### 1NC – China Mod

#### China’s space strategies strengthen deterrence now. PLA deterrence is key to joint operations, which ensure Chinese modernization beyond space.

* AT: Old – Doesn’t matter its about space deterrence strategies leading to joint operations, they need ev that those strategies don’t exist or are unsuccessful
* Deterrence kickstarts joint operations which encourage synergies among services and highlights strengths and weaknesses

Cheng 11 Dean Cheng is a Research Fellow in Chinese Political and Security Affairs in the Asian Studies Center at The Heritage Foundation. August 16, 2011. “China’s Space Program: A Growing Factor in U.S. Security Planning” [China’s Space Program: A Growing Factor in U.S. Security Planning (indianstrategicknowledgeonline.com)](https://indianstrategicknowledgeonline.com/web/bg2594.pdf) Accessed 12-17 // gord0

China’s space efforts are not simply the actions of the People’s Liberation Army (PLA) or efforts at political signaling to obtain a space arms control treaty, as some have posited. Rather, these actions occur within a particular strategic and military context. The first contextual element is the broadening view of the PLA’s responsibilities. One of the PLA’s foremost tasks is to preserve the rule of the Chinese Communist Party (CCP). As the PRC’s economic and national interests have expanded beyond its borders, what is deemed essential for preserving the party’s power has also expanded. To this end, Hu Jintao and his predecessor, Jiang Zemin, set forth the new “historic missions” of the PLA. Not only do these new historic missions sustain the longstanding duty of providing support to the CCP, but now the PLA is responsible for helping to safeguard China’s national development, its expanding national interests, and furthering the objective of maintaining global stability and peace. Hence, the PLA is expanding China’s space capabilities in this strategic, national light, especially given the PLA’s roles in safeguarding national development and interests. To fulfill these historic missions, the PLA must be able to exploit space at times and places of its own choosing and, equally important, be able to deny an opponent the same freedom of action. PLA writings increasingly mention the need for a deterrence capacity in space and elsewhere. To these historic missions must be added the additional task of constraining conflicts, both by preventing their outbreak and by limiting their extent if they occur nonetheless. Both of these tasks fall under the rubric of deterrence. As the PRC’s economic and national interests have expanded beyond its borders, what is deemed essential for preserving the party’s power has also expanded. What is striking, however, is that, while Western writings on deterrence generally focus on dissuading an opponent from performing actions that the deterring power would prefer it not undertake, Chinese writings also talk about compellence. That is, to deter an opponent successfully, the PLA must not only dissuade, but also be able to coerce an opponent into undertaking actions that the deterred power would prefer not to do. In this regard, Chinese discussions about deterrence not only note roles for conventional and nuclear forces, but also highlight the importance of space deterrence. Finally, by way of context, the PLA continues to improve its ability to undertake joint operations. This interest in joint operations was already evident a decade ago, when the PLA promulgated a variety of gangyao that would help to guide future military planning, training, and operations.3 The capstone of these gangyao was devoted to joint military operations. The ability to conduct joint operations is portrayed as a hallmark of Local Wars Under High-Tech tions, because such operations allow synergies among services, pit one’s strengths against its opponent’s strengths, and shield one’s weaknesses. As the 2010 edition of China’s National Defense, China’s biennial defense white paper, notes, “The PLA takes the building of joint operation systems as the focal point of its modernization and preparations for military struggle.”4 According to various PLA analyses, the key to successful joint operations is the ability to gather, transmit, and exploit information. Indeed, the very description of future wars has shifted from Local Wars Under High-Tech Conditions to Local Wars Under Informationalized Conditions—the most important high technologies are those related to information technology. Similarly, the 2010 Chinese defense white paper notes that the PLA “strives to enhance its fighting capabilities based on information systems.”5 Only the high ground of space can provide the opportunity to gather information; transmit it rapidly, securely, and reliably; and exploit it promptly. To create synergistic effects, widely dispersed units must be able to establish a common situational awareness framework and to coordinate their activities, timing their operations to maximize mutual support. If future wars will be marked by the “three nons” of non-contact, nonlinear, and nonsymmetrical operations, then information will be the keystone of success in future wars. In order to effect joint operations, according to PLA analyses, a military must be able to exploit space. Only the high ground of space can provide the opportunity to gather information; transmit it rapidly, securely, and reliably; and exploit it promptly. PLA writings describe space as essential for reconnaissance and surveillance, communications, navigation, weather forecasting, and battle damage assessment. A military that is capable of effective joint operations can also deter an opponent. Thus, space capabilities strengthen conventional deterrence as well as deterring in their own right. The PLA has an interest in achieving space dominance to fulfill its historic tasks, to deter future conflicts if possible, and to fight and win Local Wars Under Informationalized Conditions if necessary. This context suggests that China is following a particular method in developing an expanding array of space capabilities, including a growing range of satellites, a new heavy-lift space launcher, and a fourth launch site on Hainan Island, which is much nearer the equator. This underlying interest is reflected in certain space missions, which PLA writings suggest are particularly important. Most obviously, the PLA expects improved space information support. With each passing year, China’s satellite constellations will provide better information to military users. Today, Chinese systems provide not only basic earth observation capabilities, but also: • An autonomous navigation system, which is already operational, unlike the European Galileo system; • Data relay capacity; • Weather forecasting; and • Earth observation, including growing maritime surveillance capability. In addition, China’s improving space capabilities, coupled with its steadily advancing conventional capabilities, will provide the increased ability to seek space superiority or space dominance (zhitian quan) through a combination of space offensive and defensive operations.

