## 1NC NDCA Round 5

### 1

#### Interpretation – the aff must specify what type of Private Actor Colonization they affect through a definition of the term

#### Appropriation is extremely vague – no legal precedent means no normal means

Pershing 19, Abigail D. "Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today." Yale J. Int'l L. 44 (2019): 149. (Robina Fellow at European Court of Human Rights. European Court of Human Rights Yale Law School)//Elmer

Though the Outer Space Treaty flatly prohibits national appropriation of space,150 it leaves unanswered many questions as to what actually counts as appropriation. As far back as 1969, scholars wondered about the implications of this article.151 While it is clear that a nation may not claim ownership of the moon, other questions are not so clear. Does the prohibition extend to collecting scientific samples?152 Does creating space debris count as appropriation by occupation? While the answers to these questions are most likely no, simply because of the difficulties that would be caused otherwise, there are some questions that are more difficult to answer, and more pressing. As commercial space flight becomes more and more prevalent,153 the question of whether private entities can appropriate property in space becomes very important. Whereas once it took a nation to get into space, it will soon take only a corporation, and scholars have pondered whether these entities will be able to claim property in space.154 Though this seems allowable, since the treaty only prohibits “national appropriation,”155 allowing such appropriation would lead to an absurd result. This is because the only value that lies in recognition of a claim is the ability to have that claim enforced.156 If a nation recognized and enforced such a claim, this enforcement would constitute state action.157 It would serve to exclude members of other nations and would thus serve as a form of national appropriation, even though the nation never attempted to directly appropriate the property.158 Furthermore, the Outer Space Treaty also requires that non-governmental entities must be authorized and monitored by the entities’ home countries to operate in space.159 Since a nation cannot authorize its citizens to act in contradiction to international law, a nation would not be allowed to license a private entity to appropriate property in space.160 While this nonappropriation principle is great for allowing free access to space, thereby encouraging research and development in the field, it makes it difficult to create or police a solution to the space debris problem. A viable solution will have to work without becoming an appropriation. There is, however, very little substantive law on what actually counts as appropriation in the context of space.161 So, the best way to see what is and is not allowed is to look both at the general international law regarding appropriations and to look at the past actions of space actors to see what has been allowed (or at least tolerated) and what has been prohibited or rejected.

#### Violation: they don’t

#### The net benefit is shiftiness – vague plan wording wrecks Neg Ground since it’s impossible to know which arguments link given different types of appropriation like mining, space col, satellites, and tourism – the 1AR dodges links by saying they don’t affect particular types of appropriation, or they don’t reduce private appropriation enough to trigger the link

### 2

#### The subject emerges through loss, constitutively unable to express it’s desires through language. That traps the subject in the symbolic, creating a constant desire towards the lost-object. Thus, the role of the ballot is to embrace loss.

McGowan 13 [Todd; Associate Professor of Film Studies at the UVermont; “Enjoying What We Don't Have: The Political Project of Psychoanalysis,” Pg. 26-29; 2013; University of Nebraska Press / Lincoln and London] Justin

The subject as such emerges through the experience of loss. It is the loss of a part of the subject — an initial act of sacrifi ce — that creates both subject and object, the object emerging through this act as what the subject has lost of itself. The subject takes an interest in the object world because it forms this world around its lost object. As Jacques Lacan notes, “Never, in our concrete experience of analytic theory, do we do without the notion of the lack of the object as central. It is not a negative, but the very spring for the relation of the subject to the world.”5 Th e loss of the object generates a world around this loss to which the subject can relate. Obviously, no one literally creates objects through an initial act of sacrifi ce of an actual body part. Th is would be too much to ask. But the psychical act of sacrifi ce allows for a distinction to develop where none existed before and simultaneously directs the subject’s desire toward the object world. In his breakthrough essay “Negation,” Freud describes this process as follows: “Th e antithesis between subjective and objective does not exist from the fi rst. It only comes into being from the fact that thinking possesses the capacity to bring before the mind once more something that has once been perceived, by reproducing it as a presentation without the external object having still to be there. Th e fi rst and immediate aim, therefore, of reality-testing is, not to fi nd an object in real perception which corresponds to the one presented, but to refi nd such an object, to convince oneself that it is still there.”6 Th ough Freud doesn’t use terms from linguistics, it is clear that he is making reference to the subject’s alienation in language and that he sees this alienation as the key to the emergence of both the subject and the object When the subject submits to the imperatives of language, it enters into an indirect relation with the object world. Th e speaking being does not relate to books, pencils, and paper but to “books,” “pencils,” and “paper.” Th e signifier intervenes between the subject and the object that the subject perceives. Th e subject’s alienation into language deprives it of immediate contact with the object world. And yet, in the above passage from “Negation,” Freud conceives of the subject’s entrance into language — its “capacity to bring before the mind once more something that has once been perceived, by reproducing it as a presentation without the external object having still to be there” — as the event that produces the very distinction between subject and object. Th is means that the indirectness or mediation introduced by language deprives the subject of a direct relation to the object world that it never had. Prior to its immersion in the mediation of language, the subject had no object at all — not a privileged relation to objects but a complete absence of relationality as such due to its autoeroticism. In this sense, the subject’s willingness to accede to its alienation in language is the fi rst creative act, a sacrifice that produces the objects that the subject cannot directly access. Language is important not for its own sake but because it is the site of our founding sacrifi ce. We know that the subject has performed this act of sacrifi ce when we witness the subject functioning as a being of language, but the sacrifi ce is not an act that the subject takes up on its own. Others always impose the entry into language on the subject. Th eir exhortations and incentives to speak prompt the emergence of the speaking subject. But the subject’s openness to alienation in language, its willingness to sacrifi ce a part of itself in order to become a speaking subject, suggests a lack in being itself prior to the entry into language. Th at is, the act through which the subject cedes the privileged object and becomes a subject coincides with language but is irreducible to it. Th e subject engages in the act of sacrifi ce because it does not fi nd its initial autoeroticism perfectly satisfying — the unity of the autoerotic being is not perfect — and this lack of complete satisfaction produces the opening through which language and society grab onto the subject through its alienating process. If the initial autoerotic state of the human animal were perfectly satisfying, no one would begin to speak, and subjectivity would never form. Speaking as such testifi es to an initial wound in our animal being and in being itself. But subjectivity emerges only out of a self-wounding. Even though others encourage the infant to abandon its autoerotic state through a multitude of inducements, the initial loss that constitutes subjectivity is always and necessarily self-infl icted. Subjectivity has a fundamentally masochistic form, and it continually repeats the masochistic act that founds it. Th e act of sacrifi ce opens the door to the promise of a satisfaction that autoerotic isolation forecloses, which is why the incipient subject abandons the autoerotic state and accedes to the call of sociality. But the term “sacrifi ce” is misleading insofar as it suggests that the subject has given up a wholeness (with itself or with its parent) that exists prior to being lost. In the act of sacrifi ce, the incipient subject gives up something that it doesn’t have. Th e initial loss that founds subjectivity is not at all substantial; it is the ceding of nothing. Th rough this defi ning gesture, the subject sacrifi ces its lost object into being. But if the subject cedes nothing, this initial act of sacrifi ce seems profoundly unnecessary. Why can’t the subject emerge without it? Why is the experience of loss necessary for the subject to constitute itself qua subject? Th e answer lies in the diff erence between need and desire. While the needs of the human animal are not dependent on the experience of loss, the subject’s desires are. It is the initial act of sacrifi ce that gives birth to desire: the subject sacrifi ces nothing in order to create a lost object around which it can organize its desire. As Richard Boothby puts it in his unequaled explanation of the psychoanalytic conception of the emergence of desire, “Th e destruction and loss of the object . . . opens up a symbolic dimension in which what was lost might be recovered in a new form.”7 He adds: “Sacrifi ce serves to constitute the very matrix of desire. Th e essential function of sacrifi ce is less do ut des, I give so that you might give, than do ut desidero: I give in order that I might desire.”8 Th e subject’s desire is oriented around this lost object, but the object is nothing as a positive entity and only exists insofar as it is lost. Th is is why one can never att ain the lost object or the object that causes one to desire.9 Th e coming-into-being of this object originates the subject of desire, but, having no substance, the object can never become an empirical object of desire. We may see an object of desire as embodying the lost object, but whenever we obtain this object, we discover its emptiness. Th e lost object is constitutively rather than empirically lost.

#### Their utopian politics of fiat requires a scapegoat to maintain conceptual coherence – that leads to a drive for elimination that justifies violent and genocidal practices

Stavrakakis Yannis Stavrakakis, 1999, “Lacan and the political,” Routledge, SJBE

What I will try to do in this chapter is, first of all, to demonstrate the deeply problematic nature of utopian politics. Simply put, my argument will be that every utopian fantasy construction needs a scapegoat in order to constitute itself – the Nazi utopian fantasy and the production of the Jew is a good example, especially as pointed out in Zizek’s 4 analysis. Every utopian fantasy produces its reverse and calls for its elimination. Put another way, the beatific side of fantasy is coupled in utopian constructions with a horrific side, a paranoid need for a stigmatised scapegoat. The naivety and also the danger of utopian structures is revealed when the realisation of this fantasy is attempted. It is then that we are brought close to the frightening kernel of the real: stigmatisation is followed by extermination. This is not an accident. It is inscribed in the structure of utopian constructions; it seems to be the way all fantasy constructions work. If in almost all utopian visions, violence and antagonism are eliminated, if utopia is based on the expulsion and repression of violence (this is its beatific side) this is only because it owes its own creation to violence; it is sustained and fed by violence (this is its horrific side). This repressed moment of violence resurfaces, as Marin points out, in the difference inscribed in the name utopia itself (Marin, 1984:110). What we shall argue is that it also resurfaces in the production of the figure of an enemy. To use a phrase enunciated by the utopianist Fourier, what is ëdriven out through the door comes back through the windowí (is not this a precursor of Lacan’s dictum that ‘what is foreclosed in the symbolic reappears in the real’?-VII:131) 5 The work of Norman Cohn and other historians permits the articulation of a genealogy of this manichean, equivalential way of understanding the world, from the great witch-hunt up to modern anti-Semitism, and Lacanian theory can provide valuable insights into any attempt to understand the logic behind this utopian operationóhere the approach to fantasy developed in Chapter 2 will further demonstrate its potential in analysing our political experience. In fact, from the time of his unpublished seminar on The Formations of the Unconscious, Lacan identified the utopian dream of a perfectly functioning society as a highly problematic area (seminar of 18 June 1958). The historical argument In order to realise the problematic character of the utopian operation it is necessary to articulate a genealogy of this way of representing and making sense of the world. The work of Norman Cohn seems especially designed to serve this purpose. What is most important is that in Cohnís schema we can encounter the three basic characteristics of utopian fantasies that we have already singled out: first, their link to instances of disorder, to the element of negativity. Since human experience is a continuous battle with the unexpected there is always a need to represent and master this unexpected, to transform disorder to order. Second, this representation is usually articulated as a total and universal representation, a promise of absolute mastery of the totality of the real, a vision of the end of history. A future utopian state is envisaged in which disorder will be totally eliminated. Third, this symbolisation produces its own remainder; there is always a certain particularity remaining outside the universal schema. It is to the existence of this evil agent, which can be easily localised, that all persisting disorder is attributed. The elimination of disorder depends then on the elimination of this group. The result is always horrible: persecution, massacres, holocausts. Needless to say, no utopian fantasy is ever realised as a result of all these ëcrimesíóas mentioned in Chapter 2, the purpose of fantasy is not to satisfy an (impossible) desire but to constitute it as such. What is of great interest for our approach is the way in which Cohn himself articulates a genealogy of the pair utopia/demonisation in his books The Pursuit of the Millennium and Europeís Inner Demons (Cohn, 1993b, 1993c). The same applies to his book Warrant for Genocide (Cohn, 1996) which will also be implicated at a certain stage in our analysis. These books are concerned with the same social phenomenon, the idea of purifying humanity through the extermination of some category of human beings which are conceived as agents of corruption, disorder and evil. The contexts are, of course, different, but the urge remains the same (Cohn, 1993b:xi). All these works then, at least according to my reading, are concerned with the production of an archenemy which goes together with the utopian mentality.

#### Vote negative to embrace the lack – this requires being open to the anxiety that occurs from an encounter with the real of the other and breaks down fantasy and drives.

McGowan 13 [Todd; Associate Professor of Film Studies at the UVermont; “Enjoying What We Don't Have: The Political Project of Psychoanalysis,” Pg. 26-29; 2013; University of Nebraska Press / Lincoln and London] SJBE Re-Highlighted Justin

The alternative — the ethical path that psychoanalysis identifies — demands an embrace of the anxiety that stems from the encounter with the enjoying other. If there is a certain ethical dimension to anxiety, it lies in the rela- tionship that exists between anxiety and enjoyment. Contra Heidegger, the ethics of anxiety does not stem from anxiety’s relation to absence but from its relation to presence — to the overwhelming presence of the other’s enjoyment. In some sense, the encounter with absence or nothing is easier than the encounter with presence. Even though it traumatizes us, absence allows us to constitute ourselves as desiring subjects. Rather than producing anxiety, absence leads the subject out of anxiety into desire. Confronted with the lost object as a structuring absence, the subject is able to embark on the pursuit of the enjoyment embodied by this object, and this pursuit provides the subject with a clear sense of direction and even meaning. This is precisely what the subject lacks when it does not encounter a lack in the symbolic structure. When the subject encounters enjoyment at the point where it should encounter the absence of enjoyment, anxiety overwhelms the subject.

In this situation, the subject cannot constitute itself along the path of desire. It lacks the lack — the absence — that would provide the space through which desire could develop. Consequently, this subject confronts the enjoying other and experiences anxiety. Unlike the subject of desire — or the subject of Heideggerean anxiety — the subject who suffers this sort of anxiety actually experiences the other in its real dimension.¶

The real other is the other caught up in its obscene enjoyment, caught up in this enjoyment in a way that intrudes on the subject. There is no safe distance from this enjoyment, and one cannot simply avoid it. There is nowhere in the contemporary world to hide from it. As a result, the contem- porary subject is necessarily a subject haunted by anxiety triggered by the omnipresent enjoyment of the other. And yet, this enjoyment offers us an ethical possibility. As Slavoj Žižek puts it, “It is this excessive and intrusive jouissance that we should learn to tolerate.”27 When we tolerate the other’s “excessive and intrusive jouissance” and when we endure the anxiety that it produces, we acknowledge and sustain the other in its real dimension.¶

Tolerance is the ethical watchword of our epoch. However, the problem with contemporary tolerance is its insistence on tolerating the other only insofar as the other cedes its enjoyment and accepts the prevailing symbolic structure. That is to say, we readily tolerate the other in its symbolic dimen- sion, the other that plays by the rules of our game. This type of tolerance allows the subject to feel good about itself and to sustain its symbolic identity. The problem is that, at the same time, it destroys what is in the other more than the other — the particular way that the other enjoys.¶

It is only the encounter with the other in its real dimension — the encounter that produces anxiety in the subject — that sustains that which defines the other as such. Authentic tolerance tolerates the real other, not simply the other as mediated through a symbolic structure. In this sense, it involves the experience of anxiety on the part of the subject. This is a difficult posi- tion to sustain, as it involves enduring the “whole opaque weight of alien enjoyment on your chest.”The obscene enjoyment of the other bombards the authentically tolerant subject, but this subject does not retreat from the anxiety that this enjoyment produces.

If the embrace of the anxiety that accompanies the other’s proximate enjoyment represents the ethical position today, this does not necessarily provide us with an incentive for occupying it. Who wants to be ethical when it involves enduring anxiety rather than finding a way — a drug, a new authority, or something — to alleviate it? What good does it do to sustain oneself in anxiety? In fact, anxiety does the subject no good at all, which is why it offers the subject the possibility of enjoyment. When the subject encounters the other’s enjoyment, this is the form that its own enjoyment takes as well. To endure the anxiety caused by the other’s enjoyment is to experience one’s own simultaneously. As Lacan points out, when it comes to the enjoyment of the other and my own enjoyment, “nothing indicates they are distinct.” Thus, not only is anxiety an ethical position, it is also the key to embracing the experience of enjoyment. To reject the experience of anxiety is to flee one’s own enjoyment.¶

The notion that the other’s enjoyment is also our own enjoyment seems at first glance difficult to accept. Few people enjoy themselves when they hear someone else screaming profanities in the workplace or when they see a couple passionately kissing in public, to take just two examples. In these instances, we tend to recoil at the inappropriateness of the activity rather than enjoy it, and this reaction seems completely justified. The public display of enjoyment violates the social pact with its intrusiveness; it doesn’t let us alone but assaults our senses. It violates the implicit agreement of the public sphere constituted as an enjoyment-free zone. And yet, recoiling from the other’s enjoyment deprives us of our own.¶

How we comport ourselves in relation to the other’s enjoyment indi- cates our relationship to our own. What bothers us about the other — the disturbance that the other’s enjoyment creates in our existence — is our own mode of enjoying. If we did not derive enjoyment from the other’s enjoyment, witnessing it would not bother us psychically. We would sim- ply be indifferent to it and focused on our own concerns. Of course, we might ask an offending car radio listener to turn the radio down so that we wouldn’t have to hear the unwanted music, but we would not experience the mere exhibition of alien enjoyment through the playing of that music as an affront. The very fact that the other’s enjoyment captures our attention demonstrates our intimate — or extimate — relation to it.

