# Cal Trips

## Plan

#### We affirm: The appropriation of outer space through asteroid mining by private entities is unjust.

#### We’ll defend a leasing regime operationalized by the UN Committee on Peaceful Uses of Outer Space (COPUOS) which should establish an International Outer Space Authority (IOSA). Forbidding appropriation through the end of permanent and exclusive claim over asteroids allows the streamlining and regulation of exploitation that provides the secure foundation for private space activities – the alternative is an ad-hoc CIL regime that decks legal certainty.

**Pershing 19** [Abigail D. Pershing, J.D., Yale, “Interpreting the Outer Space Treaty’s Non-Appropriation Principle: Customary International Law from 1967 to Today,” 2019, *The Yale Journal of International Law*, Vol. 44, https://openyls.law.yale.edu/bitstream/handle/20.500.13051/6733/Pershing.pdf?sequence=2&isAllowed=y, EA]

B. A New Property Rights Proposal: Leasing Space One promising proposal that does not appear to have received much attention in the literature is the concept of leasing space to nations, private individuals, or companies rather than allocating it as permanently-owned property. It appears that the only authors who have even tangentially considered the possibility of leasing property rights in space beyond rights to mineral extraction are Marcel Williams and G.S. Sachdeva. Williams’ writing is limited to a thought experiment in which he imagines renting out up to one percent of the moon’s surface. This property would be directly leased to national governments, which in turn would be vested with the power to sublease sections of this territory to private companies or individuals.134 This proposal is not elaborated any further and is left as a broad-strokes outline. The second mention of leasing or renting space comes from G.S. Sachdeva, who argues that a U.N. Space Superintendence Authority could grant leases to those able to pay.135 Yet this theory is limited to a discussion of renting property rights in particular orbits to allow for hovering geostationary space hotels and does not delve into questions of renting land on celestial bodies. The concept of leasing outer space deserves greater consideration by space law scholars. This Section sketches a brief outline of how such a system might operate via an internationally-run space property rental system modeled on UNCLOS. Although UNCLOS itself is deeply problematic in its potentially devastating environmental consequences and negative impacts on indigenous peoples as it regulates deep-sea mining,136 the UNCLOS model may nonetheless be the best option for preserving non-space-faring nations’ rights with regard to outer space, given its success in providing developing nations with a voice in the regulation of the high seas and the seabed beyond national jurisdiction.137 It is worth noting that although very few scholars appear to have considered the possibility of renting space, several have examined the similarities between UNCLOS and space law.138 The approach advanced here differs from the conventional approach to this comparison in that it suggests that the international community move beyond merely authorizing nations or individuals to extract a certain quantity of minerals and instead consider the possibility of leasing out actual tracts of space land. Opened for signature on December 10, 1982, UNCLOS establishes the international rules that govern the use of the world’s oceans and their resources. An examination of UNCLOS is especially apt because it deals with resources— the high seas—that, like space, are not subject to national appropriation. In language strikingly similar to Article II of the Outer Space Treaty, Article 137 of UNCLOS reads: No State shall claim or exercise sovereignty or sovereign rights over any part of the Area [resources of the seabed and ocean floor beyond the limits of national jurisdiction] or its resources, nor shall any State or natural or juridical person appropriate any part thereof.139 Although there are clear similarities between the two treaties, there are substantial differences as well, many of which would be useful in informing an update to the Outer Space Treaty. In addition to extending the prohibition on sovereignty to individuals as well as to nations, UNCLOS goes far beyond the Outer Space Treaty in detailing the limits of the non-appropriation principle. All of Part XI of UNCLOS, totaling fifty-eight Articles, gives a detailed description of how States can negotiate within the bounds of the non-appropriation principle to exploit ocean resources. Of particular relevance for purposes of crafting a parallel space law proposal is UNCLOS Part XI, Section 4, which lays out the rules governing the International Seabed Authority—the main mechanism through which States and private companies can legally exploit ocean resources, including mining of the deep seabed.140 Using UNCLOS as a model, a similar system may prove promising for the evolution of space law. However, the new space system should allow for rental of space land instead of merely allowing for the extraction of space resources. As with UNCLOS, any such space leasing system should be run through the United Nations. Situating such a system in this forum would help the international community stay true to the intentions of the Outer Space Treaty, which provides, in the words of one author, a “philosophical roadmap for the future development of the outer space legal regime.”141 Although a new committee within the United Nations could be formed for this purpose, the existing Committee on the Peaceful Uses of Outer Space (UNCOPUOS) would be an ideal environment for the creation and operation of such a system. UNCOPUOS is composed of eighty-seven geographically and economically diverse member States (including all the major space-faring States). Additionally, intergovernmental organizations and non-governmental organizations have observer status.142 Given its central mission to maintain space as a peaceful arena of international cooperation, as well as its representative composition,143 it would be an ideal body to bring a space leasing system to fruition. UNCOPUOS, in turn, should operationalize the leasing system by establishing a new International Outer Space Authority. This Outer Space Authority should parallel the International Seabed Authority described above.144 There should be similar provisions for the International Outer Space Authority relating to the makeup and functioning of the Authority (with each country getting one vote and decisions made by a two-thirds majority);145 the power of the Outer Space Authority to exercise control over space generally;146 the ability to decide how much rent to charge nations or individual corporations;147 and how to use these funds,148 among other provisions. For this proposed Outer Space Authority to be useful as well as operational, it is critical that it have jurisdiction over property rights in space beyond mining rights. Having rights to property in addition to rights to extracted minerals would add an extra layer of legal security for companies considering venturing into space for mining purposes. And, although businesses currently seem most interested in the possibilities of mining space resources, in the long term, questions of space tourism and the potential development of space colonies may arise. Having a flexible system in place that can adequately handle these concerns is therefore desirable. Instead of just focusing on mining, an Outer Space Authority with broader jurisdiction will have longer staying power and will require less reworking in the near future. Part of the appeal of this rental model is that it works so seamlessly with the current Outer Space Treaty. Turning again to the language of the Treaty and beginning with the non-appropriation principle, Article II lays out that “[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”149 Because no State or individual would ever own land in space under a leasing system, this proposed leasing regime would not be in contravention to Article II. And yet, despite this, a leasing regime would establish enough legal security that exploitation of space resources would not be impeded—the main rationale for those who argue that the Treaty (or at least Article II) should be rescinded. Moreover, the principle established in Article I of the Outer Space Treaty, that “[t]he exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind,” is also upheld under this leasing regime.150 Leasing not only allows nations and private companies to exploit space resources and reap the benefits of their labor, but also directly benefits developing countries not yet able to tap into the resources of space by redistributing some of the space-going nations’ profits via a leasing fee and a tax on extracted resources. A potential argument against this rental system, as well as any other international legal system that would seek to regulate property rights in space, is that the United States never signed on to UNCLOS and there is nothing different about this situation that would cause the United States to join an international treaty regulating property in space either. However, space law has a fairly different history than the law of the sea. These differences make it more likely (though unfortunately not certain) that a proposal for an International Outer Space Authority would be adopted by the United States despite the fact that the facially similar UNCLOS proposal failed to garner a two-thirds majority vote in the Senate. The major difference between UNCLOS and this proposed International Outer Space Authority is that the United States has self-interested reasons for supporting an International Outer Space Authority, whereas it did not have similar reasons to join UNCLOS. The United States has maintained that under customary international law, deep seabed mining is already permissible.151 Since the United States does not recognize limitations of deep seabed mining established in UNCLOS, it may legally undertake deep sea mining under customary international law—a right that is codified in domestic U.S. law in the Deep Seabed Hard Mineral Resources Act: [I]t is the legal opinion of the United States that exploration for and commercial recovery of hard mineral resources of the deep seabed are freedoms of the high seas subject to a duty of reasonable regard to the interests of other states in their exercise of those and other freedoms recognized by general principles of international law . . . .152 The United States therefore already has access to what it wants without having to join UNCLOS. As an additional point, there is also not much pressure from American companies to ratify UNCLOS, in part because the American Exclusive Economic Zone (recognized by the United States under customary international law)153 and the continental shelf is hugely rich in the resources companies might otherwise have hoped to gain by joining the Treaty and gaining access to minerals from deep sea mining in other areas. Finally, not only does the United States stand to gain very little by ratifying the Treaty, there is an argument that ratification would disadvantage the United States. Under UNCLOS, “coastal States are required to make payments to the International Seabed Authority based on a percentage of revenues derived from the exploitation of the resources found within the continental margin beyond two hundred miles from the coast.”154 Notably, customary international law creates no such obligation.155 In stark contrast to UNCLOS, the new rental system proposed would directly benefit the United States. Unlike with deep sea mining, the United States and its citizens currently are bound by a treaty that prohibits appropriation of space: the Outer Space Treaty. Unlike the UNCLOS analogy, the United States has already relinquished rights in this arena. Agreeing to a leasing amendment would expand the scope of its rights, not infringe upon them. Additionally, the United States does not have access to an outer space “exclusive economic zone” in the same way that it does for the sea. Without some sort of agreement, the United States simply may not legally appropriate any in situ property in outer space. One final consideration increases the likelihood that the United States would in fact become a signatory to an amendment to the Outer Space Treaty. Such an amendment would likely have the support of businesses, environmental groups, and the military, an unlikely combination of key constituencies that would help push an amended treaty forward. Businesses would advocate for the change because it would provide a clearer mechanism for establishing property rights.156 Environmental groups might push for the amendment’s ratification because of the environmental protections that could be included in such an agreement.157 Finally, the military would also likely be a proponent of the system because having access to property in space gives strategic advantages158 and because it is likely that certain Cold War-era concerns that prompted spacefaring nations to sign the original Outer Space Treaty remain relevant—most notably, concerns over the weaponization of space.159 CONCLUSION The brief history of outer space law since the adoption of the Outer Space Treaty in 1967 highlights the ease with which customary international law shifts in this arena. Despite an original broad interpretation of the non-appropriation principle during the Treaty’s drafting, customary international law has since carved out an exception to this principle for extracted space resources. A second shift could be similarly underway. Driven by economic incentives, States may reinterpret the non-appropriation principle to allow for private appropriation of space property. Currently, States have an incentive to cooperate to establish a new international agreement concerning the use of outer space because international law, as it is presently understood, prohibits private property rights in space. A new amendment could broaden these rights, providing an enticing carrot to encourage State cooperation. But this enticement may soon disappear. Given the flexibility of the current outer space legal regime, customary international law could easily shift to interpret the non-appropriation principle as allowing private appropriation of property in space. Whatever the international community decides is the optimal solution regarding outer space property rights, it is vital that action be taken now to preserve the principles advanced by the Outer Space Treaty, such as equitable access and peaceful use of outer space. As the original drafters of the Outer Space Treaty recognized, these principles are best protected through a formal agreement and not merely through customary international law, which is often driven by the most powerful States. Regardless of whether a rental system similar to the one described above is established or some other method is used, the international community will have to act quickly if it wants to maintain shared international control over space. Pursuing an amendment to the Treaty as described also provides certainty and timeliness, two elements that would likely appeal to constituencies that might otherwise be supposed to be content with waiting for customary international law to shift.

#### That’s comparatively better for private entities than unlimited appropriation.

**Pastorius 13** [Claudia Pastorius, J.D., Barry University School of Law, “Law and Policy in the Global Space Industry's Lift-Off,” 2013, *Barry Law Review*, Vol. 19, Issue 1, https://lawpublications.barry.edu/cgi/viewcontent.cgi?article=1007&context=barrylrev, EA]

Two successful applications of the public trust principles that could influence the management of outer space resources are the International Telecommunications Union (ITU) and the United States Bureau of Land Management (BLM).298 The ITU issues licenses for orbital allocations of satellites and the use of radio frequencies.299 By necessity, the nation-states of the world have peaceably participated in the licensing regime.300 A true tragedy of the commons would result if our telecommunications channel appropriations were chaotic, and, if entities placed satellites into orbit unilaterally with no precautionary coordination.301 Without coordination and commitment to the rules, the overlapping noises would prevent people from hearing each other on the radio, and millions of dollars of satellite equipment, as well as our communication systems, would be at risk.302 The BLM raises an incredible amount of revenue for the government by selling leases of publicly managed lands for oil and natural gas exploration and exploitation to the United States.303 The BLM raised $233 million through leases of public lands in 2012 alone.304 Methods the BLM employs that could be adopted for use with outer space leaseholds are: (1) the auctioning of leases; (2) relative pricing per acre of lease payments depending on whether or not the land is producing; (3) imposing environmental resource management limits on resource exploitation, and (4) issuing fixed term leases with conditions for renewal.305 Some space law academics have noted that United Nations’ treaties and other space law accords will need to distinguish surface property rights on celestial bodies and extraction rights.306 Some even argue that asteroids should be treated as chattel and not land.307 The BLM legal property rights management is an excellent model to look to for establishing the legal property rights that will be needed in outer space for mining minerals, extracting water, and harvesting Helium-3. If leasehold estates held in trust were conferred in outer space, then measures could be taken to ensure optimal and equitable allocation of outer space leaseholds, and rules could be imposed to manage the sustainable exploitation of space resources.308 Problems such as space debris pollution could be avoided by reviewing development plans to ensure measures to prevent pollution, exit strategies of endeavors, or plans of relative permanence are in place before the projects take-off.309 Controversies regarding planned celestial land use and competing claims to more lucrative territories could be arbitrated and resolved on Earth. From an economic perspective, even though the possibility of “free” appropriation of outer space resources might encourage more space exploration initiatives, development with consistent and reliable rules would provide the stronger incentive of protecting the commercial investments in space exploration.310

#### The plan grants UNCOPUOS new authority in line with its existing mandates – any other process fails through circumvention and conflict

**Qizhi 86** [He Qizhi, member of the Governing Board of the Chinese Society of International Law, “On strengthening the role of COPUOS: Maintaining outer space for peaceful uses,” 1986, *Space Policy*, Vol. 2, Issue 1, https://www.sciencedirect.com/science/article/abs/pii/0265964686900032, EA]

The United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) is the first and foremost among multinational organs working for the promotion of peaceful uses of space science and technology. COPUOS has become the forum for elaborating internationally accepted legal principles governing space activities. It has produced five international conventions on the exploration and peaceful uses of outer space, constituting the fundamental body of international space law. A number of other legal items - such as the draft principles on remote sensing from space, the elaboration of rules concerning the use of nuclear power sources in outer space, the definition and delimitation of outer space, and the principles on the use of geostationary orbit- remain on the agenda of the Legal SubCommittee, one of the two subordinate bodies. All of these questions have important bearing on the interests of every country. The most advanced question is establishing the principles of remote sensing; these discussions have entered a final stage and consensus may be reached in the near future, if a spirit of compromise and cooperation continues to prevail among the negotiating states. In the field of technical cooperation in space affairs, COPUOS and its other subordinate body, the Scientific and Technical Sub-Committee, have also done much work and achieved considerable successes. The United Nations Space Application Programme has greatly contributed to the dissemination and exchange of space technology for economic and social development. A series of training seminars and workshops on applications of space technology has been held under its auspices for participants from developing countries. Through this programme, technical advice is available on request. Viewed as a whole, the historic role of COPUOS is significant; however, there are deficiencies in its work and effectiveness. In order to maintain outer space for peaceful uses in the interests of all countries, particularly the developing countries, the Committee should be further strengthened to play a more productive and important role in expanding international cooperation. Legal framework It is useful here to provide a summary of the general legal regime upon which the peaceful uses of outer space have functioned. Its basic principles and rules are enshrined in the 1967 Outer Space Treaty - the main space law instrument of our times - and further developed in the four additional international treaties. All these documents were negotiated and concluded by COPUOS, and contain the following general provisions relating to the maintenance of outer space for peaceful uses. The exploration and use of outer space shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all humankind. Outer space shall be free for exploration and use by all states without discrimination, and is not subject to national appropriation by claim of sovereignty, by means of use or occupation or by any other means. Activities in the exploration and use of outer space shall be carried out in accordance with international law, including the Charter of the United Nations, in the interests of maintaining international peace and security and promoting international cooperation and understanding. Astronauts shall be rendered all possible assistance in the event of accident, distress or emergency. This provision was further elaborated by the 1968 Agreement on the Rescue of Astronauts and the Return of Objects Launched into Outer Space. States shall bear international responsibility for national space activities, whether carried out by governmental or non-governmental entities. This provision was further developed as the 1972 Covention on International Liability for Damage Caused by Space Objects. The launching state shall inform the Secretary-General of the United Nations of the required information concerning the space objects, and the state of registry shall retain jurisdiction and control over such objects and any personnel thereof. In support of this provision, the 1975 Convention on Registration of Objects Launched into Outer Space was elaborated. The fifth legal instrument, the 1979 Agreement Governing the Activities of States on the Moon and other Celestial Bodies (the Moon Agreement), is largely an elaboration of the general provisions of the 1967 Outer Space Treaty in the specific context of the Moon and other celestial bodies. It contains a new and important principle, that the Moon and its natural resources are the "common heritage of mankind', and that states party to the agreement shall establish an international regime to govern the exploitation of the natural resources of the Moon as such exploitation is about to become feasible'. These are the general principles and rules relevant to the peaceful uses of outer space. For instance, the principle of common benefit, though requiring further specification, constitutes a duty upon each member not to misuse outer space in a way which would lead to the detriment of the interests of humankind. So do the principle that international law (including the United Nations Charter) applies to space, and other principles. All of these contribute to the satisfactory functioning of peaceful activities in outer space. Two-pronged approaches To ensure outer space for peaceful uses, it is necessary not only to elaborate general principles as mentioned above, but also to make specific provisions directly involved with the protection of a peaceful environment in outer space which is the province of humankind. With regard to the destructive possibilities in outer space, foremost among them is the growing danger of militarization. This has deeply concerned the international community, even more than other possible harmful developments such as contamination, pollution and space debris. The 1967 Outer Space Treaty took a two-pronged approach in dealing with these direct dangers. First, foreseeing that outer space might become a battleground of the major space powers, the treaty lays down certain restrictions on military activities in outer space, thus providing some degree of arms control and disarmament. Paragraph I of Article IV stipulates: "states parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies or station such weapons in outer space in any other manner'. Paragraph II provides for general demilitarization of the Moon and other celestial bodies, and declares that they shall be used exclusively for peaceful purposes. The 1979 Moon Agreement makes further and far-reaching provisions for demilitarization of the Moon and other celestial bodies. It came into force in 1984, but has not been ratified by either of the two major space powers. It is clear from the existing provisions that, although prohibitions are placed on nuclear weapons and weapons of mass destruction, there is no express prohibition on the introduction of other kinds of weapons in outer space. It is generally held that this is a lacuna of the Outer Space Treaty which should be further discussed in the United Nations and eventually be filled. Second, in dealing with other potential dangers, Article IX of the Outer Space Treaty obliges its members (1) to conduct their space activities with due regard to the corresponding interests of all other states; (2) to avoid harmful contamination and adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter; (3) to undertake international consultations if such activities would cause potential harmful interference with activities of other states. Thus the Outer Space Treaty lays down principles of a general nature establishing as international obligation not to undertake activities which would adversely affect the space environment, while leaving concrete and detailed measures and provisions to be further elaborated in additional legal instruments. Considerations and conclusion The COPUOS, as the major United Nations organ dealing with space matters, has a key role to play in preserving outer space for peaceful uses. The following considerations could be raised with a view to increasing the contribution of COPUOS to the achievement of this lofty goal. One: strengthening and expanding the role of COPUOS in accordance with its mandate. In a resolution in 1961, the United Nations General Viewpoint Assembly decided that COPUOS should provide a focal point for international cooperation in the peaceful exploration and use of outer space. Thus, it is vital not to bypass COPUOS, nor to weaken its function by entrusting what falls within its terms of reference to a new forum or other organs. Two: reviewing the existing internationally accepted legal document by COPUOS and its Sub-Committees, with a view to supplementing or expanding the relevant principles to meet new developments. It has been pointed out that there are weaknesses and loopholes in the existing treaties. The best way to deal with these seems to be to retain the provisions covering related matters in the existing treaties as general principles, while elaborating supplementary rules by additional instruments. In this way, the original treaty could remain intact, with additional protocols being concluded consistent with the aim and principles of the main treaty. Three: reviewing the working method of COPUOS and its two Sub-Committees in order to find the best way to make them more effective. New relevant items, both technical and legal, could be placed on the agenda of COPUOS and the two Sub-Committees through consultation and discussion by the parties. This would help to keep COPUOS in accordance with its mandate as the only intergovernmental body exclusively concerned with all aspects of the peaceful uses of outer space. Four: involvement of COPUOS and its Legal Sub-Committees in the demilitarization of outer space, which is an essential condition for maintaining outer space for peaceful uses. COPUOS, while focusing its attention on peaceful uses, cannot but touch upon the other side of the question: the prevention of an arms race in outer space. Although the primary role of space arms control was entrusted to the Conference on Disarmament, COPUOS as the parent body of the Outer Space Treaty could also play a supportive role in the negotiations on space weapons. This would in turn add new impetus to international cooperation in the peaceful uses of outer space and progressive development of space law. In conclusion, the role of COPUOS should be strengthened in order to establish further the conditions essential for maintaining peaceful uses of outer space. In addition to general basic conditions, there are issues of control and elimination of destructive interferences: foremost among these is the growing danger of militarization of outer space. The issues of contamination, pollution and space debris have also to be dealt with. Only by properly solving these issues can the peaceful uses of outer space really be ensured.

