## Disclosure

#### A. Interpretation: Debaters must disclose all previously read positions before the debate on their NDCA wiki page under their own name with full citations, tags, and first three/last three words.

#### B. Violation: You didn’t check their wiki.

#### C. Standards:

#### 1. Evidence Quality – Disclosure generates an information database that encourages debaters to find the best evidence on the topic. Key to education since we have better debates with better arguments.

#### 2. Quality engagement --- disclosure allows in-depth preparation before the round which checks back against unpredictable positions and allows debaters to effectively write case negs and blocks. Not just in the context of this round, but for rounds in general. Quality engagement is an independent voter because the constitutive reason we debate is to engage and clash our arguments otherwise we would just be doing oratory. It’s also key to fairness since I need to have prep to win. This means vote on inclusion since debaters of lower skill level can have a chance to engage with better debaters which makes debate less centered towards those with larger coaching staffs.

#### Framing: You can’t coopt any of the reasons why procedurals are bad in the context of the affirmative since I don’t constrain your ability to read it– the contention is that this aff should’ve been read, just disclosed. Also, your prep outs argument is nonsense a) prep outs are a 2 way street b) they’re good as per the shell c) being a good debater solves back.

#### Independently, they said they would text me 30 minutes before the round with disclosure but then happened to lose their phone and weren’t able to text me. No shade but disclosure definitively solves since if its on your wiki I can prep before the round and not rely upon your ability to find a phone.

Graphical user interface, application, chat or text message

Description automatically generated

## Space Tech PIK

#### CP Text: Private appropriation ought to be banned for all non-US private entities. US private entities ought to have increased funding as per our solvency advocate.

#### US private space appropriation is uniquely key to ensuring ongoing innovation towards space exploration which avoids the link to the Das

**Cheng 20** [Dean Cheng, Senior Research Fellow, Asian Studies Center; 09-16-2020; "Outer Space and Private Property," Heritage Foundation, <https://www.heritage.org/space-policy/commentary/outer-space-and-private-property>; Accessed: 2-8-22 ] HZaidi

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. This welcome development will provide significant support for efforts to develop a sustainable space industrial capacity that moves from providing information support services to producing material goods. And just as important, it will help support sustainable space efforts when future missions employ celestial resources.

#### PICs are good – a) strat skew – they’ve had more time to prep the aff so I need to be able to test it from diff angles, b) they chose to put it in the aff and should be held accountable

## Heg DA

#### US leading in the space race now but China is steadily catching up

**Grieco 1/19**; Kelly A. Grieco is a senior fellow at the New American Engagement Initiative at the Atlantic Council's Scowcroft Center for Strategy and Security; “The China-US Space Race Is a Myth” <https://thediplomat.com/2022/01/the-china-us-space-race-is-a-myth/>; Accessed 1/20/22; Hzaidi

Seventy years later, it is happening again. Pundits, politicians, and senior military officers alike now warn the United States is losing a space race to China. “We are absolutely in a strategic competition with China and space is a part of that,” Gen. David D. Thompson, vice chief of space operations for the U.S. Space Force, warned recently. “The fact, that in essence, on average, they are building and fielding and updating their space capabilities at twice the rate we are means that very soon, if we don’t start accelerating our development and delivery capabilities, they will exceed us.” Space alarmism makes great headlines. But the United States is not falling behind China in space – quite the contrary. The United States remains the most advanced space power in the world. Of the more than 4,500 satellites in orbit today, the United States accounts for more than half of them, some 2,700 satellites and nearly seven times as many as the next competitor, China. True, the Chinese hold the record for the most space launches in 2021 – a total of 55 launches to the United States’ 51. But the number of launches only tells part of the story, because the United States has more powerful rockets, able to deliver more payloads – satellites, space probes, and spacecraft – into orbit. China’s space funding has increased markedly in recent years, to $8.9 billion in 2020, but it still spent a mere fraction of the United States’ $48 billion. The U.S. also boasts a booming commercial space industry, with hundreds of startups joining leading firms like Blue Origin and SpaceX, and investors pouring billions of dollars into the U.S. space economy. Meanwhile, China’s private space industry lags behind American companies and, last year, funding trended in the wrong direction. China’s space program has made significant advances in recent years, from completing its own global satellite navigation system and collecting lunar samples to landing a spacecraft on Mars and sending astronauts to its own space station. But these milestones should serve as a reality check: The United States is not falling behind in the space race, so much as China is steadily catching up after having started so far behind. Likewise, China’s space ambitions are impressive, with plans to develop satellite mega-constellations and further explore the moon and deep space, but each of these Chinese space endeavors will need to first clear significant technical and other obstacles. For example, in June, Beijing released a roadmap for an International Lunar Research Station to be developed jointly with Russia. This plan requires China to field the Long March 9, a super heavy-lift rocket that has been in the research-and-development phase since 2011. The Chinese expect it to make its first test flight around 2030, but their troubles with other heavy rockets suggest that ambitious goal could well be pushed back. Even then, China landing its astronauts on the moon hardly constitutes a great victory. After all, the United States won that race back in 1969. Still, the China space-race narrative has helped to stoke fears in Washington. The alarm associated with “falling behind” in the space race is invariably paired with calls for the U.S. to spend more on new space military capabilities, space exploration, and the commercial space industry. Steve Kwast, a retired Air Force lieutenant general, warns “there won’t be many prizes for second place” and urges Washington to act with greater “urgency and excitement.” But much like the missile gap of the late 1950s, such “calls to arms” encourage a massive militarization of space and risk misallocating limited defense resources. The United States faces real and significant security threats in space, but efforts to develop an effective space strategy must begin with a more clear-eyed net assessment. The promotion of space cooperation with China would also help to dampen hype around a space race. While the Wolf Amendment limits U.S. government agencies, such as NASA, from cooperating with Chinese space agencies, the United States and China stand to mutually gain from collaboration for civil space exploration and science. Excluded from participation in the International Space Station or NASA’s Artemis Accords, the Chinese have had little choice but to develop their own space station and lunar base. These parallel space missions create a sense of a stark competition and fuel the space race narrative. Mutually beneficial scientific cooperation between the United States and China mitigates the risks of turning all China-U.S. relations into zero-sum competition. Let the missile gap myth be a cautionary tale.