#### Chinese military modernization functions as a deterrent for nuclear war with the US

* AT: Not About Space – the internal link argument is in Cheng. “space capabilities strengthen conventional deterrence”. It also says space is the only way to “establish a common situational awareness framework”
* First, JL-2 Subs enable SSBN’s to attack the US, and A2/AD strategy further deters US interventions.
* Second, joint operation modernization allows for China to join Russia-US nuclear arms control talks. That changes distribution power and deterrence but only with hard military power strengthened by modernization.

Cimbala 15 Stephen J Cimbala, Professor of Political Science at PSU Brandywine. Summer 2015. “Chinese Military Modernization” [Chinese Military modernization: Implications for Strategic Nuclear Arms Control (af.edu)](https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-09_Issue-2/cimbala.pdf#:~:text=China%E2%80%99s%20political%20and%20military%20objectives%20in%20Asia%20and,two%20follow-on%20challenges%3A%20escala-tion%20control%20and%20nuclear%20signaling.) Accessed 12-18 // gord0

China’s political and military objectives in Asia and worldwide differ from those of the United States and Russia, reflecting a perception of that nation’s own interests and of its anticipated role in the emerging world order.1 Its growing portfolio of smart capabilities and modernized platforms includes stealth aircraft, antisatellite warfare systems, quiet submarines, “brilliant” torpedo mines, improved cruise missiles, and the potential for disrupting financial markets. Among other indicators, China’s already deployed and future Type 094 Jin-class nuclear ballistic missile submarines (SSBN), once they are equipped as planned with JL-2 submarine launched ballistic missiles, will for the first time enable Chinese SSBNs to target parts of the United States from locations near the Chinese coast. Along with this, China’s fleet of nuclear-powered attack submarines supports an ambitious anti-access/area denial (A2/AD) strategy to deter US military intervention to support allied interests in Asia against Chinese wishes.2 China’s diplomacy creates additional space for maneuver between Russian and American perceptions. While China may lack the commitment to arms control transparency, the nation’s current and future military modernization entitles Beijing to participate in future Russian-American strategic nuclear arms control talks. Entering China into the US-Russian nuclear-deterrence equation creates considerable analytical challenges, for a number of reasons. To understand these challenges one must consider the impact of China’s military modernization, which creates two follow-on challenges: escalation control and nuclear signaling. Military Modernization China’s military modernization is going to change the distribution of power in Asia, including the distribution of nuclear and missile forces. This modernization draws not only on indigenous military culture but also on careful analysis of Western and other experiences. As David Lai has noted, “The Chinese way of war places a strong emphasis on the use of strategy, stratagems, and deception. However, the Chinese understand that their approach will not be effective without the backing of hard military power. China’s grand strategy is to take the next 30 years to complete China’s modernization mission, which is expected to turn China into a true great power by that time.”3 Chinese military modernization and defense guidance for the use of nuclear and other missile forces hold some important implications for US policy. First, Chinese thinking is apparently quite nuanced about the deterrent and defense uses for nuclear weapons. Despite the accomplishments of modernization thus far, Chinese leaders are aware that their forces are far from nuclear-strategic parity with the United States or Russia. Conversely, China may not aspire to this model of nuclear strategic parity, such as between major nuclear powers, as the key to war avoidance by deterrence or other means. China may prefer to see nuclear weapons as one option among a spectrum of choices available in deterring or fighting wars under exigent conditions and as a means of supporting assertive diplomacy and conventional operations when necessary. Nuclear-strategic parity, as measured by quantitative indicators of relative strength, may be less important to China than the qualitative use of nuclear and other means as part of broader diplomatic-military strategies.4 Second, China is expanding its portfolio of military preparedness not only in platforms and weapons but also in the realms of command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) and information technology. Having observed the US success in Operation Desert Storm against Iraq in 1991, Chinese military strategists concluded that the informatization of warfare under all conditions would be a predicate to future deterrence and defense operations.5 As Paul Bracken has noted, the composite effect of China’s developments is to make its military more agile—meaning, more rapidly adaptive and flexible.6 The emphasis on agility instead of brute force reinforces traditional Chinese military thinking. Since Sun Tzu, the acme of skill has been winning without fighting, but if war is unavoidable, delivering the first and decisive blows is essential. This thinking also stipulates that one should attack the enemy’s strategy and his alliances, making maximum use of deception and basing such attacks on superior intelligence and estimation. The combination of improved platforms and command-control and information warfare should provide options for the selective use of precision fire strikes and cyberattacks against priority targets while avoiding mass killing and fruitless attacks on enemy strongholds.7

#### **US–China war goes nuclear – crisis mismanagement ensures conventional escalation - extinction**

Kulacki 20 [Dr. Gregory Kulacki focuses on cross-cultural communication between the United States and China on nuclear and space arms control and is the China Project Manager for the Global Security Program at the Union of Concerned Scientists, 2020. Would China Use Nuclear Weapons First In A War With The United States?, Thediplomat.com, https://thediplomat.com/2020/04/would-china-use-nuclear-weapons-first-in-a-war-with-the-united-states/] srey

