1AC: Framing

The value is morality

The value criterion is maximizing expected wellbeing

1 – Pleasure and pain *are* intrinsic value and disvalue – everything else *regresses* – robust neuroscience.

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Pleasure is not only one of the three primary reward functions but it also **defines reward.** As homeostasis explains the functions of only a limited number of rewards, the principal reason why particular stimuli, objects, events, situations, and activities are rewarding may be due to pleasure. This applies first of all to sex and to the primary homeostatic rewards of food and liquid and extends to money, taste, beauty, social encounters and nonmaterial, internally set, and intrinsic rewards. Pleasure, as the primary effect of rewards, drives the prime reward functions of learning, approach behavior, and decision making and provides the **basis for hedonic theories** of reward function. We are attracted by most rewards and exert intense efforts to obtain them, just because they are enjoyable [10].

Pleasure is a passive reaction that derives from the experience or prediction of reward and may lead to a long-lasting state of happiness. The word happiness is difficult to define. In fact, just obtaining physical pleasure may not be enough. One key to happiness involves a network of good friends. However, it is not obvious how the higher forms of satisfaction and pleasure are related to an ice cream cone, or to your team winning a sporting event. Recent multidisciplinary research, using both humans and detailed invasive brain analysis of animals has discovered some critical ways that the brain processes pleasure [14].

Pleasure as a hallmark of reward is sufficient for defining a reward, but it may not be necessary. A reward may generate positive learning and approach behavior simply because it contains substances that are essential for body function. When we are hungry, we may eat bad and unpleasant meals. A monkey who receives hundreds of small drops of water every morning in the laboratory is unlikely to feel a rush of pleasure every time it gets the 0.1 ml. Nevertheless, with these precautions in mind, we may define any stimulus, object, event, activity, or situation that has the potential to produce pleasure as a reward. In the context of reward deficiency or for disorders of addiction, homeostasis pursues pharmacological treatments: drugs to treat drug addiction, obesity, and other compulsive behaviors. The theory of allostasis suggests broader approaches - such as re-expanding the range of possible pleasures and providing opportunities to expend effort in their pursuit. [15]. It is noteworthy, the first animal studies eliciting approach behavior by electrical brain stimulation interpreted their findings as a discovery of the brain's pleasure centers [16] which were later partly associated with midbrain dopamine neurons [17–19] despite the notorious difficulties of identifying emotions in animals.

Evolutionary theories of pleasure: The love connection BO:D

Charles Darwin and other biological scientists that have examined the biological evolution and its basic principles found various mechanisms that steer behavior and biological development. Besides their theory on natural selection, it was particularly the sexual selection process that gained significance in the latter context over the last century, especially when it comes to the question of what makes us "what we are," i.e., human. However, the capacity to sexually select and evolve is not at all a human accomplishment alone or a sign of our uniqueness; yet, we humans, as it seems, are ingenious in fooling ourselves and others–when we are in love or desperately search for it.

It is well established that modern biological theory conjectures that **organisms are** the **result of evolutionary competition.** In fact, Richard Dawkins stresses gene survival and propagation as the basic mechanism of life [20]. Only genes that lead to the fittest phenotype will make it. It is noteworthy that the phenotype is selected based on behavior that maximizes gene propagation. To do so, the phenotype must survive and generate offspring, and be better at it than its competitors. Thus, the ultimate, distal function of rewards is to increase evolutionary fitness by ensuring the survival of the organism and reproduction. It is agreed that learning, approach, economic decisions, and positive emotions are the proximal functions through which phenotypes obtain other necessary nutrients for survival, mating, and care for offspring.

Behavioral reward functions have evolved to help individuals to survive and propagate their genes. Apparently, people need to live well and long enough to reproduce. Most would agree that homo-sapiens do so by ingesting the substances that make their bodies function properly. For this reason, foods and drinks are rewards. Additional rewards, including those used for economic exchanges, ensure sufficient palatable food and drink supply. Mating and gene propagation is supported by powerful sexual attraction. Additional properties, like body form, augment the chance to mate and nourish and defend offspring and are therefore also rewards. Care for offspring until they can reproduce themselves helps gene propagation and is rewarding; otherwise, many believe mating is useless. According to David E Comings, as any small edge will ultimately result in evolutionary advantage [21], additional reward mechanisms like novelty seeking and exploration widen the spectrum of available rewards and thus enhance the chance for survival, reproduction, and ultimate gene propagation. These functions may help us to obtain the benefits of distant rewards that are determined by our own interests and not immediately available in the environment. Thus the distal reward function in gene propagation and evolutionary fitness defines the proximal reward functions that we see in everyday behavior. That is why foods, drinks, mates, and offspring are rewarding.

There have been theories linking pleasure as a required component of health benefits salutogenesis, (salugenesis). In essence, under these terms, pleasure is described as a state or feeling of happiness and satisfaction resulting from an experience that one enjoys. Regarding pleasure, it is a double-edged sword, on the one hand, it promotes positive feelings (like mindfulness) and even better cognition, possibly through the release of dopamine [22]. But on the other hand, pleasure simultaneously encourages addiction and other negative behaviors, i.e., motivational toxicity. It is a complex neurobiological phenomenon, relying on reward circuitry or limbic activity. It is important to realize that through the "Brain Reward Cascade" (BRC) endorphin and endogenous morphinergic mechanisms may play a role [23]. While natural rewards are essential for survival and appetitive motivation leading to beneficial biological behaviors like eating, sex, and reproduction, crucial social interactions seem to further facilitate the positive effects exerted by pleasurable experiences. Indeed, experimentation with addictive drugs is capable of directly acting on reward pathways and causing deterioration of these systems promoting hypodopaminergia [24]. Most would agree that pleasurable activities can stimulate personal growth and may help to induce healthy behavioral changes, including stress management [25]. The work of Esch and Stefano [26] concerning the link between compassion and love implicate the brain reward system, and pleasure induction suggests that social contact in general, i.e., love, attachment, and compassion, can be highly effective in stress reduction, survival, and overall health.

Understanding the role of neurotransmission and pleasurable states both positive and negative have been adequately studied over many decades [26–37], but comparative anatomical and neurobiological function between animals and homo sapiens appear to be required and seem to be in an infancy stage.

Finding happiness is different between apes and humans

As stated earlier in this expert opinion one key to happiness involves a network of good friends [38]. However, it is not entirely clear exactly how the higher forms of satisfaction and pleasure are related to a sugar rush, winning a sports event or even sky diving, all of which augment dopamine release at the reward brain site. Recent multidisciplinary research, using both humans and detailed invasive brain analysis of animals has discovered some critical ways that the brain processes pleasure.

Remarkably, there are pathways for ordinary liking and pleasure, which are limited in scope as described above in this commentary. However, there are **many brain regions**, often termed hot and cold spots, that significantly **modulate** (increase or decrease) our **pleasure or** even produce **the opposite** of pleasure— that is disgust and fear [39]. One specific region of the nucleus accumbens is organized like a computer keyboard, with particular stimulus triggers in rows— producing an increase and decrease of pleasure and disgust. Moreover, the cortex has unique roles in the cognitive evaluation of our feelings of pleasure [40]. Importantly, the interplay of these multiple triggers and the higher brain centers in the prefrontal cortex are very intricate and are just being uncovered.

Desire and reward centers

It is surprising that many different sources of pleasure activate the same circuits between the mesocorticolimbic regions (Figure 1). Reward and desire are two aspects pleasure induction and have a very widespread, large circuit. Some part of this circuit distinguishes between desire and dread. The so-called pleasure circuitry called "REWARD" involves a well-known dopamine pathway in the mesolimbic system that can influence both pleasure and motivation.

In simplest terms, the well-established mesolimbic system is a dopamine circuit for reward. It starts in the ventral tegmental area (VTA) of the midbrain and travels to the nucleus accumbens (Figure 2). It is the cornerstone target to all addictions. The VTA is encompassed with neurons using glutamate, GABA, and dopamine. The nucleus accumbens (NAc) is located within the ventral striatum and is divided into two sub-regions—the motor and limbic regions associated with its core and shell, respectively. The NAc has spiny neurons that receive dopamine from the VTA and glutamate (a dopamine driver) from the hippocampus, amygdala and medial prefrontal cortex. Subsequently, the NAc projects GABA signals to an area termed the ventral pallidum (VP). The region is a relay station in the limbic loop of the basal ganglia, critical for motivation, behavior, emotions and the "Feel Good" response. This defined system of the brain is involved in all addictions –substance, and non –substance related. In 1995, our laboratory coined the term "Reward Deficiency Syndrome" (RDS) to describe genetic and epigenetic induced hypodopaminergia in the "Brain Reward Cascade" that contribute to addiction and compulsive behaviors [3,6,41].

Furthermore, ordinary "liking" of something, or pure pleasure, is represented by small regions mainly in the limbic system (old reptilian part of the brain). These may be part of larger neural circuits. In Latin, hedus is the term for "sweet"; and in Greek, hodone is the term for "pleasure." Thus, the word Hedonic is now referring to various subcomponents of pleasure: some associated with purely sensory and others with more complex emotions involving morals, aesthetics, and social interactions. The capacity to have pleasure is part of being healthy and may even extend life, especially if linked to optimism as a dopaminergic response [42].

Psychiatric illness often includes symptoms of an abnormal inability to experience pleasure, referred to as anhedonia**. A negative feeling state is called dysphoria, which can consist of many emotions such as pain**, depression, anxiety, fear, and disgust. Previously many scientists used animal research to uncover the complex mechanisms of pleasure, liking, motivation and even emotions like panic and fear, as discussed above [43]. However, as a significant amount of related research about the specific brain regions of pleasure/reward circuitry has been derived from invasive studies of animals, these cannot be directly compared with subjective states experienced by humans.