#### Continued success of private space companies is key to secure space for the US.

Macias & Sheetz 2/3 [(Amanda, covers global trade and foreign policy for CNBC. She joined CNBC’s Washington bureau in 2018 from CBS Radio. Amanda studied Broadcast Journalism and Finance at the University of Missouri. She is a Knight-Bagehot Fellow in Economics and Business Journalism at Columbia University in New York.) (Micheal, Space Reporter) “Space Force general says success of private companies like SpaceX helps U.S. secure the space domain” CNBC, 2/3/21. <https://www.cnbc.com/2021/02/03/space-force-general-america-owns-space-with-help-from-elon-musks-spacex.html>] RR

WASHINGTON – The nation’s top general leading the U.S. military mission in space said Wednesday that he is excited about Wall Street and billionaire investment in the space industry, which has sparked renewed interest in the field among Americans and strong recruitment at the Pentagon’s youngest branch.

“There is a ton of excitement across America on space in all sectors,” said Gen. John Raymond, the U.S. Space Force’s chief of operations, when asked by CNBC about the strides made by private space companies like Elon Musk’s SpaceX.

“I’ve talked about people knocking on our door wanting to come into the Space Force in numbers greater than what we have slots to fill. I’ve talked in the past about how universities are seeing more students apply for space STEM degrees, which I think is going to be great for our nation,” Raymond added.

“I’m excited about all of it, both what we’re doing here on national security and what’s going on in the commercial industry that we can leverage the advantage,” the four-star general said without specifically naming any companies.

“The U.S. has always, has long understood that we are stronger with a secure and stable space domain and all of those sectors play into that,” Raymond said.

The U.S. Space Force, the Pentagon’s youngest branch, has increasingly looked to partner with the private sector as companies and investors pour into the space industry. The Pentagon is closely watching the progress of rocket builders like Rocket Lab, Astra and Virgin Orbit in addition to SpaceX.

Raymond’s comments came on the heels of SpaceX announcing this week that it will fly its first all-civilian crew into orbit later this year, a mission known as Inspiration 4.

The landmark flight, led by billionaire Jared Isaacman, is aimed at using high-profile space tourism to raise support for St. Jude Children’s Research Hospital. Three yet-to-be-announced passengers will accompany Isaacman on the multiday journey around the Earth, with two of the seats to be decided in public online competitions this month.

SpaceX announces first space mission with all-civilian crew

Raymond also called out NASA’s Crew-1 mission, which was the first operational launch of SpaceX’s Crew Dragon spacecraft.

“If you look at what’s going on in the civil sector with the launch of U.S. astronauts, and in this last launch a Japanese astronaut from U.S. soil on a commercial launch vehicle, there’s a ton of excitement there,” he said.

Raymond did not provide a reaction to SpaceX’s Starship rocket test flight on Tuesday, which resulted in an explosion as it attempted to land.

Starship prototype SN9 launched successfully to about 33,000 feet but, like the previous prototype flight in December, the rocket smashed into the ground while attempting to land.

Private investment in space companies last year set a fresh annual record, despite industry fears that the Covid-19 pandemic would end the past decade’s momentum, according to a report by Space Capital last month. Builders of rockets and satellites brought in $8.9 billion in 2020, with venture capital and angel investors continuing to pour funds into space businesses.

