# 2NR

#### No Fermi’s paradox - dark matter barriers, multiverses, and the limitations of human neurology explain why we haven’t contacted aliens.

**De la Torre and Garcia 18** Gabriel G. De La Torre [University of Cadiz, Department of Psychology, Campus Rio San Pedro, Puerto Real, 11510, Cadiz, Spain], Manuel A.Garcia [University of Cadiz, Department of Psychology, Campus Rio San Pedro, Puerto Real, 11510, Cadiz, Spain] , May 2018, "The cosmic gorilla effect or the problem of undetected non terrestrial intelligent signals," Acta Astronautica, Volume 146, May 2018, Pages 83-91, <https://www.sciencedirect.com/science/article/pii/S009457651731706X?via%3Dihub> // ash

1.1. Dark matter, ETI and NTI

It is estimated that 13.7 billion years ago, our universe contained 63% of dark matter instead of the 27% that we can measure today. It is also understood that dark matter densities appear to vary throughout the universe. If indeed dark energy is the energy of the quantum vacuum, this would make the case for the weak anthropic principle. The latter states that in order for life to exist as we know it in baryonic form, the vacuum conditions have to allow for it. Areas of the universe with vacuum energy densities above a critical density, such as the early universe, may be too harsh for life as we know it to exist. It would stand to reason that life as we know it would evolve in an intimate relationship with dark matter in the universe. The local vacuum energy density in the observable universe must be such that life can take hold.

It is reasonably to think that advanced civilizations ETI or more precisely non terrestrial intelligence (NTI) will either have mastered dark matter or possibly be composed of it. A multiverse of a somewhat different kind has been envisaged within string theory and its higher dimensional extension, M-theory. These theories require the presence of 10 and 11 spacetime dimensions, respectively. The extra six or seven dimensions may either be compactified on a very small scale, or our universe may simply be localized on a dynamical multidimensional object such as a D-brane. It is possible that there are other branes that could support “other universes” [24]. This is unlike the universes in the “quantum multiverse”; however, both concepts can operate at the same time. Here we can introduce the possibility of some forms of intelligences existing in these other dimensions falling in a more accurate terminology of nonterrestrial intelligence (NTI) rather than traditional ETI nomenclature. The term ETI refers to extraterrestrial Intelligence, commonly associated to civilizations populating other planets or solar systems. However NTI refers to Non Terrestrial Intelligence in a more eclectic approach including interdimensional capable civilizations.

1.2. Radio and energy ETI classifications

Radio communication has drastically changed our world, allowing for light-speed communication across the globe. The assumption up to this point has been that other advanced species would also use this electromagnetic spectrum to communicate. Recently, many scientists have become alarmed to find that electromagnetic radiation at low levels may have many detrimental effects on biology [17–19]. If this is the case, then why would an advanced civilization use this form of communication? In the best case scenario possible, we may establish contact with another civilization very similar to us using this method. In the worst case scenario, they could interpret this radio signal as an aggression. For example, the physical healing of wounds is expedited by sleep and sleep strengthens the immune system [20]. Radiation may affect sleep quality [21,22]. Our species evolved to sleep during the night probably to repair radiation damage among other known reasons. It is reasonable to think that more advanced civilizations would not use harmful methods of communication or technology to communicate, and other alternatives should be contemplated in the search of ETI in the universe. Having been insisting on the same old methods and ideas for decades now, the current scientific community seems very oppositional to new views and paradigms. As a novelty, only a few new insights have been brought forward such as Active SETI initiative, which in essence is the same SETI scientific approach but in an opposite direction. Active SETI also has big ethics inconsistencies and dangers not appropriately addressed to this date by the scientific community [23].

Known intelligent civilization classifications to this date account for energy consumption as a key factor. According to these classification models, the total quantity of energy expended by all mankind per second at present time is about 4 1019 erg with an increase of 5% every 75 years. Kardashev [25] proposed the first serious although questionable effort to classify possible ETI civilizations. He proposed three types of civilizations: Type I civilizations with technological levels close to ours on Earth with energy consumption at approximately 4 1019 erg/sec; Type II civilizations capable of harnessing the energy radiated by its own star (stage compatible to the construction of Dyson spheres) and energy consumption at approximately 4 1033 erg/sec; finally, Type III civilizations with energy capacity scale of their own galaxy and a consumption rate of approximately 4 1044 erg/sec (Table 1).

