# **1NC**

**I negate the resolution, definitions:**

**Appropriation:** [Cambridge Dictionary] **to take something for your own use, usually without permission**

**Private Entity: [https://www.law.cornell.edu/definitions/uscode.php?height=800&def\_id=6-USC-625312480-168358316&term\_occur=999&term\_src=title:6:chapter:6:subchapter:I:section:1501]**

**the term “private entity” means any person or private group, organization, proprietorship, partnership, trust, cooperative, corporation, or other commercial or nonprofit entity, including an officer, employee, or agent thereof.**

**Outer Space: [Webster Dictionary] space immediately outside the earth's atmosphere**

# **1NC – Framing**

**I value Justice, and the standard is maximizing expected well-being**

# **Disadvantages**

### **1 - Private Companies Better**

#### **Private companies are more efficient 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 companies are surpassing the government in advancements**

### **Futurism n.d. [Futurism, “Private Companies, Not Governments, Are Shaping the Future of Space Exploration”, https://futurism.com/private-companies-not-governments-are-shaping-the-future-ofspace-exploration] /Triumph Debate**

Sixty years ago, the Soviet Union launched the first artificial satellite into orbit. The event served as the starting pistol in what would come to be known as the Space Race, a competition between the U.S.S.R. and the United States for spaceflight supremacy. In the decades that followed, the first human reached space, a man walked on the Moon, and the first space stations were built. The U.S.S.R. and the U.S. were soon joined by other world powers in exploring the final frontier, and by the time the Soviet Union was dissolved in 1991, the contentious Space Race was something of a distant memory. In recent years, however, a new Space Race has taken shape—Space Race 2.0. Rather than powerful nations guided by presidents and premiers, however, the competitors in this race are tech startups and private businesses spearheaded by billionaire entrepreneurs. And while the current atmosphere is far less contentious than that of the first Space Race (save the odd tweet or two), the competition is just as fierce. A CROWDED FIELD SpaceX, Blue Origin, Bigelow Airspace, Virgin Galactic, Boeing, Lockheed Martin… Not only has the number of **private companies** engaged in space exploration grown remarkably in recent years, these companies are quickly **best**ing their **government**-sponsored **competitors.** “We’re starting to see advances made by private entities that are more significant than any advances in the last three years that were made by the government,” Chris Lewicki, CEO and President of Planetary Resources, tells Futurism. Amazon CEO **Jeff Bezos’s Blue Origin and** Tesla CEO **Elon Musk’s SpaceX are arguably the two companies that are setting the pace.** In November 2015, the former completed the first successful vertical rocket landing after sending their New Shepard 100 kilometers (62 miles) into the air. SpaceX landed its own rocket a month later, only they did so with a craft twice as heavy as Blue Origin’s and traveled all the way into space first. A month after that, in January 2016, **Bezos’s company became the first entity to re-launch and re-land a previously used rocket**. SpaceX followed suit in 2017. **“The government was never able to [build reusable rockets]**, but now, **two private companies** within the space **of the same year have** done that,” points out Lewicki. Not only are private companies already surpassing their government counterparts, **several are poised to widen their lead in the coming months and years.** If all goes according to plan, when SpaceX’s Falcon Heavy launches in September, it’ll take the title of the world’s most powerful rocket away from NASA’s Saturn V. Virgin Galactic is already selling tickets for what it expects to be the first private spaceflights, which will take place aboard the sleek VSS Unity. SpaceX plans to send space tourists to the Moon in 2018, and then in 2024, the company hopes to launch a system that will take people all the way to Mars…roughly 5-15 years before NASA expects to do the same. ALL ON THE SAME TEAM Private companies may be in the lead, but the finish line for this Space Race isn’t exactly clear. The first iteration was arguably “won” when Neil Armstrong took his first steps on the Moon, so does this sequel end when we establish the first Moon base? When a human walks on Mars? When we leave the solar system? Truthfully, the likelihood of humanity ever calling it a day on space exploration is slim to none. The universe is huge, with galaxy estimates in the trillions, so the goalpost will continue moving back (to bring another sport into the analogy). Rather than focusing on competing in what is ultimately an unwinnable race, private and government-backed space agencies can actually benefit from collaboration thanks to their inherent differences. “The way that SpaceX, Planetary Resources, or Virgin Galactic approaches space exploration is going to be very different from NASA or the Air Force,” explains Lewicki. **Private companies aren’t beholden to the same slow processes that often stall government projects**, and they can secure or reallocate funding much more swiftly if need be. However, unlike agencies like NASA, they do have shareholders to keep happy and a need to constantly pursue profitability. The two sectors, therefore, have a tremendous opportunity to help one another. Private companies can generate revenue through government contracts —for example, NASA has contracted Boeing to transport astronauts to the International Space Station (ISS), and SpaceX just closed a deal with the U.S. Air Force to launch its secretive space drone. This leaves the government agencies free to pursue the kind of forward-thinking, longer-term research that might not immediately generate revenue, but that can be later streamlined and improved upon in the private sector. Ultimately, Space Race 2.0 has no losers. The breakthroughs happening in space exploration benefit us all, and truly, a little friendly competition never hurt anyone (unless you count the egos bruised by those tweets).