Admiral Charles A. Richard, the head of the U.S. Strategic Command, recently told the Senate Armed Service Committee he “could drive a truck” through the holes in China’s no first use policy. But when Senator John Hawley (R-MO) asked him why he said that, Commander Richard backtracked, described China’s policy as “very opaque” and said his assessment was based on “very little” information. That’s surprising. **China** has been exceptionally **clear** **about** its **intentions** **on** the possible **first** **use** **of** **nuclear** **weapons**. On the day of its first nuclear test on October 16, 1964, China declared it “will never at any time or under any circumstances be the first to use nuclear weapons.” That **unambiguous** **statement** **has** **been** a **cornerstone** **of** **Chinese** **nuclear** **weapons** policy for 56 years and has been repeated frequently in authoritative Chinese publications for domestic and international audiences, including a highly classified training manual for the operators of China’s nuclear forces. Richard should know about those publications, particularly the training manual. A U.S. Department of Defense translation has been circulating within the U.S. nuclear weapons policy community for more than a decade. The commander’s comments to the committee indicate a familiarity with the most controversial section of the manual, which, in the eyes of some U.S. analysts, indicates there may be some circumstances where **China** **would** **use** **nuclear** **weapons** **first** **in** a **war** **with** **the** **U**nited **S**tates. This U.S. misperception is understandable, especially given the difficulties the Defense Department encountered translating the text into English. The language, carefully considered in the context of the entire book, articulates a strong reaffirmation of China’s no first use policy. But it also reveals **Chinese** military planners are **struggling** **with** **crisis** **management** **and** **considering** **steps** **that** could **create** **ambiguity** **with** **disastrous** **consequences**. Towards the end of the 405-page text on the operations of China’s strategic rocket forces, in a chapter entitled, “Second Artillery Deterrence Operations,” the authors explain what China’s nuclear forces train to do if **“**a strong military power possessing nuclear‐armed missiles and an absolute advantage in high‐tech conventional weapons is carrying out intense and continuous attacks against our major strategic targets and we have no good military strategy to resist the enemy.**”** The military power they’re talking about is the United States. The authors indicate China’s nuclear missile forces train to take specific steps, including increasing readiness and conducting launch exercises, to “dissuade the continuation of the strong enemy’s conventional attacks.” The manual refers to these steps as an “adjustment” to China’s nuclear policy and a “lowering” of China’s threshold for brandishing its nuclear forces. Chinese leaders would only take these steps in extreme circumstances. The text highlights several triggers such as U.S. conventional bombing of China’s nuclear and hydroelectric power plants, heavy conventional bombing of large cities like Beijing and Shanghai, or other acts of **conventional** **warfare** **that** “**seriously** **threatened**” the “safety and **survival**” of the nation. U.S. Misunderstanding Richard seems to believe this planned adjustment in China’s nuclear posture means China is **preparing** **to** **use** **nuclear** **weapons** first under these circumstances. He told Hawley that there are a “number of situations where they may conclude that first use has occurred that do not meet our definition of first use.” The head of the U.S. Strategic Command appears to assume, as do other U.S. analysts, that the **Chinese** would **interpret** **these** types of U.S. conventional **attacks** **as** **equivalent** **to** a **U.S. first use** **of** **nuclear** **weapons** against China. But that’s not what the text says. “Lowering the threshold” refers to China putting its nuclear weapons on alert — it does not indicate Chinese leaders might lower their threshold for deciding to use nuclear weapons in a crisis. Nor does the text indicate Chinese nuclear forces are training to launch nuclear weapons first in a war with the United States. China, unlike the United States, keeps its nuclear forces off-alert. Its warheads are not mated to its missiles. China’s nuclear-armed submarines are not continuously at sea on armed patrols. The manual describes how China’s nuclear warheads and the missiles that deliver them are controlled by two separate chains of command. Chinese missileers train to bring them together and launch them after China has been attacked with nuclear weapons. All of these behaviors are consistent with a no first use policy. The “adjustment” Chinese nuclear forces are preparing to make if the United States is bombing China with impunity is to place China’s nuclear forces in a state of readiness similar to the state the nuclear forces of the United States are in all the time. This step is intended not only to end the bombing, but also to convince U.S. decision-makers they cannot expect to destroy China’s nuclear retaliatory capability if the crisis escalates. Chinese Miscalculation Unfortunately, alerting Chinese nuclear forces at such a moment could have terrifying consequences. Given the relatively small size of China’s nuclear force, a U.S. president might be tempted to try to limit the possible damage from a Chinese nuclear attack by destroying as many of China’s nuclear weapons as possible before they’re launched, especially if the head of the U.S. Strategic Command told the president China was preparing to strike first. One study concluded that if the United States used nuclear weapons to attempt to knock out a small fraction of the Chinese ICBMs that could reach the United States it may kill tens of millions of Chinese civilians. The authors of the text assume alerting China’s nuclear forces would “create a great shock in the enemy’s psyche.” That’s a fair assumption. But they also assume this shock could “dissuade the continuation of the strong enemy’s conventional attacks against our major strategic targets.” That’s highly questionable. There is a **substantial** **risk** **the** **U**nited **S**tates **would** **respond** **to** this implicit **Chinese** **threat** **to** **use** **nuclear** **weapons** **by** **escalating**, rather than halting, its **conventional** **attacks**. If China’s nuclear forces were targeted, it would put even greater strain on the operators of China’s nuclear forces. A **slippery** **slope** **to** **nuclear** **war** Chinese military planners are aware that attempting to coerce the United States into halting conventional bombardment by alerting their nuclear forces could fail. They also know it might trigger a nuclear war. But if it does, they are equally clear China won’t be the one to start it. Nuclear attack is often preceded by nuclear coercion. Because of this, in the midst of the process of a high, strong degree of nuclear coercion we should prepare well for a nuclear retaliatory attack. The more complete the preparation, the higher the credibility of nuclear coercion, the easier it is to accomplish the objective of nuclear coercion, and the lower the possibility that the nuclear missile forces will be used in actual fighting. They assume if China demonstrates it is well prepared to retaliate the United States would not risk a damage limitation strike using nuclear weapons. And even if the United States were to attack China’s nuclear forces with conventional weapons, China still would not strike first. In the opening section of the next chapter on “nuclear retaliatory attack operations” the manual instructs, as it does on numerous occasions throughout the entire text: According to our country’s principle, its stand of no first use of nuclear weapons, the Second Artillery will carry out a nuclear missile attack against the enemy’s important strategic targets, according to the combat orders of the Supreme Command, only after the enemy has carried out a nuclear attack against our country. Richard is wrong. There are no holes in China’s no first use policy. But the worse-case planning articulated in this highly classified military text is a significant and deeply troubling departure from China’s traditional thinking about the role of nuclear weapons. Mao Zedong famously called nuclear weapons “a paper tiger.” Many assumed he was being cavalier about the consequences of nuclear war. But what he meant is that they would not be used to fight and win wars. U.S. nuclear threats during the Korean War and the Taiwan Strait Crisis in the 1950s – threats not followed by an actual nuclear attack – validated Mao’s intuition that nuclear weapons were primarily psychological weapons. Chinese leaders decided to acquire nuclear weapons to free their minds from what Mao’s generation called “**nuclear** **blackmail**.” A former director of China’s nuclear weapons laboratories told me China developed them so its leaders could “sit up with a straight spine.” Countering nuclear blackmail – along with compelling other nuclear weapons states to negotiate their elimination – were the only two purposes Chinese nuclear weapons were meant to serve. Contemporary Chinese military planners appear to have added a new purpose: compelling the United States to halt a conventional attack. Even though it only applies in extreme circumstances, it **increases** the **risk** **that** a **war** between the United States and China **will** **end** **in** a nuclear exchange with unpredictable and **catastrophic** **consequences**. Adding this new purpose could also be the first step on a slippery slope to an incremental broadening the role of nuclear weapons in Chinese national security policy. Americans would be a lot safer if we could avoid that. The United States government should applaud China’s no first use policy instead of repeatedly calling it into question. And it would be wise to adopt the same policy for the United States. If both countries declared they would never use nuclear weapons first it may not guarantee they can avoid a nuclear exchange during a military crisis, but it would make one far less likely.