Carl Sagan [26] suggested defining intermediate values (not considered in Kardashev's original scale) by interpolating and extrapolating the values given above for Type I (1016 W), II (1026 W), and III (1036 W) civilizations, which would result in the formula K-log10P-6/10, where K is a civilization's Kardashev rating and P is the power it uses in watts. Further additions to this scale were made with type IV [27] with the power of controlling the energy output of the entire universe, and type V of the multiple universes. Moreover, Kaku [28] described a type V civilization with the power of controlling over dark energy. Finally, a slightly different classification made by Barrow [29] on microdimensional mastery describes up to seven types of civilizations based on the ability to manipulate dimensions of matter with the type VII, or the so-called Type Omega-minus, being able to control the spacetime structure. Barrow located Earth at the current moment between III and IV of his classification. We have discussed above how current search of ETI is clearly tainted by our own psychological and neurophysiological nature. However, thinking in much broader schemes may be of help in this scientific task. According to Kardashev [25] (Table 1), some ETI might have reached a point of evolution or technological development that will make them able to create and exploit planetary scale bodies, energy, and, most surely, dark matter and spacetime, making them look like having some God quality to our understanding. How will we recognize a Dyson sphere or an artificial planetary scale megastructure? The only possible answer to this question is that we expect this sphere or artifact to have certain artificial characteristics. Artificiality is defined by Oxford Dictionaries as the quality of being made or produced by human beings rather than occurring naturally. However, if we look for artificial structures or signs, our mind can easily get confused when confronted with the unexpected that left us bewildered (see Fig. 2) until we find an explanation. What if some artificial megastructure of a Type VI civilization, as it has been previously mentioned [27], is so natural alike that we cannot detect it? Moreover, what if the scale of these megastructures makes it difficult for our limited grey matter wired minds to see them or even understand them because we only expect radio signals?

# 1NC

### 1NC—T

#### Interp: affs must only defend that the appropriation of outer space by private entities is unjust.

#### Violation – the aff is wildly extra T or it solves none of their offense – here’s what a Public Trust Doctrine in outer space entails—1AC evidence.

Babcock 19 (, H., 2019. THE PUBLIC TRUST DOCTRINE, OUTER SPACE, AND THE GLOBAL COMMONS: TIME TO CALL HOME ET. [online] Lawreview.syr.edu. Available at: <https://lawreview.syr.edu/wp-content/uploads/2019/09/H-Babcock-Article-Final-Document-v2.pdf#page=67> [Accessed 15 December 2021] Professor Babcock served as general counsel to the National Audubon Society from 1987-91 and as deputy general counsel and Director of Audubon’s Public Lands and Water Program from 1981-87. Previously, she was a partner with Blum, Nash & Railsback, where she focused on energy and environmental issues, and an associate at LeBoeuf, Lamb, Leiby & MacRae where she represented utilities in the nuclear licensing process. From 1977-79, she served as a Deputy Assistant Secretary of Energy and Minerals in the U.S. Department of the Interior. Professor Babcock has taught environmental and natural resources law as a visiting professor at Pace University Law School and as an adjunct at the University of Pennsylvania, Yale, Catholic University, and Antioch law schools. Professor Babcock was a member of the Standing Committee on Environmental Law of the American Bar Association, and served on the Clinton-Gore Transition Team.)-rahulpenu