#### Americas private sector is key to retaining hegemony in space and defeating China in the space race

**Weichert 21**; Brandon J. Weichert is the author of “Winning Space: How America Remains a Superpower” (Republic Book Publishers). He runs The Weichert Report: World News Done Right and is a contributor at the Asia Times; “The Future of Space Exploration Depends on the Private Sector”; <https://www.nationalreview.com/2021/07/the-future-of-space-exploration-depends-on-the-private-sector/#slide-1>; Accessed: 1-21-22; Hzaidi

As Jeff Bezos, the wealthiest man on the planet, readies to launch himself into space aboard one of his own rockets, the world is watching the birth of a new dawn in space. Previously, America relied on its government agency, NASA, to propel it to the cosmos during the last space race with the Soviet Union. Today, America’s greatest hopes are with its private sector. Jeff Bezos is not engaging in such risky behavior simply because he’s an adrenaline junky. No, he’s launching himself into orbit because his Blue Origins is in a titanic struggle with Elon Musk’s SpaceX — and Bezos’s firm is losing. Whatever happens, the American people will benefit from the competition that is shaping up between America’s space entrepreneurs. This has always been how innovation occurs: through the dynamic, often cutthroat competition between actors in the private sector. While money is their ultimate prize, fame and fortune are also alluring temptations to make men like Musk and Bezos risk much of their wealth to change the world. The private space race among these entrepreneurs is part of a far more important marathon between Red China and the United States. Whichever nation wins the new space race will determine the future of the earth below. Consider this: Since winning its initial contracts to launch sensitive U.S. military satellites into orbit, SpaceX has lowered the cost of military satellite launches on taxpayers by “over a million dollars less” than what bigger defense contractors can do. Elon Musk is convinced that he can bring these costs down even more, thanks to his reusable Falcon 9 rocket. The competition between the private space start-ups is fierce — just as the competition between Edison and Westinghouse was — but the upshot is ultimately greater innovation and lower costs for you and me. In fact, Elon Musk insists that if NASA gives SpaceX the contract for building the Human Landing System for the Artemis mission, NASA would return astronauts to the lunar surface by 2024 — four years before NASA believes it will do so. (Incidentally, 2024 is also when China anticipates having a functional base on the moon’s southern pole.) Whereas China has an all-of-society approach to its space race with the United States, Washington has yet to fully galvanize the country in the way that John F. Kennedy rallied America to wage — and win — the space race in the Cold War. America’s private sector, therefore, is the silver bullet against China’s quest for total space dominance. If left unrestricted by meddlesome Washington bureaucrats, these companies will ensure that the United States retains its overall competitive advantage over China — and all other challengers, for that matter. Indeed, the next four years could prove decisive in who will be victorious. Enter the newly minted NASA director, Bill Nelson, whose station at the agency has effectively poured cold water on the private sector’s ambitious space plans. “Space is not going to be the Wild West for billionaires or anyone else looking to blast off,” Nelson admonished an inquiring reporter. Why not? America’s actions during its western expansion created a dynamic and advanced nation that was well-positioned to dominate the world for the next century. Should we not attempt to emulate this in order to remain dominant in the next century? More important, this is precisely how China treats space: as a new Wild West . . . but one in which Beijing’s forces will dominate. China takes a leap-without-looking approach to space development — everything that can be done to further its grand ambition of becoming the world’s most dominant power by 2049 will be done. Meanwhile, the Biden administration wants to prevent America’s greatest strength, the free market, from helping to beat its foremost geopolitical competitor. Nelson’s comments are fundamentally at odds with America’s spirit and animating principles. Whatever one’s opinion about Bezos or Musk, the fact is that their private space companies are inspiring greater innovation today in the space sector after years of its being left in the sclerotic hands of the U.S. government. Sensing that the federal government’s dominance of U.S. space policy is waning, the Biden administration would rather cede the strategic high ground of space to China than let wildcatting innovators do the hard work. Today, the Federal Aviation Authority (FAA) and NASA are contriving new ways for strangling the budding private space sector, just as it is taking flight. Risk aversion is not how one innovates. Risk is what led Americans to the moon just 66 years after the Wright brothers flew their first airplane. A willingness for risk doesn’t exist today in the federal government — which is why the feds shouldn’t be running space policy. The U.S. government should be partnering with the new space start-ups, not shunning them. The FAA should be automatically approving SpaceX launches, not stymying them. The federal government will not win space any more than it could win the West or build the locomotive. It takes strong-willed, brilliant individuals of a rare caliber to do that. All government can do is to give the resources and support to private-sector innovators and let them make history for us. The next decade will decide who wins space. Let it be America — and let America’s dynamic start-ups win that race, not China’s state capitalism.

#### Heg solves great power conflict and global facism

Kroenig 20 [Matthew Kroenig is an American political scientist, best-selling author, and an award-winning national security strategist. "The Return of Great Power Rivalry Democracy versus Autocracy from the Ancient World to the U.S. and China." https://www.google.com/books/edition/The\_Return\_of\_Great\_Power\_Rivalry/dXLKDwAAQBAJ?hl=en&gbpv=1&printsec=frontcover]

Indeed, China itself has been among the greatest beneficiaries of a U.S.- led international order. American military and economic power have provided the peace and macroeconomic stability that allowed China to grow into the major power that it is today.

There is little reason to believe that Russia and China will be as kind. These autocratic powers long to establish spheres of influence in their near abroad, and they have shown little concern for the sovereignty or personal freedoms of their own citizens or subjected populations. To get a vision of a world led by Russia or China, just look at how they treat the people that fall under their influence today. Russian dictator Vladimir Putin invades neighboring countries and murders critical journalists. And China takes contested territory from its neighbors through brute force and locks up one million Muslim minorities in “re-education” camps. And this is but a small taste of the brutality of these governments. If readers doubt these claims, they can simply ask citizens of American allies in Eastern Europe or East Asia whether they desire continued American leadership, or whether they would prefer to live under the thumb of Moscow or Beijing, respectively.