## Advantage – Mining

#### Space mining coming now – lack of regulations makes conflicts likely.

**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 States 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.

#### It’s feasible–best studies prove

Leonard **David**, 4-24-**2012**, "Is Asteroid Mining Possible? Study Says Yes, for $2.6 Billion," Space,<https://www.space.com/15405-asteroid-mining-feasibility-study.html> //SR

The prospect of mining asteroids may sound like science fiction, but that's exactly what the ambitious new company Planetary Resources, Inc. plans to do — and a recent study by NASA, university and private groups says it's actually possible. The in-depth study of the feasibility of asteroid mining was prepared for the Keck Institute for Space Studies (KISS) at the California Institute of Technology in Pasadena. It was released April 2, three weeks before today's unveiling by Planetary Resources of its billionaire-backed plan to tap into the riches locked inside near-Earth asteroids. While Planetary Resources is still years away from actually snatching up an asteroid and staking a cosmic claim, the KISS asteroid retrieval study details in extreme detail exactly how such a project could work. Two participants in the study were former Mars mission manager Chris Lewicki, now CEO of Planetary Resources, and former astronaut Tom Jones, who is advising the new company. The Asteroid Capture and Return mission — the central focus of the KISS study — blueprints the technological know-how to moving an asteroid weighing about 1.1 million-pound (500,000 kilograms) to a high lunar orbit by the year 2025. The mission's cost is expected to be $2.6 billion. Is asteroid mining really possible today? The top conclusions from the KISS study are that it appears feasible to identify, capture and return close to Earth an entire asteroid that is roughly 23 feet (7 meters) wide. This so-called near-Earth asteroid (NEA) would weigh in the neighborhood of 500 tons, according to the study. This feasibility rests on three major advances, Brophy told SPACE.com: Development of a ground-based observation campaign to discover and characterize potential target asteroids for return; Development of a sufficiently powerful solar electric propulsion system necessary to transport the asteroid back to lunar orbit in a reasonable time; Establishment of a human presence in lunar orbit to investigate and exploit this resource. Using current or soon-to-be technology, the asteroid could be fetched, and then deposited into high lunar orbit using a containerlike robotic spacecraft powered by a solar electric propulsion system. Moreover, such an endeavor "may be essential technically and programmatically for the success of both near-term and long-term human exploration beyond low-Earth orbit," the report says. Planetary Resources plans to build swarms of low-cost robotic spacecraft to extract resources from near-Earth asteroids.

#### Successful mining unlocks crucial rare earth metal supplies for renewables and space colonization BUT legal uncertainty makes investment unviable.

**Doshi 16** [Priyank D. Doshi, J.D., Notre Dame Law School; B.A., University of Illinois Urbana-Champagne, “Regulating The Final Frontier: Asteroid Mining and The Need For A New Regulatory Regime,” 2016, *Notre Dame Journal of International & Comparative Law*, Vol. 6, Issue 1, https://scholarship.law.nd.edu/cgi/viewcontent.cgi?article=1055&context=ndjicl, EA – OCR used]

C Benefits of Asteroid Mining While Part I sought to show that asteroid mining is possible and will soon be a reality, it also raised the question of why asteroid mining might be something the international stage needs to pursue collectively and aggressively. The simple answer is two-fold: the need for the resources and future space exploration. C.i The Need For Resources Scientists posit that the key natural resources we will need to fuel and develop the modern economy will run out within the next fifty to sixty years.51 Key resources like platinum, zinc, copper, phosphorus, lead, gold, and indium, could become depleted on Earth very soon.52 As the push for more environmentally friendly solutions to things like energy surges, the actual replacement materials to support that dream grow more and more scarce. Wind turbines and solar panels use rare earth metals in their very construction, and the future of renewable energy will demand more of these resources.53 Even everyday items like batteries, jewelry, and computer chips use platinum, gold, and nickel, which are starting to become more and more expensive as their supplies decrease. The scarcity problem is exacerbated by the fact that a lot of these elements have no readily available alternative on Earth. Asteroid mining is the solution to the coming scarcity issues. Mining the asteroids isn’t just a capitalist dream; it is the average man’s necessity. Most of the minerals being mined on Earth, including gold, iron, platinum, and palladium, originally came from the many asteroids that hit the Earth after the crust cooled during the planet’s formation.54 Asteroids are suspected to be filled with an abundance of natural resources like gold, cobalt, iron, manganese, molybdenum, nickel, osmium, palladium, platinum, rhenium, rhodium, ruthenium, and tungsten that are worth billions to trillions of dollars.55 Speaking to just one of the many examples, Some of these Near-Earth Asteroids (NEAs) are metallic, composed of metals like iron and nickel, similar to the center of the Earth. One of these asteroids is 1986 DA, a metallic NEA 1.2 miles wide that is likely composed primarily of iron and nickel with significant amounts of gold and platinum. Estimates show 1986 DA contains approximately 10,000 tons of gold and 100,000 tons of platinum, which if completely recovered would be valued on today’s market at $460 billion and $5.6 trillion, respectively. Including the value of the iron and nickel, 1986 DA could be worth between $6 and $7 trillion.56 These NEAs are close enough to be mined and harvested for the development of human technology. John S. Lewis, professor of planetary science at the University of Arizona and author of Mining the Sky: Untold Riches from the Asteroids, Comets, and Planets, estimates that asteroid 3554 Amun is worth $20 trillion. Composed of platinum, iron, nickel, and cobalt, it has enough resources to pay off the U.S. national debt.57 It is estimated that there are about one to two million asteroids in the solar system that are large enough to consider for mining projects:58 Each of these asteroids is projected to weigh roughly two billion tons and “contain 30 million tons of nickel, 1.5 million tons of metal cobalt, and 7,500 tons of platinum.” The value of these items, for both private companies and governments around the world could be significant with the dollar value being somewhere in the trillions or higher. With nickel selling for $14,575 per ton, cobalt selling for $26,600 per ton, and platinum at $1,454 per ounce, mining one single asteroid could be more than profitable.59 Though these numbers presuppose that prices of the various resources would stay the same, they provide a telling picture of the potential wealth in wait and its ability to drastically alter the shape of the future.60 Providing more than a fix for natural resource shortages, asteroids also contain other elements that are scarce or practically nonexistent on Earth. One of these, helium-3, could be used as a low-cost, efficient energy source that gives only a fraction of the polluting effect of current practices.61 Helium-3 could potentially light the future, and that is just the beginning of the possibilities reaped from asteroid mining. C.2 Future Space Exploration The societal good that could be achieved from mining asteroids, which contain both rare-Earth minerals and scarce and/or non-existent resources, is self-explanatory. Similar is the resultant financial gain from these mining activities. There is extensive scholarship surrounding the potential value of asteroids, and this Note only scratches their proverbial surface. A large share of asteroids’ benefits is derived from their position in outer space. They will allow us to push further in space exploration and space colonization by drastically bringing down the cost of travel. To those still reading this with an eye of incredulity about space, this section may seem the most unnerving, but it is by far the important use for asteroid mining. The largest barriers to space exploration and space colonization are the cost of shipping materials from Earth, and the fuel limitations inherent in travel. Asteroid mining has the potential to help with both of these problems and act as the catalyst for the modern space age. The mining of NEOs will yield great quantities of hydrogen, helium, and water.62 These materials could be used to fuel human spacefarers, untying them from the need to be refueled or resupplied from Earth. More specifically, mined water could be extremely useful as rocket fuel or as a fuel for other power and propulsion systems.6’ If water can be found on asteroids (as many believe it can be) the water could also be broken down into its hydrogen and oxygen components, which can then be used to form the basic building blocks of rocket fuel.64 Mining water alone makes both space colonization and space exploration cheaper and consequently more feasible. Furthermore, sources of water have been identified: a 2006 announcement by the Kech Observatory claimed that 617 Patroclus, a Jupiter Trojan, was essentially an extinct comet that consists largely of ice. Similarly, Jupiter-family comets, and possibly NEAs that are extinct comets, might also economically provide water which through the process of in-situ resource utilization— using materials native to space for propellant, tankage, radiation shielding, and other high-mass components of space infrastructure—could lead to radical reductions in its cost for space exploration.65 Fuel tends to make up the greatest weight of rockets; the ability to produce fuel in space would provide much needed flexibility to survive in outer space and explore the depths of the solar system.66 Part I addressed the technology that is being developed by Planetary Resources and DSI for asteroid mining; that technology will help realize the benefits of asteroid mining for space travel. Launches from Earth could be cheaper if the shuttles were able to refuel at a DSI Propellant Refinery. Planetary Resources’ ARKYD- 300 could scout ahead for possible colonization sites on both asteroids and planets. Imagine a scenario where a DSI Harvestor mines the minerals needed to create a colony, and then the shuttle takes those materials, along with a DSI Microgravity Foundry, to build the colony itself.67 Fuel for spaceships to go further and resources to build and re-equip space colonies unburdened by the high costs of Earth-to-colony transport could be the stepping stone we need to begin the new age space race. Lastly, in addition to mining for supplies, we could also use asteroids as space stations. An asteroid-based space station could be highly beneficial to research and development. It has the potential to provide conditions that cannot easily be replicated on Earth, such as zero-gravity environments, freedom from atmospheric interference, and nearly continuous sunlight for solar power.68 While on the surface this may not seem like a large benefit, it will be invaluable as a place to test some of the radiation shielding problems that have historically stalled many long-term space exploration plans.69 Many people dismiss asteroid mining positing that the benefits are primarily financial ones that will do nothing more than further line already rich pockets. But the reality is far more layered than that simple assertion. Asteroid mining is a societal necessity for global advancement. Modern technology relies increasingly on rare and scarce resources; we will need to find a new source to continue the advancement. Any future with space exploration has to be grounded in the understanding that we will need a cheaper way to deliver materials in space. Asteroid mining is the answer. D Problems Surrounding Asteroid Mining While the significant benefits described above show the impending need and the rewards of asteroids mining, many problems must be addressed before asteroid mining becomes a certain fixture of the future. The main issues confronting asteroid mining are the needs for a massive upfront investment and the economic and political implications of mining asteroids in the future. The most obvious roadblock to asteroid mining is the high required upfront investment needed to participate. While Part I spoke to some of the plans that the NASA is supporting and the goals the agency has set, it omits an important point: the funding for NASA has decreased drastically over the last twenty years. Currently, it operates using the lowest percentage of the federal budget since I960.70 Just when we are on the cusp of cracking open the final frontier, the government is bowing out. According to a Collaborative Modeling for Parametric Assessment of Space Systems (COMPASS) team at NASA’s Glenn Research Center in Cleveland, the estimate for a successful asteroid capture endeavor is in the ballpark of $2.6 billion/1 while the government’s grant to NASA for its capture project is only around $100 million. 2 Private companies will have to take the lead and absorb the large costs associated with asteroid mining and space exploration. The costs only continue to increase beyond the creation of asteroid capture technology—from the harnessing technology, or the costs required for the transport and process of raw asteroidal material to Earth for use (on Earth or elsewhere). In this assessment, the administrative costs of running a company are not even taken into account. While the discussion of technology in Part I of this Note highlights a few successfully funded companies, the high costs operate as a roadblock for others. Even though the potential profits are massive, the initial risks of asteroid mining come close to swallowing the benefits. While both Planetary Resources and Deep Space Industries have been very tight-lipped about their costs, the list of big name investors and the ambitious plans insinuate investments in the hundreds of millions of dollars, at a minimum. As it stands today, mining asteroids is too theoretical and not yet profitable enough to ask the private industry to continue to dump billions into the endeavor. It will require more relative financial certainties, rather than mere mirages of wealth, to propel the industry. The current legal framework that is in place, as is described in the next section, is not adequate to incentivize investors for such a risky endeavor. These businesses want to be sure that the technology, funding, and efforts they put toward the development of space will be rewarded, and so a properly crafted property law regime, unique to outer space, must be developed to ensure that private space industry continues to invest in cosmic ventures and technologies.7’ The law needs to create a level of predictability and incentive structure that will actually make investors overlook the long path still ahead of them and see the end goal. Assuming the substantial financial roadblocks that exist are overcome and private money pours into the industry, there are still other economic and political considerations that are sources of serious concern before asteroid mining can become a reality. The central problem is the issue of control. Once private companies get into space, after investing their own money and bearing all the risk, they will want to control how things operate. To have them take all the risk and then expect corporations to willingly subordinate themselves from their spoils is a fool’s dream. So far, the government has had a limited response. On July 10, 2014, two Congressmen proposed the Asteroids Act, intended to facilitate the commercial exploration and utilization of asteroid resources to meet national needs and to promote the right of US commercial entities to explore and utilize resources from asteroids.74 The Act seeks to create property rights in resources extracted from asteroids, stating: “Any resources obtained in outer space from an asteroid are the property of the entity that obtained such resources, which shall be entitled to all property rights thereto, consistent with applicable provisions of Federal law.”75 The legislation, while noting that no state can lay claim to the asteroids, and giving corporations some protections on their investments, is still the beginning of a scary trend; a trend where national governments are granting and recognizing property rights subject to their own rule. This bill essentially sets the stage for a showdown for when an American company and a foreign company (with their country’s support) lay claim to the same asteroid. What happens when a Chinese company subject to Chinese laws starts to mine an asteroid that an American company has rights to under American law? What happens to any company not based in a major superpower, do they just cede their rights when a company backed by a more powerful nation intervenes? Individual governments’ respective abilities to regulate, as seen by the Asteroids Act, will lead to conflicting laws and conflicting claims that have the potential to create serious political and military ramifications. Putting aside the political chaos this could cause in the global system, the question of why corporations would even cede any control comes into question. With practically no governmental involvement in the initial stages of asteroid mining, why would corporations allow the government to share the benefits of something that they, in reality, have no jurisdiction over? Building on the conflict over control, who would control how much of the resource could be brought back? Markets already exist for a lot of the natural resources that would be mined on asteroids; bringing back a large load of the resource could wreak economic havoc on those existing markets and the political systems that rely on them. The social costs to resource-based countries alone would be catastrophic. Will the corporations care? Can any government really curb the corporation’s ability to flood the market? What stops them from creating a false market due to their ability to monopolize an asteroid? Is there a state interest in miner safety and other environmental considerations involved in extra-terrestrial mining? Who can really enforce any safety and protection regulations with only claimed jurisdiction? This non-exhaustive catalog of questions is asked in an attempt to understand the wide breadth of problems that will arise under the current regulatory regimes that are in place. The problems surrounding asteroid mining are more than just the high costs of investment; there are also questions about control and global cooperation over corporate activities in space. E Current Law The problems posed in the last section rise in part due to lack of legal clarity in this area. The international community has no policy that directly speaks to asteroid mining. It has instead relied on the interpretation of a series of tangentially connected treaties and agreements to address the burgeoning industry. This section is focused on briefly introducing some of the international agreements and treaties that try to govern space. The phrase “space law” draws a blank on most faces, as very little is actually known about the practice area. Still, despite the lack of public knowledge around international space law, there are quite a few guiding documents for asteroid mining, namely: the Outer Space Treaty of 1967, the Registration Convention of 1975, and the Moon Treaty of 1979. E.i The Outer Space Treaty of 1967 The Outer Space Treaty of 1967 was the first real international agreement dealing with space. Created in the midst of the Space Race and the Cold War, it was drafted to ensure that space did not become the next battleground. Its legacy has long outlived that original purpose, and almost 50 years later, it still stands as the primary agreement on international space law, serving as the foundation for all agreements and treaties that followed. The most marked and deliberate feature of the agreement was its rejection of the traditional concept of res nullius, or treating outer space as unclaimed territory that, since unclaimed, was open for conquest by anyone.76 The policy laid out in the Treaty opted for the res communis theory, there by all entities, individual or corporate, and nations have common or open access to the resources that are contained within its realm and are precluded from making any claims of ownership.77 The strong tone of the document and the widespread agreement of the treaty has led some to assert that celestial bodies are res extra commercium as whole, and cannot be owned.78 This treaty stands at the center of international space law today, making a breakdown of its relevant articles essential. Article I of the Treaty covers its general purpose. It states that, “the exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and interests of all countries...and shall be the province of all mankind.”79 It is important to recognize the lofty language in this international consensus, as it is the result of concessions given to developing nations. The developed, space-faring nations would have much preferred the open space principle to allow for them to stake their claim. However, they recognized that any international consensus had to take the opinions of developing countries into account, and developing nations refused any agreement that would impede their future rights to space exploration. That understanding still holds today, and any international cooperative agreement on space has to make some concession to the developing and non-space faring states to be workable long-term. Article II reiterates the underlying purpose of the agreement by stating that outer space “is not subject to national appropriation by claim of sovereignty.” But its broad language in this article has created a large and very controversial loophole: nowhere in prohibiting claims of ownership does the treaty mention corporations, private entities, or individuals.80 In fact, the treaty lacks [A]ny explicit mention of property rights. It does not, however, specifically reject individual or corporate property in space. The treaty only prohibits “national appropriation” of space by claim of sovereignty, use, occupation, or other means. The drafters of the Outer Space Treaty chose to limit this prohibition to nations, even though scholars at the International Institute of Space Law had suggested that the Treaty should prohibit “national and private appropriation.”81 This large loophole becomes extremely relevant given that the Outer Space Treaty is the only space-related treaty onto which the majority of the world has signed.