#### **Space innovation leads to life saving technologies – commercialization is key**

**Raghavan 21 [Seetha Raghavan, Seetha Raghavan is a professor in UCF’s Department of Mechanical and Aerospace Engineering, “The Impact of Innovation in the New Era of Space Exploration?”, 08/04/2021, UCF Today, https://www.ucf.edu/news/the-impact-of-innovation-in-the-new-era-of-spaceexploration/] /Triumph Debate**

Every once in a while, a confluence of discoveries, events and initiatives results in a breakthrough so significant that it propels the entire world to a higher level, redefining what is possible in so many different fields. This breakthrough is taking centerstage now, as the new era of space exploration — catalyzed by increasing launch access — dawns upon us. The surge of **innovation** that comes with this will **create new opportunities and inspire the next generation** of doers. When this happens, boundaries between scientific and social impact are blurred. **Innovation leading to scientific discovery can benefit society** in the same way that social innovation can diversify and support scientific innovators, who can contribute to global progress. To ride this wave of progress, we must all participate and innovate in the new era of space exploration. The intersection of space exploration, innovation and impact isn’t a new phenomenon. In the past, technology developments and spin-offs from space research have consistently found their way into communities worldwide sometimes with lifesaving benefits. The International Space Station supports experiments that have led to discoveries and inventions in communication, water purification, and remote guidance for health procedures and robotic surgeries. Satellite-enabled Earth observation capabilities that monitor natural disasters, climate and crops often support early warnings for threats and mitigation strategies. Space exploration has always been relevant to everyone no matter the discipline or interest. **Commercialization of space has been key** in many ways to the current boost in “firsts” over the last few years. **It** has **spurred innovation** in launch vehicles and related technologies that **led to firsts in** vertical-**takeoff**-vertical **landing rocket tech**nology**, reusability of rocket boosters and** privately **developed crewed missions to orbit**. Concurrently, NASA has continued to captivate our imagination with the first flight of a helicopter in another world, a mission to return an asteroid sample to Earth and sending a probe to make the closest ever approach to the sun. While we celebrate the scientific progress, there is a vastly important question that we all need to focus on: How can we drive the surge in innovation offered by increased access to space, to benefit humankind? Access to low-Earth orbit, and eventually human exploration of space, is a portal to achieve many impactful outcomes. The numbers and completion rate of microgravity experiments conducted by scientists will be greatly increased as a range of offerings in suborbital flights provide more opportunities to advance critical research in health, agriculture, energy, and more. Lunar, planetary, and even asteroid exploration may lead to discoveries of new materials — busting the limitations now imposed on capabilities for energy, transportation, and infrastructure or creating new sensors and devices that enhance safety on Earth. Space tourism —one can hope — has the power to potentially create an awareness of our oneness that may lead to social change. B

### **2 - Resource Extraction**

#### **Humanity is expanding, and space extraction is necessary to meet future needs**

**Pelton 16 [Joseph Pelton, Director @ International Association for the Advancement of Space Safety, “Space Mining – The Reality of Tomorrow?” Room Space Journal of Asgardia, https://room.eu.com/article/space-mining-the-reality-of-tomorrow] /Triumph Debate**