This relation becomes even clearer when we consider the epistemo- logical status of the enjoying other. Because the real or enjoying other is irreducible to any observable identity, we have no way of knowing whether or not the other really is enjoying. A stream of profanity may be the result of someone hurting a toe. The person playing the car radio too loud while sitting at the traffic light may have simply forgotten to turn down the radio after driving on the highway. Or the person may have difficulty hearing. The couple’s amorous behavior in public may reflect an absence of enjoyment in their relationship that they are trying to hide from both themselves and the public.¶

Considering the enjoyment of the other, we never know whether it is there or not. If we experience it, we do so through the lens of our own fantasy. We fantasize that the person blasting the radio is caught up in the enjoyment of the music to the exclusion of everything else; we fantasize that the public kisses of the couple suggest an enjoyment that has no concern for the outside world. Without the fantasy frame, the enjoying other would never appear within our experience.¶

The role of the fantasy frame for accessing the enjoying other becomes apparent within Fascist ideology. Fascism posits an internal enemy — the figure of the Jew or some analogue — that enjoys illicitly at the expense of the social body as a whole. By attempting to eliminate the enjoying other, Fascism hopes to create a pure social body bereft of any stain of enjoy- ment. This purity would allow for the ultimate enjoyment, but it would be completely licit. This hope for a future society free of any stain is not where Fascism’s true enjoyment lies, however. Fascists experience their own enjoyment through the enjoying other that they persecute. The enjoy- ment that the figure of the Jew embodies is the Fascists’ own enjoyment, though they cannot avow it as their own. More than any other social form, Fascism is founded on the disavowal of enjoyment — the attempt to enjoy while keeping enjoyment at arm’s length. But this effort is not confined to Fascism; it predominates everywhere, because no subjects anywhere can simply feel comfortable with their own mode of enjoying.¶

The very structure of enjoyment is such that we cannot experience it directly: when we experience enjoyment, we don’t have it; it has us. We experience our own enjoyment as an assault coming from the outside that dominates our conscious intentions. This is why we must fantasize our own enjoyment through the enjoying other. Compelled by our enjoyment, we can’t do otherwise; we act against our self-interest and against our own good. Enjoyment overwhelms the subject, even though the subject’s mode of enjoying marks what is most singular about the subject.¶

Even though the encounter with the enjoying other apprehends the real other through the apparatus of fantasy, this encounter is nonetheless genuine and has an ethical status. Unlike the experience of the nonexistent symbolic identity, which closes down the space in which the real other might appear, the fantasized encounter with the enjoying other leaves this space open. By allowing itself to be disturbed by the other on the level of fantasy, the subject acknowledges the singularity of the real other — its mode of enjoying — without confining this singularity to a prescribed identity.¶

The implications of privileging the encounter with the disturbing enjoy- ment of the real other over the assimilable symbolic identity are themselves disturbing. The tolerant attitude that never allows itself to be jarred by the enjoying other becomes, according to this way of seeing things, further from really encountering the real other than the attitude of hate and mis- trust. The liberal subject who welcomes illegal immigrants as fellow citizens completely shuts down the space for the other in the real. The immigrant as fellow citizen is not the real other. The xenophobic conservative, on the other hand, constructs a fantasy that envisions the illegal immigrant awash in a linguistic and cultural enjoyment that excludes natives. This fantasy, paradoxically, permits an encounter with the real other that liberal tolerance forecloses. Of course, xenophobes retreat from this encounter and from their own enjoyment, but they do have an experience of it that liberals do not. The tolerant liberal is open to the other but eliminates the otherness, while the xenophobic conservative is closed to the other but allows for the otherness. The ethical position thus involves sustaining the liberal’s toler- ance within the conservative’s encounter with the real other.

### 3

#### CP: The appropriation of outer space for space colonization is unjust except if done by starlink sattelites.

#### China’s capitalizing on US vulnerabilities and ramping up ASAT development now – that emboldens Xi to invade Taiwan

Chow and Kelley 8/21 [(Brian G., policy analyst for the Institute of World Politics, Ph.D in physics from Case Western Reserve University, MBA and Ph.D in finance from the University of Michigan,and Brandon, graduate of Georgetown’s School of Foreign Service ) “China’s Anti-Satellite Weapons Could Conquer Taiwan—Or Start a War,” National Interest, 8/21/2021] JL

If current trends hold, then China’s Strategic Support Force will be capable by the late 2020s of holding key U.S. space assets at risk. Chinese military doctrine, statements by senior officials, and past behavior all suggest that China may well believe threatening such assets to be an effective means of deterring U.S. intervention. If so, then the United States would face a type of “Sophie’s Choice”: decline to intervene, potentially leading allies to follow suit and Taiwan to succumb without a fight, thereby enabling Xi to achieve his goal of “peacefully” snuffing out Taiwanese independence; or start a war that would at best be long and bloody and might well even cross the nuclear threshold.

This emerging crisis has been three decades in the making. In 1991, China watched from afar as the United States used space-enabled capabilities to obliterate the Iraqi military from a distance in the first Gulf War. The People’s Liberation Army quickly set to work developing capabilities targeted at a perceived Achilles’ heel of this new American way of war: reliance on vulnerable space systems.

This project came to fruition with a direct ascent ASAT weapons test in 2007, but the test was limited in two key respects. First, it only reached low Earth orbit. Second, it generated thousands of pieces of long-lasting space junk, provoking immense international ire. This backlash appears to have taken China by surprise, driving it to seek new, more usable ASAT types with minimal debris production. Now, one such ASAT is nearing operational status: spacecraft capable of rendezvous and proximity operations (RPOs).

Such spacecraft are inevitable and cannot realistically be limited. The United States, European Union, China, and others are developing them to provide a range of satellite services essential to the new space economy, such as in situ repairs and refueling of satellites and active removal of space debris. But RPO capabilities are dual-use: if a satellite can grapple space objects for servicing, then it might well be capable of grappling an adversary’s satellite to move it out of its servicing orbit. Perhaps it could degrade or disable it by bending or disconnecting its solar panels and antennas all while producing minimal debris.

This is a serious threat, primarily because no international rules presently exist to limit close approaches in space. Left unaddressed, this lacuna in international law and space policy could enable a prospective attacker to pre-position, during peacetime, as many spacecraft as they wish as close as they wish to as many high-value targets as they wish. The result would be an ever-present possibility of sudden, bolt-from-the-blue attacks on vital space assets—and worse, on many of them at once.

China has conducted at least half a dozen tests of RPO capabilities in space since 2008, two of which went on for years. Influential space experts have noted that these tests have plausible peaceful purposes and are in many cases similar to those conducted by the United States. This, however, does not make it any less important to establish effective legal, policy, and technical counters to their offensive use. Even if it were certain that these capabilities are intended purely for peaceful applications—and it is not at all clear that that is the case—China (or any other country) could at any time decide to repurpose these capabilities for ASAT use.

There is still time to get out ahead of this threat, but likely not for much longer. China’s RPO capabilities have, thus far, lagged about five years behind those of the United States. There are reasons to believe this gap may close, but even assuming that it holds, we should expect to see China demonstrate an operational dual-use rendezvous spacecraft by around 2025. (The first instance of a U.S. commercial satellite docking with another satellite to change its orbit occurred in February 2020.)

At the same time, China is expanding its capacity for rapid spacecraft manufacturing. The Global Times reported in January that China’s first intelligent mass production line is set to produce 240 small satellites per year. In April, Andrew Jones at SpaceNews reported that China is developing plans to quickly produce and loft a thirteen thousand-satellite national internet megaconstellation. It is not unreasonable to assume that China could manufacture two hundred small rendezvous ASAT spacecraft by 2029, possibly more.

If this happens, and Beijing was to decide in 2029 to launch these two hundred small RPO spacecraft and position them in close proximity to strategically vital assets, then China would be able to simultaneously threaten disablement of the entire constellations of U.S. satellites for missile early warning (about a dozen satellites with spares included); communications in a nuclear-disrupted environment (about a dozen); and positioning, navigation, and timing (about three dozen); along with several dozen key communications, imagery, and meteorology satellites. Losing these assets would severely degrade U.S. deterrence and warfighting capabilities, yet once close pre-positioning has occurred such losses become almost impossible to prevent. For this reason, such pre-positioning could conceivably deter the United States from coming to Taiwan’s aid due to the prospect that intervention would spur China to disable these critical space systems. Without their support, the war would be much bloodier and costlier—a daunting proposition for any president.

Should the United States fail to intervene, the consequences would be disastrous for both Washington and its allies in East Asia, and potentially the credibility of U.S. defense commitments around the globe. Worse yet, however, might be what could happen if China believes that such a threat will succeed but proves to be wrong. History is rife with examples of major wars arising from miscalculations such as this, and there are many pathways by which such a situation could easily escalate out of control to a full-scale conventional conflict or even to nuclear use.

#### Starlink development solves – mega-constellations are unjammable and accurate

Harris 20 [(Mark, Knight Science Journalism Fellow at MIT in 2013, writes about technology, science, business, the environment, and travel, internally cites Todd Humphreys, Professor of Aerospace Engineering at UT Austin, and Peter Iannucci,, Postdoctoral Research Fellow in Aerospace Engineering and Engineering Mechanics at UT Austin) “SpaceX’s Starlink satellites could make US Army navigation hard to jam,” MIT Technology Review, 9/28/2020] JL

Now, research funded by the US Army has concluded that the growing mega-constellation could have a secondary purpose: doubling as a low-cost, highly accurate, and almost unjammable alternative to GPS. The new method would use existing Starlink satellites in low Earth orbit (LEO) to provide near-global navigation services.

In a non-peer-reviewed paper, Todd Humphreys and Peter Iannucci of the Radionavigation Laboratory at the University of Texas at Austin claim to have devised a system that uses the same satellites, piggybacking on traditional GPS signals, to deliver location precision up to 10 times as good as GPS, in a system much less prone to interference.

The Global Positioning System consists of a constellation of around 30 satellites orbiting 20,000 kilometers above Earth. Each satellite continuously broadcasts a radio signal containing its position and the exact time from a very precise atomic clock on board. Receivers on the ground can then compare how long signals from multiple satellites take to arrive and calculate their position, typically to within a few meters.

The problem with GPS is that those signals are extremely weak by the time they reach Earth, and are easily overwhelmed by either accidental interference or electronic warfare. In China, mysterious GPS attacks have successfully “spoofed” ships in fake locations, while GPS signals are regularly jammed in the eastern Mediterranean.

The US military relies heavily on GPS. Last year, the US Army Futures Command, a new unit dedicated to modernizing its forces, visited Humphreys’s lab to talk about a startup called Coherent Navigation he had cofounded in 2008. Coherent, which aimed to use signals from Iridium satellites as a rough alternative to GPS, was acquired by Apple in 2015.

“They told me the Army has a relationship with SpaceX [it signed an agreement to test Starlink to move data across military networks in May] and would I be interested in talking to SpaceX about using their Starlink satellites the same way that I used these old Iridium satellites?” Humphreys says. “That got us an audience with people at SpaceX, who liked it, and the Army gave us a year to look into the problem.” Futures Command also provided several million dollars in funding.

The concept of using LEO satellites for navigation isn't new. In fact, some of the first US spacecraft launched in the 1960s were Transit satellites orbiting at 1,100 kilometers, providing location information for Navy ships and submarines. The advantage of an LEO constellation is that the signals can be a thousand times stronger than GPS. The disadvantage is that each satellite can serve only a small area beneath it, so that reliable global coverage requires hundreds or even thousands of satellites.

Building a whole new network of LEO satellites with ultra-accurate clocks would be an expensive undertaking. Bay Area startup Xona Space Systems plans to do just that, aiming to launch a constellation of at least 300 Pulsar satellites over the next six years.

Humphreys and Iannucci’s idea is different: they would use a simple software upgrade to modify Starlink’s satellites so their communications abilities and existing GPS signals could provide position and navigation services .

They claim their new system can even, counterintuitively, deliver better accuracy for most users than the GPS technology it relies upon. That is because the GPS receiver on each Starlink satellite uses algorithms that are rarely found in consumer products, to pinpoint its location within just a few centimeters. These technologies exploit physical properties of the GPS radio signal, and its encoding, to improve the accuracy of location calculations. Essentially, the Starlink satellites can do the heavy computational lifting for their users below.

The Starlink satellites are also essentially internet routers in space, capable of achieving 100 megabits per second. GPS satellites, on the other hand, communicate at fewer than 100 bits per second.

“There are so few bits per second available for GPS transmissions that they can’t afford to include fresh, highly accurate data about where the satellites actually are,” says Iannucci. “If you have a million times more opportunity to send information down from your satellite, the data can be much closer to the truth.”

The new system, which Humphreys calls fused LEO navigation, will use instant orbit and clock calculations to locate users to within 70 centimeters, he estimates. Most GPS systems in smartphones, watches, and cars, for comparison, are only accurate to a few meters.

But the key advantage for the Pentagon is that fused LEO navigation should be significantly more difficult to jam or spoof. Not only are its signals much stronger at ground level, but the antennas for its microwave frequencies are about 10 times more directional than GPS antennas. That means it should be easier to pick up the true satellite signals rather than those from a jammer.  “At least that’s the hope,” says Humphreys.

According to Humphreys and Iannucci’s calculations, their fused LEO navigation system could provide continuous navigation service to 99.8% of the world’s population, using less than 1% of Starlink’s downlink capacity and less than 0.5% of its energy capacity.

“I do think this could lead to a more robust and accurate solution than GPS alone,” says Todd Walter of Stanford University’s GPS Lab, who was not involved with the research. “And if you don’t have to modify Starlink’s satellites, it certainly is a fast, simple way to go.”

#### Taiwan goes nuclear – the US gets drawn in

The Week 1/4 [(The Week Staff, weekly news magazine with editions in the United Kingdom and United States) “What would happen if China tried to invade Taiwan?” The Week Staff, 1/4/2022] JL

If a conflict were to break out between the two neighbours it would be “a catastrophe”, reported The Economist. This is first because of “the bloodshed in Taiwan” but also because of the risk of “escalation between two nuclear powers”, namely the US and China.

Beijing massively outguns Taiwan, with estimates from the Stockholm International Peace Research Institute showing that China spends about 25 times more on its military. However, Taiwan has a defence pact with the US dating back to the 1954 Sino-American Mutual Defence Treaty, meaning the US could, in theory, be drawn into the conflict.

“Beijing’s optimistic version of events” after the decision to invade would see “cyber and electronic warfare units target Taiwan’s financial system and key infrastructure, as well as US satellites to reduce notice of impending ballistic missiles”, Bloomberg said.

“Chinese vessels could also harass ships around Taiwan, restricting vital supplies of fuel and food,” the news site continued, while “airstrikes would quickly aim to kill Taiwan’s top political and military leaders, while also immobilising local defences”.

This would be followed by “warships and submarines traversing some 130 kilometres [80 miles] across the Taiwan Strait”, before “thousands of paratroopers would appear above Taiwan’s coastlines, looking to penetrate defences [and] capture strategic buildings”.

According to satellite imagery seen by military news site The Drive, China has also begun “beefing up its combat aviation infrastructure across from Taiwan as invasion fears grow”.

Beijing “is upgrading three air bases located opposite” the island, “boosting its air power capability in an already tense region that is flush with air combat capabilities.”

“Construction of the new infrastructure began in early 2020 and continued uninterrupted through the pandemic, underlining its priority,” the site added.

Taiwan would be reliant on “natural defences” – its rugged coastline and rough sea – with plans to “throw a thousand tanks at the beachhead” in the event of a Chinese invasion that could result in “brutal tank battles” that “decide the outcome”, according to Forbes.