#### Renewables remove leverage – staves off global conflict.

Roman **Vakulchuk 20**, PhD in economics, senior research fellow at the Norwegian Institute of International Affairs, and adjust professor at Nord University, “Renewable energy and geopolitics: A review,” 1/07/2020, Renewable And Sustainable Energy Reviews, [https://www.sciencedirect.com/science/article/pii/S1364032119307555#](https://www.sciencedirect.com/science/article/pii/S1364032119307555)!, cc

By contrast, the reduced conflict camp sees geopolitical tensions as less likely in a world that has renewables as its main source of energy (Peters [91], Verrastro et al. [92], Lacher and Kumetat [93], Kostyuk et al. [94], Escribano et al. [95], Johansson [96], Hoggett [97], Sweijs et al. [70], Månsson [72], Paltsev [98], Scholten and Bosman [54], Smith Stegen [99], Escribano [84], Freeman [85]). This camp emphasises that it is more difficult to control, cut the supply or manipulate the price of renewable energy than of fossil fuels and the expansion of renewables will therefore lead to greater energy self-sufficiency and less conflict. It shifts the focus from the external to the internal supply of energy, reducing the scope for conflict among states. An argument frequently used by this camp is that renewables are more difficult than fossil fuels to manipulate as they are less dense and more evenly distributed geographically. Månsson [72] holds the view that due to its geographic and technical characteristics, renewable energy creates few geopolitical motivations for states to start conflicts in order to control it. Peters [91], Tsao et al. [100] and Kostyuk et al. [94] similarly note that developing renewable energy would lead to a more equitable energy distribution and energy-based economic power, in turn leading to reduced geopolitical tensions. Also Overland et al. [101] found that geopolitical power will be more evenly distributed after a complete transition to renewable energy. In a related vein, Krewitt et al. [61] argue that the creation of international solar energy partnerships would have geopolitical advantages because they could “reduce economic imbalances between the North and the South and create global markets for future-oriented energy technologies without having to fear conflicts over scarce resources” (p. 23). The application of a resource scarcity perspective to the geopolitics of oil triggers energy-insecurity anxiety among states and implicitly or explicitly justifies aggressive behaviour in resource conflicts (Jaffe and Soligo [102], Stern [103]). This perspective is not simple to transpose onto renewables, as they are both non-exhaustible and abundant, except for the critical materials used in the production of renewable energy technologies (see Section 3.4 for more on this). Fischhendler et al. [104,105] exemplify how geopolitical arguments have been used to convince Israeli decision-makers to adopt renewable energy to reduce the country's energy dependence and improve its security. These arguments have led others to draw further conclusions. Compared to an energy system based on fossil fuels, in a system dominated by renewables, access to resources is less important than distribution and infrastructure management (Scholten and Bosman [54]). Escribano [84] implies the same when he writes that “[e]nergy dependence and security of supply lose geopolitical relevance, whereas technical and regulatory aspects gain weight” (p. 7). Many publications share an understanding that the location of renewable energy resources is as important as that of fossil fuels (Skeet [106], Criekemans [67], Criekemans [107]). However, location as a geopolitical concern is mainly relevant for the large-scale and not for the small-scale domestically-oriented production and transmission of electricity from renewable energy. O'Sullivan et al. [75] argue that if renewable energy is deployed on a large scale and cross-border trade in electricity grows, then the principle of territorial control will be similar to that for oil and gas pipelines: “[c]ountries like Algeria, Mexico or Morocco, or transit countries, or actors such as the Islamic State, could still try to leverage their geographical position and in case of conflict they could threaten to interrupt electricity supplies” (p. 41). Several authors also ask whether an external supply of electricity can be used as an “energy weapon” (e.g. Escribano et al. [95]). Renewable energy infrastructure, such as the ambitious but failed Desertec project, can also be an easy target for terrorists (Smith Stegen et al. [108]). The same logic can be applied to the location of biofuels. On the other hand, if countries produce electricity from domestic renewable energy sources, geopolitical tensions and risks might recede due to falling energy imports and reduced interdependence between countries (Strunz and Gawel [66]). Escribano et al. [95] and Scholten and Bosman [54] argue that the geopolitical risks associated with domestically produced renewable energy are close to zero if we apply the energy-security standards of IEA. Hoggett [97] similarly notes that small-scale photovoltaics (and nuclear power) technologies are likely to promote a secure low-carbon transition with reduced geopolitical risks. Some believe that it is likely that the consumption of renewable energy at the location of production will prevail over large-scale regional production and distribution as it is seen as much more efficient and cost-effective when compared to the long-distance distribution of electricity (Proedrou [109], Sovacool [110]). These authors therefore see geographical location as less important for renewable energy resources than for fossil fuels from a geopolitical perspective. Nevertheless, there is a risk of local conflicts involving non-state actors that could potentially be caused by increased global competition for the land required for renewable energy installations (Capellan-Perez et al. [82], Månsson [72], Johansson [96], Walker [111]). One issue seems to be stuck between the two camps: new interdependencies among states as a result of electricity interconnectors. Hache [81] discusses the possible emergence of new and unfamiliar inter-state interdependencies. Similarly, Westphal and Droege [64] argue that more electricity interconnectors between countries will lead to greater interdependence, which may translate into reduced international security. Pierri et al. [112] examine this question in the context of the European Union. Konstantelos et al. [113] discuss the division of costs and benefits among members of an integrated North Sea grid, making it similar to the difficulties caused by major pipeline projects. By contrast, Smith Stegen [99] argues that international affairs should benefit from renewables in many ways because their distribution will not be exposed “to the political and strategic dilemmas wrought by dependence on hydrocarbons” (p. 92). In a similar vein, IRENA [76] notes that electricity cut-offs and the use of hegemonic power to cut off transport bottlenecks will be greatly reduced due to increased rerouting possibilities, decentralised power generation and the absence of global electricity connections. But Smith Stegen [99] acknowledges that some tensions are possible due to increased interdependencies in such areas as high-voltage direct current (HVDC) transmission lines, biofuels and rare earth elements. Similarly, Verrastro et al. [92] and Lacher and Kumetat [93] see that renewable energy may strengthen energy security while facilitating the emergence of new interdependencies among states.

#### Also solves smart cities and critical infrastructure security.

**Konstantinou 21** [Charalambos Konstantinou, Senior Member, IEEE, “Towards a Secure and Resilient All-Renewable Energy Grid for Smart Cities,” 2021, *arXiv*, https://arxiv.org/pdf/2101.10570.pdf, EA]

Electric energy systems constitute the backbone of critical infrastructure. National security and economic vitality rely on a safe, secure, and resilient power system. The American electric grid, once considered a marvel of 20th century engineering, has become obsolete in the face of 21st century threats. Our energy grid has numerous shortcomings and can no longer deliver (cyber) secure and (disaster) resilient electric power to businesses and households, leading to an urgent and enormous threat to our society and economy. Vertical power systems with rigid transmission and distribution system control hierarchy have failed repeatedly during extreme threats. Recent studies by the Federal Energy Regulatory Commission (FERC) found that knocking out as 9 of the 55,000 power substations could result in U.S. coast-to-coast blackouts lasting 18 months or more [1]. For example, the Hurricane Michael resulted in 1.7 million power outages along the U.S. Gulf and Atlantic coasts [2]. During June – September 2007, heat waves and forest fires occurred in Greece causing extensive damages to the medium-voltage distribution network and knocking out power in many areas of the country [3]. Recovery from such disasters also costs tens of billions of dollars including time, manpower, and lost economic productivity, and deepen social inequalities. These failures have taught utilities, regulators, and stakeholders that faults cascade across national and continental electric grids, and exacerbating a local phenomenon into a socioeconomic catastrophe. Traditional power systems are prone to such cascading power outages that last long periods of time and are complex and time-consuming to recover – in other words, not secure and resilient. Continuing to operate the electric energy system critical infrastructure using the traditional model is a well-recognized security and resiliency threat and the main barrier for the development of future smart cities. The integration of photovoltaic (PV) solar systems and wind farms together with other renewable energy sources (RES) into the electric grid, as shown in Fig. 1, helps towards improving security and reliability of the power system during normal operations and enhancing resiliency during and after extreme events. In the first quarter of 2018, solar accounted for 55% of all new generating capacity brought online in the U.S. [4], and Florida alone is expected to add over 8.6 GW of solar generation by 2025. The inclusion of such distributed resources in the form of solar PV, battery-based storage, and demand resources can increase the resiliency to catastrophic events once research efforts would be able to address open system design questions. Examples include how to strategically locate and operate these resources to sustain smart cities infrastructure by guaranteeing continuity or rapid restoration of power to vital loads following large-scale disturbances by formation of adhoc self-contained microgrids in outage situations. In addition, as more and more RES are integrated into power systems, it is projected that offshore oil and gas platforms will be re-used at end-of-life stage for the production of renewable energy (e.g., offshore wind, wave and tidal energy, ocean current energy, ocean-based solar energy, deep-water source cooling, etc.). To thwart the existing problems, a transformational development approach needs to be established, able to develop and build a secure and resilient electric grid for future smart cities. Such development will lead to an electric energy system immune to extreme phenomena while supporting the integration of RES and reducing the dependency on oil drilling into power systems, such as those at the North Sea as well as the Gulf of Mexico and its coastal zone.

#### Smart cities solve sustainable development goals.

**İkizer 22** [İhsan İkizer, Faculty of Economics, Administrative and Social Sciences, Nişantaşı University, “Smart Cities, Citizen Welfare, and the Implementation of Sustainable Development Goals | Do Smart City Solutions Contribute to the Achievement of the Sustainable Development Goals?: Case of Istanbul,” 2022, IGI Global, EA]

Sustainable development has been an indispensable concept in many disciplines ranging from economics to public administration nearly in the last thirty years. As the years pass, the destructive effects of climate change and environmental degradation are being felt more than ever, and especially policy makers realize that it is not a conceptual or theoretical issue far from the practical life, but a bitter reality. Many important steps have been taken till now in order to ensure that our economic development does not endanger the needs of the future generations, and it does not harm social and cultural development of communities. Among these steps, maybe the most significant one is the Sustainable Development Goals (SDGs), which were adopted by the Heads of States and Governments in the United Nations (UN) in 2015. Although there is no mandatory mechanism that enforces the implementation of the SDGs, the central governments have pledged to achieve them, and some of them have presented their national reviews that indicate their progress. The problems that are referred in the 17 SDGs have not been caused by just one country, or different levels of governments, or business community, or consumers. Multiple actors in multiple countries have carried the stones that have led to the gigantic challenges that we face today. Therefore, the solution, or in other words the achievement of these 17 SDGs requires joint and coordinated action of the entire world, which means local, regional, national and global partnership among all stake holders, i.e. statutory bodies, NGOs, business community and science community. Partnerships organised at different levels are expected to ensure the participation of people, who are also responsible actors as consumers. After all, these goals have been set for the peace and prosperity of people of this generation and next generations, and awareness among people about the SDGs is a key factor to the success. Among these actors, local governments emerge as extremely eminent actors for two reasons: more than half of the world population live in cities, and they are the closest statutory bodies to people. It is not realistic to expect full achievement of the SDGs without the active engagement of local governments, as nearly two third of the 169 targets of the SDGs fall directly under the realm of local governments (Sustainable Development Goals and Habitat III: Opportunities for a successful New Urban Agenda, 2015). Although, it is central governments that have designed the SDGs, and monitoring the progress of countries is conducted by the representatives of central governments at ‘High-level Political Forum on Sustainable Development (HLPF)’, local governments are expected to be active actors in the implementation of the SDGs, next to central governments, together with other stake holders. In order for local governments to be effective actors in this challenging task, principles of good governance as well as translation of the SDGs and the targets into local context seem to be essential. Different cities with different size, development level, needs and features naturally have different strategies to achieve the localised SDGs. However, smart city technologies emerge as significant tools to be integrated into localised strategies for accelerating the achievement of the SDGs, especially the SDG 11, which is on sustainable cities and communities. The need for more effective and efficient use of information and communication technologies in cities has been better comprehended during the Covid-19 pandemic. Today, in many large urban areas, local governments use these technologies in various fields from transportation to waste management, in order to make their cities smarter, healthier and more sustainable. Istanbul, the largest city in Turkey, and a city that is bigger than more than 130 countries in the world, with a population of around 16 million, is among the cities where smart city technologies are being increasingly used day by day. In this chapter, the case of Istanbul will be analysed in terms of its smart city applications, and the contribution of these applications to the SDGs will be analysed. The chapter will start by setting the context of the SDGs and the concept of smart city, which will be followed by the discussion on the positive correlation between smart city technologies and sustainable development. The final part will concretize the discussion on the link between these two concepts through the case of Istanbul.

#### SDGs are leverage points that solve extinction BUT failure causes cascading risks that cumulatively outweigh any single risk, causing extinction

**Cernev 20** [Tom Cernev and Richard Fenner “The importance of achieving foundational Sustainable Development Goals in reducing global risk,” 2020, *Futures*, Vol. 115, https://doi.org/10.1016/j.futures.2019.102492]

4. Risks from failure to meet the SDGs 4.1. Cascading failures Fig. 3 demonstrates that cascade failures can be transmitted through the complex inter-relationships that link the Sustainable Development Goals. Randers, Rockstrom, Stoknes, Goluke, Collste, Cornell, Donges et al. (2018) have suggested that where meeting some SDGs impact negatively on others, this may lead to “crisis and conflict accelerators” and “threat multipliers” resulting in conflicts, instability and migrations. Ecosystem stresses are likely to disproportionately affect the security and social cohesion of fragile and poor communities, amplifying latent tensions which lead to political instabilities that spread far beyond their regions. The resulting “bad fate of the poor will end up affecting the whole global system"(Mastrojeni, 2018). Such possibilities are likely to go beyond incremental damage and lead to runaway collapse. The World Economic Forums’ Global Risks Report for 2018 shows the top five global risks in terms of likelihood and impact have changed from being economic and social in 2008 to environmental and technological in 2018, and are closely aligned with many SDGs (World Economic Forum, 2018). The report notes “that we are much less competent when it comes to dealing with complex risks in systems characterised by feedback loops, tipping points and opaque cause-and-effect relationships that can make intervention problematic”. The most likely risks expected to have the greatest impact currently include extreme weather events natural disasters, cyber attacks, data fraud or theft, failure of climate change mitigation and water crises. These are represented in Fig. 3 by the following exogenous variables. “Climate change” drives the need for Climate Action (SDG 13), “Cyber threat” may adversely impact technology implementation and advancement which will disrupt Sustainable Cities and Communities (SDG 11); Decent Work and Economic Growth (SDG 8) and the rate of introduction of Affordable and Clean Energy (SDG 7), with reductions in these goals having direct consequences in also reducing progress in the other goals which they are closely linked to. “Data Fraud or Threat” has the capacity to inhibit innovation and Industrial Performance (SDG 9), reducing competitiveness (and having the potential to erode societal confidence in governance processes). “Water Crises” (linked with climate change) have a direct impact on Human Health and Well Being (SDG 3) as well as reducing access to Clean Water and Sanitation (SDG 6) and reducing agricultural production which increases Hunger (SDG 2). The causal loop diagram also highlights “Conflict” as a variable (driven by multiple environmental-socio-economic factors) which together with regions most impacted by climate degradation will lead to an increase in migrant refugees enhancing the spread of disease and global pandemic risk, thus impacting directly on Human Health and Well Being (SDG 3) 4.2. Existential and catastrophic risk The level and consequences of these risks may be severe. Existential Risks (ER) have a wide scope, with extreme danger, and are “a risk that threatens the premature extinction of humanity or the permanent and drastic destruction of its potential for desirable future development” (Farquhar et al., 2017,) essentially being an event or scenario that is “transgenerational in scope and terminal in intensity” (Baum & Handoh, 2014). With a smaller scope, and lower level of severity, global catastrophic risk is defined as a scenario or event that results in at least 10 million fatalities, or $10 trillion in damages (Bostrom & Ćirković, 2008). Global Catastrophic Risk (GCR) events are those which are global, but they are durable in that humanity is able to recover from them (Bostrom & Ćirković, 2008; Cotton-Barratt, Farquhar, Halstead, Schubert, & Snyder-Beattie, 2016) but which still have a long-term impact (Turchin & Denkenberger, 2018b). Achieving the Sustainable Development Goals can be considered to be a means of reducing the long-term global catastrophic and existential risks for humanity. Conversely if the targets represented across the SDGs remain unachieved there is the potential for these forms of risk to develop. This association combined with the likely emergence of new challenges over the next decades (Cook, Inayatullah, Burgman, Sutherland, & Wintle, 2014) means that it is of great value to identify points within the systems representations of the Sustainable Development Goals that could both lead to global catastrophic risk and existential risk, and conversely that could act as prevention, or leverage points in order to avoid such outcomes. This identification in turn enables sensible policy responses to be constructed (Sutherland & Woodroof, 2009). Whilst existential threats are unlikely, there is extensive peril in global catastrophic risks. Despite being lesser in severity than existential risks, they increase the likelihood of human extinction (Turchin & Denkenberger, 2018a) through chain reactions (Turchin & Denkenberger, 2018a), and inhibiting humanity’s response to other risks (Farquhar et al., 2017). It is necessary to consider risks that may seem small, as when acting together, they can have extensive consequences (Tonn, 2009). Furthermore, the high adaptability potential of humans, and society, means that for humanity to become extinct, it is most likely that there would be a series of events that culminate in extinction as opposed to one large scale event (Tonn & MacGregor, 2009; Tonn, 2009). Whilst the prospect of existential risk, or global catastrophic risk can seem distant, the Stern Review on the Economics of Climate Change estimated the risk of extinction for humanity as 0.1 % annually, which accumulates to provide the risk of extinction over the next century as 9.5 % (Cotton-Barratt et al., 2016). With respect to identifying these risks, it is known that in particular, “positive feedback loops… represent the gravest existential risks” (Kareiva & Carranza, 2018), with pollution also having the potential to pose an existential risk.

#### Space col prevents otherwise inevitable extinction.

**Green 21** [Brian Patrick Green, director of technology ethics at the Markkula Center for Applied Ethics, Santa Clara University, “Space Ethics,” 2021, Rowman, pp. 5, EA]

Another reason that humans may want to explore space would be to create a “backup Earth” to hedge against global catastrophic and existential risks (risks that may cause widespread disaster or human extinction, respectively) on our home planet. 8 Earth has always been a dangerous place for humans, with asteroid impacts, supervolcanic eruptions, pandemic disease, and other natural hazards threatening civilization. Now, in addition to these natural threats, human-made hazards such as nuclear weapons, climate change, biotechnology, nanotechnology, and artificial intelligence may threaten not only the viability of technological civilization but perhaps the survival of human life itself. A serious global-scale catastrophe could set back civilization many decades or centuries, and the worst disasters could cause human extinction. In one scenario, in which 100 percent of humanity dies, all of human effort for all of history would be for nothing. However, were the same global catastrophe to happen to Earth, yet humans were a multiplanetary species with just one self-sustaining settlement off-Earth, it would not result in the end of human civilization or human extinction. Instead while the same unimaginable fate would befall the Earth (certainly no mere triviality, with perhaps the deaths of 99.999 percent of all humans and possibly the destruction of the ecosphere and everything in it), at least all of human and planetory history would not be for nothing. Human life and culture would go on elsewhere, as well as other Earth species. This is a dire fate, but less terrible than the first.

#### Immeasurable expected value outweighs.

**Baum 16** [Seth D. Baum, Executive Director of the Global Catastrophic Risk Institute, “The Ethics of Outer Space: A Consequentialist Perspective,” 2016, Springer, pp. 115-116, EA]

Space colonization is notable because it may be able to bring utterly immense increases in intrinsic value. Early colonies might start small, given that other planets and moons have inhospitable environments. However, it may be possible to build large indoor colonies or create more hospitable outdoor environments (i.e., terraforming). Even just on other planets and moons in the Solar System, space colonies could multiply the total area available for human habitation. And there are many more planets around other stars, as ongoing research on exoplanets is now learning. One recent study estimates 22 % of Sun-like stars have Earth-like exoplanets (Petigura et al. 2013), implying billions to tens of billions of potentially habitable planets across the galaxy. Opportunities at any given star may also be quite a bit greater than those available only on planets. Earth only receives about one two-billionth of the Sun’s radiation. To collect all the Sun’s radiation, humanity would need a Dyson swarm (named after Dyson 1960), which is a series of structures that surrounds a star, collecting its radiation to power a civilization. A Dyson swarm around the Sun could potentially enable a civilization a billion times larger than is possible on Earth. Likewise, Dyson swarms around one billion stars would bring humanity approximately 1018 (one billion–billion) times more energy per unit time. Space colonies could also increase the amount of time available for human civilization. Earth will remain habitable for a few billion more years (O’Malley-James et al. 2014). Stars will continue shining for about 1014 more years (Adams 2008). That gives us an additional 105 times more energy, for a total of 1023 times more energy than is available on Earth. After the stars fade, other energy sources may be available. And even if our current universe eventually becomes uninhabitable, it may be possible to move to other universes (Kaku 2005). The physics here is speculative, but it cannot be ruled out, and hence there is a nonzero chance of a literally infinite opportunity for space colonization (Baum 2010a). Whether the opportunity is infinite or merely, say, 1023 times larger than what can be done on Earth, the opportunity is clearly immense. As long as space colonization is an improvement (Sect. 8.3.1), then it would seem that the consequentialist should prioritize space colonization. The sooner space colonization begins, the more of its immense opportunity can be gained. Indeed, Ćirković (2002) estimates 5 × 1046 human lifetimes are lost for every century in which space colonization is delayed. There can also be large value for space colonization under ecocentric intrinsic value. It is sometimes argued that Earth would be better off without humans. For example, the Voluntary Human Extinction Movement states that “Phasing out the human race by voluntarily ceasing to breed will allow Earth’s biosphere to return to good health” (http://vhemt.org, accessed 25 October 2015). However, this makes sense only if extraterrestrial locations are not intrinsically valued. Otherwise, exterminating humanity ruins the opportunity for humans to bring flourishing ecosystems into outer space. Terraforming other planets or bringing ecosystems into Dyson swarms could bring immense amounts of ecosystem flourishing.