In an attempt to resolve the controversy regarding the causal contributions of mesolimbic dopamine systems to reward, we have previously evaluated the three-main competing explanatory categories: "liking," "learning," and "wanting" [3]. That is, dopamine may mediate (a) liking: the hedonic impact of reward, (b) learning: learned predictions about rewarding effects, or (c) wanting: the pursuit of rewards by attributing incentive salience to reward-related stimuli [44]. We have evaluated these hypotheses, especially as they relate to the RDS, and we find that the incentive salience or "wanting" hypothesis of dopaminergic functioning is supported by a majority of the scientific evidence. Various neuroimaging studies have shown that anticipated behaviors such as sex and gaming, delicious foods and drugs of abuse all affect brain regions associated with reward networks, and may not be unidirectional. Drugs of abuse enhance dopamine signaling which sensitizes mesolimbic brain mechanisms that apparently evolved explicitly to attribute incentive salience to various rewards [45].

Addictive substances are voluntarily self-administered, and they enhance (directly or indirectly) dopaminergic synaptic function in the NAc. This activation of the brain reward networks (producing the ecstatic "high" that users seek). Although these circuits were initially thought to encode a set point of hedonic tone, it is now being considered to be far more complicated in function, also encoding attention, reward expectancy, disconfirmation of reward expectancy, and incentive motivation [46]. The argument about addiction as a disease may be confused with a predisposition to substance and nonsubstance rewards relative to the extreme effect of drugs of abuse on brain neurochemistry. The former sets up an individual to be at high risk through both genetic polymorphisms in reward genes as well as harmful epigenetic insult. Some Psychologists, even with all the data, still infer that addiction is not a disease [47]. Elevated stress levels, together with polymorphisms (genetic variations) of various dopaminergic genes and the genes related to other neurotransmitters (and their genetic variants), and may have an additive effect on vulnerability to various addictions [48]. In this regard, Vanyukov, et al. [48] suggested based on review that whereas the gateway hypothesis does not specify mechanistic connections between "stages," and does not extend to the risks for addictions the concept of common liability to addictions may be more parsimonious. The latter theory is grounded in genetic theory and supported by data identifying

common sources of variation in the risk for specific addictions (e.g., RDS). This commonality has identifiable neurobiological substrate and plausible evolutionary explanations.

Over many years the controversy of dopamine involvement in especially "pleasure" has led to confusion concerning separating motivation from actual pleasure (wanting versus liking) [49]. We take the position that animal studies cannot provide real clinical information as described by self-reports in humans. As mentioned earlier and in the abstract, on November 23rd, 2017, evidence for our concerns was discovered [50]

In essence, although nonhuman primate brains are similar to our own, the disparity between other primates and those of human cognitive abilities tells us that surface similarity is not the whole story. Sousa et al. [50] small case found various differentially expressed genes, to associate with pleasure related systems. Furthermore, the dopaminergic interneurons located in the human neocortex were absent from the neocortex of nonhuman African apes. Such differences in neuronal transcriptional programs may underlie a variety of neurodevelopmental disorders.

In simpler terms, the system controls the production of dopamine, a chemical messenger that plays a significant role in pleasure and rewards. The senior author, Dr. Nenad Sestan from Yale, stated: "Humans have evolved a dopamine system that is different than the one in chimpanzees." This may explain why the behavior of humans is so unique from that of non-human primates, even though our brains are so surprisingly similar, Sestan said: "It might also shed light on why people are vulnerable to mental disorders such as autism (possibly even addiction)." Remarkably, this research finding emerged from an extensive, multicenter collaboration to compare the brains across several species. These researchers examined 247 specimens of neural tissue from six humans, five chimpanzees, and five macaque monkeys. Moreover, these investigators analyzed which genes were turned on or off in 16 regions of the brain. While the differences among species were subtle, **there was** a **remarkable contrast in** the **neocortices**, specifically in an area of the brain that is much more developed in humans than in chimpanzees. In fact, these researchers found that a gene called tyrosine hydroxylase (TH) for the enzyme, responsible for the production of dopamine, was expressed in the neocortex of humans, but not chimpanzees. As discussed earlier, dopamine is best known for its essential role within the brain's reward system; the very system that responds to everything from sex, to gambling, to food, and to addictive drugs. However, dopamine also assists in regulating emotional responses, memory, and movement. Notably, abnormal dopamine levels have been linked to disorders including Parkinson's, schizophrenia and spectrum disorders such as autism and addiction or RDS.

Nora Volkow, the director of NIDA, pointed out that one alluring possibility is that the neurotransmitter dopamine plays a substantial role in humans' ability to pursue various rewards that are perhaps months or even years away in the future. This same idea has been suggested by Dr. Robert Sapolsky, a professor of biology and neurology at Stanford University. Dr. Sapolsky cited evidence that dopamine levels rise dramatically in humans when we anticipate potential rewards that are uncertain and even far off in our futures, such as retirement or even the possible alterlife. This may explain what often motivates people to work for things that have no apparent short-term benefit [51]. In similar work, Volkow and Bale [52] proposed a model in which dopamine can favor NOW processes through phasic signaling in reward circuits or LATER processes through tonic signaling in control circuits. Specifically, they suggest that through its modulation of the orbitofrontal cortex, which processes salience attribution, dopamine also enables shilting from NOW to LATER, while its modulation of the insula, which processes interoceptive information, influences the probability of selecting NOW versus LATER actions based on an individual's physiological state. This hypothesis further supports the concept that disruptions along these circuits contribute to diverse pathologies, including obesity and addiction or RDS.

2 – Extinction outweighs under any framework

Pummer 15 [Theron, Junior Research Fellow in Philosophy at St. Anne's College, University of Oxford. "Moral Agreement on Saving the World" Practical Ethics, University of Oxford. May 18, 2015] AT

There appears to be lot of disagreement in moral philosophy. Whether these many apparent disagreements are deep and irresolvable, I believe there is at least one thing it is reasonable to agree on right now, whatever general moral view we adopt: that it is very important to reduce the risk that all intelligent beings on this planet are eliminated by an enormous catastrophe, such as a nuclear war. How we might in fact

try to reduce such existential risks is discussed elsewhere. My claim here is only that we – **whether we're consequentialists, deontologists, or virtue ethicists** – should all agree that we should try to save the world. According to consequentialism, we should maximize the good, where this is taken to be the goodness, from an impartial perspective, of outcomes. Clearly one thing that makes an outcome good is that the people in it are doing well. There is little disagreement here. If the happiness or well-being of possible future people is just as important as that of people who already exist, and if they would have good lives, it is not hard to see how **reducing existential risk is easily the most important thing in the whole world.** This is for the familiar reason that there are **so many people who could exist in the future** – there are **trillions upon trillions**… upon trillions. There are so many possible future people tha**t reducing existential risk is arguably the most important** thing in the world, **even if the well-being of these possible people were given only 0.001% as much weight** as that of existing people. Even on a wholly person-affecting view – according to which there's nothing (apart from effects on existing people) to be said in favor of creating happy people – the case for reducing existential risk is very strong. As noted in this seminal paper, this case is strengthened by the fact that there's a good chance that many existing people will, with the aid of life-extension technology, live very long and very high quality lives. You might think what I have just argued applies to consequentialists only. There is a tendency to assume that, if an argument appeals to consequentialist considerations (the goodness of outcomes), it is irrelevant to non-consequentialists. But **that is a huge mistake.** Non-consequentialism is the view that there's more that determines rightness than the goodness of consequences or outcomes; **it is not the view that the latter don't matter**. Even John Rawls wrote, "All ethical doctrines worth our attention take consequences into account in judging rightness. One which did not would simply be irrational, crazy." **Minimally plausible versions of deontology and virtue ethics must be concerned in part with promoting the good**, from an impartial point of view. They'd thus imply very strong reasons to reduce existential risk, at least when this doesn't significantly involve doing harm to others or damaging one's character. What's even more surprising, perhaps, is that even if our own good (or that of those near and dear to us) has much greater weight than goodness from the impartial "point of view of the universe," indeed even if the latter is entirely morally irrelevant, we may nonetheless have very strong reasons to reduce existential risk. Even egoism, the view that each agent should maximize her own good, might imply strong reasons to reduce existential risk. It will depend, among other things, on what one's own good consists in. If well-being consisted in pleasure only, it is somewhat harder to argue that egoism would imply strong reasons to reduce existential risk – perhaps we could argue that one would maximize her expected hedonic well-being by funding life extension technology or by having herself cryogenically frozen at the time of her bodily death as well as giving money to reduce existential risk (so that there is a world for her to live in!). I am not sure, however, how strong the reasons to do this would be. But views which imply that, if I don't care about other people, I have no or very little reason to help them are not even minimally plausible views (in addition to hedonistic egoism, I here have in mind views that imply that one has no reason to perform an act unless one actually desires to do that act). To be minimally plausible, egoism will need to be paired with a more sophisticated account of well-being. To see this, it is enough to consider, as Plato did, the possibility of a ring of invisibility – suppose that, while wearing it, Ayn could derive some pleasure by helping the poor, but instead could derive just a bit more by severely harming them. Hedonistic egoism would absurdly imply she should do the latter. To avoid this implication, egoists would need to build something like the meaningfulness of a life into well-being, in some robust way, where this would to a significant extent be a function of other-regarding concerns (see chapter 12 of this classic intro to ethics). But once these elements are included, we can (roughly, as above) argue that this sort of egoism will imply strong reasons to reduce existential risk. Add to all of this Samuel Scheffler's recent intriguing arguments (quick podcast version available here) that most of what makes our lives go well would be undermined if there were no future generations of intelligent persons. On his view, my life would contain vastly less well-being if (say) a year after my death the world came to an end. So obviously if Scheffler were right I'd have very strong reason to reduce existential risk. **We**

