. Efforts to shape the long-term future could be extremely high in expected value Even if the chance of our actions influencing the long-term trajectory of humanity is relatively low, there are extremely large potential benefits, which mean that these actions could still have a very high expected value. For example, decreasing the probability of human extinction by just one in a million could result in an additional 1,000 to 10,000 expected years of civilisation (using earlier assumptions).[12] Compare this to actions we could take to improve the lives of people alive today, without looking at longer-run effects. A dramatic victory such as curing the most common and deadly diseases, or ending all war, might only make the current time period (~100 years) about twice as good as otherwise.[13] Though this seems like an enormous success, given the calculations above, decreasing the probability of human extinction would be 10 or 100 times better in expectation. We might want to adjust this naive estimate downwards slightly, however, given uncertainty about some of the assumptions that go into it - we could be wrong about the probability of humanity surviving far into the future, or about the value of the future (if we think that future flourishing might have diminishing value, for example.) However, even if we think these estimates should be adjusted downwards substantially, we might very conservatively imagine that reducing the likelihood of existential risk by one in a million only equates to 100 expected years of civilization. This still suggests that the value of working to reduce existential risk is comparable to the value of the biggest victories we could imagine in the current time period - and so well worth taking seriously.

### Plan

#### Plan: Private entities should not appropriate outer space via commercial space stations that replace the International Space Station.

### Advantage

#### The ISS is retiring and being replaced solely by the private sector – extension reverse causally stops privatization

Heilwell 12/03 [Rebecca, reporter for Open Sourced, covering emerging technologies, artificial intelligence, and logistics, “NASA gave Jeff Bezos money to build his office park in space”, Updated 12-03-2021 (I couldn’t find the original publishing date – this is the only one that showed up on the website – if you can please lmk), Vox Recode, https://www.vox.com/recode/2021/10/27/22747509/blue-origin-orbital-reef-office-park-bezos]//pranav

After more than two decades in orbit, NASA is preparing to retire the International Space Station. The habitable satellite only has permission to operate until 2024, and while it’s likely that the space station’s funding could be extended until 2028, NASA plans to decommission the ISS and find a replacement by the end of the decade. Cue Jeff Bezos. The billionaire’s spaceflight company, Blue Origin, has proposed a new commercial space station called Orbital Reef, which would provide a “mixed use business park” in space. This concept now has the support of NASA. The agency announced on Thursday that it would award Blue Origin and its partner companies $130 million to develop the space station, which NASA hopes will launch before 2030. With the help of several other companies, including Sierra Space and Boeing, Blue Origin plans to build a satellite that’s slightly smaller than the ISS and houses up to 10 people. The design includes desk space, computers, laboratories, a garden, and 3D printers. The goal, the company says, is to lease out office space to interested parties, including government agencies, researchers, tourism companies, and even movie production crews. Blue Origin’s plan is predicated on the idea that the end is coming for the ISS, which NASA is still figuring out how exactly to remove from orbit. While space stations have been helpful for space exploration, Blue Origin senior vice president Brent Sherwood argued in an October op-ed that private companies now have the capabilities to take over much of the burgeoning economy in low-Earth orbit, or LEO. Blue Origin is even building a space tug, a transport vehicle that moves cargo between different orbits, that could reportedly be used to salvage parts from the ISS and incorporate them into Orbital Reef’s systems. NASA doesn’t mind the corporate takeover of low-Earth orbit. The agency’s first space station, SkyLab, was only in orbit for a few months before NASA let the vehicle descend and decompose into the atmosphere. The space agency has been weighing defunding the ISS, which is full of aging hardware, for several years, and NASA’s investment in Orbital Reef is part of more than $400 million in funding that the agency has set aside to develop new, privately built and operated space stations through its Commercial LEO Destinations program. Eventually, NASA hopes that it can send its astronauts to these stations instead of paying to maintain the ISS. Overall, the plan could save the government more than $1 billion every year. “This is technology that is over 20 years old at this point. When you expose that infrastructure to radiation, solar weather ... things are going to break down,” Wendy Whitman Cobb, a professor at the US Air Force’s School of Air and Space Studies, told Recode. “Having these commercial space stations will be a way of America keeping their foot in low-Earth orbit while focusing more of their resources on moon and Mars exploration.” In the meantime, NASA is currently focusing on the Artemis program, an ambitious plan to establish a long-term human presence on the moon. The agency intends to send people to the moon for the first time in decades as soon as 2025, and hopes the project will eventually serve as a stepping stone to future exploration of Mars. Private companies, including Blue Origin, have desperately fought for a role in this prestigious mission, and especially a lucrative contract to develop pivotal moon landing technology. SpaceX won that contract earlier this year, prompting Bezos’s company to sue NASA and lobby the Senate to reverse the decision. Those efforts have yet to bear fruit, so Bezos now seems to be turning his attention back to the low-Earth orbit economy, where there are more customers and less competition from Elon Musk. “Most, if not all, of the problems or the challenges that need to be worked to have a commercial LEO destination have already been solved by the International Space Station program,” Sherwood, of Blue Origin, said in a Thursday press conference. “That’s the explanation for why we can develop a commercial space station for so much less than it cost NASA the first time.” But there’s reason to believe that the Orbital Reef project may not succeed in the near future — or at all. Blue Origin still hasn’t launched humans into orbit, a feat SpaceX achieved last month during the Inspiration4 mission. Blue Origin also lists its New Glenn reusable launch system and Boeing’s Starliner crew vehicle as pivotal parts of the Orbital Reef plan, but both vehicles have yet to conduct a problem-free spaceflight.