#### Confusion over space licensing causes resource wars.

**Renstrom 15** [Joelle Renstrom, Lecturer of Rhetoric at Boston University, “Will Mining Celestial Bodies Ruin Space?,” 12/09/15, WBUR, https://www.wbur.org/cognoscenti/2015/12/09/asteroid-mining-joelle-renstrom, EA]

We could certainly use these resources on Earth — especially water, if catastrophic drought predictions are accurate. Of course, asteroid mining companies that sell water to the rest of the world would need to be regulated, but that’s not really a new proposition. As with oil and gas companies, extracting, processing and selling water could promote worldwide competition and boost the economy. But how, exactly, would that competition work? Planetary Resources might be the first asteroid mining company, but it won’t be the last. Once the technology and resources are in place, other companies from the U.S. and elsewhere will join them in the hunt for viable, resource-rich asteroids. And then what? Earth has a history of oil crises, embargoes and conflicts. What’s to prevent similar clashes from arising in space? Perhaps enough asteroids exist to keep companies from various countries out of each other’s way if they can’t share. But the situation could get tricky, especially because the asteroids themselves would remain sovereign territory, as dictated by the 1967 Outer Space Treaty. The new law makes clear its consistency with this Treaty: “the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body.” So no one would own the asteroids, but people would own the spoils. Would other countries recognize that? Would we recognize it if a Chinese or Russian company found a stockpile of platinum on an asteroid? Would asteroid mining become a first-come, first-served proposition? The Asteroid Resources Property Act also paves the way for resource exploitation on planets, such as Mars. One of the primary arguments made for colonizing the Red Planet is its resources. Mars Society founder and colonization advocate Robert Zubrin argues that Mars “is endowed with all the resources needed to support not only life but the actual development of a technological civilization.” These resources include water, carbon, nitrogen, hydrogen, oxygen and deuterium, a rare (on Earth) and valuable hydrogen isotope used to make rocket fuel. As such endeavors become more feasible, their implications raise some slippery-slope fears -- namely, that in addition to lifeless asteroids, planets with the potential for microbial life such as Mars may become competitive mining stations.

#### A global governance framework ensures equitable distribution to prevent resource disparities and solidifies norms against space weaponization/arms races

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The first concern is establishing clear regulations regarding asteroid mining. With an intent to establish clear regulations with respect to asteroid mining and to legalise material extraction from the moon and other celestial bodies by private companies in the US, the US government legalised space mining in 2015 by introducing the US Commercial Space Launch Competitiveness Act, 2015.[xxvii] This move was heartily welcomed by the private companies as it provided legitimacy to their planned activities. Subsequently in 2017, Luxembourg followed suit.[xxviii] While the US has been a spacefaring nation for many decades now, Luxembourg aspires to become a global leader in the nascent race to mine resources in outer space. In the 1980s the tiny European nation arose out of almost nowhere to become a leader in the satellite communications industry; today it is looking to the skies again, hoping to be the Silicon Valley of asteroid mining.[xxix] In the backdrop of a thriving steel industry that faced trade recession during the oil crisis of 1973, Luxembourg is trying to capitalise on the potential of space mining. As Prime Minister Xavier Bettel put it, “We realized it wouldn't be forever, the steel, so we decided to do other things.”[xxx] Similarly, looking beyond oil, the UAE is framing its policy approaches to make advances in two key areas: human space exploration, and commercial activities of resource extraction through mining.[xxxi] The two formal pieces of legislation (passed by the US and Luxembourg) provide an answer to the complex question of ownership in outer space; the two-word answer appears to be, “finders, keepers”. The US Commercial Space Launch Competitiveness Act, 2015 states: “A US citizen engaged in commercial recovery of an asteroid resource or a space resource shall be entitled to any asteroid resource or space resource obtained.”[xxxii] This legislation gives US space firms the right to own, keep, use, and sell the spoils of the cosmos as they deem fit. Luxembourg’s legislation is fairly analogous to the US Act, giving mining companies the right to keep their plunder. However, unlike the US law, Luxembourg’s does not require a company’s major stakeholders to be based in the country to enjoy its safeguards; the only requirement is for that company to have an office in the country.[xxxiii] In 2017, Japan entered into a five-year agreement with Luxembourg for mining operations in celestial bodies. Japan today appears a step closer to realising its objective of asteroid mining with two Japanese rovers, Minerva II-1, of JAXA landing on the surface of the asteroid named Ryugu in September 2018.[xxxiv] Earlier, Portugal and the UAE signed similar cooperation agreements with Luxembourg.[xxxv] Meanwhile, a few other countries—which have been critical of the US and Luxembourg, at the forefront of the space mining efforts—have also decided to join the field. The increasingly competitive and contested nature of outer space activities is spurring major spacefaring nations to push the boundaries in their space exploration. Asteroid mining could possibly become the next big thing and is already seeing a race among the space powers. The US and Luxembourg are at the forefront in space resource extraction in terms of the policy frameworks and funding.[xxxvi] Even as the US has clarified that the US Space Act 2015 is being misunderstood and that there is no change in the US policy towards national appropriation of space, the reality is that it has already spurred a major debate.[xxxvii] China and Russia are among those countries that are following on the path of the US and Luxembourg in undertaking mining missions in space. According to media reports, Ye Peijian, chief commander and designer of China’s lunar exploration programme has stated that China would send the first batch of asteroid exploration spacecraft around 2020.[xxxviii] Speaking to China’s Ministry of Science and Technology-run newspaper, Science and Technology Daily, Ye said that these asteroids have a high concentration of precious metals, which could rationalise the huge cost and risks involved in these activities as their economic value could run into the trillions of US dollars. Therefore, extraction, mining and transporting them back to Earth through robotic equipment will be a significant activity. Chinese scientists are working on missions to “bring back a whole asteroid weighing several hundred tonnes, which could turn asteroids with a potential threat to Earth into usable resources.”[xxxix] Ye was also quoted as saying that China has plans of “using an asteroid as the base for a permanent space station.”[xl] Helium mining on the moon is also part of China’s goals.[xli] Russia, for its part, is also responding to the space-mining developments of the last decade. For one, it plans to have a permanent lunar base somewhere between 2015 and 2020 for possible extraction of Helium.[xlii] Even as Russia’s official position on asteroid mining is that it is forbidden under the 1967 OST—which states that space is the “province of mankind”—the Russian industry players are of the view that they must follow the lead taken by the US and Luxembourg.[xliii] In early 2018, the director of the Scientific-Educational Center for Innovative Mining Technologies of the Moscow-based National University of Science and Technology MISIS (NUST MISIS), Pavel Ananyev, spoke about the Russian ambitions and proposed activities including space drilling rigs, water extraction on the Moon and 3D printers at space stations.[xliv] Russia’s private space companies including Dauria Aerospace, one of the first Russian private space companies, also hold the opinion that they must go forward in the same direction and call for a larger space to private sector to engage in extracting space resources.[xlv] Moscow may not have yet actively pursued space mining and resource extraction, but it is likely to pick up pace in the coming years alongside global efforts. Moscow clearly has a capacity gap in terms of funding because its earlier plans to have a permanent base in the Moon by 2015 is yet to happen. India, too, has ambitions in extraterrestrial resource extraction. In fact, a year after the US legislation, Prabhat Ranjan, executive director of Technology Information, Forecasting and Assessment Council (TIFAC), a policy organisation within the Department of Science and Technology, made a case for India to push ahead with lunar and asteroid mining. He said, “Moon is already being seen as a mineral wealth and further one can go up to the asteroids and start exploiting this. This can be a big game changer and if India doesn’t do this, we will lag behind.”[xlvi] More recently, Dr. K Sivan, Chairman of the country’s civil space organisation, Indian Space Research Organisation (ISRO), talked about ISRO’s plans for helium-3 extraction and said, “the countries which have the capacity to bring that source from the moon to Earth will dictate the process. I don’t want to be just a part of them, I want to lead them.”[xlvii] However, gaining proficiency in such missions is not easy – the NASA and ESA (the European Space Agency) have been discussing these possibilities for a longer time, albeit quietly. The ISRO Chairman’s response was characterised by an Indian commentator as “aspirational” and “emotional”, clearly conceding that the country’s technological wherewithal is yet to be adequate.[xlviii] Importantly, it is not clear how the legal and regulatory aspects of space mining operations are being dealt with. There was one instance, though, when Luxembourg and Japan in a joint press statement said, “The exchange of information may cover all the issues of the exploration and commercial utilization of space resources, including legal, regulatory, technological, economic, and other aspects.”[xlix] Whether such legalisation is truly legal is arguable. Space Mining: Legal or Not? The Outer Space Treaty (OST) of 1967, considered the global foundation of the outer space legal regime, along with the other four associated international instruments have provided the fundamental basis for outer space activities by prohibiting certain activities and emphasising aspects such as the “common heritage of mankind”. These agreements have been useful in highlighting the global common nature of outer space. At the same time, however, they have been insufficient and ambiguous in providing clear regulations to newer space activities such as asteroid mining. Based on the premise of ‘res communis’, the magna carta of space law, the OST, illustrates outer space as “the province of all mankind”.[l] Under Article I, States are free to explore and use outer space and to access all celestial bodies “on the basis of equality and in accordance with international law.”[li] Although the OST does not explicitly mention “mining” activities, under Article II, outer space including the Moon and other celestial bodies are “not subject to national appropriation by claim of sovereignty” through use, occupation or any other means.[lii] Furthermore, the Moon Agreement, 1979, not only defines outer space as “common heritage of mankind” but also proscribes commercial exploitation of planets and asteroids by States unless an international regime is established to govern such activities for “rational management,” “equitable sharing” and “expansion of opportunities” in the use of these resources.[liii] Slipping conveniently through the loophole in the OST, both the US and Luxembourg have authorised companies to claim exclusive ownership over extracted resources (but not of the asteroid itself). Proponents argue that since no sovereign nation is actually asserting rights over an area of outer space, instead, it is only a private unit claiming rights over singular resources, the treaty norm, “national appropriation by claim of sovereignty”, is not being violated. In the words of renowned space lawyer, Frans von der Dunk, “In terms of the law, yes it’s true that no country can claim any part of outer space as national territory — but that doesn’t mean private industry can’t mine resources.”[liv] Quoting reference from maritime law, Luxembourg regards space resources as appropriable akin to fish and shellfish, but celestial bodies and asteroids are not, just like the high sea. It is noteworthy that out of the only 18 nations that have ratified the Moon Agreement,[lv] none are major spacefaring nations, thereby giving themselves a convenient leeway to not abide by the same. These unilateral initiatives have set off a critical response from the international community. Applying literal interpretation of the OST, there is certainly room to construe that space mining may be legal, compared to the Moon Agreement whose prohibition is absolute. However, taking into consideration the letter and spirit of the OST, strengthened by the Moon Agreement, the argument that “national appropriation” only extends to appropriation of territory and not appropriation of resources is a far reach. That resource extraction is contemplated, albeit implicitly, in the OST, is nothing but logical. Not only have such claims of possessory rights not been recognised in the past, there is also global consensus regarding its illegality.[lvi] It therefore forms a part of customary international law, despite the Moon Agreement not having been widely ratified. In this light, the legalisation of space mining is a sheer violation of the elemental principles of international space law. Yet, there is no clarity on what activity is allowed and what is prohibited in outer space under the existing law.[lvii] There is ambiguity around most issues—from “who would license and regulate asteroid mining operations” to the legality of these activities as per the existing international space law.[lviii] When comparing it to the law of the seas, resource appropriation in the high seas and deep seabed is governed by the United Nations Convention on the Law of the Sea (UNCLOS), 1982, and that in Antarctica, as per the Protocol on Environmental Protection to the Antarctic Treaty, 1991. While the former is strictly regulated under Part XI of UNCLOS, the latter is completely forbidden but for scientific purposes. The law of the sea argument—“owning the fish, not the sea”—cannot be applied to outer space primarily because fish are living resources that can reproduce and therefore are renewable. Outer space resources, on the other hand, are depletable: once harvested, they cannot be replenished. The analogy with fish and seas, therefore, is not a fair one and its transposition to outer space and celestial bodies would be inaccurate. Perhaps a more comparable regime is the deep seabed, which contemplates property rights over mineral extraction. The utilisation and ownership of the deep seabed’s resources are exclusively structured around the International Seabed Authority (ISA), which is responsible for organising, carrying out and controlling all activities in the seabed.[lix] Not only must State parties seek sanction from the ISA before beginning resource exploitation, but the fiscal benefits from seabed mining must also be shared among all.[lx] Evidently, even the UNCLOS upholds State ownership and fair distribution over individual ownership and self-centred gains.[lxi] By allowing private ownership, the US and Luxembourg are once again in contravention of the very same law they are relying on. The touchstone principle, “province of all mankind” is also being defeated. Therefore, to even reap the limited benefits as under UNCLOS, at least the derivation must be made alike. This argument too falls flat. The Way Ahead Undoubtedly, growing technological adeptness has made space mining inevitable and, therefore, the question is no longer “if” but “when”. Nevertheless, a scenario where companies can, solely based on domestic laws, steadily exploit mineral resources in outer space, would be universally unacceptable. Minus regulations, the realisation of space exploitation will create great disparity between nations and disrupt dynamics of the world economy. Regulations are particularly important in the context of the space debris problem. We definitely do not wish for a future, befittingly described by renowned engineer and inventor Graham Hawkes, thus: “Space exploration promised us alien life, lucrative planetary mining, and fabulous lunar colonies. News flash, ladies and gents: Space is nearly empty. It’s a sterile vacuum, filled mostly with the junk we put up there.”[lxii] Therefore, it is extremely important that resource appropriation is carried out in an ethical manner, without interrupting safe and secure access to outer space, simultaneously allowing all countries a share in the proceeds. Technological advances and financial readiness are pushing both, states and non-state players towards new ventures in outer space. Yet, the rules of engagement especially dealing with the new commercial activities are far from ideal. There is a clear and urgent need to debate and come up with either a new regulation or accommodate the space mining activities within the existing international legal measures. Experts have articulated that these could possibly be addressed under the existing property law principles or old mining law principles.[lxiii] However, given the scale of activities that states and non-state parties will engage in, the ability of the existing regime to address space mining could be highly inadequate. The second option would be to develop a new instrument including an institutional architecture that would set out the parameters for activities related to resource extraction and space mining. Since there are a good number of commercial players playing a formidable role in asteroid mining, there has to be space for commercial players in the new gig, which might be a big departure from the earlier era institutions that saw states being the sole authority in regulating activities in outer space. A clear role for commercial players has been articulated for some time but the global space community has yet to reach a consensus in how they can be incorporated into the global governance debates. The apprehension on the part of a number of states is driven by the fact that private sector participation is still largely a western phenomenon. This trend may be undergoing change in other parts of the world but until there is a sizeable private sector community in other major spacefaring powers, there is a fear that the western bloc of countries may stand to gain from the industry being represented in the global governance debates. A third possible option is to get a larger global endorsement of the Moon Treaty, which highlights the common heritage of mankind. The Moon Treaty is important as it addresses a “loophole” of the OST “by banning any ownership of any extraterrestrial property by any organization or private person, unless that organization is international and governmental.”[lxiv] But the fact that it has been endorsed only by a handful of countries makes it a “failure” from the international law perspective.[lxv] Nevertheless, efforts must be made to strengthen the support base for the Moon Agreement given the potential pitfalls of resource extraction and space mining activities in outer space. Signatories to the Moon Treaty can take the lead within multilateral platforms such as the UN to debate the usefulness of the treaty in the changed context of technological advancements and new geopolitical dynamics, and potentially find compromises where there are disagreements. Pursuing a collective approach is ideal. An example is UNCLOS, which demonstrates that the international society possesses the capability of regulating mining quarters deemed to be the “province of mankind”. However, a sui generis legal framework must be crafted because the difference between the marines and outer space and their resources is wide, and the regulations are too region-specific to permit a superimposition of the oceanic regime to outer space. A sound legal environment will protect both the company performing operations and its beneficiaries, while ensuring even-handed resource allocation. In addition, regulations spelling out safety standards and identifying safety zones around mining operations could be useful in ensuring safe and secure operations in outer space. It would be wrong, however, to say that the international community has not debated over this. In fact, one of the main agenda points of the fifty-seventh session of UNCOPUS Legal Committee held in April 2018, was especially devoted to “general exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources.”[lxvi] Upon evaluation, it is clear that countries are not against space mining as such; rather the contentious points are vis-à-vis authorisation, regulation, and where to place responsibility. There also appears to be concurrence regarding the need for international coordination efforts of some sort. Over the last two years, The Hague Space Resources Governance Working Group,[lxvii] established with the purpose of “assess[ing] the need for a regulatory framework for space resource activities, has identified 19 “building blocks”,[lxviii] encompassing subject matters that could be included in such a regulatory framework. Although this leaves a lot of hope for the legitimate mining of space resources, its status is still pending. Also, several questions need to be agreed upon by the global space policy community before the establishment of a framework. First, there must be an agreement among all the space powers on the need for a global governance framework for the use of space resources. This must be followed by detailed deliberations on the scope, mandate and objectives of such a framework. Can and should there be safety zones and exclusive rights be recognised under such a framework and how one can ensure equitable sharing of the resources, and lastly, the role of industries and how the interests of the industry as pioneers in this area can be secured. These are all pertinent questions that need to be considered and debated before an international regime for extraction and use of space resources can be established.[lxix] Even legal space mining activity could have serious impacts in two ways. For instance, any technological spinoffs that a country might have could add to the space weaponisation debate. Two, the erosion of norms with regard to space mining could have a cascading effect on other norms in the same issue area such as weaponisation of space. It is imperative for nations to actively combine their efforts to ensure that this activity transpires in the most globally acceptable manner and not one which stirs anarchism. The ancient Roman maxim, ‘Quod omnes tangit ab omnibus approbatur’ (What touches all must be approved by all) gains due traction in this kind of a scenario. Therefore, a universal activity like space exploration mandates an international guideline; or else, the first haul from mining, instead of earning admiration and exultation, will only be enmeshed in litigation.