Today, many would be startled to learn, **there are four United States-based companies whose business plans involve ‘space mining’ for profit**. These companies include Planetary Resources Inc, Deep Space Industries, Moon Express, and Shackleton Energy Corporation. There is a great abundance of wealth of natural resources on our six sextillion ton planet. But we **humans**, now **numbering** some **7.5 billion and likely** to grow as large as **12 billion by 2100**, **have** a vast **hunger for products and energy**. With our automated manufacturing machines we have developed to ability to manufacture a relentless army of goods and we consume more and more energy every year. If all of the natural resources on our planet are used wisely and in a sustainable fashion they can be recycled and used over and over again. Modern civilization, with its complex infrastructure, burgeoning population and surging urban complexes will soon need to adjust to emerging 21st century realities. By the end of this century there may be perhaps a 100 megacities of more than 10 million people. Our world will be experiencing significant elements of climate change, major environmental shifts, and growing natural resource needs. The world as we know it today will significantly change or, life as we know it today, will no longer be sustainable. In short big changes are coming. We will be forced to shift to sustainable and renewable energy sources. We will be forced to engage in more and more recycling. We will have to change our ways of life as our cities absorb more than 70 per cent of the world’s population. **We** will, despite all these shifts, still **need to** reach out into space and **start** to evolve **a space-based economy**. US Secretary of State John Hay once famously said: “The Mediterranean is the ocean of the past, the Atlantic is the ocean of the present, and the Pacific is the ocean of the future.” And over time the global economy has expanded to make this prediction a reality. Soon the economies of China, India, Indonesia and Japan - plus the smaller countries of Singapore, Taiwan, Republic of Korea, Thailand, etc - will outstrip those of the US and Europe. Asthese developing economies get more prosperous and **demand for natural resources continues to grow, the availability of natural resources will become a growing problem**

#### **Expansion to space is necessary to avoid energy shortages and climate change**

**Ursul & Ursul 20** [Arkady Ursul, Ecology @ Academy of Sciences of Moldova, Tatiana Ursul, Philosophy @ National Research Technical University, “On the Path to Space Mining and a Cosmic Sustainable Way of Socio-Natural Interaction,” Philosophy and Cosmology, http://ispcjournal.org/journals/2020/02/PhC\_25\_UrsulUrsul.pdf]

**In the near space future, mankind will have to massively ship the production of energy and materials outside the planet**, instead of deploying this industry in undeveloped territories, for example, in deserts, the Arctic, the Antarctic or in the oceans and seas. **The main reason** for the **relocation of** the **energy** and some other industries **outside the Earth is related to** the transition to SD and especially **with a number of environmental issues, such as global warming and depletion of the world’s fossil fuel and** **energy resources with the increase of energy consumption.** Therefore, the development of any new terrestrial territories, for example, the ocean, is economically inefficient and environmentally impractical. In the case of the development of space bodies, a new anthropogenically-space method and a method of preserving the terrestrial biosphere, as well as the creation of it of the most favorable conditions for the existence of mankind and other forms of life, appear. Therefore, those projects that in the acceptable future can be implemented in space are hardly worthwhile to implement on the planet. A fundamental conclusion about the need for the future to “split” production into terrestrial, mainly agricultural and space, mainly industrial, between which the products of activity can and will be exchanged has already been made on the basis of an analysis of current trends in the environmentalization of economic and other anthropogenic activities in the context of achieving global sustainability. Agricultural production in the perspective of the transition to SD should fit into the biosphere, using intensively-ecologized methods of economy management (Bazaluk et al., 2020). The strategic perspective of the global-space production split is the most natural and effective one and is understandable in terms of ensuring ecoand geo-security of the civilization’s existence

#### **Many private entities anticipate appropriating space to mine asteroids, which releases nearly 300x less carbon emissions than earth-based mining – that’s key to prevent climate change.**

**MIT Technology Review 18**

Emerging Technology 18, 10-19-2018, "Asteroid mining might actually be better for the environment," MIT Technology Review, [https://www.technologyreview.com/2018/10/19/139664/asteroid-mining-might-actually-be-better-for-the-environment/]//pranav//Jia](https://www.technologyreview.com/2018/10/19/139664/asteroid-mining-might-actually-be-better-for-the-environment/%5d//pranav//Jia) Retagged for Lay