The island’s top military leadership has also “warned China that the closer its aircraft and ships get to the island the harder Taipei will respond”, Bloomberg reported, with “a multi-pronged approach that utilises aircraft, ships and its air defence systems to counter Chinese military incursions” in the works.

“Chinese state media has dismissed the idea of Taiwan retaliating,” the news agency added. But a report by the island’s defence ministry sent to legislators shows the island is preparing to “take tougher measures” should they be necessary.

This would all be complicated by the US pledge to defend its ally in what The Economist called a “test of America’s military might and its diplomatic and political resolve”.

Asked last week during a CNN town hall meeting whether the US would mount a military response if Beijing attempted to take the island by force, Biden responded: “Yes, we have a commitment to do that.”

The Guardian said that Biden “made a similar pledge in August”, when he told ABC News that the US has a “sacred commitment” to defend its Nato allies in Canada and Europe and it was the “same with Japan, same with South Korea, same with Taiwan”.

If the US had decided against intervention, “China would overnight become the dominant power in Asia” and “America’s allies around the world would know that they could not count on it”, the paper added. In other words, “Pax Americana would collapse”.

That would be unacceptable in Washington, especially as “Joe Biden pivots US foreign policy towards a focus on the Indo-Pacific as the main arena for 21st-century superpower competition”, The Guardian said.

Biden’s comments during the CNN event were “at odds with the long-held US policy” of “strategic ambiguity”, The Telegraph said. Historically, Washington has helped “build Taiwan’s defences” but has “not explicitly promised to come to the island’s aid”.

US manoeuvres have so far consisted of building up “large amounts of lethal military hardware”, The Guardian added, with “the steady buildup of troops and equipment and the proliferation of war games” meaning there is “more of a chance of conflict triggered by miscalculation or accident”.

The primary danger that comes with US involvement lies in the fact that both Washington and Beijing possess nuclear weapons.

Leaked documents published by The New York Times earlier this year revealed the extent of Washington’s discussions about using nuclear weapons to deter a Chinese invasion of Taiwan in the 1950s.

Provided to the paper by Daniel Ellsberg, the whistleblower behind the 1971 Pentagon Papers, the documents appeared to show an “acceptance by some US military leaders of possible retaliatory nuclear strikes on US bases”, CNN noted, raising the spectre of how the nuclear powers would square off in a 21st-century conflict.

### 4

#### Private companies dampen space tensions–the alternative is military space programs which triggers US-China war

[**Utrata**](https://bostonreview.net/authors/alina-utrata/) **21** (Alina, PhD Candidate in the Department of Politics and International Studies at the University of Cambridge, and a Gates-Cambridge and Marshall scholar. Her research “Silicon Valley and the State” examines technology corporations as competitors to state power. “Lost In Space” <https://bostonreview.net/articles/lost-in-space/> July 14, 2021)DR 22

Company-states were predicated on an understanding of sovereignty as divisible and delegatory, defying what we today consider “public” and “private” power. Compared to company-states at their zenith, even the largest modern-day multinational **corporation**—and certainly SpaceX and Blue Origin—has significantly less authority, with absolutely no military might to speak of. The monarchies that first granted monopoly charters to these voyaging companies, having evolved into modern states, have also consolidated sovereign authority and gained far more power than their antecedents in previous centuries. Today states, not corporations, are perceived to be the truly dangerous actors in space exploration. Particularly in the context of worsening U.S.-China relations, the **militarization of space by states** is often posited as the most likely way that **celestial encounters** may become violent. On this view, if private U.S. companies were to extract commercial resources from asteroids, it would be a much more peaceful prospect than the U.S. Space Force establishing a military base on the moon.

#### US-China space war goes nuclear- Russia, Iran and Noko get dragged in

**Gertz 21** (Bill, reporter for the Washington Times. “China space war threat growing ‘exponentially’” <https://www.washingtontimes.com/news/2021/jul/7/china-space-war-threat-growing-exponentially/> July 7, 2021)DR 22

[China](https://www.washingtontimes.com/topics/china/) engaged in a large-scale, **rapid** buildup of space warfare capabilities over the past six years — that is a major concern for the new Space Command, a senior officer revealed.

Rear Adm. [Michael Bernacchi](https://www.washingtontimes.com/topics/michael-bernacchi/), the command’s director of strategy, plans and policy, said the rapid expansion of anti-satellite missiles, orbiting weapons and electronic tools for space warfare is particularly alarming, considering where [Beijing](https://www.washingtontimes.com/topics/beijing/) was just a short time ago.

“The thing that scares me the most: If you go back six years ago, [China](https://www.washingtontimes.com/topics/china/) had almost nothing. Now you look at them and the ability for [China](https://www.washingtontimes.com/topics/china/) to exponentially grow their counterspace capability is scary. I mean I don’t know how else to put it,” Adm. [Bernacchi](https://www.washingtontimes.com/topics/michael-bernacchi/) said during a recent webinar.

The admiral, a former submarine commander, said the growing danger posed by [China](https://www.washingtontimes.com/topics/china/)’s space buildup is compounded by the People’s Liberation Army ability to **integrate** space warfighting with other military capabilities, such as cyber and conventional forces.

[China](https://www.washingtontimes.com/topics/china/)‘s ability “to integrate, in a cross-domain capability and start to show this in their exercises, is even more scary,” [he](https://www.washingtontimes.com/topics/michael-bernacchi/) said. “Where is this exponential growth and cross-domain capability going to stop? The answer is, I don’t know.”

Adm. [Bernacchi](https://www.washingtontimes.com/topics/michael-bernacchi/) said [he](https://www.washingtontimes.com/topics/michael-bernacchi/), like former Defense Secretary James N. Mattis, has asserted that “nothing keeps me up at night; I want to keep them up at night.”

“But if there is something that would give me pause, [it’s] the growth rate” of [China](https://www.washingtontimes.com/topics/china/)’s space arms, he said.

One reason for the large-scale build-up is that [Beijing](https://www.washingtontimes.com/topics/beijing/)’s space infrastructure does not distinguish between military and civilian space systems.

“Everything is dual-use,” Adm. [Bernacchi](https://www.washingtontimes.com/topics/michael-bernacchi/) said, adding that [Beijing](https://www.washingtontimes.com/topics/beijing/) officials are guilty of “hypocrisy” for insisting that [China](https://www.washingtontimes.com/topics/china/)‘s new space weapons are not “militarizing space.”

Both [China](https://www.washingtontimes.com/topics/china/) and Russia, which also has space weaponry capable of knocking out satellites, are seeking legally binding agreements to limit the U.S. from developing space defenses.

“They want to get into the letter of the law because the United States will always honor its treaties. As a democratic nation, we always do that,” Adm. [Bernacchi](https://www.washingtontimes.com/topics/michael-bernacchi/) said.

The U.S. Space Command is working to deter [China](https://www.washingtontimes.com/topics/china/) by taking an asymmetric approach to countering space threats.

“We have to make sure at Spacecom why we exist is that we have to deter that aggression,” [he](https://www.washingtontimes.com/topics/michael-bernacchi/) said. “We never go man-for-man. We’ve never done that in our history.”

The command’s approach to [China](https://www.washingtontimes.com/topics/china/)’s space buildup is similar to the undersea warfare disparity between the U.S. and Soviet submarine fleets during the Cold War.

“We were outnumbered on submarines quite significantly, in some places seven, eight to one,” [he](https://www.washingtontimes.com/topics/michael-bernacchi/) said. “That didn’t bother us. It has to do with, ‘Hey, what is the capability? What is the magazine size? What’s the training, what’s the people advantage?’ It’s all about outthinking, outmaneuvering [rather] than just sheer size.”

Space Command plans to apply advanced technologies, such as artificial intelligence and quantum computing for its arsenal, “but we have to respect the growth rate and the capability that has happened in the last six years,” the admiral acknowledged.

[China](https://www.washingtontimes.com/topics/china/)’s space weapons include several types of anti-satellite missiles capable of shooting down satellites in orbits ranging from low-earth to geosynchronous — 22,500 miles in space. [China](https://www.washingtontimes.com/topics/china/) also has developed electronic jammers and lasers capable of disrupting or damaging orbiting satellites. Its on-orbit weapons include small maneuvering satellites, some equipped with robotic arms that can grab or crush satellites.

[China](https://www.washingtontimes.com/topics/china/) also plans to use its formidable cyberwarfare capabilities to disrupt or take control of satellites by hacking enemy ground stations.

Adm. [Bernacchi](https://www.washingtontimes.com/topics/michael-bernacchi/), who spoke last week at a meeting of the National Security Space Association, also said the new military command has been hampered by the stringent information classification rules. The secrecy has made it difficult for analysts and officers to develop plans and share information.

“I had to take a polygraph to get into the building,” [he](https://www.washingtontimes.com/topics/michael-bernacchi/) said of the command headquarters at Peterson Air Force Base, Colorado. “You get to a point where it’s just not productive.”

In developing space warfare plans, Adm. [Bernacchi](https://www.washingtontimes.com/topics/michael-bernacchi/) said classification levels were so high that in one meeting was limited to two admirals and a general. Unless military planners are granted access to needed information, “it’s a recipe for disaster,” [he](https://www.washingtontimes.com/topics/michael-bernacchi/) warned.

Nuclear war threat increases

The Pentagon’s Joint Staff recently made public a report on nuclear war operations that reveals that nuclear strikes in a conflict would include enemy leaders.

The report, “Joint Nuclear Operations,” also discloses that the danger a U.S. **adversary** will resort to nuclear arms in a conflict is growing.

“Adversaries increasingly rely on nuclear weapons to secure their interests,” the report said. “Those adversaries seeking ways to use nuclear weapons for coercion and war termination present complex deterrence and escalation management challenges.”

The report states that despite efforts by the U.S. government to reduce the role of nuclear weapons for the military, “others, including Russia and [China](https://www.washingtontimes.com/topics/china/), have moved in the opposite direction.”

“They have added new types of nuclear capabilities to their arsenal, increased the salience of nuclear forces in their strategies and plans, and engaged in increasingly aggressive behavior,” the report said. “There now exists an unprecedented range and mix of threats, including major conventional, chemical, biological, nuclear, space, and cyber threats and violent non-state actors.”

Since 2010, no U.S. adversary has reduced either the role of nuclear arms or the number of nuclear weapons it fields.

“As a result, there is an increased potential for regional conflicts involving nuclear-armed **adversaries** in several parts of the world and the potential for adversary nuclear escalation in crisis or conflict,” the report said.

[China](https://www.washingtontimes.com/topics/china/) is building up the number, types, and protection of its nuclear forces with new road-mobile intercontinental-range missiles, adding multiple warheads to DF-5 silo-based missiles, building new missile submarines and a new strategic bomber, providing [Beijing](https://www.washingtontimes.com/topics/beijing/) with a “triad” of strategic arms.

Russia regards the United States as its main enemy and built up — and is continuing to build up — its nuclear forces, including systems that give Moscow the ability to rapidly expand the number of deployed warheads.

“In addition to modernizing ‘legacy’ Soviet nuclear systems, Russia is developing and employing new nuclear warheads and launchers,” the report said. “It is also developing three new intercontinental-range nuclear weapon systems; a hypersonic glide vehicle; a nuclear-armed, nuclear-powered ground-launched cruise missile; and a nuclear-armed, nuclear-powered, undersea autonomous torpedo.”

North Korea is accelerating its pursuit of nuclear arms and missiles and “expressed **explicit threats** to use nuclear weapons against the United States and its allies in the region,” the report said.

Iran could build nuclear weapons within a year, based on its infrastructure. Tehran’s development of long-range missiles and destabilizing regional activities “raise questions about its long-term commitment to forgoing nuclear weapons capability,” the report said.

The doctrine publication states that deterring nuclear war remains the highest priority for the military. But preparing to wage war with nuclear arms is also required.

“There is no ‘one size fits all’ for deterrence because the content of each adversary’s decision calculus is unique, and the context in which each adversary’s decision making takes place varies,” the report said. “Consequently, the United States applies a tailored and flexible approach to effectively deter a range of adversaries.”

U.S. nuclear attacks **will** only be carried out in extreme circumstances to defend American vital interests or those of allies and partners. The report says U.S. intelligence agencies will need to provide global awareness and help target adversaries leaders and other high-value assets.

“Assets highly valued by adversary leaders need to be identified, catalogued, targeted … and maintained for strike planning,” the report said.

The report did not specify targets for adversaries like [China](https://www.washingtontimes.com/topics/china/) or Russia. However, [China](https://www.washingtontimes.com/topics/china/)‘s ruling Communist Party and its power structures likely **would be key targets**, as would Russian leaders and regime infrastructure.

### 5

#### JCPOA passes now, but it’s tentative and the window is closing

Norman 3/15 [(Laurence, deputy bureau chief at Dow Jones Newswires and The Wall Street Journal based in London) “Russia Softens Iran Demands, Re-Opening Way for Nuclear Deal,” The Wall Street Journal, 3/15/2022] JL

Russia walked back recently made demands on Washington related to the Iran nuclear deal, clearing the way for Tehran and Washington to revive the 2015 agreement, senior western diplomats said.

On Tuesday, after Russia’s Foreign Minister Sergei Lavrov met in Moscow with his Iranian counterpart, both Mr. Lavrov and Hossein Amir-Abdollahian said Russia wasn’t standing in the way of the accord.

Russia earlier this month had demanded guarantees from Washington that its economic ties with Iran wouldn’t be affected by the Western sanctions imposed on Moscow over Ukraine. The last-minute move was the driving factor that prevented a deal to revive the 2015 nuclear agreement over the past 10 days, western diplomats have said.

The European Union, which coordinates the talks, announced a break in the negotiations on Friday, blaming “external factors” for preventing a deal that is “essentially ready.”

A senior Western diplomat said Tuesday evening that Russia’s chief negotiator at the talks, Mikhail Ulyanov, had informed the EU that Russia would accept narrower guarantees ensuring that Russia could carry out the nuclear work it is mandated to do under the 2015 nuclear deal. That includes a uranium swap with Iran, the redesign of the Fordow nuclear facility and the provision of nuclear fuel to Iranian reactors.

“Russia says happy with guarantees on nuclear projects and not asking for anything else,” said the diplomat, who asked to remain unidentified because of the sensitive nature of the talks. “So we can go ahead with negotiations that are now exclusively US-Iran.”

State Department spokesman Ned Price said Tuesday evening that “we are not going to sanction Russia for undertaking, for participating in nuclear projects that are part of the” nuclear deal.

The negotiations, which have taken place for almost a year now, aim to reach agreement on the steps Washington and Tehran will take to return into compliance with the 2015 agreement, which lifted most international sanctions on Tehran in exchange for tight but temporary restrictions on Iran’s nuclear work.

After the Trump administration took the U.S. out of the accord and reimposed sweeping sanctions on Iran, saying the accord was too weak, Tehran expanded its nuclear work and has now gathered almost enough nuclear high-grade enriched uranium for a nuclear weapon, according to the United Nations nuclear agency.

Iran says its nuclear program is purely peaceful and U.S. officials have said there is no evidence Iran has decided to build a nuclear weapon.

Over the weekend, a senior U.S. official told The Wall Street Journal that only “a handful of issues left” remained between the U.S. and Iran to reach an accord, mainly on the issue of the scope of sanctions relief Iran would receive from Washington. The official said the U.S. side felt the resolution of these issues was “within reach.”

The U.S. official and senior European diplomats said they wouldn’t negotiate broad carve-outs from Western sanctions over Russia’s invasion of Ukraine with Moscow to save the nuclear deal. They warned that if Russia didn’t back off its demands, they would seek to complete an agreement with Iran, bypassing Russia.

Mr. Ulyanov said Tuesday evening on Twitter it was a lie that Russia had stood in the way of the accord with its demands for guarantees. He added that “some demands were accepted.” Iran, which has friendly ties with Moscow, has also continued to blame Washington for not completing the deal.

Negotiations between the U.S. and Iran could resume without negotiators returning to Vienna, where the talks have been held since April 2021, the senior western diplomat said. Iran so far has refused to talk directly with the Americans and instead have negotiated through the European powers at the talks. With so few issues still to be resolved, negotiators could work from capitals to resolve the remaining differences.

Time is pressing. U.S. and European officials say that Iran’s nuclear work has expanded close to a point that the deal’s main benefit to the West—keeping Iran months away from amassing enough nuclear fuel for a nuclear weapon—would be impossible.

European diplomats in particular have warned that with the war in Ukraine becoming ever-deadlier, the diplomatic window for concluding the deal is closing.