Moreover, just as consequentially for the globe, the decline of the United States could very well result in war. As noted earlier, international relations theory maintains that the decline of one dominant power and the rise of another often results in great power conflict.24 According to this telling, World War I and World War II were primarily the result of the decline of the British Empire and the rise of Imperial and then Nazi Germany. Falling powers fight preventive wars in a bid to remain on top, and rising powers launch conflicts to dislodge the reigning power and claim their “place in the sun.”25 Many fear that a power transition between Beijing and Washington would produce a similar catastrophic result.26 Continued American leadership, therefore, could forestall this transition and may be necessary for continued peace and stability among the major powers.

## Innovation DA

#### Private companies are more efficient and are accomplishing more than NASA

**Follett 21** [Andrew Follett, Andrew Follett previously worked as a space and science reporter for the Daily Caller News Foundation. He has also done research for the Congressional Committee on Science, Space and Technology, the National Aeronautics and Space Administration, the Cato Institute, and the Competitive Enterprise Institute. He currently conducts research analysis for a nonprofit in the Washington, D.C., area., “Private Firms Are the Key to Space Exploration”, 08/21/2021, The National Review, <https://www.nationalreview.com/2021/08/private-firms-are-the-key-to-space-exploration>] /Triumph Debate

But NASA’s troubles are, depressingly, likely to get even worse. In November the James Webb Space Telescope (JWST) will finally launch, after taxpayers have forked over $9.7 billion. It was originally supposed to launch in 2007 on a budget of $500 million. That means the project is over a decade behind schedule and costing almost 20 times its initial budget. Perhaps the telescope, meant to locate potentially habitable planets around other stars and perhaps even extraterrestrial life, could instead search for a calendar . . . or fiscal sanity . . . in the stars? JWST isn’t the first NASA space telescope to suffer cost overruns and setbacks. The Hubble Space Telescope (HST) was originally intended to launch in 1983, but technical issues delayed the launch until 1990 because the main mirror was incorrectly manufactured. JWST is very likely to fail because it is supposed to unfold itself “origami style” in space in an extremely technically complicated process. If difficulties arise, JWST lacks HST’s generous margin for error because of its location far beyond earth’s orbit at the Sun-Earth L2 LaGrange point. NASA currently lacks the capability to send a team of astronauts out that far to fix any problems. Even if NASA could get out to JWST, the telescope doesn’t have a grappling ring for an astronaut to grab onto and thus could potentially kill astronauts attempting to fix it. It is hard to imagine a better example of the private sector’s amazing ability to outcompete government bureaucracy and mismanagement than NASA’s planned Shuttle replacement, the Space Launch System. It is estimated to cost more than $2 billion per flight. That’s on top of the $20 billion and nine years the agency has already spent developing the vehicle. Contrast that with the comparatively inexpensive $300 million spent by SpaceX to develop the Falcon 9 in a little over four years, and the fact that each Falcon 9 costs around $62 million. One SLS launch could pay for over 32 SpaceX launches. Private ventures such as SpaceX are more efficient because they have a lot more incentive to avoid excessive costs and focus on solutions: Their own money is at stake, and people spend their own money more carefully than they spend taxpayer dollars collected from others. Multiple private American space firms are currently pursuing accomplishments beyond those of NASA, and they are more advanced and ambitious than the entire government space programs of China and the European Union combined. So one possible solution to NASA’s woes would be to greatly increase its reliance on commercial launch providers. And one way to do that would be to return to the system that made civil aviation great: prizes to reward private-sector innovation. Charles Lindbergh flew across the Atlantic Ocean in pursuit of the privately funded Orteig prize, valued at almost $395,000 in today’s money. Another famous example was the X Prize, which rewarded Burt Rutan’s company Scaled Composites with over $14 million in today’s money for becoming the first nongovernmental organization to launch a reusable and manned space vehicle, SpaceShipOne. The X Prize succeeded in creating over $100 million in investment by private corporations and individuals. Aerospace experts expect that establishing a $10 billion prize for successfully landing a crew on Mars and returning it safely to earth could very well lead to a successful landing. That’s a bargain compared with the $500 billion cost estimates NASA puts out for the same objective. And of course in the worst-case failure scenario for a prize program, taxpayers would pay nothing until the mission was complete. A system based on private enterprise incentivized by a fixed prize would end government cost overruns and waste. The cause of space exploration is simply too important to leave to the public sector.