#### Nuclear war causes extinction – smoke, UV radiation, and ag production.

PND 16. internally citing Zbigniew Brzezinski, Council of Foreign Relations and former national security adviser to President Carter, Toon and Robock’s 2012 study on nuclear winter in the Bulletin of Atomic Scientists, Gareth Evans’ International Commission on Nuclear Non-proliferation and Disarmament Report, Congressional EMP studies, studies on nuclear winter by Seth Baum of the Global Catastrophic Risk Institute and Martin Hellman of Stanford University, and U.S. and Russian former Defense Secretaries and former heads of nuclear missile forces, brief submitted to the United Nations General Assembly, Open-Ended Working Group on nuclear risks. A/AC.286/NGO/13. 05-03-2016. <http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/OEWG/2016/Documents/NGO13.pdf> //Re-cut by Elmer

Consequences human survival 12. Even if the 'other' side does NOT launch in response the smoke from 'their' burning cities (incinerated by 'us') will still make 'our' country (and the rest of the world) uninhabitable, potentially inducing global famine lasting up to decades. Toon and Robock note in ‘Self Assured Destruction’, in the Bulletin of Atomic Scientists 68/5, 2012, that: 13. “A nuclear war between Russia and the United States, even after the arsenal reductions planned under New START, could produce a nuclear winter. Hence, an attack by either side could be suicidal, resulting in self assured destruction. Even a 'small' nuclear war between India and Pakistan, with each country detonating 50 Hiroshima-size atom bombs--only about 0.03 percent of the global nuclear arsenal's explosive power--as air bursts in urban areas, could produce so much smoke that temperatures would fall below those of the Little Ice Age of the fourteenth to nineteenth centuries, shortening the growing season around the world and threatening the global food supply. Furthermore, there would be massive ozone depletion, allowing more ultraviolet radiation to reach Earth's surface. Recent studies predict that agricultural production in parts of the United States and China would decline by about **20 percent** for four years, and by 10 percent for a decade.” 14. A conflagration involving USA/NATO forces and those of Russian federation would most likely cause the deaths of most/nearly all/all humans (and severely impact/extinguish other species) as well as destroying the delicate interwoven techno-structure on which latter-day 'civilization' has come to depend. Temperatures would drop to below those of the last ice-age for up to 30 years as a result of the lofting of up to 180 million tonnes of very black soot into the stratosphere where it would remain for decades. 15. Though human ingenuity and resilience shouldn't be underestimated, human survival itself is arguably problematic, to put it mildly, under a 2000+ warhead USA/Russian federation scenario. 16. The Joint Statement on Catastrophic Humanitarian Consequences signed October 2013 by 146 governments mentioned 'Human Survival' no less than 5 times. The most recent (December 2014) one gives it a highly prominent place. Gareth Evans’ ICNND (International Commission on Nuclear Non-proliferation and Disarmament) Report made it clear that it saw the threat posed by nuclear weapons use as one that at least threatens what we now call 'civilization' and that potentially threatens human survival with an immediacy that even climate change does not, though we can see the results of climate change here and now and of course the immediate post-nuclear results for Hiroshima and Nagasaki as well.

