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#### Private entities should restrict the appropriation of outer space except for terrestrially accessible blockchain verification computing centers and cryptocurrency mining centers. Private entities should work to appropriate outer space to create terrestrially accessible blockchain verification computing centers and cryptocurrency mining centers on the Moon and Deep Space. States should create significant subsidies for private entities to create terrestrially accessible blockchain verification computing centers and cryptocurrency mining centers on the Moon and Deep Space.

#### Restrictions are prohibitions.

Schiedler-Brown 12 – Attorney, Jean Schiedler-Brown & Associates (Jean, “Appellant Brief of Randall Kinchloe v. States Dept of Health, Washington,” *The Court of Appeals of the State of Washington, Division 1*, <http://www.courts.wa.gov/content/Briefs/A01/686429%20Appellant%20Randall%20Kincheloe%27s.pdf>)

3. The ordinary definition of the term "restrictions" also does not include the reporting and monitoring or supervising terms and conditions that are included in the 2001 Stipulation. Black's Law Dictionary, 'fifth edition,(1979) defines "restriction" as; A limitation often imposed in a deed or lease respecting the use to which the property may be put. The term "restrict' is also cross referenced with the term "restrain." Restrain is defined as; To limit, confine, abridge, narrow down, restrict, obstruct, impede, hinder, stay, destroy. To prohibit from action; to put compulsion on; to restrict; to hold or press back. To keep in check; to hold back from acting, proceeding, or advancing, either by physical or moral force, or by interposing obstacle, to repress or suppress, to curb. In contrast, the terms "supervise" and "supervisor" are defined as; To have general oversight over, to superintend or to inspect. See Supervisor. A surveyor or overseer. . . In a broad sense, one having authority over others, to superintend and direct. The term "supervisor" means an individual having authority, in the interest of the employer, to hire, transfer, suspend, layoff, recall, promote, discharge, assign, reward, or discipline other employees, or responsibility to direct them, or to adjust their grievances, or effectively to recommend such action, if in connection with the foregoing the exercise of such authority is not of a merely routine or clerical nature, but required the use of independent judgment. Comparing the above definitions, it is clear that the definition of "restriction" is very different from the definition of "supervision"-very few of the same words are used to explain or define the different terms. In his 2001 stipulation, Mr. Kincheloe essentially agreed to some supervision conditions, but he did not agree to restrict his license.

#### Climate-motivated terrestrial mining regulations kill crypto now – those don’t get applied to space because of unique environments – that saves crypto with sufficient private investment

Greene 21 Greene, Tristan. Tristan covers human-centric artificial intelligence advances, quantum computing, STEM, Spiderman, physics, and space stuff. As far as I can tell his highest level of education was that he was in the Navy for a while. "What happens to Bitcoin when billionaires build cryptocurrency miners on the Moon?" TNW | Hardfork, 8 June 2021, thenextweb.com/news/bitcoin-billionaires-build-cryptocurrency-miners-on-moon-bitcoin.

Space exploration and exploitation have traditionally been nationalist endeavors. But the rise of the 12-digit billionaire has suddenly made outer space look like open territory. The players Jeff Bezos is stepping down from his position as the CEO of Amazon after 25 years ahead of his imminent launch into space aboard one of his own Blue Origin spaceships. This will be the future of fintech 6 trends that will dominate fintech in 2022 While it’s easy to imagine the long-time leader retiring to live out a childhood fantasy, there’s nothing in Bezos’ history as an incredibly ambitious person and businessman to indicate his he’ll just blast off into the sunset to live a life of quiet leisure. Simply put, Bezos’ interest in the space sector likely won’t end with offering consumer thrill rides. While it’s impossible to know where the soon-to-be-former CEO might take his ambition, it’s likely Amazon and/or Blue Origin is already looking for ways to exploit the space sector for profit. But, obviously, Bezos isn’t the only private citizen with a spaceship company. Elon Musk’s SpaceX has spent the last decade becoming the belle of NASA’s ball and he’s already all-in on the idea of sending humans to Mars. And we can’t forget Richard Branson. He may only be worth a paltry $5 billion (lol), but his Virgin Galactic company’s been banking on making some money in space tourism for a long time. Let’s also not forget that Virgin’s dabbled in everything from railroad technology to record labels. And the list goes on. Anyone with a few billion dollars has business options and opportunities that extend beyond our planet’s surface. Space for profit In the past, we’ve discussed the idea of mining space asteroids for profit. Some experts believe there are unimaginable fortunes floating around in space in the form of resource-rich asteroids. In fact, you can even get a degree in asteroid mining. And even Goldman Sachs has considered getting in on the action. But, at the end of the day, we still have to figure out where these resources are, build machines capable of extracting them, and get them safely to somewhere they can be useful. Right now, there’s not much value in investing in asteroid mining futures because the technology either doesn’t exist or isn’t ready yet. However, there’s more than one kind of mining you can do in space. Enter cryptocurrency and the future Elon Musk recently got involved in a friendly space race, but this time it has nothing to do with competition over rockets or government contracts. He’s racing against BitMEX, a cryptocurrency exchange and derivative platform, to see who can get a cryptocurrency on the Moon first. If you’re curious about how that works, here’s a snippet from BitMEX’s official announcement: BitMEX will mint a one-of-a-kind physical bitcoin, similar to the Casascius coins of 2013, which will be delivered to the Moon by Astrobotic. The coin will hold one bitcoin at an address to be publicly released, underneath a tamper-evident hologram covering. The coin will proudly display the BitMEX name, the mission name, the date it was minted and the bitcoin price at the time of minting. According to BitMEX, this isn’t just a ceremonial or token delivery. The coin itself is a hardware wallet containing an actual Bitcoin, so its value will change with the value of the BTC here on Earth. In other words, BitMEX is sending a literal treasure to the Moon for anyone brave (or rich) enough to retrieve it. Per the company’s blog post: A moon surface background with text superimposed, quote below Credit: BitMEX Come and Get It. When the physical coin lands, it will remain on the Moon until anyone deems it worthy of retrieval. Decades from now, what will it be worth? It’s a great question. Some experts have predicted a single bitcoin will one day be worth $100K, $1M, or even more. But an even better question is this: What’s the end game for cryptocurrency in space? Billionaires want to be trillionaires Back in 1999 Wired ran a feature about the imminent rise of the world’s first trillionaire. At the time, everyone assumed the richest man in the world, Microsoft CEO Bill Gates, would be the first trillionaire by a long shot. Here’s a quote from that article: The value of Bill’s Microsoft stake has grown from $233.9 million at the time of Microsoft’s 1986 IPO to $72.2 billion as of June 15, 1999 (disregarding stock sales). At this rate – 58.2 percent a year – he will become a trillionaire in March 2005, at age 49, and his Microsoft holdings will be valued at $1 quadrillion in March 2020, when he is 64. Of course, we still haven’t seen a trillionaire in modern history. As of the time of this writing, the richest person in the world is France’s Bernard Arnault, whose $193.6 billion empire edges out Jeff Bezos’ $189 billion. At some point, if Bezos wants to pull away with it or Elon Musk wants to close the widening gap between his $151.4 billion and a first place finish, the world’s richest people are going to have to do more than squeeze terrestrial markets for every last drop of profit. That’s why many experts view Elon Musk’s heavy involvement in cryptocurrency as the potential difference maker. On any given day the Tesla, SpaceX, and Neuralink founder’s total worth can skyrocket or plummet by tens of billions of dollars based on how his cryptocurrency holdings are performing. When you consider that market movements can be directly tied to Musk’s social media statements, the power proposition for billionaires holding cryptocurrency is unbridled. Simply put: Elon Musk has more control over the so-called “volatile” world of cryptocurrency than most. Putting a cryptocurrency in space, much like firing a Tesla off into the galaxy, is a PR move meant to generate interest in the burgeoning cryptomarket. But that’s not the only purpose they serve. These acts remind us that people like Musk and Bezos can do anything they want. If they want to put a coin on the Moon, they have the means to do it. And, for example, if Musk or Bezos suddenly wanted to solve the biggest problems with cryptocurrency mining – power consumption, carbon footprint, developing powerful-enough hardware – they’re in a unique position to do so. In space, no one can hear you mine Arguably, one of the biggest things stopping an apex whale like Elon Musk from spending a fair portion of his billions on cryptomining centers is the fact that such an operation would almost certainly draw universal condemnation for its potential effect on the global climate crisis. But the Moon’s atmosphere isn’t necessarily as fragile as the Earth’s. Hypothetically speaking, there’s nothing to stop a billionaire from building a facility on the Moon to mine cryptocurrency. They would, of course, need to be able to build their own batteries, have experience with artificial intelligence and supercomputers, and already have their own satellite network set up in space – all boxes Elon Musk can tick today. And, in the near-future, as we perfect deep space transmission technology, what’s to stop a billionaire from putting a supercomputer on a satellite and sending it somewhere in deep space to mine cryptocurrency 24/7 at near absolute-zero temperatures? All of this is conjecture, but the writing is on the wall. Cryptocurrency enthusiasts fear what the experts are consistently warning: regulation is coming. Eventually, it’s possible cryptocurrency mining could become regulated with harsh policies designed to keep mining operations from further damaging the environment. This could seriously hinder the market. If humanity walks away from terrestrial mining to save the planet, we’ll be leaving unfathomable amounts of money on table. Billionaires don’t become billionaires by doing that. The only logical path forward, barring some unknown new green mining technology, may be moving the cryptocurrency industry to space.

#### Bitcoin is private property in space – appropriation is key

Rule & LeClair 21 [Dylan LeClair And Sam Rule Bitcoin Magazine. "Bitcoin’s Private Property Rights." https://www.nasdaq.com/articles/bitcoins-private-property-rights-2021-09-28]

Bitcoin’s Superior Private Property Rights

For the first time in history, bitcoin offers us a property option that does not rely on a local authority or legal system to enforce or protect it. It’s protected by the natural incentives of those participating in the network.

“Satoshi Nakamoto has created a form of property that can exist without relying on the state, centralized authority, or traditional legal structures.” - Eric D. Chason,"How Bitcoin Functions As Property Law"

It provides us with a store of value and savings technology where no government, central institution or voting bloc can seize, freeze or access it through violence or force when properly secured. Anyone in the world with an internet connection can secure this property without permission, and no other person or institution may take it away or erode its value. Whether it’s real estate, cash, equities, bonds, or gold, no other asset on the market provides this level of assurance and security.

What we know of strong, well-defined property rights is that they are the basis of human cooperation and economic activity. When private property rights flourish, so do the people. When we look at the nations of the world with the lowest ranking of property rights, we also find some of the key regions where bitcoin is making its mark.

#### Unregulated commercial innovation is a necessity to make bitcoin mining a reality.

Vlad Costea 03/30/2021 [“On Taking Bitcoin Mining To The Moon… Literally”] [DS] [https://bitcoin-takeover.com/on-taking-bitcoin-mining-to-the-moon-literally/]

As humankind becomes an inter-planetary species which embraces the Bitcoin standard, we should seriously consider extending the mining operations beyond Earth. The reasons behind the expansion take into consideration both single point of failure scenarios (Bitcoin would be destroyed if our home planet remained the only place where the currency gets secured, while some catastrophic Death Star-like event happened) and the distribution of mining to relay transactions a lot easier across our galaxy. Furthermore, moving mining operations to celestial bodies that we don’t inhabit (such as Earth’s natural satellite) would bring environmental benefits while lowering the delay between transmissions to other around the Solar System. If we factor in the 2-week lunar days and the amount of energy we can capture and use for mining, we get a pretty sustainable extension for the already-existing Earth operations. The Moon is not the end goal, but only the first step towards making Bitcoin the inter-planetary network which helps us make payments. After we successfully establish mining operations on the Moon, we can undergo easier expansions to Mars and other planets. There is already an ongoing project in which NASA and Nokia are putting 4G technology on Earth’s natural satellite, so following it up with Bitcoin mining would be really useful expansion. In time, if we manage to make mining equipment to withstand extreme temperatures, we can also get closer to the Sun by setting up operations on Venus and Mercury (which would be ideal, given the amount of solar energy that we can capture and use). This article is inspired by Blockstream’s project to deliver Bitcoin blockchain synchronization via commercial satellites, as well as Peter Todd‘s 2017 hard sci-fi on Bitcoin mining in space. And while some political and physical challenges may exist, the idea is not as far-fetched as it first sounds. Bitcoin Mining On The Moon: The Delay Times When it comes to Bitcoin mining, one of the biggest concerns is always the lag (or delay time) which reduces the miners’ competitive advantage in discovering blocks. A faster and more stable internet connection is always preferable – yet thanks to the satellite synchronization and the development of high-speed mobile networks across areas which have no broadband infrastructure, the situation is gradually changing. Now let’s do the math. The average distance between the Earth and the Moon is 385.000 kilometres (240.000 miles). Conversely, the speed of light, which radio waves reach when they propagate in vacuum, is exactly 299.792.458 m/s. This means that sending a message with the speed of light to the Moon and back will take an average of 1.28 seconds. But we should also take into consideration the shape of the Moon, the smoothness of the surface, and the antenna polarization of these transmissions. According to existing research, there is a delay of this mathematically ideal time which bumps the average EME (Earth-Moon-Earth) radio signal propagation time to an average of 2.56 seconds. Given Bitcoin’s block-issuing time of approximately 10 minutes, this kind of delay time is more than acceptable. Therefore, we already possess the technology to make this space expansion of Bitcoin mining work. Bitcoin Mining On The Moon: The Solar Energy And Temperature Beyond the single point of failure and environmental criteria, we should also consider the amount of solar energy that we can use for Lunar Bitcoin mining. And as you might remember from school, the Moon rotates around its axis throughout 27 Earth days – which means that it has a 13 1/2 daytime, and a 13 1/2 night time. This almost fits the 2 weeks Bitcoin meme. In theory, this sounds ideal for capturing and using solar power. There is an extended amount of time during which the energy can be stored, so if we developed efficient batteries we could sustain the activity throughout the entire night cycle. According to 2019 NASA research, building solar panels in space might be as easy as clicking “Print”. In theory, the Moon surface should get a similar amount of sunlight as Earth during daytime. So we can assume that the solar constant (aka solar irradiance) of 1.36 kW per square meter also applies to the Moon. But due to the lack of an atmosphere and the absence of clouds to stand in the way of sunlight, the solar energy production should be slightly higher on the Moon surface. It all sounds feasible, but the main challenge is still storing the energy for almost two weeks with negligible waste. At this point in our research, we should factor in the Lunar temperature swings. Given the Moon’s lack of an atmosphere, the heat doesn’t get preserved and we go from extremely hot to extremely cold. The extremes are 127 degrees Celsius (260 Fahrenheit, 400.15 Kelvin) for daytime and minus 173 degrees Celsius (343.4 Fahrenheit, 446.15 Kelvin) during nights. For reference, a Bitmain Antminer mining ASIC operates within a range of 65 to 135 degrees Celsius (149 to 275 Fahrenheit, 338.15 to 408.15 Fahrenheit). With proper ventilation and heating, the device is very likely to withstand the extreme temperatures of the Moon’s daytime. However, the issue comes at night. Not only that it’s hard to store the electricity for two weeks, but we must also ensure a proper temperature to make the Bitcoin mining devices function. Ideally, the heat generated from mining should get preserved throughout the 13-day sunlight cycle so it can be used to sustain the operation during the night. So in order to make Bitcoin mining on the Moon work, we need to find better materials to store both electricity and heat. If we solve these two problems, there is no other obstacle – and further research can be put into expanding towards Mars and Mercury. Bitcoin Mining On The Moon: The Governments And Space Exploration Monopolies Even if we fix all of the technological and physical issues which concern Bitcoin mining on the Moon, we must still fix space travel, exploration, and research – fields which are currently in an unfair situation of government monopoly. Sure, we do have private companies which seek to offer space travel and colonization services. But in order for them to operate, they still needed to get permission from governmental authorities and they worked with governmental agencies for their early testing. Hopefully, the situation will change in time and space travelling will be as simple as getting a bus ticket, while interplanetary law will allow for some innovation without restricting exploration and scientific development on the grounds of private property enforcement. In other words, we should make sure that our future legislators don’t treat uninhabited places as if they entirely belong to them or to monopolistic private entities.

#### Subsidizing green lunar mining is necessary to make it profitable compared to terrestrial mining operations

Nic Carter 10/05/2021 [“Want Cleaner Bitcoin Mining? Subsidize It”] [DS] [https://www.coindesk.com/policy/2021/10/05/want-cleaner-bitcoin-mining-subsidize-it/]

In philosophy, some of the best results come when intuitions clash with logical chains of reasoning. You might call those counterintuitive. The result we discuss today certainly fits the bill. Put simply, there’s a compelling case to be made that policymakers looking to ameliorate the emissions associated with bitcoin should subsidize, rather than ban, the act of mining bitcoin. How is this possible? CoinDesk columnist Nic Carter is partner at Castle Island Ventures, a public blockchain-focused venture fund based in Cambridge, Mass. He is also the co-founder of Coin Metrics, a blockchain analytics startup. Well, a new paper from philosophers Andrew Bailey and Troy Cross lays out this argument. In steps: Bitcoin mining is a single global market; that is, miners compete with every other miner. One miner gaining market share means another is losing share. It follows that a new unit of hashrate (computing power) economically disadvantages every existing unit of hashrate. Individuals who want to reduce the carbon intensity of bitcoin mining ought therefore to simply mine bitcoin sustainably, at a loss if necessary. If you assume miners are economically rational and some miners are unsustainable, a new unit of sustainable or “green” hashrate definitionally reduces the carbon intensity of the Bitcoin network. In lieu of directly mining, interested bitcoin holders looking to offset their emissions could simply invest in a renewables-only, publicly traded miner, like Iris Energy. By lowering the cost of capital for a sustainable public miner, holders advantage green-powered mining at the expense of default mining, offsetting the emissions associated with their bitcoin held. A Pigovian tax discourages transactions that create negative emissions. A tax on sugar (obesity-related illnesses consume finite health-care resources), tobacco (causing negative primary health outcomes plus risks from second hand smoke) or carbon dioxide (climate change) would be examples. In this instance, mining sustainably is a de facto Pigovian tax because it disadvantages all other miners, who presumably mine with nonzero emissions. This is an incredible feature of Bitcoin, which exists only because it is a single market, in which every miner competes for the same exact finite resource (new units of bitcoin). Thus, a new unit of hashrate no longer empowers existing miners, economically, speaking. If enough sustainable units come online, especially if they are subsidized (and so the equilibrium for hashrate is higher than it otherwise would be, at normal breakevens), some regular miners with a generic energy mix will no longer be profitable and will shutter their operations. Few other industries are this directly open and competitive. Thus, you can imagine financial products for those concerned about their bitcoin-related emissions that bundle a unit of bitcoin and a proportional share of a sustainable miner. These are far superior to bundled bitcoin plus offset products, because offsets are non-standardized and their effect is generally unclear and in fact quite controversial. In the case of an investment in a public miner that is provably sustainable, your investment lowers the cost of capital (some of these mining firms actually fund their operations entirely by issuing new stock), directly advantaging the miner relative to its dirtier competitors. The second-order effect of this market emerging is that certain miners will orient their operations towards full sustainability to cater to this new demographic of motivated buyers. This logic applies at the policy level, too. The state of New York has recently considered banning bitcoin mining, but they state should be considering the precise opposite if it cares about bitcoin’s emissions. Upstate New York offers abundant hydro resources. I’ve personally visited the Coinmint mining operation in Massena, N.Y., which is an old hydro-powered Alcoa aluminum smelting facility perched on the banks of the St. Lawrence River. It would take some work to fully determine this, but I believe that bitcoin mining operations in New York are more sustainable than the generic energy mix of the rest of the Bitcoin network. Thus, banning mining there would actually drive up Bitcoin’s emissions footprint. Instead, the state should consider subsidizing its largely clean local bitcoin mining operations. A few forward-looking policymakers have already begun to act according to this logic. Just recently, the state of Wyoming created a tax incentive supporting mining with otherwise-flared natural gas. Since methane associated with oil well operations is flared anyway (it’s often uneconomical to capture or store), putting it into a generator and powering a bitcoin operation is at worst net neutral from a greenhouse gas perspective. (In practice, it’s generally favorable because a controlled burn in a generator is cleaner than a simple flare.) If miners take Wyoming up on its offer, a new portion of hashrate will emerge that is fully carbon neutral, displacing dirtier energy. The converse is also true. And this idea has already been implemented at the national level, by none other than El Salvador President Nayib Bukele. In response to a question by human rights activist Alex Gladstein in a historic Twitter Spaces chat, President Bukele mused about mining bitcoin with otherwise-untapped – and carbon-neutral – geothermal energy. The president kept his promise and, as of this week, mining operations have begun. By subsidizing mining with fully sustainable geothermal energy, El Salvador is disempowering every other non-sustainable miner out there. So El Salvador can claim two firsts: the first nation to ratify bitcoin as legal tender, and the first nation to impose a market-based Pigovian tax on dirty bitcoin miners.

#### Cryptocurrency reaching a wide rollout builds resilience to survive inevitable existential filters.

Alex McShane 21, Writer and Head of Video for Bitcoin Magazine, BA from the University of Iowa, Degree from the University College Dublin, Degree from Kirkwood Community College, “Bitcoin and Existential Risk”, Bitcoin Magazine, 9/5/2021, https://bitcoinmagazine.com/culture/bitcoin-and-existential-risk-alex-mcshane

TL;DR - An existential risk is the possibility of an event or series of events that could drastically curtail humanity’s potential. A hypothetical global catastrophe could be anthropogenic or non-anthropogenic and internal or external in nature. The adoption of Bitcoin will better position us to address these risks as a society.

EXTERNAL NON-ANTHROPOGENIC

A catastrophic collision with an astronomical object, such as an asteroid impact would be an external non-anthropogenic risk. This has already occurred here several times. During the Permian Triassic period (ending 250 million years ago) an astronomical impact killed 90 percent of the species on Earth. It took tens of millions of years for life on Earth to repopulate and Earth’s intelligence potential to recover.

One interesting external non-anthropogenic risk is Earth’s reflected light, which could be measured by an external intelligence who then come to extinguish us. (The topic of our own signal bringing about this death by misadventure is discussed further below.)

What does this have to do with Bitcoin?

Generally, hard money facilitates greater innovation and technological process. At this point one might argue that if we do not migrate to some degree from Earth as a species, and are subsequently wiped out by an astronomical object impact or a super-volcanic event, the risk becomes anthropogenic in nature. We are a centralized species on a grand scale, and at this point one could say we have through consensus chosen to remain vulnerable to a single vector of attack by staying here.

Bitcoin is not only the hardest money known to man, it is the most responsible from this standpoint. Bitcoin as it currently operates is currency that can provide a monetary framework on which humans can achieve greater capital growth, collaboration, resource allocation, and therefore technological progress. Because the terminal supply of Bitcoin is capped, we can store value in it indefinitely as a society.

66 Million years ago the Cretaceous-Paleogene Extinction Event extinguished the life and intelligence potential of the non-avian dinosaurs. This series of events was external, and broadly non-anthropogenic in the sense that no form of life on Earth at the time contributed to its own demise, but more specifically, at the time of those astronomical impacts the first humans hadn’t split from chimpanzee lineages. This split is thought to have occurred between between 4 and 8 million years ago.

An important distinction between astronomical impacts or super-volcanic events of the past and such events if they were to happen today is that one could argue that our intelligence potential is now mature enough to tackle certain of the external existential risks. Today, the risk posed by an asteroid impact or something similar would still be external in its origin, but at what point does the burden of responsibility to migrate off of the planet fall upon our population? We can surely solve for some external existential risks, and in any case, no one is going to do it for us. You could say that failing to collectively pursue a solution when technically we could have would recategorize a civilization-extinguishing asteroid impact as an external but anthropogenic risk.