#### Space diplomacy directly trades off with nonproliferation agreements – finite manpower, money, and political will within the AVC

Johnson-Freeze 16 [(Joan, Professor and former Chair of National Security Affairs at the US Naval War College, Newport, Rhode Island) “Space Warfare in the 21st Century: Arming the Heavens,” Cass Military Studies, 11/8/2016] JL

 \*The plan is legislated in the AVC (same bureau of the State Department that’s concerned with the JCPOA)

Proactive policymaking takes commitment, manpower, and money. A quick look at the money and manpower devoted to diplomacy in the US State and Defense departments compared to the resources available for the hardwareproducing military–industrial complex efforts described in Chapter 5 is enlightening. The Assistant Secretary of State for Arms Control, Verification, and Compliance (AVC) leads space-related diplomacy in the State Department. The AVC Bureau is responsible for “all matters related to the implementation of certain international arms control, nonproliferation, and disarmament agreements and commitments; this includes staffing and managing treaty implementation commissions.”34 The AVC arms control portfolio includes nuclear, biological, and chemical weapons and all related issues. The AVC section charged with space issues is the Office of Emerging Security Challenges; this office also handles missile defense issues and the promotion of transparency, cooperation, and building confidence regarding cybersecurity. As of financial year 2013, AVC had a budget of $31.2 million and 141 employees35 to be active participants and leaders in all of these issues.

By way of comparison, the Space Security and Defense Program, a joint program of the DoD and the Office of the Director of National Intelligence (ODNI) was programmed for a similar budget amount in financial year 2015: $32.3 million. That program is described as a “center of excellence for options and strategies (materiel, non-materiel, cross-Title, cross-domain) leading to a more resilient and enduring National Security Space (NSS) Enterprise.”36 A majority of SSDP funding is allocated to the development of offensive space control strategies. So basically, the same budget is allocated for all US global space diplomacy efforts as for an in-house Pentagon think tank to devise counterspace strategies.

Within the Pentagon, the Deputy Assistant Secretary of Defense for Space Policy is charged with all issues related to space policy, including diplomacy. The responsibilities of the Space Policy office are to:

• Develop policy and strategy for a domain that is increasingly congested, competitive, and contested

• Implement across DoD — plans, programs, doctrine, operations — and with the IC and other agencies

• Engage with allies and other space-faring countries in establishing norms and augmenting our capabilities.37

The breadth of those responsibilities, which includes reviewing space acquisitions, means that there may be only a handful of individuals actually engaged in multilateral diplomatic efforts, acting, for example, as advisors to diplomatic discussions such as those through the United Nations. Additionally, the expanse of the Pentagon results in a chain of command that makes organizational competition for attention to subject matter challenging at best. The Deputy Assistant Secretary of Defense for Space Policy reports to the Assistant Secretary of Defense for Homeland Defense, who then reports to the Principle Deputy Secretary of Defense for Homeland Defense and Global Security, who then reports to the Under Secretary of Defense for Defense Policy. There are also a multitude of space players in other governmental organizations to coordinate and contend with, particularly within the Air Force and intelligence communities. Personnel are spread thin.

US government-wide space diplomacy needs a mandate, manpower, and a supporting budget. Diplomacy, especially multilateral diplomacy, can be timeconsuming, manpower-intensive, and frustrating; and patience is not a strong American virtue. The recent experience in the UN LTS Working Group is emblematic of everything that causes the United States to shun multilateralism. Under the auspices of this group, countries had worked in good faith over the past five years to develop technical guidelines as reciprocal constraints, as insisted upon by the developing countries when they rejected the ICOC. Yet group success appeared thwarted at the February 2016 meeting of the LTS Working Group by one country, Russia.

#### The JCPOA returns Iran to global oil markets – increased supply and perception solve market volatility

Shokri 3/3 [(Omid, visiting research scholar at the School of Policy and Government at George Mason University and is an analyst at Gulf State Analytics (GSA) who specializes in energy security, author of US Energy Diplomacy in the Caspian Sea Basin: Changing Trends Since 2001) “Can Iranian oil stabilize a volatile market?” Atlantic Council, 3/3/2022] JL

As fuel prices skyrocket following the Russian invasion of Ukraine, another major supplier of oil and natural gas is poised to play an important role.

Before Donald Trump‘s withdrawal from the 2015 nuclear deal and the imposition of sanctions on Iran’s oil exports, Iran produced 3.8 million barrels of oil per day. Afterwards, this dropped as low as 1.9 million barrels and currently it is about 2.4 million barrels. It will take time for the country’s production to return to pre-sanction levels due to this significant drop as well as low levels of investment in recent years. However, Iran’s oil and gas condensate reserves in tankers, as well as onshore oil storage facilities, will help Iran accelerate its exports which currently total more than 1 million barrels per day.  Some sources predict that with the lifting of the sanctions, Iran could ship an additional 500,000 barrels of oil per day to international markets from April to May, and by the end of this year this figure could reach an additional 1.3 million barrels per day.

All of this assumes that current talks in Vienna on reviving the Joint Comprehensive Plan of Action (JCPOA) are successful. Without sanctions relief, any new disruptions in US supplies could boost oil prices beyond $100 a barrel to as high as $150. As reported by GasBuddy**,** the United States is already struggling to cope with its highest level of inflation in four decades. The price of gasoline has risen about $4 a gallon in many parts of the country since the Ukraine crisis began.

Iran has said that it is ready to increase its oil exports significantly if sanctions imposed by the Trump administration are lifted, but it will take time to restore relationships with customers in Europe and Asia. In February, officials from the National Iranian Oil Company (NIOC) traveled to Seoul, the capital of South Korea, to hold talks with several refineries on the prospects for resuming oil deliveries.

The International Energy Agency (IEA) has increased its forecast for demand growth in 2022, stating that global demand for oil will increase by 3.2 million barrels per day this year to a record 100.6 million barrels per day. These forecasts show that there is a market for more oil and that this is an opportunity for producers to increase oil sales and export revenues.

Iran will clearly be a major beneficiary of this increase if it can resolve its problems with the United States over a return to the JCPOA.  Iran is asking the US government to remain committed to the deal in the event of a change of administration in Washington. But this is something that President Joe Biden, or any other US leader, cannot promise. Tehran must decide whether it is worthwhile to reach an agreement that could last only three years.

After the JCPOA went into implementation in 2016, Iran increased its oil production much faster than expected. Most analysts had predicted that Iran would increase its production by 500,000 barrels per day within a year after the lifting of sanctions, but in fact Iran reached this figure in less than four months, and by the end of the year had increased production by nearly one million barrels.

After sanctions were reimposed following the US withdrawal from the JCPOA in 2018, Iran stored oil in tankers. It is estimated that Iran has stored more than 85 million barrels of oil and gas condensate at sea. These supplies can be exported rapidly if sanctions are lifted.

The elimination of important oil exporting countries from the market has major ripple effects. Other producers often raise prices and pursue their own interests. Even if Iran returns to the market, not all problems of oil and gas will be solved, but an Iranian return can have a major psychological impact in helping the oil market move towards equilibrium. There is also the possibility that Iran can play a role in replacing Russian gas exports to Europe.

#### High oil prices and volatility cause nuclear war

King 8 [(Neil King, Global Economics Editor for the WSJ), Peak Oil: A Survey of Security Concerns, Center for a New American Security, September, http://www.cnas.org/files/documents/publications/CNAS\_Working%20Paper\_PeakOil\_King\_Sept2008.pdf] TDI

Many commentators in the United States and abroad have begun to wrestle with the question of whether soaring oil prices and market volatility could spark an outright oil war between major powers—possibly ignited not by China or Russia, but by the United States. In a particularly pointed speech on the topic in May, James Russell of the Naval Postgraduate School in California addressed what he called the increasing militarization of international energy security. “Energy security is now deemed so central to ‘national security’ that threats to the former are liable to be reflexively interpreted as threats to the latter,” he told a gathering at the James A. Baker Institute for Public Policy at Houston’s Rice University.6 The possibility that a large-scale war could break out over access to dwindling energy resources, he wrote, “is one of the most alarming prospects facing the current world system.”7 Mr. Russell figures among a growing pool of analysts who worry in particular about the psychological readiness of the United States to deal rationally with a sustained oil shock. Particularly troubling is the increasing perception within Congress that the financial side of the oil markets no longer functions rationally. It has either been taken over by speculators or is being manipulated, on the supply side, by producers who are holding back on pumping more oil in order to drive up the price. A breakdown in trust for the oil markets, these analysts fear, could spur calls for government action—even military intervention. “The perceptive chasm in the United States between new [oil] market realities and their impact on the global distribution of power will one day close,” Mr. Russell said. “And when it does, look out.”8 The World at Peak: Taking the Dim View For years, skeptics scoffed at predictions that the United States would hit its own domestic oil production peak by sometime in the late 1960s. With its oil fields pumping full out, the U.S. in 1969 was providing an astonishing 25 percent of the world’s oil supply—a role no other country has ever come close to matching. U.S. production then peaked in December 1970, and has fallen steadily ever since, a shift that has dramatically altered America’s own sense of vulnerability and reordered its military priorities. During World War II, when its allies found their own oil supplies cut off by the war, the United States stepped in and made up the difference. Today it is able to meet less than a third of its own needs. A similar peak in worldwide production would have far more sweeping consequences. It would, for one, spell the end of the world’s unparalleled economic boom over the last century. It would also dramatically reorder the wobbly balance of power between nations as energy-challenged industrialized countries turn their sights on the oil-rich nations of the Middle East and Africa. In a peak oil future, the small, flattened, globalized world that has awed recent commentators would become decidedly round an d very vast again. Oceans will reemerge as a hindrance to trade, instead of the conduit they have been for so long. An energy-born jolt to the world economy would leave no corner of the globe untouched. Unable to pay their own fuel bills, the tiny Marshall Islands this summer faced the possibility of going entirely without power. That is a reality that could sweep across many of the smallest and poorest countries in Africa, Asia, and Latin America, reversing many of the tentative gains in those regions and stirring deep social unrest. Large patches of the world rely almost entirely on diesel-powered generators for what skimpy electricity they now have. Those generators are the first to run empty as prices soar. A British parliamentary report released in June on “The Impact of Peak Oil on International Development” concluded that “the deepening energy crisis has the potential to make poverty a permanent state for a growing number of people, undoing the development efforts of a generation.”9 We are seeing some of the consequences already in Pakistan – a country of huge strategic importance, with its own stash of nuclear weapons – that is now in the grips of a severe energy crisis. By crippling the country’s economy, battering the stock market, and spurring mass protests, Pakistan’s power shortages could end up giving the country’s Islamic parties the leverage they have long needed to take power. It’s not hard to imagine similar scenarios playing out in dozens of other developing countries. Deepening economic unrest will put an enormous strain on the United Nations and other international aid agencies. Anyone who has ever visited a major UN relief hub knows that their fleets of Land Rovers, jumbo jets and prop planes have a military size thirst for fuel. Aid agency budgets will come under unprecedented pressure just as the need for international aid skyrockets and donor countries themselves feel pressed for cash. A peaking of oil supplies could also hasten the impact of global climate change by dramatically driving up the use of coal for power generation in much of the world. A weakened world economy would also put in jeopardy the massively expensive projects, such as carbon capture and storage, that many experts look to for a reduction in industrial emissions. So on top of the strains caused by scarce fossil fuels, the world may also have to grapple with the destabilizing effects of more rapid desertification, dwindling fisheries, and strained food supplies. An oil-constricted world will also stir perilous frictions between haves and have-nots. The vast majority of all the world’s known oil reserves is now in the hands of national oil companies, largely in countries with corrupt and autocratic governments. Many of these governments—Iran and Venezuela top the list—are now seen as antagonists of the United States. Tightened oil supplies will substantially boost these countries’ political leverage, but that enhanced power will carry its own peril. Playing the oil card when nations are scrambling for every barrel will be a far more serious matter that at any time in the past. The European continent could also undergo a profound shift as its needs—and sources of energy—diverge all the more from those of the United States. A conservation-oriented Europe (oil demand is on the decline in almost every EU country) will look all the more askance at what it sees as the gluttonous habits of the United States. At the same time, Europe’s governments may have little choice but to shy from any political confrontations with its principal energy supplier, Russia. An energy-restricted future will greatly enhance Russia’s clout within settings like the UN Security Council but also in its dealings with both Europe and China. Abundant oil and gas have fueled Russia’s return to power over the last decade, giving it renewed standing within the UN and increasing sway over European capitals. The peak oil threat is already sending shivers through the big developing countries of China and India, whose propulsive growth (and own internal stability) requires massive doses of energy. For Beijing, running low on fuel spells economic chaos and internal strife, which in turn spawns images of insurrection and a breaking up of the continent sized country. Slumping oil supplies will automatically pit the two largest energy consumers—the United States and China—against one another in competition over supplies in South America, West Africa, the Middle East, and Central Asia. China is already taking this competition very seriously. It doesn’t require much of a leap to imagine a Cold War-style scramble between Washington and Beijing—not for like-minded allies this time but simply for reliable and tested suppliers of oil. One region that offers promise and peril in almost equal measure is the Artic, which many in the oil industry consider the last big basin of untapped hydrocarbon riches. But the Artic remains an ungoverned ocean whose legal status couldn’t be less clear, especially so long as the United States continues to remain outside the international Law of the Sea Treaty. As the ices there recede, the risk increases that a scramble for assets in the Artic could turn nasty.

### 6

#### Unpredictable shifts ruin biz con AND overall growth

Sarah Chaney Cambon 21, Reporter on The Wall Street Journal's Economics Team, BA in Business Journalism from the University of North Carolina-Chapel Hill, “Capital-Spending Surge Further Lifts Economic Recovery”, Wall Street Journal, 6/27/2021, https://www.wsj.com/articles/capital-spending-surge-further-lifts-economic-recovery-11624798800

Business investment is emerging as a powerful source of U.S. economic growth that will likely help sustain the recovery.

Companies are ramping up orders for computers, machinery and software as they grow more confident in the outlook.

Nonresidential fixed investment, a proxy for business spending, rose at a seasonally adjusted annual rate of 11.7% in the first quarter, led by growth in software and tech-equipment spending, according to the Commerce Department. Business investment also logged double-digit gains in the third and fourth quarters last year after falling during pandemic-related shutdowns. It is now higher than its pre-pandemic peak.

Orders for nondefense capital goods excluding aircraft, another measure for business investment, are near the highest levels for records tracing back to the 1990s, separate Commerce Department figures show.

“Business investment has really been an important engine powering the U.S. economic recovery,” said Robert Rosener, senior U.S. economist at Morgan Stanley. “In our outlook for the economy, it’s certainly one of the bright spots.”

Consumer spending, which accounts for about two-thirds of economic output, is driving the early stages of the recovery. Americans, flush with savings and government stimulus checks, are spending more on goods and services, which they shunned for much of the pandemic.

Robust capital investment will be key to ensuring that the recovery maintains strength after the spending boost from fiscal stimulus and business reopenings eventually fades, according to some economists.

Rising business investment helps fuel economic output. It also lifts worker productivity, or output per hour. That metric grew at a sluggish pace throughout the last economic expansion but is now showing signs of resurgence.

The recovery in business investment is shaping up to be much stronger than in the years following the 2007-09 recession. “The events especially in late ’08, early ’09 put a lot of businesses really close to the edge,” said Phil Suttle, founder of Suttle Economics. “I think a lot of them said, ‘We’ve just got to be really cautious for a long while.’”

Businesses appear to be less risk-averse now, he said.

After the financial crisis, businesses grew by adding workers, rather than investing in capital. Hiring was more attractive than capital spending because labor was abundant and relatively cheap. Now the supply of workers is tight. Companies are raising pay to lure employees. As a result, many firms have more incentive to grow by investing in capital.

Economists at Morgan Stanley predict that U.S. capital spending will rise to 116% of prerecession levels after three years. By comparison, investment took 10 years to reach those levels once the 2007-09 recession hit.

Company executives are increasingly confident in the economy’s trajectory. The Business Roundtable’s economic-outlook index—a composite of large companies’ plans for hiring and spending, as well as sales projections—increased by nine points in the second quarter to 116, just below 2018’s record high, according to a survey conducted between May 25 and June 9. In the second quarter, the share of companies planning to boost capital investment increased to 59% from 57% in the first.

“We’re seeing really strong reopening demand, and a lot of times capital investment follows that,” said Joe Song, senior U.S. economist at BofA Securities.

Mr. Song added that less uncertainty regarding trade tensions between the U.S. and China should further underpin business confidence and investment. “At the very least, businesses will understand the strategy that the Biden administration is trying to follow and will be able to plan around that,” he said.