#### Private-Public partnerships owned by NASA replace the ISS better and are coming now

Jones ’18 [Karen, a senior project leader with The Aerospace Corporation’s Center for Space Policy and Strategy. She has experience and expertise in the disciplines of technology strategy, program evaluation, and regulatory and policy analysis spanning the public sector, telecommunications, space, aerospace defense, energy, and environmental industries. She is a former management consultant with IBM Global Services and Arthur D. Little and has an M.B.A. from the Yale School of Management, “PUBLIC-PRIVATE PARTNERSHIPS: STIMULATING INNOVATION IN THE SPACE SECTOR”, April 2018, Center for Space Policy and Strategy, [https://aerospace.org/sites/default/files/2018-06/Partnerships\_Rev\_5-4-18.pdf]//pranav](https://aerospace.org/sites/default/files/2018-06/Partnerships_Rev_5-4-18.pdf%5d//pranav)

* P3 = public-private partnership

When a public-sector entity considers a P3 arrangement, it should articulate the objectives. Within the space sector this could include:

• Mission Support—to advance science, space exploration, or national security and defense.

• Functional Support—such as communications, Earth observation, space logistics.

• Technology Advancement—such as prototyping or developing new technologies.

• Space Industrial Base—to promote a competitive and robust commercial space sector

Traditional public infrastructure projects are structured across a range of P3 project delivery models to provide functional support—from operation and maintenance to concession agreements (see Figure 1). By contrast, space industry P3 delivery models typically include various arrangements for sharing risk and know how through cooperative research, Space Act Agreements (SAAs), or longer term development agreements. The current emphasis appears to be leveraging commercial sector innovation and agility (see Figure 2). Perhaps over time the space sector will introduce more traditional P3 functional support models such as:

◆ Example: Future Low Earth Orbit (LEO) Modules/

Habitat (“Concession” P3 Model). NASA could potentially apply a concession arrangement to replace the ISS with one or more commercial modules. The space module(s) could be owned by the U.S. government and designed, built and operated by one or more commercial companies for a specific period of time. Several commercial companies, including Axiom Space, Bigelow Aerospace and NanoRacks, have already expressed interest in the provisioning of space modules to replace the existing International Space Station (ISS). Note that if these commercial modules were owned, built, operated and maintained by the commercial sector then this would shift the business model from a P3 model to full privatization.

#### Public control of commercial space stations solves all neg offense – OST proves

Smith ’79 [Delbert D., Legal Advisor for the Space Science and Engineering Center of the University of Wisconsin, “Space Stations International Law and Policy”, October 30, 1979, https://www.google.com/books/edition/Space\_Stations\_International\_Law\_And\_Pol/4U2fDwAAQBAJ?hl=en&gbpv=0&kptab=overview]//pranav

Three potential limitations on these conclusions should be noted. First, the interpretation set forth above would not permit commercial or international organizations from claiming exclusive rights to a particular area of outer space in the absence of actual use. Thus, if such an organization had maintained a space station in a specific orbital slot for a substantial period of time and the station-keeping system subsequently failed, the organization would not be entitled to prevent any other entity from occupying that slot pending the orbiting to a replacement station by the original occupant. Second, if an entity were established that, although commercial in form, was essentially under the control of the government of the country in which it was organized, permanent use would constitute national, as distinguished from nonnational, appropriation. This is especially true in light of the Article VI provision that makes states responsible for acts of their nationals and for international organizations of which they are members. Third, dispute has arisen regarding the minimum standard of universality that would determine whether an international organization of relatively universal membership satisfies the minimum standard. However, some question remains regarding the exemption of an organization composed of a limited number of governments.

#### The path to space is “not…one or the other”, but rather P3 cooperation that brings new governments into the fold and decreases financial constraints.