At what point do innovation dampening authoritarian states and their mandated broken money cause society to stall at a local optimum? Surely the government has already caused this. It’s only a matter of time before another object strikes the Earth with devastating consequence. I would argue it is irresponsible to continue life here with government money. Government money is an existential risk. Bitcoin is not only a solution, it is a societal responsibility.

INTERNAL ANTHROPOGENIC

Nuclear war is one example of an internal anthropogenic risk. That is, should nuclear war arise, it would be both self destructive, and relatively self contained on a cosmic scale. It follows that biological warfare is an internal anthropogenic risk, the reality of which we as a species can surely understand now. If I were to hazard a guess I would say virtual emergencies and cyber pandemics are next. These self constructed catastrophes are the government’s misguided attempts at proof of work. This is a topic for another time. Do not surrender your ability to think and speak freely.

The second law of thermodynamics can summed thus, processes that involve the transfer or conversion of heat energy are irreversible. The law indicates we have not observed a spontaneous transfer of energy from cold to hot. Another way to think of this is that there is no such thing as cold, only lesser degrees of hot. Nothing cannot transfer. So broadly, within a closed system, the second law of thermodynamics would indicate that all differences tend to level out.

So what has this got to do with Bitcoin?

Well firstly, all hardware is subject to entropy. The distributed nature of the blockchain increases the probability that it will survive centralized entropy. At Bitcoin’s inception, imagine a failure because Satoshi’s computer randomly crashed. Distributed networks are inherently hedged against this particular centralized form of existential risk.

The second law of thermodynamics also suggests that on a grander scale, relatively isolated (centralized) systems will degenerate more and more into disordered states. Proof of work, and network growth are two ways Bitcoin fights against falling into disrepair.

Bitcoin uses proof of work to stave off entropy. The system cannot stay dormant. It must continue to use proof of work to advance the state of the chain, and to fight entropy to secure the monetary value all of the users have stored in the network. The U.S. dollar, as many have pointed out, relies on proof of war, or distributed political energies to maintain dominance. Its methodology can be described as haphazard at best.

INTERNAL NON-ANTHROPOGENIC

One internal non-anthropogenic risk is that of a super-volcanic eruption, provided it wasn’t humans who brought about the eruption. Just like with external non-anthropogenic risks, Bitcoin alone cannot prevent them, but it can help humans prepare for them such that we may survive these relatively small intelligence filters the universe throws our way.

Bitcoin allows for fundamental capital accumulation and human innovation, and promotes collaboration to such a degree that we will find an increased collective problem solving power as humans the further Bitcoin adoption spreads. It is worth mentioning that Bitcoin also maintains and appreciates wealth to such a degree that often those of us to chose to live our lives on a Bitcoin standard will experience relatively greater freedoms, and vastly greater amounts of free time than our peers who chose to continue their lives on a fiat standard, and are perpetually working to outpace their chronic debt. Many Bitcoiners will likely forego that newfound free time to work and continue to provide value to others in whatever area interests them, because Bitcoin incentivizes the collaborative accumulation of capital but also the responsible reallocation of it.

EXTERNAL ANTHROPOGENIC

An external anthropogenic risk has the least probability of occurring. This is a problem of reach. Imagine human intelligence being sent into the cosmos and signaling or generally causing an external intelligence or astronomical object to come back to extinguish us. This is a most improbable extinction by misadventure.

The probability that we send messages of consequence into the cosmos that in turn cause some other far-flung intelligence, with knowledge enough to reach us, to come and bring about our own destruction is next to zero, but it isn’t zero.

I would posit that the probability increases every day that Bitcoin survives, with each person that chooses to hold Bitcoin over fiat, because on a fiat standard we are again, stuck at a local optimum at best, and each day the global monetary system devolves further into chaos. The fiat world may continue to be habitable chaos, but our technological progress and our greatest capacity for innovation cannot be achieved on a fiat standard.

A Bitcoin standard is not only our current best bet, it is the only monetary vehicle that will take us from here, or enable us to build technology that can effectively communicate with places in the universe where other intelligence has emerged. The other reason this fatal miscommunication is unlikely to occur is that once through a Bitcoin standard we have manage to build a society that can effectively reach and communicate at greater depths of the cosmos we will at that time have already become a multi-planetary, if not transitory, if not multi-solar system species. The topic of Bitcoin in space and planetary interoperability will be discussed in a later essay.

The most distant human made object from the earth is the Voyager 1, which is over 13 billion miles away. (For perspective, Apha Centuri, the nearest star system to Earth, is 25 trillion miles away.) Human radio signals have announced our presence and our intelligence to the cosmos since around 1900. The first human radio signals have all ready traveled 114 light years, that is 681,920,540,000,000 miles. Although the reach of our radio signals is very great, the probability of us being heard and subsequently extinguished is negligible. External anthropogenic risks are the least of our concerns at the moment.

As Bitcoin adoption grows, it serves to promote advances in artificial intelligence and nanotechnology. External anthropogenic risks will become more relevant to human intelligence at a much later time. External non-anthropogenic risks are similarly out of our hands for the time being. That is, at the moment there is nothing we can do to prevent the Sun from becoming a red giant star and subsuming the Earth.

But we do already have the monetary technology upon which to engineer solutions to some of these problems. We have the potential as humans to prevent internal global catastrophes, both those set on by us and not. Survival and longevity is arguably our greatest task as a species. Adopting Bitcoin, and protecting this network is proceeding with diligence and a long eye toward the future in all of our political and scientific affairs. The existential risks of living are great, though it is human nature for our ambitions to out pace our current abilities. The only evidence of life is change. To change is to exit fiat currency, it is to use Bitcoin instead.

#### Climate-motivated terrestrial mining regulations kill crypto now – those don’t get applied to space because of unique environments – that saves crypto with sufficient private investment

Greene 21 Greene, Tristan. Tristan covers human-centric artificial intelligence advances, quantum computing, STEM, Spiderman, physics, and space stuff. As far as I can tell his highest level of education was that he was in the Navy for a while. "What happens to Bitcoin when billionaires build cryptocurrency miners on the Moon?" TNW | Hardfork, 8 June 2021, thenextweb.com/news/bitcoin-billionaires-build-cryptocurrency-miners-on-moon-bitcoin.

Space exploration and exploitation have traditionally been nationalist endeavors. But the rise of the 12-digit billionaire has suddenly made outer space look like open territory. The players Jeff Bezos is stepping down from his position as the CEO of Amazon after 25 years ahead of his imminent launch into space aboard one of his own Blue Origin spaceships. This will be the future of fintech 6 trends that will dominate fintech in 2022 While it’s easy to imagine the long-time leader retiring to live out a childhood fantasy, there’s nothing in Bezos’ history as an incredibly ambitious person and businessman to indicate his he’ll just blast off into the sunset to live a life of quiet leisure. Simply put, Bezos’ interest in the space sector likely won’t end with offering consumer thrill rides. While it’s impossible to know where the soon-to-be-former CEO might take his ambition, it’s likely Amazon and/or Blue Origin is already looking for ways to exploit the space sector for profit. But, obviously, Bezos isn’t the only private citizen with a spaceship company. Elon Musk’s SpaceX has spent the last decade becoming the belle of NASA’s ball and he’s already all-in on the idea of sending humans to Mars. And we can’t forget Richard Branson. He may only be worth a paltry $5 billion (lol), but his Virgin Galactic company’s been banking on making some money in space tourism for a long time. Let’s also not forget that Virgin’s dabbled in everything from railroad technology to record labels. And the list goes on. Anyone with a few billion dollars has business options and opportunities that extend beyond our planet’s surface. Space for profit In the past, we’ve discussed the idea of mining space asteroids for profit. Some experts believe there are unimaginable fortunes floating around in space in the form of resource-rich asteroids. In fact, you can even get a degree in asteroid mining. And even Goldman Sachs has considered getting in on the action. But, at the end of the day, we still have to figure out where these resources are, build machines capable of extracting them, and get them safely to somewhere they can be useful. Right now, there’s not much value in investing in asteroid mining futures because the technology either doesn’t exist or isn’t ready yet. However, there’s more than one kind of mining you can do in space. Enter cryptocurrency and the future Elon Musk recently got involved in a friendly space race, but this time it has nothing to do with competition over rockets or government contracts. He’s racing against BitMEX, a cryptocurrency exchange and derivative platform, to see who can get a cryptocurrency on the Moon first. If you’re curious about how that works, here’s a snippet from BitMEX’s official announcement: BitMEX will mint a one-of-a-kind physical bitcoin, similar to the Casascius coins of 2013, which will be delivered to the Moon by Astrobotic. The coin will hold one bitcoin at an address to be publicly released, underneath a tamper-evident hologram covering. The coin will proudly display the BitMEX name, the mission name, the date it was minted and the bitcoin price at the time of minting. According to BitMEX, this isn’t just a ceremonial or token delivery. The coin itself is a hardware wallet containing an actual Bitcoin, so its value will change with the value of the BTC here on Earth. In other words, BitMEX is sending a literal treasure to the Moon for anyone brave (or rich) enough to retrieve it. Per the company’s blog post: A moon surface background with text superimposed, quote below Credit: BitMEX Come and Get It. When the physical coin lands, it will remain on the Moon until anyone deems it worthy of retrieval. Decades from now, what will it be worth? It’s a great question. Some experts have predicted a single bitcoin will one day be worth $100K, $1M, or even more. But an even better question is this: What’s the end game for cryptocurrency in space? Billionaires want to be trillionaires Back in 1999 Wired ran a feature about the imminent rise of the world’s first trillionaire. At the time, everyone assumed the richest man in the world, Microsoft CEO Bill Gates, would be the first trillionaire by a long shot. Here’s a quote from that article: The value of Bill’s Microsoft stake has grown from $233.9 million at the time of Microsoft’s 1986 IPO to $72.2 billion as of June 15, 1999 (disregarding stock sales). At this rate – 58.2 percent a year – he will become a trillionaire in March 2005, at age 49, and his Microsoft holdings will be valued at $1 quadrillion in March 2020, when he is 64. Of course, we still haven’t seen a trillionaire in modern history. As of the time of this writing, the richest person in the world is France’s Bernard Arnault, whose $193.6 billion empire edges out Jeff Bezos’ $189 billion. At some point, if Bezos wants to pull away with it or Elon Musk wants to close the widening gap between his $151.4 billion and a first place finish, the world’s richest people are going to have to do more than squeeze terrestrial markets for every last drop of profit. That’s why many experts view Elon Musk’s heavy involvement in cryptocurrency as the potential difference maker. On any given day the Tesla, SpaceX, and Neuralink founder’s total worth can skyrocket or plummet by tens of billions of dollars based on how his cryptocurrency holdings are performing. When you consider that market movements can be directly tied to Musk’s social media statements, the power proposition for billionaires holding cryptocurrency is unbridled. Simply put: Elon Musk has more control over the so-called “volatile” world of cryptocurrency than most. Putting a cryptocurrency in space, much like firing a Tesla off into the galaxy, is a PR move meant to generate interest in the burgeoning cryptomarket. But that’s not the only purpose they serve. These acts remind us that people like Musk and Bezos can do anything they want. If they want to put a coin on the Moon, they have the means to do it. And, for example, if Musk or Bezos suddenly wanted to solve the biggest problems with cryptocurrency mining – power consumption, carbon footprint, developing powerful-enough hardware – they’re in a unique position to do so. In space, no one can hear you mine Arguably, one of the biggest things stopping an apex whale like Elon Musk from spending a fair portion of his billions on cryptomining centers is the fact that such an operation would almost certainly draw universal condemnation for its potential effect on the global climate crisis. But the Moon’s atmosphere isn’t necessarily as fragile as the Earth’s. Hypothetically speaking, there’s nothing to stop a billionaire from building a facility on the Moon to mine cryptocurrency. They would, of course, need to be able to build their own batteries, have experience with artificial intelligence and supercomputers, and already have their own satellite network set up in space – all boxes Elon Musk can tick today. And, in the near-future, as we perfect deep space transmission technology, what’s to stop a billionaire from putting a supercomputer on a satellite and sending it somewhere in deep space to mine cryptocurrency 24/7 at near absolute-zero temperatures? All of this is conjecture, but the writing is on the wall. Cryptocurrency enthusiasts fear what the experts are consistently warning: regulation is coming. Eventually, it’s possible cryptocurrency mining could become regulated with harsh policies designed to keep mining operations from further damaging the environment. This could seriously hinder the market. If humanity walks away from terrestrial mining to save the planet, we’ll be leaving unfathomable amounts of money on table. Billionaires don’t become billionaires by doing that. The only logical path forward, barring some unknown new green mining technology, may be moving the cryptocurrency industry to space.

#### appropriation is key

Rule & LeClair 21 [Dylan LeClair And Sam Rule Bitcoin Magazine. "Bitcoin’s Private Property Rights." https://www.nasdaq.com/articles/bitcoins-private-property-rights-2021-09-28]

Bitcoin’s Superior Private Property Rights

For the first time in history, bitcoin offers us a property option that does not rely on a local authority or legal system to enforce or protect it. It’s protected by the natural incentives of those participating in the network.

“Satoshi Nakamoto has created a form of property that can exist without relying on the state, centralized authority, or traditional legal structures.” - Eric D. Chason,"How Bitcoin Functions As Property Law"

It provides us with a store of value and savings technology where no government, central institution or voting bloc can seize, freeze or access it through violence or force when properly secured. Anyone in the world with an internet connection can secure this property without permission, and no other person or institution may take it away or erode its value. Whether it’s real estate, cash, equities, bonds, or gold, no other asset on the market provides this level of assurance and security.

What we know of strong, well-defined property rights is that they are the basis of human cooperation and economic activity. When private property rights flourish, so do the people. When we look at the nations of the world with the lowest ranking of property rights, we also find some of the key regions where bitcoin is making its mark.

#### Blockchain empowers indigenous communities AND foments a transition from exploitative economics---it can be scaled up without crypto-colonialism---their author!

Peter Howson 21, Professor in the Department of Social Sciences at Northumbria University, “Distributed Degrowth Technology: Challenges for Blockchain Beyond the Green Economy”, Ecological Economics, Volume 184, June 2021, ScienceDirect

5. Scaling-up degrowth without crypto-colonialism

Solutions to growth-induced environmental crises rooted in positivism, reinforce a colonial perspective (Nirmal and Rocheleau, 2019). Favouring a pluralism of values, a growing coalition of degrowth scholar-activists are aiming to transform degrowth into a scaled-up international field, bridging networks of social and environmental justice movements (Liegey and Nelson, 2020). To avoid a colonial approach to the bridging process, a primary concern must be to avoid one branch of ideas being imposed on vulnerable groups, especially technological ideas, like blockchain. Escobar (2018: 65) argues that to positively design tools for degrowth requires the deconstruction of the colonial divide – “the us-versus-them divide that was introduced with the conquest of America, slavery, and colonialism and is alive and well today with modernizing globalization and development”. For degrowth technology to be decolonising, it should not exhibit a propensity for deployment towards neocolonial projects, and it must be useful for reparative justice. If distributed technologies limit freedoms of vulnerable groups and leave intact the legacies of colonial dispossession, whether they were ‘co-produced’ or not, then their design is not decolonising.

Howson (2020a) explores how environmental crises are used to justify ‘crypto-colonialism’, where blockchain technology is used to extract economic benefits from peoples suffering scars of colonialism in the Global South. These benefits include land, labour, data and other resources needed to facilitate capital interests elsewhere. One of the starkest manifestations of this blockchain-based neocolonialism is observed in the exclusive crypto-enclaves of Puerto Rico. As Crandall (2019) explains, degrowth visions from Puerto Rico’s women-led and grassroots groups, to exercise collective sovereignty over their land, energy and resources, conflicts with the growth-oriented visions conjured up by crypto-enthusiasts (primarily men in fintech and venture capital from the United States) looking to establish their own cryptoutopia.

Blockchain applications can connect diverse groups, but often involve attaching automated conditions to interactions, inevitably leading to power asymmetries, whilst limiting the freedom of some users (Howson, 2020d). The Indonesia-based blockchain project, SEEDS,5 aims to provide fledgling communities, often relocating from the Global North, with tools for constructing local economies, including UBI schemes, whilst incentivising community-based ecologically regenerative tasks, like tree planting. As well as being potentially colonising, SEEDS maintains a hierarchical multi-level structure and an associated governance framework which is likely to promote homogeneity, rather than diversity of interests.

In some cases, blockchain initiatives are being used to promote indigenous customary land claims. But indigenous, does not always equate with degrowth. Some initiatives like the Honduran blockchain land registry, designed with indigenous communities in mind, has been criticised for leaning heavily towards the growth-orientated business interests of their developers (Eder, 2019). The Canadian non-profit organisation, Blockchain for Reconciliation, aims to ensure blockchain project promotions account for local interests and are sympathetic to local struggles for reparative justice and reconciliation from colonialism. The project advocates on behalf of Treaty Four Cree and Saulteaux First Nation communities. The blockchain-agnostic group6 asserts that there is no better place for ‘trustless’ systems than between indigenous peoples and the Canadian government. The group describe themselves as ‘a filter layer’ encouraging distributed application developers to start working with indigenous communities in a spirit of collaboration, not colonisation.

Other indigenous blockchain projects, such as IDGO aims to create tourism and blockchain-based community economies for local indigenous peoples. Indigenous ID cards are verified by indigenous community nodes globally to strengthen local autonomy and ethnic identity. Tourists can buy digital passport permits, the revenue from which is returned to indigenous communities to pay for environmental protection, education, and cultural continuity (Ringuette, 2020). These projects may help empower some communities in the short term. They may encourage meaningfully engaged visitation. But such projects also support the conventional growth economy if they entertain alienated workers looking for eco-touristic voyeurism (Higgins-Desbiolles et al., 2019). In localised degrowth economies, the need for such escapism is less likely (Howson, 2020c), but the need for building international alliances between marginalised communities will remain. Dislocated communities, including indigenous perspectives, will continue to benefit from cultural exchange, even within a sustainable degrowth society.

Despite these mixed results, critical degrowth scholars should not be too keen to wholly reject blockchain. This technology foments political and economic change by circumventing growth-orientated interests, rather than fighting them (Russo, 2020). Continuing this fight maintains a crisis of imagination, blinkering the degrowth movement from seeing alternative post-capitalist futures (Thwaites, 2020). A distributed network of global infrastructure supporting more direct, deliberative, and democratic forms of governance, owned by a network of networked communities, could help transcend that crisis.

6. Conclusions

Centralised digital technology is destroying human freedoms and the environment (Bihouix, 2020). With new blockchain platforms for surveillance capitalism, green growth tools for environmental management are becoming increasingly more automated (Howson et al., 2019). Despite these concerns, some scholars understand blockchain as a potentially useful tool for transitioning towards a post-capitalist society (Huckle and White, 2016; Raworth, 2017; Büscher and Fletcher, 2020). Others argue that explorations around distributed technology point to a red herring, diverting attention away from degrowth’s target adversaries (patriarchy, racism, environmental destruction, and class conflict).

This commentary has offered a critical exploration of blockchain solutions to start discussions concerning how (or if) these technologies could be useful in facilitating sustainable degrowth economies. The exploration has focused on three key challenges for the technology. If blockchain is ever to prove useful for degrowth it would need to: 1) help build (re)distributive economies, 2) regenerate the environment without commodifying it, and 3) help facilitate international alliances without imposing a particular set of values. There are many other litmus tests besides those explored here that require research. What is certain is that these technologies on their own will not transcend political struggles ‘away from keyboard’. They might, however, make those struggles more effective, enabling a transition away from market capitalism locally and/or at scale.

#### The aff fails without the CP

Paul Mason 16, Visiting Professor at the University of Wolverhampton, BA in Politics from the University of Sheffield, Postgraduate Degree from the Second Viennese School at the University of Sheffield, PostCapitalism: A Guide to Our Future, Kindle Edition, p. 6-17

What started in 2008 as an economic crisis morphed into a social crisis, leading to mass unrest; and now, as revolutions turn into civil wars, creating military tension between nuclear superpowers, it has become a crisis of the global order.

There are, on the face of it, only two ways it can end. In the first scenario, the global elite clings on, imposing the cost of crisis on to workers, pensioners and the poor over the next ten or twenty years. The global order – as enforced by the IMF, World Bank and World Trade Organisation – survives, but in a weakened form. The cost of saving globalization is borne by the ordinary people of the developed world. But growth stagnates.

In the second scenario, the consensus breaks. Parties of the hard right and left come to power as ordinary people refuse to pay the price of austerity. Instead, states then try to impose the costs of the crisis on each other. Globalization falls apart, the global institutions become powerless and in the process the conflicts that have burned these past twenty years – drug wars, post-Soviet nationalism, jihadism, uncontrolled migration and resistance to it – light a fire at the centre of the system. In this scenario, lip-service to international law evaporates; torture, censorship, arbitrary detention and mass surveillance become the regular tools of statecraft. This is a variant of what happened in the 1930s and there is no guarantee it cannot happen again.

In both scenarios, the serious impacts of climate change, demographic ageing and population growth kick in around the year 2050. If we can’t create a sustainable global order and restore economic dynamism, the decades after 2050 will be chaos.

So I want to propose an alternative: first, we save globalization by ditching neoliberalism; then we save the planet – and rescue ourselves from turmoil and inequality – by moving beyond capitalism itself.

Ditching neoliberalism is the easy part. There’s a growing consensus among protest movements, radical economists and radical political parties in Europe as protest movements, radical economists and radical political parties in Europe as to how you do it: suppress high finance, reverse austerity, invest in green energy and promote high-waged work.

But then what?

As the Greek experience demonstrates, any government that defies austerity will instantly clash with the global institutions that protect the 1 per cent. After the radical left party Syriza won the election in January 2015, the European Central Bank, whose job was to promote the stability of Greek banks, pulled the plug on those banks, triggering a €20 billion run on deposits. That forced the left-wing government to choose between bankruptcy and submission. You will find no minutes, no voting records, no explanation for what the ECB did. It was left to the right-wing German newspaper Stern to explain: they had ‘smashed’ Greece.3 It was done, symbolically, to reinforce the central message of neoliberalism that there is no alternative; that all routes away from capitalism end in the kind of disaster that befell the Soviet Union; and that a revolt against capitalism is a revolt against a natural and timeless order.

The current crisis not only spells the end of the neoliberal model, it is a symptom of the longer-term mismatch between market systems and an economy based on information. The aim of this book is to explain why replacing capitalism is no longer a utopian dream, how the basic forms of a postcapitalist economy can be found within the current system, and how they could be expanded rapidly.

Neoliberalism is the doctrine of uncontrolled markets: it says that the best route to prosperity is individuals pursuing their own self-interest, and the market is the only way to express that self-interest. It says the state should be small (except for its riot squad and secret police); that financial speculation is good; that inequality is good; that the natural state of humankind is to be a bunch of ruthless individuals, competing with each other.

Its prestige rests on tangible achievements: in the past twenty-five years, neoliberalism has triggered the biggest surge in development the world has ever seen, and it unleashed an exponential improvement in core information technologies. But in the process, it has revived inequality to a state close to that of 100 years ago and has now triggered a survival-level event.

The civil war in Ukraine, which brought Russian special forces to the banks of the Dniestr; the triumph of ISIS in Syria and Iraq; the rise of fascist parties in the Dniestr; the triumph of ISIS in Syria and Iraq; the rise of fascist parties in Europe; the paralysis of NATO as its populations withhold consent for military intervention – these are not problems separate from the economic crisis. They are signs that the neoliberal order has failed.

Over the past two decades, millions of people have resisted neoliberalism but in general the resistance failed. Beyond all the tactical mistakes, and the repression, the reason is simple: free-market capitalism is a clear and powerful idea, while the forces opposing it looked like they were defending something old, worse and incoherent.