#### Private entities are specifically developing more space technology. The plan destroys innovation of the private sector because they ban appropriation of outer space

**Innovation News 20**; Innovation News Network brings you the latest science, research and innovation news from across the fields of digital healthcare, space exploration, e-mobility, biodiversity, aquaculture and much more; “Innovation in space: the private sector’s role in the 2020 space race”; <https://www.innovationnewsnetwork.com/innovation-in-space-the-private-sectors-role-in-the-2020-space-race/5490/>; Hzaidi

As the industry becomes more commercialised, funding for the space sector is set to increase – could this be the start of a new space race? SpaceX has paved the way for a new wave of commercial space technologies. However, private actors have been influencing the space industry for many years. In May 2003, Scaled Composites first launched SpaceShipOne, an experimental and reusable space plane that uses a hybrid rocket to achieve speeds of up to speeds of up to 900 m/s. SpaceShipOne completed the first crewed private spaceflight in 2004, which was then retired that year. In 2013, The Spaceship Company announced the first powered flight of SpaceShipTwo, another suborbital spaceplane designed for space tourism. Unfortunately, in October 2014, the first SpaceShipTwo VSS Enterprise crashed in the Mojave Desert. Further investigation suggested that the craft’s descent device deployed too early, killing the pilot, Michael Alsbury. Virgin Galactic plans to operate a fleet of five improved SpaceShipTwo spaceplanes in a private passenger-carrying service and has been taking bookings for some time, with a suborbital flight carrying an updated ticket price of $250,000. SpaceX is responsible for some of the most innovative space technologies produced in the last decade. SpaceX has created the most powerful rocket ever developed, Falcon Heavy, which can lift more than twice the payload of the next closest operational vehicle, the Delta IV Heavy. Although the nature is of the commercial space sector is competitive, many private companies share common goals. Almost 60 years of space activities and more than 5,450 launches have resulted in approximately 23,000 objects remaining in orbit. Around 24% of the catalogued objects are satellites. This catastrophic waste of technology can have a negative effect of future launches and it has been theorised that sending objects into Earth’s orbit could become impossible due the risk of collision. This debris must be removed from orbit if the space industry is to continue to grow. Many private companies have taken on the burden of removing debris from Earth’s orbit. Aviosonic Space Tech has pioneered the first Debris Collision Alert System (DeCAS) for the monitoring of space vehicles and satellites as they re-enter Earth’s atmosphere. Avisonic’s patented space debris management system, DeCAS, addresses the vital issue of protecting people and institutions across the globe through a precise, efficient, and cost-effective system which will make the world a safer place. Although the removal of space debris is an important step in sustainable space travel, many businesses are developing nanosatellites to reduce the volume of technology in orbit. Another benefit of developing nanosatellites is that they can do almost everything a conventional satellite does at a fraction of the cost, making this technology more popular in the commercial sector. Travelling to Mars has been a major goal of the 2020 space race. However, with minimal funding, many commercial space companies have struggled to keep afloat. One of which, Inspiration Mars, initially planned to launch a spacecraft to Mars in January 2018, with a backup opportunity in 2021. However, the Inspiration Mars Foundation has not made any recent public announcements on the matter. In testimony before Congress in November 2013, Tito said that he expected private donors would only provide around $300m. Tito then asked for an additional investment of $700m from the US government. NASA said they would not commit to sharing expenses with the organisation. Many privately owned businesses have expressed their interest in travelling to Mars. The Netherlands-based company, Mars One is working toward sending four astronauts to Mars in 2026, and four more every two years thereafter. With an initial cost of $6bn, the company aims to raise fund for this mission by staging a global media event around the project, from astronaut selection, to launch, to the settlers’ life on Mars. However, Mars One allegedly filed for bankruptcy in 2019. SpaceX’s founder, Elon Musk, announced that he wants to land the first transport ship on Mars by 2022. Musk suggests that this ship will be followed by four vehicles, two of which would be crewed. According to SpaceX: ‘Together the Starship spacecraft and Super Heavy rocket create a reusable transportation system capable of on orbit refuelling and leveraging Mars’ natural H2O and CO2 resources to refuel on the surface of Mars.’

#### Space Commercialization drives Tech Innovation in the Status Quo – it provides a unique impetus.

Hampson 17 Joshua Hampson 1-25-2017 “The Future of Space Commercialization” <https://republicans-science.house.gov/sites/republicans.science.house.gov/files/documents/TheFutureofSpaceCommercializationFinal.pdf> (Security Studies Fellow at the Niskanen Center)//Elmer