should also take into account moral uncertainty. What is it reasonable for one to do, when one is uncertain not (only) about the empirical facts, but also about the moral facts? I've just argued that there's agreement among minimally plausible ethical views that we have strong reason to reduce existential risk – not only consequentialists, but also deontologists, virtue ethicists, and sophisticated egoists should agree. But even those (hedonistic egoists) who disagree should have a significant level of confidence that they are mistaken, and that one of the above views is correct. Even if they were 90% sure that their view is the correct one (and 10% sure that one of these other ones is correct), they would have pretty strong reason, from the standpoint of moral uncertainty, to reduce existential risk. Perhaps most disturbingly still, **even if we are only 1% sure that** the **well-being** of possible future people **matters,** it is at least arguable that, **from** the standpoint of **moral uncertainty, reducing existential risk is the most important thing in the world.** Again, this is largely for the reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. (For more on this and other related issues, see this excellent dissertation). Of course, it is uncertain whether these untold trillions would, in general, have good lives. It's possible they'll be miserable. It is enough for my claim that there is moral agreement in the relevant sense if, at least given certain empirical claims about what future lives would most likely be like, **all minimally plausible moral views would converge on the conclusion that we should try to save the world.** While there are some non-crazy views that place significantly greater moral weight on avoiding suffering than on promoting happiness, for reasons others have offered (and for independent reasons I won't get into here unless requested to), they nonetheless seem to be fairly implausible views. And even if things did not go well for our ancestors, I am optimistic that they will overall go fantastically well for our descendants, if we allow them to. I suspect that most of us alive today – at least those of us not suffering from extreme illness or poverty – have lives that are well worth living, and that things will continue to improve. Derek Parfit, whose work has emphasized future generations as well as agreement in ethics, described our situation clearly and accurately: "We live during the hinge of history. Given the scientific and technological discoveries of the last two centuries, the world has never changed as fast. We shall soon have even greater powers to transform, not only our surroundings, but ourselves and our successors. If we act wisely in the next few centuries, humanity will survive its most dangerous and decisive period. Our descendants could, if necessary, go elsewhere, spreading through this galaxy…. Our descendants might, I believe, make the further future very good. But that good future may also depend in part on us. If our selfish recklessness ends human history, we would be acting very wrongly." (From chapter 36 of On What Matters)

3 – Degree of wrongness - only util explains a degree of wrongness, if i break a promise to take a dying person to the hospital its way worse than breaking a promise to meet you for lunch

OV

I affirm the resolution resolved: the appropriation of outer space by private entities is unjust.

the act of taking something for your own use, usually without permission:

https://www.dictionary.com/browse/appropriation
https://dictionary.cambridge.org/us/dictionary/english/appropriation

“Appropriation” includes claims to natural resources, not just real property.

Amanda M. **Leon**, Associate*, Caplin & Drysdale, Chtd., **’18**, Virginia Law Review [“MINING FOR MEANING: AN EXAMINATION OF THE LEGALITY OF PROPERTY RIGHTS IN SPACE RESOURCES” Vol. 104:497 2018] TDI

Appropriation. The term “appropriation” also remains ambiguous. Webster’s defines the verb “appropriate” as “to take to oneself in exclusion of others; to claim or use as by an exclusive or pre-eminent right; as, let no man appropriate a common benefit.”165 Similarly, **Black’s Law Dictionary describes “appropriate” as an act “[t]o make a thing one’s own;** to make a thing the subject of property; to exercise dominion over an object to the extent, and for the purpose, of making it subserve one’s own proper use or pleasure.”166 Oftentimes, appropriation refers to the setting aside of government funds, the taking of land for public purposes, or a tort of wrongfully taking another’s property as one’s own. The term **appropriation is often used not only with respect to real property but also with water**. **According to U.S. case law, a person completes an appropriation of water by diversion of the water and an application of the water to beneficial use**.167 **This common use of the term “appropriation” with respect to water illustrate**s two key points: **(1) the term applies to natural resources**—e.g., water or minerals—**not just real property**, **and (2) mining space resources and putting them to beneficial use**—**e.g., selling or manufacturing the mined resources**— **could reasonably be interpreted as an “appropriation” of outer space.** While the ordinary meaning of “appropriation” reasonably includes the taking of natural resources as well as land, whether the drafters and parties to the OST envisioned such a broad meaning of the term remains difficult to determine with any certainty. **The prohibition against appropriation “by any other means” supports such a reading**, though, by expanding the prohibition to other types not explicitly

described.168 As illustrated by this analysis, **<u>considerable ambiguity remains after this ordinary-meaning analysis and thus, the question of Treaty obligations and property rights remains unresolved</u>**. In order to resolve these ambiguities, an analysis of preparatory materials, historical context, and state practice follows.

Inherency

Private entities are set to mine in space soon. New legislation and profit motive makes the industry lucrative.

Zeisl 19 [Yasemin Zeisl, MSc in International Relations and Affairs from the London School of Economics and Political Science (LSE), "Three Salient Risks of Mining in Space," 05/03/19, *GlobalRiskIntel*, https://www.globalriskintel.com/insights/three-salient-risks-mining-space, EA]

The **harvesting** of **natural resources from space objects is the goal of numerous companies** such as Planetary Resources or Deep Space Industries in the United States, Asteroid Mining Corporation in Scotland, or iSpace in Japan. While some **companies** such as iSpace are focusing on resources inside the Moon, others **are developing strategies to identify and extract resources from asteroids** and extinct comets. Given that **calculations evaluate space mining as a highly lucrative business with potential profits amounting to trillions in U.S.-dollars**, it is unsurprising that investment into space mining rose from 534 million USD in 2014 to 3.1 billion USD in 2018.
Research institutions such as the Center for Near-Earth Object Studies (CNEOS) — which cooperates with the National Aeronautics and Space Administration (NASA) — detects, traces, and assesses risks of objects moving close to the Earth. Such calculations are relevant for future ventures into space mining, which will focus on metals such as platinum, gold, iron, rhodium, zinc, cobalt, and nickel, as well as water and carbon found in asteroids and extinct comets. Celestial ice would be particularly useful for generating rocket fuel by splitting it into hydrogen and oxygen. This may facilitate long space travel to destinations such as Mars. The usage of extinct comets as gas stations may bring engineers and scientists one step closer to the goal of colonizing Mars. While rocket fuel extraction may be a relatively feasible project for the near future, it is expected that harvesting metals from space may require several more decades to realize.
Spotting the potential profitability of space mining, the United **S**tates **passed the** Commercial **Space** Launch Competitiveness **Act** in 2015 to grant U.S. citizens the right **to harvest natural resources from celestial bodies.** Similarly, Luxembourg established a space mining law and provided investment opportunities in August 2017. In January 2019, Russia started negotiating a bilateral cooperation arrangement with Luxembourg. The fact that there is no clearly defined international treaty on space mining poses a major risk. Although the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 1984 may provide some detail on the issue by asserting that no state, organization, or natural person can lay claim to any object in space, the fact that only 18 countries have committed to this multilateral treaty leaves the majority of states unbound by this regulation. An inconsistent legal landscape in regard to resource extraction of celestial bodies could lead to legal clashes between different countries and potential disadvantages for companies or organizations from certain countries. Mining in space could turn into a fierce competition among various private businesses and states. Therefore, licensing regulations will also have to be clearly defined. Licenses will help to clarify both ownership of yields and the relationships among miners, investors, and governments in order to avoid conflict in the future.

Advantage 1 - Economy

Asteroid mining crushes the economy – kills global markets with influx of low prices – profit driven private companies will be uniquely responsible.

O'Neill 14

Ian O'Neill, PhD Solar Physics, "Mining Asteroids: Not Mankind's Silver Bullet," Seeker. April 24, 2012. https://www.seeker.com/mining-asteroids-not-mankinds-silver-bullet-1765750275.html

The biggest hurdle facing any hopeful space mining company is that we don't have the ability to refine precious metals and rare minerals in a microgravity environment. Every asteroid mining plan in the past has come with a huge caveat: we don't have the technology. This may not seem like a huge hurdle - especially considering the amazing feats of human ingenuity in space technology over the past six decades - for investors who actually want to see a return on their investment, it's probably a deal breaker. Perhaps it's not desirable to refine asteroids in situ - might it make sense to capture asteroids in Earth orbit and use them as a near-Earth smorgasbord of resources, cutting off chunks as needed? In this case, I'm highly skeptical that there would be any international agreement about steering potential city-killer asteroids near Earth. That's one Planetary Health and Safety meeting I'd love to sit in on. PHOTOS: Asteroids and Near-Earth Objects Also, Planetary Resources specifically single out near-Earth asteroids (NEAs) as their target. "Of the approximately 9,000 known NEAs, there are more than 1,500 that are energetically as easy to reach as the Moon," says the press release. This may be true, but NEAs don't hang around. They orbit the sun just like the Earth. So is the plan to jump on board, set up a mining platform and then watch billions of dollars of equipment zoom off into deep space until it comes back a year (or ten, or a hundred years) in the future? Or are we going to slow the small NEAs sufficiently so they can be parked in Earth orbit? Once again, messing with an asteroid's trajectory is a huge technological unknown. During the announcement, Diamandis kept referring to "risk tolerant investors" investing their "smart money" in the biggest opportunity ever. He also emphasized that Planetary Resources' goals would enrich humanity as a whole and that their goals were in alignment with NASA's aims to push humanity into space. Bold words for sure, but, again, there are problems with this vision. Countering the "Gee Whiz" factor, as my cohort and business/space analyst Greg Fish would put it, there's a thick forest of formidable red tape an asteroid mining company would have to wade through. ANALYSIS: Asteroid Forensics May Point to Alien Space Miners **For starters, mining and refining materials on Earth is a costly and risky endeavor. Can you imagine trying to insure an extraterrestrial mining outfit? If the refinery is totally automated, at least you don't have to worry about workers' benefits, health and safety. But humanity would need to have mastered our solar system to an incredible degree to assure the safety of in-space assets. Losing a multi-billion dollar robotic mining operation wouldn't look so good at the end of the next quarter's budget report. But the biggest selling point for asteroid mining is, of course, all the gazillions of dollars we stand to make from sucking precious metals like platinum from asteroids. As Diamandis kept emphasizing, by exploiting the solar system we would enrich the entire planet with huge wealth. How a profit-making industry became a world-wide charity, I'm not too sure. Last time I checked, BP wasn't busy enriching the world with the profits from their oil drilling. And, as Fish has pointed out countless times, flooding the world's economy with much-fabled trillions of dollars-worth of "cheap" platinum and other rare minerals could kill global markets. On the basis of supply and demand, the price of platinum group metals could collapse as supply routes from asteroids become common.** However, to set up and maintain an asteroid mining industry, it would be unimaginatively expensive - perhaps the price of asteroid material would be naturally high due to the sheer risk and overheads required. In short, we have no idea about how an influx of asteroid resources could impact the world. But to say it would benefit mankind as a whole? That's as speculative as predicting the world's economy in 50 years time. ANALYSIS: Capturing Lazy Asteroids to Plunder In short, the only thing that seems unique about today's announcement is that a group of very well respected and smart entrepreneurs and billionaires have clubbed together and thought asteroid mining seemed cool. Sadly, the plan is deliberately vague (who knows how many technological iterative steps are needed before a sustainable mining operation can begin anyway?), there is no realistic timescale and as far as I can tell, there's been only limited analysis as to how much investment will be needed. Regardless of how "risk tolerant" Google's investment may be, the corporation certainly isn't stupid with their investments. Seed money may be very forthcoming in the early stages (and that's all that may be needed if Planetary Resources turns rapidly