#### Resource wars go nuclear.

**Cribb 17** [Julian Cribb, Fellow of the Australian Academy of Technological Sciences and Engineering, “Surviving the 21st Century,” 2017, Springer, pp. 73-75, EA]

While the media tendency to dramatise war invariably throws the spotlight on the ideological, religious, racial or political factors propelling the combatants, in reality disputes over resources have underlain or exacerbated most conflicts historically. Were we able to interview the combatants in that stone-age Gwion Gwion rock painting, it is likely they would tell us it was an argument over hunting rights or a water hole, that led to that historic discharge of weapons. In the case of World War II, more mythologised that any conflict (Weber 2008), resources played a central role in precipitating war. As early as the 1920s, Hitler telegraphed his intention of taking large areas of Eastern Europe as ‘lebensraum (living space for German farmers) in response to a feeling common among Germans at the time that there was a national overpopulation crisis. Subsequent histories concluded that for the Hitler and the Nazis, lebensraum was in fact their most important foreign policy goal (Messerschmidt 1990). German military strategy was also significantly dictated by the need to acquire oil and coalfields as well as farms in Russia, Romania and elsewhere. Japan—as an industrial and military economy—was also critically short of oil, depending for most of its needs on imports from the US. Acquiring its own oil supplies formed a central plank in its motivation for war and military planning, and led to its invasion of Indochina. When America countered with a total trade and oil embargo on Japan in July 1941, war between the two became inevitable, as the Roosevelt Administration duly recognised at the time (Children in History 2012). The pattern of Japanese conquest of southeast Asia and the Pacific islands was strategically driven by its need to acquire and defend oil, rubber, food and other resources from Indonesia, Malaya, southern China and the Philippines. Up to half of all inter-state wars since 1973 have been linked to oil, says Jeff Colgan of the Harvard Kennedy School. “Although the threat of‘resource wars’ over possession of oil reserves is often exaggerated, the sum total of the political effects generated by the oil industry makes oil a leading cause of war. Between one-quarter and one-half of interstate wars since 1973 have been connected to one or more oil-related causal mechanisms. No other commodity has had such an impact on international security,” he says. Colgan identifies eight different ways in which oil helps precipitate, stoke or underpin conflict and warns that the number of security concerns is multiplying as new oil exporters enter the global market (Colgan 2013). It follows that ceasing to use oil will remove a major driver of conflict. In 1999 the Oslo Peace Research Institute issued a ground-breaking paper by Indra de Soysa and Nils Gleditsch which drew attention to the fact that, in the first decade of the post-Cold War era, most conflicts began with development failure and contests between the different players over those fundamental resources for life: food, land and water. “The new internal wars, extremely bloody in terms of civilian casualties, reflect subsistence crises and are largely apolitical,” they said (De Soya and Gleditsch 1999). This represented a challenge to the long-held academic view that scarcity is a product of war—rather than war a being product of scarcity. In fact, humans have always contested key resources vi et armis—and politics, religion, patriotism and ethnicity are just the way we tend to marshal ourselves into opposing groups around them. Peter Gleick’s work on water conflicts lends substance to the warnings of two UN chiefs, Boutros Boutros-Ghali and Ban Ki-Moon, of the increased danger of wars breaking out over this indispensable resource as scarcity takes hold. ‘Food wars’ (including so-called ‘fish wars’) have erupted on numerous occasions in Africa—where the Rwandan genocide and drawn-out bloody conflicts in Darfur and the Horn of Africa are particular examples—but also in Central America and Asia (Messer et al. 1998). These fights are almost always over the fundamentals of human survival and tend to originate as civil conflicts, which then spiral out of control to embroil neighbour states and even the superpowers. From the depth of his experience as both a farmer and an international statesman, former US president Jimmy Carter observed that modern wars almost invariably begin in poor countries where resources and people are stressed— seldom in rich ones or in democracies. Writing in the International Herald Tribune, he said “The message is clear. There can be no peace until people have enough to eat. Hungry people are not peaceful people” (Carter 1999a). In the emerging era of resource instability, described in Chap. 3, the risk of war is liable to increase in proportion to the scarcity of essential resources, be they water, farm land, food itself, oil, gas or strategic minerals. The possibility that some of these conflicts will involve the discharge of chemical, biological or nuclear weapons cannot be discounted. For example, in their Age of Consequences report, Kurt Campbell and colleagues at the US Center for Strategic and International Studies (CSIS) foreshadowed that with the famines and global disruption arising out of severe climate change (2.6 °C, in their scenario) “It is clear that even nuclear war cannot be excluded as a political consequence. Moreover, so-called “limited nuclear war” in any part of the world can escalate to a full-scale nuclear exchange among the big nuclear powers.” With catastrophic change of 5° or more, “The probability of conflict between two destabilized nuclear powers would seem high.” Furthermore “Armed conflict between nations over resources and even territory, such as the Nile and its tributaries, is likely, and nuclear war is possible” (Campbell et al. 2007).

#### Space Arms Races go nuclear

**Grego 18** [Laura Grego, Stanton Nuclear Security Fellow at MIT’s Laboratory for Nuclear Security and Policy, on leave from the Union of Concerned Scientists’ Global Security Program, where she is senior scientist and research director, “Space and Crisis Stability,” 03/19/18, https://www.law.upenn.edu/live/files/7804-grego-space-and-crisis-stabilitypdf, EA]

For the foreseeable future, military tensions between the United States, China, and Russia are likely to remain high, as are those between China and India. Even absent intentional confrontation, regional problems, such as those in the Baltics and East and South Asia, have the potential to draw these actors into conflict. Thus, it is imperative to pay attention to any pathways that could lead an actor considering crossing the nuclear threshold, or approaching it very closely. The United States and Russia continue to retain large nuclear arsenals on high alert1 . Each are developing new strategic weapons, including hypersonic conventional prompt global strike systems with a suggestion mission of holding ground-based anti-satellite weapons at risk.2 Russia has declared the existence of novel nuclear delivery systems as a response to US missile defense systems,3 weapons which complicate the management of crises. China is reportedly considering increasing the size, capacity and alert status of its nuclear weapons delivery systems4 and is also developing new kinds of strategic weapons. China is also developing hypersonic weapons,5 and the ingredients for an arms race around these technologies is in place. India continues to increase the sophistication of its strategic posture. And India, China, Russia and the United States have or are pursuing missile defense technologies that are important both in the nuclear realm but in space issues, since missile defenses present demonstrated or inherent antisatellite capabilities. Thus it is critical to ensure that in times of tension, no actor escalates the crisis inadvertently or against their better judgment, and that misperception does not play an important role in the initiation or progress of the crisis. And that hostilities, if initiated, resolve as quickly as possible. Thomas Schelling‘s encapsulated an aspect of this idea in his landmark work this way: This is the problem of surprise attack. If surprise carries an advantage, it is worth while [sic] to avert it by striking first. Fear that the other may be about to strike in the mistaken belief that we are about to strike gives us a motive for striking, and so justifies the other‘s motive. But if the gains from even successful surprise are less desired than no war at all, there is no “fundamental” basis for an attack by each side. Nevertheless, it look as though a modest temptation on each side to sneak in the first place — a temptation too small by itself to motivate an attack — might become compounded through a process of interacting expectations, with additional motive for attack being produced by successive cycles of ―He thinks we think he thinks we think … ~~he~~ think we think ~~he~~‘ll attack; so he thinks we will; so he will; so we must.6 This suggests that it is important to make the advantage of surprise attack negligible and the disadvantages as great as possible, to make sure that all actors understand this, and to make sure that actors have as clear an understanding of each other‘s motivations as possible to avoid miscalculation. In the last twenty years, space assets have become important not only for strategic missions but also increasingly underpin conventional military force for modern militaries, and especially those with expeditionary forces, such as the United States. They are essential not only for militaries, but are a critical provider of essential civilian, commercial, and scientific services. Not only do satellites perform many more missions than they have in the past, there are many more spacefaring nations. While most satellites belong to the United States, Russia, and China, more than sixty countries own satellites or a large stake in one.7 At the same time, the technologies that are useful for holding satellites at risk have grown significantly in sophistication and capacity even in the last decade, and have become more widely available. This is particularly problematic because attacks on satellites can create or escalate terrestrial crises in potentially difficult to predict ways. The world is drifting towards a space regime that faces an ever more prevalent and more sophisticated anti-satellite technology and greater numbers and types of targets in space, with very little mutual understanding about how actions in space are perceived. While space‘s foundational legal document, the 1967 Outer Space Treaty, sets out the principles by which space is used and provides a number of useful, most recognize that more is needed to secure lasting peace on earth and the long-term health of the space environment. Different stakeholders are tackling space security issues from different angles. Under the aegis of the United Nations Conference on Disarmament‘s (UNCD) Prevention of an Arms Race in Space (PAROS) agenda item, Russia and China have invested in the Treaty for the Prevention of the Placement of Weapons in Outer Space, a comprehensive ban on the deployment of space-based weapons and on threats of any kind against satellites. 8 The United States has stated that it sees little value in this treaty, but has not proposed revisions that would make it more acceptable nor suggested its own preferred legally-binding treaty. And the UNCD has struggled to extricate itself from a deadlock that has kept it from moving forward on discussions on this (and all other) topics. Others have suggested a ban on destructive anti-satellite weapons development and testing,9 and limits on exoatmospheric missile defense tests.10 These efforts have not yet produced any appreciable progress. Others prefer the approach of starting with confidence building and transparency measures that are politically binding rather than legally binding. The European Union moved forward a Code of Conduct for Outer Space Activities, 11 which would set out rules of the road for space, creating transparency and building confidence. It did not address directly core security issues, and the gestures it made in this direction (the requirement by the United States that it include a specific reference to the right of self-defense) created disagreements serious enough to not be easily addressed in this format. The process hit a wall in 2015. A United Nations Group of Governmental Experts, convened to consider TCBMs for space, produced a consensus document,12 though for a number of reasons, little progress has been made on implementing them.13 Perhaps the greatest progress in creating new guidelines has come under the aegis of protecting the long-term sustainability of space. (While the long-term sustainability of space does imply that core security questions are solved enough to not threaten the space environment, work on this topic does not take the issue head-on.) The United Nations Committee on the Peaceful Uses of Outer Space has drafted a set of such guidelines which will be referred to the General Assembly in 2018.14 For its part, the United States, currently the most heavily invested in space in sheer capacity and in posture, is investing significant intellectual energy in creating a deterrence strategy to protect its military interests in space. While this is closely related to crisis stability, this work is distinctly from a US point of view. Each of these approaches have something distinct to offer. The aim of this paper, however, is to look at the issue differently and to use crisis stability (rather than, e.g., preventing an arms race, preserving the space environment) as an organizing principle or lens to help identify which facets of space activities are particularly dangerous, and to prioritize the existing initiatives, as well as to offer other unilateral and collaborative actions that can help reduce the pathways to confrontation between nuclear powers. 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. For example, the United States is the country most heavily dependent on military space assets. Its proportionally higher commitment to expeditionary forces make this likely to be true well into the future. So while the United States seeks to create a deterrence framework, punishment-based deterrence would not likely target its adversary‘s space assets. But then there is difficulty finding target on the ground that would be credible but also not unpredictably escalate a crisis. If an American military satellite were attacked but without attendant human casualties (‗satellites have no mothers‘), retaliation on an adversary‘s ground-based target is likely to escalate the conflict, perhaps justifying the adversary‘s subsequent claim to self-defense, even if the initial satellite attack didn‘t support such a claim. Little experience in engaging substantively in these issues Related to this issue is that there is relatively little experience among the major space actors in handling a crisis with the others. The United States and the Soviet Union, then Russia, have had a long history of strategic discussions and negotiations. This built up a shared understanding of each other‘s point of view, developed relationships between those conducting those discussions, and created bureaucracies and expertise to support those discussions. This experience and these relationships are important to interpreting events and to resolving disputes before they turn into a crisis, and to managing one once it begins. There is nothing like this level of engagement around space issues between these two states, and much less between the US and China. One of the participants in a 2010 US space war game, a diplomatic veteran, imagined25 how things would play out if one or more militarily important US satellites failed amidst a crisis with an adversary known to have sophisticated offensive cyber and space capabilities: The good news is that there has never been a destructive conflict waged in either the space or cyber domains. The bad news is that no one around the situation room table can cite any history from previous wars, or common bilateral understandings with the adversary, relating to space and cyber conflict as a guide to what the incoming reports mean, and what may or may not happen next. This is the big difference between the space-cyber domains, and the nuclear domain. There is, in this future scenario, no credible basis for anyone around the president to attribute restraint to the adversary, no track record from which to interpret the actions by the adversary. There is no crisis management history: the president has no bilateral understandings or guidelines from past diplomatic discussions, and no operational protocols from previous incidents where space and cyber moves and counter-moves created precedents. Perhaps the adversary intended to make a point with one series of limited attacks, and hoped for talks with Washington and a compromise; but for all the president knows, sitting in the situation room, the hostile actions taken against America‘s space assets and information systems are nothing less than early stages of an all-out assault on US interests.

#### That turns good mining – only reclassifying space property solves.

**Yan 18** [Laura Yan, citing Ramin Skibba, an astrophysicist, ”Should We Really Be Mining in Space?,” 05/05/18, *Popular Mechanics*, https://www.popularmechanics.com/space/a20195040/should-we-be-really-be-mining-in-space/]

Imagine, for instance, an asteroid that contains as many platinum-group metals as all reserves on Earth. Businesses will compete for the precious resource, and the competing may soon turn into battle by armed satellites, which can lead back to conflicts on Earth. The act of mining itself could also be dangerous: if space-mining break up asteroids, it could harm other satellites, spacecrafts and astronauts. Commerical space mining could lead to conflicts between profitability and public interest. "Once you’re on board with the commercial space industry, then you as a researcher must accept, if not support, everything that comes with it," Skibba writes. "To succeed, these businesses will seek profitable missions, while science, exploration, and discovery—goals that stimulate public interest—will inevitably have lower priority," The solution, according to Skibba, is to treat outer space as we do Antarctica: a place to encourage scientific investigation and discourage territorial claims. It's a commendable idea, but is it likely? Last week, President Trump has already suggested the idea of adding a "Space Force" to the military. According to The Independent, "experts have warned that space will be increasingly contested in years to come, as increasingly complex weapons are built and more opportunities are opened up for exploring the area outside the Earth."

#### Unregulated mining independently causes massive debris

Edd **Gent 20,** freelance science and technology writer, “Space Mining Should Be a Global Project—But It's Not Starting Off That Way,” Singularity Hub, 10-12-2020, https://singularityhub.com/2020/10/12/the-us-is-trying-to-hijack-space-mining-and-there-could-be-disastrous-consequences/

Exploiting the resources of outer space might be key to the future expansion of the human species. But researchers argue that the US is trying to skew the game in its favor, with potentially disastrous consequences. The enormous cost of lifting material into space means that any serious effort to colonize the solar system will require us to rely on resources beyond our atmosphere. Water will be the new gold thanks to its crucial role in sustaining life, as well as the fact it can be split into hydrogen fuel and oxygen for breathing. Regolith found on the surface of rocky bodies like the moon and Mars will be a crucial building material, while some companies think it will eventually be profitable to extract precious metals and rare earth elements from asteroids and return them to Earth. But so far, there’s little in the way of regulation designed to govern how these activities should be managed. Now two Canadian researchers argue in a paper in Science that recent policy moves by the US are part of a concerted effort to refocus international space cooperation towards short-term commercial interests, which could precipitate a “race to the bottom” that sabotages efforts to safely manage the development of space. Aaron Boley and Michael Byers at the University of British Columbia trace back the start of this push to the 2015 Commercial Space Launch Competitiveness Act, which gave US citizens and companies the right to own and sell space resources under US law. In April this year, President Trump doubled down with an executive order affirming the right to commercial space mining and explicitly rejecting the idea that space is a “global commons,” flying in the face of established international norms. Since then, NASA has announced that any countries wishing to partner on its forthcoming Artemis missions designed to establish a permanent human presence on the moon will have to sign bilateral agreements known as Artemis Accords. These agreements will enshrine the idea that commercial space mining will be governed by national laws rather than international ones, the authors write, and that companies can declare “safety zones” around their operations to exclude others. Speaking to Space.com Mike Gold, the acting associate administrator for NASA’s Office of International and Interagency Relations, disputes the authors’ characterization of the accords and says they are based on the internationally-recognized Outer Space Treaty. He says they don’t include agreement on national regulation of mining or companies’ rights to establish safety zones, though they do assert the right to extract and use space resources. But given that they’ve yet to be released or even finalized, it’s not clear how far these rights extend or how they are enshrined in the agreements. And the authors point out that the fact that they are being negotiated bilaterally means the US will be able to use its dominant position to push its interpretation of international law and its overtly commercial goals for space development. Space policy designed around the exploitation of resources holds many dangers, say the paper authors. For a start, loosely-regulated space mining could result in the destruction of deposits that could hold invaluable scientific information. It could also kick up dangerous amounts of lunar dust that can cause serious damage to space vehicles, increase the amount of space debris, or in a worst-case scenario, create meteorites that could threaten satellites or even impact Earth. By eschewing a multilateral approach to setting space policy, the US also opens the door to a free-for-all where every country makes up its own rules. Russia is highly critical of the Artemis Accords process and China appears to be frozen out of it, suggesting that two major space powers will not be bound by the new rules. That potentially sets the scene for a race to the bottom, where countries compete to set the laxest rules for space mining to attract investment. The authors call on other nations to speak up and attempt to set rules through the UN Committee on the Peaceful Uses of Outer Space. Writing in The Conversation, Scott Shackelford from Indiana University suggests a good model could be the 1959 Antarctic Treaty, which froze territorial claims and reserved the continent for “peaceful purposes” and “scientific investigation.” But the momentum behind the US’ push might be difficult to overcome. Last month, the agency announced it would pay companies to excavate small amounts of regolith on the moon. Boley and Byers admit that if this went ahead and was not protested by other nations, it could set a precedent in international law that would be hard to overcome. For better or worse, it seems that US dominance in space exploration means it’s in the driver’s seat when it comes to setting the rules. As they say, to the victor go the spoils.

#### Debris from mining destroys satellites

**Scoles 15** Sarah Scoles [Freelance science writer, and a contributing writer at WIRED Science, with articles in places like Popular Science, the New York Times, Scientific American, Vice, Outside, and others.], 5-27-2015, "Dust from asteroid mining spells danger for satellites," New Scientist,<https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/> DD AG

IF THE gold mine is too far from home, why not move it nearby? It sounds like a fantasy, but would-be miners are already dreaming up ways to drag resource-rich space rocks closer to home. Trouble is, that could threaten the web of satellites around Earth. Asteroids are not only stepping stones for cosmic colonisation, but may contain metals like gold, platinum, iron and titanium, plus life-sustaining hydrogen and oxygen, and rocket-fuelling ammonia. Space age forty-niners can either try to work an asteroid where it is, or tug it into a more convenient orbit. NASA chose the second option for its Asteroid Redirect Mission, which aims to pluck a boulder from an asteroid’s surface and relocate it to a stable orbit around the moon. But an asteroid’s gravity is so weak that it’s not hard for surface particles to escape into space. Now a new model warns that debris shed by such transplanted rocks could intrude where many defence and communication satellites live – in geosynchronous orbit. According to Casey Handmer of the California Institute of Technology in Pasadena and Javier Roa of the Technical University of Madrid in Spain, 5 per cent of the escaped debris will end up in regions traversed by satellites. Over 10 years, it would cross geosynchronous orbit 63 times on average. A satellite in the wrong spot at the wrong time will suffer a damaging high-speed collision with that dust. The study also looks at the “catastrophic disruption” of an asteroid 5 metres across or bigger. Its total break-up into a pile of rubble would increase the risk to satellites by more than 30 per cent (arxiv.org/abs/1505.03800). That may not have immediate consequences. But as Earth orbits get more crowded with spent rocket stages and satellites, we will have to worry about cascades of collisions like the one depicted in the movie Gravity.

#### Satellite destruction causes nuclear war

**Egeli 21** [Sitki Egeli is an assistant professor in the Political Science and International Relations Department of Izmir University of Economics. He was previously a director for foreign affairs in Turkey’s Undersecretariat for Defense Industries (SSM) and vice president in charge of the defense and aerospace sectors of an international consulting firm.] “Space-to-Space Warfare and Proximity Operations: The Impact on Nuclear Command, Control, and Communications and Strategic Stability,” Published 25 Jun 2021,<https://www.tandfonline.com/doi/full/10.1080/25751654.2021.1942681>, VM

“Amid increased tensions, perhaps even an imminent military confrontation between two nuclear-armed adversaries, a high-value (for example, early-warning or strategic communication) satellite stops functioning or communicating instantly and inexplicably. SSA sensors do not pick up any anomalies. This may be the outcome of a technical malfunction or a natural phenomenon, such as the impact of a collision with a meteoroid or piece of space debris small enough to have evaded detection. Alternatively, the satellite perhaps becomes the victim of a deliberate, undetected attack. Earth-to-space kinetic, electronic, or directed energy attacks would leave behind some trails. A cyberattack, which is harder to detect and attribute, is a strong possibility. So is a stealthy attack by hostile spacecraft. In fact, the adversary is known to have experimented with ominous small spacecraft that could easily conceal or disguise themselves until conducting a final maneuver to neutralize their targets. The victim would also be aware that, especially at distant GEO and HEO altitudes, SSA is not sufficiently comprehensive to detect and give warning of all suspicious or threatening movements as they happen. As suspicions abound, decision makers are faced with hard choices. Could this perhaps be the harbinger of a wider nuclear or nonnuclear first strike, along with which the attacker is seeking to eliminate the possibility of retaliation by degrading the defender’s capacity to command, control, and communicate with its forces? Should the defender react immediately before the remaining space-enabled NC3 elements are also compromised and its control over nuclear and nonnuclear forces degrades even further? In the absence of a clear-cut picture of what actually has happened, there is a risk that impending decisions will be made on the basis of insufficient and potentially erroneous information, and the climate will be ripe for unfounded presumptions and predispositions. The resulting ultimatums, responses, or counteractions could set off a dangerous cycle of escalation and tit-for-tat actions, whereby reactions and overreactions between adversaries lead to potentially catastrophic consequences. At a minimum, heightened tension in orbit would have the outcome of spilling down to Earth so as to further aggravate an already tense situation.?”