Among the 1 per cent, neoliberalism has the power of a religion: the more you practise it, the better you feel – and the richer you become. Even among the poor, once the system was in full swing, to act in any other way but according to neoliberal strictures became irrational: you borrow, you duck and dive around the edges of the tax system, you stick to the pointless rules imposed at work.

And for decades the opponents of capitalism have revelled in their own incoherence. From the anti-globalization movement of the 1990s through to Occupy and beyond, the movement for social justice has rejected the idea of a coherent programme in favour of ‘One No, Many Yes-es’. The incoherence is logical, if you think the only alternative is what the twentieth century left called ‘socialism’. Why fight for a big change if it’s only a regression – towards state control and economic nationalism, to economies that work only if everyone behaves the same way or submits to a brutal hierarchy? In turn, the absence of a clear alternative explains why most protest movements never win: in their hearts they don’t want to. There’s even a term for it in the protest movement: ‘refusal to win’.4

To replace neoliberalism we need something just as powerful and effective; not just a bright idea about how the world could work but a new, holistic model that can run itself and tangibly deliver a better outcome. It has to be based on micro-mechanisms, not diktats or policies; it has to work spontaneously. In this book, I make the case that there is a clear alternative, that it can be global, and that it can deliver a future substantially better than the one capitalism will be offering by the mid-twenty-first century.

It’s called postcapitalism.

Capitalism is more than just an economic structure or a set of laws and institutions. It is the whole system – social, economic, demographic, cultural, ideological – needed to make a developed society function through markets and private ownership. That includes companies, markets and states. But it also includes criminal gangs, secret power networks, miracle preachers in a Lagos slum, rogue analysts on Wall Street. Capitalism is the Primark factory that collapsed in Bangladesh and it is the rioting teenage girls at the opening of the Primark store in London, overexcited at the prospect of bargain clothes.

By studying capitalism as a whole system, we can identify a number of its fundamental features. Capitalism is an organism: it has a lifecycle – a beginning, a middle and an end. It is a complex system, operating beyond the control of individuals, governments and even superpowers. It creates outcomes that are often contrary to people’s intentions, even when they are acting rationally. Capitalism is also a learning organism: it adapts constantly, and not just in small increments. At major turning points, it morphs and mutates in response to danger, creating patterns and structures barely recognizable to the generation that came before. And its most basic survival instinct is to drive technological change. If we consider not just info-tech but food production, birth control or global health, the past twenty-five years have probably seen the greatest upsurge in human capability ever. But the technologies we’ve created are not compatible with capitalism – not in its present form and maybe not in any form. Once capitalism can no longer adapt to technological change, postcapitalism becomes necessary. When behaviours and organizations adapted to exploiting technological change appear spontaneously, postcapitalism becomes possible.

That, in short, is the argument of this book: that capitalism is a complex, adaptive system which has reached the limits of its capacity to adapt.

This, of course, stands miles apart from mainstream economics. In the boom years, economists started to believe the system that had emerged after 1989 was permanent – the perfect expression of human rationality, with all its problems solvable by politicians and central bankers tweaking control dials marked ‘fiscal and monetary policy’.

When they considered the possibility that the new technology and the old forms of society were mismatched, economists assumed society would simply remould itself around technology. Their optimism was justified because such adaptations have happened in the past. But today the adaptation process is adaptations have happened in the past. But today the adaptation process is stalled.

Information is different from every previous technology. As I will show, its spontaneous tendency is to dissolve markets, destroy ownership and break down the relationship between work and wages. And that is the deep background to the crisis we are living through.

If I am right we have to admit that for most of the past century the left has misunderstood what the end of capitalism would look like. The old left’s aim was the forced destruction of market mechanisms. The force would be applied by the working class, either at the ballot box or on the barricades. The lever would be the state. The opportunity would come through frequent episodes of economic collapse. Instead, over the past twenty-five years, it is the left’s project that has collapsed. The market destroyed the plan; individualism replaced collectivism and solidarity; the massively expanded workforce of the world looks like a ‘proletariat’, but no longer thinks or behaves purely as one.

If you lived through all this, and hated capitalism, it was traumatic. But in the process, technology has created a new route out, which the remnants of the old left – and all other forces influenced by it – have either to embrace or die.

Capitalism, it turns out, will not be abolished by forced-march techniques. It will be abolished by creating something more dynamic that exists, at first, almost unseen within the old system, but which breaks through, reshaping the economy around new values, behaviours and norms. As with feudalism 500 years ago, capitalism’s demise will be accelerated by external shocks and shaped by the emergence of a new kind of human being. And it has started.

Postcapitalism is possible because of three impacts of the new technology in the past twenty-five years.

First, information technology has reduced the need for work, blurred the edges between work and free time and loosened the relationship between work and wages.

Second, information goods are corroding the market’s ability to form prices correctly. That is because markets are based on scarcity while information is abundant. The system’s defence mechanism is to form monopolies on a scale not seen in the past 200 years – yet these cannot last.

Third, we’re seeing the spontaneous rise of collaborative production: goods, services and organizations are appearing that no longer respond to the dictates of services and organizations are appearing that no longer respond to the dictates of the market and the managerial hierarchy. The biggest information product in the world – Wikipedia – is made by 27,000 volunteers, for free, abolishing the encyclopaedia business and depriving the advertising industry of an estimated $3 billion a year in revenue.

Almost unnoticed, in the niches and hollows of the market system, whole swathes of economic life are beginning to move to a different rhythm. Parallel currencies, time banks, cooperatives and self-managed spaces have proliferated, barely noticed by the economics profession, and often as a direct result of the shattering of old structures after the 2008 crisis.

New forms of ownership, new forms of lending, new legal contracts: a whole business subculture has emerged over the past ten years, which the media has dubbed the ‘sharing economy’. Buzzterms such as the ‘commons’ and ‘peer- production’ are thrown around, but few have bothered to ask what this means for capitalism itself.

I believe it offers an escape route – but only if these micro-level projects are nurtured, promoted and protected by a massive change in what governments do. This must in turn be driven by a change in our thinking about technology, ownership and work itself. When we create the elements of the new system we should be able to say to ourselves and others: this is no longer my survival mechanism, my bolt-hole from the neoliberal world, this is a new way of living in the process of formation.

In the old socialist project, the state takes over the market, runs it in favour of the poor instead of the rich, then moves key areas of production out of the market and into a planned economy. The one time it was tried, in Russia after 1917, it didn’t work. Whether it could have worked is a good question, but a dead one.

Today the terrain of capitalism has changed: it is global, fragmentary, geared to small-scale choices, temporary work and multiple skill-sets. Consumption has become a form of self-expression – and millions of people have a stake in the finance system that they did not have before.

With the new terrain, the old path is lost. But a different path has opened up. Collaborative production, using network technology to produce goods and services that work only when they are free, or shared, defines the route beyond the market system. It will need the state to create the framework, and the postcapitalist sector might coexist with the market sector for decades. But it is postcapitalist sector might coexist with the market sector for decades. But it is happening.

Networks restore ‘granularity’ to the postcapitalist project; that is, they can be the basis of a non-market system that replicates itself, which does not need to be created afresh every morning on the computer screen of a commissar.

#### Cryptocurrency reaching a wide rollout builds resilience to survive inevitable existential filters.

Alex McShane 21, Writer and Head of Video for Bitcoin Magazine, BA from the University of Iowa, Degree from the University College Dublin, Degree from Kirkwood Community College, “Bitcoin and Existential Risk”, Bitcoin Magazine, 9/5/2021, https://bitcoinmagazine.com/culture/bitcoin-and-existential-risk-alex-mcshane

TL;DR - An existential risk is the possibility of an event or series of events that could drastically curtail humanity’s potential. A hypothetical global catastrophe could be anthropogenic or non-anthropogenic and internal or external in nature. The adoption of Bitcoin will better position us to address these risks as a society.

EXTERNAL NON-ANTHROPOGENIC

A catastrophic collision with an astronomical object, such as an asteroid impact would be an external non-anthropogenic risk. This has already occurred here several times. During the Permian Triassic period (ending 250 million years ago) an astronomical impact killed 90 percent of the species on Earth. It took tens of millions of years for life on Earth to repopulate and Earth’s intelligence potential to recover.

One interesting external non-anthropogenic risk is Earth’s reflected light, which could be measured by an external intelligence who then come to extinguish us. (The topic of our own signal bringing about this death by misadventure is discussed further below.)

What does this have to do with Bitcoin?

Generally, hard money facilitates greater innovation and technological process. At this point one might argue that if we do not migrate to some degree from Earth as a species, and are subsequently wiped out by an astronomical object impact or a super-volcanic event, the risk becomes anthropogenic in nature. We are a centralized species on a grand scale, and at this point one could say we have through consensus chosen to remain vulnerable to a single vector of attack by staying here.

Bitcoin is not only the hardest money known to man, it is the most responsible from this standpoint. Bitcoin as it currently operates is currency that can provide a monetary framework on which humans can achieve greater capital growth, collaboration, resource allocation, and therefore technological progress. Because the terminal supply of Bitcoin is capped, we can store value in it indefinitely as a society.

66 Million years ago the Cretaceous-Paleogene Extinction Event extinguished the life and intelligence potential of the non-avian dinosaurs. This series of events was external, and broadly non-anthropogenic in the sense that no form of life on Earth at the time contributed to its own demise, but more specifically, at the time of those astronomical impacts the first humans hadn’t split from chimpanzee lineages. This split is thought to have occurred between between 4 and 8 million years ago.

An important distinction between astronomical impacts or super-volcanic events of the past and such events if they were to happen today is that one could argue that our intelligence potential is now mature enough to tackle certain of the external existential risks. Today, the risk posed by an asteroid impact or something similar would still be external in its origin, but at what point does the burden of responsibility to migrate off of the planet fall upon our population? We can surely solve for some external existential risks, and in any case, no one is going to do it for us. You could say that failing to collectively pursue a solution when technically we could have would recategorize a civilization-extinguishing asteroid impact as an external but anthropogenic risk.

At what point do innovation dampening authoritarian states and their mandated broken money cause society to stall at a local optimum? Surely the government has already caused this. It’s only a matter of time before another object strikes the Earth with devastating consequence. I would argue it is irresponsible to continue life here with government money. Government money is an existential risk. Bitcoin is not only a solution, it is a societal responsibility.

INTERNAL ANTHROPOGENIC

Nuclear war is one example of an internal anthropogenic risk. That is, should nuclear war arise, it would be both self destructive, and relatively self contained on a cosmic scale. It follows that biological warfare is an internal anthropogenic risk, the reality of which we as a species can surely understand now. If I were to hazard a guess I would say virtual emergencies and cyber pandemics are next. These self constructed catastrophes are the government’s misguided attempts at proof of work. This is a topic for another time. Do not surrender your ability to think and speak freely.

The second law of thermodynamics can summed thus, processes that involve the transfer or conversion of heat energy are irreversible. The law indicates we have not observed a spontaneous transfer of energy from cold to hot. Another way to think of this is that there is no such thing as cold, only lesser degrees of hot. Nothing cannot transfer. So broadly, within a closed system, the second law of thermodynamics would indicate that all differences tend to level out.

So what has this got to do with Bitcoin?

Well firstly, all hardware is subject to entropy. The distributed nature of the blockchain increases the probability that it will survive centralized entropy. At Bitcoin’s inception, imagine a failure because Satoshi’s computer randomly crashed. Distributed networks are inherently hedged against this particular centralized form of existential risk.

The second law of thermodynamics also suggests that on a grander scale, relatively isolated (centralized) systems will degenerate more and more into disordered states. Proof of work, and network growth are two ways Bitcoin fights against falling into disrepair.

Bitcoin uses proof of work to stave off entropy. The system cannot stay dormant. It must continue to use proof of work to advance the state of the chain, and to fight entropy to secure the monetary value all of the users have stored in the network. The U.S. dollar, as many have pointed out, relies on proof of war, or distributed political energies to maintain dominance. Its methodology can be described as haphazard at best.

INTERNAL NON-ANTHROPOGENIC

One internal non-anthropogenic risk is that of a super-volcanic eruption, provided it wasn’t humans who brought about the eruption. Just like with external non-anthropogenic risks, Bitcoin alone cannot prevent them, but it can help humans prepare for them such that we may survive these relatively small intelligence filters the universe throws our way.

Bitcoin allows for fundamental capital accumulation and human innovation, and promotes collaboration to such a degree that we will find an increased collective problem solving power as humans the further Bitcoin adoption spreads. It is worth mentioning that Bitcoin also maintains and appreciates wealth to such a degree that often those of us to chose to live our lives on a Bitcoin standard will experience relatively greater freedoms, and vastly greater amounts of free time than our peers who chose to continue their lives on a fiat standard, and are perpetually working to outpace their chronic debt. Many Bitcoiners will likely forego that newfound free time to work and continue to provide value to others in whatever area interests them, because Bitcoin incentivizes the collaborative accumulation of capital but also the responsible reallocation of it.

EXTERNAL ANTHROPOGENIC

An external anthropogenic risk has the least probability of occurring. This is a problem of reach. Imagine human intelligence being sent into the cosmos and signaling or generally causing an external intelligence or astronomical object to come back to extinguish us. This is a most improbable extinction by misadventure.

The probability that we send messages of consequence into the cosmos that in turn cause some other far-flung intelligence, with knowledge enough to reach us, to come and bring about our own destruction is next to zero, but it isn’t zero.

I would posit that the probability increases every day that Bitcoin survives, with each person that chooses to hold Bitcoin over fiat, because on a fiat standard we are again, stuck at a local optimum at best, and each day the global monetary system devolves further into chaos. The fiat world may continue to be habitable chaos, but our technological progress and our greatest capacity for innovation cannot be achieved on a fiat standard.

A Bitcoin standard is not only our current best bet, it is the only monetary vehicle that will take us from here, or enable us to build technology that can effectively communicate with places in the universe where other intelligence has emerged. The other reason this fatal miscommunication is unlikely to occur is that once through a Bitcoin standard we have manage to build a society that can effectively reach and communicate at greater depths of the cosmos we will at that time have already become a multi-planetary, if not transitory, if not multi-solar system species. The topic of Bitcoin in space and planetary interoperability will be discussed in a later essay.

The most distant human made object from the earth is the Voyager 1, which is over 13 billion miles away. (For perspective, Apha Centuri, the nearest star system to Earth, is 25 trillion miles away.) Human radio signals have announced our presence and our intelligence to the cosmos since around 1900. The first human radio signals have all ready traveled 114 light years, that is 681,920,540,000,000 miles. Although the reach of our radio signals is very great, the probability of us being heard and subsequently extinguished is negligible. External anthropogenic risks are the least of our concerns at the moment.

As Bitcoin adoption grows, it serves to promote advances in artificial intelligence and nanotechnology. External anthropogenic risks will become more relevant to human intelligence at a much later time. External non-anthropogenic risks are similarly out of our hands for the time being. That is, at the moment there is nothing we can do to prevent the Sun from becoming a red giant star and subsuming the Earth.

But we do already have the monetary technology upon which to engineer solutions to some of these problems. We have the potential as humans to prevent internal global catastrophes, both those set on by us and not. Survival and longevity is arguably our greatest task as a species. Adopting Bitcoin, and protecting this network is proceeding with diligence and a long eye toward the future in all of our political and scientific affairs. The existential risks of living are great, though it is human nature for our ambitions to out pace our current abilities. The only evidence of life is change. To change is to exit fiat currency, it is to use Bitcoin instead.

## OFF

### K

#### The call to space fuels strategies of technocratic managerialism that position the American transcendental state as supreme---transcendence of limits enables imperialistic violence through intervention, war, circumvention of norms, preemption, and tactics of control

Daniel Sage 16, Senior Lecturer in Human Resource Management and Organizational Behavior at Loughborough University, Ph.D. in Political and Cultural Geographies from Loughborough University, 4/29/16, How Outer Space Made America: Geography, Organization and the Cosmic Sublime, p. 153-156

// Space’s vast endlessness is integral to US geopower – our production of US identity (Manifest Destiny) is wedded to the idea that we can transcend limits and explore / colonize. American geopower results in drone war/police helicopters etc. “Deterritorialization involves reterritorialization.”

In the preceding eight chapters I have argued that some of the unique qualities of outer space—vastness, Otherness, sublimity, timelessness, spacelessness—are just as integral to extra-terrestrial projections of US geopower, as its well-known capacity (Arendt, 1963; Cosgrove, 2001; Dickens and Ormrod, 2007; Dolman, 2001; Macdonald, 2007) to function as an Archimedean high point to monitor and control the surface, and atmosphere, of the Earth. While the focus of my study has been the United States, and more specifically NASA, the implications of this cosmic projection of geopower—the American transcendental state—are global in reach, from enabling and shaping imperialistic ideologies (Chapters 1-3 and 7) to fuelling the extension of technocratic managerialism (Chapter 4-6 and 8). What is more, messianic hope in America remains a global commodity, consumed, for example, through the internationally franchised Star Trek television episodes and films (Penley, 1997: 98-99), multinational ‘Space 2.0’ corporations, like SpaceX (Chapter 6), worldwide audiences to the addresses of American presidents (Chapter 6) and global tourist attractions like the National Air and Space Museum and Kennedy Space Center Visitor Complex (Chapter 7). These global circulations suggest that while my empirical focus in this study has been on the extra-terrestrial assemblage of the American transcendental state, as viewed from within the borders of the US, the salience of my analysis is geo-political.

The development of the American transcendental state through space exploration must also be viewed as an integral component of a far older geopolitical project—the production of an American identity defined in terms of the transcendence of limits, whether technological, economic, spiritual or territorial, enabling the moral aggrandizement of the past, present and future of a horizontal strata of sovereign territory and its peoples (McDougall, 1997; Noble, 2002; Nye, 1994; O’Brien, 1988; Ricard, 1999; Stephanson, 1995). Over the last decade or so, a growing number of scholars, including geographers, have turned their attention to how messianic-exceptionalist visions of America as the ‘Promised Land’ of ‘Chosen People’ have inflected various imperialistic projects including: the pursuit of democracy through military intervention in the ‘global south’ (Anthony, 2008); the technocratic ‘greening’ of Western global capitalism (Singer, 2010); the building of a ‘culture of war’ in foreign policy (Marsella, 2011), the circumvention of international institutions (Agnew, 2006); and most prominently perhaps, George W. Bush’s ‘war on terror’ where invasions of Afghanistan and Iraq became justified as a ‘cosmic struggle between good and evil’ (Agnew, 2006: 183; see also Barkun, 2010; Dijink, 2006; Strum, 2010; Wallace, 2006). All of this work indicates two points: first, the enduring Apocalyptic influence of dispensational pre-millennialism on both interventionist and isolationist currents within American (geo)politics (Strum and Dittmer, 2010: 18); and secondly, the rise of a religious cosmology that positions America at the moral, geographical, and spiritual, centre of the universe (Strum, 2010: 150).

My analysis of American spaceflight adds to this body of work on religion and geopolitics by drawing attention to five less discussed conduits of this pious vision of American geopower: (i) the secular—museums, family theme parks, systems management; (ii) the sublime—astronomical artwork, Moon landings and distant Nebula; (iii); the profane—Nazi slave labor camps, technocratic patriarchy, and dead astronauts; the technological (iv)—rocket production lines, O-rings, electrical wiring; and (v) the revolutionary—female astronauts, May 1968, and Richard Feynman. Analytically, these diverse registers suggest the utility of working with a broader, less explicitly spiritual, set of theoretical assumptions, to address the cosmological aspects of American geopolitics. This is why I mobilized the concept of the ‘American transcendental state’, rather than ‘deified nation’ (O’Brien, 1988: 41) within this study. This deliberately hallucinogenic sounding term captures some sense that the messianic-exceptionalistic projection of American geopower is a more diffusive, experimental, fantasmic, embodied, and ostensibly secular, affair, than conveyed within much discursive analysis of the religious undercurrents inflecting American geopolitics (for example Agnew, 2006; Dijink, 2006; Strum, 2010; Wallace, 2006).

I would like to suggest now that there is another benefit in bringing together these diverse practices under a broader analysis of the American transcendental state: their common geography becomes all the more obvious. That is, all these practices involve thinking, doing or resisting, celestial transcendence as an apparatus of American geopower; hence they can all be rightly considered ‘vertical geopolitics’ (Elden, 2013; Graham, 2004; Graham and Hewitt, 2013). This label has developed to identify a body of work addressing how the circulation of American geopower involves more than two-dimensional geographies of area. It currently includes analyses of; drone warfare (Gregory, 2011); aerial bombardment (Graham, 2004); police helicopters (Adey, 2010); satellite surveillance (Macdonald, 2007) and satellite drone navigation and targeting (Gregory, 2011). Elden (2013: 40) explains that ‘vertical geopolitics’ is mostly focussed upon how state political technologies allow diverse populations to be measured, calculated, controlled and killed, ‘from above’, and occasionally ‘from below’ (for example Elden, 2013; Graham and Hewitt, 2013). By contrast, the vertical orientation I have adopted here, while related, is different. Specifically, I have described how aspects of the projection of American identity, geopower, and territory, also involve a vertical spacelessness—a deterritorialization—a potential collapse into sublime, cosmic, insignificance; in short, rather than the ‘view from above’, the perspective I have traced has been a ‘view into the above’ (and back). In part, therefore, my study can be considered a response to Elden’s (2013) recent question: ‘How would our thinking of geo-power, geo-politics and geo-metrics work if we took the earth; the air and the subsoil; questions of land, terrain, territory; earth processes and understandings of the world as the central terms at stake, rather than a looser sense of the ‘global?’ (p49)

I propose we add to this list celestial entities, including the Moon (Chapter 3), the Martian surface (Chapter 6) and the Eagle Nebula (Chapter 7), as well as God (Agnew, 2006; Dittmer and Strum, 2010; Strum, 2013). Thus, perhaps we should be cautious of Elden’s (2013b) rather geocentric call ‘about how geopolitics might be thought as earth-politics rather than simply a synonym for global politics’ (p59). Instead, it might be more useful to bear in mind Deleuze and Guattari’s (1988: 101) argument that even absolute deterritorialization—something akin perhaps to the mathematical cosmic sublime of Kant (Nye, 1994: 7-8)—always involves reterritorialization(s). Recall how Charles Bonestell (Chapter 2), William Clancey (Chapter 6) and the National Air and Space Museum (Chapter 7), respectively, and persuasively, associated vistas of the Moon, Mars and the Eagle Nebula with the American West, and by extension locate America at the centre of God’s universe (Boime, 1991; Stephanson, 1995).

This analysis of American spaceflight also sheds light on seldom acknowledged connections between religious and vertical geopolitics and technocracy. The relation between critical analysis of geopolitics (O Tuathail, 1996) and technocratic management (Alvesson, 1987), remains remarkably undeveloped. Arguably this lacuna says more about the disciplinary separation between critical security studies and organization studies (Grey, 2009) than the various intellectual crossfertilizations between organization studies and human geography (Clegg and Kornberger, 2006; Dale and Burrell, 2008; Parker, 2013). Nevertheless, there are, as Grey (2009) maintains, clear resonances:

Indeed it could said that, in the same way that the development of security studies in particular, and organization studies to an extent, was shaped by geopolitics of wars both hot and cold, so too many current and future directions be in part a reflection of developments in contemporary geo-politics (p31).