#### It’s perception-based---the possibility that precedent could be applied crumbles confidence and spirals into global decline

Mohamed A. El-Erian 17, Chief Economic Adviser at Allianz, Chairman of US President Barack Obama’s Global Development Council, Former CEO of the Harvard Management Company and Deputy Director at the International Monetary Fund, “America’s Confidence Economy”, Project Syndicate, 3/20/2017, https://www.project-syndicate.org/commentary/trump-market-optimism-economic-growth-by-mohamed-a--el-erian-2017-03

The surge in business and consumer sentiment reflects an assumption that is deeply rooted in the American psyche: that deregulation and tax cuts always unleash transformative pro-growth entrepreneurship. (To some outside the US, it is an assumption that sometimes looks a lot like blind faith.)

Of course, sentiment can go in both directions. Just as a “pro-business” stance like Trump’s can boost confidence, perhaps even excessively, the perception that a leader is “anti-business” can cause confidence to fall. Because sentiment can influence actual behavior, these shifts can have far-reaching impacts.

In his groundbreaking General Theory of Employment, Interest, and Money, John Maynard Keynes referred to “animal spirits” as “the characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism, rather than mathematical expectations, whether moral or hedonistic or economic.” Jack Welch, who led General Electric for 20 years, is a case in point: he once stated that many of his own major business decisions had come “straight from the gut,” rather than from analytical models or detailed business forecasts.

But sentiment is not always an accurate gauge of actual economic developments and prospects. As the Nobel laureate Robert J. Shiller has shown, optimism can evolve into “irrational exuberance,” whereby investors take asset valuations to levels that are divorced from economic fundamentals. They may be able to keep those valuations inflated for quite a while, but there is only so far that sentiment can take companies and economies.

So far, the exuberant reaction of markets to Trump’s victory – all US stock indices have reached multiple record highs – has not been reflected in “hard data.” Moreover, economic forecasters have made only modest upward revisions to their growth projections.

It is not surprising that equity investors have responded to the surge in animal spirits by attempting to run ahead of a possible uptick in economic performance. After all, they are in the business of anticipating developments in the real economy and the corporate sector. In any case, they believe that they can quickly reverse their portfolio positions should their expectations change.

That is not the case for companies investing in new plants and equipment, which are less likely to change their behavior until announcements begin to be translated into real policies. But the longer they wait, the weaker the stimulus to economic activity and income, and the more consumers must rely on dissaving to translate their positive sentiment into actual purchases of goods and services.

It is in this context that the economy awaits a solid timeline for policy announcements to evolve into detailed design and durable implementation. While there is often some delay when political negotiations and trade-offs are involved, in this case, the sense of uncertainty may be heightened by policy-sequencing decisions. By deciding to begin with health-care reform – an inherently complicated and highly divisive issue in US politics – the Trump administration risks losing some of the political goodwill that could be needed to carry out the kinds of fiscal reform that markets are expecting.

Even if a bump in the economic data does arrive, it may not last, unless the Trump administration advances policies that enhance longer-term productivity, through, for example, education reform, apprenticeship programs, skills training, and labor retooling. The Trump administration would also have to refrain from pursuing protectionist trade measures that would disrupt the “spaghetti bowl” of cross-border value chains for both producers and consumers.

If improved confidence in the US economy does not translate into stronger hard data, unmet expectations for economic growth and corporate earnings could cause financial-market sentiment to slump, fueling market volatility and driving down asset prices. In such a scenario, the US engine could sputter, causing the entire global economy to suffer, especially if these economic challenges prompt the Trump administration to implement protectionist measures.

#### Decline cascades---nuclear war

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Various scholars and institutions regard global social instability as the greatest threat facing this decade. The catalyst has been postulated to be a Second Great Depression which, in turn, will have profound implications for global security and national integrity. This paper, written from a broad systems perspective, illustrates how emerging risks are getting more complex and intertwined; blurring boundaries between the economic, environmental, geopolitical, societal and technological taxonomy used by the World Economic Forum for its annual global risk forecasts. Tight couplings in our global systems have also enabled risks accrued in one area to snowball into a full-blown crisis elsewhere. The COVID-19 pandemic and its socioeconomic fallouts exemplify this systemic chain-reaction. Onceinexorable forces of globalization are rupturing as the current global system can no longer be sustained due to poor governance and runaway wealth fractionation. The coronavirus pandemic is also enabling Big Tech to expropriate the levers of governments and mass communications worldwide. This paper concludes by highlighting how this development poses a dilemma for security professionals.

Key Words: Global Systems, Emergence, VUCA, COVID-9, Social Instability, Big Tech, Great Reset

INTRODUCTION

The new decade is witnessing rising volatility across global systems. Pick any random “system” today and chart out its trajectory: Are our education systems becoming more robust and affordable? What about food security? Are our healthcare systems improving? Are our pension systems sound? Wherever one looks, there are dark clouds gathering on a global horizon marked by volatility, uncertainty, complexity and ambiguity (VUCA).

But what exactly is a global system? Our planet itself is an autonomous and selfsustaining mega-system, marked by periodic cycles and elemental vagaries. Human activities within however are not system isolates as our banking, utility, farming, healthcare and retail sectors etc. are increasingly entwined. Risks accrued in one system may cascade into an unforeseen crisis within and/or without (Choo, Smith & McCusker, 2007). Scholars call this phenomenon “emergence”; one where the behaviour of intersecting systems is determined by complex and largely invisible interactions at the substratum (Goldstein, 1999; Holland, 1998).

The ongoing COVID-19 pandemic is a case in point. While experts remain divided over the source and morphology of the virus, the contagion has ramified into a global health crisis and supply chain nightmare. It is also tilting the geopolitical balance. China is the largest exporter of intermediate products, and had generated nearly 20% of global imports in 2015 alone (Cousin, 2020). The pharmaceutical sector is particularly vulnerable. Nearly “85% of medicines in the U.S. strategic national stockpile” sources components from China (Owens, 2020).

An initial run on respiratory masks has now been eclipsed by rowdy queues at supermarkets and the bankruptcy of small businesses. The entire global population – save for major pockets such as Sweden, Belarus, Taiwan and Japan – have been subjected to cyclical lockdowns and quarantines. Never before in history have humans faced such a systemic, borderless calamity.

COVID-19 represents a classic emergent crisis that necessitates real-time response and adaptivity in a real-time world, particularly since the global Just-in-Time (JIT) production and delivery system serves as both an enabler and vector for transboundary risks. From a systems thinking perspective, emerging risk management should therefore address a whole spectrum of activity across the economic, environmental, geopolitical, societal and technological (EEGST) taxonomy. Every emerging threat can be slotted into this taxonomy – a reason why it is used by the World Economic Forum (WEF) for its annual global risk exercises (Maavak, 2019a). As traditional forces of globalization unravel, security professionals should take cognizance of emerging threats through a systems thinking approach.

METHODOLOGY

An EEGST sectional breakdown was adopted to illustrate a sampling of extreme risks facing the world for the 2020-2030 decade. The transcendental quality of emerging risks, as outlined on Figure 1, below, was primarily informed by the following pillars of systems thinking (Rickards, 2020):

• Diminishing diversity (or increasing homogeneity) of actors in the global system (Boli & Thomas, 1997; Meyer, 2000; Young et al, 2006);

• Interconnections in the global system (Homer-Dixon et al, 2015; Lee & Preston, 2012);

• Interactions of actors, events and components in the global system (Buldyrev et al, 2010; Bashan et al, 2013; Homer-Dixon et al, 2015); and

• Adaptive qualities in particular systems (Bodin & Norberg, 2005; Scheffer et al, 2012) Since scholastic material on this topic remains somewhat inchoate, this paper buttresses many of its contentions through secondary (i.e. news/institutional) sources.

ECONOMY

According to Professor Stanislaw Drozdz (2018) of the Polish Academy of Sciences, “a global financial crash of a previously unprecedented scale is highly probable” by the mid- 2020s. This will lead to a trickle-down meltdown, impacting all areas of human activity.

The economist John Mauldin (2018) similarly warns that the “2020s might be the worst decade in US history” and may lead to a Second Great Depression. Other forecasts are equally alarming. According to the International Institute of Finance, global debt may have surpassed $255 trillion by 2020 (IIF, 2019). Yet another study revealed that global debts and liabilities amounted to a staggering $2.5 quadrillion (Ausman, 2018). The reader should note that these figures were tabulated before the COVID-19 outbreak.

The IMF singles out widening income inequality as the trigger for the next Great Depression (Georgieva, 2020). The wealthiest 1% now own more than twice as much wealth as 6.9 billion people (Coffey et al, 2020) and this chasm is widening with each passing month. COVID-19 had, in fact, boosted global billionaire wealth to an unprecedented $10.2 trillion by July 2020 (UBS-PWC, 2020). Global GDP, worth $88 trillion in 2019, may have contracted by 5.2% in 2020 (World Bank, 2020).

As the Greek historian Plutarch warned in the 1st century AD: “An imbalance between rich and poor is the oldest and most fatal ailment of all republics” (Mauldin, 2014). The stability of a society, as Aristotle argued even earlier, depends on a robust middle element or middle class. At the rate the global middle class is facing catastrophic debt and unemployment levels, widespread social disaffection may morph into outright anarchy (Maavak, 2012; DCDC, 2007).

Economic stressors, in transcendent VUCA fashion, may also induce radical geopolitical realignments. Bullions now carry more weight than NATO’s security guarantees in Eastern Europe. After Poland repatriated 100 tons of gold from the Bank of England in 2019, Slovakia, Serbia and Hungary quickly followed suit.

According to former Slovak Premier Robert Fico, this erosion in regional trust was based on historical precedents – in particular the 1938 Munich Agreement which ceded Czechoslovakia’s Sudetenland to Nazi Germany. As Fico reiterated (Dudik & Tomek, 2019):

“You can hardly trust even the closest allies after the Munich Agreement… I guarantee that if something happens, we won’t see a single gram of this (offshore-held) gold. Let’s do it (repatriation) as quickly as possible.” (Parenthesis added by author).

President Aleksandar Vucic of Serbia (a non-NATO nation) justified his central bank’s gold-repatriation program by hinting at economic headwinds ahead: “We see in which direction the crisis in the world is moving” (Dudik & Tomek, 2019). Indeed, with two global Titanics – the United States and China – set on a collision course with a quadrillions-denominated iceberg in the middle, and a viral outbreak on its tip, the seismic ripples will be felt far, wide and for a considerable period.

A reality check is nonetheless needed here: Can additional bullions realistically circumvallate the economies of 80 million plus peoples in these Eastern European nations, worth a collective $1.8 trillion by purchasing power parity? Gold however is a potent psychological symbol as it represents national sovereignty and economic reassurance in a potentially hyperinflationary world. The portents are clear: The current global economic system will be weakened by rising nationalism and autarkic demands. Much uncertainty remains ahead. Mauldin (2018) proposes the introduction of Old Testament-style debt jubilees to facilitate gradual national recoveries. The World Economic Forum, on the other hand, has long proposed a “Great Reset” by 2030; a socialist utopia where “you’ll own nothing and you’ll be happy” (WEF, 2016).

In the final analysis, COVID-19 is not the root cause of the current global economic turmoil; it is merely an accelerant to a burning house of cards that was left smouldering since the 2008 Great Recession (Maavak, 2020a). We also see how the four main pillars of systems thinking (diversity, interconnectivity, interactivity and “adaptivity”) form the mise en scene in a VUCA decade.

ENVIRONMENTAL

What happens to the environment when our economies implode? Think of a debt-laden workforce at sensitive nuclear and chemical plants, along with a concomitant surge in industrial accidents? Economic stressors, workforce demoralization and rampant profiteering – rather than manmade climate change – arguably pose the biggest threats to the environment. In a WEF report, Buehler et al (2017) made the following pre-COVID-19 observation:

The ILO estimates that the annual cost to the global economy from accidents and work-related diseases alone is a staggering $3 trillion. Moreover, a recent report suggests the world’s 3.2 billion workers are increasingly unwell, with the vast majority facing significant economic insecurity: 77% work in part-time, temporary, “vulnerable” or unpaid jobs.

Shouldn’t this phenomenon be better categorized as a societal or economic risk rather than an environmental one? In line with the systems thinking approach, however, global risks can no longer be boxed into a taxonomical silo. Frazzled workforces may precipitate another Bhopal (1984), Chernobyl (1986), Deepwater Horizon (2010) or Flint water crisis (2014). These disasters were notably not the result of manmade climate change. Neither was the Fukushima nuclear disaster (2011) nor the Indian Ocean tsunami (2004). Indeed, the combustion of a long-overlooked cargo of 2,750 tonnes of ammonium nitrate had nearly levelled the city of Beirut, Lebanon, on Aug 4 2020. The explosion left 204 dead; 7,500 injured; US$15 billion in property damages; and an estimated 300,000 people homeless (Urbina, 2020). The environmental costs have yet to be adequately tabulated.

Environmental disasters are more attributable to Black Swan events, systems breakdowns and corporate greed rather than to mundane human activity.

Our JIT world aggravates the cascading potential of risks (Korowicz, 2012). Production and delivery delays, caused by the COVID-19 outbreak, will eventually require industrial overcompensation. This will further stress senior executives, workers, machines and a variety of computerized systems. The trickle-down effects will likely include substandard products, contaminated food and a general lowering in health and safety standards (Maavak, 2019a). Unpaid or demoralized sanitation workers may also resort to indiscriminate waste dumping. Many cities across the United States (and elsewhere in the world) are no longer recycling wastes due to prohibitive costs in the global corona-economy (Liacko, 2021).

Even in good times, strict protocols on waste disposals were routinely ignored. While Sweden championed the global climate change narrative, its clothing flagship H&M was busy covering up toxic effluences disgorged by vendors along the Citarum River in Java, Indonesia. As a result, countless children among 14 million Indonesians straddling the “world’s most polluted river” began to suffer from dermatitis, intestinal problems, developmental disorders, renal failure, chronic bronchitis and cancer (DW, 2020). It is also in cauldrons like the Citarum River where pathogens may mutate with emergent ramifications.

On an equally alarming note, depressed economic conditions have traditionally provided a waste disposal boon for organized crime elements. Throughout 1980s, the Calabriabased ‘Ndrangheta mafia – in collusion with governments in Europe and North America – began to dump radioactive wastes along the coast of Somalia. Reeling from pollution and revenue loss, Somali fisherman eventually resorted to mass piracy (Knaup, 2008).

The coast of Somalia is now a maritime hotspot, and exemplifies an entwined form of economic-environmental-geopolitical-societal emergence. In a VUCA world, indiscriminate waste dumping can unexpectedly morph into a Black Hawk Down incident. The laws of unintended consequences are governed by actors, interconnections, interactions and adaptations in a system under study – as outlined in the methodology section.

Environmentally-devastating industrial sabotages – whether by disgruntled workers, industrial competitors, ideological maniacs or terrorist groups – cannot be discounted in a VUCA world. Immiserated societies, in stark defiance of climate change diktats, may resort to dirty coal plants and wood stoves for survival. Interlinked ecosystems, particularly water resources, may be hijacked by nationalist sentiments. The environmental fallouts of critical infrastructure (CI) breakdowns loom like a Sword of Damocles over this decade.

GEOPOLITICAL

The primary catalyst behind WWII was the Great Depression. Since history often repeats itself, expect familiar bogeymen to reappear in societies roiling with impoverishment and ideological clefts. Anti-Semitism – a societal risk on its own – may reach alarming proportions in the West (Reuters, 2019), possibly forcing Israel to undertake reprisal operations inside allied nations. If that happens, how will affected nations react? Will security resources be reallocated to protect certain minorities (or the Top 1%) while larger segments of society are exposed to restive forces? Balloon effects like these present a classic VUCA problematic.

Contemporary geopolitical risks include a possible Iran-Israel war; US-China military confrontation over Taiwan or the South China Sea; North Korean proliferation of nuclear and missile technologies; an India-Pakistan nuclear war; an Iranian closure of the Straits of Hormuz; fundamentalist-driven implosion in the Islamic world; or a nuclear confrontation between NATO and Russia. Fears that the Jan 3 2020 assassination of Iranian Maj. Gen. Qasem Soleimani might lead to WWIII were grossly overblown. From a systems perspective, the killing of Soleimani did not fundamentally change the actor-interconnection-interaction adaptivity equation in the Middle East. Soleimani was simply a cog who got replaced.