The size of the space economy is far larger than many may think. In 2015 alone, the global market amounted to $323 billion. Commercial infrastructure and systems accounted for 76 percent of that 9 total, with satellite television the largest subsection at $95 billion. The global space launch market’s 10 11 share of that total came in at $6 billion dollars. It can be hard to disaggregate how space benefits 12 particular national economies, but in 2009 (the last available report), the Federal Aviation Administration (FAA) estimated that commercial space transportation and enabled industries generated $208.3 billion in economic activity in the United States alone. Space is not just about 13 satellite television and global transportation; while not commercial, GPS satellites also underpin personal navigation, such as smartphone GPS use, and timing data used for Internet coordination.14 Without that data, there could be problems for a range of Internet and cloud-based services.15 There is also room for growth. The FAA has noted that while the commercial launch sector has not grown dramatically in the last decade, there are indications that there is latent demand. This 16 demand may catalyze an increase in launches and growth of the wider space economy in the next decade. The Satellite Industry Association’s 2015 report highlighted that their section of the space economy outgrew both the American and global economies. The FAA anticipates that growth to 17 continue, with expectations that small payload launch will be a particular industry driver.18 In the future, emerging space industries may contribute even more the American economy. Space tourism and resource recovery—e.g., mining on planets, moons , and asteroids—in particular may become large parts of that industry. Of course, their viability rests on a range of factors, including costs, future regulation, international problems, and assumptions about technological development. However, there is increasing optimism in these areas of economic production. But the space economy is not just about what happens in orbit, or how that alters life on the ground. The growth of this economy can also contribute to new innovations across all walks of life. Technological Innovation Innovation is generally hard to predict; some new technologies seem to come out of nowhere and others only take off when paired with a new application. It is difficult to predict the future, but it is reasonable to expect that a growing space economy would open opportunities for technological and organizational innovation. In terms of technology, the difficult environment of outer space helps incentivize progress along the margins. Because each object launched into orbit costs a significant amount of money—at the moment between $27,000 and $43,000 per pound, though that will likely drop in the future —each 19 reduction in payload size saves money or means more can be launched. At the same time, the ability to fit more capability into a smaller satellite opens outer space to actors that previously were priced out of the market. This is one of the reasons why small, affordable satellites are increasingly pursued by companies or organizations that cannot afford to launch larger traditional satellites. These small 20 satellites also provide non-traditional launchers, such as engineering students or prototypers, the opportunity to learn about satellite production and test new technologies before working on a full-sized satellite. That expansion of developers, experimenters, and testers cannot but help increase innovation opportunities. Technological developments from outer space have been applied to terrestrial life since the earliest days of space exploration. The National Aeronautics and Space Administration (NASA) maintains a website that lists technologies that have spun off from such research projects. Lightweight 21 nanotubes, useful in protecting astronauts during space exploration, are now being tested for applications in emergency response gear and electrical insulation. The need for certainty about the resiliency of materials used in space led to the development of an analytics tool useful across a range of industries. Temper foam, the material used in memory-foam pillows, was developed for NASA for seat covers. As more companies pursue their own space goals, more innovations will likely come from the commercial sector. Outer space is not just a catalyst for technological development. Satellite constellations and their unique line-of-sight vantage point can provide new perspectives to old industries. Deploying satellites into low-Earth orbit, as Facebook wants to do, can connect large, previously-unreached swathes of 22 humanity to the Internet. Remote sensing technology could change how whole industries operate, such as crop monitoring, herd management, crisis response, and land evaluation, among others. 23 While satellites cannot provide all essential information for some of these industries, they can fill in some useful gaps and work as part of a wider system of tools. Space infrastructure, in helping to change how people connect and perceive Earth, could help spark innovations on the ground as well. These innovations, changes to global networks, and new opportunities could lead to wider economic growth.

#### Strong Innovation solves Extinction.

Matthews 18 Dylan Matthews 10-26-2018 “How to help people millions of years from now” <https://www.vox.com/future-perfect/2018/10/26/18023366/far-future-effective-altruism-existential-risk-doing-good> (Co-founder of Vox, citing Nick Beckstead @ Rutgers University)//Re-cut by Elmer

If you care about improving human lives, you should overwhelmingly care about those quadrillions of lives rather than the comparatively small number of people alive today. The 7.6 billion people now living, after all, amount to less than 0.003 percent of the population that will live in the future. It’s reasonable to suggest that those quadrillions of future people have, accordingly, hundreds of thousands of times more moral weight than those of us living here today do. That’s the basic argument behind Nick Beckstead’s 2013 Rutgers philosophy dissertation, “On the overwhelming importance of shaping the far future.” It’s a glorious mindfuck of a thesis, not least because Beckstead shows very convincingly that this is a conclusion any plausible moral view would reach. It’s not just something that weird utilitarians have to deal with. And Beckstead, to his considerable credit, walks the walk on this. He works at the Open Philanthropy Project on grants relating to the far future and runs a charitable fund for donors who want to prioritize the far future. And arguments from him and others have turned “long-termism” into a very vibrant, important strand of the effective altruism community. But what does prioritizing the far future even mean? The most literal thing it could mean is preventing human extinction, to ensure that the species persists as long as possible. For the long-term-focused effective altruists I know, that typically means identifying concrete threats to humanity’s continued existence — like unfriendly artificial intelligence, or a pandemic, or global warming/out of control geoengineering — and engaging in activities to prevent that specific eventuality. But in a set of slides he made in 2013, Beckstead makes a compelling case that while that’s certainly part of what caring about the far future entails, approaches that address specific threats to humanity (which he calls “targeted” approaches to the far future) have to complement “broad” approaches, where instead of trying to predict what’s going to kill us all, you just generally try to keep civilization running as best it can, so that it is, as a whole, well-equipped to deal with potential extinction events in the future, not just in 2030 or 2040 but in 3500 or 95000 or even 37 million. In other words, caring about the far future doesn’t mean just paying attention to low-probability risks of total annihilation; it also means acting on pressing needs now. For example: We’re going to be better prepared to prevent extinction from AI or a supervirus or global warming if society as a whole makes a lot of scientific progress. And a significant bottleneck there is that the vast majority of humanity doesn’t get high-enough-quality education to engage in scientific research, if they want to, which reduces the **odds that we have enough trained scientists to come up with the breakthroughs** we need as a civilization to survive and thrive. So maybe one of the best things we can do for the far future is to improve school systems — here and now — to harness the group economist Raj Chetty calls “lost Einsteins” (potential innovators who are thwarted by poverty and inequality in rich countries) and, more importantly, the hundreds of millions of kids in developing countries dealing with even worse education systems than those in depressed communities in the rich world. What if living ethically for the far future means living ethically now? Beckstead mentions some other broad, or very broad, ideas (these are all his descriptions): Help make computers faster so that people everywhere can work more efficiently Change intellectual property law so that technological innovation can happen more quickly Advocate for open borders so that people from poorly governed countries can move to better-governed countries and be more productive Meta-research: improve incentives and norms in academic work to better advance human knowledge Improve education Advocate for political party X to make future people have values more like political party X ”If you look at these areas (economic growth and technological progress, access to information, individual capability, social coordination, motives) a lot of everyday good works contribute,” Beckstead writes. “An implication of this is that a lot of everyday good works are good from a broad perspective, even though hardly anyone thinks explicitly in terms of far future standards.” Look at those examples again: It’s just a list of what normal altruistically motivated people, not effective altruism folks, generally do. Charities in the US love talking about the lost opportunities for innovation that poverty creates. Lots of smart people who want to make a difference become scientists, or try to work as teachers or on improving education policy, and lord knows there are plenty of people who become political party operatives out of a conviction that the moral consequences of the party’s platform are good. All of which is to say: Maybe effective altruists aren’t that special, or at least maybe we don’t have access to that many specific and weird conclusions about how best to help the world. If the far future is what matters, and generally trying to make the world work better is among the best ways to help the far future, then effective altruism just becomes plain ol’ do-goodery.