Smith ’21 (Yes this is a 3rd different Smith card) [Fisher, second year law student at the University of Mississippi where he is currently part of the Space Law concentration. Additionally, he is part of the Ole Miss Trial Advocacy Board and a junior staff editor on the Air and Space Law Journal at the university, “Public-Private Partnerships: The Way to Space”, 03-31-2021, NSS, [https://space.nss.org/public-private-partnerships-the-way-to-space/]//pranav](https://space.nss.org/public-private-partnerships-the-way-to-space/%5d//pranav)

* Solvency advocate
* Straight turns tradeoffs/funding disad

However, while these companies have accomplished much, there is still a need for an organized, governmental role in space development. Government involvement is necessary to ensure that the public maintains access to space and to advance the frontier of development beyond Earth. For instance, consider NASA and the American government. NASA’s ongoing scientific efforts are characterized by four key strategic goals: 1) expanding knowledge of our human species, 2) creating “sustainable long-term exploration and utilization” of outer space for the whole species, 3) addressing national challenges and aiding in economic development, and 4) continuing to optimize and develop their capabilities and operations within outer space. NASA’s ongoing commitments are to develop outer space and technology for the United States and for humanity as a whole. Their missions of exploration, scientific discovery and technological development have continued to advance humanity.

The fundamental structure of democratic governments such as those in the U.S. allow regular people to influence and participate in space development policy. People can vote for and petition their elected representatives to promote certain policies for the use of outer space, or join non-profits such as the National Space Society (NSS) to represent their views. This allows anyone to have a say in our development of outer space.

While private companies are pushing the boundaries of outer space, NASA and the US government have the ability to create policies that encourage more rapid and beneficial development in space. The National Space Society (NSS) advocates that the government promote policies for infrastructure development and reusability for outer space expansion. The successful model of public-private partnerships that has been used to transport both cargo and crew to the International Space station via the commercial purchase of launch services should be extended throughout cis-lunar space. Further, through NASA, NSS recommends that the government continue to promote international cooperation. The international community has cooperated in the past, particularly with the International Space Station. By continuing this partnership, multiple States can contribute to outer space exploration and development, and private organizations can continue provide vital services at lower cost, allowing government funds to accomplish more in space.

While past developments in outer space have been led by governments and governmental space agencies, that is no longer true. Private organizations have reignited space exploration and provided a way for humanity to continue to expand and revolutionize technology needed to expand beyond Earth, without many of the hurdles, including cost and regulations, that sometimes hamper government advances. But, the path to the stars is not paved by one or the other. Instead, cooperation, between States, governmental agencies, and private companies, will ensure that we continue to push our boundaries into space.

#### Only P3 reinvigorates multilateralism – brings new governments into the arena

Smith ’18 [Milton, Air Force Academy graduate with a doctorate in air and space law, Skip is a former Air Force JAG who held several significant leadership positions during his Air Force career, including director of space law at Space Command and chief of air and space law for the Air Force. He also served in Geneva as the legal advisor of the 50-person U.S. Delegation at the ITU Conference on the Geostationary Satellite Orbit. A past chair of the Colorado Space Business Roundtable, Skip is on the board of the International Institute of Space Law. He has served as an adjunct professor of space law at the University of Colorado Law School, the George Washington University Law School, and currently teaches commercial space law at the University of Denver Law School. Regarded as a leader in the field, Skip has received numerous honors, including the Lifetime Achievement Award from the International Institute of Space Law. Skip was selected to author the United States chapter in the inaugural edition of the “Space Law Review,” a series published by The Law Reviews. He is the author of six space-related law review articles and of a book on the international regulation of satellite communication. Skip speaks nationally and internationally on commercial space law issues., “Op-ed | P3 or not P3: What can space ventures learn from terrestrial infrastructure projects?”, 04-19-2018, Space News, https://spacenews.com/op-ed-p3-or-not-p3-what-can-space-ventures-learn-from-terrestrial-infrastructure-projects/]//pranav