#### Any nuclear war causes extinction – ice age and famine.

Steven **Starr 15** [Director of the University of Missouri’s Clinical Laboratory Science Program, as well as a senior scientist at the [Physicians for Social Responsibility](http://www.psr.org/). He has worked with the Swiss, Chilean, and Swedish governments in support of their efforts at the United Nations to eliminate thousands of high-alert, launch-ready U.S. and Russian nuclear weapons. “Nuclear War: An Unrecognized Mass Extinction Event Waiting To Happen.” Ratical. March 2015.<https://ratical.org/radiation/NuclearExtinction/StevenStarr022815.html>] TG

A war fought with 21st century strategic nuclear weapons would be more than just a great catastrophe in human history. If we allow it to happen, such a war would be a mass extinction event that [ends human history](https://ratical.org/radiation/NuclearExtinction/StarrNuclearWinterOct09.pdf). There is a profound difference between extinction and “an unprecedented disaster,” or even “the end of civilization,” because even after such an immense catastrophe, human life would go on. But extinction, by definition, is an event of utter finality, and a nuclear war that could cause human extinction should really be considered as the ultimate criminal act. It certainly would be the crime to end all crimes. The world’s leading climatologists now tell us that nuclear war threatens our continued existence as a species. Their studies predict that a large nuclear war, especially one fought with strategic nuclear weapons, would create [a post-war environment in which for many years it would be too cold and dark to even grow food](http://climate.envsci.rutgers.edu/pdf/RobockToonSAD.pdf). Their findings make it clear that not only humans, but most large animals and many other forms of complex life would likely vanish forever in a nuclear darkness of our own making. The environmental consequences of nuclear war would attack the ecological support systems of life at every level. Radioactive fallout, produced not only by nuclear bombs, but also by the destruction of nuclear power plants and their spent fuel pools, would poison the biosphere. Millions of tons of smoke would act to [destroy Earth’s protective ozone layer](https://www2.ucar.edu/atmosnews/just-published/3995/nuclear-war-and-ultraviolet-radiation) and block most sunlight from reaching Earth’s surface, creating Ice Age weather conditions that would last for decades. Yet the political and military leaders who control nuclear weapons strictly avoid any direct public discussion of the consequences of nuclear war. They do so by arguing that nuclear weapons are not intended to be used, but only to deter. Remarkably, the leaders of the Nuclear Weapon States have chosen to ignore the authoritative, long-standing scientific research done by the climatologists, research that predicts virtually any nuclear war, fought with even a fraction of the operational and deployed nuclear arsenals, will leave the Earth essentially uninhabitable.

#### Independently, controls the internal link to solving every existential crisis–warming, disease, food, etc

Dylan **Taylor**, 5-11-**2020**, "Space technologies can help solve Earth's challenges (op-ed)," Space,<https://www.space.com/space-technologies-help-solve-earth-challenges.html> //SR

Many people may not recognize that the development of space exploration technologies has already helped benefit Earth in many ways, especially when it comes to communications, Earth observation and even fostering economic growth. Space technologies are surprisingly critical in impacting government, industry and personal daily decision-making. However, with more planetary-wide troubles such as climate change, humanitarian crises, mass migration and others on the horizon, how effectively can we rely on space technologies to sustain our own Earth and life on it? Combating climate change Climate change is altering environments across the globe, causing harsh superstorms and weather patterns that are an ever-increasing threat to the sustainability of life on Earth. However, space satellites can do much more than simply predict daily weather forecasts. Space systems can save thousands of lives from extreme weather each year. Before satellite technology, major disaster incidents like the 1900 Galveston, Texas, hurricane killed from 6,000 to 12,000 people because there were no early-warning systems allowing people to get out of harm's way. NASA's satellite data was the first to reveal a massive hole in the ozone layer over the South Pole. Just over a decade ago, we weren't yet using weather apps or online mapping applications to get to where we're going in efficient ways. Earth-observation satellites monitor greenhouse gases and other climate indicators, while also allowing us to analyze Earth's ecosystem health more effectively. For example, technologies adapted from space use, like GPS and semiconductor solar cells, have dramatically reduced greenhouse gas emissions. GPS navigation reduces fuel use on sea, land and in the air by up to 15 to 21 percent, which is more than what more efficient engines or fuel changes have offered. Solar photovoltaic power, which was first used by NASA on projects like the International Space Station, has led to massive improvements in solar energy performance. In the future, orbital space power stations could continuously send down clean power day or night through targeted radiation, whatever weather conditions on Earth may be. Free from atmospheric events, solar power would be more efficient than current solar technology. Additionally, sending solar power generation to space would free up land and cultural resources from huge panel arrays, and it would also save landfills from discarded solar panel waste. Climate change's impact is also harming agriculture production, fisheries management, freshwater sources and forestry. Earth-observation satellites, however, allow us to track, monitor and identify environmentally harmful activities like illegal logging, animal poaching, fires and mining. The closer we monitor these incidents, the better we can offer early and immediate action to help stop these events. Without these systems in place, we would have no way to assess and deal with climate change in a scientific capacity. Confronting humanitarian crises Not only can using space observations help protect society from climate change, but it can also improve society in the commercial, public health and national safety sectors. World hunger, for instance, is one of the leading humanitarian crises in the world. But satellite imagery can identify crop yield through a magnified view of each pixel, allowing farmers to understand when to water, fertilize and harvest crops. Imaging the land using special spectral bands like near infrared, we can create a vegetation index that represents crop yield productivity. And satellites are uniquely able to capture and collect data on agricultural areas, which make up 37 percent of Earth's landmass. What's more, big data applications of space technology are instrumental to developing nations, which are especially susceptible to natural disasters due to their limited resources. The United Nations Office for Outer Space Affairs (UNOOSA) even has a platform for space-based information for disaster management and emergency response (UN-SPIDER), which uses big data and satellite technology to respond to natural disasters in African countries. With an increasing amount of data from Earth-observation tech, social media, crowdsourced geolocation, virtual tools and internet access, big data can help generate insights that allow us to make better decisions in emergencies while sticking to sustainability goals. The future benefits of space activities In the next 5 to 20 years, we will see a huge transformation in more advanced space technologies. It's expected that satellite megaconstellations, fast point-to-point suborbital transport (which will save on fuel emissions) and asteroid impact prevention (although the technology is still in its infancy) will all make their mark. Megaconstellations are emerging with great promise. These satellite groups can enhance efficiency, capacity and safety to a variety of Earth-based services and business users in the maritime, energy, banking, government and telecommunications sectors. By using big data, megaconstellations will create more latent, higher-speed internet with increased throughput and global coverage that will benefit billions of everyday internet users. Currently, SpaceX, Amazon, Telesat and Samsung all aim to loft huge satellite networks. Space technologies are an integral part of our evolution as a society. As we further explore the cosmos, the level of innovation and exploration needed to do so will help inform how we may purposefully integrate and adapt these tools to benefit our lives down on the surface. While we still have a long journey to evolve these technologies, the track record is there that we can use them to enhance our society and ultimately safeguard our planet, too.

#### Lack of regulations throw asteroids off orbit–causes astro terror and deflection

**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

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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). The 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.

## Framework

#### The standard is minimizing death.

#### Extinction outweighs

**Burns 2017** (Elizabeth Finneron-Burns is a Teaching Fellow at the University of Warwick and an Affiliated Researcher at the Institute for Futures Studies in Stockholm, What’s wrong with human extinction?, <http://www.tandfonline.com/doi/pdf/10.1080/00455091.2016.1278150?needAccess=true>, Canadian Journal of Philosophy, 2017)

Many, though certainly not all, people might believe that it would be wrong to bring about the end of the human species, and the reasons given for this belief are various. I begin by considering four reasons that could be given against the moral permissibility of human extinction. I will argue that only those reasons that impact the people who exist at the time that the extinction or the knowledge of the upcoming extinction occurs, can explain its wrongness. I use this conclusion to then consider in which cases human extinction would be morally permissible or impermissible, arguing that there is only a small class of cases in which it would not be wrong to cause the extinction of the human race or allow it to happen. 2.1. It would prevent the existence of very many happy people One reason of human extinction might be considered to be wrong lies in the value of human life itself. The thought here might be that it is a good thing for people to exist and enjoy happy lives and extinction would deprive more people of enjoying this good. The ‘good’ in this case could be understood in at least two ways. According to the first, one might believe that you benefit a person by bringing them into existence, or at least, that it is good for that person that they come to exist. The second view might hold that if humans were to go extinct, the utility foregone by the billions (or more) of people who could have lived but will now never get that opportunity, renders allowing human extinction to take place an incidence of wrongdoing. An example of this view can be found in two quotes from an Effective Altruism blog post by Peter Singer, Nick Beckstead and Matt Wage: One very bad thing about human extinction would be that billions of people would likely die painful deaths. But in our view, this is by far not the worst thing about human extinction. The worst thing about human extinction is that there would be no future generations. Since there could be so many generations in our future, the value of all those generations together greatly exceeds the value of the current generation. (Beckstead, Singer, and Wage 2013) The authors are making two claims. The first is that there is value in human life and also something valuable about creating future people which gives us a reason to do so; furthermore, it would be a very bad thing if we did not do so. The second is that, not only would it be a bad thing for there to be no future people, but it would actually be the worst thing about extinction. Since happy human lives have value, and the number of potential people who could ever exist is far greater than the number of people who exist at any one time, even if the extinction were brought about through the painful deaths of currently existing people, the former’s loss would be greater than the latter’s. Both claims are assuming that there is an intrinsic value in the existence of potential human life. The second claim makes the further assumption that the forgone value of the potential lives that could be lived is greater than the disvalue that would be accrued by people existing at the time of the extinction through suffering from painful and/or premature deaths. The best-known author of the post, Peter Singer is a prominent utilitarian, so it is not surprising that he would lament the potential lack of future human lives per se. However, it is not just utilitarians who share this view, even if implicitly. Indeed, other philosophers also seem to imply that they share the intuition that there is just something wrong with causing or failing to prevent the extinction of the human species such that we prevent more ‘people’ from having the ‘opportunity to exist’. Stephen Gardiner (2009) and Martin O’Neill (personal correspondence), both sympathetic to contract theory, for example, also find it intuitive that we should want more generations to have the opportunity to exist, assuming that they have worth-living lives, and I find it plausible to think that many other people (philosophers and non-philosophers alike) probably share this intuition. When we talk about future lives being ‘prevented’, we are saying that a possible person or a set of possible people who could potentially have existed will now never actually come to exist. To say that it is wrong to prevent people from existing could either mean that a possible person could reasonably reject a principle that permitted us not to create them, or that the foregone value of their lives provides a reason for rejecting any principle that permits extinction. To make the first claim we would have to argue that a possible person could reasonably reject any principle that prevented their existence on the grounds that it prevented them in particular from existing. However, this is implausible for two reasons. First, we can only wrong someone who did, does or will actually exist because wronging involves failing to take a person’s interests into account. When considering the permissibility of a principle allowing us not to create Person X, we cannot take X’s interest in being created into account because X will not exist if we follow the principle. By considering the standpoint of a person in our deliberations we consider the burdens they will have to bear as a result of the principle. In this case, there is no one who will bear any burdens since if the principle is followed (that is, if we do not create X), X will not exist to bear any burdens. So, only people who do/will actually exist can bear the brunt of a principle, and therefore occupy a standpoint that is owed justification. Second, existence is not an interest at all and a possible person is not disadvantaged by not being caused to exist. Rather than being an interest, it is a necessary requirement in order to have interests. Rivka Weinberg describes it as ‘neutral’ because causing a person to exist is to create a subject who can have interests; existence is not an interest itself.3 In order to be disadvantaged, there must be some detrimental effect on your interests. However, without existence, a person does not have any interests so they cannot be disadvantaged by being kept out of existence. But, as Weinberg points out, ‘never having interests itself could not be contrary to people’s interests since without interest bearers, there can be no ‘they’ for it to be bad for’ (Weinberg 2008, 13). So, a principle that results in some possible people never becoming actual does not impose any costs on those ‘people’ because nobody is disadvantaged by not coming into existence.4 It therefore seems that it cannot be wrong to fail to bring particular people into existence. This would mean that no one acts wrongly when they fail to create another person. Writ large, it would also not be wrong if everybody decided to exercise their prerogative not to create new people and potentially, by consequence, allow human extinction. One might respond here by saying that although it may be permissible for one person to fail to create a new person, it is not permissible if everyone chooses to do so because human lives have value and allowing human extinction would be to forgo a huge amount of value in the world. This takes us to the second way of understanding the potential wrongness of preventing people from existing — the foregone value of a life provides a reason for rejecting any principle that prevents it. One possible reply to this claim turns on the fact that many philosophers acknowledge that the only, or at least the best, way to think about the value of (individual or groups of) possible people’s lives is in impersonal terms (Parfit 1984; Reiman 2007; McMahan 2009). Jeff McMahan, for example, writes ‘at the time of one’s choice there is no one who exists or will exist independently of that choice for whose sake one could be acting in causing him or her to exist … it seems therefore that any reason to cause or not to cause an individual to exist … is best considered an impersonal rather than individual-affecting reason’ (McMahan 2009, 52). Another reply along similar lines would be to appeal to the value that is lost or at least foregone when we fail to bring into existence a next (or several next) generations of people with worth-living lives. Since ex hypothesi worth-living lives have positive value, it is better to create more such lives and worse to create fewer. Human extinction by definition is the creation of no future lives and would ‘deprive’ billions of ‘people’ of the opportunity to live worth-living lives. This might reduce the amount of value in the world at the time of the extinction (by killing already existing people), but it would also prevent a much vaster amount of value in the future (by failing to create more people). Both replies depend on the impersonal value of human life. However, recall that in contractualism impersonal values are not on their own grounds for reasonably rejecting principles. Scanlon himself says that although we have a strong reason not to destroy existing human lives, this reason ‘does not flow from the thought that it is a good thing for there to be more human life rather than less’ (104). In contractualism, something cannot be wrong unless there is an impact on a person. Thus, neither the impersonal value of creating a particular person nor the impersonal value of human life writ large could on its own provide a reason for rejecting a principle permitting human extinction. It seems therefore that the fact that extinction would deprive future people of the opportunity to live worth-living lives (either by failing to create either particular future people or future people in general) cannot provide us with a reason to consider human extinction to be wrong. Although the lost value of these ‘lives’ itself cannot be the reason explaining the wrongness of extinction, it is possible the knowledge of this loss might create a personal reason for some existing people. I will consider this possibility later on in section (d). But first I move to the second reason human extinction might be wrong per se. 2.2. It would mean the loss of the only known form of intelligent life and all civilization and intellectual progress would be lost A second reason we might think it would be wrong to cause human extinction is the loss that would occur of the only (known) form of rational life and the knowledge and civilization that that form of life has created. One thought here could be that just as some might consider it wrong to destroy an individual human heritage monument like the Sphinx, it would also be wrong if the advances made by humans over the past few millennia were lost or prevented from progressing. A related argument is made by those who feel that there is something special about humans’ capacity for rationality which is valuable in itself. Since humans are the only intelligent life that we know of, it would be a loss, in itself, to the world for that to end. I admit that I struggle to fully appreciate this thought. It seems to me that Henry Sidgwick was correct in thinking that these things are only important insofar as they are important to humans (Sidgwick 1874, I.IX.4).5 If there is no form of intelligent life in the future, who would there be to lament its loss since intelligent life is the only form of life capable of appreciating intelligence? Similarly, if there is no one with the rational capacity to appreciate historic monuments and civil progress, who would there be to be negatively affected or even notice the loss?6 However, even if there is nothing special about human rationality, just as some people try to prevent the extinction of nonhuman animal species, we might think that we ought also to prevent human extinction for the sake of biodiversity. The thought in this, as well as the earlier examples, must be that it would somehow be bad for the world if there were no more humans even though there would be no one for whom it is bad. This may be so but the only way to understand this reason is impersonally. Since we are concerned with wrongness rather than badness, we must ask whether something that impacts no one’s well-being, status or claims can be wrong. As we saw earlier, in the contractualist framework reasons must be personal rather than impersonal in order to provide grounds for reasonable rejection (Scanlon 1998, 218–223). Since the loss of civilization, intelligent life or biodiversity are per se impersonal reasons, there is no standpoint from which these reasons could be used to reasonably reject a principle that permitted extinction. Therefore, causing human extinction on the grounds of the loss of civilization, rational life or biodiversity would not be wrong. 2.3. Existing people would endure physical pain and/or painful and/or premature deaths Thinking about the ways in which human extinction might come about brings to the fore two more reasons it might be wrong. It could, for example, occur if all humans (or at least the critical number needed to be unable to replenish the population, leading to eventual extinction) underwent a sterilization procedure. Or perhaps it could come about due to anthropogenic climate change or a massive asteroid hitting the Earth and wiping out the species in the same way it did the dinosaurs millions of years ago. Each of these scenarios would involve significant physical and/or non-physical harms to existing people and their interests. Physically, people might suffer premature and possibly also painful deaths, for example. It is not hard to imagine examples in which the process of extinction could cause premature death. A nuclear winter that killed everyone or even just every woman under the age of 50 is a clear example of such a case. Obviously, some types of premature death themselves cannot be reasons to reject a principle. Every person dies eventually, sometimes earlier than the standard expected lifespan due to accidents or causes like spontaneously occurring incurable cancers. A cause such as disease is not a moral agent and therefore it cannot be wrong if it unavoidably kills a person prematurely. Scanlon says that the fact that a principle would reduce a person’s well-being gives that person a reason to reject the principle: ‘components of well-being figure prominently as grounds for reasonable rejection’ (Scanlon 1998, 214). However, it is not settled yet whether premature death is a setback to well-being. Some philosophers hold that death is a harm to the person who dies, whilst others argue that it is not.7 I will argue, however, that regardless of who is correct in that debate, being caused to die prematurely can be reason to reject a principle when it fails to show respect to the person as a rational agent. Scanlon says that recognizing others as rational beings with interests involves seeing reason to preserve life and prevent death: ‘appreciating the value of human life is primarily a matter of seeing human lives as something to be respected, where this involves seeing reasons not to destroy them, reasons to protect them, and reasons to want them to go well’ (Scanlon 1998, 104). The ‘respect for life’ in this case is a respect for the person living, not respect for human life in the abstract. This means that we can sometimes fail to protect human life without acting wrongfully if we still respect the person living. Scanlon gives the example of a person who faces a life of unending and extreme pain such that she wishes to end it by committing suicide. Scanlon does not think that the suicidal person shows a lack of respect for her own life by seeking to end it because the person whose life it is has no reason to want it to go on. This is important to note because it emphasizes the fact that the respect for human life is person-affecting. It is not wrong to murder because of the impersonal disvalue of death in general, but because taking someone’s life without their permission shows disrespect to that person. This supports its inclusion as a reason in the contractualist formula, regardless of what side ends up winning the ‘is death a harm?’ debate because even if death turns out not to harm the person who died, ending their life without their consent shows disrespect to that person. A person who could reject a principle permitting another to cause his or her premature death presumably does not wish to die at that time, or in that manner. Thus, if they are killed without their consent, their interests have not been taken into account, and they have a reason to reject the principle that allowed their premature death.8 This is as true in the case of death due to extinction as it is for death due to murder. However, physical pain may also be caused to existing people without killing them, but still resulting in human extinction. Imagine, for example, surgically removing everyone’s reproductive organs in order to prevent the creation of any future people. Another example could be a nuclear bomb that did not kill anyone, but did painfully render them infertile through illness or injury. These would be cases in which physical pain (through surgery or bombs) was inflicted on existing people and the extinction came about as a result of the painful incident rather than through death. Furthermore, one could imagine a situation in which a bomb (for example) killed enough people to cause extinction, but some people remained alive, but in terrible pain from injuries. It seems uncontroversial that the infliction of physical pain could be a reason to reject a principle. Although Scanlon says that an impact on well-being is not the only reason to reject principles, it plays a significant role, and indeed, most principles are likely to be rejected due to a negative impact on a person’s well-being, physical or otherwise. It may be queried here whether it is actually the involuntariness of the pain that is grounds for reasonable rejection rather than the physical pain itself because not all pain that a person suffers is involuntary. One can imagine acts that can cause physical pain that are not rejectable — base jumping or life-saving or improving surgery, for example. On the other hand, pushing someone off a cliff or cutting him with a scalpel against his will are clearly rejectable acts. The difference between the two cases is that in the former, the person having the pain inflicted has consented to that pain or risk of pain. My view is that they cannot be separated in these cases and it is involuntary physical pain that is the grounds for reasonable rejection. Thus, the fact that a principle would allow unwanted physical harm gives a person who would be subjected to that harm a reason to reject the principle. Of course the mere fact that a principle causes involuntary physical harm or premature death is not sufficient to declare that the principle is rejectable — there might be countervailing reasons. In the case of extinction, what countervailing reasons might be offered in favour of the involuntary physical pain/ death-inducing harm? One such reason that might be offered is that humans are a harm to the natural environment and that the world might be a better place if there were no humans in it. It could be that humans might rightfully be considered an all-things-considered hindrance to the world rather than a benefit to it given the fact that we have been largely responsible for the extinction of many species, pollution and, most recently, climate change which have all negatively affected the natural environment in ways we are only just beginning to understand. Thus, the fact that human extinction would improve the natural environment (or at least prevent it from degrading further), is a countervailing reason in favour of extinction to be weighed against the reasons held by humans who would experience physical pain or premature death. However, the good of the environment as described above is by definition not a personal reason. Just like the loss of rational life and civilization, therefore, it cannot be a reason on its own when determining what is wrong and countervail the strong personal reasons to avoid pain/death that is held by the people who would suffer from it.9 Every person existing at the time of the extinction would have a reason to reject that principle on the grounds of the physical pain they are being forced to endure against their will that could not be countervailed by impersonal considerations such as the negative impact humans may have on the earth. Therefore, a principle that permitted extinction to be accomplished in a way that caused involuntary physical pain or premature death could quite clearly be rejectable by existing people with no relevant countervailing reasons. This means that human extinction that came about in this way would be wrong. There are of course also additional reasons they could reject a similar principle which I now turn to address in the next section. 2.4. Existing people could endure non-physical harms I said earlier than the fact in itself that there would not be any future people is an impersonal reason and can therefore not be a reason to reject a principle permitting extinction. However, this impersonal reason could give rise to a personal reason that is admissible. So, the final important reason people might think that human extinction would be wrong is that there could be various deleterious psychological effects that would be endured by existing people having the knowledge that there would be no future generations. There are two main sources of this trauma, both arising from the knowledge that there will be no more people. The first relates to individual people and the undesired negative effect on well-being that would be experienced by those who would have wanted to have children. Whilst this is by no means universal, it is fair to say that a good proportion of people feel a strong pull towards reproduction and having their lineage continue in some way. Samuel Scheffler describes the pull towards reproduction as a ‘desire for a personalized relationship with the future’ (Scheffler 2012, 31). Reproducing is a widely held desire and the joys of parenthood are ones that many people wish to experience. For these people knowing that they would not have descendants (or that their descendants will endure painful and/or premature deaths) could create a sense of despair and pointlessness of life. Furthermore, the inability to reproduce and have your own children because of a principle/policy that prevents you (either through bans or physical interventions) would be a significant infringement of what we consider to be a basic right to control what happens to your body. For these reasons, knowing that you will have no descendants could cause significant psychological traumas or harms even if there were no associated physical harm. The second is a more general, higher level sense of hopelessness or despair that there will be no more humans and that your projects will end with you. Even those who did not feel a strong desire to procreate themselves might feel a sense of hopelessness that any projects or goals they have for the future would not be fulfilled. Many of the projects and goals we work towards during our lifetime are also at least partly future-oriented. Why bother continuing the search for a cure for cancer if either it will not be found within humans’ lifetime, and/or there will be no future people to benefit from it once it is found? Similar projects and goals that might lose their meaning when confronted with extinction include politics, artistic pursuits and even the type of philosophical work with which this paper is concerned. Even more extreme, through the words of the character Theo Faron, P.D. James says in his novel The Children of Men that ‘without the hope of posterity for our race if not for ourselves, without the assurance that we being dead yet live, all pleasures of the mind and senses sometimes seem to me no more than pathetic and crumbling defences shored up against our ruins’ (James 2006, 9). Even if James’ claim is a bit hyperbolic and all pleasures would not actually be lost, I agree with Scheffler in finding it not implausible that the knowledge that extinction was coming and that there would be no more people would have at least a general depressive effect on people’s motivation and confidence in the value of and joy in their activities (Scheffler 2012, 43). Both sources of psychological harm are personal reasons to reject a principle that permitted human extinction. Existing people could therefore reasonably reject the principle for either of these reasons. Psychological pain and the inability to pursue your personal projects, goals, and aims, are all acceptable reasons for rejecting principles in the contractualist framework. So too are infringements of rights and entitlements that we accept as important for people’s lives. These psychological reasons, then, are also valid reasons to reject principles that permitted or required human extinction.