### 1NC – Innovation

#### 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.

## 1NC

#### Interpretation – Unjust refers to a negative action – it means contrary.

Blacks Law No Date "What is Unjust?" <https://thelawdictionary.org/unjust/> //Elmer

Contrary to right and justice, or to the enjoyment of his rights by another, or to the standards of conduct furnished by the laws.

#### Violation – The Aff is a positive action – it creates a new concept for Space -- i.e. Leasing committee by the UN

#### Vote Neg –

#### 1] Limits – making the topic bi-directional explodes predictability – it means that Aff’s can both increase non-exist property regimes in space AND decrease appropriation by private actors – makes the topic untenable. Their interpretation includes negative action, AND the PTD expansion Aff, DD’s OST Aff, Affs that expand the Moon Treaty or Liability Convention, and a number of other Affs that haven’t been read yet but probably will.

#### 2] Ground – wrecks Neg Generics – we can’t say appropriation good since the 1AC can create new views on Outer Space Property Rights that circumvent our Links since they can say “Public Trust” approach solves.

#### 3] Paradigm Issues --

#### a] Topicality is Drop the Debater – it’s a fundamental baseline for debate-ability.

#### b] Use Competing Interps – Topicality is a yes/no question, you can’t be reasonably topical and Reasonability invites arbitrary judge intervention and a race to the bottom of questionable argumentation.

#### c] No RVI’s - Forces the 1NC to go all-in on Theory which kills substance education, and its Illogical – you shouldn’t win for not being abusive.

# Case

#### Asteroid mining fails

Fickling 20 [(David, Bloomberg opinion columnist, previously at Guardian and Financial Times, MA in Eng Lit from Cambridge) “We’re Never Going to Mine the Asteroid Belt,” Bloomberg Opinion, December 21, 2020, <https://www.bloomberg.com/opinion/articles/2020-12-21/space-mining-on-asteroids-is-never-going-to-happen>] TDI

It’s wonderful that people are shooting for the stars — but those who declined to fund the expansive plans of the nascent space mining industry were right about the fundamentals. Space mining won’t get off the ground in any foreseeable future — and you only have to look at the history of civilization to see why.

One factor rules out most space mining at the outset: gravity. On one hand, it guarantees that most of the solar system’s best mineral resources are to be found under our feet. Earth is the largest rocky planet orbiting the sun. As a result, the cornucopia of minerals the globe attracted as it coalesced is as rich as will be found this side of Alpha Centauri.

Gravity poses a more technical problem, too. Escaping Earth’s gravitational field makes transporting the volumes of material needed in a mining operation hugely expensive. On Falcon Heavy, the large rocket being developed by Elon Musk’s SpaceX, transporting a payload to the orbit of Mars comes to as little as [$5,357 per kilogram](https://www.spacex.com/media/Capabilities&Services.pdf) — a drastic reduction in normal launch costs. Still, at those prices just lofting a single half-ton drilling rig to the asteroid belt would use up the annual exploration budget of a small mining company.

Power is another issue. The international space station, with 35,000 square feet of solar arrays, generates up to 120 kilowatts of electricity. That drill would need a [similar-sized power plant](https://www.rocktechnology.sandvik/en/products/exploration-drill-rigs-and-tools/compact-core-drill-rigs/) — and most mining companies operate multiple rigs at a time. Power demands rise drastically once you move from exploration drilling to mining and processing. Bringing material back to Earth would raise the costs even more. Japan’s Hayabusa2 satellite spent six years and 16.4 billion yen ($157 million) recovering a single gram of material from the asteroid Ryugu and returning it to Earth earlier this month.



The red line of the current catalog does not represent the complete risk; it indicates the risk we can track and perhaps avoid. A rule of thumb is that the current SSN LEO catalog contains objects about 10 cm or larger. It is generally accepted that an impact in LEO with an object 1 cm or larger will cause damage likely to be fatal to a satellite's mission. Therefore, there is a large latent risk from unobserved debris. While we cannot currently track and catalog much smaller than 10 cm, experiments have been performed to detect and sample much smaller objects and statistically model the population at this size [3]. The (solid) blue line represents the model of the 1 cm and larger debris that is likely mission-ending, usually called lethal but not trackable. If LEO operators avoid collisions with all the objects in the red line, they are nonetheless inherently accepting the risk from the blue line. This risk is already present.

The (dashed) orange line is an estimate of the population at 5 cm and larger and is thus an estimate of what the catalog might conservatively be a few years after the Space Fence, a new radar system being built by the Air Force, comes on line (currently planned for 2019) [4]. Commercial companies offering space surveillance services, such as LeoLabs, ExoAnalytics, Analytic Graphics Inc., Lockheed, and Boeing, might also add to the number of objects currently tracked. Space Policy Directive 3 (SPD-3) [13] specifically seeks to expand the use of commercial SSA services.