But profit margins are only part of the picture. **A potentially more significant aspect of these missions is the impact they will have on Earth’s environment.** But nobody has assessed this environmental impact in detail. Today, that changes thanks to the work of **Andreas Hein and colleagues at the University of Paris**-Saclay in France. These guys **have calculated the greenhouse-gas emissions from asteroid-mining operations and compared them with the emissions from similar Earth-based activities.** Their results provide some eyebrow-raising insights into the benefits that asteroid mining might provide. The calculations are relatively straightforward. **Rocket launches release significant amounts of greenhouse gases into the atmosphere. The fuel on board the first stage of a rocket burns in Earth’s atmosphere to form carbon dioxide. For kerosene-burning rockets, one kilogram of fuel creates three kilograms of CO2**. (The second and third stages operate outside the Earth’s atmosphere and so can be ignored.) **Reentries are just as damaging. That’s because a significant mass of a re-entering vehicle ablates in the upper atmosphere, producing NOx such as nitrous oxide** **(N2O), a greenhouse gas that is about 300 times more potent than CO2**. By one estimate, the space shuttle released about 20% of its mass in the form of N2O every time it returned to Earth. **Hein and co use these numbers to calculate that a kilogram of platinum mined from an asteroid would release some 150 kilograms of CO2 into Earth’s atmosphere**. However, economies of scale from large asteroid-mining operations could lower this to about 60 kilograms of CO2 per kilogram of platinum. **That needs to be compared with the emission from Earth-based mining**. Here, platinum mining generates significant greenhouse gases, mostly from the energy it takes to remove this stuff from the ground. Indeed, th**e numbers are huge. The mining industry estimates that producing one kilogram of platinum on Earth releases around 40,000 kilograms of carbon dioxide. “The global warming effect of Earth-based mining is several orders of magnitude larger,**” say Hein and co. **The figures for water are also encouraging.** In this case, the authors calculate the greenhouse-gas emissions from an asteroid-mining operation that returns water to anywhere within the moon’s orbit, a so-called cis-lunar orbit. They compare this to the emissions from sending the same volume of water from Earth into orbit. **The big difference is that a water-carrying vehicle from Earth can haul only a small percentage of its mass as water. But an asteroid-mining spacecraft can transport a significant multiple of its mass as water to cis-lunar orbit. “Substantial savings in greenhouse gas emissions can be achieved,”** say Hein and co. This interesting work should help to focus minds on the environmental impacts of mining, which are rapidly increasing in profile. But it is only a first step. There is significant uncertainty in the numbers here, so these will need to be better understood.

#### **Moreover, asteroid mining solves climate change, resource shortages, and environmental degradation – independently its key to space colonization that solves every existential crisis**

**Hlimi 14** [Tina Hlimi, Canadian lawyer with a Bachelors and Masters Degrees in Environmental Sciences from McGill University, 2014, “THE NEXT FRONTIER: AN OVERVIEW OF THE LEGAL AND ENVIRONMENTAL IMPLICATIONS OF NEAR-EARTH ASTEROID MINING,” ANNALS OF AIR AND SPACE LAW, https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=2546924]/Kankee

A. THE ENVIRONMENTAL BENEFITS OF NEAR EARTH ASTEROID HARVESTING Let us recapitulate what we have already found. Shortage of resources is not a fact; it is an illusion born of ignorance. Scientifically and **technically feasible improvements in launch vehicles will make departure** from Earth **easy and inexpensive**. Once we have a foothold in space, **the** mass of the **asteroid belt will** be at our **disposal**, permitting us to **provide for the** material **needs of a million times as many people as Earth can hold. Solar power can provide** all the **energy needs** of this vast civilisation (10,000,000 billion people) from now **until the Sun expires**. Using less than one percent of the helium-3 energy resources of Uranus and Neptune for fusion propulsion, **we could send a billion interstellar arks, each containing a billion people, to the stars**. There are about a billion Sun-like stars in our galaxy. **We have the resources to colonise the entire Milky Way**. 122 In addition to demystifying the legal doctrine governing outer space natural resource appropriation it is also necessary to weigh the benefits and detriments of space-faring activities. Foremost, **States** around the world **are developing at unprecedented rates** and the human population is mounting in conjunction with demand for natural resources to sustain the current and newly established western standard of living. One of the fastest growing nations, China, is experiencing unhindered growth **facilitated by fossil fuel use** from coal and extensive mining. **This has caused substantial water, soil and air degradation**. In the face of these troubles, NEA **mining could be** the **key to preserving the Earth**'s bounty and replenishing contaminated water supplies. **The influx of** natural **resources could thwart the burning of** dirty coal and **fossil fuels**, thereby **mitigating** the effects of **climate change**, such as, rising sea level, atmospheric pollution, melting of sea ice and rising temperatures. NEA **harvesting could** also **protect the ocean** and the fragile and largely unexplored deep seabeds 123 from oil and gas drilling. It could furthermore protect ecosystems from rare-earth mineral mining predominantly used to fuel the electronics sector. 124 NEA mining is especially pertinent as China restricted its global exports of rare-earth minerals in 2009, incongruously citing the need to protect the environment. Unfortunately, the supply cuts have forced dependent States like Japan, the United States and South Korea to heighten rare-Earth mineral exploration. This accordingly led to Japan's 2011 discovery of rare-earth minerals in the ocean-bed deposits of the Pacific Exclusive Economic Zone (PEEZ) thereby necessitating risky, deep-sea mining techniques, which may result in marine pollution if not carefully designed and developed. Other States, which have joined the **environmentally destructive** rare-earth mineral exploration movement include India, Canada, Tanzania, Australia, Brazil and Vietnam., There is accordingly much competition and exploration for rare-earth minerals which could result in **significant exploitation** of untouched areas like the PEEZ seabed and Mongolia.125 Other regions which may soon be targeted for mineral and hydrological resources include Antarctica and the Arctic. With the advent of technological advances, **environmentally destructive practices** such as refining **may** soon **occur in** outer **space, sparing the Earth of pollution**. 126 Accordingly, NEA mining is a viable technology for preserving the Earth's environment by curbing atmospheric and marine pollution, enhancing water supply and quality and mitigating the effects of climate change; all while allowing humankind to maintain and even improve their standard of living through increased technologies, consumption and population growth. B. THE ENVIRONMENTAL CONSEQUENCES OF NEAR EARTH ASTEROID MINING