Some organizational practices are of course, very much on the ‘front line’ of practical geopolitics; that is, they comprise the ‘the foreign policy bureaucracy’ (Ó Tuathail and Dalby, 1998: 4) through which geographical concepts are deployed to aid ‘conceptualization and decision making’ in ‘everyday foreign policy’ (O Tuathail, 1999: 110). Examples here include the work of the US Air Force, the CIA (Central Intelligence Agency) and the UK’s Foreign and Common Wealth Office. There are also a host of other organizations that no doubt influence how practical geopolitics is produced, from security analysts like the RAND Corporation to global defense contractors like McDonnell Douglas. However, analysis of the relationship between organizational and geopolitical practices remains embryonic. For example, Anderson’s (2011) study of urban counterinsurgency and Gregory’s (2011) of drone warfare, do no more than merely infer that the rise of the ‘networked organization’ is reworking the projection of American geo-power. Correspondingly, two organizational studies of the military only hint that, for example, masculine discipline (Godfrey et al., 2012) and team identities (Corona and Godart, 2010) shape and are themselves shaped by grand geopolitical narratives like the ‘war on terror’.

But the imbrication of geopolitical and organizational practice can also be more subtle and much less militaristic—concerning the anticipation and cultivation of geopower through shared national identities, that is ‘popular geopolitics’ (O Tuathail, 1999: 110). Here, the connection to organizational practices is no less significant, yet invisible in the literature. NASA offers a good example: from its inception, the space agency developed increasingly refined technocratic techniques that aligned people and machines to naturalize the pursuit of a popular geopolitics wedded to American geopower. Viewed in this way, imperialistic geopower and technocratic-managerialism are interwoven forces; hence the present study suggests the richness of more sustained critical analysis of organization and geopolitics.

#### Technocratic apathy makes war an inevitable outcome of calculative logics---removes the inter-subjective nature of war and reduces conflict to risk calculations that always justify conflict because of the increasing sophistication and remoteness of weapons

Columba Peoples 9, Senior Lecturer in International Relations, University of Bristol, 2009, “Haunted Dreams: Critical theory, technology and the militarization of space,” in Securing Outer Space, International Relations Theory and the Politics of Space, p. 152-178 (All of Chapter 6)

// War is no longer an ethical, interpersonal experience. It has become symbolic, detached from experience. The integration of technocracy in war means there is no separation between means and ends – all of this makes space war inevitable. Academic hegemony upholds the status quo.

***\*\* Italics in Original***

Christopher Coker interprets Adorno here as identifying a process of ‘dissociation’ by which the increasing sophistication and remote-ness of weapons, reaching new distances with the V-2, that had ‘begun to hollow out war as a social experience’. Adorno, according to Coker, feared that ‘in time societies would be able to target their enemies while immune from any threat or risk themselves. At that point war would cease to be an inter-subjective (and therefore) ethical experience’ (Coker 2001: 150).

Even more so than Adorno, Marcuse’s writings in the 1950s and 1960s make frequent reference to von Braun and the disturbing pre—history of the American space programme. In typically Marcusian fashion, these references played upon the contemporaraneous fixation with space in the US and the mix of fascination and fear it evoked in the public consciousness. By the early 1950s, as Rip Bulkeley and Graham Spinardi note, the American public had ‘acquired and alarmingly combined a typically post—war liking for science fiction, and a fascination for revelations about “ﬂying saucers”, with an intense “Cold War” anxiety about the “Communist menace” of the Soviet Union’ (Bulkely and Spinardi 1986: 11). Such combinations were encouraged by the publication of von Braun’s contribution to the ‘Space—Flight’ issue of Collier’s magazine in 1952, expounding plans for a ‘Space Station and Bomb Platform’, replete with illustrations of a wheel—shaped, nuclear—armed space station (Neufeld 2006: 52—62). ‘Facing the existence of the atomic bomb and the fact that such a circling rocket represents an everpresent threat above the heads of almost every nation’, von Braun assured US Army representatives in 1946, ‘that nation which ﬁrst reaches this goal will possess an overwhelming military superiority over other nations’, and recommended using such a platform as a means for launching pre-emptive nuclear strikes on the Soviet Union (Neufeld 2006: 53—54). Likewise, the *Collier’s* piece described how satellites placed in orbit could be used to fire ‘Small winged rocket missiles with atomic warheads’ which could be ‘accurately guided to any spot on earth’ (Bulkely and Spinardi 1986: 12). Such ideas only made Americans more nervous once the Soviet Union launched Sputnik in 1957.

Marcuse effectively tapped into this mixture of fascination and anxiety over the development of space technology by alluding to the more disquieting past of rocket technology discussed in the previous section. In a striking passage of *One Dimensional Man*, his assault on what he viewed as the disappearance of genuine freedom and critique in post—war (particularly American post—war) society, Marcuse asserts that:

*Auschwitz continues to haunt, not the memory but the accomplishments of man — the spaceﬂights; the rockets and missiles; the ‘labyrinthine basement under the Snack Bar’; the pretty electronic plants, clean, hygienic and with ﬂower beds; the poison gas which is not really harmful to people; the secrecy in which we all participate. This is the setting in which the great human achievements of science, medicine, technology take place; the efforts to save and ameliorate life are the sole promise in the disaster. The wilful play with fantastic possibilities; the ability to act with good conscience, contra naturum, to experiment with men and things, to convert illusion into reality and ﬁction into truth, testify to the extent to which Imagination has become an instrument ofprogress.*

(Marcuse 1962: 248)

Marcuse’s juxtaposition of the seemingly banal with the barbaric is one of his common motifs; the ‘labyrinthine basement under the Snack Bar’ is a reference to the nuclear war ‘scenarios’ played out in the 1950s and 1960s at the RAND corporation in sunny Santa Monica, California (Kaplan 1983).

Quoting from promotional material he found to be representatively abhorrent, Marcuse declares that

*The rockets are rattling, the H —bomb is waiting, and the space—ﬂights are flying, and the problem is ‘how to guard the nation and thefree world.’ It is a picture in which ‘the world becomes a map, missile merely symbols [long live the soothing power qfsymbolisml] and wars just [just] plans and calculations written down on article...’In this picture, RAND has transﬁgured the world into an interesting technological game, and one can relax — the ‘military planners can gain valuable "synthetic" experience without risk’.*

(Marcuse 1962: 81)

Marcuse identifies a similar tendency in the widespread ‘hyphenised abridgement’ of the corporeal and technological as an implicit sanitization of new means of destruction and their creators. Here he refers speciﬁcally to ‘“bush—browed” Teller, the “father of the H—bomb”’ and ‘“bull—shouldered missileman von Braun”’, representative quotes he takes from the popular media (Marcuse 1962: 84).

With regard to the latter, von Braun’s time in America provides a rich tapestry for those of a Frankfurt School bent, with the rocket—man proving something of a model product of the ‘culture industry’ and the ‘star system’. Von Braun’s activity in promoting the idea of space exploration and the early American space—programme had elevated him to celebrity status, and his life became the subject of a Hollywood movie in 1960, I Aim at the Stars. Von Braun disliked the film intensely, although he was not exactly publicity shy.

His star—quality assured by his intellect, chiselled features and natural propensity for promotion of space exploration, von Braun appeared on the covers of Time and Life, and was a subject for This is Your Life! Among his celebrity friends were such luminaries as Walter Kronkite, John Denver and Walt Disney, with whom von Braun made a series of TV shows on the possibilities for space travel (Ward 2006: 11). This ‘management of his public image, backed by his superiors and a sympathetic, cold—war—driven press’ helped to diminish the memory of von Braun’s earlier proposals for a nuclear—armed space station and shift the emphasis to peaceful and scientific exploration of space (Neufeld 2006: 52, 59). Those who knew von Braun, such as the astronaut John Glenn, lauded him as ‘a space—age Renaissance man’, interested not only in space but also a keen reader of ‘books on religion, comparative religion, philosophy, geography, geology and politics and a whole realm of other subjects’ and possessing a ‘curiosity about everything around him just as curious about matters of religion and politics and philosophy and government as he was interested in how to build a better rocket’ (Ward 2006: x).

This image of the inquisitive von Braun, curious about all around him and conversant on topics of religion and philosophy, is somewhat difficult to reconcile with the image of von Braun as the dreamer caught up years earlier in the cogs of the German war—machine, oblivious to the suffering and slave labour of Dora and Mittelwerk. Bob Ward argues that there is no ﬁrm evidence that von Braun ever visited Camp Dora, although he had seen the primitive living conditions inside the factory tunnels prior to the camp’s establishment (Ward 2006: 67). Von Braun himself later emphasized that he was not directly in control of the production facilities, remarking of those that were that,

*I would never have believed that human beings can sink that low; but I realized that any attempt [at] reasoning on humane grounds would be utterlyfutile. These individuals had drifted soﬁzr away from even the most basic principles ofhuman [morality] that this scene ofgigantic suﬂering left them entirely untouched.*

(Ward 2006: 67)

Irrespective of what von Braun knew or could do about the conditions of the V weapons production, though, it’s difficult not to get the impression that his overriding concern was for his work:

*Any moral conﬂict caused by the thought the rockets [V—2s] could be used as weapons in a war was opposed by the desire for finance for our space plans. We always considered the development of rocketsfor military purposes as a roundabout way to get into to space.*

(Ward 2006: 70)

Von Braun ends up then, not as a Nazi ideologue, but as something of a Faustian character enslaved by the prospect of making his rocket dreams a reality, seemingly at any cost. As Michael J. Neufeld concludes, it is von Braun’s ‘technocratic amorality, his single—minded obsession with his technical dreams, that is so disturbing’ (Neufeld 2002: 72).

It is this seeming apathy to the relationship between means and ends, and the diptych between von Braun the idealistic dreamer of space and the pragmatic realist, that would perhaps mark out von Braun as a ‘One Dimensional Man’ in the Marcusian sense: ‘The formerly antagonistic realms merge on technical and political grounds — magic and science, life and death, joy and misery’ (Marcuse 1962: 248). The most damning criticism of von Braun is, perhaps, in his apolitical indifference to the furtherance of his dreams. Here again Marcuse takes von Braun to be representative of a broader trend:

*The interdependence of productive and destructive forces, which characterizes technicity as domination, tends to suppress any difference between the ‘normal ’and the abnormal ‘use’ of technology. The difference between the use of ‘technology’ and science by the Nazis and by democracy is dubious. A missile remains a missile whether it destroys London or Moscow, and Mr. von Braun remains Mr. von Braun whether he works for the Brown House or the White House. The absence of an ultimate purpose in technology manifests itself equally in politics, where it becomes open to suspicion and contestation.*

(Marcuse 1oo9: 124)

Von Braun’s imagination becomes an instrument of progress, to paraphrase Marcuse, becoming subservient to instrumental technical rationality. In this vision, ideological leanings are a somewhat secondary question. Perhaps appropriately, Ordway and Sharpe note that in the period during which von Braun and his rocket team were held by the allies before being allowed into the US, ‘Some of the Germans were issued brand new Nazi Party uniforms, but without insignia — the only clothing for them the British quartermasters could find’ (Ordway and Sharpe 2003: 209). This image — of the previous servant of the Nazi war machine now wearing the now apparently neutral costumes prior to their entry into the ‘Free World’ — fits the Marcusian vision perfectly. The elimination of the outward identifiers of fascism creates the grounds for the absorption of fascist techniques into capitalism: in this case, the instrumental calculation of the value of the Rocket Team to the US was reason enough to overlook the troubling context of their wartime work.

We might say that technological rationality, in this instance, is overriding, ﬁnal, and its own justiﬁcation, becoming what Marcuse termed as the ‘Happy Conscience’:

*In this general necessity, guilt has no place. One man can give the signal that liquidates hundreds and thousands of people, then declare himself free from all pangs of conscience, and live happily ever ater. The anti-fascist powers who beat fascism on the battleﬁeld reap the benefits of the Nazi scientists, generals and engineers," they have the historical advantage Qfthe late—comer. What begins as the horror of the concentration camps turns into the practice of training peoplejbr abnormal conditions — a subterranean human existence and the daily intake of radioactive nourishment.*

(Marcuse 1962: 80)

The ‘practice of training people for abnormal conditions’ (in reference to nuclear tests involving troops as well as the inculcation of the Cold War at a broader societal level) has a grim resonance with the altitude and cold experiments of Dachau and Auschwitz, although Marcuse, in some ways foreshadowing the starting point taken by Giorgio Agamben, views the logic of the camp as something more pervasive (Agamben 1998). Marcuse quotes one commentator approvingly that ‘The world of the concentration camps was not an exceptionally monstrous society. What we saw there was the image, and in a sense the quintessence, of the infernal society into which we are plunged every day’.4 Elsewhere Marcuse had noted that

*Throughout the world of industrial civilization, the domination of man by man is growing in scope and efficiency. Nor does this trend appear as an accidental, transitory regression on the road to progress. Concentration camps, mass exterminations, world wars and atom bombs are no ‘relapse into barbarism,’ but the unrepressed implementation of the achievements of modern science, technology and domination.*

(Marcuse 1998: 290)

In sum, for Marcuse and the other early Critical Theorists technological rationality equates to a mode of being in which modern science, technology and domination necessarily go together.

Contemporary US policy and the domination of space

It might be wondered, however, as to why particularly we should revisit Critical Theory in light of the resurgent debate on the militarization/weaponization of space. Certainly the rhetoric surrounding both the military and non—military use of space in the case of the United States, which has tended to stimulate the greatest debate in this regard, is pervaded by the language of domination underpinned by an assumption of technological supremacy. Indeed, pace Agamben, some have gone so far as to argue that current research into space weapons that could ‘target anyone, anywhere, at anytime’ portends the reduction of all life to ‘bare life’.5 Whether or not this assumption is backed up either by actual technological advances or funding is less easy to verify. But recent policy discourse surrounding US space technology is certainly replete with aspirations of ‘dominance’, and related concepts such as ‘space control’ and ‘space superiority’. Representative of this is the US National Space Policy, released in August, 2006 which states that:

*The United States considers space capabilities — including the ground and space segments and supporting links — vital to its national interests. Consistent with this policy, the United States will: preserve its rights, capabilities, and freedom of action in space; dissuade or deter others from either impeding those rights or developing capabilities intended to do so; take those actions necessary to protect its space capabilities; respond to interference; and deny, if necessary, adversaries the use of space capabilities hostile to US national interests.*

(US 2006)

This follows on the back of a persistent fascination with space as ‘the ultimate highground’ for both civil and military purposes (Wolfowitz 2002), the designation of space as within *Joint Vision 2020’s* mandate of ‘full spectrum dominance’,7 the elevation of the concept of ‘Space Control’ (‘the ability to assure access to space, freedom of operations within the space medium, and an ability to deny others the use of space, if required’8) within US air and space doctrine, as well as references by American military officials to the ‘importance of dominating space in peace and war’ (France 2000).

The role of space surveillance and communications technologies during the Gulf War of 1991, the US—led strike on Afghanistan and the invasion of Iraq in 2003 lend substance to this stated centrality of space dominance to US military capacity. In addition the latent ‘dual—use’ potentialities of missile defence technologies — whether in terms of using deployed Ground—Based or Sea—Based Missile Defense as a rudimentary form of anti—satellite or ASAT weapon (as was effectively illustrated by the US in its strike against an American spy—satellite in February 2008) or the offensive potential of ostensibly defensive technologies in development such as the ‘NFIRE’ and Space—Based Laser (SBL) — have raised further questions about the potential use of space as a theatre of war in its own right as well as a ‘force multiplier’ for conventional terrestrial conﬂicts (DeBlois et al. 2008).

Much of this current debate invites parallels with the period of the space weapons fantasies of the 1950s and 1960s and Marcuse’s ensuing analysis. Certainly there are echoes of von Braun’s proposed orbital bombing platforms in recent discussions of ‘Long—Rod Penetrators’ — satellites used to deliver projectile weapons from orbit (DeBlois et al. 2008: 70). Indeed, Neufeld argues that von Braun is a ‘forgotten forerunner to space power theory’, most notably being the first person to use the term ‘space superiority’, the antecedent to today’s concepts of space control and dominance, in print (Neufeld 2006: 52). Likewise, Marcuse’s war—gamers at RAND have their contemporary equivalent in simulations of space conflict in the ‘2o1o and 2020 time frame’ that invariably end up in escalated, even nuclear, conﬂict where players recommend space weaponization in the interim as a panacea (DeBlois et al. 2008: 66).

It would be tempting to read American space policy in this regard in terms of Marcuse’s assertion that:

*Technological rationality reveals its political character as it becomes the great vehicle of better domination, creating a truly totalitarian universe in which society and nature, mind and body are kept in a state of permanent mobilization for the defense of this universe 9.*

To do so would of course be taking Marcuse’s use of the term ‘universe’ too literally; even the ‘discursive universe’ surrounding American policy on space is not entirely closed, as objections to the bellicose nature of the current US stance attest to.1O At the same time, Marcuse’s foreboding reading of the nature of technological development in One—Dimensional Man and elsewhere might at the very least provide a cautionary reminder of the latent negative consequences of increasing technological sophistication, most obviously in weapons of war. As in Coker’s reading of Adorno cited earlier, Douglas Kellner argues that ‘[Marcuse] feared that more sophisticated technologies would “instrumentalize” war and produce ever more brutal forms of destruction — a vision amply confirmed in the Vietnam and Persian Gulf wars’.11 We could, arguably, easily extend this analysis to contemporary US space policy as illustrated above.

Conclusion: rocket dreams, critical consciousness

Where the Marcusian perspective arguably becomes more problematic, and certainly more provocative, is in its assertion that a stated desire to dominate, such as that recurrent espoused within recent US space policy, are only the most obvious outward manifestation of an intrinsic connection between technology and domination; his contention that there is a barbarism latent in all technological ‘progress’. Proponents of the military use of space as an aspect of current US policy are quick to point out that by space dominance they mean ensuring that the US preserves its access to space in all instances, not that the US should exercise complete control. Certainly, we might also want to refute the claim that technological innovation, in space as in any other realm, necessarily leads to domination. Here it is worth noting that Marcuse himself both dismissed the possibility that we might return to some kind of pre-technological culture and even at his most pessimistic still held out hope for what he termed as ‘the chance of the alternatives’:

*It [pre—technological culture] is an outdated and surpassed culture, and only dreams and childlike regressions can recapture it. But this culture is, in some of its decisive elements, also a p0st—technological one. Its most advanced images and positions seem to survive their absorption into administered comforts and stimuli; they continue to haunt the consciousness with the possibility of their rebirth in the consummation of technical progress.*

(Marcuse 1 962: 59)

So, in short, there might still be a chance that technological development could encompass more emancipatory social ends — a view extendable once again, presumably, to space technologies. Space has consistently been the realm of dreams, of the fantastical, of (hu)man’s striving to explore the unknown (Benjamin 2004) and imagination must certainly be required to think of alternative, less bellicose uses of space.

As Wendy Brown notes in a different context, however, ‘the ﬁgure of dreamwork taken up for political analysis promises to puncture the conceit of our innocence and virtue: dreams often tell us things we would rather not know about ourselves’ (2006: 690). Nowhere is this more clearly illustrated than in the case of von Braun and his Rocket Team and their inﬂuence upon the US space programme, where the ‘dream’ metaphor is employed recurrently both by participants and in subsequent historical narratives. The conditions of the advancement of their ‘dream’ of space exploration are, as was shown, somewhat opaque; even if the connections to forced labour and concentration camps are difficult to prove or disprove with finality, the vagaries of the past continue to exert a haunting quality to, as Marcuse put it, ‘the accomplishments of man — the space ﬂights; the rockets and missiles’. As in Goya’s painting, the sleep of reason produces monsters.

In this sense, it is perhaps worthwhile tarrying with the negative potentialities of the military use of space, even if these potentialities are still only in their infancy and dreams of ‘space control’ seem as fantastical as utopian visions for future space exploration and colonization (Radford 2006). Marcuse’s approach is suggestive of a move from, to paraphrase one of his own works, technology to hauntology: 12 current developments in space technology in the US in particular are haunted most immediately by the prospects for greater destructive capacity that they portend, but also by alternative visions for the use of space that they preclude. Marcuse argues that ‘Naming the “things that are absent" is breaking the spell of the things that are’ (1962: 68), and at the current moment there is a vital need to point out not only the negative consequences of the weaponization of space, but also to understand the tendency to conceive of space within a militarized framework in the ﬁrst place (think of the multiple visions of conﬂict in space that saturate the science ﬁction genre), and the rival ways of thinking about space that risk being marginalized as a result (for example, those with an emphasis on exploration or space, on outer space as a Weapons free ‘sanctuary’, or less anthropocentric understandings of the cosmos). In short, a critical approach to the military use of space must tread a careful path between despondency and determinism in the face of the development of space technology, and the utopian impulse so frequently associated with outer space. Without the former, the latter risks becoming ~~blind~~ idealism; Without the latter, assessments of the negative potentialities of space technology risk becoming complicit in the promotion of these largely still nascent capacities. As Joel Whitebook puts it in a different context: ‘The following question can still be raised: What is the fate of the transgressive— utopian impulse, given this new sobriety? For better or worse, that impulse Will exist as long as people dream’; but ‘Any process of enlightenment worth its name must engage the nocturnal’ (Whitebook 1996: 301). In the case of the militarization of space this might be extended to all aspects of the nocturnal: the dark side of the history of space exploration; space nightmares as Well as space dreams.

#### The alternative is a refusal to name and command space, a movement of transcendence to a plane focused on human experience, and an exploration of new affects that all interfere with the state’s technocratic, imperial impulses

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However, I am all too aware that in stressing the widespread application of this concept of the America transcendental state to understand American geopower— and, concomitantly, the fecundity of bringing together analyses of religion, verticality and now technocracy within critical geopolitics—I run the risk of constructing a totalizing, monstrous, edifice. The reader might rightly ask at this juncture, paraphrasing Nietzsche, have you not gazed into the cosmic abyss of American geopower for too long; are you not also reifying American geopower in the cosmos rather than challenging it? Indeed, throughout the preceding chapters I made reference to a rather singular sounding concept of the ‘American transcendental state’. But, as in the introduction, I must stress again here, that I took this decision for reasons of analytical clarity rather than to suggest I have revealed an independent, singular, definite and a priori reality (Law, 2006), some essence akin perhaps to what Agnew (2006: 184) refers to as ‘Americanism’. Instead, within each chapter I have traced the progressive assemblage of the American transcendental state—that is, nothing less than the divinely sanctioned, exceptional, and messianic, right and duty, of America, and its leaders in its name (Wallace, 2006: 225), to command cosmic space and time by evoking forces of ‘good’ and ‘evil’, ‘us’ and ‘them’ (Agnew, 2006; Strum, 2010). But the immutability of this cosmic vision (Strum and Dittmer, 2010; Wallace, 2006) belies the transformative, fragmented, heterogeneous components that sustain it, across landscape artwork, through Kennedy’s Moon Speech, to the O-rings of Space Shuttle Challenger. Throughout this study I have suggested countless relations through which this vision is not only produced (Dijink, 2006; McDougall, 1997; Noble, 2002; Nye, 1994; Ricard, 1999; Stephanson, 1995; Wallace, 2006) but circulated, maintained, resisted, repaired, transformed, and experimented with.

How then to conceptualize this heterogeneous, but obdurate, cosmic being? Latour’s actor-network theory (1987; 2005; 2012) is useful to an extent here; first, we can conceptualize the transcendental state as an ‘immutable mobile’ that ‘ends up traversing the universe’ by ‘pay[ing] for each transport with a transformation’ (Latour, 2013: 127); it is ‘not displacement without transformation but displacement through transformation (Latour, 2005: 223); second, the transcendental state can be understood as offering a prophetic, but partial, ‘panorama’ of the ‘world [cosmos] to be lived in’ (p189) which must then, in turn, be:

… carefully situated inside one of the many Omnimax theatres offering complete panoramas of society—and we now know that the more thrilling the impression, the more enclosed the room has to be. [American] Society is not the whole ‘in which’ everything is embedded, but what travels ‘through’ everything, calibrating connections and offering every entity it reaches some possibility of commensurability. (p242)

Read against Latour’s concepts of the ‘immutable mobile’ and the ‘localizable panorama’ it is easy to see why my analysis of American transcendental state has involved mapping circulations within as well as beyond our lives. And this is a political move too, because it suggests that opportunities to test and resist the American transcendental state are closer to hand than we might think. As revealed in Chapter 8, a great deal of effort is required to keep the transcendental state circulating because the heterogeneous conduits it passes through—electrical wiring, teleconferences, flight readiness reviews, budget decisions and O-ring joints—are capricious and experimental; that is, affective. Other Chapters acknowledged similar fragility accompanying the assemblage of the transcendental state, including; the partially-owned Declaration of Independence (Chapter 1), the globally unifying Earthrise photograph of Apollo 8 (Chapter 3) and the rusting rockets on display in the gardens of the Kennedy Space Center Visitor Complex (Chapter 7). Now located within this chain of heterogeneous transformations, what strategies might aid us in purposefully transforming this now confined totality? Or put differently, how might we engage outer space to resist this cosmic deification of America (O Brien, 1988)? In concluding this study, I propose three techniques but no doubt there are many more.