F. The Public Trust Doctrine (PTD) as a Gap Filling, Place-Holding Management Approach506 The PTD offers both an approach for managing an open access commons and a gap-filling tool until a regulatory regime is adopted.507 The doctrine is based on the idea that the “sovereign holds certain common properties in trust in perpetuity for the free and unimpeded use of the general public.”508 The public’s right to access and use trust resources is never lost, and neither the government nor private individuals can alienate or otherwise adversely affect those resources unless for a comparable public purpose.509 The resources the doctrine protects “have long been part of a ‘taxonomy of property’ [that recognizes] the division of natural wealth into private and public property.”510 “The doctrine places on governments ‘an affirmative, ongoing duty to safeguard the long-term preservation of those resources for the benefit of the general public,’”511 thus limiting the sovereign’s power on behalf of both present and future individuals.512 It directs the government to manage trust resources for public benefit, not private gain.513 It applies to private as well as public resources and is used to preserve the public’s access to CPRs.514 Government agencies have the non-rescindable power to revoke uses of trust resources that are inconsistent with the doctrine.515 This effectively places a permanent easement over trust resources that burdens their ownership with an overriding public interest in the preservation of those resources.516 However, trust resources can be alienated in favor of private ownership, if the alienation will still serve the public’s interest in those resources and not interfere with trust uses of the remaining land.517 The PTD, therefore, protects the “people’s common heritage,”518 just as Article 11 of the Moon Treaty protects outer space as part of the common heritage of mankind.519 The doctrine also appears to be infinitely malleable. Original uses of the doctrine were restricted to only that “aspect of the public domain below the low-water mark on the margin of the sea and the great lakes, the waters over those lands, and the waters within rivers and streams of any consequence,”520 and covered only traditional uses of those lands, like fishing and navigation.521 Over time, the scope and application of the doctrine broadened to protect more public resources and different uses.522 Thus, the **doctrine** expanded to protect new trust resources, such as dry sand beaches, inland lakes, groundwater, dry riverbeds, and wildlife,523 and passive uses of those resources, like scientific study.524 The original link to navigable water and tidelands disappeared.525 Supporters of the doctrine successfully advocated that it be applied to “wildlife, parks, cemeteries, and even works of fine art,”526 while arguing more recently its application to the atmosphere.527 A doctrine that imposes a perpetual duty on the sovereign to preserve trust resources, prevents their alienation for private benefit, assures public access to them, and can be invoked by anyone seems particularly useful as a management tool in outer space.528 The fact that **public** **access** to trust resources is so **central** to the doctrine **makes** it **reflective**, not contradictory, **of** international space **law’s** **bar** **against** **appropriation** of outer space and of the principle of space being the “province of all mankind.”529 It **avoids** the problems of alienation and **exclusion** associated with any of the management approaches associated with some form of private property and requires neither the creation of a new administrative authority nor the presence of a close-knit group of like-minded people.530 Members of the public, both rich and poor, can invoke and enforce the doctrine as easily as the sovereign.531 It is cost effective to the extent that no separate apparatus is required to implement it, and the doctrine has shown itself to be highly adaptable and innovative as different needs arise.532 It could also fill the gap in international law with respect to managing celestial property. Therefore, of all the management approaches studied here, the PTD seems the most suited to keep order in space until a regulatory regime is imposed. However, the doctrine provides no incentives for development of trust resources; rather, it might be used to limit or curtail that development, making it an imperfect, perhaps even counter-productive solution by itself to the extent that such development might be beneficial.533 Modifying the doctrine to allow limited use of private property management approaches, like tradable development claims, might buffer that effect—a form of overlapping hybridity between one type of property, a commons, and a management regime from another, private property, enabled by application of the PTD. CONCLUSION “Only a legal system that accommodates both the human need for resources and the necessary preservation of mankind’s common heritage can fulfill these criteria.”534 The future is now with regard to the development of outer space and its resources—it is no longer a question of whether humans will engage in these activities, but how soon they will. Technically advanced countries and private commercial enterprises are probing outer space and preparing for landing on an asteroid or the moon to extract their resources.535 Speculators are selling deeds to the moon’s surface and preparing to exploit the tourism potential that space offers.536 But, the legal framework for managing these initiatives is almost nonexistent.537 International treaties came into being before all this activity began in earnest and national laws that might apply are stunted by jurisdictional quandaries like the absence of national boundaries in outer space.538 Thus, there is an urgency to figure out how to control what happens in outer space before its resources are irreparably damaged or permanently monopolized by powerful countries and individuals. In the absence of regulation, much of the current debate centers on what property regime should be applied in outer space.539 The assumption is that by only allowing private property rights in space, countries and commercial enterprises will undertake the risks and costs of space development.540 However, unless international space law changes, it may prevent this from happening. If it changes, strong management controls will be necessary to prevent destruction or over-consumption of celestial resources, as well as monopolization and competitive behavior by participants, which could lead to hostilities and inequities. This Article examines various private property regimes, including those of less than full fee ownership, to see if any would avoid the conflict with the international prohibition on appropriation of outer space and its resources. It concludes that none will because each retains the right to exclude and each is insensitive to the treaties’ equity concerns. In contrast, considering outer space to be common is consistent with international space law in both respects. Hypothesizing that private property in outer space may yet prevail, this Article investigates different private property management approaches, such as the right of first possession, lotteries, and tradable development rights, to see if any would be cost effective, easy to implement and equitable, and would also prevent over-consumption, monopolization or the slide into rivalrous behavior. The Article concludes that each comes up short in some respect. Social norms as a management tool for property held in common, although compliant with international law, are also not up to the task. Instead, although ancient, the PTD, with its malleability, easy and cost-effective implementation and enforcement, non-consumption principle, and consistency with the goals that animate international space treaties, seems best suited to the task of protecting the public’s interests in the global commons that is outer space as it has done for centuries in Earth-bound commons. But, as its principal terrestrial use has been to protect trust resources from development, the doctrine needs some modification to encourage development of celestial resources. Hence, this Article suggests that modifying the PTD to allow the application of private property management tools, like tradable development rights, will not only allow development, but also will assure that when it happens, it will not be just profitable for a few, but will also be sustainable and equitable.

#### Vote neg for limits – extra-topicality allows them to tack on infinite planks to artificially improve aff solvency and spike out of DAs, like fiating enforcement or random possible modifications to extraterrestrial property rights. The counter-interp sets a precedent that the scope of aff fiat doesn’t have to be bounded by the resolution, which outweighs on magnitude. No drop the arg – we shouldn’t have to always read T just to get back to what we should’ve been debating to begin with – it incentivizes adding random extra-t planks because there’s no punishment.

#### Competing interpretations—it tells the negative what they do and do not have to prepare for. Reasonability is arbitrary and unpredictable, inviting a race to the bottom and we’ll win it links to our offense.

#### No RVIs—it’s your burden to be fair and T—same reason you don’t win for answering inherency or putting defense on a disad.