P3s for space projects, however, have generally been fairly simple agreements involving one public entity and one private entity. Future large space activities such as privatizing the International Space Station and establishing a cislunar Deep Space Gateway and a base on the moon, will require far more complex contractual arrangements and international participation. International participation is best exemplified by the ISS. The program has a complex legal structure based on an intergovernmental agreement signed by the government partners, four memoranda of understanding between NASA and other cooperating space agencies, and numerous bilateral implementing arrangements between space agencies. In many respects, the ISS has been a tremendous success and it is now facing issues of what to do next. Privatization using a P3 structure is one option. Another example: Sierra Nevada Corp. has teamed with the UN Office for Outer Space Affairs in a type of international P3 where the Dream Chaser spaceplane will be used by countries to fly payloads or experiments. Mark Sirangelo, executive vice president of SNC Space Systems stated: “The benefits of a joint mission between government and private organizations on a level of this scale is incalculable.” Hopefully, it will open up the space arena to many governments otherwise unable to participate. As space activities and investments mature, we must look to industries like construction and finance for lessons on major P3 projects. All involve large sums of capital and allocation of risk. To have people living and working in space will take P3 leverage of the government budget with commercial collaboration. In evaluating P3s, the space industry should carefully review P3 experience on many large infrastructure projects and evaluate best practices and lessons learned. Typical infrastructure P3 projects have included airports, toll roads, higher education facilities, water projects, telecommunications, energy and utilities. Europe, Canada and Australia have outpaced the United States in their use of P3s for infrastructure projects. The largest P3 project is the Channel Tunnel between England and France, now known as the Eurotunnel. It cost about $25 billion, took eight years to build, and was financed by private debt and sales of shares in a private company formed to build and maintain the tunnel under a long-term management contract. Although the project experienced significant financing problems during construction, it has certainly provided great benefit. The U.S. is catching up and is turning more toward P3s for infrastructure projects because of the limited availability of federal, state and local government funding for necessary projects. The Trump administration infrastructure plan released in February outlines many new incentives and initiatives to facilitate $1.5 trillion in infrastructure investment over a 10-year period. Bootstrapping a $200 billion federal investment into $1.5 trillion will be challenging. The plan seeks to accomplish this by using investment from state and local governments, other public agencies, and substantial private investment including P3s. If P3s can help remedy vast infrastructure problems, perhaps P3s can also accomplish wonders for space projects, particularly if there is international support. A full P3 project involves a partnership among all phases of a project from design-build construction and finance to operations and maintenance. Developing an equitable allocation of risks among partners over many decades is probably the most challenging task. Thanks to the vast number of P3 projects around the world, there has been considerable analysis of the various types of P3 projects. The commonly recognized P3 best practices generally include things such as: appropriately preparing, creating a shared vision, understanding the partners, clarifying long-term risks and rewards, establishing effective decision-making processes, negotiating fair and reasonable contracts that will withstand decades of implementation, and finding the right champion. That last one can be the most difficult since large projects tend to take many years to plan and implement. Politicians and administrators often have a limited shelf life. Policies, including National Space Policies, often change with new administrations.

#### No private only space stations good offense – they’re unproven, decades away, and underestimate ISS resiliency

Davenport ’20 [Christian, covers NASA and the space industry for The Washington Post's Financial desk. He joined The Post in 2000 and has served as an editor on the Metro desk and as a reporter covering military affairs. He is the author of "The Space Barons: Elon Musk, Jeff Bezos and the Quest to Colonize the Cosmos", “The International Space Station can’t stay up there forever. Will privately run, commercial replacements be ready in time?”, 12-23-2020, The Washington Post, https://www.washingtonpost.com/technology/2020/12/23/space-station-replace-biden/?outputType=amp]//pranav

But while those options show promise, they are still unproven and years from hitting the market.

As a result, NASA has been increasingly concerned it could have a gap in low Earth orbit that would be even more consequential than the ignominious period after the space shuttle fleet was retired that left the space agency with no way to launch its astronauts to space from U.S. soil. Instead, NASA was forced to rely on the Russians for rides to space, at a price that grew to as much as $90 million a seat, before Elon Musk’s SpaceX restored human spaceflight for NASA earlier this year.

Even if the station is extended, NASA needs to be working now on its replacement, officials said. It took years to get the ISS up and running. The concept was born in 1984, when President Ronald Reagan announced the United States would put a station, eventually dubbed Freedom, in orbit. But after different administrations and design changes, the first segments weren’t launched until 1998. Since then, NASA has invested more than $100 billion in the facility, which receives more than $3 billion annually from NASA.

Privately run stations would also need time to build their business cases, signing foreign governments as tenants, working with companies and universities that want to do research in space, and wealthy tourists who would pay millions of dollars to visit.

While NASA and the private sector work toward developing commercial habitats, China is building its own space station that it hopes to launch within a couple of years and is recruiting countries around the world as partners. The United States would not be one of them, however, since NASA is effectively barred by law from partnering with China in space.

“I think it would be a tragedy if, after all of this time and all of this effort, we were to abandon low Earth orbit and cede that territory,” NASA administrator Jim Bridenstine told a Senate panel earlier this year.

The ISS still does have some good years left, officials said. “We’re good from an engineering standpoint,” Joel Montalbano, NASA’s space station program manager, said in an interview. “We’re cleared through 2028.”

Boeing, which is paid $225 million per year as the prime contractor supporting space station operations, said it could stay in orbit for even longer.

“The ISS is incredibly healthy, with life capability well beyond 2030,” said John Mulholland, Boeing’s ISS program manager. He said the U.S. and Russia recently completed a life extension study “and all the hardware has been cleared to a minimum of 2030. That’s a real testament to the design and the maintenance that’s been done on it.”