into a profit making space technology company), but in the long term, hinging this enterprise on making vast wads of imaginary cash from mining asteroids will leave any investor looking for a way out. While I'm personally very excited to hear about any enterprise that can drive innovation in space and invigorate private investment into building a sustainable space infrastructure, I don't believe that getting all hot and heavy over mining asteroids is the way to do it. Although I hope asteroid mining is an industry of the future, we'll have to wait some time before it becomes a realistic proposition. Setting unachievable goals for an undefined future - regardless of the amazing technological advances this will inevitably generate - leaves the plan open to criticism and ultimately rapid loss of interest. I think I'll wait until one of the big oil companies starts to launch rockets before I go getting too excited about yet another plan to pillage asteroids. Image: The double asteroid 90 Antiope - what riches are inside? Credit: ESO, edit by Ian O'Neill The opinions expressed here do not necessarily represent the official views of Discovery Communications.

Economic decline cascades – nuclear war – extinction

Maavak 21 – Mathew Maavak, PhD in Risk Foresight from the Universiti Teknologi Malaysia, External Researcher (PLATBIDAFO) at the Kazimieras Simonavicius University, Expert and Regular Commentator on Risk-Related Geostrategic Issues at the Russian International Affairs Council, "Horizon 2030: Will Emerging Risks Unravel Our Global Systems?", Salus Journal – The Australian Journal for Law Enforcement, Security and Intelligence Professionals, Volume 9, Number 1, p. 2-8

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, **health**care 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 **U**nited **S**tates 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.

Advantage 2 – Unregulated Mining

Regulation fails – states won't control the companies they're in bed with, since that costs them profits.

Utrata 21: Utrata, Alina. [Ph.D. candidate, Department of Politics and International Studies at the University of Cambridge; Gates-Cambridge and Marshall scholar] "Lost in Space." *Boston Review*, July 14, 2021. https://bostonreview.net/articles/lost-in-space/ CH

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. **However, this framing ignores corporations' violent histories and the deep connection between private commercial pursuits and systems of capitalism and colonialism. Moreover, though states may help create and participate in these systems, they do not always control the forces they unleash.** For example, there was nothing inevitable about the fact that the East India Company came under the control of the British state. Even when it did, it caused devastating impacts on both the places it claimed to "rule" as well as the state that had chartered and owned it, ushering in the age of the British Empire. As historian William Dalrymple, author of The Anarchy: The Relentless Rise of the East India Company (2019), noted, "It was not the British government that seized India at the end of the 18th century, but a dangerously unregulated private company. . . [that] executed a corporate coup unparalleled in history: the military conquest, subjugation and plunder of vast tracts of southern Asia. It almost certainly remains the supreme act of corporate violence in world history." **As contemporary companies set out to colonize space, we should ask whether modern states have a better grasp on how to control corporations and the violence that may result from battles over who ought to rule these settlers and resources. Though Blue Origin and SpaceX are indebted to the U.S. government for**

funding, U.S. regulators' ability to manage these corporations—especially Musk's—already appears limited. Musk's remarks toward U.S. regulators, even those investigating him, are infamous for being outrageous and crude—and his behavior is no less intransigent. **For instance, in December of last year, SpaceX refused to comply with Federal Aviation Association (FAA) orders to abort a high-altitude test launch of its Starship rocket after the agency revoked its launch license due to atmospheric conditions. And this was not the first time Musk defied government authority.** In May 2020 he re-opened his Tesla factory despite an Alameda county health order to shelter in place due to the COVID-19 pandemic, requesting on Twitter that police "only arrest him" if law enforcement took action. His **companies have been repeatedly investigated and fined for various other regulatory and safety violations.** (Reports have claimed that the Tesla factory does not have proper hazard signage because Musk "does not like the color yellow.") **Is it simply the case that Musk, like many powerful men before him, receives preferential treatment from the state? Or are the state and its regulatory agencies truly unable to control him? Colonial destruction was justified by a specific ideology that made a certain view of the world, and humanity's role in it, appear natural and inevitable.** Musk, for his part, does not seem particularly cowed. After the December rocket launch incident, the FAA announced that additional measures, including having an FAA inspector on site, will be imposed on SpaceX during future launches. In response Musk tweeted on January 28 that the FAA "rules are meant for a handful of expendable launches per year from a few government facilities. Under those rules, humanity will never get to Mars." For Musk, becoming an inter-planetary species is an existential matter for human civilization, far more important than rules and regulations. Both Bezos and Musk use the language of moral imperative when talking about space colonization: humanity must not merely explore space, but settle it, too. The two engineers can easily explain the technical dimensions of their plans to colonize the cosmos. Though these plans differ—Bezos wants to establish artificial tube-like structures floating close to Earth, whereas Musk wants to terraform Mars—the political philosophies underpinning them are remarkably similar. Both offer utopian visions of humanity in space that attempt to provide technological solutions to the political problems that colonialism and capitalism have caused.

Unregulated mining causes asteroid deflection and astroterror

Drmola and Mareš 15 - Jakub Drmola is a PhD student and Miroslav Mareš professor, at the Divison of Security and Strategic Studies, Masaryk University, Czech Republic, "Revisiting the deflection dilemma", *Astronomy & Geophysics*, Volume 56, Issue 5, October 2015, Pages 5.15–5.18, https://academic.oup.com/astrogeo/article/56/5/5.15/235650

There are two basic ways to go **about moving the resources contained within a given asteroid to the Earth. They can be extracted from the asteroid during its natural orbit and then transported to the Earth, or the**

entire asteroid might be moved closer to a more convenient location before starting mining. Thus repositioned, it might even be used as a shielded habitat, once hollowed out (Ostro 1999). There are different speculative costs and benefits associated with either option, which would vary with the size, orbit and composition of the asteroid. But, crucially, the second option would entail putting asteroids into orbit around the Earth, the Moon or possibly at one of the Earth's Lagrangian points. Indeed, NASA has already planned a mission to capture a small asteroid and place it in a high cislunar orbit, where it would serve as a destination for future manned missions and experiments. This "Asteroid Redirect Mission" is to take place in the next decade and is being pitched mainly as a stepping stone towards a future mission to Mars (see box "NASA's Asteroid Redirect Mission"; Brophy et al. 2012, Burchell 2014, Gates et al. 2015). Programmes to redirect asteroids and, especially, plans to mine asteroids on an industrial scale essentially resurrect the deflection dilemma. But it is no longer a matter of superpowers intentionally misusing technology designed to prevent dangerous impacts. It becomes an issue of proliferation among private entities. Once private mining companies acquire the technical ability to redirect suitable NEOs (Baoyin et al. 2011) in order to extract platinum or water from them, perilous inflections become more likely. The probability of accidents will rise with the number of asteroids whose trajectories we decide to manipulate. Such accidents might be very unlikely, but even a tiny technical or human error in the execution of an inflection meant to place an asteroid into the lunar or geocentric orbit might send it crashing into the Earth with potentially devastating consequences. And while we might find solace in the low probabilities associated with such an accident, even contemporary industries which are considered very safe suffer from unlikely tragedies. Despite being dependable and reliable, airliners do crash; there are a lot of them flying and very improbable accidents do happen if the dice are rolled often enough. Undoubtedly, we will not be steering as many asteroids as we steer planes any time soon, but industries tend to be more accident-prone during their infancy. Furthermore, a single asteroid can do a lot more damage than a single plane. And who is to say how much metal or water we are going to need in space over the course of the 21st century, or the next? The second source of risk is the intentional misuse, similar to the original deflection dilemma. But the entry barrier for asteroid weaponization gets much lower if mining them and moving them around becomes a common industrial activity. This is in stark contrast to the original scenario which envisioned this technology to be used solely for planetary defence and under control of a very small number of the most powerful countries (Morrison 2010). If such a powerful technology becomes widely and commercially available, even rogue states and wellfunded terrorist groups might be tempted to use it for an unexpected and devastating attack. In addition, an active asteroid mining industry would make it more difficult to detect any hostile inflection attempts among the number of legitimate and benign ones. Policy implications Considering these possible future dangers, it seems prudent to consider what to do about them sooner rather than later. The most obvious "solution" would be a blanket ban on the development of any technology that might lead to artificially inflected asteroids crashing into the Earth. However, such a ban would be incompatible with the dream of increased presence of humans in the solar system. It would stymie both scientific exploration and economic development here on Earth, which is increasingly dependent on precious metals and spacebased technologies. Furthermore, this approach would leave us more vulnerable to natural impacts which, in the long view, seems less than desirable. Another approach might be similar to the current regime of non-proliferation of nuclear weapons, aiming to support peaceful civilian use of nuclear power while at the same time prohibiting the spread of weapons of mass destruction. The regime mostly works (with caveats, see Wood et al. 2008) because these applications require different infrastructures and fissile materials enriched to different levels of purity. This makes it possible, at least in principle, to tell apart operations meant for the production of electricity and those designed to create weapons. Unfortunately, the difference between legitimate and hostile trajectory modification would lie only in the acceleration imparted on the asteroid and not in the technical means to do it. As the spacecraft launched with the intent to cause impact with the Earth might be identical to those sent off to retrieve resources, telling them apart would be nearly impossible, until it was too late. And this approach makes no difference to the chances of an industrial accident. If monitoring equipment on Earth is unhelpful, the focus changes to space. In other words, all asteroid movement missions should be constantly monitored. For an attacker, it would make most sense to delay the final course adjustment for as long as possible in order to give the least warning and make the timeframe for reaction as short as possible. So an asteroid might head towards a safe orbit fit for resource extraction for most of its altered flight time, but be further accelerated at the last possible moment onto an impact trajectory, perhaps mere days before it hits a major city. Our current programmes cataloguing NEOs (such as CSS or Pan-STARRS), which look for new, previously unknown objects, are not ideally suited for the task of constantly tracking a number of different, already known asteroids. New instruments would be needed to track them in order to immediately detect any hazardous inflection, whether intentional or accidental. Once such a detection is made, emergency measures to evacuate the population or, preferably, to "re-deflect" the incoming object can be executed right away, regardless of the cause. Accidents and