### 1NC—Space Col

#### Space colonization fails—

#### Space col can’t solve existential risks.

Szocik 18 (Konrad Szocik, Assistant Professor at the University of Information Technology and Management in Rzeszow, Poland (Department of Philosophy and Cognitive Science), 2018. “Should and could humans go to Mars? Yes, but not now and not in the near future”. Futures. doi:10.1016/j.futures.2018.08.004)

4.5. There is no risk on Earth sufficient to justify the expense of a space refuge Space refuge is justified only when there is at least one kind of catastrophe on Earth which will lead to extinction of the entire human species. Baum (2015) and Baum et al. (2015) do not believe that space settlement offers advantage over terrestrial refuge. If terrestrial refuge (aquatic and/or subterranean) is able to protect against the strongest catastrophes including asteroid impact, the unique serious rationale accepted by public opinion for space human mission fails. As Alexey Turchin and Brian Patrick Green (2017) show, aquatic refuges based on adaptation of nuclear submarines may effectively play their role. They may be surface independent, which is the basic criterion of any refuge (Baum et al. 2015). They are cheaper and easier in engineering terms when compared with Mars settlement. A space refuge would not be able to cope with currently-occurring risks, e.g. overpopulation and climate change. Human overpopulation can be limited only on Earth by terrestrial policy and, if this can be done, no space base is necessary. If it is not possible, then no space base can solve this problem. For example, space settlement is not able to alleviate global warming, against Milligan’s suggestion. The unique way to do that on Earth is to reduce methane emission and/or to cool Earth by turning sunlight into space, as Solar Radiation Management proposes (Farquhar et al. 2017). There is only indirect, not direct applicability of space exploration. For instance, space technology might be applied to cope with asteroid impact or increasing the Sun temperature (Crawford). But these exogenous catastrophes caused by cosmic events are unlikely in lifespan of current and future generations (Tegmark and Bostrom 2005, p. 754), and for this reason they offer poor incentive for human space program. The unique rationale for space refuge mission could be future development of the Sun which will be getting more and more warmer in next billions years. But this threat does not justify human space settlement due to its high risk and high costliness (Jebari 2015). Nick Beckstead speculates on possible disasters on Earth deleterious also for humans living in shelters, e.g. scenarios that include invasion of aliens, runaway AI, or ecophagy caused by nanotechnology (Beckstead 2015).9 Beckstead rightly adds that the big challenge is not only rate of survival immediately after catastrophe but also chances for survival in long-term scale including collapse in food production and supply chain, and associated social and political collapse. It is hard to imagine catastrophe which kills the entire Earth population excluding people living in refuge. In this case, rationale for refuge fails.

#### Their impact calculus is backwards – default neg on certainty – tracing causal pathways can be useful but making small, incremental changes is key

**Karnofsky 14** (Holden Karnofsky – Executive Director of the Open Philanthropy Project degree in Social Studies from Harvard University. “The Moral Value of the Far Future” July 3, 2014. Open Philanthropy Project. <https://www.openphilanthropy.org/blog/moral-value-far-future>) \*modified for ableist language