Recently, the station got new lithium-ion batteries that “are less than half the size of the original batteries and produce twice the power,” Mulholland said. The power upgrade also doubled the speed at which the station’s crew can send data from science experiments back to Earth.

Over the years, the station’s water recovery system has improved to the point where today, 95 percent of the water used for drinking and cooking is recycled, Montalbano said. The communications systems have also been upgraded, as have life support systems like carbon dioxide removal.

#### Militarization is inevitable, but reinvigorating space multilateralism, solves future militarization that spills over into conflict – brings revisionist powers to the table.

Mason ’21 [Paul, author of several books, and a visiting professor at the University of Wolverhampton, “How to halt the space arms race”, 11-17-2021, New Statesman, https://www.newstatesman.com/comment/2021/11/how-to-halt-the-space-arms-race]//pranav

Could space be demilitarised? Not a chance, say the experts, who point out that – in contrast to the space exploration of the popular imagination, where it is still seen as a benign, trans-national endeavour – the entire history of space technology, from the Nazi V2 rocket to the recent Russian anti-satellite strike, has been driven by the military. Yet military activity in space could be made more orderly and transparent. The two most authoritative annual reports on military space capabilities are both reliant on open-source information and acknowledge that there are huge gaps in what even the experts know. We know how many satellites are up there: we do not know much about what weapons they might carry. This stands in contrast to the way the rival superpowers have managed both nuclear and conventional deterrence since the onset of the Cold War, with a series of treaties signed by Russia and the West to minimise or regulate aggression – for example, limiting the possession of nuclear weapons or the deployment of armoured vehicles. But there is almost no such framework for regulating the space arms race, or for achieving basic transparency about who’s doing what, still less for avoiding conflict. US and Russian space commanders convened in Vienna last July, agreeing to “enhance communications between the two countries about space-related operational issues in order to reduce the risks of misunderstanding, help prevent or manage space-related incidents, and prevent inadvertent escalation”. This did not stop Russia’s surprise launch of an anti-satellite missile on 15 November, nor did it avert the war of words that followed it. In truth the US-Russia space dialogue, a hangover from the Cold War, is a long way from the multilateral and comprehensive framework needed to bring China, India, Israel and Iran around the table. Lacking any formal international treaty beyond the anti-nuclear one, space has, in effect, become a demonstration zone for geopolitical realism. Those who have real power on Earth have untrammelled power in space. They will zap their own satellites at will, buzz the satellites of others, launch “projectiles” from existing satellites – as Russia allegedly did last year – and unleash spoofing attacks to disorient civilian shipping, all without acknowledgement or explanation. The emerging field of space war looks, in other words, exactly like terrestrial conflict would if there were no treaties and deployment patterns, or journalists and NGOs to observe them. This year the UK launched its own space command, with military chiefs acknowledging space as a domain of conflict co-equal with air, land, sea and cyber. Britain is late to the space war game and, after years of offshoring and outsourcing, lacks the expertise and resources to compete with the big four space powers: it doesn’t figure in either of the monitoring reports on space militarisation documenting significant offensive capabilities. As a medium-sized power, self-excluded from large parts of the EU’s space programmes, it is in Britain’s interest to promote order, multilateralism and transparency in space, and to resist its further militarisation. And, to an extent, haltingly, it has done so, promoting the first real debate at the UN over a new space treaty.

#### Weaponization of space and dual-use tech results in unsustainable arms races and causes a laundry list of impacts – alternative measures to check weaponization are NOT mutually exclusive with the aff

Ortega et al. ’21 [ALMUDENA AZCÁRATE ORTEGA - associate researcher, John Borrie - senior research fellow, James Revill - program lead of the Weapons of Mass Destruction and Other Strategic Weapons Programme of the United Nations Institute for Disarmament Research, “Star Wars: the not-so-phantom menace”, 05-12-2021, [https://english.elpais.com/opinion/2021-05-12/star-wars-the-not-so-phantom-menace.html]//pranav](https://english.elpais.com/opinion/2021-05-12/star-wars-the-not-so-phantom-menace.html%5d//pranav) \*modified for ableist language\*