### Case

#### Investing in space exploration solves econ

Dubner, American journalist & Freakonomics Author, 8 (Steven, Is Space Exploration Worth the Cost? A Freakonomics Quorum, Freakonomics Blog, http://freakonomics.com/2008/01/11/is-space-exploration-worth-the-cost-a-freakonomics-quorum/)

Pretend that instead of being responsible for your household budget, which means paying for rent or a mortgage, transportation, some schooling costs, groceries, healthcare, vacation, etc., you are instead responsible for a considerably larger budget that provides a variety of services for about 300 million people including the maintenance of an army, protecting the borders, etc. In other words, pretend you are responsible for the U.S. Federal budget. And now ask yourself how much of that money you want to spend on manned space travel, and why. We gathered up a group of space authorities — G. Scott Hubbard, Joan Vernikos, Kathleen M. Connell, Keith Cowing, and David M. Livingston, and John M. Logsdon — and asked them the following: Is manned space exploration worth the cost? Why or why not? Their responses are below. As I suggested above, take your time. For the impatient among you, here are a few highlights: Logsdon on a not-so-obvious incentive for manned space travel: “Space exploration can also serve as a stimulus for children to enter the fields of science and engineering.” Vernikos on the R.O.I. of space travel: “Economic, scientific and technological returns of space exploration have far exceeded the investment. … Royalties on NASA patents and licenses currently go directly to the U.S. Treasury, not back to NASA.” Cowing on space expenditures relative to other costs: “Right now, all of America’s human space flight programs cost around $7 billion a year. That’s pennies per person per day. In 2006, according to the USDA, Americans spent more than $154 billion on alcohol. We spend around $10 billion a month in Iraq. And so on.” I hope you enjoy their answers, and learn from them, as much as I did. G. Scott Hubbard, professor of Aeronautics and Astronautics at Stanford University and former director of the NASA Ames Research Center: The debate about the relative merits of exploring space with humans and robots is as old as the space program itself. Werner Von Braun, a moving force behind the Apollo Program that sent humans to the moon and the architect of the mighty Saturn V rocket, believed passionately in the value of human exploration — especially when it meant beating the hated Soviet Empire. James Van Allen, discoverer of the magnetic fields that bear his name, was equally ardent and vocal about the value of robotic exploration. There are five arguments that are advanced in any discussion about the utility of space exploration and the roles of humans and robots. Those arguments, in roughly ascending order of advocate support, are the following: 1. Space exploration will eventually allow us to establish a human civilization on another world (e.g., Mars) as a hedge against the type of catastrophe that wiped out the dinosaurs. 2. We explore space and create important new technologies to advance our economy. It is true that, for every dollar we spend on the space program, the U.S. economy receives about $8 of economic benefit. Space exploration can also serve as a stimulus for children to enter the fields of science and engineering. 3. Space exploration in an international context offers a peaceful cooperative venue that is a valuable alternative to nation state hostilities. One can look at the International Space Station and marvel that the former Soviet Union and the U.S. are now active partners. International cooperation is also a way to reduce costs. 4. National prestige requires that the U.S. continue to be a leader in space, and that includes human exploration. History tells us that great civilizations dare not abandon exploration. 5. Exploration of space will provide humanity with an answer to the most fundamental questions: Are we alone? Are there other forms of life beside those on Earth? It is these last two arguments that are the most compelling to me. It is challenging to make the case that humans are necessary to the type of scientific exploration that may bring evidence of life on another world. There are strong arguments on both sides. Personally, I think humans will be better at unstructured environment exploration than any existing robot for a very long time. There are those who say that exploration with humans is simply too expensive for the return we receive. However, I cannot imagine any U.S. President announcing that we are abandoning space exploration with humans and leaving it to the Chinese, Russians, Indians, Japanese or any other group. I can imagine the U.S. engaging in much more expansive international cooperation. Humans will be exploring space. The challenge is to be sure that they accomplish meaningful exploration. Joan Vernikos, a member of the Space Studies Board of the National Academy and former director of NASA’s Life Sciences Division: Why explore? Asked why he kept trying to climb Everest, English mountaineer George Mallory reputedly replied, “Because it was there.” Exploration is intrinsic to our nature. It is the contest between man and nature mixed with the primal desire to conquer. It fuels curiosity, inspiration and creativity. The human spirit seeks to discover the unknown, and in the process explore the physical and psychological potential of human endurance. There have always been the few risk-takers who ventured for the rest of us to follow. Because of earlier pioneers, air travel is now commonplace, and space travel for all is just around the corner. Economic and societal benefits are not immediately evident, but they always follow, as does our understanding of human potential to overcome challenges. Fifty years after Sputnik, space remains the next frontier. Without risking human lives, robotic technology such as unmanned missions, probes, observatories, and landers enables space exploration. It lays the groundwork, and does the scouting. But as I heard former astronaut Thomas Jones often say, “only a human can experience what being in space feels like, and only a human can communicate this to others.” It is humans who repair the Hubble telescope. It is humans who service the International Space Station (ISS). Mercury astronauts were the first to photograph Earth from space with hand-held cameras. Earth scientists in orbit on the ISS may view aspects of global change that only a trained eye can see. In addition, studying astronauts in the microgravity of space has been the only means of understanding how gravity affects human development and health here on Earth. It is highly probable that, in this century, humans will settle on other planets. Our ability to explore and sustain human presence there will not only expand Earth’s access to mineral resources but, should the need arise, provide alternative habitats for humanity’s survival. At what cost? Is there a price to inspiration and creativity? Economic, scientific and technological returns of space exploration have far exceeded the investment. Globally, 43 countries now have their own observing or communication satellites in Earth orbit. Observing Earth has provided G.P.S., meteorological forecasts, predictions and management of hurricanes and other natural disasters, and global monitoring of the environment, as well as surveillance and intelligence. Satellite communications have changed life and business practices with computer operations, cell phones, global banking, and TV. Studying humans living in the microgravity of space has expanded our understanding of osteoporosis and balance disorders, and has led to new treatments. Wealth-generating medical devices and instrumentation such as digital mammography and outpatient breast biopsy procedures and the application of telemedicine to emergency care are but a few of the social and economic benefits of manned exploration that we take for granted. Space exploration is not a drain on the economy; it generates infinitely more than wealth than it spends. Royalties on NASA patents and licenses currently go directly to the U.S. Treasury, not back to NASA. I firmly believe that the Life Sciences Research Program would be self-supporting if permitted to receive the return on its investment. NASA has done so much with so little that it has generally been assumed to have had a huge budget. In fact, the 2007 NASA budget of $16.3 billion is a minute fraction of the $13 trillion total G.D.P. “What’s the hurry?” is a legitimate question. As the late Senator William Proxmire said many years ago, “Mars isn’t going anywhere.” Why should we commit hard-pressed budgets for space exploration when there will always be competing interests? However, as Mercury, Gemini and Apollo did 50 years ago, our future scientific and technological leadership depends on exciting creativity in the younger generations. Nothing does this better than manned space exploration. There is now a national urgency to direct the creative interests of our youth towards careers in science and engineering. We need to keep the flame of manned space exploration alive as China, Russia, India, and other countries forge ahead with substantial investments that challenge U.S. leadership in space. Kathleen M. Connell, a principal of The Connell Whittaker Group, a founding team member of NASA’s Astrobiology Program, and former policy director of the Aerospace States Association: The value of public sector human space exploration is generally perceived as worth the cost when exploration outcomes address one or more national imperatives of the era. For example, in the twentieth century, the Soviet Union’s launch of Sputnik required a bold technological retort by the U.S. Apollo put boots on the moon, winning the first space race. The resulting foreign policy boost and psychic prestige for the U.S. more that justified the cost for the Cold War generation. Unquestionably, manned exploration of that era also created unintended economic consequences and benefits, such as the spinoff of miniaturization that led to computers and cell phones. Apollo also created new NASA centers in the South, acting as an unanticipated economic development anchor for those regions, both then and now. In the twenty-first century, what would happen if U.S. manned space programs were managed based upon the contemporary demands of the planet and the American taxpayer? NASA could be rewarded to explore, but with terrestrial returns as a priority. Space exploration crews could conduct global warming research on the International Space Station National Laboratory, while other crews from the public or private sector could rapidly assemble solar energy satellites for clean energy provision to Earth. Lunar settlements could be established to develop new energy sources from rare compounds that are in abundance on the moon. Getting to Mars, to develop a terrestrial lifeboat and to better understand the fate of planets, suddenly takes on new meaning and relevance. I have to come the conclusion, after over 20 years in the space industry, that addressing global challenges with space solutions that benefit humanity and American constituents is the key to justifying the cost of manned space exploration. I believe we are about to find out, all over again, if civil manned space capability and policy can adapt and rise to meet new imperatives. Keith Cowing, founder and editor of NASAWatch.com and former NASA space biologist. Right now, all of America’s human space flight programs cost around $7 billion a year. That’s pennies per person per day. In 2006, according to the USDA, Americans spent more than $154 billion on alcohol. We spend around $10 billion a month in Iraq. And so on. Are these things more important than human spaceflight because we spend more money on them? Is space exploration less important? Money alone is not a way to gauge the worthiness of the cost of exploring space. NASA is fond of promoting all of the spinoffs that are generated from its exploits, such as microelectronics. But are we exploring space to explore space, or are we doing all of this to make better consumer electronics? I once heard the late Carl Sagan respond to this question by saying, “you don’t need to go to Mars to cure cancer.” If you learn how to do that as a side benefit, well, that’s great, but there are probably more cost effective ways to get all of these spinoffs without leaving Earth. To be certain, tax dollars spent on space projects result in jobs — a large proportion of which are high paying, high tech positions. But many other government programs do that as well — some more efficiently. Still, for those who would moan that this money could be “better spent back on Earth,” I would simply say that all of this money is spent on Earth — it creates jobs and provides business to companies, just as any other government program does. You have to spend all of NASA’s money “on Earth.” There is no way to spend it in space — at least, not yet. Where am I going with this? Asking if space exploration — with humans or robots or both — is worth the effort is like questioning the value of Columbus’s voyages to the New World in the late 1490s. The promise at the time was obvious to some, but not to others. Is manned space exploration worth the cost? If we Americans do not think so, then why is it that nations such as China and India — nations with far greater social welfare issues to address with their limited budgets — are speeding up their space exploration programs? What is it about human space exploration that they see? Could it be what we once saw, and have now forgotten? As such, my response is another question: for the U.S. in the twenty-first century, is not sending humans into space worth the cost? David M. Livingston, host of The Space Show, a talk radio show focusing on increasing space commerce and developing space tourism: I hear this question a lot. So a few years ago, I decided to see what really happened to a public dollar spent on a good space program, compared to spending it on an entitlement program or a revenue generating infrastructure program. I used the school breakfast program for the test entitlement program. I chose Hoover Dam for the revenue generating infrastructure program. The space program I chose was the manned program to the moon consisting of the Mercury, Gemini, and Apollo programs. Let me briefly summarize what I discovered. All programs, if properly managed, can produce benefits in excess to the original invested dollar. There is no guarantee that a program will be properly managed, and this includes a space program. “Properly managed” implies many things, but I don’t think space is any more or less likely to be well managed than anything else the government does. A mismanaged space program wastes money, talent, and time, just like any other faulty program. As for what happened to the dollar invested in the respective programs, the school breakfast program was successful, in that it increased the number of kids who received breakfast. However, when funding for this program or this type of program stops, as soon as the last of the funds goes through the pipeline, the program is over. It has no life past government funding. I was unable to find an inspirational or motivational quality for the program leading to downstream business, economic, or science advancements. One could make the case that kids who benefited from the program went on through school to accomplish great things, and I don’t doubt that — I simply could not document it in my research. The Hoover Dam was very interesting. This project paid off its bond cost early, was a major contributor to the U.S. victory in World War II, and has been a huge economic factor for development in the Western part of the country. However, the Hoover Dam requires overhead and maintenance investment on a continual basis. It needs repairs, updates, modernization, and security, and it employs a labor force. Were we to stop investing in the Hoover Dam, over time it would lose its effectiveness and cease to be the value to our nation that it is now. Its value to us depends on our willingness to maintain, protect, and update it as necessary. The Hoover Dam and Lake Mead have given birth to thousands of private businesses, economic growth for the region, and much more. However, as with the entitlement program above, I could not find an inspirational or motivational aspect to the Hoover Dam. What I discovered about our manned lunar program was different. When I did this study, it was 34 years after the last dime had been spent on Apollo, the last of the manned moon programs. Thirty-four years later, when I asked guests on The Space Show, students, and people in space-related fields what inspired or motivated them to start a space business or pursue their science education, over 80 percent said they were inspired and motivated because of our having gone to the moon. Businesses were started and are now meeting payrolls, paying taxes, and sustaining economic growth because the founder was inspired by the early days of the manned space program, often decades after the program ended! This type of inspiration and motivation seems unique to the manned space program and, of late, to some of our robotic space missions. I found the same to be true when I asked the same question to Space Show guests from outside the U.S. John M. Logsdon, director of the Space Policy Institute and acting director of the Center for International Science and Technology Policy at George Washington University’s Elliott School of International Affairs: The high costs of sending humans into orbit and beyond are measured in dollars, rubles, or yuan. The benefits of human spaceflight are not so easily calculated, since they include both tangible and intangible payoffs. So answering the question, “Do the benefits outweigh the costs?” is not straightforward. If the payoffs are limited to scientific discovery, the position taken by many critics of human spaceflight is “no.” With both current and, especially, future robotic capabilities, the added value of human presence to missions aimed primarily at new understanding of the moon, Mars, near-Earth asteroids, and other celestial destinations most likely does not justify the added costs and risks involved. However, Steve Squyres, the principal investigator for the Mars Exploration Rovers, has frequently said that he wished that spirit and opportunity were working in partnership with humans on the surface of Mars; that combination, he argues, would greatly increase the scientific payoffs of the mission. To me, the primary justifications for sending people into space require that they travel beyond low Earth orbit. For the next few decades, the major payoffs from humans traveling to the moon and Mars are intangible, and linked to both national pride and national power. Space exploration remains an effort that can be led by only a few countries, and I believe that it should be part of what the United States does in its desire to be seen by both its citizens and the global public as a leader, one to be admired for its continued willingness to invest in pushing the frontiers of human activity. In the longer run, I believe that human exploration is needed to answer two questions. One is: “Are there activities in other places in the solar system of such economic value that they justify high costs in performing them?” The other is: “Can humans living away from Earth obtain at least a major portion of what they need to survive from local resources?” If the answer to both questions is “yes,” then I believe that eventually some number of people in the future will establish permanent settlements away from Earth, in the extreme case to ensure that the human species will survive a planetary catastrophe, but also because people migrate for both economic opportunities and new experiences. That is a big jump from today’s argument regarding the costs and benefits of human spaceflight, but I believe such a long range perspective is the best way to justify a new start in human space exploration.