The importance of the far future As discussed previously, I believe that the general state of the world has improved dramatically over the past several hundred years. It seems reasonable to state that the people who made contributions (large or small) to this improvement have made a major difference to the lives of people living today, and that when all future generations are taken into account, their impact on generations following them could easily dwarf their impact in their own time. I believe it is reasonable to expect this basic dynamic to continue, and I believe that there remains huge room for further improvement (possibly dwarfing the improvements we’ve seen to date). I place some probability on global upside possibilities including breakthrough technology, space colonization, and widespread improvements in interconnectedness, empathy and altruism. Even if these don’t pan out, there remains a great deal of room for further reduction in poverty and in other causes of suffering. In Astronomical Waste, Nick Bostrom makes a more extreme and more specific claim: that the number of human lives possible under space colonization is so great that the mere possibility of a hugely populated future, when considered in an “expected value” framework, dwarfs [outweighs] all other moral considerations. I see no obvious analytical flaw in this claim, and give it some weight. However, because the argument relies heavily on specific predictions about a distant future, seemingly (as far as I can tell) backed by little other than speculation, I do not consider it “robust,” and so I do not consider it rational to let it play an overwhelming role in my belief system and actions. (More on my epistemology and method for handling non-robust arguments containing massive quantities here.) In addition, if I did fully accept the reasoning of “Astronomical Waste” and evaluate all actions by their far future consequences, it isn’t clear what implications this would have. As discussed below, given our uncertainty about the specifics of the far future and our reasons to believe that doing good in the present day can have substantial impacts on the future as well, it seems possible that “seeing [viewing] a large amount of value in future generations” and “seeing an overwhelming amount of value in future generations” lead to similar consequences for our actions. Catastrophic risk reduction vs. doing tangible good Many people have cited “Astronomical Waste” to me as evidence that the greatest opportunities for doing good are in the form of reducing the risks of catastrophes such as extreme climate change, pandemics, problematic developments related to artificial intelligence, etc. Indeed, “Astronomical Waste” seems to argue something like this: For standard utilitarians, priority number one, two, three and four should consequently be to reduce existential risk. The utilitarian imperative “Maximize expected aggregate utility!” can be simplified to the maxim “Minimize existential risk!”. I have always found this inference flawed, and in my recent discussion with Eliezer Yudkowsky and Luke Muehlhauser, it was argued to me that the “Astronomical Waste” essay never meant to make this inference in the first place. The author’s definition of existential risk includes anything that stops humanity far short of realizing its full potential - including, presumably, stagnation in economic and technological progress leading to a long-lived but limited civilization. Under that definition, “Minimize existential risk!” would seem to potentially include any contribution to general human empowerment. I have often been challenged to explain how one could possibly reconcile (a) caring a great deal about the far future with (b) donating to one of GiveWell’s top charities. My general response is that in the face of sufficient uncertainty about one’s options, and lack of conviction that there are good (in the sense of high expected value) opportunities to make an enormous difference, it is rational to try to make a smaller but robustly positive difference, whether or not one can trace a specific causal pathway from doing this small amount of good to making a large impact on the far future. A few brief arguments in support of this position: I believe that the track record of “taking robustly strong opportunities to do ‘something good’ ” is far better than the track record of “taking actions whose value is contingent on high-uncertainty arguments about where the highest utility lies, and/or arguments about what is likely to happen in the far future.” This is true even when one evaluates track record only in terms of seeming impact on the far future. The developments that seem most positive in retrospect - from large ones like the development of the steam engine to small ones like the many economic contributions that facilitated strong overall growth - seem to have been driven by the former approach, and I’m not aware of many examples in which the latter approach has yielded great benefits. I see some sense in which the world’s overall civilizational ecosystem seems to have done a better job optimizing for the far future than any of the world’s individual minds. It’s often the case that people acting on relatively short-term, tangible considerations (especially when they did so with creativity, integrity, transparency, consensuality, and pursuit of gain via value creation rather than value transfer) have done good in ways they themselves wouldn’t have been able to foresee. If this is correct, it seems to imply that one should be focused on “playing one’s role as well as possible” - on finding opportunities to “beat the broad market” (to do more good than people with similar goals would be able to) rather than pouring one’s resources into the areas that non-robust estimates have indicated as most important to the far future. The process of trying to accomplish tangible good can lead to a great deal of learning and unexpected positive developments, more so (in my view) than the process of putting resources into a low-feedback endeavor based on one’s current best-guess theory. In my conversation with Luke and Eliezer, the two of them hypothesized that the greatest positive benefit of supporting GiveWell’s top charities may have been to raise the profile, influence, and learning abilities of GiveWell. If this were true, I don’t believe it would be an inexplicable stroke of luck for donors to top charities; rather, it would be the sort of development (facilitating feedback loops that lead to learning, organizational development, growing influence, etc.) that is often associated with “doing something well” as opposed to “doing the most worthwhile thing poorly.” I see multiple reasons to believe that contributing to general human empowerment mitigates global catastrophic risks. I laid some of these out in a blog post and discussed them further in my conversation with Luke and Eliezer. For one who accepts these considerations, it seems to me that: It is not clear whether placing enormous value on the far future ought to change one’s actions from what they would be if one simply placed large value on the far future. In both cases, attempts to reduce global catastrophic risks and otherwise plan for far-off events must be weighed against attempts to do tangible good, and the question of which has more potential to shape the far future will often be a difficult one to answer. If one sees few robustly good opportunities to “make a huge difference to the far future,” the best approach to making a positive far-future difference may be “make a small but robustly positive difference to the present.” One ought to be interested in “unusual, outstanding opportunities to do good” even if they don’t have a clear connection to improving the far future.

#### Space Exploration for Colonization trades-off w/ terrestrial life-sciences – key to re-direct focus.

Haymet 7 (Tony, Director of the Scripps Institution of Oceanography – University of California, San Diego, Mark Abbott, Dean of the College of Oceanic and Atmospheric Science – Oregon State University, and Jim Luyten, Acting Director – Woods Hole Oceanographic Institution, “The Planet NASA Needs to Explore”, Washington Post, 5-10, [http://www.washingtonpost.com/wp-dyn/content/article/2007/05/09/AR2007050902451.html](http://www.lexis.com/research/retrieve))