First, we can expose the void at the heart of this messianic-technocratic projection of geopower (Wallace, 2006). This approach was evidenced in Chapter 1 by Derrida’s (2002) deconstructive reading of Declaration of Independence. Derrida (2002) emphasizes how signing the Declaration in God’s name entails no democratic ownership over America’s future, in outer space or elsewhere. Across the development of American spaceflight, the perils of messianic, freefloating, notions of ‘Progress’, ‘Exploration,’ ‘Frontier’ and ‘The Future’ are all too apparent, not least for NASA itself. Lester and Robinson (2009) suggest the emergence of this critique within the American space policy community:

We should accept that “exploration” is a multivalent term, with many meanings, some of which are contradictory, and all of which have historical precedent. For too long we have looked at the history of exploration selectively, seeking to find the antecedents which justify our own vision of exploration: as science, as human adventure, as geopolitical statement. This is a definitional fight which cannot be won. Space policy must acknowledge the multiple visions for space exploration, developing a clear-eyed metric of value which avoids the vagaries of lofty “exploration-speak”, If the merits of human exploration of the Moon and Mars are primarily symbolic and geopolitical, what are these goals worth in terms of federal funding?

I am unconvinced by the economically instrumentalist conclusions made by Lester and Robinson (2009) about putting a value upon even NASA’s ‘softer’ geopower, but the general caution about harnessing nebulous messianic mythologies to advance American space exploration is valuable. Of course the problem is this tradition of finding our God in the cosmos is long-established as Olsson (2007) suggests via this retelling of the Babylonian creation epic, Enuma elish:

Marduk is the Lord of lords … Hail to the Chief! Fifty were his names, so numerous that if ever attacked he could always hide behind another alias. Never catchable as the specific this or that, always on the move as an ambiguous this and that … Ungraspable multiplicity. … In this mist-enveloped region of religion naming is the name of the game, an exercise in ontological transformations where earthly people appear as projections of heavenly gods, social relations as signs in the sky. … a signified meaning searching for its own coordinates (Olsson, 2007: 23).

Perhaps a more modest approach is required: we should simply resist the urge to name, and tame, the cosmos as a Whole, by naming a celestial Godhead in it that we claim for ourselves (Wallace, 2006) but cannot ever fully own. ‘Evil is the disaster of a truth when the desire to force the naming of the unnameable is unleashed . … Evil is not disrespect for the name of the other, but rather the will to name at any price’ (Badiou, 2004: 115-6; original emphasis). Challenging the cosmic aggrandization of America might therefore imply some attempt to resist naming our God/Future/Progress in the cosmos. Put simply, this all too easy act of cosmic de/reterroritalizaiton is too crude, too undemocratic, too costly.

A second, related, strategy which can be adopted to resist the American transcendental state was discussed within Chapter 3; this is the capacity to push transcendence to another plane or refuge—to follow one line of flight of cosmic deterritorialization and then re-territorialize the Earth in a panorama that starts with a common human experience, rather than those of any particular nation/ God/future. The aim of this strategy is to mobilize a cosmic imagination that can register something of the shared experience of being human.

In Chapter 3 I discussed how the Earthrise photograph from NASA’s Apollo 8 mission have stimulated new cosmic imaginations—including ‘spaceship’ Earth (Cosgrove: 2001, 257-262; Henry and Taylor, 2009; Ward, 1964), Noetic science (Benjamin, 2003: 60-61), global political ecologies (Connolly, 2002)—that defied nationalistic appropriations by inferring a human transcendence. However, as the American author Kurt Vonnegut explains such a transcendental image of humanity, emptied of territorial divisions and difference, is not itself without risk: ‘Earth is such a pretty blue and pink and white pearl in the pictures NASA sent me. It looks so clean. You can’t see all the hungry, angry earthlings down there—and the smoke and sewage and trash and sophisticated weaponry’ (Vonnegut cited in Burrows, 1998: 423). Similarly, Deleuze and Guattari (1988) suggest we should always remain sceptical that de-territorialization is a progressive act on its own: ‘Never believe that a smooth space will suffice to save us’ (p500).

A third strategy is to augment different affects amid the assemblage of the American transcendental state. As described in Chapter 8, the American transcendental state depends upon the cultivation of confidence in technocracy allied to an affective becoming hopeful—a positive openness to the future as life enhancing—orientated around the transcendence of America in cosmic space and time. But, as Anderson (2006), explains, becoming hopeful does not necessarily need to operate in this transcendental manner: hopefulness can also emerge not to ward off suffering, but through every day sorrows, through diminishment of the body’s potential to affect and be affected. Consider, for example, how Dotty Duke refused to discuss her fears and anxieties with her astronaut husband as she kept the ‘house in order and [took] out the garbage’ (Duke 1990—Chapter 5). Dotty Duke epitomizes a different kind of becoming hopeful—a capacity to remain open-ended about the future in a life enhancing manner through diminishment—devoid of discussion of a better future in Earth or in the cosmos; this is hope that challenges ‘the easy equation between transcendence and a future elsewhen or elsewhere in favor of an imminent transcendence from within vectors of diminishment’ (Anderson, 2006: 749; for more analysis of immanent transcendence related to Space see Smith, 2009: 211).

Another affect which is useful in short-circuiting the hopeful assemblage of the transcendental state is boredom. Anderson (2004) describes boredom as the moment when the ‘“forgetting” intrinsic to habit has been momentarily incapacitated. It is the unravelling of habit, a sudden realization of the again’ (p743). Boredom depresses the life enhancing capacity of ourselves to be open to the future, engendering stillness and slowness of thought-action in spacetime, where, as Anderson (2004) puts it, the capacity to experience the ‘not yet’ (p749) is suspended. The evolution of American spaceflight might appear to some the antithesis of boredom, but, as Jorgensen (2009) suggests, the American humanization of outer space has gone hand in hand with endless repetition (of middle America):

The August 1969 Life Special Issue, released to commemorate the landing, wants to produce sympathetic accounts of the astronauts. It is filled with glossy, high color photographs of the astronauts not only mastering outer space, but their domestic spaces as well. Neil Armstrong bakes pizza, Buzz Aldrin jogs through the suburbs, and Mike Collins prunes his garden. These images resonate with outer space itself, as the astronauts use tools in both terrestrial and extraterrestrial environments. The spatula and shears the astronauts use to cook lamb curry and prune roses with resemble the objects they hold while walking the moon, these being a laser reflector, seismometer and solar wind sheet (p179).

There is no hopefulness on offer in Jorgensen’s (2009) reading of American spaceflight. Instead the boredom experienced in the cosmic repetition of middle America signals despair: ‘Apollo 11 represented an America that had become unhinged by its own technocracy, its middle class lifestyle, and television’ (p188). Jorgensen (2009) is not, of course, alone in identifying aspects of spaceflight repetitive, even boring. As the emergence of the Teacher in Space program demonstrated (see Chapter 8), NASA itself has historically attempted to introduce elements of excitement, even increased risk, to engage a global audience. Yet, of course, a balance has always had to be struck, as Parker (2009) explains of Apollo: ‘Everything was supposed to be boring, because boredom meant no surprises, and hence the possibility of the adventure in some sense rested on its denial’ (p326). Although fleeting, boredom is surely an unavoidable ingredient in NASA’s technocratic confidence, but when focused and channeled, it does suspend hope in the cosmos as a better place, perhaps providing an opportunity for us to pause and register something of the sublime Otherness of Space, where we concurrently repeat and differ ourselves into infinity: ‘Media representations of space travel turn the vastness of space into the similitude of domesticity, as human familiarity comes to stand in for the infinite. At the same time, the domestic attains the dimensions of the infinite, and in turn becomes strangely unfamiliar to the television viewer’ (Jorgensen, 2009: 179).

These three techniques of cosmo-political intervention—refusal to name, human transcendence, and sensitivity to new affects—are all worthy of greater attention, especially when they can be connected up to, and interfere with, the assemblage of the American transcendental state. Clearly not all of those involved directly in the development of spaceflight will want or be able to practise these techniques. Nevertheless even among this group these techniques are intended to offer greater receptivity to new cosmographical imaginations which move beyond the cosmic aggrandization of messianic-imperialistic-technocratic impulses. If we have entered the Cosmic Age where all territorializing assemblages, all States, now derive vital energy from the Cosmos (Deleuze and Guattari (1988: 342), then the imperative becomes not to simply do cosmopolitics (Latour, 2005) but rather which cosmo-politics do we want to pursue? My favoured vision of a Geography of Space is one where this question is endlessly asked but never answered with absolute confidence.

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#### Private LEO constellations are economically viable in the long term, but require upfront investment – those uniquely solve disaster response because of satellite internet’s connectivity options for island countries

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Satellite communication plays a necessary role in the global connectivity ecosystem, connecting rural and remote populations, providing backhaul connectivity to mobile cellular networks, and rapidly establishing communication in emergency and disaster response scenarios. This Asian Development Bank (ADB) Sustainable Development Working Paper, the first in a series reviewing emerging innovations in connectivity technologies, focuses on low Earth orbit (LEO) satellites, which have been in deployment for decades and are again a subject of intensive investment as new large constellations are in early stages of deployment. These new LEO constellations, such as those being deployed by Starlink by SpaceX, Project Kuiper by Amazon, OneWeb, Lightspeed by Telesat, among others, may prove to be transformational to the connectivity landscape based on their global coverage and their suitability for areas not served by fiber optic cable networks. ADB’s developing member countries are well placed to leverage and benefit from this expansion of internet connectivity, particularly for underserved geographies and countries with limited international internet bandwidth, such as landlocked developing countries and small island developing states. With their global reach and coverage, LEO constellations are expected to dramatically expand the availability of high-speed broadband internet access with levels of service that rival fiber optic cables in terms of speed and latency, and at significantly reduced price levels compared to traditional geostationary satellites. A proactive engagement with LEO solutions is likely to yield benefits as the relevant business models are still evolving. Well-informed early action by regulators and investors can ensure that developing member countries prepare for opportunities presented by the anticipated expansion of connectivity bandwidth. I. IntRoDUCtIon This Emerging Connectivity Innovations Case Study on SpaceX Starlink and low Earth orbit (LEO) satellite constellations is intended to provide readers, particularly in developing countries in Asia and the Pacific, with a background understanding of the role of satellite communications in global internet connectivity and an exploration of the potential impact of the next generation of LEO constellation systems. While the adoption of internet connectivity across the world has generally increased incrementally, some innovations have been transformational, dramatically expanding the geographic reach of connectivity and bandwidth capacity. For example, the introduction of basic mobile phones in the late 1990s and early 2000s led to rapid adoption of mobile telephony across low- and middle-income countries (a phenomenon known as the “mobile miracle”). Similarly, public and private investment in undersea fiber optic cables circling sub-Saharan Africa in the 2000s significantly reduced the cost of bandwidth in many countries in the region. Satellites have used low Earth orbits since the beginning of space exploration; however, private investment in LEO constellations, consisting of hundreds or thousands of satellites, has been limited because significant up-front capital expenditure is required. While it remains to be seen how the next generation of LEO satellite constellations will evolve, LEOs are forecasted to significantly increase the available internet bandwidth in remote and rural geographies not currently served by fiber optic cables. This increased bandwidth could be leveraged to increase economic and social development opportunities for individuals, organizations, businesses, and government facilities (including public schools) located in these areas, provided that the private sector satellite companies investing in LEO constellations see market opportunities to extend service to these areas. This case study is intended to introduce to Asian Development Bank developing member countries how to start preparing for the expansion of LEO satellite communication services. II. BACKGRoUnD: sAteLLIte ConneCtIVItY As A MeAns FoR BRoADBAnD InteRnet Internet connectivity has become a necessary component of every country’s critical infrastructure given the reliance of all aspects of economic activity, governance, and social development on internet communications. The coronavirus disease (COVID-19) pandemic dramatically increased the importance of internet communications infrastructure. Trade, employment, learning, leisure, and communications quickly shifted into the digital sphere and countries with robust internet infrastructure and high adoption rates of internet-enabled devices were better able to adjust and adapt to the shift to digital activity. The United Nations estimates that 1.6 billion learners were affected by school closures in 2020, affecting 94% of the world’s student population and up to 99% in low and lower middle-income countries.1 1 United Nations. 2020. Policy Brief: Education during COVID-10 and beyond. 2 ADB Sustainable Development Working Paper Series No. 76 Access to distance learning opportunities varies greatly by country and income groups, with estimates of less than half of students in low-income countries able to access distance learning.2 Internet access and adoption in the developing member countries (DMCs) of the Asian Development Bank (ADB) continues to grow, particularly as a result of public and private investment in telecommunications infrastructure, increased competition, and allocation of shared resources, such as spectrum auctions and assignment. Despite these efforts, large access gaps remain in Asia, where the most remote, difficult to reach, or sparsely populated districts remain disconnected, leaving more than half of the population without access to the internet. This lack of digital infrastructure represents a missed opportunity to accelerate economic and social development. Despite the rapid expansion of internet connectivity infrastructure across the world, significant gaps in internet adoption and infrastructure access remain. This highlights the importance of satellite communications that can bridge gaps, swiftly expand network coverage, and enhance existing infrastructure. The latest estimates from the International Telecommunication Union (ITU) show that 3.7 billion people are still not participating online (49% of the global population), and 63% of rural households are without internet access (Figure 1).3 Also, 1.5 billion people reside in areas without high-speed mobile data coverage (fourth generation long-term evolution or 4G LTE), while 607 million people reside in areas with no mobile data coverage at all (at least 4G or third generation [3G] coverage). Furthermore, 313 million people reside in areas with only basic voice and short messaging service (SMS) coverage (second generation [2G]), and 220 million people reside in areas with no cellular coverage. The ITU estimates that nearly $428 billion is required to achieve universal access to broadband globally, $251 billion of which is required for Asia, with approximately 75% coming from the private sector and the remainder with support from the public sector.4 The majority of the world’s population, over 5 billion people, live more than 10 kilometers (km) away from any fiber optic cable infrastructure (3.6 billion reside more than 25 km away).5 Other issues, such as affordability, digital literacy, and the lack of relevant or local language content, have resulted in 2.4 billion people who live within 4G coverage not subscribing to 4G data services. [FIGURE 1 OMITTED] Satellite connectivity is predominantly used for backhaul connectivity for remote cellular base stations and as a last-mile connection for individual subscribers and enterprises. Figure 2 provides an overview of the internet infrastructure network components, from international connectivity to the last mile. Because of the higher relative cost of bandwidth transmitted via satellite versus terrestrial technologies, satellite is currently primarily used in situations where fiber optic cables and other high-capacity technologies are not financially viable due to low population densities and large distances between high-capacity networks and last-mile networks.6 However, in a few cases, satellite connectivity is relied upon for international internet gateway traffic or as part of a country’s core network. For landlocked developing countries that are dependent on terrestrial fiber connectivity, in some cases, satellite connectivity serves as a substitute to complex bilateral and multilateral negotiations to extend costly fiber connectivity to their country. [FIGURE 2 OMITTED] Satellite connectivity is predominantly used for backhaul connectivity for remote cellular base stations and as a last-mile connection for individual subscribers and enterprises. Figure 2 provides an overview of the internet infrastructure network components, from international connectivity to the last mile. Because of the higher relative cost of bandwidth transmitted via satellite versus terrestrial technologies, satellite is currently primarily used in situations where fiber optic cables and other high-capacity technologies are not financially viable due to low population densities and large distances between high-capacity networks and last-mile networks.6 However, in a few cases, satellite connectivity is relied upon for international internet gateway traffic or as part of a country’s core network. For landlocked developing countries that are dependent on terrestrial fiber connectivity, in some cases, satellite connectivity serves as a substitute to complex bilateral and multilateral negotiations to extend costly fiber connectivity to their country. Particularly in situations where a high degree of data throughput is required per site, such as satellite backhaul for broadband cellular networks, the data volumes as well as the distance to the nearest backbone node play a significant role in cost comparisons between satellite connectivity versus terrestrial network deployments (microwave backhaul, in particular). Figure 4 illustrates how higher data bandwidth requirements are more cost-effectively supplied by terrestrial ground networks; however, a crossover point occurs where satellite capacity may end up being more cost-competitive, depending on different price points of satellite bandwidth and total traffic demand per month.12 Satellite connectivity is also well- suited to deploy in emergency situations, such as in response to natural disasters or other external shocks, that require expeditious deployment of network connectivity where terrestrial infrastructure is either nonexistent or destroyed. For many rural and remote communities, satellites are the only connectivity option. For geographies without direct access to fiber optic cable infrastructure or at great distances from high- capacity bandwidth capacity, satellite connectivity is the only option available. Even where terrestrial network infrastructure that could be used for backhaul connectivity is available, satellite deployments may still be preferred because satellite terminals require only electrical power and a clear line of sight to the sky. However, an expansion of terrestrial infrastructure usually requires extensive civil works (underground fiber ducts, pole attachments, or tower construction for cellular base stations), which comes with challenges such as securing the rights-of-way, permits, and having to pay the related fees. Satellite broadband is poised to become an even more important technology for addressing the growing digital divide. As information and communication technologies play an increasingly important role in commerce, government services, health care, education, and other sectors, satellite connectivity allows communities to get connected swiftly, bypassing the infrastructure deployment challenges that come with terrestrial infrastructure deployments. The role of satellite connectivity in emergency telecommunications has also been vital where the communications satellites are heavily relied upon in disaster recovery efforts.13 Satellite technology may also be complementary with traditional wired and mobile broadband, which are better suited for densely populated areas. Satellite service could become a default solution for remote areas, allowing terrestrial services to focus on improving access in their current coverage areas. Satellite connectivity is already being used for network redundancy at national levels for international internet capacity, as well as for backup in core and backhaul networks.14 The recent $50 million loan to Kacific by ADB for the deployment of a broadband satellite, which covers large parts of Southeast Asia and the Pacific, demonstrates the relevance of satellite connectivity for unserved and underserved regions.15 By deploying new satellite technology (in the Ka-band16), Kacific’s service offering is commercially viable despite the existing presence of other major competitors in Asia and the Pacific, including global entities such as Intelsat, SES, and Eutelsat, as well as more regional players such as AsiaSat, Thaicom, MEASAT, and SKY Perfect JSAT.

#### The Asia-Pacific is the most disaster-prone region in the world – the next catastrophe is a question of when, not if

Thomas Bickford et al 15, Ph.D., senior research scientist in CNA Corporation’s China Studies division, “The Role of the U.S. Army in Asia,” May, https://www.cna.org/CNA\_files/PDF/CRM-2015-U-010431-Final.pdf

Natural disasters As Typhoon Haiyan amply demonstrated when it hit the Philippines in November 2013, natural disasters can represent a significant threat to human security. In 2012, the Asia-Pacific region experienced 93 natural disasters, which affected some 75 million people.206 It is one of the most disaster-prone regions in the world:207 it is prone to typhoons and cyclones; it contains some of the world’s most active faults and volcanos; and many areas experience massive flooding. As former USARPAC commander Lieutenant General Wiercinski has noted, the only questions are when and where the next big disaster will occur. Admiral Locklear, Commander, USPACOM has noted that climate change is one of the region’s most pressing security challenges.209 While the ability to respond to natural disasters varies widely among countries in the region, even advanced countries can require international assistance, as Japan did after the March 2011 earthquake and tsunami.

#### Disasters are an existential threat---it’s try or die for response and coordination.

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As the three spheres of our habitat evolve and erupt, human beings frequently get in the way. Natural hazards become humanitarian disasters when they expose and exacerbate human vulnerabilities—those characteristics of societies that limit their ability to avoid major damage and recover quickly.3 Such vulnerabilities range from very concrete weaknesses in infrastructure or the exposed locations of large populated areas to more intangible dimensions of economic fragility, social cohesion, and political capacity, which affect both preparedness and recovery. Although the recent historical pattern of major storms, droughts, and earthquakes can be traced (see map 1 at the end of this report), the extent of human vulnerabilities is a complex and subjective matter, often evident only after the fact. Mortality figures are typically used as indicators of the severity of disasters. By that measure, the three worst disasters in the world since 1950 were the earthquake in Tangshan, China, in 1976 (250,000 dead), the earthquake and tsunami in the Indian Ocean in 2004 (240,000 dead), and the earthquake in Haiti in 2010 (316,000 dead).4 These three earthquakes were by no means the largest in that sixty-year time frame, but they occurred where large numbers of people were exposed and unable to protect themselves. Severity also can be measured by other direct effects: destruction, dislocation, and disease. The 2010 earthquake in Haiti not only killed more than 300,000 people but injured an additional 300,000, affected 3.7 million (30 percent of the total population), caused $8 billion in damage, and was followed by 470,000 cases of cholera with 6,631 attributable deaths. The death rate from an earthquake, hurricane, or epidemic is generally much higher in poorer societies than in richer ones, where economic damage is usually the more numerically impressive consequence. Because their constituents have come to recognize how much the damage from “acts of God” can be affected by the actions, or inactions, of human beings, political leaders are increasingly being held accountable for minimizing the foreseeable risks of extreme events. “Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention” is the indicative title of one important report by the United Nations and the World Bank. Reducing the risks begins with the recognition of how vulnerable many people have become. Throughout the world, in both wealthy and poor countries, ever-larger concentrations of people live in exposed locations under fragile or unprotected conditions. Infrastructure is often inadequate or deteriorating, and there is little or no awareness or preparation even for likely natural events. Those most exposed include millions in low-lying shorelines or coastal wetlands, marginal urban slums, and huge “temporary” settlements of internally displaced persons or refugees. Many of these populations depend on international humanitarian agencies to provide food and medicine and to assist local authorities in assuring adequate water, sanitation, health services, and shelter. As urban populations grow and conditions deteriorate further, reliable access to these necessities is becoming increasingly problematic for more and more people. Demographic trends best convey the scale of the challenges. In less than twenty years, the global population will rise from 7.1 billion to more than 8 billion. Key countries will grow even more rapidly. Between 2010 and 2025, Egypt is projected to grow from 81 million people to 106 million, Pakistan from 174 million to 234 million, and Nigeria from 159 million to 258 million.5 Many more people around the world will attain middle-class incomes, but a large percentage in many countries will be young and unemployed. Half the world’s population is already twenty-five years old or younger. Projections suggest that, by 2030, the world will need to provide fifty percent more food and additional fresh water equivalent to twenty new Nile Rivers.6 In that time frame, the needs of many countries, including India and China, will begin to exceed foreseeable water supplies for consumption and irrigation. The growth of earthquake-prone megacities is perhaps most telling of all. In just over a decade, metropolitan Jakarta will go from 9.6 million to 12.8 million people, Mexico City from 20 million to 24.6 million, Delhi from 22 million to 32.9 million, and Tokyo from 37 million to nearly 40 million—and these are just four of the thirty-seven cities that will then have populations greater than 10 million.7 There were only twenty-three in 2011. One of every seven or eight people in the world will be living in one of these massive metropolises, many in huge urban slums that have few, if any, services or infrastructure. Such concentrated population centers are extremely vulnerable to even normal patterns of earthquakes, storms, drought, and disease (see map 2). Epidemics that spread within such populations are especially difficult to contain. Climate volatility adds a further dimension of growing risk. Current changes in the climate of key regions portend severe near-term effects, whether or not the consequences of global warming match the worst predictions for the longer term. Since the 1980s the number of recorded natural disasters related to weather and climate has roughly doubled. According to the above-mentioned United Nations-World Bank report, “If there is no conscious change in adaptation policies to extreme events, baseline damages [even] without climate change are expected to triple to $185 billion a year from economic and population growth alone”8 (emphasis added). Nor are these risks confined to poor or middle-income countries. The world’s largest reinsurance companies, Munich Re and Swiss Re, warn of major increases in weather-related damage in both North America and Europe over the next decade.9 Contrary to critiques from global warming skeptics, the scientific and intelligence communities actually have been cautious in predicting the human effects of climate change. The April 2012 report of the Intergovernmental Panel on Climate Change (IPCC) is relatively conservative in forecasting future climate-induced disasters.10 Likewise, the National Intelligence Council handles climate change and natural disasters in a largely conventional and understated manner.11 However, an increasing number of authoritative reports have begun to highlight the dire risks of current climate trends and the need to begin assessing the potential for plausible adverse scenarios. Both the World Bank and the UN Environment Programme warned recently that the likely rise in global mean temperatures will exceed key thresholds sooner than previously expected, with implications for both severe weather and ocean surges.12 Security specialists are beginning to take these trends to heart. The Defense Science Board warned in its 2011 report that climate changes in key regions will interact with other vulnerabilities to become serious “threat multipliers.”13 The World Economic Forum highlights the interactive implications of climate changes with governance, fiscal, population, and technology vulnerabilities.14 A recent report of the National Research Council called on foreign policy experts to consider more systematically the political and security implications of foreseeable climate changes, suggesting that “it is prudent for security analysts to expect climate surprises in the coming decade, including unexpected and potentially disruptive single events as well as conjunctions of events occurring simultaneously or in sequence, and for them to become progressively more serious and more frequent thereafter, most likely at an accelerating rate.”15 Despite the pervasive dysfunction of most governments in addressing “climate surprises” and other disaster vulnerabilities, we will no doubt see environmental risks beginning to shape the political expectations of senior officials and thought leaders. As in the Cold War or the current ”war on terror,” responsible policymakers must look not only to the familiar and most imminent threats but also to less likely but higher-impact scenarios that could be truly catastrophic for national security, particularly if sudden and unanticipated.16 Not unlike other threats to peace and security, the inability to predict with certainty the location and timing of future natural disasters should not obscure a nation’s vital interest in assessing their likelihood and potential aftereffects.