Existing operators can expect a sharp increase in the number of warnings and alerts they will receive because of the increase in the cataloged population. Almost all the increase will come from newly detected debris [5].

The pace of safety operations for each satellite on orbit will significantly change because of the increase in the catalog from the Space Fence. This effect is compounded because the NewSpace constellations described in Table 1 will drastically change the profile of satellites in LEO. The green bars in Fig. 1 represent the number of objects that will be added to the catalog (red or orange lines) from only the NewSpace large LEO constellations at their operational altitudes. This does not include the rocket stages that launch them, or satellites in the process of being phased into or removed from the operational orbits. Neighbors of one of these new constellations may face a radically different operations environment than their current practices were designed to address.

Satellites in these large LEO constellations typically have planned operational lifetimes of 5–10 years. Some companies have proposed to dispose of their satellites using low thrust electric propulsion systems, which would spiral satellites down over a period of months or years from operating altitudes as high as 1500 km through lower orbits where the Hubble Space Telescope, the International Space Station, and other critical LEO satellites operate [6]. Similar propulsive techniques would raise replacement satellites from lower launch injection orbits to higher operational orbits. These disposal and replenishment activities will add thousands of satellites each year transiting through lower altitudes and posing a risk to all resident satellites in those lower orbits. More importantly, failures will occur both among transiting satellites and operational constellations, potentially leaving hundreds more stranded along the transit path.

**No ‘space war’ – Insurmountable barriers and everyone has an interest in keeping space peaceful**

**Dobos 19** [(Bohumil Doboš, scholar at the Institute of Political Studies, Faculty of Social Sciences, Charles University in Prague, Czech Republic, and a coordinator of the Geopolitical Studies Research Centre) “Geopolitics of the Outer Space, Chapter 3: Outer Space as a Military-Diplomatic Field,” Pgs. 48-49] TDI

Despite the theorized potential for the achievement of the terrestrial dominance throughout the utilization of the ultimate high ground and the ease of destruction of space-based assets by the potential space weaponry, the utilization of space weapons is with current technology and no effective means to protect them far from fulfilling this potential (Steinberg 2012, p. 255). In current global international political and technological setting, the utility of space weapons is very limited, even if we accept that the ultimate high ground presents the potential to get a decisive tangible military advantage (which is unclear). This stands among the reasons for the lack of their utilization so far. Last but not the least, it must be pointed out that the states also develop passive defense systems designed to protect the satellites on orbit or critical capabilities they provide. These further decrease the utility of space weapons. These systems include larger maneuvering capacities, launching of decoys, preparation of spare satellites that are ready for launch in case of ASAT attack on its twin on orbit, or attempts to decrease the visibility of satellites using paint or materials less visible from radars (Moltz 2014, p. 31). Finally, we must look at the main obstacles of connection of the outer space and warfare. The first set of barriers is comprised of physical obstructions. As has been presented in the previous chapter, the outer space is very challenging domain to operate in. Environmental factors still present the largest threat to any space military capabilities if compared to any man-made threats (Rendleman 2013, p. 79). A following issue that hinders military operations in the outer space is the predictability of orbital movement. If the reconnaissance satellite's orbit is known, the terrestrial actor might attempt to hide some critical capabilities-an option that is countered by new surveillance techniques (spectrometers, etc.) (Norris 2010, p. 196)-but the hide-and-seek game is on. This same principle is, however, in place for any other space asset-any nation with basic tracking capabilities may quickly detect whether the military asset or weapon is located above its territory or on the other side of the planet and thus mitigate the possible strategic impact of space weapons not aiming at mass destruction. Another possibility is to attempt to destroy the weapon in orbit. Given the level of development for the ASAT technology, it seems that they will prevail over any possible weapon system for the time to come. Next issue, directly connected to the first one, is the utilization of weak physical protection of space objects that need to be as light as possible to reach the orbit and to be able to withstand harsh conditions of the domain. This means that their protection against ASAT weapons is very limited, and, whereas some avoidance techniques are being discussed, they are of limited use in case of ASAT attack. We can thus add to the issue of predictability also the issue of easy destructibility of space weapons and other military hardware (Dolman 2005, p. 40; Anantatmula 2013, p. 137; Steinberg 2012, p. 255). Even if the high ground was effectively achieved and other nations could not attack the space assets directly, there is still a need for communication with those assets from Earth. There are also ground facilities that support and control such weapons located on the surface. Electromagnetic communication with satellites might be jammed or hacked and the ground facilities infiltrated or destroyed thus rendering the possible space weapons useless (Klein 2006, p. 105; Rendleman 2013, p. 81). This issue might be overcome by the establishment of a base controlling these assets outside the Earth-on Moon or lunar orbit, at lunar L-points, etc.-but this perspective remains, for now, unrealistic. Furthermore, no contemporary actor will risk full space weaponization in the face of possible competition and the possibility of rendering the outer space useless. No actor is dominant enough to prevent others to challenge any possible attempts to dominate the domain by military means. To quote 2016 Stratfor analysis, "(a) war in space would be devastating to all, and preventing it, rather than finding ways to fight it, will likely remain the goal" (Larnrani 20 16). This stands true unless some space actor finds a utility in disrupting the arena for others.