hostilities could be treated the same way and countered by the same system (initially, at least). Such a system would be more akin to an air traffic control than a non-proliferation regulation, offering security through vigilance, rather than absence. Additionally, development of a system able to deflect incoming objects at relatively short notice would be beneficial in case of an impending natural impact. Conclusion Perhaps none of these concerns will become relevant. Maybe the idea of asteroid mining will soon fizzle out because we will discover cheaper and more efficient local alternatives. Maybe humanity will lose the will or the capability to explore space any further. Or perhaps manipulating asteroid trajectories will prove impractical or too costly. Certainly, it would not be the first time that a promising and seemingly obvious future does not come about. In the 1960s it seemed almost self-evident that by the second decade of the 21st century we would have flying cars and a base on the Moon. Yet we do not. **Asteroid mining might be a similar case of unfulfilled promises and misplaced visions. On the other hand, there are examples of industries that developed surprisingly fast despite being considered unrealistic, not too long ago:** air travel, nuclear power generation, or commercial satellites. The spread of the internet and the accompanying digital information revolution is another example; **hardly anyone anticipated having virtually the entire repository of human knowledge at our fingertips** at all times (except Douglas Adams). Whether the deflection dilemma forever remains an unmaterialized threat or it becomes a palpable problem, **it is something to be mindful of now, as the foundations of the prospective asteroid mining industry are being laid**. In the end, the purpose of this paper is not to predict the future. Instead it aims to merely update a conscientious warning which called for our diligence more than 20 years ago. While the world has changed somewhat, the basic idea remains valid. Whether the danger comes from warring superpowers, terrorists or negligent corporations, we must be aware of the realistic risks in order to avoid being either stumped by unforeseen catastrophes or paralysed by unwarranted fear. Either extreme would be harmful for our future.●

Major collisions cause extinction

Baum '19 - executive director of the Global Catastrophic Risk Institute, Ph.D in Geography

Seth Baum, "Risk-Risk Tradeoff Analysis of Nuclear Explosives for Asteroid Deflection," SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, May 31, 2019), https://papers.ssrn.com/abstract=3397559.

The most severe asteroid collisions and nuclear wars can cause global environmental effects. **The core mechanism is the transport of particulate matter into the stratosphere**, **where it can spread worldwide and remain aloft for** years or **decades**. **Large asteroid collisions create** large quantities of **dust and large fireballs**; **the fire heats the dust so that some portion of it rises into the stratosphere**. **The largest collisions**, such as the 10km Chicxulub impactor, can also **eject debris** from the collision site **into space**; upon **reentry** into the atmosphere, the debris **heats up enough to spark global fires** (Toon, Zahnle, Morrison, Turco, & Covey, 1997). The fires **are a major impact in their own right and can send additional smoke into the stratosphere**. For nuclear explosions, there is also a fireball and smoke, in this case from the burning of cities or other military targets. While in the stratosphere, **the particulate matter blocks sunlight and destroys ozone** (Toon et al., 2007). **The ozone loss increases the amount of ultraviolet radiation** reaching the surface, **causing skin cancer and other harms** (Mills, Toon, Turco, Kinnison, & Garcia, 2008). T**he blocked sunlight causes abrupt cooling of Earth's surface and in turn reduced precipitation** due to a weakened hydrological cycle. The **cool, dry, and dark conditions reduce plant growth**. Recent studies use modern climate and crop models to examine the effects for **a hypothetical IndiaPakistan nuclear war scenario with 100 weapons** (50 per side) each of 15KT yield. The studies **find agriculture declines** in the range of **approximately** 2% to **50%** depending on the crop and location.11 Another study compares the crop data to existing poverty and malnourishment and estimates that the **crop declines could threaten starvation for two billion people** (Helfand, 2013). However, the aforementioned studies do not account for new nuclear explosion fire simulations that find approximately five times less particulate matter reaching the stratosphere, and correspondingly weaker global environmental effects (Reisner et al., 2018). Note also that **the 100 weapon scenario** used in these studies **is not the largest potential scenario**. Larger nuclear wars and large asteroid collisions could cause greater harm. **The largest asteroid collisions could even reduce sunlight below the minimum needed for vision** (Toon et al., 1997). Asteroid risk analyses have proposed that **the global environmental disruption from large collisions could**

cause one billion deaths (NRC, 2010) or the death of 25% of all humans (Chapman, 2004; Chapman & Morrison, 1994; Morrison, 1992), though these figures have not been rigorously justified (Baum, 2018a). The harms from asteroid collisions and nuclear wars can also include important secondary effects. The food shortages from severe global environmental disruption could lead to infectious disease outbreaks as public health conditions deteriorate (Helfand, 2013). Law and order could be lost in at least some locations as people struggle for survival (Maher & Baum, 2013). Today's complex global political-economic system already shows fragility to shocks such as the 2007- 2008 financial crisis (Centeno, Nag, Patterson, Shaver, & Windawi, 2015); an asteroid collision or nuclear war could be an extremely large shock. The systemic consequences of a nuclear war would be further worsened by the likely loss of major world cities that serve as important hubs in the global economy. Even a single detonation in nuclear terrorism would have ripple effects across the global political-economic system (similar to, but likely larger than, the response prompted by the terrorist attacks of 11 September 2001). It is possible for asteroid collisions to cause nuclear war. An asteroid explosion could be misinterpreted as a nuclear attack, prompting nuclear attack that is believed to be retaliation. For example, the 2013 Chelyabinsk event occurred near an important Russian military installation, prompting concerns about the event's interpretation (Harris et al., 2015). The ultimate severity of an asteroid collision or violent nuclear conflict use would depend on how human society reacts. Would the reaction be disciplined and constructive: bury the dead, heal the sick, feed the hungry, and rebuild all that has fallen? Or would the reaction be disorderly and destructive: leave the rubble in place, fight for scarce resources, and descend into minimalist tribalism or worse? Prior studies have identified some key issues, including the viability of trade (Cantor, Henry, & Rayner, 1989) and the self-sufficiency of local communities (Maher & Baum, 2013). However, the issue has received little research attention and remains poorly understood. This leaves considerable uncertainty in the total human harm from an asteroid collision or nuclear weapons use. Previously published point estimates of the human consequences of asteroid collisions12 and nuclear wars (Helfand, 2013) do not account for this uncertainty and are likely to be inaccurate. Of particular importance are the consequences for future generations, which could vastly outnumber the present generation. If an asteroid collision or nuclear war would cause human extinction, then there would be no future generations. Alternatively, if survivors fail to recover a large population and advanced technological civilization, then future generations would be permanently diminished. The largest long-term factor is whether future generations would colonize space and benefit from its astronomically large amount of resources (Tonn, 1999). However, it is not presently known which asteroid collisions or nuclear wars (if any) would cause the permanent collapse of human civilization and thus the loss of the large future benefits (Baum et al., 2019). Given the enormous stakes, prudent risk management would aim for very low probabilities of permanent collapse (Tonn, 2009). It should be noted that the severity of violent nuclear conflict could depend on more than just the effects of nuclear explosions, because the overall conflict scenario could include non-nuclear violence. Indeed, it is possible for the nuclear explosions to constitute a relatively small portion of the total severity, as was the case in World War II. 4.4 Risk of Violent Non-Nuclear Conflict Finally, it is necessary to discuss the risk of violent non-nuclear conflict. Only a small portion of violent non-nuclear conflicts are applicable, specifically the portion affected by nuclear weapons. More precisely, this section discusses non-nuclear conflicts involving one or more countries that possess nuclear weapons at some point during the lifetime of a nuclear deflection program. Nuclear deterrence theory predicts that nuclear-armed adversaries will not initiate major wars against each other because both sides could be destroyed in a nuclear war. However, the theory does permit limited, small-scale violent conflicts between nuclear-armed countries. These conflicts likely would not involve nuclear weapons. Indeed, nuclear deterrence may even make small violent conflicts more likely, because the countries know that neither side wants to escalate the conflict into major war. This idea is known as the stability-instability paradox: nuclear deterrence brings stability with respect to major wars but instability with respect to minor conflicts. Empirical support for the stability-instability paradox has been found by some research (Rauchhaus, 2009),while other research has found no significant effect of the possession of nuclear weapons on the probability of conflicts of any scale (Bell & Miller, 2015; Gartzke & Jo, 2009). If countries fully disarm their nuclear arsenals, such that they would never have nuclear weapons again, then there would be no nuclear deterrence to prevent the onset of major wars. A simple risk analysis could assume that the risk of major wars would be comparable to the risk prior to the development of nuclear weapons. The two twentieth century World Wars combined for around 100 million deaths in 50 years,13 suggesting an annualized risk of two million deaths. However, two World Wars do not make for a robust dataset. Indeed, the robustness of these two data points is called into question by historical analysis finding that both world wars might not have occurred in the reasonably plausible event that the 1914 assassination of Archduke Ferdinand had failed (Lebow, 2014). Similarly, another

historical analysis finds that the U.S. and Soviet Union would probably not have waged major war against each other even in the absence of nuclear deterrence (Mueller, 1988). Furthermore, these past events are not necessarily applicable to the future conditions of a post-nuclear-disarmament world. To the best of the present author's knowledge, no studies have analyzed the risk of major wars in a post-nucleardisarmament world.