Decades ago, a shift in NASA priorities sidelined progress in human space exploration. As momentum gathers to reinvigorate human space missions to the moon and Mars, we risk hurting ourselves, and Earth, in the long run. Our planet -- not the moon or Mars -- is under significant threat from the consequences of rapid climate change. Yet the changing NASA priorities will threaten exploration here at home. NASA not only launches shuttles and builds space stations, it also builds and operates our nation's satellites that observe and monitor the Earth. These satellites collect crucial global data on winds, ice and oceans. They help us forecast hurricanes, track the loss of Arctic sea ice and the rise of sea levels, and understand and prepare for climate changes. NASA's budget for science missions has declined 30 percent in the past six years, and that trend is expected to continue. As more dollars are reallocated to prepare for missions back to the moon and Mars, sophisticated new satellites to observe the Earth will be delayed, harming Earth sciences. The National Academy of Sciences has noted that the Landsat satellite system, which takes important measurements of global vegetation, is in its fourth decade of operation and could fail without a clear plan for continuation. The same is true for the QuikSCAT satellite, which provides critical wind data used in forecasting hurricanes and El Niño effects. In January, a partnership of university and NASA scientists demonstrated that climate change and higher ocean temperatures were reducing the growth of microscopic plants and animals at the heart of the marine food web. Their analysis was based on nearly a decade of NASA satellite measurements of ocean color, which unfortunately are at risk of being interrupted for several years. Sea levels are rising, and the Arctic Ocean may be ice-free in summer. The buildup of carbon dioxide in the oceans threatens to make them more acidic, which may in turn hinder the ability of some types of marine life, including corals, to build their shells and skeletons. We must learn as much as we can to assess these threats and develop solutions. Satellites provide coverage of vast, remote regions of our planet that would otherwise remain unseen, especially the oceans, which play an important role in climate change. Without accurate data on such fundamentals as sea surface height, temperatures and biomass, as well as glacier heights and snowpack thickness, we will not be able to understand the likelihood of dangers such as more severe hurricanes along the Gulf Coast or more frequent forest fires in the Pacific Northwest. Climate change is the most critical problem the Earth has ever faced. Government agencies and the private sector, as well as individual citizens, need to better grasp the risks and potential paths of global climate change. Mitigating these risks and preparing for the effects of warming will require scientific understanding of how our complex planet operates, how it is changing, and how that change will affect the environment and human society. John F. Kennedy's brilliant call to put a man on the moon by the end of the 1960s set an arbitrary deadline, but the deadline we face today is set by nature. NASA must continue to play a vital role in helping find ways to protect our planet for (and perhaps from) its intelligent life. Exploration of space is a noble quest. But we can't afford to be so starry-eyed that we overlook our own planet.

#### But attempts to colonize are bad—

#### Space col causes inter-colony wars and war with ETs---extinction.

Marko **Kovic 18**. Social scientist (PhD in political communication, University of Zurich), co-founder and CEO of the consulting firm ars cognitionis, co-founder and president of the thinktank ZIPAR, the Zurich Institute of Public Affairs Research. 06-12-18. “Political, moral, and security challenges of space colonization.” ZIPAR. https://zipar.org/discussion-paper/political-moral-security-challenges-space-colonization/