The picture isn’t all rosy, however. Due to the critical importance of space, several countries have, in recent years, formed “space forces” and are developing national doctrines for fighting in space. A handful of nations have even tested offensive capabilities of various kinds. These countries have some legitimate security concerns. The problem is this pattern of responses to the actions and activities of space competitors is fuelling an arms race. If the international community doesn’t act to turn down the dial on space’s quickening weaponization, humankind risks suffering the devastating consequences of a space-based conflict, such as mass disruption of services like GPS and denial of internet access. Debris from the destruction of space objects could also prevent space users from using orbits, possibly for years. States have long sought to ensure that outer space is used only for peaceful purposes. Even at the height of the Cold War, they reached international agreements such as the 1967 Outer Space Treaty that, among other things, indicates that states shall not “place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space.” These treaties have contributed to safety and security in space and on Earth, but as technology advances so does the risk of conflict in space. Counterspace capabilities have the capacity to interfere, incapacitate or destroy adversaries’ space assets, and some of them are commonly used nowadays, such as cyberattacks and electronic interference with satellites. Others, such as interceptor missiles launched from Earth to attack space objects, could be used during a conflict on Earth, and would have a [devastating]~~crippling~~ effect on militaries and civilians alike. Even if specific space technologies were not invented with a counterspace purpose in mind, their characteristics nevertheless could make them a threat in the eyes of others. An example of this is the so-called space harpoon, a barbed projectile fired from a satellite to collect space junk, which could be exploited for hostile purposes. In the face of such strategic unpredictability, trust deficit grows and tensions escalate more easily. For decades governments have argued about “preventing an arms race in outer space” in multilateral forums like the Geneva-based Conference on Disarmament. Now the space arms race is here – and given what is at stake – governments need to focus afresh on practical steps to provide each other meaningful reassurance about their capabilities and intentions in space. There are already several proposals. China and Russia have proposed a treaty to prevent weapons from being placed in space and threats against space objects. Other, predominantly Western governments, have proposed “reducing space threats through norms, rules and principles of responsible behaviors.” These approaches are not mutually exclusive. Arms control history suggests legal and normative measures can be combined and sequenced in ways that are mutually reinforcing. Even then, it’s unlikely these measures will be sufficient to ensure the safe and secure use of space in the future. Measures to increase transparency and confidence in space-related activities to minimize misunderstandings are also required. This could be augmented by the publication of national policies on counterspace capabilities and by encouraging dialogue between space users – including commercial stakeholders – about the impacts of and risks introduced by new strategic technologies. Greater mutual understanding of these issues among space users could help to avoid escalatory situations. Space is critical for sustaining and enhancing life on Earth. It actively contributes to sustainable development in a myriad of ways. To ensure space’s continued contribution to humankind’s wellbeing, spacefaring nations must work to arrest their weaponization of outer space and develop safeguards to prevent current tensions blowing out into full-blown conflict, thus keeping Star Wars firmly in the realm of science fiction.

#### Goes nuclear – great powers are developing nukes for new territorial conflicts in space

Tisdall ’20 [Simon, foreign affairs commentator. He has been a foreign leader writer, foreign editor and US editor for the Guardian, “A nuclear arms race in space? It seems we've learned nothing from Hiroshima”, 08-02-2020, The Guardian, https://www.theguardian.com/commentisfree/2020/aug/02/a-nuclear-arms-race-in-space-it-seems-weve-learned-nothing-from-hiroshima]//pranav