#### Economic decline causes extinction.

Qian **Liu 18**. China-based economist. “From economic crisis to World War III.” Project Syndicate. 11-8-2018. https://www.project-syndicate.org/commentary/economic-crisis-military-conflict-or-structural-reform-by-qian-liu-2018-11

The next economic crisis is closer than you think. But what you should really worry about is what comes after: in the **current** **social, political, and technological** **landscape**, a **prolonged** **economic crisis**, combined with rising income inequality, could well escalate into a **major global military conflict**. The 2008-09 global financial crisis almost bankrupted governments and caused systemic collapse. Policymakers managed to pull the global economy back from the brink, using massive monetary stimulus, including **q**uantitative **e**asing and near-zero (or even negative) interest rates. But monetary stimulus is like an adrenaline shot to jump-start an arrested heart; it can revive the patient, but it does nothing to cure the disease. Treating a sick economy requires structural reforms, which can cover everything from financial and labour markets to tax systems, fertility patterns, and education policies. Policymakers have utterly failed to pursue such reforms, despite promising to do so. Instead, they have remained preoccupied with politics. From Italy to Germany, forming and sustaining governments now seems to take more time than actual governing. Greece, for example, has relied on money from international creditors to keep its head (barely) above water, rather than genuinely reforming its pension system or improving its business environment. The lack of structural reform has meant that the unprecedented excess liquidity that central banks injected into their economies was not allocated to its most efficient uses. Instead, it raised global asset prices to levels even higher than those prevailing before 2008. In the United States, housing prices are now 8% higher than they were at the peak of the property bubble in 2006, according to the property website Zillow. The price-to-earnings (CAPE) ratio, which measures whether stock-market prices are within a reasonable range, is now higher than it was both in 2008 and at the start of the Great Depression in 1929. As monetary tightening reveals the vulnerabilities in the real economy, the collapse of asset-price bubbles will trigger another economic crisis – one that could be even more severe than the last, because we have built up a tolerance to our strongest macroeconomic medications. A decade of regular adrenaline shots, in the form of ultra-low interest rates and unconventional monetary policies, has severely depleted their power to stabilise and stimulate the economy. If history is any guide, the consequences of this mistake could extend far beyond the economy. According to Harvard’s Benjamin Friedman, **prolonged** **periods of** **economic** **distress** have been characterised also by public **antipathy toward** **minority groups or** **foreign countries** – attitudes that can help to **fuel unrest**, **terrorism**, or even **war**. For example, during the Great Depression, US President Herbert Hoover signed the 1930 **Smoot-Hawley** Tariff Act, intended to protect American workers and farmers from foreign competition. In the subsequent five years, global trade shrank by two-thirds. Within a decade, **World War II** had begun. To be sure, WWII, like World War I, was caused by a multitude of factors; there is no standard path to war. But there is reason to believe that high levels of inequality can play a significant role in stoking conflict. According to research by the economist Thomas **Piketty**, a spike in income inequality is often followed by a great crisis. Income inequality then declines for a while, before rising again, until a new peak – and a new disaster. Though causality has yet to be proven, given the limited number of data points, this correlation should not be taken lightly, especially with wealth and income inequality at historically high levels. This is all the more worrying in view of the numerous other factors stoking social unrest and diplomatic tension, including technological disruption, a record-breaking migration crisis, anxiety over globalisation, political polarisation, and rising nationalism. All are symptoms of failed policies that could turn out to be trigger points for a future crisis. Voters have good reason to be frustrated, but the emotionally appealing **populists** to whom they are increasingly giving their support are offering ill-advised solutions that will **only** **make matters worse**. For example, despite the world’s unprecedented interconnectedness, **multilateralism is** **increasingly** **being eschewed**, as countries – most notably, Donald J. Trump’s US – pursue unilateral, isolationist policies. Meanwhile, **proxy wars** are **raging in Syria and Yemen**. Against this background, we must take seriously the possibility that the **next** **economic** **crisis could lead to a large-scale military confrontation**. By the logic of the political scientist Samuel Huntington, considering such a scenario could help us avoid it because it would force us to take action. In this case, the key will be for policymakers to pursue the structural reforms that they have long promised while replacing finger-pointing and antagonism with a sensible and respectful global dialogue. The alternative may well be global conflagration.

#### Space colonization solves extinction and is a filter for all other risks – their own author!

**Torres 16** – PhD Candidate @ Rice (Phil, “Top Three Strategies for Avoiding an Existential Risk,” Institute for Ethics and Emerging Technologies, https://ieet.org/index.php/IEET2/print/11654)

(3) Space colonization. I would argue that this offers perhaps the **most practicable strategy** for avoiding an existential catastrophe, all things considered. It requires neither the invention of a superintelligence nor the sort of radical cognitive enhancements discussed above. The idea is simple: the wider we spread out in the world, the less chance there is that a single event will have worldwide consequences. A collapse of the global ecosystem on Earth wouldn’t affect colonies on Mars, nor would a grey goo disaster on (say) Gliese 667 Cc affect those living on spaceship Earth. Similarly, a disaster that wipes out the Milky Way in 1,000 years might be survivable if our progeny also resides in the Andromeda Galaxy. As it happens, NASA recently announced that there will be Earth-independent colonies on Mars by the 2030s, and Elon Musk has said that he’s hoping to launch the first flight to Mars “in around 2025.” As Musk described his motivation in 2014, “there is a strong humanitarian argument for making life multi-planetary . . . in order to safeguard the existence of humanity in the event that something catastrophic were to happen.” This sentiment was echoed by the former NASA administrator, Michael Griffin, who claimed that “human expansion into the solar system is, in the end, fundamentally about the survival of the species.” Similarly, Hawking has opined that he doesn’t “think the human race will survive the next thousand years, unless we spread into space.” So, there’s growing momentum to distribute the human population throughout this strange universe in which we find ourselves, and numerous intellectuals have explicitly recognized the existential significance of space colonization. Given the minimal risks involved, the relatively minimal cost of colonization programs (for example, it requires neither “(1)” nor “(2)” to be realized), and the potential gains of establishing self-sustaining colonies throughout the galaxy, this strategy ought to be among the top priorities for existential risk activists. **To survive, we must colonize**.

#### Outweighs scope of all living humans by like 10^30 – so tiny risk of this o/w all their stuff

Bostrom 3 – Department of Philosophy, Yale University, Director of the Future of Humanity Institute at Oxford University, 2002 (Nick, “Astronomical Waste: The Opportunity Cost of Delayed Technological Development,” Preprint, Utilitas Vol. 15, No. 3, pp. 308-314, http://www.nickbostrom.com/astronomical/waste.html)

As I write these words, suns are illuminating and heating empty rooms, unused energy is being flushed down black holes, and our great common endowment of negentropy is being irreversibly degraded into entropy on a cosmic scale. These are resources that an advanced civilization could have used to create value-structures, such as sentient beings living worthwhile lives. The rate of this loss boggles the mind. One recent paper speculates, using loose theoretical considerations based on the rate of increase of entropy, that the loss of potential human lives in our own galactic supercluster is at least ~10^46 per century of delayed colonization.[1] This estimate assumes that all the lost entropy could have been used for productive purposes, although no currently known technological mechanisms are even remotely capable of doing that. Since the estimate is meant to be a lower bound, this radically unconservative assumption is undesirable. We can, however, get a lower bound more straightforwardly by simply counting the number or stars in our galactic supercluster and multiplying this number with the amount of computing power that the resources of each star could be used to generate using technologies for whose feasibility a strong case has already been made. We can then divide this total with the estimated amount of computing power needed to simulate one human life. As a rough approximation, let us say the Virgo Supercluster contains 10^13 stars. One estimate of the computing power extractable from a star and with an associated planet-sized computational structure, using advanced molecular nanotechnology[2], is 10^42 operations per second.[3] A typical estimate of the human brain’s processing power is roughly 10^17 operations per second or less.[4] Not much more seems to be needed to simulate the relevant parts of the environment in sufficient detail to enable the simulated minds to have experiences indistinguishable from typical current human experiences.[5] Given these estimates, it follows that the potential for approximately 10^38 human lives is lost every century that colonization of our local supercluster is delayed; or equivalently, about 10^31 potential human lives per second. While this estimate is conservative in that it assumes only computational mechanisms whose implementation has been at least outlined in the literature, it is useful to have an even more conservative estimate that does not assume a non-biological instantiation of the potential persons. Suppose that about 10^10 biological humans could be sustained around an average star. Then the Virgo Supercluster could contain 10^23 biological humans. This corresponds to a loss of potential equal to about 10^14 potential human lives per second of delayed colonization. What matters for present purposes is not the exact numbers but the fact that they are huge. Even with the most conservative estimate, assuming a biological implementation of all persons, the potential for one hundred trillion potential human beings is lost for every second of postponement of colonization of our supercluster.[6]

#### We’ll answer their Torres stuff line by line

#### Colony wars – wrong

Globus ’20 [Al, co-founded the NASA Ames Space Settlement Contest for 6-12th grade students. 6-12th grade students. He also co-founded the NASA Ames Nanotechnology Group, which, at first, worked on materials for space elevators and diamondoid machine phase matter to build $50,000 personal spacecraft. He has designed three orbital space settlements (Lewis One, Kalpana One, and Kalpana Two) and published over 45 papers in technical conferences and journals, won a Feynman Prize in Nanotechnology, a NASA Software of the Year award, and a NASA Public Service Medal. He has discussed space colonization and nanotechnology on the History Channel, Danish radio, a French magazine, on a European Commission video, and elsewhere. He is co-author of the book The High Frontier: An Easier Way, “Not so dark skies”, 07-13-2020, https://www.thespacereview.com/article/3985/1]//pranav

War (Geopolitical Malefic)

Argument: Space settlement creates an endless frontier extending for millions of light-years into the cosmos. Frontiers tend to be violent places, creating wars not only at the frontier but between the polities that support the expansion. The vast size of the cosmos means that settlers are widely separated for much of the time, perhaps even evolving new species. When they come close enough to interact there may be little fellow feeling and little reluctance for the stronger to exterminate the weaker.

Counter-argument: With space settlement development there are a number of factors inhibiting violence and warfare. For one, the vast energy and materials resources available will tend to make resource wars obsolete. The fragility of space settlements, particularly free-space settlements in orbit, mandates that settlers avoid pointless provocations and chest-beating exercises. The enormous size of the space inhabited, up to and including the entire galaxy, makes it extremely unlikely that war will consume more than a small fraction of the population and resources available. It is difficult, if not impossible, to predict whether space settlement will lead to an increase or decrease in the odds that any given individual or group is involved in warfare or not. Preventing space settlement may be more or less dangerous than allowing it to proceed; it’s impossible to say.

Comparison with no space settlement: It is reassuring that since World War II warfare has decreased substantially and rarely involves the great powers directly killing each other’s citizens. That is left to proxies. However, not all wars are intentional. Consider World War I and the Cuban Missile Crisis. These suggest that there is a possibility—some would say probability—of an accidental humanity-ending nuclear war.

Space settlement could reduce this probability a bit by exposing large numbers of people to the Overview Effect created by the view of Earth from space, where some astronauts have come to value Earth and the unity of Earth’s people much more than before. More substantively, a sufficiently developed space settlement society surviving a war can repopulate Earth and restock other species if prevention fails. Thus the chance of a humanity-ending nuclear war is much lower with a sufficiently advanced space settlement society.

#### Alien Generation – wrong

Globus ’20 [Al, co-founded the NASA Ames Space Settlement Contest for 6-12th grade students. 6-12th grade students. He also co-founded the NASA Ames Nanotechnology Group, which, at first, worked on materials for space elevators and diamondoid machine phase matter to build $50,000 personal spacecraft. He has designed three orbital space settlements (Lewis One, Kalpana One, and Kalpana Two) and published over 45 papers in technical conferences and journals, won a Feynman Prize in Nanotechnology, a NASA Software of the Year award, and a NASA Public Service Medal. He has discussed space colonization and nanotechnology on the History Channel, Danish radio, a French magazine, on a European Commission video, and elsewhere. He is co-author of the book The High Frontier: An Easier Way, “Not so dark skies”, 07-13-2020, https://www.thespacereview.com/article/3985/1]//pranav

Ubermensch (Alien Generation)

Argument: As humanity spreads throughout the solar system, some branches of homo sapiens may eventually evolve into new species, with or without genetic engineering, nanotechnology implants, artificial superintelligence, and/or other cybernetics. One or more of these “Ubermensch” societies may wish to colonize Earth, Mars, or other worlds with little care for the people living there. Earth may be considered particularly valuable as it is uniquely well suited to life. That may make it a target for powerful groups of free space settlements. Assuming the Ubermensch really are superior, at least in warfare, this could lead to homo sapiens’ extinction.

Counter-argument:

Speciation takes a long time. Trying to predict so far into the future is a dicey business.

Except for speciation, cybernetic and nanotech modification could happen even if humanity were to stay only on Earth, although keeping it hidden would be harder than in a society consisting of hundreds or thousands of orbital habitats.

The problems that may come from genetic engineering or cyborg development are likely to arise on Earth well before large-scale space settlement.

A sudden attack on Earth by Ubermensch living on Earth would be harder to counter than an aggressive force working its way in from, say, the Kuiper Belt, which could take years and be seen well before they posed a direct threat to Earth.

Comparison with no space settlement: With space settlement, genetic engineering, cyborg, and nanotech research can be extremely well controlled. Research facilities can be isolated from all other life by thousands of kilometers of vacuum and the entire facility obliterated if things get really out of hand. While possible without settlement, creating a dangerous new species would be much easier for a space settling civilization as the work could be tucked away in one or a few settlements.

#### Group their weapons stuff – no extinction warrant – never explained how “sun guns” or whatever kill everyone- but if humanity is spread out even if a single colony goes down the species survives

#### Asteroid weapons – they suck and are wrong

**Wall 11** (Mike, Ph.D. in evolutionary biology, Senior writer for Space.com, 11/4/11, Why Asteroids Make Lousy Space Weapons, accessed 1/15/20, https://www.space.com/13515-asteroid-deflection-space-weapons.html, RAW)

If you lie awake at night worrying about some supervillain steering giant asteroids toward your hometown, you really should relax, experts say. It's not going to happen anytime soon. Humanity does indeed have the technical skills to move space rocks around, and we may employ this know-how at some point to avoid a catastrophic impact like the one that killed the dinosaurs 65 million years ago. But the odds of any rogue state using asteroids to rain death down on its enemies are minuscule, experts say. "**It's a lousy weapon**," said former astronaut Rusty Schweickart, chairman of the B612 Foundation, a group dedicated to predicting and preventing cataclysmic asteroid impacts on Earth. "**You get a chance to use one once every several hundred years**," Schweickart said during a recent panel discussion called "Moving an Asteroid" at the California Institute of Technology in Pasadena. "And **even then, you can only deflect it to hit someplace along** a sort of **arbitrary** **line** across the Earth." [Top 10 Space Weapons] Serious spaceflight skills Changing the orbit of a massive asteroid hurtling through deep space sounds like a daunting task, but our species knows how to do it. For example, we could launch a spacecraft that would rendezvous with an asteroid, then travel alongside it for months or years. Over time, the probe's modest gravity would tug on the space rock, pulling it into a different orbit, Schweickart said. Given enough time to act, this so-called "gravity tractor" method could work in quite precise and predictable ways. And we've demonstrated the skills necessary to make it happen. Multiple missions have met up with asteroids in deep space. For example, NASA's Dawn spacecraft is currently in orbit around Vesta, the second-largest object in the main asteroid belt between Mars and Jupiter. And in 2005, Japan's Hayabusa probe rendezvoused with a space rock called Itokawa. The craft even scraped some samples off Itokawa and sent them back to Earth for analysis. It's a good thing we possess these potential asteroid-moving skills, Schweickart said, for they may save our bacon someday. Earth has been pummeled by many dangerous asteroids throughout its history, and there's no reason to think the barrage will stop in the future. Space rocks big enough to cause major damage and disruption to the global economy and society (were they to strike a populated area today) have hit Earth, on average, every 200 or 300 years, Schweickart said. Firing a weapon once every 300 years That bombardment rate is scarily frequent to anyone worried about the long-term survival of human civilization. But it's not nearly frequent enough to make asteroids good weapons of mass destruction, according to Schweickart. [5 Reasons to Care About Asteroids] "You're going to have an opportunity once every two or three hundred years to go up and have a weapon to hit Baghdad," Schweickart said. "Of course, the problem is that by that time, the Zambian space program is the world's premier space program, and Baghdad is a buddy of yours." Potential asteroid wranglers also wouldn't be able to direct a space rock just anywhere on Earth, he added. For the foreseeable future, we'll be able only to speed up or slow down an asteroid, moving it in an "east-west" direction along its trajectory. Moving it in the "north-south" plane is not an option. "If you do anything other than speed up or slow down the asteroid, it has almost no effect," Schweickart said. "You've got to go along that line; it's the only way physics lets you do it." So anyone wishing to asteroid-bomb the United States would have to manipulate a space rock whose trajectory already crossed American territory. The trick would be tweaking its velocity enough to ensure an impact on American soil. In practice, therefore, **the wait for a suitable asteroid weapon could be considerably longer** **than 200 or 300 years.** Protecting Earth Schweickart and other panelists argued that humanity will need to deflect a killer asteroid away from Earth someday. It would be a shame, they said, if unfounded fears about possible nefarious uses of asteroid-moving technology impeded its development. "The public perception of asteroids can be pretty scary," Schweickart said. "There's going to be a lot of scare stuff. It's already out there, it's going to get worse and that is going to be a very serious challenge that we on the technical side will have to deal with." People worried about death from above should focus their anxiety elsewhere, fellow panelist Bill Nye said. There are plenty of much more viable space weapons than asteroids already up there. "Space is already pretty weaponized," said Nye, executive director of the Planetary Society and former host of the science-themed TV show "Bill Nye the Science Guy." "The global positioning system that we all know and love was designed to guide weapons. So using an asteroid as a weapon is sort of coming late to the party."