3.3 Extraterrestrial life The scientific understanding of the origins of humankind and of life on Earth thus far paints a clear picture: We are the “products” of biological evolution, just as all other life forms on Earth. Furthermore, we know that life can come into existence where there was no life before, through so-called abiogenetic mechanisms. These basic facts lead to a clear conclusion: It is very improbable that life on Earth is a once-in-a-universe event; it is highly probable that life has come into existence elsewhere in the universe as well. We do not know whether extraterrestrial life currently exists, and whether there is any extraterrestrial life in our vicinity (as far as we know, there is none in our Solar System). In theory, our galaxy might be full of life and even highly intelligent and technologically advanced life, but, as the famous Fermi paradox posits32, there is no trace of any extraterrestrial intelligence. Be that as it may, it is possible that there is extraterrestrial life beyond Earth, and it is possible that we will come into contact with extraterrestrial life due to colonization activity. What should our moral attitude towards extraterrestrial life look like? The moral issue of our attitudes towards extraterrestrial life can be divided into three classes of problems, according to the type of life we are dealing with: Primitive non-sentient life. Primitive sentient life. Non-primitive sentient life. Primitive non-sentient life are life forms that resemble microbial life forms on Earth, such as bacteria. Extraterrestrial microbial life can be of great instrumental value, specifically to humans, but also in a more general sense. That is a strong argument in favor of studying and preserving extraterrestrial microbial life33; we should not go out of our way to destroy microbial life, because that life might be very useful. The main moral issue about primitive non-sentient life, however, is not the question of instrumental value, but rather the question of intrinsic value: Is there a moral obligation for humans not to manipulate or even end extraterrestrial microbial life forms? This problem is, in all likelihood, the most pressing moral issue about extraterrestrial life and space colonization and one that deserves greater practical attention34. A common argument in favor of the intrinsic value position is that of conation or goal-orientedness35 36: Because even microbial life forms act vaguely rational (they have goals and behave so as to achieve their goals), their existence has some intrinsic value. The problem with this moral argument is that it can easily lead to the conclusion of strong conservationism, whereby any habitable planet or moon should remain uncolonized, lest we interfere with microbes that we might have failed to detect37. In addition, if we accept a strong version of the intrinsic value argument, we already have immense moral problems: On Earth, we do not particularly care for any microbial life form on intrinsic grounds, and we even actively fight some of them. Primitive sentient life are life forms that are not as intelligent as humans, but that are sentient, in the sense of being able to experience positive or negative affective states. Even though sentience is not a perfectly precise concept38, and even though we lack the means for truly assessing qualia (subjective experiences) of life forms other than humans39, it is almost certain that we humans are not the only life form capable of experiencing pain and pain-related suffering and that many animals on our planet are sentient as well40. Sentient extraterrestrial life forms require a different moral stance than non-sentient life forms. Imagine, for example, that two human space ship are about to land on an exoplanet. As the space ships are landing, the exhaust from their engines heats up the ground. Space ship A is landing on a nest of insect-like non-sentient life forms, frying them alive in the process. Space ship B is landing on a herd of bunny-like sentient creatures, frying them alive in the process. Both outcomes are unfortunate, but undoubtedly, killing the sentient bunny-like creatures must be morally worse than killing the non-sentient insect-like creatures, because the bunnies experienced enormous pain while they were being killed. Our moral stance towards sentient primitive extraterrestrial life will have to take sentience into account. Avoiding suffering in sentient extraterrestrial life should be a universal rule of space colonization. Somewhat obviously, such a rule would also prohibit treating sentient extraterrestrial life forms as food (But it is highly improbable that humans would have to routinely rely on extraterrestrial sentient life forms as sources of nutrition, even though we would be technologically advanced enough to engage in intersolar space colonization. We are in the process of overcoming traditional agriculture today41; reverting to traditional agriculture on future extrasolar colonies would amount to an extraordinarily improbable and inefficient anachronism.). Non-primitive sentient life are life forms that are sentient and possess a general intelligence at least as great as our own (It is possible that highly intelligent life forms might be non-sentient, but at least on Earth, sentience seems to correlate with intelligence.). The moral challenge of this type of extraterrestrial life is the same as with primitive sentient life, and there are additional moral problems to consider. If there are intelligent life forms beyond Earth, their levels of technological development will have great variance; some life forms will be intelligent, but not yet developed, whereas others will be intelligent and much more technologically advanced than we are. Intelligent life forms that are less technologically developed than we are present us with a moral problem: Should we interact with such civilizations and try to help them develop faster and overcome problems? This moral problem has perhaps most famously been explored in the television show Star Trek with its “Prime Directive”: The fictional United Federation of Planets is never to interfere with a technologically undeveloped civilization in order to avoid doing damage (Alas, the protagonists of Star Trek end up violating the Prime Directive time and again; doing so makes for a good story.). More generally, the problem of non-interference can be described as a reversed Zoo hypothesis42, whereby it is not extraterrestrial civilizations treating Earth like a conservation project, but us humans pondering whether we should treat extraterrestrial civilizations as conservation projects. A strong argument in favor of non-interference is the risk of both causing bad outcomes, both in the short- as well as in the long-term. Interacting with less developed civilizations might inadvertently do more harm than good, and it might steer the affected civilizations away from a path to development that might be beneficial to humankind in the long run. On the other hand, however, not investing a small amount of resources to greatly improve lives and reduce suffering seems morally dubious. If an extraterrestrial civilization that is going through a historical era similar to our Middle Ages is confronted with some catastrophic disease like our Black Death pandemic, not helping that civilization fight that pandemic seems cruel; not least because the cost for helping that civilization would almost certainly be trivially low. 3.4 Cosmic suffering Imagine that humankind has successfully mastered phase II colonization (colonization beyond our Solar System). All the problems described in the previous sections and subsections have long been successfully solved, and humankind is progressing steadily and peacefully. Then, something happens. At some point and for some reason, future humans decide that they do not want to merely engage in