Local Catastrophes and Global Repercussions

The challenge is to envision plausible threats and sequential patterns of potential danger—not to scare people but to anticipate potential consequences and devise strategies to prevent or reduce economic, political, and social damage. The National Research Council suggests using analytical “stress” tests of particular countries or regions to envision the effects of major disasters, or clusters of disasters, even if some of them should be considered unlikely. History offers examples of catastrophes that illustrate the possible ripple effects from otherwise local disasters. The Lisbon earthquake, tsunami, and fire of 1755 destroyed that city and decisively degraded Portugal’s role as an imperial power.17 The Spanish flu epidemic of 1918–20 killed an estimated fifty million to one hundred million people worldwide and was particularly lethal among young adults, compounding the immense losses to that generation from World War I. More recently, the destruction from Hurricane Katrina on the U.S. Gulf Coast in 2005; the earthquake, tsunami, and nuclear shutdown in Fukushima, Japan in 2011; and Tropical Storm Sandy on the U.S East Coast in 2012 exposed the interconnected vulnerabilities of coastal settlements, energy infrastructures, health-care facilities, and large-scale relief and recovery operations—a complex combination for which neither the United States nor Japan was adequately prepared. Major localized disasters do not always result in irreversible setbacks. The Chicago Fire of 1871, the Boston Fire of 1872, and the San Francisco Earthquake of 1906 resulted in the major reconstruction of all three cities, making each of them more economically vibrant and resilient.18 New York will undoubtedly be better prepared after Sandy, as New Orleans was after Katrina when it faced Hurricane Isaac in August 2012. Yet both disaster specialists and mainstream media too often treat natural disasters as limited and local matters. Media focus has typically been more on immediate suffering than larger implications, direct effects than long-term consequences, and infrastructure repair than major institutional reforms. Nevertheless, as the number and scale of natural disasters increases, we are likely to witness growing public awareness and anxiety about the vulnerability of certain areas, which will become a strong political factor adding to the wider and longer-term consequences of disasters. Internet technologies will facilitate not only the rapid dissemination of distressing information about natural disasters and severe environmental conditions but also the potential for exaggerated predictions, political incitement, conspiracy theories, or even popular panic. Worst-case scenarios may then become urgent political focal points, especially those that illustrate the fragility of economic necessities, social cohesion, or public safety.19 Economic Cascades The most troubling scenarios of natural disasters involve those with simultaneous effects on major essentials: food, water, land, medicine, energy, or subsistence income. An overlapping series of earthquakes, floods, and food shortages affecting a megacity could overwhelm the capacity of national and international agencies to respond adequately. Other consequences could follow: The Fukushima nuclear meltdown, for example, led both the Japanese and German governments to announce the phasing out of their nuclear power industries—a major blow to any prospect of curbing global carbon emissions.20 Disruptive disasters in major food-producing regions could have dire global consequences. Corn, wheat, and rice crop failures would lead to price hikes and shortages in far-flung locations. The worldwide collapse of one of these major staples—for example, from a new fungal infestation in one region and a drought in another—could lead to famines, export cutoffs, stockpiling and hoarding, or cartelized supply arrangements. Such developments could create new zones of instability, hostility, and populist pretexts for aggressive steps to secure new supplies or assure future access. The drive to guarantee food sources has already prompted the governments of China, Korea, Saudi Arabia, and others to buy land in Africa and Latin America for growing food that could be diverted from global markets during shortages. Water shortages could be another cause of future conflicts. Recent intelligence analyses suggest that countries are unlikely to go to war over water,21 but the larger patterns of depletion and diversion—glacial melts in South Asia and the Andes; upstream dams in the Middle East, East Africa, and Southeast Asia; widening drought in sub-Saharan Africa—suggest that peacefully resolving some disputes over severe water shortages could be very difficult. The genocides in Rwanda and Darfur owed much to the pressures of land, food, and water competition in fomenting ethnic conflicts.22 Medicine can be another life-and-death necessity in times of emergency. It is not difficult to imagine that the government of a state facing the prospect of a deadly epidemic would take steps to seize or intercept supplies of essential medicines. After European and U.S. laboratories cloned the lethal H5N1 virus, Indonesia demanded access to the vaccine formulas to assure adequate supplies for its huge population at reasonable cost. A global pandemic from that virus or a similar microorganism could lead to travel restrictions, news blackouts, and other isolationist reactions, but also to more aggressive measures to obtain lifesaving medicine. Massive casualties could undermine the standard protocols of global cooperation among international and national agencies, reducing global effectiveness in containing disease.23 Natural disasters can also sever transportation and communication links and global supply chains—life lines for necessities—compounding the catastrophe where the disaster occurs and affecting employment even in distant locations. In 2011 both the Thai floods and the Japanese earthquake and tsunami disasters affected hard-disk and auto suppliers, causing factory shutdowns and end-product shortages on other continents. The volcanic dust cloud from Iceland in 2010 halted European air traffic for only a week or so but even then had significant effects on both business and tourism. Compare this with the massive 1883 eruption of Krakatoa and the 1815 eruption of Mount Tambora, both in Indonesia, which created longer-lasting effects around the world. The Tambora event led to what was then called “The Year Without a Summer,” because of the adverse effects on U.S. and European weather patterns.24 Social Collapse Major disasters can have social consequences when the intense stress of damage and recovery causes breaks along ethnic, religious, class, or geographic fault lines. A major earthquake in a megacity could produce violent confrontations among groups competing for scarce relief supplies and recovery assistance. Or the disaster might create reverse-urbanization pressures for millions of homeless and jobless people in suddenly uninhabitable slums. Once again, the purpose of discussing such scenarios is not to suggest that social chaos following a disaster is a given but rather to consider ways to prevent, or at least reduce, that possibility. The major quake that struck Mexico City in 1985 produced not widespread strife but inspiring solidarity in local relief and recovery operations, even among the poorest citizens.25 That city is now a prime candidate for even bigger quakes, affecting an even larger population. Joint planning for such a crisis by the United States and Mexico could reduce the possibility of greater casualties and infrastructure losses that might impel hundreds of thousands to seek entry into the United States. Sudden large-scale migrations are an increasing prospect among the effects of climate change. Low-lying islands, flood-prone coastal areas, large refugee camps, and regions of prolonged drought could provoke major population movements. The possibility of Bangladeshis pouring into India to escape delta flooding has already led the Indian government to construct a 4,000-kilometer fence to forestall such influxes. Mass migration from Africa to Europe could also result from the droughts and floods affecting an increasing number of areas. Within the continent, such forced movement could compound urbanization trends. Such cataclysms are unlikely to occur without violence.

Political Catalysts

Natural disasters can dramatically expose deep social inequities and government indifference or incompetence, fomenting opposition movements. In 1970, the government in western Pakistan responded so poorly to the cyclone that struck eastern Pakistan that it strongly contributed to the secession of what became Bangladesh. The Nicaraguan earthquake in 1972 fatally discredited the Somoza regime. The Myanmar government’s heartless response to Cyclone Nargis in 2008 was likely a further factor in the military regime’s political vulnerability and may have accelerated the recent transition there. An unprecedented drought in Syria from 2006 to 2010 disrupted agriculture in regions that then became strong supporters of the armed resistance.26 The rise in global food prices that began with a severe drought in Russia in the summer of 2010 was a key factor in provoking popular uprisings in various Arab states the following year.27 An earthquake and tsunami near Jakarta—40 percent of which is below sea level and frequently inundated by heavy rains—could render much of that city uninhabitable and set back Indonesia’s economic growth and democratic development for years. It could also reduce the country’s ability to cooperate on global issues, such as deforestation or pandemic prevention, on which its involvement has been crucial.28 An earthquake in Karachi or Delhi or a major flood in Mumbai or Lagos could cripple the economies of their respective countries and further degrade the effectiveness of government authorities to avoid serious ethnic, sectarian, or even international conflicts. Major deterioration of any one of these cities could undermine the stability of their respective regions, with direct economic and possibly military consequences for the United States. Weak governments or failed states lack the capacity to prevent even moderate disasters from becoming severe crises. For any of the above scenarios, it is insufficient for only government agencies to be aware or prepared. As the extent of global fragility in the face of natural disasters becomes more widely felt, the public may sense the start of a regional or even global slide toward scarcities of various kinds, leading to political pressures for more secure sources of necessities. Such pressures increase the risk of international confrontation and present opportunities for exploitation by terrorists, criminals, or fanatics who see increased mayhem as in their interest.29

Defensive Measures and Strategic Adjustments

Efforts to reduce the severity of natural disasters and contain their larger consequences will require three kinds of initiatives: stoic, heroic, and “ecozoic.”

Stoic Resilience

Humans continue to cope with natural disasters largely as they always have, by “weathering” them: riding out storms, putting out fires, waiting out droughts, and helping out their neighbors. The capacity of societies to withstand catastrophes is generally referred to as resilience. Such resilience depends on physical, economic, cultural, and political factors that determine a society’s ability to plan for and recover from disasters without creating major social and economic fallout. These capabilities are almost entirely the “stoic” achievements of local people—namely, doing what is necessary to survive and prosper in the places they inhabit. As with all preventive efforts, the benefits of investing in resilient infrastructure and sensible preparedness far outweigh the costs of coping with the consequences after disasters strike. Strong and enforced building codes; zoning restrictions in coastal areas; prepositioned shelters and supplies; accessible hospitals, clinics, and health workers; wellpublicized evacuation routes; and other aspects of public awareness all make a substantial difference in reducing casualties and damage. Media coverage can sometimes give the impression that those most affected by disasters depend mainly on responses from outsiders, but the reality in most cases is otherwise. People in the path of a natural event are almost always most effective in helping each other, comprising the overwhelming proportion of first and subsequent responders.30 However, the United States is neglecting a range of major domestic vulnerabilities to natural hazards that could have catastrophic consequences.31 Stephen Flynn has most ably summarized these and other ominous features of what he calls our “brittle nation.”32 The vulnerability of coastal developments along the Eastern seaboard, so tragically demonstrated during Tropical Storm Sandy, is one continuing danger. On the opposite side of the country, earthquakes present the more ominous threat. As Flynn recounts, the deteriorating earthen levees that currently protect the massive farmlands of California’s Central Valley are vulnerable to seismic effects. If seawater were to breach the levees after a major earthquake, it would contaminate one of the country’s most important food and employment sources for years to come. Prolonged heat waves and drought in the Midwest, even worse than those in 2012, could permanently devastate croplands and damage the country’s strained and outdated electrical grid. As the U.S. public health infrastructure continues to degrade, deadly epidemics could severely reduce national economic performance and shake citizens’ confidence in the competence and reliability of government at all levels. The current economic stress and political paralysis in the United States complicate the country’s physical vulnerabilities. Debt levels and ongoing deficits substantially reduce the capacity of government agencies at all levels to address infrastructure and preparedness investments that reduce disaster risks. In 2012, even normally routine federal appropriations for disaster relief after Sandy became a political football.33 While most investments in community resilience, as well as in industrial and agricultural facilities, are state and local matters, congressional gridlock on many major issues indicates the difficulty that new assertions of federal authority or leadership would face in directing infrastructure changes or restricting flood zone settlements. The domestic vulnerabilities of the United States are further compounded by the global risks to vital U.S. interests resulting from the vulnerabilities of critical infrastructure and large populations around the world. While national development strategies increasingly emphasize “disaster risk reduction” and “sustainable economies”34 and certain countries, such as Bangladesh, Vietnam, and Mozambique, have successfully lowered their casualty rates from recurrent flooding through better preparedness and infrastructure changes, their examples are not widely imitated. Even their successes may be overwhelmed eventually by the expected scale of storms and ocean surges. Ethiopia and Rwanda have implemented food security policies that have increased their ability to cope with drought and other environmental challenges. But despite initiatives such as the U.S. Agency for International Development’s (USAID) Feed the Future program, the global prospects for substantial increases in food production are uncertain at best. Worldwide expenditures on health care, including infrastructure and training, experienced an exceptional increase over the last decade, especially from the U.S. government. However, both health and agricultural improvements depend on continued donor assistance, which has already fallen significantly since the global recession.35 Most fundamental to stoic readiness is the political capacity of societies to mobilize in the face of crises. Such capacity includes the ability to make decisions quickly and cohesively, to redirect funding rapidly without corruption, and to deliver supplies and support efficiently. Even effective democratic governments, such as those of Turkey or Indonesia, might find regional, ethnic, or religious diversity becoming a source of conflict in the wake of a massive natural disaster. More troubled federal polities, such as Pakistan or Nigeria, could unravel, although Pakistan has handled three successive seasons of massive flooding with remarkable resilience. In failed or failing states, government capabilities are especially lacking, and such political capacity is the most difficult set of skills and institutions to improve, even with major development assistance from outsiders.36 International organizations and financial institutions increasingly promote disaster risk reduction. Both the World Bank and the agencies of the UN system, led by the United Nations Development Programme, advocate investments that increase resilience to environmental challenges. But the resources to back up these recommendations are not commensurate. For example, under the impetus of the 1997 Kyoto Protocol on climate change, an adaptation fund to assist with risk reductions was initiated in 2001. But that fund was not actually launched until 2007, and despite the creation of a similar green climate fund at the Copenhagen climate change summit in 2009, both initiatives remain woefully underfunded—as highlighted in the latest global gathering on climate change in Doha.37 With a huge imbalance between growing global risks to large populations and declining investments in resilience, U.S. leaders will be forced to make difficult choices. U.S. policies on development assistance will likely have to adopt a form of preventive triage, placing scarce assistance dollars where they will have the most enduring effects on resilience and adjustment, rather than where the needs of poverty reduction and other objectives of the UN’s Millennium Development Goals (MDGs) might otherwise seem greatest. Already the efforts to set a new agenda for development after the deadline for the MDGs in 2015 include some recognition of the need for a more pragmatic view of sustainability. But as with the MDGs, the political dimensions of resilience continue to receive little emphasis in current drafts of these global manifestos.

Heroic Relief

Increased resilience must be matched with enhanced capabilities for effective relief. Improving the scale and effectiveness of assistance to the victims of disasters is an essential priority not only for limiting immediate effects but also for containing political fallout. In the United States, specialized national agencies, such as the Federal Emergency Management Agency (FEMA) and the American Red Cross, are the principal organizers of emergency support, supplemented by state-level agencies, the National Guard, and countless local and national non-governmental organizations (NGOs).38 Since Hurricane Katrina in 2005, all these actors have demonstrated improved capacities to deal with storms, even as available resources for future crises are in decline. Most other developed countries have similar, though mainly national, agencies to lead relief operations. In poorer countries, capacities are more variable, often either completely localized or highly dependent on national military agencies, as evidenced during the 2004 tsunami in the Indian Ocean. The National Disaster Management Authority of Pakistan, in its response to the massive floods of 2010 and 2011, has been one of the notable civilian exceptions. Assistance to the most at-risk countries to increase their own capacity for humanitarian relief should be a donor priority. Resources for humanitarian assistance from national donor agencies have seen major growth in the past twenty years. In the United States, funding for foreign disaster assistance has had strong bipartisan support in Congress for many years, and humanitarian relief resonates strongly with large portions of the U.S. electorate. The Office of Foreign Disaster Assistance (OFDA) within USAID has had a record of operational excellence and effectiveness. Other governments also have made international humanitarian assistance a high priority. Scandinavian ministries, the United Kingdom’s Department for International Development (DFID), and the European Commission’s Solidarity Fund have been especially generous contributors to relief operations in recent times, both directly and through UN agencies. The role of major international NGOs, corporate philanthropy, and foundations has also grown, with resources that sometimes exceed those from official sources. With the expansion of heroic generosity, the delivery of disaster assistance has become a major international industry. Large companies and suppliers sell their goods and services in the wake of each major event. NGOs similarly follow devastation and suffering from place to place. Many take advantage of public attention and sympathy for disaster victims to raise large amounts of money for relief. However, the effectiveness of relief operations, and especially the transition from relief to recovery, often has been less than optimal. Repeated proposals have been made to create a more centrally coordinated system, and UN agency leaders have made major advances over the past two decades in coordinating and funding major international relief operations. In 1991, the General Assembly created an Inter-Agency Standing Committee (IASC) of UN agencies, a Central Emergency Revolving Fund (CERF), and an Emergency Relief Coordinator (ERC) within the UN secretariat. The latter evolved by the end of the 1990s into the Office for the Coordination of Humanitarian Affairs (OCHA), headed by the ERC with the rank of under-secretary-general. In 2005, following the Indian Ocean tsunami, IASC members agreed on an intensified approach to collaboration, dubbed the “cluster system,” which divided relief operations into major functional components and designated lead agencies in each sector to coordinate the work of both international organizations and NGOs. The current ERC, Valerie Amos from the United Kingdom, has undertaken further efforts to improve the performance of the relief community, in the process raising billions of dollars through consolidated appeals, including urgent “flash appeals” to donors. The January 2010 earthquake in Haiti, which received huge publicity and donations, highlighted both the best and worst features of the international cluster system—and of heroic relief efforts in general.39 Assistance followed a familiar pattern of initial energy and compassion that dissipated once the atmosphere of emergency and improvisation shifted to the long-term demands for major reconstruction and local government control. The influx of supplies and aid workers during the first year of relief was overwhelming. One year later, agencies reluctantly faced the need to shift their promises from “building back better” (as former President Clinton likes to put it)40 to the harsher choices involved in satisfying donors that their resources were accomplishing more immediate concrete effects. Addressing short-term basic human needs for water, food, and shelter—often to people living in large tent cities—is a different task from that of rebuilding basic infrastructure, restarting large and small businesses, and forging political institutions that endure after agencies depart. As all too often happens, the initial humanitarian response to Haiti was overly romantic, inconsistent, and insufficiently attuned to the unique features of the local culture, economy, and political system.41 With intense economic pressures on virtually all major donors, disillusionment with relief operations may result in political pressures to reduce assistance. Popular support for even the most sympathetic causes may begin to wither, including among generous Americans, especially if foreign crises multiply, or if the U.S. homeland itself is struck by major natural disasters that divert attention and resources to domestic priorities. The multilateral institutional cushions needed to mitigate the social, economic, and political fallout from extreme events remain ad hoc and undeveloped. G-8 and G-20 summit agendas pay some attention to these issues but with little evident follow-through from national governments.42 The UN Security Council, despite one famous session to address the security implications of HIV/AIDs in early 2000, has been erratic and unfocused in dealing with the broader security challenges of disease and disasters. As the council is the principal global institution responsible for addressing international “threats to the peace,” such neglect will need to be remedied. International financial institutions have standard approaches for assisting with disaster recovery, such as the emergency response programs of regional development banks, as well as the World Bank’s Emergency Recovery Loan program, Hazard Management Unit, and Global Facility for Disaster Reduction and Recovery (GFDRR). The International Monetary Fund has an emergency assistance facility designed to ease the fiscal effects of major disasters.43 But these economic mechanisms are not scaled for the size of the challenges ahead, and the international diplomatic and intelligence channels needed to address urgent political and security risks are relatively undeveloped. Even the example of the successful global efforts led by the World Health Organization in responding to pandemic threats from the SARS and avian flu viruses may not prevent national budget cuts in preventive and public health capacity.44 The same budgetary fate could befall otherwise promising initiatives to reduce food insecurities, such as those which the G-20 governments have endorsed. The international community deserves great credit for its recent heroic efforts to aid societies affected by natural disasters. But it is highly unlikely that multilateral relief operations are prepared to work at the necessary scale when disaster incidents multiply. As with future investments in resilience, some form of priority setting or triage may become the imposed standard for major international relief as well. Ecozoic Relocation Even the most effective combination of stoic and heroic efforts will not sustain vulnerable populations indefinitely. As sea levels and storm surges continue to rise, as key fisheries are contaminated or extinguished, as certain regions become inhospitable to agriculture, or as earthquakes or epidemics degrade the capacity of megacities to provide for their citizens, some currently inhabited parts of the planet will have to be scaled back, or even abandoned, for large-scale settlement. Particularly if global warming trends fulfill some scientific projections, the planet may impose wholesale and dramatic adjustments to the locations, dimensions, and lifestyles of human settlements on a scale akin to the major migrations imposed by ancient ice ages. Anticipating future adaptations of this magnitude, some scientists and philosophers have begun to refer to a coming “ecozoic” age of human adaptation.45 In the United States, such speculation will likely surface initially as more intense versions of familiar controversies over development or rebuilding in coastal areas or floodplains. These issues involve decisions about zoning, taxes, subsidized flood insurance,46 and the various publicly funded programs that promote or sustain coastal growth, such as beach reclamation or the building of wave barriers and dikes.47 Developers and local politicians often downplay disaster risks and the pressures from local citizens are almost always to rebuild rather than to abandon or relocate. Yet even the most stoic impulses must confront difficult choices. New Orleans is a prominent case in point regarding resettlement and reconstruction in areas prone to further flooding, such as the lower Ninth Ward. Hurricane Isaac demonstrated that the huge post-Katrina investments in floodwalls and levies involved decisions to protect certain areas at the expense of others. Such choices now confront officials and citizens on the Jersey Shore, Staten Island, and Long Island in the wake of Tropical Storm Sandy. The same issues will be replicated around the world. Government subsidies for hazard insurance or expensive engineering for stopgap measures, such as dikes, imported water supplies, or beach reclamation, will at some point no longer protect exposed populations enough to justify the resources needed to maintain them. As media coverage and public discussion increasingly focus on the most exposed areas, many people will begin to vote with their feet and look to resettle their families and businesses in areas less exposed to the hazards they witness across the globe. Real estate prices and infrastructure investments will increasingly reflect the realities of that new marketplace. Obvious areas of special exposure already justify “exit strategies” or migratory transitions. The former president of the Maldives, Mohamed Nasheed, has become a prominent spokesman for the fundamental threats of sea level increases to small island states.48 In other exposed areas—such as low-lying estuaries of Bangladesh, Burma, and Vietnam, as well as large areas of Africa—desertification, erosion, or salinization could render agriculture or adequate supplies of potable water infeasible. Water shortages may make areas of Central Asia and the Middle East impractical for continued settlement. On an even larger scale, some experts suggest that the expected growth of certain megacities will reach practical ceilings because of the physical and economic limitations of distributing food and water.49 Major epidemics could accelerate these pressures to limit or reduce some urban populations. The political and social dimensions of massive shifts in environment and population are difficult to predict, but the likelihood is that over time large groups of people will become ecologically displaced persons or “environmental refugees,” forced from their historic homelands and needing relocation to more hospitable places within or beyond national boundaries.50 Such transitions will present large political and economic challenges, both for long-term humanitarian support and for immigration laws and enforcement. If these movements involve millions of desperate people, geographic and political boundaries will become increasingly problematic. Recommendations: National Security and Global Solidarity The incidence of military conflicts between states is at a historic low; even the number of conflicts within states has declined steeply since the twentieth century.51 However, both trends could be slowed or reversed by increased vulnerabilities to natural disasters and the limits of political and economic capacity to deal with them. How should the challenges ahead be framed in terms of U.S. national security and the larger “threats to the peace”?