The battle for outer space is only getting going – yet deserves immediate attention. Russia’s alleged development of anti-satellite weapons is almost certainly matched by the US and China, and undermines past undertakings about the peaceful use of space. Christopher Ford, US assistant secretary of state for international security and non-proliferation, warned last week that Russia and China had already turned space into a “war-fighting domain”. “What [the Russians] are doing is signalling to the world that they’re able to destroy satellites in orbit with other satellites,” Ford said. “This is the sort of thing that could get out of hand and go very badly rather quickly.” The UK called the alleged test “a threat to space systems on which the world depends” – meaning use of such weapons could, in theory, produce an instant global security and communications blackout. Yet in relaunching US space command last year, Donald Trump also pointed to space as the next great-power battlefield. Nato secretary-general Jens Stoltenberg says the alliance will not deploy weapons in space but is obliged to defend its interests, which include 2,000 orbiting satellites. For Nato, too, space is now an “operational domain”. New and “improved” nuclear weapons are proliferating in parallel with the race for space. According to the Stockholm International Peace Research Institute (Sipri), nine states – the US, Russia, China, Israel, the UK, France, India, Pakistan and North Korea – together possess about 13,400 weapons. While the overall total is falling, “retired” warheads and bombs are being replaced by more powerful, versatile devices, such as smaller, “use-able” US battlefield nukes. “All these states are either developing or deploying new weapon systems or have announced their intention to do so,” Sipri’s annual report said. The US and Russia each possessed about 1,550 deployed, long-range weapons, while China had about 300. Both the US and Russia were spending more and placing greater reliance on nuclear weapons in future military planning, it said, while China was rushing to catch up. “China is in the middle of a significant modernisation of its nuclear arsenal. It is developing a so-called nuclear triad for the first time, made up of new land- and sea-based missiles and nuclear-capable aircraft. India and Pakistan are slowly increasing the size and diversity of their nuclear forces,” Sipri reported. Meanwhile, North Korea continued to prioritise its military nuclear programme, while conducting “multiple” ballistic missile tests. “Instead of planning for nuclear disarmament, the nuclear-armed states appear to plan to retain large arsenals for the indefinite future, are adding new nuclear weapons, and are increasing the role such weapons play in their national strategies,” a Federation of American Scientists survey said. It estimated about 1,800 warheads were kept on high alert, ready for use at short notice. Russia claims to lead the world in developing hi-tech weaponry. Speaking in July, Putin boasted that Russia’s navy was being equipped with nuclear-powered hypersonic cruise missiles, which supposedly have unlimited range, and submarine-launched underwater nuclear drones. Despite celebrated speeches supporting a nuclear-free world, Barack Obama authorised a $1.2tn plan to upgrade America’s nuclear triad while pursuing strategic arms reductions via the 2010 New Start treaty with Russia. Trump has doubled down, at the same time abandoning arms control pacts. His 2018 nuclear posture review proposed an extra $500bn in spending, including $17bn for low-yield, battlefield weapons. Trump looks set to scupper New Start, which expires in February, on the spurious ground that it does not reduce China’s much smaller arsenal (which it was never intended to do). He has previously reneged on the 2015 Iran nuclear treaty, the 1987 Intermediate-range Nuclear Forces treaty, and is said to favour resumed nuclear testing in Nevada in defiance of the 1996 Comprehensive Nuclear-Test-Ban treaty. Like Britain and other signatories, the US continues to fail to fulfil its obligation under the 1970 Nuclear Non-Proliferation treaty “to pursue nuclear disarmament aimed at the ultimate elimination of nuclear arsenals”. Despite its acute financial situation, Britain remains committed to replacing its Trident missile system at an estimated cost of £205bn over 30 years. While nuclear weapons have not been used since 1945, great-power military flashpoints are increasing the risk that they might be. These potential triggers include the South China Sea, Taiwan, the India-Pakistan and India-China borders, the US-Israel-Iran conflict, North Korea and Ukraine. Heightened international tensions and collapsing arms-control regimes only partly explain the accelerating pace of nuclear rearmament. Resurgent nationalism, authoritarian rightwing populism, revived or new territorial rivalries (as in space), the bypassing of the UN and multilateral institutions, and a shifting economic and geopolitical power balance are all aggravating factors.

**Causes extinction** through winter, firestorms, EMP blasts, ozone damage, and meltdowns

-Immediate death -Climate destruction spurring an ice age (Nuclear winter) via nuclear firestorms and smoke -Ozone collapses -2 Billion insta-die in famine -kills biodiversity -Meltdowns and grid collapse via EMPs -Remaining fallout

**Starr 14** {Steven, Senior Scientist for Physicians for Social Responsibility, Director of the Clinical Laboratory Science Program (Missouri), commentator in the Bulletin of the Atomic Scientists and the Strategic Arms Reduction, Associate member of the Nuclear Age Peace Foundation, “The Lethality of Nuclear Weapons: Nuclear War has No Winner,” Global Research: Centre for Research on Globalization, 6/5, http://www.globalresearch.ca/the-lethality-of-nuclear-weapons-nuclear-war-has-no-winner/5385611}