#### Public sector mining thumps

NASA 19 [“NASA Invests in Tech Concepts Aimed at Exploring Lunar Craters, Mining Asteroids,” NASA, June 11, 2019, <https://www.nasa.gov/press-release/nasa-invests-in-tech-concepts-aimed-at-exploring-lunar-craters-mining-asteroids>] TDI

NASA Invests in Tech Concepts Aimed at Exploring Lunar Craters, Mining Asteroids

Robotically surveying lunar craters in record time and mining resources in space could help NASA establish a sustained human presence at the Moon – part of the agency’s broader [Moon to Mars exploration](https://www.nasa.gov/specials/moon2mars/) approach. Two mission concepts to explore these capabilities have been selected as the first-ever Phase III studies within the [NASA Innovative Advanced Concepts](https://www.nasa.gov/niac) (NIAC) program.

“We are pursuing new technologies across our development portfolio that could help make deep space exploration more Earth-independent by utilizing resources on the Moon and beyond,” said Jim Reuter, associate administrator of NASA’s Space Technology Mission Directorate. “These NIAC Phase III selections are a component of that forward-looking research and we hope new insights will help us achieve more firsts in space.”

The Phase III proposals outline an aerospace architecture, including a mission concept, that is innovative and could change what’s possible in space. Each selection will receive as much as $2 million. Over the course of two years, researchers will refine the concept design and explore aspects of implementing the new technology. The inaugural Phase III selections are:

Robotic Technologies Enabling the Exploration of Lunar Pits

William Whittaker, Carnegie Mellon University, Pittsburgh

This mission concept, called Skylight, proposes technologies to rapidly survey and model lunar craters. This mission would use high-resolution images to create 3D model of craters. The data would be used to determine whether a crater can be explored by human or robotic missions. The information could also be used to characterize ice on the Moon, a crucial capability for the sustained surface operations of NASA’s Artemis program. On Earth, the technology could be used to autonomously monitor mines and quarries.

[Mini Bee Prototype to Demonstrate the Apis Mission Architecture and Optical Mining Technology](https://www.nasa.gov/directorates/spacetech/niac/2019_Phase_I_Phase_II/Mini_Bee_Prototype)

Joel Sercel, TransAstra Corporation, Lake View Terrace, California

This flight demonstration mission concept proposes a method of asteroid resource harvesting called optical mining. Optical mining is an approach for excavating an asteroid and extracting water and other volatiles into an inflatable bag. Called Mini Bee, the mission concept aims to prove optical mining, in conjunction with other innovative spacecraft systems, can be used to obtain propellant in space. The proposed architecture includes resource prospecting, extraction and delivery.

#### Space colonization is financially, scientifically, and logistically infeasible.

Impey 19 — Chris Impey, a faculty member at the University of Arizona, served as Vice-President of the American Astronomical Society, a Fellow of the American Association for the Advancement of Science, and a Howard Hughes Medical Institute Professor, serves on the Advisory Council of METI (Messaging Extraterrestrial Intelligence), 2019 (“Chapter 5: Mars and Beyond: The Feasibility of Living in the Solar System,” *The Human Factor in a Mission to Mars: An Interdisciplinary Approach*, Edited by Konrad Szocik, Published by Springer, ISBN 978-3-030-02059-0, Accessed 08-30-2019, pp. 97-99)

5.2 Establishing a Colony

Robert Zubrin never lost the faith. With a Ph.D. in Nuclear Engineering and over 200 technical papers to his credit, Zubrin has been a staunch advocate of human exploration of Mars for 30 years. He holds patents for hybrid rocket-planes, synthetic fuel manufacturing, magnetic sails, salt-water nuclear reactors, and three-person chess, but his true passion is Mars. He thinks we can lower the cost and complexity of a Mars mission by “living off the land,” or utilizing many resources as possible from the air and soil. His ideas were strong enough to be adopted by NASA as their “design reference mission,” but he became frustrated at NASA’s glacial progress and anemic government support so he founded the advocacy group Mars Society in 1998. He’s written a series of books that make the case for going to Mars (Zubrin and Wagner 1996; Zubrin 2008). His most recent book brings Mars exploration up to date with the Mars Direct proposal using the DragonX rocket (Zubrin 2013).

Asked about saving costs with a one-way journey, Zubrin has said: “Life is a one-way trip, and one way to spend it is by going to Mars and starting a new branch of human civilization there” (Zubrin 2011).

Mars is a challenging goal for human exploration. The problem isn’t energy. The energy cost of going to Mars is less than 10% more than the energy cost of going to the Moon. The problem is the distance. An energy-efficient trajectory involves a travel time of 9 months each way. The trip can be shortened to 6–7 months at the expense of extra energy—a far cry from the week it takes to get to the Moon. The cost of transporting 2 years of supplies for even a small crew is daunting. Wernher von Braun was the first to make a technical study of a Mars mission in the 1950s but it was hopelessly grandiose, using a thousand Saturn V rockets to build a fleet of ten spacecraft in Earth orbit to then carry seventy astronauts to Mars. He pitched a scaled-down concept to Richard Nixon but it was passed over in favor of the Space Shuttle. Former NASA administrator Thomas Paine tried next. Perhaps he’d watched too much Star Trek, but he aimed to conquer and industrialize the Moon with nuclear space tugs, launch a fleet of space stations into orbit around the Earth, and send several dozen spaceships a year to Mars to build a space station and support the settlement The Reagan administration was happy to shelve his report.