Citizen Safety Most governments place their highest priority on national security, which begins with ensuring the physical safety of their citizens, or as John Jay famously put it in The Federalist: “Among the many objects to which a wise and free people find it necessary to direct their attention, that of providing for their safety seems to be the first.”52 While they are used to thinking of such safety in terms of protection from attacks by military or terrorist adversaries, Americans also regard their fundamental security as dependent on access to reliable supplies of air, water, food, medicine, and shelter.53 All would likely place these subsistence needs above any threat currently on the horizon, foreign or domestic. However, it is leaders—thought leaders as well as political leaders—who define the priorities for government policy and expenditures in dealing with what they perceive as the greatest threats to the country and its citizens. Such definitions of national security generally arise as narratives developed in the course or aftermath of major international attacks or threats of attack. Historical turning points in these narratives over the last hundred years include, for example, the German attacks on U.S. shipping that provoked the country into World War I; the Japanese attack on Pearl Harbor that plunged the United States into World War II; the Berlin crisis, Korean War, and Soviet nuclear tests that intensified the Cold War; and the September 11, 2001, attacks that provoked the U.S. War on Terror. Whether or not all Americans agreed with the security rationales their leaders offered at those times, they provided bold assessments of the threats confronting the country, which gained wide acceptance. Each narrative was a necessary, and apparently sufficient, political basis to enlist political support for executive orders, policies, legislation, appropriations, treaties, and other international commitments that were consistent with the leaders’ justifications. At present there is no reasonable prospect that U.S. leaders would create a national security narrative focused on the cumulative threats from an overstressed planet.54 To mobilize popular support for the major initiatives necessary to reduce foreseeable risks, U.S. leaders would eventually have to shift their characterizations of such threats from environmental to existential and from futuristic (after 2050) to imminent (before 2020). That shift is unlikely until Americans experience a pattern of severe crises that would shift popular perceptions and political attitudes in decisively different directions. No one wants to contemplate the horrific disasters that might drive such a shift in attitudes, especially when the destruction from Katrina and Sandy seem not to have had such an effect on most political leaders. Political resistance to the recognition of these likely threats is reinforced by a suspicion that those who highlight them are also seeking to justify major government interventions and expenditures, involving severe changes in lifestyles. References to global warming, or even to obvious climate changes, sound to some audiences as code words to justify carbon caps and oil taxes. Therefore this report assumes that such mitigation programs are not foreseeable in time to avoid the climatic, economic, and demographic consequences of current trends. Indeed, it is because these trends will not be changed in time that steps must be taken to adapt to their likely effects. U.S. political and thought leaders need to fulfill their highest responsibility—for the safety of citizens—by beginning to consider a range of risk reduction policies, infrastructure investments, and preparedness strategies, including the necessary legislative and budgetary changes, that might constitute an approach to national security aimed at reducing the direct and secondary consequences of natural disasters. Whether or not the necessary stoic and heroic steps are all politically palatable, the larger arguments for them should at least be actively under current debate. As Stephen Flynn has emphasized, most of these steps would not only reduce U.S. vulnerability to extreme natural events but would also reduce the opportunities for terrorists to exploit the same vulnerabilities.55 How these competing political pressures will play out depends not only on the timing and locations of disasters but also on how soon the growing public perception of our vulnerabilities becomes a political reality. The combination in 2012 of major tornados, midwestern drought, Texas floods, Hurricane Isaac, western wildfires, Arctic ice depletion, and Tropical Storm Sandy could mark the beginning of a sea change in the electorate’s expectations of present and future exposure to natural disasters. In that event, the hardest challenge for U.S. leaders may well be to prevent the country from turning inward to focus on domestic priorities and resisting involvement in the crises of other countries or regions. Such isolationism could be expressed through intensified calls for energy independence, food selfsufficiency, foreign assistance cutoffs, and even military retrenchment. Reversing decades of generosity and pragmatism, donor fatigue and domestic needs could generate a new version of an “America First” constituency that opposes all such international engagement and punishes at the polls any politician who supports it. Collective Containment U.S. leaders also cannot ignore the national security implications of the most serious risks of disaster beyond our borders. The safety of U.S. citizens is inextricably bound through the global economy with the course of environmental events in other parts of the world. Disasters or extreme conditions that degrade major agricultural areas (Russian, Australian, or Argentinean wheat fields, Japanese, Burmese, Philippine rice), disrupt for prolonged periods key manufacturing, transportation, or communications infrastructure (greater Bangkok, Bosporus, European airspace), or create immense casualties among large stressed populations (pandemics in Pakistan, Brazil, Nigeria) could affect the stability of entire regions. The severe degradation of a megacity could snowball into wider instability and conflict if not managed collaboratively. The sooner and more deliberately U.S. leaders can articulate geographic, cultural, or economic justifications for targeting scarce assistance, the sooner they are to be persuasive to U.S. citizens. Political preparation is equally required of other governments and populations. If disasters multiply, U.S. influence with these countries will likely depend on the level of U.S. engagement, generosity, and leadership in promoting a sense of global solidarity through an agenda for collaboration on resilience, relief, and relocation options. For this purpose, the U.S. government will need to complement its domestic security rationale with a compelling diplomatic narrative that advocates the needs and priorities for dealing with events that might otherwise spark major confrontations. The alternative could well be aggressive measures by governments, desperate for necessities, to bypass market allocations or seize supplies by intercepting transports, deploying covert operations, or even initiating outright invasions. A series of functionally focused collaborations to identify and manage key risks could be indispensable to contain the political consequences of future extreme events. Whether the Security Council, the G-20, the World Health Organization, or some new or combined political coalition would be the locus for such negotiated understandings is unclear. But the likelihood is that all international institutions will have to elevate their focus and resources to address disaster scenarios and environmental vulnerabilities. The security agendas of politicians, policymakers, and intelligence personnel will likely be distracted, for the time being, by perceived dangers from rogue states armed with nuclear weapons, failed states and ungoverned areas as safe havens for terrorists, and economic criminals, such as cyberburglars, unfair traders, and intellectual property thieves. Meanwhile, the safety and prosperity of the United States, as well as peace throughout the world, increasingly will be endangered by unaddressed vulnerabilities to natural disasters and extreme environmental crises. Contention and conflict could also result from the sudden realization—or opportunistic exaggeration—among large groups of alarmed citizens that such vulnerabilities are both existential and irreversible. Given demographic and environmental trends, and the increasing vulnerabilities and probable shortages to be expected within this decade—and certainly before 2030—the threats to the peace from Mother Nature may soon come to dwarf any of the threats posed by mere mortals.

## OFF

### T

#### Interpretation – affirmative teams must defend legal action by a government

John Bouvier 56 [The Free Dictionary, “Unjust”] [DS] [https://legal-dictionary.thefreedictionary.com/Unjust#:~:text=UNJUST.,test%20of%20right%20and%20wrong.]

Unjust Also found in: Dictionary, Thesaurus, Wikipedia. Related to Unjust: Unjust enrichment UNJUST. That which is done against the perfect rights of another; that which is against the established law; that which is opposed to a law which is the test of right and wrong.

#### This is clear

Black’s Law Dictionary ND [DS] [https://thelawdictionary.org/unjust/]

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

#### “Resolved” means enactment of a law.

Words and Phrases 64 Words and Phrases Permanent Edition (Multi-volume set of judicial definitions). “Resolved”. 1964.

Definition of the word “resolve,” given by Webster is “to express an opinion or determination by resolution or vote; as ‘it was resolved by the legislature;” It is of similar force to the word “enact,” which is defined by Bouvier as meaning “to establish by law”.

#### Violation – the aff fiats private self-restriction, which is not a method of correcting injustice nor an enactment of a law.

#### Ground – generics on this topic must be tied to the actor, not the action, because each space appropriation is unique. A topic where the unifying thesis is countries legislating restrictions on space appropriation is much better than one about private actors self-restricting – their interp skirts multilat good/bad, K’s of IR and global governance, and CP’s to reform the OST – there are no unifying DA’s to different private companies around the world signing binding internal memos to restrict a type of space appropriation.

#### Predictability and Limits – there are infinite private entities that could appropriate space but only a small amount of spacefaring nations – legal limits are necessary when the topic doesn’t have the word “substantial” in it.

#### Topicality is a voting issue of competing interpretations – it prevents arbitrary judge intervention and a race to the top that favors no one. The standards debate above also proves they aren’t reasonable.

#### No RVIs – they’re illogical, create a chilling effect on setting theory norms, and destroy substantive education.

## OFF

### T

#### Interp: If the aff defends a restriction on private space mining they must specify the extent of that restriction, which entities they actually restrict, and which mining activities they reduce or ban in a delineated text in the 1AC.

#### Restrict is a vague term – lack of specification is considered legally vague.

Dynia 9 Philip A Dynia 2009 "Vagueness" (Philip A. Dynia is an Associate Professor in the Political Science Department of Loyola University New Orleans. He teaches constitutional law and judicial process as well as specialized courses on the Bill of Rights and the First Amendment.)//Elmer

Court has shown three reasons vague statutes are unconstitutional A fundamental explication of the modern Supreme Court’s concerns regarding overly vague statutes is found in Grayned v. City of Rockford (1972). The Court upheld a city ordinance restricting any “noise or diversion” that would disrupt activities at a public school against claims of vagueness. Because Rockford’s ordinance was aimed at disruptive speech and was grounded in the interest of ensuring the order needed for a proper education, the Court found no constitutional violation. But the Court did suggest three reasons why overly vague statutes are unconstitutional. First, due process requires that a law provide fair warning and provides a “persons of ordinary intelligence a reasonable opportunity to know what is prohibited, so that he may act accordingly.” Second, the law must provide “explicit standards” to law enforcement officials, judges, and juries so as to avoid “arbitrary and discriminatory application.” Third, a vague statute can “inhibit the exercise” of First Amendment freedoms and may cause speakers to “steer far wider of the unlawful zone . . . than if the boundaries of the forbidden areas were clearly marked.”

#### Violation: they don’t

#### Negate for stable ground — restrict can mean anything from regulating forms of mining to a complete ban, and it’s unclear which specific mining operations/ types are or aren’t eliminated based on the extent of the restriction – that decks predictable neg ground cuz they can delink from disads by saying the affs restriction doesn’t completely end whatever the link’s about – we lose access to Das about particular asteroids, types of Asteroid Mining, AND the scale of which they decrease.

#### Presumption – private entities will interpret restrict as narrowly as possible – also splits multilat cuz different countries can restrict differently. If they fiat anything other than the plan that’s a voter for extra t – allows affirmatives to add on infinite planks to spike out of neg offense. Even if we lose the theory debate, reason why they don’t get perm do the CP

#### Fairness is a voter – it’s a gateway issue to the ballot and every argument assumes the judges evaluates fairly.

#### Drop the debater to deter future abuse and since substance is skewed.

#### CI – Reasonability is arbitrary and we don’t know the brightline while prepping. Collapses since it uses an offense/defense paradigm to win it.

#### No RVIs- A] Illogical- you don’t win for being fair B] Encourages baiting theory which proliferates abuse C] Chills checking abuse for fear of the RVI

## Case

### AT: Debris = Sat Attacks

#### Top – aff makes no sense – they have made the argument that the aff catalyzes space as a site for commercial development, if that’s true then obviously debris and sat attacks are much worse.

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

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

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

What is Kessler Syndrome?

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

It is a dark picture.

Is Kessler Syndrome likely to happen?

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

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

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

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

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

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

How bad could Kessler Syndrome in High LEO be?

Let’s imagine a worst case scenario.

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

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

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

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

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

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

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

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

#### It takes centuries and adaptation solves

Ted Muelhaupt 19, Associate Principal Director of the Systems Analysis and Simulation Subdivision (SASS) and Manager of the Center for Orbital and Reentry Debris Studies at The Aerospace Corporation, M.S., B.S. Aerospace and Aeronautical Engineering & Mechanics, University of Minnesota - Twin Cities, Senior Member of the American Institute of Aeronautics and Astronautics, “How Quickly Would It Take For the Kessler Syndrome To Destroy All The Satellites In LEO? And Could You See This Happening From Earth?”, Quora, 2/28/2019, https://www.quora.com/How-quickly-would-it-take-for-the-Kessler-Syndrome-to-destroy-all-the-satellites-in-LEO-And-could-you-see-this-happening-from-Earth

The dynamics of the Kessler Syndrome are real, and most people studying it agree on the concept: if there is sufficient density of objects and mass, a chain reaction of debris breaking up objects and creating more debris can occur. But the timescale of this process takes decades and centuries. There are many assumptions that go into these models. Though there is still argument about this, many people in the field think that the process is already underway in low earth orbit. But others, including myself, think we can stop it if we take action. This is a slow motion disaster that we can prevent.

But in spite of hype to the contrary, we will never “lose access to space”. Certain missions may become impractical or too expensive, and we may decide that some orbits are too risky for humans. Even that depends on the tolerance for the risk. But robots don’t have mothers, and if we feel it is worthwhile we will take the risk and fly the satellites where we need to.

To the specifics of the question, it will take many decades. It will not destroy all satellites in LEO. You won’t be able to see it from the ground unless you were extraordinarily lucky, and you happened to see a flash from a collision in the instant you were looking, with just the right lighting.

#### Squo tracking, shielding, and removal plans solve

Dr. Brian Koberlein 16, Professor of Physics at the Rochester Institute of Technology and PhD in Astrophysics from the University of Connecticut, “Cascade Effect”, 5-4, https://archive.briankoberlein.com/2016/05/04/cascade-effect/index.html

In the movie Gravity the driving force of the plot is a catastrophic cascade of space debris. An exploding satellite sends high speed debris into the path of other satellites, and the resulting collisions create more space debris until everything from a space shuttle to the International Space Station faces an eminent threat of destruction. Not unexpectedly, the movie portrayal of such a situation is not particularly accurate, but the risk of a debris cascade is very real.

It’s known as the Kessler syndrome, after Donald Kessler, who first imagined the scenario in the 1970s. The problem comes down to the fact that small objects in Earth orbit can stay in orbit for a very long time. If an astronaut drops a bolt, it can stay in orbit for decades or centuries. Because the relative speed of two objects in orbit can be quite large, it doesn’t take a big object to pose a real threat to your spacecraft. On the highway a small pebble can chip your car windshield. In space it can be done by a chip of paint traveling at thousands of kilometers per hour. In the history of the space shuttle missions, there were more than 1,600 debris strikes. Because of such strikes, more than 90 space shuttle windows had to be replaced over the lifetime of shuttle missions.

While that might sound alarming, it’s actually quite manageable. Upgrades and maintenance were quite common on the shuttle missions, and we tend to err on the side of caution when it comes to replacing parts. Modern spacecraft also have ways to mitigate the risk of small impacts, such as Whipple shields made of thin layers of material spaced apart so that objects disintegrate when hitting the shield rather than the spacecraft itself. We also have a tracking system that currently tracks more than 300,000 objects bigger than 1 cm, so we can make sure that most spacecraft avoid these objects.

But the risk of big collisions isn’t negligible. In 2009 the Iridium 33 and Kosmos-2251 satellites collided at high speed, destroying both spacecraft and creating more dangerous debris. It wouldn’t take many collisions like this for the debris numbers to rise dramatically, and more debris means a greater risk of collisions. In Gravity the cascade happens very quickly, triggered by a single event. The reality is not quite so grave. Instead of happening overnight, Kessler syndrome would occur gradually, raising collision risks to the point where certain orbits become logistically impractical. It could occur so gradually that we might not notice it early on, and there are some that argue it’s already underway.

The good news is that we’re aware of the threat. And, as the old saying goes, knowing is half the battle. Already we take steps to limit the amount of debris created. New spacecraft include end of life plans to remove them from orbit, either by sending them into Earths atmosphere to burn up, or sending them to a “graveyard orbit” that poses little risk to other spacecraft. There are also plans on the drawing board to clear orbits of debris, particularly in low-Earth orbit where the risk is greatest. The cascade effect is a real risk, but it’s also one we can likely manage with a bit of ingenuity.

#### No retal or escalation from satellite attacks

Eric J. Zarybnisky 18, MA in National Security Studies from the Naval War College, PhD in Operations Research from the MIT Sloan School of Management, Lt Col, USAF, “Celestial Deterrence: Deterring Aggression in the Global Commons of Space”, 3/28/2018, https://apps.dtic.mil/dtic/tr/fulltext/u2/1062004.pdf

PREVENTING AGGRESSION IN SPACE

While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used high-powered lasers against American intelligence-gathering satellites8F8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

#### Accidental war or miscalc is impossible

Michael **Quinlan 9**. Distinguished Former British Defence Strategist and Former Permanent Under-Secretary of State. 2009. “Thinking About Nuclear Weapons.” p. 63-69