### **3 - Innovation**

#### **Strong commercial space catalyzes tech innovation – progress at the margins and spinoff tech change global information networks**

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

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.**

#### **Short innovation cycles mean every contract counts**

John J. **Klein 19**, Senior Fellow and Strategist at Falcon Research Inc. and adjunct professor at the George Washington University Space Policy Institute, 1-15-2019, "Rethinking Requirements and Risk in the New Space Age," Center for a New American Security, https://www.cnas.org/publications/reports/rethinking-requirements-and-risk-in-the-new-space-age

Unfortunately, these variances in models between the MDAP’s lengthy development cycle and the commercial space sector’s 18-month innovation cycle are a result of stark differences in thinking about requirements and risk. Requirements and risk for MDAPs commonly focus on ensuring critical mission capabilities at a given cost. In contrast, the commercial space sector tends to focus more on providing innovation quickly using economies of scale. The commercial sector understands that time dynamically shapes decisions related to requirements and risk **because of the relatively short innovation cycle**. **In a highly competitive space sector with tight profit margins, those unable to innovate quickly will likely be out of business soon**. Alternatively, space systems with mission assurance requirements – where failures are detrimental to national security and military operations – often drive DoD’s timelines. Program managers of critical national security space systems commonly require additional time to test and verify that satellites can perform missions with a very low probability of failure.

#### **Tech innovation solves every existential threat – cumulative extinction events outweigh the aff**

Dylan **Matthews 18**. Co-founder of Vox, citing Nick Beckstead @ Rutgers University. 10-26-2018. "How to help people millions of years from now." Vox. https://www.vox.com/future-perfect/2018/10/26/18023366/far-future-effective-altruism-existential-risk-doing-good

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 thing**s 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.\*

**Blocks:**

**McDonald 21** McDonald, Jordan. “Space Junk Removal Could Become a Hot New Startup Category.” *Morning Brew*, Morning Brew, 22 Nov. 2021, [www.morningbrew.com/emerging-tech/stories/2021/11/22/space-junk-removal-could-become-a-hot-new-startup-category](http://www.morningbrew.com/emerging-tech/stories/2021/11/22/space-junk-removal-could-become-a-hot-new-startup-category).

**Some satellite providers—like Starlink—deorbit their own satellites, while specialist companies like ClearSpace are sprouting up with inventive ways to collect space junk, like using a drone-like satellite to capture space junk using a net.**

**One of the biggest companies in space debris removal is Astroscale, which has raised over $204 million since its founding in 2013.**

Astroscale’s operation consists of a robotic arm called the ELSA-d, which connects to docking plates preinstalled on satellites, allowing the robotic arm to bring the decommissioned satellites low enough into Earth’s atmosphere that they burn up upon reentry. **The company has worked with satellite broadband provider OneWeb in getting the ELSA-d in the field, outfitting at least 200 of its new satellites with Astroscale-compatible docking plates,** Ron Lopez, president and managing director at Astroscale US, told us.

Astroscale is also working on bringing down legacy space junk through the use of docking stations, but it takes on those contracts on a case-by-case basis. That’s because legacy objects stem from a variety of national space programs, and lack a universal size or shape as a result.

**And Morpheus Space, which has raised $1.6 million since its founding in 2018, has carved out a hyper-specific role in space sustainability.**

It uses onboard rockets to accelerate a satellite’s orbital decay, a process that naturally can take anywhere from a few days to thousands of years depending on where in the atmosphere it is located. The rockets allow satellite operators to navigate that descent, making sure the decommissioned satellite doesn’t intersect with another satellite’s orbit path.