Nuclear war **has no winner**. Beginning in 2006, several of the world’s **leading climatologists** (at Rutgers, UCLA, John Hopkins University, and the University of Colorado-Boulder) published a series of studies that evaluated the long-term environmental consequences of a nuclear war, including baseline scenarios fought with **merely 1%** of the explosive power in the US and/or Russian launch-ready nuclear arsenals. They concluded that the consequences of even a “small” nuclear war would include **catastrophic disruptions** of global climate[i] and **massive destruction** of Earth’s protective ozone layer[ii]. These **and more recent studies** predict that global agriculture would be so negatively affected by such a war, a global famine would result, which would cause up to **2 billion people to starve to death**. [iii]¶ These **peer-reviewed** studies – which were analyzed by the **best scientists in the world** and found to be without error – also predict that a war fought with less than half of US or Russian strategic nuclear weapons would **destroy the human race**.[iv] In other words, a US-Russian nuclear war would create such extreme long-term damage to the global environment that it would leave the Earth **uninhabitable** for humans and most animal forms of life.¶ A recent article in the Bulletin of the Atomic Scientists, “Self-assured destruction: The climate impacts of nuclear war”,[v] begins by stating:¶ “A nuclear war between Russia and the United States, **even after the arsenal reductions** planned under New START, could produce a nuclear winter. Hence, an attack by either side could be **suicidal**, resulting in self-assured **destruction**.”¶ In 2009, I wrote an article[vi] for the International Commission on Nuclear Non-proliferation and Disarmament that summarizes the findings of these studies. It explains that nuclear firestorms would produce millions of tons of smoke, which would rise above cloud level and form a global stratospheric smoke layer that would **rapidly encircle the Earth**. The smoke layer would remain for at least a **decade**, and it would act to destroy the protective ozone layer (vastly increasing the UV-B reaching Earth[vii]) as well as block warming sunlight, thus creating Ice Age weather conditions that would last **10 years** or longer.¶ Following a US-Russian nuclear war, temperatures in the central US and Eurasia would fall below freezing every day for one to three years; the intense cold would **completely eliminate growing seasons for a decade** or longer. No crops could be grown, leading to a famine that would **kill most humans and large animal populations**.¶ Electromagnetic pulse from high-altitude nuclear detonations would destroy the integrated circuits in all modern electronic devices[viii], including those in commercial nuclear power plants. Every nuclear reactor would almost **instantly** meltdown; every nuclear spent fuel pool (which contain many times more radioactivity than found in the reactors) would boil-off, releasing vast amounts of **long-lived** radioactivity. The fallout would make most of the US and Europe **uninhabitable**. Of course, the survivors of the nuclear war would be **starving to death anyway.** Once nuclear weapons were introduced into a US-Russian conflict, there would be little chance that a **nuclear holocaust** could be avoided. Theories of “limited nuclear war” and “nuclear de-escalation” are **unrealistic**.[ix] In 2002 the Bush administration modified US strategic doctrine from a retaliatory role to permit preemptive nuclear attack; in 2010, the Obama administration made only incremental and miniscule changes to this doctrine, leaving it essentially unchanged. Furthermore, Counterforce doctrine – used by both the US and Russian military – emphasizes the need for preemptive strikes once nuclear war begins. Both sides would be under immense pressure to launch a preemptive nuclear first-strike once military hostilities had commenced, especially if nuclear weapons had already been used on the battlefield.

#### Independently, increases readiness, innovation, and tighter coordination – it’s try or die aff

Johnson ’19 [Kent, retired USAF F-15 Strike Eagle and A-10 Warthog pilot, and political-military advisor on the staff of the secretary of the Air Force, and an adjunct at North Central Texas College in Gainesville, Texas, specializing in defense studies, “Public-Private Partnerships in Space – An Approach to Risk Mitigation”, 05-09-2019, Real Clear Defense, https://www.realcleardefense.com/articles/2019/05/09/public-private\_partnerships\_in\_space\_\_an\_approach\_to\_risk\_mitigation\_114409.html]//pranav

If the USG is serious about acquiring more capability from the commercial space industry – especially as a way to maintain an advantage over peer competitors that are moving quickly in space – working with the private sector will be imperative. After all, it is in the commercial space industry where all of the dynamic innovation is occurring now – from the development of lower cost launch vehicles to highly-capable smaller satellites, to game-changing data processing technology. Increasing calls are coming from all corners of government – from high-ranking leaders in DoD to members of the U.S. Congress – to find more ways to leverage the commercial space industry to enhance our national defense and intelligence capabilities in space.

That being said, the private sector can only commit so many resources and capital without expecting or realizing a reasonable return on investment. Thus, a public-private partnership that spreads the risk and establishes workable arrangements for both industry and government allows for shared “skin in the game.”

Additionally, healthy public-private partnerships might allow for tighter coordination between the USG and industry on the technological development of U.S. national security capabilities. In this sense, industry becomes a vital partner with the USG on our most critical national security imperatives in space – for everything from increased satellite resiliency, reduced data interruption, streamlining of data processing, enhanced persistence and accuracy of ISR, and more rapidly responsive space launch. These partnerships also improve and enhance the regulatory and oversight dynamics between the USG and commercial industry.

Quite frankly, the time for this type of approach is now. If America is going to retain our dominance in space against peer competitors who are expanding their capabilities – civil and military – at a rapid clip, public-private partnerships may be critical to harnessing the promise of commercial industry. Three key points add reinforcement.

#### Only U.S. space heg solves war – it’s sustainable and Chinese counter-hegemonic pushes on Earth mean it’s try or die for American hegemony

Elvevold ’19 [Eirik Billingsø, master’s in international Relations from Universidade Nova, ““War in Space: Why Not?” A Neorealist Analysis of International Space Politics (1957-2018)”, May 2019, https://run.unl.pt/bitstream/10362/82269/1/Thesis\_InternationalRelations\_EirikBElvevold\_47082.pdf]//pranav

* ON = Offensive Neorealism - anarchy forces states to maximize space power instead of security and aim for space hegemony

The risk of space war seems to have decreased substantially in the beginning of the Second Space Age because no other state could threaten the US in space – the ideal position for any state seeking security according to Mearsheimer.973 The US had, by force of all its satellites, the most to lose from a space war, but also the most space weapons to strike back