#### That is the only egalitarian metric---anything else collapses cooperation on collective action crises and makes extinction inevitable

**Khan 18** (Risalat, activist and entrepreneur from Bangladesh passionate about addressing climate change, biodiversity loss, and other existential challenges. He was featured by The Guardian as one of the “young climate campaigners to watch” (2015). As a campaigner with the global civic movement Avaaz (2014-17), Risalat was part of a small core team that spearheaded the largest climate marches in history with a turnout of over 800,000 across 2,000 cities. After fighting for the Paris Agreement, Risalat led a campaign joined by over a million people to stop the Rampal coal plant in Bangladesh to protect the Sundarbans World Heritage forest, and elicited criticism of the plant from Crédit Agricolé through targeted advocacy. Currently, Risalat is pursuing an MPA in Environmental Science and Policy at Columbia University as a SIPA Environmental Fellow, “5 reasons why we need to start talking about existential risks,” https://www.weforum.org/agenda/2018/01/5-reasons-start-talking-existential-risks-extinction-moriori/)

Infinite future possibilities I find the story of the Moriori profound. It teaches me two lessons. Firstly, that human culture is far from immutable. That we can struggle against our baser instincts. That we can master them and rise to unprecedented challenges. Secondly, that even this does not make us masters of our own destiny. We can make visionary choices, but the future can still surprise us. This is a humbling realization. Because faced with an uncertain future, the only wise thing we can do is prepare for possibilities. Standing at the launch pad of the Fourth Industrial Revolution, the possibilities seem endless. They range from an era of abundance to the end of humanity, and everything in between. How do we navigate such a wide and divergent spectrum? I am an optimist. From my bubble of privilege, life feels like a rollercoaster ride full of ever more impressive wonders, even as I try to fight the many social injustices that still blight us. However, the accelerating pace of change amid uncertainty elicits one fundamental observation. Among the infinite future possibilities, only one outcome is truly irreversible: extinction. Concerns about extinction are often dismissed as apocalyptic alarmism. Sometimes, they are. But repeating that mankind is still here after 70 years of existential warning about nuclear warfare is a straw man argument. The fact that a 1000-year flood has not happened does not negate its possibility. And there have been far too many nuclear near-misses to rest easy. As the World Economic Forum’s Annual Meeting in Davos discusses how to create a shared future in a fractured world, here are five reasons why the possibility of existential risks should raise the stakes of conversation: 1. Extinction is the rule, not the exception More than 99.9% of all the species that ever existed are gone. Deep time is unfathomable to the human brain. But if one cares to take a tour of the billions of years of life’s history, we find a litany of forgotten species. And we have only discovered a mere fraction of the extinct species that once roamed the planet. In the speck of time since the first humans evolved, more than 99.9% of all the distinct human cultures that have ever existed are extinct. Each hunter-gatherer tribe had its own mythologies, traditions and norms. They wiped each other out, or coalesced into larger formations following the agricultural revolution. However, as major civilizations emerged, even those that reached incredible heights, such as the Egyptians and the Romans, eventually collapsed. It is only in the very recent past that we became a truly global civilization. Our interconnectedness continues to grow rapidly. “Stand or fall, we are the last civilization”, as Ricken Patel, the founder of the global civic movement Avaaz, put it. 2. Environmental pressures can drive extinction More than 15,000 scientists just issued a ‘warning to humanity’. They called on us to reduce our impact on the biosphere, 25 years after their first such appeal. The warning notes that we are far outstripping the capacity of our planet in all but one measure of ozone depletion, including emissions, biodiversity, freshwater availability and more. The scientists, not a crowd known to overstate facts, conclude: “soon it will be too late to shift course away from our failing trajectory, and time is running out”. In his 2005 book Collapse, Jared Diamond charts the history of past societies. He makes the case that overpopulation and resource use beyond the carrying capacity have often been important, if not the only, drivers of collapse. Even though we are making important incremental progress in battles such as climate change, we must still achieve tremendous step changes in our response to several major environmental crises. We must do this even while the world’s population continues to grow. These pressures are bound to exert great stress on our global civilization. 3. Superintelligence: unplanned obsolescence? Imagine a monkey society that foresaw the ascendance of humans. Fearing a loss of status and power, it decided to kill the proverbial Adam and Eve. It crafted the most ingenious plan it could: starve the humans by taking away all their bananas. Foolproof plan, right? This story describes the fundamental difficulty with superintelligence. A superintelligent being may always do something entirely different from what we, with our mere mortal intelligence, can foresee. In his 2014 book Superintelligence, Swedish philosopher Nick Bostrom presents the challenge in thought-provoking detail, and advises caution. Bostrom cites a survey of industry experts that projected a 50% chance of the development of artificial superintelligence by 2050, and a 90% chance by 2075. The latter date is within the life expectancy of many alive today. Visionaries like Stephen Hawking and Elon Musk have warned of the existential risks from artificial superintelligence. Their opposite camp includes Larry Page and Mark Zuckerberg. But on an issue that concerns the future of humanity, is it really wise to ignore the guy who explained the nature of space to us and another guy who just put a reusable rocket in it? 4. Technology: known knowns and unknown unknowns Many fundamentally disruptive technologies are coming of age, from bioengineering to quantum computing, 3-D printing, robotics, nanotechnology and more. Lord Martin Rees describes potential existential challenges from some of these technologies, such as a bioengineered pandemic, in his book Our Final Century. Imagine if North Korea, feeling secure in its isolation, could release a virulent strain of Ebola, engineered to be airborne. Would it do it? Would ISIS? Projecting decades forward, we will likely develop capabilities that are unthinkable even now. The unknown unknowns of our technological path are profoundly humbling. 5. 'The Trump Factor' Despite our scientific ingenuity, we are still a confused and confusing species. Think back to two years ago, and how you thought the world worked then. Has that not been upended by the election of Donald Trump as US President, and everything that has happened since? The mix of billions of messy humans will forever be unpredictable. When the combustible forces described above are added to this melee, we find ourselves on a tightrope. What choices must we now make now to create a shared future, in which we are not at perpetual risk of destroying ourselves? Common enemy to common cause Throughout history, we have rallied against the ‘other’. Tribes have overpowered tribes, empires have conquered rivals. Even today, our fiercest displays of unity typically happen at wartime. We give our lives for our motherland and defend nationalistic pride like a wounded lion. But like the early Morioris, we 21st-century citizens find ourselves on an increasingly unstable island. We may have a violent past, but we have no more dangerous enemy than ourselves. Our task is to find our own Nunuku’s Law. Our own shared contract, based on equity, would help us navigate safely. It would ensure a future that unleashes the full potential of our still-budding human civilization, in all its diversity. We cannot do this unless we are humbly grounded in the possibility of our own destruction. Survival is life’s primal instinct. In the absence of a common enemy, we must find common cause in survival. Our future may depend on whether we realize this.

#### Realism is true and inevitable – human nature

**de Araujo 14** De Aruajo, professor for Ethics at Universidade do Estado do Rio de Janeiro, 14 (Marcelo, “Moral Enhancement and Political Realism,” Journal of Evolution and Technology 24(2): 29-43) ayala am