## Framing

We agree with util

## Case

### Contention 1

#### Cx proves collions can still happen

#### Private entities are key to solving massive amounts of debris which is dangerous for Earth’s atmosphere especially with collisions

Mark **Strauss 18** ; Mark is a former writer/editor for Pew Research center; “As debris piles up, Americans are skeptical enough will be done to limit space junk”; <https://www.pewresearch.org/fact-tank/2018/08/31/as-debris-piles-up-americans-are-skeptical-enough-will-be-done-to-limit-space-junk/>; 8-31-18; Accessed: 12/30/21; Hzaidi

Over the past 60 years, more than 5,250 space launches have spawned an orbital junkyard consisting of around 23,000 objects large enough to be detected, with a combined (Earth) weight of over 8,000 tons. While that’s a small amount compared with the more than 3.5 million tons of garbage the world produces every single day, it’s enough to pose a growing hazard to satellites and space stations. There is at least one terrestrial clean-up strategy that could be applied to space junk: recycling. Among the estimated 4,500 satellites in orbit, only about 1,500 are still functional. But those roughly 3,000 dead satellites contain valuable components that could be repurposed for other uses. Some could be towed to Mars, to assist missions to the red planet, where they could be repaired. Other satellites with valuable building materials could be melted down by a solar-powered orbiting forge. But most of the orbital debris is space-age flotsam and jetsam, such as spent rocket stages, screws and lens caps. There are about 23,000 detectable objects at least 2 to 4 inches in size in low-Earth orbit (the preferred altitude for most satellites and space missions) or about 1 to 3 feet in size in geostationary orbit (the ideal altitude for surveillance and communications satellites). What’s more, **these objects can create more pieces of debris when they collide with one another or explode in orbit, due to leftover fuel or battery failures.** Around 290 such “fragmentation events” are known to have occurred since 1961, creating an estimated 750,000 objects larger than about 0.5 inches in size. Circling the Earth at speeds around 10 times faster than a bullet, the kinetic energy of even miniscule objects can pack a punch strong enough to puncture the hull of a space station or damage solar panels and communication arrays. As more satellites are launched into space, the probability of collisions grows. There are, however, preventive measures that could mitigate the problem. For instance, engineers are developing technology to facilitate the venting of leftover fuel, thereby averting explosions in orbit. Or, satellites could be equipped with low-tech devices, such as balloons, that would enable Earth-based operators to guide them into the atmosphere – where they would burn up – at the end of their operational lifetimes. Many are confident private space companies will be profitable but skeptical they will keep space clean. Only 13% of Americans, however, have a great deal of confidence that space companies will sufficiently address the debris problem, while 51% have not too much or no confidence, according to a recent Pew Research Center survey. Yet, the same survey finds that, among the 7% of the public that is highly attentive to space news – those who say they have heard “a lot” about NASA in the past year and “a lot” about private space companies – some **37% have a great deal of confidence that private companies will minimize space debris**. Private companies might, in fact, **profit from the growing need to eliminate existing space junk** from Earth’s orbit. One recent business study estimates that the global market for monitoring and removing debris will generate $2.9 billion in revenue by 2022. Technology for debris removal is currently being tested at the International Space Station. A **satellite built by the British company Surrey Satellite Technology Limited, which is equipped with a harpoon and net, will test a system for capturing large pieces of space junk**. At the end of its mission, it will unfurl a drag sail to slow its speed, bringing itself and the captured debris out of orbit, where it will burn up as it enters the atmosphere. No landfill required.