In 2014, the National Research Council revisited human flight, as directed by Congress. Its sweeping 286-page report concluded bluntly that NASA had an unsustainable and unsafe strategy that will prevent the United States from achieving a human landing on Mars any time in the foreseeable future (National Research Council 2014). With current budgets, they suggest that it can’t happen before mid-century. Along the way, the report addresses the philosophical question of why we should send people into space at all, concluding that purely practical and economic benefits don’t justify the cost, but the aspirational aspect of the endeavor might make it worthwhile.

There must be good reasons and a strong will, because Mars is hard. One risk is radiation. Earth dwellers are sheltered from high-energy cosmic rays and solar flares by our atmosphere and magnetic field. When the Curiosity rover headed to Mars, [end page 96] scientists switched on a radiation detector and found that the radiation environment in deep space is far more intense than it is on Earth. An astronaut on a 2-year trip to Mars would get 200 times more radiation dose than an Earth dweller over that same period (Fig. 5.2). However, to put it in perspective, the adventure only increases the lifetime risk of cancer from 21 to 24%. The risk of some sort of spacecraft malfunction is likely to be much higher.

Another risk is weightlessness. Substantial physiological changes result from a microgravity environment. Russian cosmonaut Valeri Polyakov spent 438 days on board Mir, making a dizzying 7000 orbits of the Earth, in part to see if humans could handle a trip to Mars. The Russians reported that he suffered no long-term ill-effects from his 14 months in space. There is extensive literature on the adverse effects of microgravity on humans, including bone loss, muscle atrophy, cardiovascular dysfunction, and reduced functioning of the immune system (White and Averner 2001). Some of these effects, like bone loss, can be mitigated but not completely compensated for, by exercise and diet (Grimm et al. 2016). [end page 97]

Robert Zubrin notes that the used upper stage of a Mars launch vehicle could be employed as a counterweight. With a mile-long tether and a spin rate of 2 rpm, Earth gravity would be simulated. With a spin rate of 1 rpm, it would be Mars gravity and the astronauts could get acclimatized to the new situation before landing. Materials exist with the requisite tensile strength to construct such a tether, but it would add cost to a mission so it is not clear if such technology is warranted by the health risks.

A third risk is being cooped up. A Mars traveler would have to spend a year and a half in a cabin the size of a school bus, and as much as a year at their destination in a space no bigger than a large motor home. The Mars500 mission locked an international crew of six volunteers in a mock spaceship bound for Mars, but actually sitting in Moscow for a year and a half. The crew “returned to Earth” in 2011. Most of them experienced severely disrupted sleep patterns and all of them reduced their activity levels in the confined space, something researchers call a behavioral torpor (Vigo et al. 2013). The experiment made clear how important it will be to simulate Earth life rhythms in the spaceship or on Mars, and how important it will be to stay physically active.

It’s hard to judge the psychological impacts of such a trip. People who winter in Antarctica experience a diluted version of the problems. But travelers to Mars will be the most isolated humans who ever lived. They’ll have real-time interactions with a small number of companions and delayed communications with friends and loved ones who are tens of millions of miles away. They’ll be in a confined space with no option to simply go out for a walk, and they’ll be continuously monitored by anxious ground crews and scientists on Earth. If anyone spins out of control, there’s no real-time access to mental health services such as counseling or psychotherapy.

The visionaries are undeterred. Apollo astronaut Buzz Aldrin put it like this: “Going to Mars means staying on Mars—a mission by which we are building up a confidence level to become a two-planet species. At Mars, we’ve been given a wonderful set of moons which can act as offshore worlds from which crews can robotically preposition hardware and establish radiation shielding on the Martian surface to begin sustaining increasing numbers of people” (Aldrin 2013).

Two new ventures are trying to put Mars within reach without using any government resources. Inspiration Mars is the brainchild of Dennis Tito, an engineer turned tycoon who was the world’s first space tourist in 2001. Tito plans to keep costs down by not landing. His billion-dollar fly-by plans to use an upgraded version of the SpaceX Dragon capsule. With a cleverly designed trajectory, he can get there with a single burn of the engine. The return is challenging. The capsule will slam into the Earth’s atmosphere at 32,000 mph, requiring new materials for a heat shield. The project is currently aiming for a launch in 2021.

Mars One is run by Dutch entrepreneur Bas Lansdorp, who also plans to use a SpaceX capsule. He plans to keep costs down by leaving his four passengers on Mars. If they survive the trip, they will build a habitat from their spacecraft and adjacent inflated areas covered by Martian regolith. They’ll create water, oxygen, and some food locally, augmented by regular supply missions, and every 2 years they will be joined by four more refugees from Earth. Gradually, they will build a settlement (Fig. 5.3). Lansdorp estimates his costs to be $6 billion for the first trip and $4 billion [end page 98] for each crew that follows. Space experts judge the plan to be very ambitious; some judge it to be impossible. Everyone agrees that it is audacious (Do et al. 2014). NASA has a plan that will take several decades and cost about $100 billion, which makes the claims of Mars One seem unrealistic.

Would-be Martians are in a race against time. The red planet has its next close approach to the Earth in 2018, and it won’t get as close again until 2035. Inspiration Mars and Mars One have both had to slip past the most favorable 2018 launch date. Mars One accepted over 200,000 applications online for the chance to live and die on Mars. In 2014 the number was culled to 1058, and then to 705. Those who remain will go endure rigorous physical and psychological testing to generate a final group of 24. Lansdorp plans to finance his venture by turning it into a reality TV epic—think Survivor meets The Truman Show meets The Martian Chronicles.