Although simple and attractive, this assumption is, as I intend to show, false. At the root of threats to the survival of humankind in the future is not a deficit in our moral dispositions, but the endurance of an old political arrangement that prevents the pursuit of shared goals on a collective basis. The political arrangement I have in mind here is the international system of states. In my analysis of the political implications of moral enhancement, I intend to concentrate my attention only on the supposition that we could avoid major wars in the future by making individuals morally better. I do not intend to discuss the threats posed by climate change, or by terrorism, although some human enhancement theorists also seek to cover these topics. I will explain, in the course of my analysis, a conceptual distinction between “human nature realism” and “structural realism,” well-known in the field of international relations theory. Thomas Douglas seems to have been among the first to explore the idea of “moral enhancement” as a new form of human enhancement. He certainly helped to kick off the current phase of the debate. In a paper published in 2008, Douglas suggests that in the “future people might use biomedical technology to morally enhance themselves.” Douglas characterizes moral enhancement in terms of the acquisition of “morally better motives” (Douglas 2008, 229). Mark Walker, in a paper published in 2009, suggests a similar idea. He characterizes moral enhancement in terms of improved moral dispositions or “genetic virtues”: The Genetic Virtue Program (GVP) is a proposal for influencing our moral nature through biology, that is, it is an alternate yet complementary means by which ethics and ethicists might contribute to the also task of making our lives and world a better place. The basic idea is simple enough: genes influence human behavior, so altering the genes of individuals may alter the influence genes exert on behavior. (Walker 2009, 27–28) Walker does not argue in favor of any specific moral theory, such as, for instance, virtue ethics. Whether one endorses a deontological or a utilitarian approach to ethics, he argues, the concept of virtue is relevant to the extent that virtues motivate us either to do the right thing or to maximize the good (Walker 2009, 35). Moral enhancement theory, however, does not reduce the ethical debate to the problem of moral dispositions. Morality also concerns, to a large extent, questions about reasons for action. And moral enhancement, most certainly, will not improve our moral beliefs; neither could it be used to settle moral disagreements. This seems to have led some authors to criticize the moral enhancement idea on the ground that it neglects the cognitive side of our moral behavior. Robert Sparrow, for instance, argues that, from a Kantian point of view, moral enhancement would have to provide us with better moral beliefs rather than enhanced moral motivation (Sparrow 2014, 25; see Agar 2010, 74). Yet, it seems to me that this objection misses the point of the moral enhancement idea. Many people, across different countries, already share moral beliefs relating, for instance, to the wrongness of harming or killing other people arbitrarily, or to the moral requirement to help people in need. They may share moral beliefs while not sharing the same reasons for these beliefs, or perhaps even not being able to articulate the beliefs in the conceptual framework of a moral theory (Blackford 2010, 83). But although they share some moral beliefs, in some circumstances they may lack the appropriate motivation to act accordingly. Moral enhancement, thus, aims at improving moral motivation, and leaves open the question as to how to improve our moral judgments. In a recent paper, published in The Journal of Medical Ethics, neuroscientist Molly Crockett reports the state of the art in the still very embryonic field of moral enhancement. She points out, for example, that the selective serotonin reuptake inhibitor (SSRI) citalopram seems to increase harm aversion. There is, moreover, some evidence that this substance may be effective in the treatment of specific types of aggressive behavior. Like Douglas, Crockett emphasizes that moral enhancement should aim at individuals’ moral motives (Crockett 2014; see also Spence 2008; Terbeck et al. 2013). Another substance that is frequently mentioned in the moral enhancement literature is oxytocin. Some studies suggest that willingness to cooperate with other people, and to trust unknown prospective cooperators, may be enhanced by an increase in the levels of oxytocin in the organism (Zak 2008, 2011; Zak and Kugler 2011; Persson and Savulescu 2012, 118–119). Oxytocin has also been reported to be “associated with the subjective experience of empathy” (Zak 2011, 55; Zak and Kugler 2011, 144). The question I would like to examine now concerns the supposition that moral enhancement – comprehended in these terms and assuming for the sake of argument that, some day, it might become effective and safe – may also help us in coping with the threat of devastating wars in the future. The assumption that there is a relationship between, on the one hand, threats to the survival of humankind and, on the other, a sort of “deficit” in our moral dispositions is clearly made by some moral enhancements theorists. Douglas, for instance, argues that “according to many plausible theories, some of the world’s most important problems — such as developing world poverty, climate change and war — can be attributed to these moral deficits” (2008, 230). Walker, in a similar vein, writes about the possibility of “using biotechnology to alter our biological natures in an effort to reduce evil in the world” (2009, 29). And Julian Savulescu and Ingmar Persson go as far as to defend the “the need for moral enhancement” of humankind in a series of articles, and in a book published in 2012. One of the reasons Savulescu and Persson advance for the moral enhancement of humankind is that our moral dispositions seem to have remained basically unchanged over the last millennia (Persson and Savulescu 2012, 2). These dispositions have proved thus far quite useful for the survival of human beings as a species. They have enabled us to cooperate with each other in the collective production of things such as food, shelter, tools, and farming. They have also played a crucial role in the creation and refinement of a variety of human institutions such as settlements, villages, and laws. Although the possibility of free-riding has never been fully eradicated, the benefits provided by cooperation have largely exceeded the disadvantages of our having to deal with occasional uncooperative or untrustworthy individuals (Persson and Savulescu 2012, 39). The problem, however, is that the same dispositions that have enabled human beings in the past to engage in the collective production of so many artifacts and institutions now seem powerless in the face of the human capacity to destroy other human beings on a grand scale, or perhaps even to annihilate the entire human species. There is, according to Savulescu and Persson, a “mismatch” between our cognitive faculties and our evolved moral attitudes: “[…] as we have repeatedly stressed, owing to the progress of science, the range of our powers of action has widely outgrown the range of our spontaneous moral attitudes, and created a dangerous mismatch” (Persson and Savulescu 2012, 103; see also Persson and Savulescu 2010, 660; Persson and Savulescu 2011b; DeGrazie 2012, 2; Rakić 2014, 2). This worry about the mismatch between, on the one hand, the modern technological capacity to destroy and, on the other, our limited moral commitments is not new. The political philosopher Hans Morgenthau, best known for his defense of political realism, called attention to the same problem nearly fifty years ago. In the wake of the first successful tests with thermonuclear bombs, conducted by the USA and the former Soviet Union, Morgenthau referred to the “contrast” between the technological progress of our age and our feeble moral attitudes as one of the most disturbing dilemmas of our time: The first dilemma consists in the contrast between the technological unification of the world and the parochial moral commitments and political institutions of the age. Moral commitments and political institutions, dating from an age which modern technology has left behind, have not kept pace with technological achievements and, hence, are incapable of controlling their destructive potentialities. (Morgenthau 1962, 174) Moral enhancement theorists and political realists like Morgenthau, therefore, share the thesis that our natural moral dispositions are not strong enough to prevent human beings from endangering their own existence as a species. But they differ as to the best way out of this quandary: moral enhancement theorists argue for the re-engineering of our moral dispositions, whereas Morgenthau accepted the immutability of human nature and argued, instead, for the re-engineering of world politics. Both positions, as I intend to show, are wrong in assuming that the “dilemma” results from the weakness of our spontaneous moral dispositions in the face of the unprecedented technological achievements of our time. On the other hand, both positions are correct in recognizing the real possibility of global catastrophes resulting from the malevolent use of, for instance, biotechnology or nuclear capabilities. The supposition that individuals’ unwillingness to cooperate with each other, even when they would be better-off by choosing to cooperate, results from a sort of deficit of dispositions such as altruism, empathy, and benevolence has been at the core of some important political theories. This idea is an important assumption in the works of early modern political realists such as Machiavelli and Thomas Hobbes. It was also later endorsed by some well-known authors writing about the origins of war in the first half of the twentieth century. It was then believed, as Sigmund Freud suggested in a text from 1932, that the main cause of wars is a human tendency to “hatred and destruction” (in German: ein Trieb zum Hassen und Vernichtung). Freud went as far as to suggest that human beings have an ingrained “inclination” to “aggression” and “destruction” (Aggressionstrieb, Aggressionsneigung, and Destruktionstrieb), and that this inclination has a “good biological basis” (biologisch wohl begründet) (Freud 1999, 20–24; see also Freud 1950; Forbes 1984; Pick 1993, 211–227; Medoff 2009). The attempt to employ Freud’s conception of human nature in understanding international relations has recently been resumed, for instance by Kurt Jacobsen in a paper entitled “Why Freud Matters: Psychoanalysis and International Relations Revisited,” published in 2013. Morgenthau himself was deeply influenced by Freud’s speculations on the origins of war.1 Early in the 1930s, Morgenthau wrote an essay called “On the Origin of the Political from the Nature of Human Beings” (Über die Herkunft des Politischen aus dem Wesen des Menschen), which contains several references to Freud’s theory about the human propensity to aggression.2 Morgenthau’s most influential book, Politics among Nations: The Struggle for Power and Peace, first published in 1948 and then successively revised and edited, is still considered a landmark work in the tradition of political realism. According to Morgenthau, politics is governed by laws that have their origin in human nature: “Political realism believes that politics, like society in general, is governed by objective laws that have their roots in human nature” (Morgenthau 2006, 4). Just like human enhancement theorists, Morgenthau also takes for granted that human nature has not changed over recent millennia: “Human nature, in which the laws of politics have their roots, has not changed since the classical philosophies of China, India, and Greece endeavored to discover these laws” (Morgenthau 2006, 4). And since, for Morgenthau, human nature prompts human beings to act selfishly, rather than cooperatively, political leaders will sometimes favor conflict over cooperation, unless some superior power compels them to act otherwise. Now, this is exactly what happens in the domain of international relations. For in the international sphere there is not a supranational institution with the real power to prevent states from pursuing means of self-defense. The acquisition of means of self-defense, however, is frequently perceived by other states as a threat to their own security. This leads to the security dilemma and the possibility of war. As Morgenthau put the problem in an article published in 1967: “The actions of states are determined not by moral principles and legal commitments but by considerations of interest and power” (1967, 3). Because Morgenthau and early modern political philosophers such as Machiavelli and Hobbes defended political realism on the grounds provided by a specific conception human nature, their version of political realism has been frequently called “human nature realism.” The literature on human nature realism has become quite extensive (Speer 1968; Booth 1991; Freyberg-Inan 2003; Kaufman 2006; Molloy 2006, 82–85; Craig 2007; Scheuerman 2007, 2010, 2012; Schuett 2007; Neascu 2009; Behr 2010, 210–225; Brown 2011; Jütersonke 2012). It is not my intention here to present a fully-fledged account of the tradition of human nature realism, but rather to emphasize the extent to which some moral enhancement theorists, in their description of some of the gloomy scenarios humankind is likely to face in the future, implicitly endorse this kind of political realism. Indeed, like human nature realists, moral enhancement theorists assume that human nature has not changed over the last millennia, and that violence and lack of cooperation in the international sphere result chiefly from human nature’s limited inclination to pursue morally desirable goals. One may, of course, criticize the human enhancement project by rejecting the assumption that conflict and violence in the international domain should be explained by means of a theory about human nature. In a reply to Savulescu and Persson, Sparrow correctly argues that “structural issues,” rather than human nature, constitute the main factor underlying political conflicts (Sparrow 2014, 29). But he does not explain what exactly these “structural issues” are, as I intend to do later. Sparrow is right in rejecting the human nature theory underlying the human enhancement project. But this underlying assumption, in my view, is not trivially false or simply “ludicrous,” as he suggests. Human nature realism has been implicitly or explicitly endorsed by leading political philosophers ever since Thucydides speculated on the origins of war in antiquity (Freyberg-Inan 2003, 23–36). True, it might be objected that “human nature realism,” as it was defended by Morgenthau and earlier political philosophers, relied upon a metaphysical or psychoanalytical conception of human nature, a conception that, actually, did not have the support of any serious scientific investigation (Smith 1983, 167). Yet, over the last few years there has been much empirical research in fields such as developmental psychology and evolutionary biology that apparently gives some support to the realist claim. Some of these studies suggest that an inclination to aggression and conflict has its origins in our evolutionary history. This idea, then, has recently led some authors to resume “human nature realism” on new foundations, devoid of the metaphysical assumptions of the early realists, and entirely grounded in empirical research. Indeed, some recent works in the field of international relations theory already seek to call attention to evolutionary biology as a possible new start for political realism. This point is clearly made, for instance, by Bradley Thayer, who published in 2004 a book called Darwin and International Relations: On the Evolutionary Origins of War and Ethnic Conflict. And in a paper published in 2000, he affirms the following: Evolutionary theory provides a stronger foundation for realism because it is based on science, not on theology or metaphysics. I use the theory to explain two human traits: egoism and domination. I submit that the egoistic and dominating behavior of individuals, which is commonly described as “realist,” is a product of the evolutionary process. I focus on these two traits because they are critical components of any realist argument in explaining international politics. (Thayer 2000, 125; see also Thayer 2004) Thayer basically argues that a tendency to egoism and domination stems from human evolutionary history. The predominance of conflict and competition in the domain of international politics, he argues, is a reflex of dispositions that can now be proved to be part of our evolved human nature in a way that Morgenthau and other earlier political philosophers could not have established in their own time. Now, what some moral enhancement theorists propose is a direct intervention in our “evolved limited moral psychology” as a means to make us “fit” to cope with some possible devastating consequences from the predominance of conflict and competition in the domain of international politics (Persson and Savulescu 2010, 664). Moral enhancement theorists comprehend the nature of war and conflicts, especially those conflicts that humankind is likely to face in the future, as the result of human beings’ limited moral motivations. Compared to supporters of human nature realism, however, moral enhancement theorists are less skeptical about the prospect of our taming human beings’ proclivity to do evil. For our knowledge in fields such as neurology and pharmacology does already enable us to enhance people’s performance in a variety of activities, and there seems to be no reason to assume it will not enable us to enhance people morally in the future. But the question, of course, is whether moral enhancement will also improve the prospect of our coping successfully with some major threats to the survival of humankind, as Savulescu and Persson propose, or to reduce evil in the world, as proposed by Walker. V. The point to which I would next like to call attention is that “human nature realism” – which is implicitly presupposed by some moral enhancement theorists – has been much criticized over the last decades within the tradition of political realism itself. “Structural realism,” unlike “human nature realism,” does not seek to derive a theory about conflicts and violence in the context of international relations from a theory of the moral shortcomings of human nature. Structural realism was originally proposed by Kenneth Waltz in Man, the State and War, published in 1959, and then later in another book called Theory of International Politics, published in 1979. In both works, Waltz seeks to avoid committing himself to any specific conception of human nature (Waltz 2001, x–xi). Waltz’s thesis is that the thrust of the political realism doctrine can be retained without our having to commit ourselves to any theory about the shortcomings of human nature. What is relevant for our understanding of international politics is, instead, our understanding of the “structure” of the international system of states (Waltz 1986). John Mearsheimer, too, is an important contemporary advocate of political realism. Although he seeks to distance himself from some ideas defended by Waltz, he also rejects human nature realism and, like Waltz, refers to himself as a supporter of “structural realism” (Mearsheimer 2001, 20). One of the basic tenets of political realism (whether “human nature realism” or “structural realism”) is, first, that the states are the main, if not the only, relevant actors in the context of international relations; and second, that states compete for power in the international arena. Moral considerations in international affairs, according to realists, are secondary when set against the state’s primary goal, namely its own security and survival. But while human nature realists such as Morgenthau explain the struggle for power as a result of human beings’ natural inclinations, structural realists like Waltz and Mearsheimer argue that conflicts in the international arena do not stem from human nature, but from the very “structure” of the international system of states (Mearsheimer 2001, 18). According to Waltz and Mearsheimer, it is this structure that compels individuals to act as they do in the domain of international affairs. And one distinguishing feature of the international system of states is its “anarchical structure,” i.e. the lack of a central government analogous to the central governments that exist in the context of domestic politics. It means that each individual state is responsible for its own integrity and survival. In the absence of a superior authority, over and above the power of each sovereign state, political leaders often feel compelled to favor security over morality, even if, all other things being considered, they would naturally be more inclined to trust and to cooperate with political leaders of other states. On the other hand, when political leaders do trust and cooperate with other states, it is not necessarily their benevolent nature that motivates them to be cooperative and trustworthy, but, again, it is the structure of the system of states that compels them. The concept of human nature, as we can see, does not play a decisive role here. Because Waltz and Mearsheimer depart from “human nature realism,” their version of political realism has also sometimes been called “neo-realism” (Booth 1991, 533). Thus, even if human beings turn out to become morally enhanced in the future, humankind may still have to face the same scary scenarios described by some moral enhancement theorists. This is likely to happen if, indeed, human beings remain compelled to cooperate within the present structure of the system of states. Consider, for instance, the incident with a Norwegian weather rocket in January 1995. Russian radars detected a missile that was initially suspected of being on its way to reach Moscow in five minutes. All levels of Russian military defense were immediately put on alert for a possible imminent attack and massive retaliation. It is reported that for the first time in history a Russian president had before him, ready to be used, the “nuclear briefcase” from which the permission to launch nuclear weapons is issued. And that happened when the Cold War was already supposed to be over! In the event, it was realized that the rocket was leaving Russian territory and Boris Yeltsin did not have to enter the history books as the man who started the third world war by mistake (Cirincione 2008, 382).3 But under the crushing pressure of having to decide in such a short time, and on the basis of unreliable information, whether or not to retaliate, even a morally enhanced Yeltsin might have given orders to launch a devastating nuclear response – and that in spite of strong moral dispositions to the contrary. Writing for The Guardian on the basis of recently declassified documents, Rupert Myers reports further incidents similar to the one of 1995. He suggests that as more states strive to acquire nuclear capability, the danger of a major nuclear accident is likely to increase (Myers 2014). What has to be changed, therefore, is not human moral dispositions, but the very structure of the political international system of states within which we currently live. As far as major threats to the survival of humankind are concerned, moral enhancement might play an important role in the future only to the extent that it will help humankind to change the structure of the system of states. While moral enhancement may possibly have desirable results in some areas of human cooperation that do not badly threaten our security – such as donating food, medicine, and money to poorer countries – it will not motivate political leaders to dismantle their nuclear weapons. Neither will it deter other political leaders from pursuing nuclear capability, at any rate not as long as the structure of international politics compels them to see prospective cooperators in the present as possible enemies in the future. The idea of a “structure” should not be understood here in metaphysical terms, as though it mysteriously existed in a transcendent world and had the magical power of determining leaders’ decisions in this world. The word “structure” denotes merely a political arrangement in which there are no powerful law-enforcing institutions. And in the absence of the kind of security that law-enforcing institutions have the force to create, political leaders will often fail to cooperate, and occasionally engage in conflicts and wars, in those areas that are critical to their security and survival. Given the structure of international politics and the basic goal of survival, this is likely to continue to happen, even if, in the future, political leaders become less egoistic and power-seeking through moral enhancement. On the other hand, since the structure of the international system of states is itself another human institution, there is no reason to suppose that it cannot ever be changed. If people become morally enhanced in the future they may possibly feel more strongly motivated to change the structure of the system of states, or perhaps even feel inclined to abolish it altogether. In my view, however, addressing major threats to the survival of humankind in the future by means of bioengineering is unlikely to yield the expected results, so long as moral enhancement is pursued within the present framework of the international system of states.

**Futurity is good**

**Bliss 15** (James, Professor at the University of California, Irvine, Hope Against Hope: Queer Negativity, Black Feminist Theorizing, and Reproduction without Futurity” p. 85-86 file:///C:/Users/crumb/Downloads/bliss.pdf)

Critiques of Edelman(s) have run the gamut from accusations that his arguments amount to little more than a dissembled optimism, that he ignores the polymorphous perversity of really-existing children, that he misapprehends Lacan entirely, and that his polemic is overwritten by an intransigent, smirking whiteness that limits the applicability of his conclusions.1 Fair enough. For my part, I am interested in how the latter critique has been marshaled by some utopian (or, to borrow from José Muñoz, James Bliss 85 anti-antiutopian) queer theorists whose critiques rely on the figure of the “other” child.2 In a 2007 GLQ roundtable, Judith Halberstam described Edelman’s project as “utterly compelling [. . .] for certain subjects in certain social locations. For others, that place of pure critique might constitute epistemological self-destruction” (Dinshaw et al. 194). To which Edelman challenged, especially for Halberstam’s “unidentified ‘others,’” “why not endorse, to the contrary, ‘epistemological self-destruction’ for all? Why not accept that queerness, taken seriously, demands nothing less?” (195) In their endorsement of Muñoz’s Cruising Utopia, Halberstam restates this position, that “for some queers, particularly for queers of color, hope is not something one can afford to lose and for them giving up on futurity is not an option.”3 Indeed, Muñoz himself offers that “the future is only the stuff of some kids. Racialized kids, queer kids, are not the sovereign princes of futurity” (95). For Halberstam and Muñoz, Edelman’s stubborn refusal of futurity is structured by the privilege of having a guaranteed future, foreclosing the possibility that his project can speak to the concerns of non-white queers. More interesting, perhaps, is to consider how Edelman’s avoidance of race weakens his critique of the Child and futurity. Neither Edelman nor his utopian critics seem willing or able to imagine a mode of reproduction that is not reproductive futurism; that is, Black reproduction. On this score, we can consider Hortense Spillers’s seminal essay, “Mama’s Baby, Papa’s Maybe: An American Grammar Book.” In her gloss of the Moynihan Report, Spillers seems to anticipate Edelman’s well known passage, quoted above: “According to Daniel Patrick Moynihan’s celebrated ‘Report’ of the late sixties, the ‘Negro Family’ has no father to speak of—his name, his law, his symbolic function mark the impressive missing agencies in the essential life of the black community” (204). On Spillers’s reading, the father, the L/law, and the “whole network of symbolic relations” that Edelman rejects in the name of the queer are foreclosed a priori for the Black. Spillers marks how “the Black family” is refused entry into the symbolic order except negatively as a site of pure dysfunction. This incoherence that accrues around Black filiation is also what Orlando Patterson has labeled “natal alienation.” One of the “constituent elements” of slavery described in his Slavery and Social Death, Patterson offers natal alienation as “what is critical in the slave’s forced alienation, the loss of ties of birth in both ascending and descending generations” (7). I want to rest on this point for a moment because it is a point that queer negativity is unwilling to theorize and that queer anti-antiutopianism theorizes only to the extent that it can still enable an orientation toward the future. What does reproductive futurity mean for the natally alienated? What is the status of the Child or of the family for those “alienated from all ‘rights’ or claims of birth”? What does reproduction mean a “genealogical isolate”? Patterson offers a formulation much like those of Edelman and Spillers in describing the natally alienated: for the enslaved, seeking out, creating, or maintaining synchronic and diachronic bonds “meant struggling with and penetrating the iron curtain of the master, his community, his laws, his policemen or patrollers, and his heritage” (5). Rather than argue, following the anti-antiutopians, that “others” cannot “afford” to give up on hope for the future, we might argue instead that Edelman does not account for those modes of reproduction that are not future-oriented, the children who do not register as such, and the “families” that are not granted the security of nuclear bonds. And we might find in this reproduction without futurity not a crisis scenario demanding redoubled attention to either the family (Moynihan et al.) or the future (the anti-antiutopians), but an opportunity to develop a politics of position that inhabits the incoherence of Black reproduction. Reproduction without futurity, then, names nothing more (and nothing less) than the queer capacity of Blackness to reproduce without being productive and to orient lives extimate—simultaneously internal and external—to sociality as Edelman might understand it.

**Psychoanalysis is bunk science**

**Bunge**, McGill University philosopher, **2010** (Mario, “Should Psychoanalysis Be in the Science Museum?”, 10-5,<http://www.newscientist.com/article/mg20827806.200-should-psychoanalysis-be-in-the-science-museum.html>)

We should congratulate the Science Museum for setting up an exhibition on psychoanalysis. Exposure to pseudoscience greatly helps understand genuine science, just as learning about tyranny helps in understanding democracy. Over the past 30 years, psychoanalysis has quietly been displaced in academia by scientific psychology. But it persists in popular culture as well as being a lucrative profession. It is the psychology of those who have not bothered to learn psychology, and the psychotherapy of choice for those who believe in the power of immaterial mind over body. Psychoanalysis is a bogus science because its practitioners do not do scientific research. When the field turned 100, a group of psychoanalysts admitted this gap and endeavoured to fill it. They claimed to have performed the first experiment showing that patients benefited from their treatment. Regrettably, they did not include a control group and did not entertain the possibility of placebo effects. Hence, their claim remains untested (The International Journal of Psychoanalysis, vol 81, p 513). More recently, a meta-analysis published in American Psychologist (vol 65, p 98) purported to support the claim that a form of psychoanalysis called psychodynamic therapy is effective. However, once again, the original studies did not involve control groups. In 110 years, psychoanalysts have not set up a single lab. They do not participate in scientific congresses, do not submit their papers to scientific journals and are foreign to the scientific community - a marginality typical of pseudoscience. This does not mean their hypotheses have never been put to the test. True, they are so vague that they are hard to test and some of them are, by Freud's own admission, irrefutable. Still, most of the testable ones have been soundly refuted. For example, most dreams have no sexual content. The Oedipus complex is a myth; boys do not hate their fathers because they would like to have sex with their mothers. The list goes on. As for therapeutic efficacy, little is known because psychoanalysts do not perform double-blind clinical trials or follow-up studies. Psychoanalysis is a pseudoscience. Its concepts are woolly and untestable yet are regarded as unassailable axioms. As a result of such dogmatism, psychoanalysis has remained basically stagnant for more than a century, in contrast with scientific psychology, which is thriving.

**The child is not literally the social order but is rather the representation of an anti-queer world**

**Whyman 19** [Tom Whyman, Tom Whyman, a contributing writer at The Outline, is a writer and philosopher from the UK., 09-10-2019, "It is perfectly moral to bring children into a shitty world," Outline, https://theoutline.com/post/7925/having-babies-climate-change-birthstrike?zd=1&amp;zi=m4jdphym, accessed 5-4-2020]LHSBC

A BirthStrike, then, is on one level a rejection of what the queer theorist Lee Edelman named in his 2004 book No Future as “reproductive futurism”: the ideology which casts the figure of “The Child” as “the fantasmatic beneficiary of every political intervention” — what the Helen Lovejoys of this world just want “someone to please think of.” According to Edelman, reproductive futurism imposes an “ideological limit” on political discourse, preserving “the absolute privilege of heteronormativity” by making any political intervention somehow not in the interests of children morally unthinkable. Reproductive futurism is thus a way of disciplining people — not least against queerness. “There is a fascism in the baby's face,” he writes.∂ At one point in the book, Edelman relates seeing an anti-abortion advert and believing it to be aimed against him — a cis gay man. “The sign, after all, might as well have pronounced, and with the same absolute and invisible authority that testifies to the successfully accomplished work of ideological naturalization, the biblical mandate ‘Be fruitful and multiply.’” “Fuck the social order,” he writes, “and the Child in whose name we're collectively terrorized; fuck Annie; fuck the waif from Les Mis; fuck the poor, innocent kid on the Net... fuck the whole network of Symbolic relations and the future that serves as its prop.”∂ But Edelman’s argument misses something important. As Maggie Nelson puts this when discussing Edelman in her memoir of queer parenthood, The Argonauts: “Why bother fucking this Child when we could be fucking the specific forces that mobilize and crouch behind its image?” At one point in No Future, Edelman cites the example of Bernard Law, the former Cardinal of Boston, who in 1996 opposed legislation that would give health care benefits to the same-sex partners of municipal employees:∂ “He did so by proclaiming... that bestowing such access to health care would profoundly diminish the marital bond. ‘Society,’ he opined, ‘has a special interest in the protection, care and upbringing of children. Because marriage remains the principal, and the best, framework for the nurture, education and socialization of children, the state has a special interest in marriage.’”∂ Seven years later, Law was forced to resign over his failure to protect Catholic children from pedophile priests. He is an awful, bigoted hypocrite — but Edelman does not draw what seems like the most natural conclusion from this, namely that powerful men like Law, and the institutions they represent, have no real interest in the well-being of children at all; that they just want to use The Child as a sort of front.∂ The dominant social order only wants children insofar as it is concerned with its legacy; what it wants is to carry on the existing order of things. And this is why I don’t think the “resistance” of the BirthStrikers really makes much sense, in the face of climate disaster, a surfeit of actually existing children is in fact more of a threat to global capitalism’s ongoing hegemony than their scarcity.