#### Specifically, Astroscale is taking massive strides to clearing space junk

Tereza **Pultarova 21**; Tereza is a London-based science and technology journalist; “Astroscale's space junk removal satellite aces 1st orbital test”; <https://www.space.com/astroscale-first-space-junk-capture-demonstration>; Accessed: 1/10/22; Hzaidi

The ELSA-d spacecraft of Japan-based startup Astroscale has successfully captured a simulated piece of space junk, completing the first phase of a demonstration mission that could pave the way for a less cluttered future in orbit. Launched on March 22, ELSA-d (short for "End-of-Life Services by Astroscale demonstration") brought with it to orbit a 37-pound (17 kilograms) cubesat fitted with a magnetic docking plate. During the experiment on Wednesday (Aug. 25), ground controllers first remotely released a mechanical locking mechanism attaching the cubesat to the main 386-pound (175 kg) removal craft, Astroscale said in a statement. The two satellites were still held together by the magnetic system, which is responsible for capturing the debris. The cubesat was then released completely and recaptured before floating too far away from the main spacecraft. Astroscale said on Twitter that this maneuver was repeated several times. This short demonstration enabled Astroscale to test and calibrate rendezvous sensors, which enable safe approach and capture of floating objects. "**This has been a fantastic first step in validating all the key technologies for rendezvous and proximity operations and capture in space,**" Astroscale founder and CEO Nobu Okada said in the statement. "We are proud to have proven our magnetic capture capabilities and excited to drive on-orbit servicing forward with ELSA-d." The operation was managed from Astroscale's ground control center in Harwell, U.K. In an earlier statement, the company explained the challenges of the demonstration, the first orbital capture experiment performed by a commercial company. The ground control team had to rely on 16 ground stations located in 12 countries around the world to maintain constant contact with the spacecraft for up to 30 minutes at a time, Astroscale said in the statement. "A typical low Earth orbit mission's connectivity ranges from 5-15 minutes, with 1 or 2 ground station providers in a couple of locations," Alberto Fernandez, Astroscale's head of ground.

#### No Kessler syndrome, but even a worst case is confined to low LEO with no impact

Daniel Von Fange 17, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 5/21/2017, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/

Kessler Syndrome is overhyped. A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong.

What is Kessler Syndrome?

Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites.

It is a dark picture.

Is Kessler Syndrome likely to happen?

I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit.

The orbital area around earth can be broken down into four regions.

Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over.

High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue.

Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here.

GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here.

How bad could Kessler Syndrome in High LEO be?

Let’s imagine a worst case scenario.

An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space?

I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000.

So even in the worst case, we don’t lose access to space.

Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits.

In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment.

* Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely.
* Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner.
* Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided.
* The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler.
* Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting)

So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect.

I’m removing Kessler Syndrome from my list of things to worry about.

#### Starlink ACA systems and de-orbiting solves any debris impact – Russian ASAT test proves and also non-uniques their impact

Kan 21 – [Michael, “Starlink Satellite Orbits Changed to Avoid Debris After Russia's Missile Test,” PC Mag, 12/1/2021, https://www.pcmag.com/news/starlink-satellite-orbits-changed-to-avoid-debris-after-russias-missile]

SpaceX has altered the orbits for its Starlink satellites, likely to prevent them from colliding with debris from Russia’s anti-satellite missile test.

On Tuesday, SpaceX CEO Elon Musk mentioned the issue after NASA abruptly delayed a spacewalk on the International Space Station due to the threat of space debris. In his tweet, Musk said: “We had to shift some Starlink satellite orbits to reduce probability of collision. Not great, but not terrible either.”

Musk didn’t explicitly blame the space debris on Russia’s anti-satellite missile test. Nevertheless, the “Not great, but not terrible” quote may be a subtle jab at the Russian government. The same line is used in the HBO series Chernobyl, which dramatizes the 1986 nuclear plant disaster in the Soviet Union. (In the show, a nuclear plant worker utters the line “Not great, but not terrible,” when in reality the conditions at the facility are catastrophic.)

Last month, the US was quick to condemn Russia’s anti-satellite missile test, which involved the Kremlin sending up a missile to destroy one of its own defunct satellites. The ensuing impact caused hundreds of thousands of pieces of debris to spill out into orbit, according to the US.

Because space debris can travel up to 17,500 miles per hour, even a small artifact can cause serious damage if strikes a spacecraft or an astronaut. "Russia's dangerous and irresponsible behavior jeopardizes the long-term sustainability of outer space,” the US State Department said at the time.

However, Russia claims the resulting debris poses no danger to any space activity. The Kremlin also points out other countries have embarked on their own anti-satellite missile tests too.

To avoid space debris, SpaceX has equipped each Starlink satellite with an “autonomous collision avoidance” system. The same satellites will eventually descend and burn up in Earth’s atmosphere within one to five years if the propulsion system on board ever fails.

In his tweet, Musk added that the International Space Station and SpaceX’s own Dragon craft possess “micrometeorite shields,” which can withstand high-velocity impacts. However, spacesuits lack such protection, hence the need for NASA to cancel the spacewalk.