#### Rods from God – wrong

**Armagh** **15**, Armagh Observatory and Planetarium, published 9-27-2010 but updated as of 2015, "Rods from god: a terrifying space weapon? – Astronotes," https://armaghplanet.com/rods-from-god-a-terrifying-space-weapon.html)SEM

There are undeniable links between the spaceflight and military communities but apart from a few tests of anti-satellite weapons, the odd armed space station and laser battlestation there have been mercifully few weapons in space. Yet **the idea of bombarding the Earth from orbit** keeps coming up again and again. **Thankfully it** **is ridiculous**. I believe the idea is that having weapons hovering menacingly overhead will persuade your enemies to behave themselves. However this idea is stupid- I cannot think of a better word. Anyone who suggests such an idea must have learned their science from Tom Clancy books or Steven Seagal movies. The current version of this mad scheme is the kinetic energy weapon and is usually described as scores, possibly hundreds, of tungsten (chosen for its high melting temperature and hardness) projectiles orbiting the Earth in formation or attached to a satellite ‘bus’. These could be either relatively small darts (weighing about 100kg) or large ‘phone poles’ (about 8000 kg each). When required these projectiles can be commanded to dive, singly or en masse, at targets on the Earth’s surface, smashing into the victim at orbital speed. As the projectile’s kinetic energy is released, the blast would be equivalent to a large conventional bomb (a 100kg projectile traveling at 7km/s would release about 2.5 gigajoules of kinetic energy, a tonne of TNT releases about 4.2 gigajoules). This would be a non-nuclear precision weapon, essentially a smart bomb that can target anywhere in the world. It is further claimed that the darts would be capable of penetrating deeply into the Earth’s surface enabling non-nuclear attacks on installations deep underground. This idea is said to have originated in 1964 (but was revised and updated in 1975) in the mind of Jerry Pournelle, engineer, writer and consultant to the US Air Force. He originally named the concept “Thor” after the hammer-wielding Norse god of thunder. Pournelle said each projectile was …an orbiting element some 20 to 40 feet long. It requires a GPS receiver to locate itself; a means of taking it out of orbit; an atmospheric guidance system, such as a means of changing its center of gravity (moving weights, small fins, etc.), and a communication system to give it a target and activate the system…Achievable accuracy has been estimated at ten to twenty feet CEP (Circular Error of Probability) Pournelle assumed extremely cheap fully reusable single stage to orbit launch vehicles were just around the corner and would enable his concept to be quickly deployed, sadly no such craft have yet been built. Moving further into fantasy, Pournelle later had a smaller but more accurate optically guided variant of the weapon described as “crowbars” used by invading alien space elephants (really) to devastate the US military in Footfall (1985), a novel he co-wrote with Larry Niven. In this book, Niven and Pournelle introduced the concept You take a big iron bar. Give it a rudimentary sensor, and a steerable vane for guidance. Put bundles of them in orbit. To use it, call it down from orbit, aimed at the area you’re working on. It has a simple brain, just smart enough to recognize what a tank looks like from overhead. When it sees a tank silhouette, it steers toward it. Drop ten or twenty thousand of those over an armored division, and what happens? Subsequently similar weapons have appeared in other fictional works where they always work perfectly! A recent example is the movie GI Joe: Retaliation (2013) which is dissected in this video: This artificial meteorite concept is often nicknamed ‘the rods from God’ even by its supporters, who usually claim it would be relatively cheap to set up (indeed some claim it already exists). They give the impression that at the press of a button, these rods will just fall from the sky on their victims. However it is not that easy. As each rod circles the Earth it is moving at least 7 km/s, to make the rod fall from orbit under gravity, we need to **adjust its orbit** to intersect the Earth’s surface. To do this each rod therefore needs to be attached to a rocket motor and its fuel tanks (or solid propellant), suddenly each cheap 100kg rod has **ballooned into a multi-tonne vehicle**, perhaps the size of a Soyuz spacecraft. At least it does not need a heatshield, a tungsten projectile could reasonably be expected to survive the expected heat of re-entry. The ground-penetrating effects of such projectiles is **grossly** **over-stated** too- do falling meteorites of this sort of size always bury themselves hundreds of metres under the ground? Laboratory experiments show that **objects striking the surface** at speeds greater than 1 km/s **are melted by their own kinetic energy** before they penetrate the ground, effectively **liquefying** **on** impact. Rather than slamming into the target at 20 times the speed of sound, the rods may need to be slowed down to fast aircraft speeds to prevent them disintegrating on impact. The problems of guiding each rod is usually dismissed with handwaving references to GPS, although some armchair space marshals also follow Pournelle’s fictional lead to suggest each rod would have its own imaging sensor to find and steer onto moving targets like tanks or warships. I have no doubt that the electronics are feasible but the rod now needs control surfaces hooked to its guidance system and sounds more like a missile than a cheap metal rod. Do these now complex projectiles require maintenance in orbit? Finally, it is said that the rods can hit any target on Earth minutes after the KILL button is pressed. Once again, this doesn’t seem properly thought out. The rods can only hit targets on or near their orbital track, **for weeks** **at a time** **some parts of the world would be invulnerable** as their potential attackers would never come within hundreds of kilometers from their positions. The only way around this limitation is to have hundred of rods waiting ready in multiple orbits, **requiring a** **ludicrous number of launches**. Even if the target is directly under the rod’s orbital track, the attack **may not be instantaneous**, as those who order the attack wait perhaps 90 minutes for the rods to move around the Earth into position. Even the Joint Chiefs of Staff cannot overrule Sir Isaac Newton. A rods from god bombardment would probably look a lot like this test of the re-entry vehicles of a LGM-118A Peacekeeper ICBM. The projectiles are highly visible; it would be obvious that an attack was taking place, so this would not be a weapon for covert strikes. Each reentry vehicle here is a large and complex piece of hardware, not a simple “crowbar” or “telephone pole”. (Image credit: USAF via fas.org) The number of launches needed to deploy even a few dozen individually weighty weapons is glossed over by Rods enthusiasts. Assuming they are deployed, every rod (or their carrier satellite) will move around the Earth on a regular and predictable orbit where they will be observable from the surface by radar and optical sensors, so potential enemies will always know where they are. “Dropping” the projectiles from orbit is no actual advantage by the way, by the time they reach the surface they will have no more kinetic energy than was imparted to them by their original launch vehicle. After considering all this, to be honest, it would make more sense to launch each rod from the Earth’s surface directly to the target. To make them less vulnerable to preemptive attacks, perhaps the rods should be based in hardened underground silos or hidden in submerged submarines. Congratulations, we have just reinvented the ICBM! The most recent unclassified mention of the concept is in a USAF document called The US Air Force Transformative Flight Plan (2003) which talks of “hyper­ve­lo­city rod bundles” as a potential weapon in the post 2015 period. Note this mention in an official document does not mean the US military can magic this weapon into existence. There is a history among militaries world-wide of wasting billions on R&D into projects which are hopelessly impractical or even completely ungrounded in reality (see hafnium excimer bomb, atomic-powered aircraft, camouflage uniforms which make the wearer more conspicuous and using ESP for espionage). As of 2015 no kinetic-energy orbital bombardment system has officially been proposed or tested, never mind deployed. The older version of the concept is the idea of putting nuclear bombs in geostationary orbit over a potential enemy country is still brought up from time to time. This is even more ill-conceived than the Rods from God. When you think about it, it is obvious that a geostationary orbit must be above the Earth’s equator. Now there are only thirteen nations on the equator and it hard to see why any would want to suspend a bomb over say, the Maldives or Gabon. Even though they are sometimes put forward by apparently sensible people or organizations, “Rods from God” and other schemes for bombing the Earth from space are half-baked science fiction concepts. The cost of developing an orbital bombardment system would make the F-35 project look cheap in comparison. They are militarily pointless and hopelessly implausible. Similar damage could be inflicted more cheaply and easily by conventional ground-based weapons. A cynic would say that clever diplomacy would avoid the need for the weapons altogether.

#### Group their “universe destroying superweapons stuff” – only mechanism is false vacuum, which is fake

**Cottrell 12** [Seth Cottrell, professor of mathematics at NYU.] “Q: What is the “False Vacuum” and are we living in it?” 15 July 2012 (https://www.askamathematician.com/2012/07/q-what-is-the-false-vacuum-and-are-we-living-in-it/) – MZhu

The “danger” of living in a false vacuum is that, under the proper circumstances the false vacuum can drop into the true vacuum. The cause is usually described as a sufficient burst of energy to get the appropriate fields “over the hump” (picture above). If the difference in energy between the false vacuum and true vacuum is large enough, then the surrounding space can likewise be tipped into the lower state. In theory, a “false vacuum collapse” would expand at light speed (or about light speed) from the originating event, and destroy the heck out of everything in the affected, and ever-expanding, region.

It’s worth mentioning that **the idea of a false vacuum is wild speculation** and that there is **no indication, not even a little**, that the vacuum of the universe is a false vacuum and not the true ground state. **There’s a** **long** **history of spectacular bursts of energy in the universe, and none of them have tripped a collapse**. The ground state of the universe is kinda like a septuagenarian’s testicle; if it hasn’t dropped by now, it probably won’t.

#### Turn – space col solves universe extinction through quantum immortality

Turchin 19 (Alexey Turchin an author of several books and articles on the topics of existential risks and life extension, and was published in "Futures", "Acta Astronatutica", "Informatica", "AI & Society" journals. He graduated in Moscow State University where he studied Physics and Art History (1997). He translated into Russian around 20 main articles about existential risks by Bostrom, Yudkowsky, Circovich, Kent, Hanson. From 2010 he works in the "Science for Life Extension Foundation" on various topics about life extension and risks prevention. He is a contributing author on IEET. He is the founder of the Digital Immortality Now startup. He is a member of the advisory boards of IEET, Open Longevity, AI agents, Arch Mission. In 2018 he won one of the prizes in AI Global Challenge race with his article on global solutions on AI safety, ”How to Survive the End of the Universe.” Version 2, Uploaded: 2019-11-28, Available at https://philpapers.org/rec/TURHTS-2, HKR-cjh)

1. Introduction Based on some optimistic models, we could start a wave of colonization of the universe using von Neumann probes moving at near-light speed a few hundred years from now (Stuart Armstrong & Sandberg, 2013), leveraging technology such as nanotech replicators connected to laser-powered sails. Communication and coordination between different parts of such a wave would be difficult. But to prevent some scenarios of the end of the universe, a form of large-scale coordination may be needed. This may take, for example, the form of an aggregation of large masses of matter to build massive astroengineering structures, as described by (Hooper, 2018), who suggested that an advanced civilization will send stars to its central region and increase mass of available matter after expansion of the universe will make these stars inaccessible. (Hooper expected that it may help to increase the available mass by 1000 x, but Loeb wrote that it may be cheaper to migrate to a dense cluster of galaxies (Loeb, 2018)). Bostrom suggested idea of astronomical waste (Bostrom, 2003), a huge opportunity cost which could come into play if we delay our exploration of the universe—as many new stars become permanently inaccessible every day because of the expansion of the universe. He also states that human endowment could be to reach all our opportunities and become everything which we could be. This assumes that we should use remaining time and matter of the universe in the most effective way to get as much human-values-related utility as possible. However, there is another alternative: use all the time and matter available to use to find the ways to survive the end of the universe, as the possible prize could be very large: in other words, this enterprise is a form of Pascal’s wager. Moreover, before the decision about how to fight the end of the universe is made (or at least before we know how much time we actually have left), we need a perfect knowledge of high-energy physics—as we need to know for sure how and when the universe will end and what can be done to prevent it. Gaining such knowledge may require creation of large-scale particle accelerators or long-term observations of changes in dark energy. Sabina Hossenfelder has said that new physics become apparent only by studying energies many orders of magnitude higher than those achievable on Cern’s Large Hadron Collider (LHC), and for example, to study quantum gravity, an accelerator the size of the Milky Way Galaxy is needed (Hossenfelder, 2019). Several authors have explored the possibility of reaching immortality and surviving “the end of the universe.” Tipler suggested that we will use the energy of the collapsing universe to perform an infinite number of computations in Omega point (Tipler, 1997), but this idea was criticized by (Ellis & Coule, 1994). Many predictions made by Tipler now seem to be obsolete: for example, the mass of the Higgs boson turned to be different than that required by Tipler’s Omega theory, as well as Hubble’s constant. Notably, Tipler wrote his book The physics of Immortality before the discovery of dark energy. Egan suggested—in fictional form—migration into an eternal mathematical universe as the ultimate form of escape in his novel Permutation City (Egan, 2010). Dvorsky explored several ideas about surviving the end of the universe (Dvorsky, 2015). Cirncovich and Bostrom suggested the possibility that a mind could travel between old and new universes via singularities (Ćirković & Bostrom, 2000). There have also been suggestions about how to extend our existence as long as possible in the case of a Big Freeze. For example, Sandberg et al. suggested an “aestivation hypothesis” (Sandberg, Armstrong, & Cirkovic, 2017), in which civilizations might wait until very cold times to perform computations more effectively. However, such “civilizational life extension” is not a form of true immortality. Along similar lines, Freeman Dyson explored how to survive for a very long time in a slowly freezing universe (Dyson, 1979). Preventing the end of the universe could be also regarded as a cause prioritization area for effective altruism, because if we prevent (or survive) some short-term forms of the end of the universe, like false vacuum decay or a Big Rip soon, we could increase amount of good we can create by many orders of magnitude. We could also act effectively in this direction by preventing collider accidents (Kent, 2004) or other potentially dangerous experiments, and by including the goal of surviving the end of the universe in the goal system of future superintelligent AI (Bostrom, 2014). By exploring survival strategies for the universe, we may help establish existential optimism for people who are living now, support life extension research, and gain more information from fundamental studies of physics. Another purpose of the discussion about surviving the end of the universe is to show that actual immortality is possible: that we have the opportunity to live not just billions and trillions of years, but for an unlimited duration. My hope is that recognizing the possibility to survive the end of the universe will encourage us to invest more in life extension and prevention of global catastrophic risks. Our life could be eternal and thus have meaning forever. The end of the observable universe is not an absolute end: it's just one more problem the future human race will be able to address. And even at the limited level of knowledge about the universe that we have today, we are still able to offer several dozen more ideas on how to prevent its end. In the distant future, we can find more ideas, choose the best, validate them, and prepare for their implementation.

#### That solves vacuum decay

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4.6. Prevent accidental universe destruction There is a very small probability that we could destroy universe even now by starting false vacuum decay. Small black holes could be nucleation points of new vacuum, and such small black holes could theoretically appear during experiments in a hadron collider. The recently discovered Higgs boson’s mass range renders the vacuum decay hypothesis more probable; also, true vacuum will not be like ordinary vacuum, but will itself gravitationally collapse (Elias-Miro et al., 2012; Mack, 2015). Objections often refer to the fact that much more intensive collisions are happening in the universe all the time; however, there are small differences between collider experiments and natural collisions: the products of LHC collisions have a small relative speed to the Earth as opposite beams collide (Kent, 2004). As a result, it is possible small black holes could have the opportunity to catch surrounding atoms before evaporating via Hawking radiation and could start to grow. Such a growing black hole would eventually consume the Earth (as in David Brin’s novel Earth), but not immediately, as the accretion rate initially could be very slow on the early stages. It may take years before any observable effects became obvious (as the accretion rate could become stable on some lower level and the whole black hole will be just the size of a few atoms, surrounded by a pocket of hot gas and sitting somewhere in the center of the Earth). However, such a small black hole could exist long enough to make the random event of the false vacuum decay more probable (or maybe two such small black holes would need to collide) (Burda et al., 2015; Villatoro, 2015). 5. Survival strategies in relation to other ideas 5.1. Order of implementation Preventing the end of the universe should concentrate on different risks at different times. 1. False vacuum. We need to minimise the risk of false vacuum decay, while simultaneously getting more information about the nature of the universe and reducing our cosmological uncertainty. We should conduct experiments about the nature of the universe carefully, as they themselves may trigger false vacuum decay or have other unintended consequences. Also, if everything possible actually exists, false vacuum decay may be exactly compensated for by quantum immortality, and thus will be an unobservable and inconsequential event. However, if the speed of the false vacuum bubble is a little bit below the speed of light, we could observe the incoming bubble. For example, if the bubble originates 1 billion light-years from us and has the speed of 99.9 per cent of the speed of light, we would observe, and may be even be destroyed by the radiation of its domain walls. Bostrom and Tegmark estimated that such type of catastrophes has a probability below one percent in a billion years based on some observation selection effects: if they occurred more often, we should find ourselves earlier in the timeline of our universe (Tegmark & Bostrom, 2005). 2. Big Rip. This risk could arise relatively soon, but not very soon: even in the case of very implausible values of dark energy, it is still 20 billion years from now. 3. Heat death is the most remote risk, and we have plenty of time to prepare for it.