Independently, unregulated mining causes space war

Fengna **Xu 20**, Law School, Xi'an Jiaotong University, "The approach to sustainable space mining: issues, challenges, and solutions," Fengna Xu 2020 IOP Conf. Ser.: Mater. Sci. Eng. 738 012014

3.1. Conflicts between multiple States Space resources, as res communis [3], can be appropriated to some extent on the basis of freedom of exploration and use of the outer space. However, it is likely to follow a 'first come, first served' approach to space resources activities. In fact, the 'first come, first served' approach drove early and rapid development of oil industry of the US in the 19th century, although a frenetic race among surface owners followed and led to an extraordinary waste of oil and gas. Given that so far there are no agreement or property rights on space resources, they are essentially in a 'state of nature'. Allocation by the 'first come, first served' approach is simple and requires very little government involvement to deter another one (called a 'junior') from displacing the rightful first comer (called a 'senior'). However, overprotecting the senior by priority rights could run the risk of disorder, waste, inequality, and even monopoly. The Outer Space Treaty, requires State parties to conduct all their activities in outer space 'with due regard to the corresponding interests of all other States Parties'. Without specific coordinating rules, conflicts between multiple States are likely to happen. Private entities may choose to arm themselves to safeguard their own interests. In extreme cases, **States may also protect them by placing weapons of mass destruction in outer space if necessary [4]. As a result, priority rights should not be absolute but subjected to some arrangements. 7**

That goes nuclear — the domain is fragile and offense dominant, so even small incidents escalate

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Why **space is a particular problem for crisis stability**

For a number of reasons, space poses particular challenges in preventing a crisis from starting or from being managed well. Some of these are to do with the physical nature of space, such as the short timelines and difficulty of attribution inherent in space operations. Some are due to the way space is used, such as the entanglement of strategic and tactical missions and the prevalence of dual-use technologies. Some are due to the history of space, such the absence of a shared understanding of appropriate behaviors and consequences, and a dearth of stabilizing personal and institutional relationships. While some of these have terrestrial equivalents, taken together, they present a special challenge.

The vulnerability of satellites and first strike incentives

Satellites are inherently fragile and difficult to protect; in the language of strategic planners, space is an **"offense-dominant"** regime. This can lead to a number of pressures to strike first that **don't exist for other, better-protected domains**. Satellites travel on predictable orbits, and many pass repeatedly over all of the earth's nations. Low-earth orbiting satellites are reachable by missiles much less capable than those needed to launch satellites into orbit, as well as by directed energy which can interfere with sensors or with communications channels. Because launch mass is at a premium, satellite armor is impractical. Maneuvers on orbit need costly amounts of fuel, which has to be brought along on launch, limiting satellites' ability to move away from threats. And so, these very valuable satellites are also inherently vulnerable and may present as attractive targets.

Thus, an actor with substantial dependence on space has an incentive to strike first if hostilities look probable, to ensure these valuable assets are not lost. **Even if** both (or all) sides in a conflict prefer not to engage in war, this weakness may provide an incentive to approach it closely anyway.

A RAND Corporation monograph commissioned by the Air Force15 described the issue this way:

First-strike stability is a concept that Glenn Kent and David Thaler developed in 1989 to examine the structural dynamics of mutual deterrence between two or more nuclear states.16 It is similar to crisis stability, which Charles Glaser described as ―a measure of the countries' incentives not to preempt in a crisis, that is, not to attack first in order to beat the attack of the enemy,‖17 except that it does not delve into the psychological factors present in specific crises. Rather, first strike stability focuses on each side's force posture and the balance of capabilities and vulnerabilities that could make a crisis unstable should a confrontation occur.

For example, in the case of the United States, the fact that conventional weapons are so heavily dependent on vulnerable satellites may create incentives for the US to strike first terrestrially in the lead up to a confrontation, before its space-derived advantages are eroded by anti-satellite attacks.18 Indeed, any actor for which satellites or space-based weapons are an important part of its military posture, whether for support missions or on-orbit weapons, will feel **"use it or lose it"** pressure because of the inherent vulnerability of satellites.

Short timelines and difficulty of attribution

The **compressed timelines** characteristic of crises combine with these "use it or lose it" pressures to shrink timelines. This dynamic couples dangerously with the inherent difficulty of determining the causes of satellite degradation, whether malicious or from natural causes, in a timely way.

Space is a difficult environment in which to operate. Satellites orbit amidst increasing amounts of debris. A collision with a debris object the size of a marble could be catastrophic for a satellite, but objects of that size cannot be reliably tracked. So a failure due to a collision with a small piece of untracked debris may be left open to other interpretations. Satellite electronics are also subject to high levels of damaging radiation. Because of their remoteness, satellites as a rule cannot be repaired or maintained. While on-board diagnostics and space surveillance can help the user understand what went wrong, it is difficult to have a complete picture on short timescales. Satellite failure on-orbit is a regular occurrence19 (indeed, many satellites are kept in service long past their intended lifetimes).

In the past, when fewer actors had access to satellite-disrupting technologies, satellite failures were usually ascribed to "natural" causes. But increasingly, even during times of peace operators may assume malicious intent. More to the point, in a crisis when the costs of inaction may be perceived to be costly, there is an incentive to choose the worst-case interpretation of events even if the information is incomplete or inconclusive.

Entanglement of strategic and tactical missions

During the Cold War, nuclear and conventional arms were well separated, and escalation pathways were relatively clear. While space-based assets performed critical strategic missions, including early warning of ballistic missile launch and secure communications in a crisis, there was a relatively clear sense that these targets were off limits, as attacks could undermine nuclear deterrence. In the Strategic Arms Limitation Treaty, the US and Soviet Union pledged not to interfere with each other's ―national technical means‖ of verifying compliance with the agreement, yet another recognition that attacking strategically important satellites could be destabilizing.20 There was also restraint in building the hardware that could hold these assets at risk.

However, where the lines between strategic satellite missions and other missions are **blurred**, these norms can be weakened. For example, the satellites that provide **early warning** of ballistic missile launch are associated with **nuclear deterrent** posture, but also are critical sensors for **missile defenses**. Strategic surveillance and missile warning satellites also support efforts to locate and destroy mobile conventional missile launchers. Interfering with an early warning sensor satellite might be intended to dissuade an adversary from using nuclear weapons first by degrading their missile defenses and thus hindering their first-strike posture. **However**, for a state that uses early warning satellites to enable a **"hair trigger"** or **launch-on-attack posture**, the **interference** with such a satellite might instead be interpreted as a precursor to a **nuclear attack**. It may **accelerate the use of nuclear weapons** rather than inhibit it.

Misperception and dual-use technologies

Some space technologies and activities can be used both for relatively benign purposes but also for hostile ones. It may be difficult for an actor to understand the intent behind the development, testing, use, and stockpiling of these technologies, and see threats where there are none. (Or miss a threat until it is too late.) This **may start a cycle** of action and reaction based on **misperception**. For example, relatively low-mass satellites can now maneuver autonomously and closely approach other satellites without their cooperation; this may be for peaceful purposes such as satellite maintenance or the building of complex space structures, or for more controversial reasons such as intelligence-gathering or anti-satellite attacks.

Ground-based lasers can be used to dazzle the sensors of an adversary's remote sensing satellites, and with sufficient power, they may damage those sensors. The power needed to dazzle a satellite is low, achievable with commercially available lasers coupled to a mirror which can track the satellite. Laser ranging networks use low-powered lasers to track satellites and to monitor precisely the Earth's shape and gravitational field, and use similar technologies. 21

Higher-powered lasers coupled with satellite-tracking optics have fewer legitimate uses. Because midcourse missile defense systems are intended to destroy long-range ballistic missile warheads, which travel at speeds and altitudes comparable to those of satellites, such defense systems also have inherent ASAT capabilities. In fact, while the technologies being developed for long-range missile defenses might not prove very effective against ballistic missiles—for example, because of the countermeasure problems associated with midcourse missile defense—they could be far more effective against satellites. This capacity is not just theoretical. In 2007, China demonstrated a direct-ascent anti-satellite capability which could be used both in an ASAT and missile defense role, and in 2009, the United States used a ship-based missile defense interceptor to destroy a satellite, as well. US plans indicated a projected inventory of missile defense interceptors with capability to reach all low earth orbiting satellites in the dozens in the 2020s, and in the hundreds by 2030.22

Discrimination

The consequences of interfering with a satellite may be vastly different depending on who is affected and how, and whether the satellite represents a legitimate military objective.

However, it will not always be clear who the owners and operators of a satellite are, and users of a satellite's services may be numerous and not public. Registration of satellites is incomplete23 and current ownership is not necessarily updated in a readily available repository. The identification of a satellite as military or civilian may be deliberately obscured. Or its value as a military asset may change over time; for example, the share of capacity of a commercial satellite used by military customers may wax and wane. A potential adversary's satellite may have different or additional missions that are more vital to that adversary than an outsider may perceive. An ASAT attack that creates persistent debris could result in significant collateral damage to a wide range of other actors; unlike terrestrial attacks, these consequences are not limited geographically, and could harm other users unpredictably.

In 2015, the Pentagon's annual wargame, or simulated conflict, involving space assets focused on a future regional conflict. The official report out24 warned that it was hard to keep the conflict **contained geographically** when using anti-satellite weapons:

As the wargame unfolded, a regional crisis quickly escalated, partly because of the interconnectedness of a multi-domain fight involving a capable adversary. The wargame participants emphasized the challenges in containing **horizontal escalation** once space control capabilities are employed to achieve limited national objectives.

Lack of shared understanding of consequences/proportionality

States have fairly **similar understandings** of the implications of military actions on the **ground**, in the **air**, and at **sea**, built over decades of experience. The United States and the Soviet Union/Russia have built some shared understanding of each other's strategic thinking on nuclear weapons, though this is less true for other states with nuclear weapons. But in the context of nuclear weapons, there is an arguable understanding about the crisis escalation based on the type of weapon (strategic or tactical) and the target (counterforce—against other nuclear targets, or countervalue—against civilian targets).

Because of a lack of experience in hostilities that target space-based capabilities, it is not entirely clear what the proper response to a space activity is and where the escalation thresholds or **"red lines"** lie. Exacerbating this is the asymmetry in space investments; not all actors will assign the same value to a given target or same escalatory nature to different weapons.