Even if initial nuclear use did not quickly end the fighting, the supposition of inexorable momentum in a developing exchange, with each side rushing to overreaction amid confusion and uncertainty, is implausible. It fails to consider what the situation of the decisionmakers would really be. Neither side could want escalation. Both would be appalled at what was going on. Both would be desperately looking for signs that the other was ready to call a halt. Both, given the capacity for evasion or concealment which modern delivery platforms and vehicles can possess, could have in reserve significant forces invulnerable enough not to entail use-or-lose pressures. (It may be more open to question, as noted earlier, whether newer nuclear-weapon possessors can be immediately in that position; but it is within reach of any substantial state with advanced technological capabilities, and attaining it is certain to be a high priority in the development of forces.) As a result, neither side can have any predisposition to suppose, in an ambiguous situation of fearful risk, that the right course when in doubt is to go on copiously launching weapons. And none of this analysis rests on any presumption of highly subtle or pre-concerted rationality. The rationality required is plain. The argument is reinforced if we consider the possible reasoning of an aggressor at a more dispassionate level. Any substantial nuclear armoury can inflict destruction outweighing any possible prize that aggression could hope to seize. A state attacking the possessor of such an armoury must therefore be doing so (once given that it cannot count upon destroying the armoury pre-emptively) on a judgement that the possessor would be found lacking in the will to use it. If the attacked possessor used nuclear weapons, whether first or in response to the aggressor's own first use, this judgement would begin to look dangerously precarious. There must be at least a substantial possibility of the aggressor leaders' concluding that their initial judgement had been mistaken—that the risks were after all greater than whatever prize they had been seeking, and that for their own country's survival they must call off the aggression. Deterrence planning such as that of NATO was directed in the first place to preventing the initial misjudgement and in the second, if it were nevertheless made, to compelling such a reappraisal. The former aim had to have primacy, because it could not be taken for granted that the latter was certain to work. But there was no ground for assuming in advance, for all possible scenarios, that the chance of its working must be negligible. An aggressor state would itself be at huge risk if nuclear war developed, as its leaders would know. It may be argued that a policy which abandons hope of physically defeating the enemy and simply hopes to get him to desist is pure gamble, a matter of who blinks first; and that the political and moral nature of most likely aggressors, almost ex hypothesis, makes them the less likely to blink. One response to this is to ask what is the alternative—it can only be surrender. But a more positive and hopeful answer lies in the fact that the criticism is posed in a political vacuum. Real-life conflict would have a political context. The context which concerned NATO during the cold war, for example, was one of defending vital interests against a postulated aggressor whose own vital interests would not be engaged, or would be less engaged. Certainty is not possible, but a clear asymmetry of vital interest is a legitimate basis for expecting an asymmetry, credible to both sides, of resolve in conflict. That places upon statesmen, as page 23 has noted, the key task in deterrence of building up in advance a clear and shared grasp of where limits lie. That was plainly achieved in cold-war Europe. 11 vital interests have been defined in a way that is clear, and also clearly not overlapping or incompatible with those of the adversary, a credible basis has been laid for the likelihood of greater resolve in resistance. It was also sometimes suggested by critics that whatever might be indicated by theoretical discussion of political will and interests, the military environment of nuclear warfare—particularly difficulties of communication and control—would drive escalation with overwhelming probability to the limit. But it is obscure why matters should be regarded as inevitably so for every possible level and setting of action. Even if the history of war suggested (as it scarcely does) that military decision-makers are mostly apt to work on the principle 'When in doubt, lash out', the nuclear revolution creates an utterly new situation. The pervasive reality, always plain to both sides during the cold war, is 'If this goes on to the end, we are all ruined'. Given that inexorable escalation would mean catastrophe for both, it would be perverse to suppose them permanently incapable of framing arrangements which avoid it. As page 16 has noted, NATO gave its military commanders no widespread delegated authority, in peace or war, to launch nuclear weapons without specific political direction. Many types of weapon moreover had physical safeguards such as PALs incorporated to reinforce organizational ones. There were multiple communication and control systems for passing information, orders, and prohibitions. Such systems could not be totally guaranteed against disruption if at a fairly intense level of strategic exchange—which was only one of many possible levels of conflict— an adversary judged it to be in his interest to weaken political control. It was far from clear why he necessarily should so judge. Even then, however, it remained possible to operate on a general fail-safe presumption: no authorization, no use. That was the basis on which NATO operated. If it is feared that the arrangements which a nuclear-weapon possessor has in place do not meet such standards in some respects, the logical course is to continue to improve them rather than to assume escalation to be certain and uncontrollable, with all the enormous inferences that would have to flow from such an assumption. The likelihood of escalation can never be 100 per cent, and never zero. Where between those two extremes it may lie can never be precisely calculable in advance; and even were it so calculable, it would not be uniquely fixed—it would stand to vary hugely with circumstances. That there should be any risk at all of escalation to widespread nuclear war must be deeply disturbing, and decision-makers would always have to weigh it most anxiously. But a pair of key truths about it need to be recognized. The first is that the risk of escalation to large-scale nuclear war is inescapably present in any significant armed conflict between nuclear-capable powers, whoever may have started the conflict and whoever may first have used any particular category of weapon. The initiator of the conflict will always have physically available to him options for applying more force if he meets effective resistance. If the risk of escalation, whatever its degree of probability, is to be regarded as absolutely unacceptable, the necessary inference is that a state attacked by a substantial nuclear power must forgo military resistance. It must surrender, even if it has a nuclear armoury of its own. But the companion truth is that, as page 47 has noted, the risk of escalation is an inescapable burden also upon the aggressor. The exploitation of that burden is the crucial route, if conflict does break out, for managing it to a tolerable outcome—the only route, indeed, intermediate between surrender and holocaust, and so the necessary basis for deterrence beforehand. The working out of plans to exploit escalation risk most effectively in deterring potential aggression entails further and complex issues. It is for example plainly desirable, wherever geography, politics, and available resources so permit without triggering arms races, to make provisions and dispositions that are likely to place the onus of making the bigger and more evidently dangerous steps in escalation upon the aggressor who wishes to maintain his attack, rather than upon the defender. (The customary shorthand for this desirable posture used to be 'escalation dominance'.) These issues are not further discussed here. But addressing them needs to start from acknowledgement that there are in any event no certainties or absolutes available, no options guaranteed to be risk-free and cost-free. Deterrence is not possible without escalation risk; and its presence can point to no automatic policy conclusion save for those who espouse outright pacifism and accept its consequences. Accident and Miscalculation Ensuring the safety and security of nuclear weapons plainly needs to be taken most seriously. Detailed information is understandably not published, but such direct evidence as there is suggests that it always has been so taken in every possessor state, with the inevitable occasional failures to follow strict procedures dealt with rigorously. Critics have nevertheless from time to time argued that the possibility of accident involving nuclear weapons is so substantial that it must weigh heavily in the entire evaluation of whether war-prevention structures entailing their existence should be tolerated at all. Two sorts of scenario are usually in question. The first is that of a single grave event involving an unintended nuclear explosion—a technical disaster at a storage site, for example, or the accidental or unauthorized launch of a delivery system with a live nuclear warhead. The second is that of some event—perhaps such an explosion or launch, or some other mishap such as malfunction or misinterpretation of radar signals or computer systems—initiating a sequence of response and counter-response that culminated in a nuclear exchange which no one had truly intended. No event that is physically possible can be said to be of absolutely zero probability (just as at an opposite extreme it is absurd to claim, as has been heard from distinguished figures, that nuclear-weapon use can be guaranteed to happen within some finite future span despite not having happened for over sixty years). But human affairs cannot be managed to the standard of either zero or total probability. We have to assess levels between those theoretical limits and weigh their reality and implications against other factors, in security planning as in everyday life. There have certainly been, across the decades since 1945, many known accidents involving nuclear weapons, from transporters skidding off roads to bomber aircraft crashing with or accidentally dropping the weapons they carried (in past days when such carriage was a frequent feature of readiness arrangements—it no longer is). A few of these accidents may have released into the nearby environment highly toxic material. None however has entailed a nuclear detonation. Some commentators suggest that this reflects bizarrely good fortune amid such massive activity and deployment over so many years. A more rational deduction from the facts of this long experience would however be that the probability of any accident triggering a nuclear explosion is extremely low. It might be further noted that the mechanisms needed to set off such an explosion are technically demanding, and that in a large number of ways the past sixty years have seen extensive improvements in safety arrangements for both the design and the handling of weapons. It is undoubtedly possible to see respects in which, after the cold war, some of the factors bearing upon risk may be new or more adverse; but some are now plainly less so. The years which the world has come through entirely without accidental or unauthorized detonation have included early decades in which knowledge was sketchier, precautions were less developed, and weapon designs were less ultra-safe than they later became, as well as substantial periods in which weapon numbers were larger, deployments more widespread and diverse, movements more frequent, and several aspects of doctrine and readiness arrangements more tense. Similar considerations apply to the hypothesis of nuclear war being mistakenly triggered by false alarm. Critics again point to the fact, as it is understood, of numerous occasions when initial steps in alert sequences for US nuclear forces were embarked upon, or at least called for, by indicators mistaken or misconstrued. In none of these instances, it is accepted, did matters get at all near to nuclear launch—extraordinary good fortune again, critics have suggested. But the rival and more logical inference from hundreds of events stretching over sixty years of experience presents itself once more: that the probability of initial misinterpretation leading far towards mistaken launch is remote. Precisely because any nuclear-weapon possessor recognizes the vast gravity of any launch, release sequences have many steps, and human decision is repeatedly interposed as well as capping the sequences. To convey that because a first step was prompted the world somehow came close to accidental nuclear war is wild hyperbole, rather like asserting, when a tennis champion has lost his opening service game, that he was nearly beaten in straight sets. History anyway scarcely offers any ready example of major war started by accident even before the nuclear revolution imposed an order-of-magnitude increase in caution. It was occasionally conjectured that nuclear war might be triggered by the real but accidental or unauthorized launch of a strategic nuclear-weapon delivery system in the direction of a potential adversary. No such launch is known to have occurred in over sixty years. The probability of it is therefore very low. But even if it did happen, the further hypothesis of its initiating a general nuclear exchange is far-fetched. It fails to consider the real situation of decision-makers, as pages 63-4 have brought out. The notion that cosmic holocaust might be mistakenly precipitated in this way belongs to science fiction.

#### Cyberattacks are inevitable

Beebe 10/7/19 [George Beebe is vice president and director of studies at the Center for the National Interest, a nonpartisan think tank in Washington. He is also the former head of Russia analysis at the CIA, and the author of The Russia Trap: How Our Shadow War with Russia Could Spiral into Nuclear Catastrophe. We’re More at Risk of Nuclear War With Russia Than We Think. October 7, 2019. https://www.politico.com/magazine/story/2019/10/07/were-more-at-risk-of-nuclear-war-with-russia-than-we-think-229436]

Cyber technology is also magnifying fears of our adversaries’ strategic intentions while prompting questions about whether warning systems can detect incoming attacks and whether weapons will fire when buttons are pushed. This makes containing a crisis that might arise between U.S. and Russian forces over Ukraine, Iran or anything else much more difficult. It is not hard to imagine a crisis scenario in which Russia cyber operators gain access to a satellite system that controls both U.S. conventional and nuclear weapons systems, leaving the American side uncertain about whether the intrusion is meant to gather information about U.S. war preparations or to disable our ability to conduct nuclear strikes. This could cause the U.S. president to wonder whether he faces an urgent “use it or lose it” nuclear launch decision. It doesn’t help that the lines of communication between the United States and Russia necessary for managing such situations are all but severed.

#### But no impact

Mazur 12 [Jonathan Mazur, Manager Engineering at Northrop Grumman, writing in Space & Defense, from the Eisenhower Center for Space and Defense Studies. Past U.S. Actions: Redlines in Space. Space & Defense, Volume 6, Number 1, Fall 2012. https://inss.ndu.edu/Portals/97/Space\_and\_Defense\_6\_1.pdf?ver=2018-09-06-135424-147]

U.S. Reactions To Foreign Disruption Of U.S. Capabilities

In the 1970s, it was suspected that a U.S. maritime communications satellite was turned off by the Soviets when it was outside of the range of U.S. tracking stations.25 There does not appear to be any documented U.S. reaction, and I suspect there was none. In the mid-1990s, satellite hackers in Brazil began hijacking U.S. military communication satellite signals to broadcast their own information, though it took until 2009 for Brazil to crack down on the illegal activity with the support of the DoD.26 In 1998, a U.S.-German satellite known as ROSAT was rendered useless after it turned suddenly toward the sun. NASA investigators later determined the accident was possibly linked to a cyber-intrusion by Russia.

The fallout? Though there was an ongoing criminal investigation as of 2008; NASA security officials have seemed determined to publicly minimize the seriousness of the threat.27 In 2003, a signal originating from Cuba—later determined to be coming from Iranian embassy property— was jamming a U.S. communications satellite that was transmitting Voice of America programming over Iran, which was publicly referred to as an “act of war” by a U.S. official. 28 Press reporting indicates the U.S. administration was [frozen]“paralyzed” about how to cope with the jamming that continued for at least a month, even after U.S. diplomatic protests to Cuba.29 In 2005, U.S. diplomats protested to the Libyan government after two international satellites were illegally jammed disrupting American diplomatic, military, and FBI communications.30 In 2006, press reporting indicates that China hit a U.S. spy satellite with a ground-based laser. This action was acknowledged by the then director of the NRO, though the DoD remained tight lipped about the incident.31

“We’re at a point where the technology’s out there, and the capability for people to do things to our satellites is there. I’m focused on it beyond any single event.” – Air Force Space Command Commander, General Chilton, 2006 32

In 2009, a U.S. commercial Iridium communications satellite—extensively used by the DoD—was accidently destroyed by a collision with a dead Russian satellite.33 The U.S. company, Iridium, was able to minimize any loss of service by implementing a network solution within a few days.34 As of early 2011, no legal action had been taken by the company either because it is not clear who was at fault or because it might be politically problematic for the United States, which is trying to enter into bi-lateral transparency and confidence-building measures (TCBM) with Russia regarding space activities.35 Since August of 2010, North Korea has been intermittently using GPS jamming equipment, which reportedly has been interfering with U.S. and South Korean military operations and civilian use south of the North Korean border.36 Reportedly, only South Korea and the United Nations International Telecommunications Union—at the request of South Korea—have issued letters to Pyongyang demanding the cessation of disruptive communications signals in South Korea.37

It appears that the only time the U.S. military has responded with force to a disruption in U.S. space capabilities was in 2003, a few days after the start of the Iraq war.38 According to U.S. officials, Iraq was using multiple GPS jammers—which supposedly did not affect military GPS functionality. However, the U.S. military bombed the jammers anyway after a diplomatic complaint to Russia.39 The use of military force against the GPS jamming threat was possibly because the United States was already intervening in Iraq, and the bombing probably would not have occurred if the United States was not at war.

#### The Internet doesn’t need satellites

Jim Grupé 19, Former Technical Consultant and Strategic Planner at Federal Government of the United States, 40+ years as an Engineer, Mostly “Systems Level”, “Would The Internet Still Function If All Satellites Were Destroyed?”, Quora, 2/16/2019, https://www.quora.com/Would-the-internet-still-function-if-all-satellites-were-destroyed

The internet rarely uses satellites. That’s because a satellite link is slow, and the internet automatically prioritizes fast connections. The only time a satellite link would be in the path is an island that didn’t have a cable connection to the mainland nearby.

### AT: Innovation

#### Innovation – no internal between monopolization and broader innovation – no AFF spill up evidence.

**Innovation is fake – haven’t proven innovations will be for good things – could be just as likely to accelerate dangerous tech development**

**Tech, efficiency and innovation won’t save us**

**Heinberg 19** [Richard William Heinberg is an American journalist and educator who has written extensively on energy, economic, and ecological issues, including oil depletion. He is the author of 13 books, and presently serves as the senior fellow at the Post Carbon Institute. The End of Economic Growth Is Inevitable. Let’s Plan for It. January 15, 2019. https://undark.org/2019/01/15/economic-growth/]

The trouble is, a **bigger economy** uses **more** **stuff** than a **smaller one**, and we happen to live on a **finite planet**. So, an **end to growth** is **inevitable**. Ending growth is also **desirable** if we want to leave some stuff (**minerals**, **forests**, **biodiversity**, and **stable climate**) for our kids and their kids. Further, if growth is meant to have anything to do with increasing quality of life, there is plenty of evidence to suggest it has passed the point of diminishing returns: Even though the U.S. economy is 5.5 times bigger now than it was in 1960 (in terms of real GDP), America is losing ground on its happiness index.

So how do we stop growth without making life miserable — and maybe even making it better?

To start with, there are two strategies that many people already agree on. We should substitute good consumption for bad, for example using renewable energy instead of fossil fuels. And we should use stuff more efficiently — making products that last longer and then repairing and recycling them instead of tossing them in a landfill. The reason these strategies are uncontroversial is that they reduce growth’s environmental damage without impinging on growth itself.

But **renewable** energy **tech**nology **still requires materials** (aluminum, glass, silicon, and copper for solar panels; concrete, steel, copper, and neodymium for wind turbines). And **efficiency has limits**. For example, we can reduce the time required to send a message to nearly zero, but from then on, **improvements are infinitesimal**. In other words, **substitution and efficiency** are good, but they’re **not sufficient**. **Even if** we **somehow** arrive at a **near-virtual economy**, **if it is growing**, we’ll still use more stuff, and the result will be **pollution** and **resource depletion**. Sooner or later, we have to **do away** with **growth directly**.

**Innovation sucks!**

**Clark & York 2008** [Clark, assistant professor of sociology and sustainability studies at the University of Utah; Richard, Associate Professor of sociology at the University of Oregon | "Rifts and shifts: getting to the root of environmental crises." Monthly Review 60.6 (2008): 13-24]

Although the ecological crisis has captured public attention, the dominant economic forces are attempting to seize the moment by assuring us that capital, technology, and the market can be employed so as to ward off any threats without a major transformation of society. For example, numerous technological solutions are proposed to remedy global climate change, including agrofuels, nuclear energy, and new coal plants that will capture and sequester carbon underground. The ecological crisis is thus presented as a technical problem that can be fixed within the current system, through better ingenuity, technological innovation, and the magic of the market. In this view, the economy will be increasingly dematerialized, reducing demands placed on nature.2 The market will ensure that new avenues of capital accumulation are created in the very process of dealing with environmental challenges. Yet, this line of thought ignores the root causes of the ecological crisis. The social metabolic order of capitalism is inherently anti-ecological, since it systematically subordinates nature in its pursuit of endless accumulation and production on ever larger scales. Technical fixes to socio-ecological problems typically have unintended consequences and fail to address the root of the problems: the political-economic order. **Rather than acknowledging metabolic rifts**, natural limits, and/or ecological contradictions, **capital seeks to play a shell game with the environmental problems it generates, moving them around rather than addressing the root causes.** One obvious way capital shifts around ecological problems is through simple geographic displacement-once resources are depleted in one region, capitalists search far and wide to seize control of resources in other parts of the world, whether by military force or markets. One of the drivers of colonialism was clearly the demand for more natural resources in rapidly industrializing European nations. However, expanding the area under the control of global capitalism is only one of the ways in which capitalists shift ecological problems around. There is a qualitative dimension as well, whereby one environmental crisis is "solved" (typically only in the short term) by changing the type of production process and generating a different crisis, such as how the shift from the use of wood to plastic in the manufacturing of many consumer goods replaced the problems associated with wood extraction with those associated with plastics production and disposal.

**Faster innovation causes evil AI---extinction**

Salvador **Pueyo 18**. 8 Department of Evolutionary Biology, Ecology, and Environmental Sciences, Universitat de Barcelona. 10/01/2018. “Growth, Degrowth, and the Challenge of Artificial Superintelligence.” Journal of Cleaner Production, vol. 197, pp. 1731–1736.

The challenges of **sustainability** and of **superintelligence** are **not independent**. The changing 84 fluxes of **energy, matter, and information** can be interpreted as **different faces of** a **general** **acceleration**2 85 . More **directly**, it is argued below that superintelligence would **deeply affect** 86 **production** technologies and also economic decisions, and could in turn **be affected** by the 87 **socioeconomic** and ecological **context** in which it develops. Along the lines of Pueyo (2014, p. 88 3454), this paper presents an approach that integrates these topics. It employs insights from a 89 variety of sources, such as ecological theory and several schools of economic theory. 90 The next section presents a thought experiment, in which superintelligence emerges after the 91 technical aspects of goal alignment have been resolved, and this occurs specifically in a neoliberal 92 scenario. Neoliberalism is a **major force** shaping current policies on a global level, which urges 93 governments to assume as their main role the creation and support of capitalist markets, and to 94 avoid interfering in their functioning (Mirowski, 2009). Neoliberal policies stand in **sharp contrast** 95 to **degrowth views**: the first are largely rationalized as a way to enhance efficiency and production 96 (Plehwe, 2009), and represent the maximum expression of capitalist values. 97 The thought experiment illustrates how **superintelligence** perfectly **aligned** with **capitalist** 98 **markets** could have **very** **undesirable consequences for humanity and the whole biosphere**. It also 99 suggests that there is little reason to expect that the wealthiest and most powerful people would be 100 exempt from these consequences, which, as argued below, gives reason for hope. Section 3 raises 101 the possibility of a broad social consensus to respond to this challenge along the lines of degrowth, 102 thus tackling major technological, environmental, and social problems simultaneously. The 103 uncertainty involved in these scenarios is vast, but, if a non-negligible probability is assigned to 104 these two futures, little room is left for either **complacency** or **resignation**. 105 106 2. Thought experiment: Superintelligence in a neoliberal scenario 107 108 Neoliberalism is creating a very **special breeding ground** for superintelligence, because it strives 109 to reduce the role of **human agency** in collective affairs. The neoliberal pioneer Friedrich Hayek 110 argued that the spontaneous order of **markets** was preferable over **conscious plans**, because markets, 111 he thought, have more capacity than humans to process information (Mirowski, 2009). Neoliberal 112 policies are actively **transferring decisions to markets** (Mirowski, 2009), while firms' automated 113 decision systems become an integral part of the market's information processing machinery 114 (Davenport and Harris, 2005). Neoliberal globalization is locking governments in the role of mere 115 players competing in the global market (Swank, 2016). Furthermore, automated **governance** is a 116 **foundational tenet** of neoliberal ideology (Plehwe, 2009, p. 23). 117 In the neoliberal scenario, most technological development can be expected to take place either in the context of **firms** or in support of firms3 118 . A number of institutionalist (Galbraith, 1985), post119 Keynesian (Lavoie, 2014; and references therein) and evolutionary (Metcalfe, 2008) economists 120 concur that, in capitalist markets, firms tend to **maximize their growth rates** (this principle is related 121 but not identical to the neoclassical assumption that firms maximize profits; Lavoie, 2014). Growth 122 maximization might be interpreted as expressing the goals of people in key positions, but, from an 123 evolutionary perspective, it is thought to result from a mechanism akin to **natural selection** 124 (Metcalfe, 2008). The first interpretation is insufficient if we accept that: (1) in big corporations, the 125 managerial bureaucracy is a coherent social-psychological system with motives and preferences of 126 its own (Gordon, 1968, p. 639; for an insider view, see Nace, 2005, pp. 1-10), (2) this system is 127 becoming techno-social-psychological with the progressive incorporation of decision-making 128 algorithms and the increasing opacity of such algorithms (Danaher, 2016), and (3) human mentality 129 and goals are partly **shaped by firms themselves** (Galbraith, 1985). 130 The type of AI best suited to participate in firms' decisions in this context is described in a 131 recent review in Science: AI researchers aim to construct a synthetic homo economicus, the 132 mythical perfectly rational agent of neoclassical economics. We review progress toward creating 133 this new species of machine, machina economicus (Parkes and Wellman, 2015, p. 267; a more 134 orthodox denomination would be Machina oeconomica). 135 Firm growth is thought to rely critically on **retained earnings** (Galbraith, 1985; Lavoie, 2014, p. 136 134-141). Therefore, **economic selection** can be generally expected to favor firms in which these are greater. The aggregate retained earnings4 137 RE of all firms in an economy can be expressed as: 138 RE=FE(R,L,K)-w⋅L-(i+δ)⋅K-g. (1) 139 Bold symbols represent vectors (to indicate multidimensionality). F is an aggregate production 140 function, relying on inputs of various types of natural resources R, labor L and capital K (including intelligent machines), and being affected by environmental factors5 141 E; w are wages, i are returns to 142 capital (dividends, interests) paid to households, δ is depreciation and g are the net taxes paid to 143 governments. 144 Increases in retained earnings face constraints, such as trade-offs among different parameters of 145 Eq. 1. The present thought experiment explores the consequences of economic selection in a 146 scenario in which two sets of constraints are nearly absent: sociopolitical constraints on market 147 dynamics are averted by a neoliberal institutional setting, while **technical** constraints are **overcome** 148 by **asymptotically advanced technology** **(with extreme AI allowing for extreme technological** 149 **development also in other fields).** The environmental and the social implications are discussed in 150 turn. Note that this scenario is **not** defined by some **contingent choice of AIs'** **goals** by their 151 **programmers**: The goals of maximizing each firm's growth and retained earnings are assumed to 152 emerge from the collective dynamics of **large sets of entities subject to capitalistic rules**

**of** 153 **interaction** and, therefore, to **economic selection**.

### AT: Cap Bad

#### Unregulated cap is key to space colonization---extinction.

Kovic '19 [Marko; March 2019; co-founder president of the Zurich Institute of Public Affairs Research; "The future of energy," https://osf.io/preprints/socarxiv/aswz9/download]

Ideally, the mitigation of climate risks will coincide with and contribute to the development of improved or even entirely novel sources of energy that will increase the long-term chances of humankind’s survival by means of space colonization. This is not an unrealistic expectation, given that the mitigation of climate risks consists, to a large degree, of replacing fossil fuels with other, less harmful sources of energy. However, some climate change mitigation strategies might actually harm the long-term prospects of humankind.

First, it is possible that dominant climate change mitigation strategies will actively exclude any form of nuclear energy from the repertoire of climate-friendly energy sources. Existing and experimental (molten salt) fission reactors could play a significant role in replacing carbon-heavy energy sources, but pro-environmental attitudes often overlap with anti-nuclear sentiments [65]. As a result, and in combination with other problems such as large-scale market failures of existing fission reactors (one of the reasons being that generating electricity from fossil fuels is cheaper) [66], nuclear fission does not currently have significant standing as a “cleantech” contribution to climate change mitigation. From a long-term perspective, an unfavorable view of nuclear energy in the context of climate change might mean that technological progress in the areas of nuclear fission and fusion might come to a halt (for example, due to explicit bans or implicit disincentives). If such a scenario came to be, our attempts at colonizing space would almost certainly fail: There are currently no alternatives to fission and fusion, and it is highly improbable that Solar power alone could suffice for sustaining extraterrestrial habitats.

Second, there is some probability that climate change mitigation strategies will change the social order towards a degrowth philosophy. Degrowth is a vague socio-economic concept and social movement that, in general, calls for a contraction of the global and national economies by means of lower production and consumption rates, and, to some degree, to more profound changes to the “capitalist” system of economic production [67]. Degrowth or degrowth-like approaches are being actively considered as climate risk mitigation strategies [68, 69], and degrowth would almost certainly be a highly effective measure for mitigating climate change. After all, if we were to drastically reduce or even completely eliminate the (industrial) sources of greenhouse gases, the amount of greenhouse gases that are being emitted would accordingly drastically sink. From the long-term perspective of humankind’s survival, degrowth is problematic in at least two ways. First, there is a risk that the general contraction of economic activity would also slow or eliminate progress in the domain of energy, which would, in turn, reduce the probability of successful space colonization due to an absence of suitable energy sources. Second, and more fundamental: If degrowth were to become a dominant societal paradigm, it is uncertain whether the long-term survival of humankind by means of space colonization would be regarded a desirable goal. In a literal sense, establishing extraterrestrial colonies would mean growth; the size of the total human population would grow, and the area of space-time that humans occupy would grow.

In a more philosophical sense, degrowth might even be antithetical to space colonization. Even though both degrowth and space colonization have a similar moral goal – increasing wellbeing – , the ends to that goal are very different. Within degrowth philosophy, the goal is, metaphorically speaking, not to “live beyond our means”: We should strive for “ecological balance”, and such a state should increase the average wellbeing. But the frame of reference is the status quo; Earth and humankind as we know it today. Space colonization, on the other hand, operates with a much larger frame of reference: All the future generations of humans (and other sentient beings) who could enjoy wellbeing if we succeed in colonizing space – and who will categorically be denied that wellbeing if we fail to colonize space [70]. The goal of space colonization as a moral project is not to live beyond our means, but to actively redefine and expand what our means are through scientific and technological progress.