Space weapon buildups make it most likely now

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 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, 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 was just a short time ago.

"The thing that scares me the most: If you go back six years ago, China had almost nothing. Now you look at them and the ability for China to exponentially grow their counterspace capability is scary. I mean I don't know how else to put it," Adm. Bernacchi said during a recent webinar.

The admiral, a former submarine commander, said the grog **danger** posed by 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**.

winChina's ability "to integrate, in a cross-domain capability and start to show this in their exercises, is even more scary," he said. "Where is this exponential growth and cross-domain capability going to stop? The answer is, I don't know."

Adm. Bernacchi said he, 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's space arms, he said.

One reason for the large-scale build-up is that Beijing's space infrastructure does not distinguish between military and civilian space systems.

"Everything is dual-use," Adm. Bernacchi said, adding that Beijing officials are guilty of "hypocrisy" for insisting that China's new space weapons are not "militarizing space."

Both 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 said.

The U.S. Space Command is working to deter 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 said. "We never go man-for-man. We've never done that in our history."

The command's approach to 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 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'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 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 also plans to use its formidable cyberwarfare capabilities to disrupt or take control of satellites by hacking enemy ground stations.

Adm. 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 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 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 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, 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 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 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** or **Russia**. However, China's ruling Communist Party and its power structures likely **would be key targets**, as would Russian leaders and regime infrastructure.

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Shaer 16, Matthew Shaer, "*The Asteroid Miner's Guide to the Galaxy,*" Foreign Policy, 28 April 2016, https://foreignpolicy.com/2016/04/28/the-asteroid-miners-guide-to-the-galaxy-space-race-mining-asteroids-planetary-research-deep-space-industries/ // AKRG

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http://www.matthewshaer.com/about

The tech firm **Deep Space Industries (DSI)** is headquartered on the second story of an aging office building at the edge of NASA's Ames Research Center, not far from the town of Mountain View, California. Established in 1939 as a laboratory **for** the National Advisory Committee for Aeronautics, a predecessor to NASA, Ames is now part government research site, part industrial park, and part open-air museum — visitors pass rows of decommissioned rockets and the hulking skeleton of Hangar One, where the Navy once parked its experimental blimps in the 1930s. Shimmering nearby in the Pacific coast sun lies the sprawling aerospace facility owned by Google's Sergey Brin and Larry Page. "The first time I came to Ames, I had the feeling I was standing between the history of spaceflight and its future," Sagi Kfir, an aviation attorney, told me when I visited earlier this year. "You've got NASA labs here, but at the same time you're in Silicon Valley," he said. "Hard to think of a more exciting place to be." Kfir is 43, with a high forehead, tawny hair he wears tied in a bun, and the kind of leanness that comes from hours of yoga practice. (His wife, Britta, is an instructor.) Since 2012, he has served as DSI's chief lawyer, a job that encompasses both legal-counsel duties — liaising with legislators, vetting contracts — and the full-time proselytization of his company's mission**: laying the foundation for an asteroid mining industry that one day will lead to a sprawling and profitable space economy. To evangelists of asteroid mining, the heavens are not just a frontier but a vast and resource-rich place teeming with opportunity. According to NASA, there are potentially 100,000 near-Earth objects — including asteroids and comets — in the neighborhood of our planet.** Some of **these NEOs**, as they're called, are small. Others **are substantial and potentially packed full of water and various important minerals, such as nickel, cobalt, and iron.** One day, advocates believe, **those objects will be tapped** by variations on the equipment used in the coal mines of Kentucky or in the diamond mines of Africa. And **for immense gain:** According to industry experts**, the contents of a single asteroid could be worth trillions of dollars. Kfir pitched me on the long-term plan. First, a fleet of satellites will be dispatched to outer space, fitted with probes that can measure the quality and quantity of water and minerals in nearby asteroids and comets. Later, armed with that information, mining companies like DSI will send out vessels to mechanically remove and refine the material extracted. In some cases, the take will be returned to Earth. But most of the time, it will be processed in space — for instance, to produce rocket fuel — and stored in container vessels that will serve as the equivalent of gas stations for outbound spacecraft.** This possibility isn't so unrealistic, Kfir said. Consider the recent and seismic growth of the space industry, he

suggested, as we climbed the stairs to DSI's second-floor suite. **Every year, the private spaceflight sector grows larger, and every year the goals become grander.** Jeff Bezos, founder of Amazon and the space exploration company Blue Origin, has spoken of the day "when millions of people are living and working in space"; Elon Musk's SpaceX is expected to reveal a Mars colonization plan this year. "But how are they going to sustain this new space economy?" Kfir asked rhetorically. He nudged open DSI's office door. "Easy: by mining asteroids." Bezos, Musk, and the other billionaires who plan to be cruising around space in the near future won't be able to do so without celestial pit stops. In his book, Asteroid Mining 101: Wealth for the New Space Economy, John S. Lewis, professor emeritus of Cosmochemistry and Planetary Atmospheres at the University of Arizona's Lunar and Planetary Laboratory and DSI's chief scientist, envisions a future where "ever more remote and ever more massive reservoirs of resources" take astronauts farther and farther from our planet. "First to the Near Earth Asteroids and the moons of Mars, then to the asteroid belt, then to…[the] Trojan asteroids and the outer moons of Jupiter, then to the Saturn system and the Centaurs," and so on, to infinity. Copies of Lewis's book lined two shelves in DSI's headquarters, where the vibe was more nerd lair than sleek startup. A poster for the new Star Wars movie hung on a wall; a chunk of real meteorite, found over a century ago in Namibia, stood on display; and cans of Coke cluttered the snack table. Working inside what appeared to be an old utility closet, chief engineer Grant Bonin hunched over a desktop computer, designing the code that will help power the first asteroid probes that DSI plans to launch in 2017. Behind him, an electrical panel spouted a bouquet of colorful wires. Kfir pointed me in the direction of his office. A resident of San Diego, Kfir commutes once a week to Ames, 1,000 miles round trip, but if the constant travel was wearing on him, it didn't show — his eyes were bright, his skin SoCal bronze. He wore slacks and a button-down, with cactus-patterned socks. "You get used to the pace," he said, taking a pull from a large coffee mug marked "Kiss my Asteroid." "It's the life of a startup. You go, go, go seven days a week. Because you believe." For now, belief — and a fervid sense of enthusiasm — represent the core of the DSI business model. After all, the company, and its only major competitor in the asteroid mining arena, Washington-based Planetary Resources, are dealing in hypotheticals: equipment that remains largely in the planning phase, a market that won't fully emerge for years, if not decades, and a science that has yet to be tested in any meaningful way. Perhaps it's not surprising, then, that some critics have suggested Planetary Resources, which is backed by millions in venture capital — including cash from Eric Schmidt of Google — and the scrappier, less-moneyed DSI, are nothing more than vanity projects. Writing on the Discovery News website in April 2012, the month Planetary Resources co-founder Peter Diamandis unveiled his company's mission, space journalist Ian O'Neill dismissed the venture as "deliberately vague (who knows how many technological iterative steps are needed before a sustainable mining operation can begin anyway?)." He also argued it was wholly unrealistic: "In short, the only thing that seems unique about today's announcement is that a group of very well-respected and smart entrepreneurs and billionaires have clubbed together and thought asteroid mining seemed cool." For O'Neill and other skeptics, asteroid mining is, for the time being, a glitzy but far-fetched venture that will distract both attention and dollars from eminently more achievable — and perhaps more scientifically vital — missions, such as continuing the exploration of Mars. For the 12-person team at DSI, and the 50-person team at Planetary Resources, however, asteroid mining isn't just a dream. It's the future — one in which all those deep-pocketed private spaceflight companies (to say nothing of NASA) will be eager to pay by the bucket load for access to space's riches. DSI and Planetary Resources, both of which are determined to profit from a 21st-century extraterrestrial gold rush, might be the equivalent of the mining barons of yore. But first, they have to get to the rocks.

AND

The impact is plutocracy

The advent of new trillionaire space-barons exacerbates plutocratic trends and gives way to authoritarian governments.

(Suny 21) Ronald G. Suny, *"Autocracy, Democracy, Plutocracy"* Agos, 24 July 2021, http://www.agos.com.tr/en/article/25827/autocracy-democracy-plutocracy // AKRG

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Is there a way out? The struggle is clearly more difficult in authoritarian countries, and it must take the path of increasing democratic possibilities. After the fall of Soviet-style "socialist" states in 1991, there was euphoria in the West among scholars, journalists, and politicians that the World was experiencing an inexorable transition to democracy. Within a decade and a half, however, roughly in the mid- and late-2000s, that triumphalist effervescence was dampened by an observable shift toward more authoritarian regimes**. In Russia, Poland, Hungary, Turkey, India, and elsewhere, the promise of reformers to establish more participatory, egalitarian, and inclusive democratic states gave way to populist and nationalist leaders who manipulated constitutions and painted opponents as traitors and terrorists**. **All across the globe**, from Modi's India through Erdoğan's Turkey to Trump's United States, illiberal **leaders, using populist and nationalist rhetoric, shifted power toward strong executives**. With the triumph of Trump in the United States, many American Cassandras, prophets of a dark future, predicted **a turn toward tyranny and the collapse of democracy altogether**. As a consequence of the retreat of democracy, scholarly and journalistic interest in the phenomenal rise of authoritarianism exploded. As the transitologists (those who made their careers outlining how dictatorships transformed into democracies) appeared to be less relevant to current trends, political scientists began seriously exploring the nature, evolution, and durability of what they termed autocracy. **Explanations for the rise of the new authoritarianism [were]** abound**. The greater control of the economy by finance and globalizing** of capitalism, the **weakening of labor unions,** the erosion of social welfare protections **and** the **increase of privatization of public services have increased the risks to lower and middle class people and led them to seek solutions in populist parties that identify their grievances with foreigners, immigrants, and liberal elites.** The neoliberal faith that free markets can solve all economic problems has in fact led to a growing gap between the very rich and everyone else. **Deregulation in favor of business has added to the global climate crisis and forced vulnerable people to choose between their jobs and their health. The limits and fragilities of liberal democracy have led to political stagnation and an erosion of belief in democratic politics to solve serious problems. Populists stoke fears that the benefits that citizens enjoyed earlier are being eroded by elites and shared with those – people of a different ethnicity or skin color or country of origin -- who do not deserve them. Anxiety about status and future, along with resentment toward alien others, has led many voters to turn to charismatic demagogic**

populist and nationalist leaders. The erosion of democracy and the rise of autocracies is real, and ordinary people all over the world – from Belarus to Hong Kong, Vladivostok, Myanmar, Saint Louis, and Delhi – have marched in the streets to oppose anti-democratic repression. People want competent government responsive to the popular will; they desire some degree of participation in decision-making through elected representatives; and they are prepared to fight for rights and protections from their government. But **the powerful forces of the state in many countries have ruthlessly crushed the mobilized opposition.** Yet there is another trend besides the autocratic threat to democracy that also needs to be recognized. And that trend, often closely related to autocracy but present in democracies as well, is **plutocracy -- the rule of the very rich**, which also **erodes** the possibilities of true **democratic choices and** the **possibilities of** real **social and political equality. In the United States economic polarization has reached the point that the top 0.01 percent of the population owns roughly the same share of national wealth as the bottom 85 percent combined. Money in America is considered free speech, and unlimited amounts of cash flow from millionaires and billionaires into political campaigns, favored candidates, and lobbies to influence legislation. Low taxes (or often no taxes) for wealthy people with sophisticated accountants means that they can not only influence elections but through their charitable foundations or private philanthropy shape policy in areas like health care, education, or social welfare without democratic oversight.** Americans in general do not resent the rich. They all hope to become millionaires or better. Their anti-elitism is directed at intellectuals, journalists, and politicians. They believe in the good billionaire, though they wish he (or she) would pay their fair share of the tax burden. However, many voters did not seem bothered by presidential candidate Donald Trump's remarks, when accused of not paying any federal income tax, he quickly retorted: "That makes me smart." Recently, the trend toward autocracy and authoritarianism has slowed down or even been stopped. Trump lost his bid for reelection last year, whether he knows it or not. Victor Orban in Hungary and Janez Janša in Slovenia have lost popularity and are facing a resurgent public looking for change. The party in power in Turkey is held responsible for the devasting economic decline and the erosion of the lira. Thousands of peasants march in India against Modi. But **the power of the plutocrats has only increased, and the vulnerability of the poor and middle classes – the precariat -- remains. Is there a way out? The struggle is clearly more difficult in authoritarian countries, and it must take the path of increasing democratic possibilities**. Elections where they are still possible can weaken or eliminate autocrats, but they do not affect the influence of the plutocrats, who benefit both from the corruption and nepotism endemic to autocracies and the free-for-all politics of liberal democracies. In democratic countries voters can choose representatives who are prepared to tax wealth and the wealthy, promote environmental protection, and increase social welfare and protection of the most-needy. We live in difficult but interesting times. Most people, particularly the young, are seeking alternatives to an intolerable present. They are less likely to succumb to the siren calls of populists who trade in hatred of the other, and appeal to imagined anti-Semitic, anti-Armenian, or anti-immigrant threats. Even without clear answers as to how to achieve what might seem to be utopian goals of greater freedom, it is essential not to despair, to remain optimistic and hopeful, and to use the tools at hand to move step-by-small-step toward empowerment of ordinary people. All power to the people is still a powerful slogan, but it also means that we need a new people. We need people with vision and courage.

The shift to authoritarianism causes extinction, multiple warrants-

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It is rare that policymakers, analysts, and academics agree. But there is an emerging consensus in the world of foreign policy: **threats to the stability of the current international order are rising.** The norms, values, laws, and institutions that have undergirded the international system and governed relationships between nations are being gradually dismantled. The most discussed sources of this pressure are the ascent of China and other non-Western countries, Russia's assertive foreign policy, and the diffusion of power from traditional nation-states to nonstate actors, such as nongovernmental organizations, multinational corporations, and technology-empowered individuals. Largely missing from these discussions, however, is the specter of widespread democratic decline. **Rising challenges to democratic governance across the globe are a major strain on the international system, but they receive far less attention in discussions** of the shifting world order.

In the 70 years since the end of World War II, the **U**nited **S**tates has **fostered** a global **order dominated by states that are liberal,** capitalist, **and democratic.** The United States has promoted the spread of democracy to strengthen global norms and rules that constitute the foundation of our current international system. However, despite the steady rise of democracy since the end of the Cold War, over the last 10 years **we have seen dramatic reversals in** respect for **democratic principles** across the globe. A 2015 Freedom House report stated that the "acceptance of democracy as the world's dominant form of government—and of an international system built on **democratic ideals—is under greater threat than at any point in the last 25 years**."

Although the number of democracies in the world is at an all-time high, there are a number of key trends that are working to undermine democracy. The **rollback of democracy** in a few influential states or even in a number of less consequential ones would almost certainly accelerate meaningful changes in today's global order.

Democratic decline would **weaken U.S. partnerships and erode an important foundation for U.S. cooperation** abroad. Research demonstrates that domestic politics are a key determinant of the international behavior of states. In particular, **democracies are more likely to form alliances and cooperate** more fully with other democracies than with autocracies. Similarly, **authoritarian countries** have established mechanisms for cooperation and sharing of "worst practices." An increase in authoritarian countries, then, would provide a broader platform for coordination that could enable these countries to overcome their divergent histories, values, and interests—factors that are frequently cited as obstacles to the **formation** of **a cohesive challenge to the** U.S.-led international **system**.

Recent examples support the empirical data**. Democratic backsliding in Hungary and** the hardening of **Egypt's** autocracy under Abdel Fattah el-Sisi **have led to enhanced relations between these countries and Russia.** Likewise, **democratic decline in Bangladesh has led** Sheikh Hasina Wazed and her ruling Awami League **to** seek **closer relations with China and Russia,** in part to mitigate Western pressure and bolster the regime's domestic standing.

Although none of these burgeoning relationships has developed into a highly unified partnership, democratic backsliding in these countries has provided a basis for cooperation where it did not previously exist. And while the United States certainly finds common cause with authoritarian partners on specific issues, the **depth and reliability of such cooperation is limited. Consequently, further democratic decline could seriously compromise the United States' ability to form the kinds of deep partnerships that will be required to confront today's increasingly complex challenges. Global issues such as climate change, migration, and**

violent extremism demand the coordination and cooperation that democratic backsliding would put in peril. Put simply, the United States is a less effective and influential actor if it loses its ability to rely on its partnerships with other democratic nations.

A slide toward authoritarianism could also challenge the current global order by diluting U.S. influence in critical international institutions, including the United Nations , the World Bank, and the International Monetary Fund (IMF). Democratic decline would weaken Western efforts within these institutions to advance issues such as Internet freedom and the responsibility to protect. In the case of Internet governance, for example, Western democracies support an open, largely private, global Internet. Autocracies, in contrast, promote state control over the Internet, including laws and other mechanisms that facilitate their ability to censor and persecute dissidents. Already many autocracies, including Belarus, China, Iran, and Zimbabwe, have coalesced in the "Likeminded Group of Developing Countries" within the United Nations to advocate their interests. , the rising influence of autocracies could enable these countries to bypass the IMF and World Bank all together. For example, the Chinese-created Asian Infrastructure and Investment Bank and the BRICS Bank—which includes Russia, China, and an increasingly authoritarian South Africa—provide countries with the potential to bypass existing global financial institutions when it suits their interests. Authoritarian-led alternatives pose the risk that global economic governance will become fragmented and less effective.

Violence and instability would also likely increase if more democracies give way to autocracy. International relations literature tells us that democracies are less likely to fight wars against other democracies, suggesting that interstate wars would rise as the number of democracies declines. Moreover, within countries that are already autocratic, additional movement away from democracy, or an "authoritarian hardening," would increase global instability. Highly repressive autocracies are the most likely to experience state failure, as was the case in the Central African Republic, Libya, Somalia, Syria, and Yemen. In this way, democratic decline would significantly strain the international order because rising levels of instability would exceed the West's ability to respond to the tremendous costs of peacekeeping, humanitarian assistance, and refugee flows.

Finally, widespread democratic decline would contribute to rising anti-U.S. sentiment that could fuel a global order that is increasingly antagonistic to the United States and its values. Most autocracies are highly suspicious of U.S. intentions and view the creation of an external enemy as an effective means for boosting their own public support. Russian president Vladimir Putin, Venezuelan president Nicolas Maduro, and Bolivian president Evo Morales regularly accuse the United States of fomenting instability and supporting regime change. This vilification of the United States is a convenient way of distracting their publics from regime shortcomings and fostering public support for strongman tactics.

Since 9/11, and particularly in the wake of the Arab Spring, Western enthusiasm for democracy support has waned. Rising levels of instability, including in Ukraine and the Middle East, fragile governance in Afghanistan and Iraq, and sustained threats from terrorist groups such as ISIL have increased Western focus on security and stability. U.S. preoccupation with intelligence sharing, basing and overflight rights, along with the perception that autocracy equates with stability, are trumping democracy and human rights considerations.

While rising levels of global instability explain part of Washington's shift from an historical commitment to democracy, the nature of the policy process itself is a less appreciated factor. Policy discussions tend to occur on a country-by-country basis—leading to choices that weigh the costs and benefits of democracy support within the confines of a single country. From this perspective, the benefits of **counterterrorism cooperation or access to natural resources are regularly judged to outweigh the perceived costs of supporting human rights**. A serious problem arises, however, when this process is replicated across countries. The bilateral focus rarely incorporates the risks to the U.S.-led global order that arise from widespread democratic decline across multiple countries.

Many of the threats to the current global order, such as China's rise or the diffusion of power, are driven by factors that the United States and West more generally have little leverage to influence or control. Democracy, however, is an area where **Western actions can affect outcomes**. Factoring in the risks that arise from a global democratic decline into policy discussions is a vital step to building a comprehensive approach to democracy support. Bringing this perspective to the table may not lead to dramatic shifts in foreign policy, but it would ensure that we are having the right conversation.