space colonization, but to do more: Actively seed the universe with (non-human) life43. Given the technological development of future humankind, it is relatively easy to send out non-sentient primitive life forms across the galaxy. Unfortunately, something horrible happens: The primitive microbial life-forms sent out into the cosmos mutate into aggressive bacteria that attack any life form they encounter, including sentient life – and in doing so, they cause tremendous pain and agony in the organisms they attack. The benevolent idea of spreading life has quickly turned into unimaginable suffering of trillions of sentient beings across the galaxy. Colonizing humans have thus created suffering on a cosmic, or astronomical, scale44. Cosmic suffering is the risk of creating suffering on a scale that is either not possible or not as probable without space colonization. There are many potential scenarios in which successful space colonization results in cosmic suffering. For example, the general problem of the repugnant conclusion discussed further above can also be regarded as an example of this class of risks. Cosmic suffering is a severe problem because it is contingent on, or at least made more likely by, successful space colonization. The conceptually challenging aspect of cosmic suffering is the correlation of cosmic suffering with the degree of space colonization: The greater the level of space colonization, the greater the risks of cosmic suffering become. This is the opposite of the relationship between space colonization and existential risks: The greater the level of space colonization, the lower existential risks become – this is one of the main motivations for space colonization, after all. In other words, successful space colonization decreases the probability that something goes wrong for humankind in terms of existential risks, but it increases the probability that something goes wrong in terms of suffering for the whole universe. 4. Security challenges In the above discussions of political and moral challenges, it is presumed that the problems and challenges that arise do so in a generally peaceful system of colonization. However, peace in the sense of a lack of armed conflict is not guaranteed with space colonization. On the contrary: Space colonization might produce new kinds of security challenges. 4.1 Inter-colonial war Violence and war have been decreasing over the course of our civilization’s history45 46 47. The decrease in violent armed conflict has coincided with an increase in cultural, political, and economic interconnectedness. Even though major armed conflicts are not yet a thing of the past48, humankind will probably continue on its current trajectory of peace. With space colonization, however, the trend of growing closer together might reverse because of increasing fragmentation, and with that reversal, peaceful cooperation might again give way to armed conflict. Some amount of human fragmentation due to space colonization is almost inevitable. One of the strongest biases we humans have is the intergroup bias49: We tend to separate people into ingroups and outgroups, and we generally favor our own ingroup over any outgroup. Our ingroup favoritism is often the source of collective identity: We identify with our home city and think it is better than other cities; we identify with our favorite football team and think it is better than other teams; we identify with our country of origin and think it is better than other countries. In a future in which humans have successfully mastered type I colonization (colonization within our Solar System) and perhaps even type II colonization (intersolar colonization), belonging to one habitat rather than another will almost certainly also be a source of collective identity. Humans born and raised on Venus would probably have more positive general attitudes towards Venus than towards Earth. That is not a problem in and of itself, but it can become a problem: If humankind is very successful at space colonization and manages to establish colonies across the galaxy, the ingroup dynamics within colonies and regions of colonies might grow so much that the perceived benefits of armed conflict increase, and the perceived costs decrease. In part, this might be due to the infrahumanization (or dehumanization) bias50: Our intergroup bias can have the effect of perceiving members of the outgroup as less human than members of our own ingroup. The problem of intergroup bias and armed conflict could be compounded by real biological differences in the long-term future. In the long term, different colonies of humans might adopt different stances on human enhancement technology and embrace different kinds of enhancement technologies. These differential paths of human enhancement might result in technology-induced quasi-speciation, whereby different strands of humans have increasingly distinct biological traits. The ultimate result of such a development might be a strong fragmentation of humankind and an increasing arms race in order to defend against the outgroup of all the (former) humans that are different from the ingroup (former) humans51. 4.2 Extraterrestrial (existential) risks Space colonization will increase the probability of discovering and coming into contact with extraterrestrial intelligence, either biological or artificial (in the sense of hypothetical advanced artificial general intelligence52). That prospect poses some moral challenges, as argued in subsection 3.3. However, it might also pose a security challenge if an extraterrestrial intelligence more technologically advanced than humankind has goals and preferences that go against the goals and preferences of humankind. In general, there are three categories of attitudes an extraterrestrial intelligence can have towards humankind53. First, an extraterrestrial intelligence can be benevolent. A benevolent extraterrestrial intelligence is one that would change its goals and preferences upon learning of humankind. Humankind is a benevolent intelligence: If we, for example, came into contact with an extraterrestrial civilization, we would obviously take the goals and preferences of that civilization into account and update our own goals and preferences, since we are morally advanced enough to do so. Second, an extraterrestrial intelligence can be apathetic. An apathetic extraterrestrial intelligence is one that does not at all change its goals and preferences upon learning of humankind. An apathetic intelligence would neither try to accommodate humankind, nor would it react in some non-friendly way. It would not care at all. The attitude of an apathetic intelligence is similar to the attitude we humans have when it comes to some random microbial life form on Earth: We might understand that that life form exists, but we do not care either way. Third, an extraterrestrial intelligence can be hostile. Hostility in a general sense means that an intelligence reacts to learning of humankind by regarding its own goals and preferences as categorically more important than humankind’s. A hostile extraterrestrial intelligence is not necessarily a security threat to humankind; hostility in this context does not mean hostility in the Hollywood kind but hostility in the sense of active disregard of humankind’s goals and preferences. That, however, might still represent a tremendous security risk. For example, a hostile intelligence might prefer humankind not to exist because our mere existence is perceived as a slight discomfort to the extraterrestrial intelligence. Hostile extraterrestrial intelligence thus represents a form of existential risk.

#### Outweighs on scope - NOT just earth life, but all life in the universe would end.

Torres 18 (Phil Torres. Project for Future Human Flourishing. 06/2018. “Space Colonization and Suffering Risks: Reassessing the ‘Maxipok Rule.’” Futures, vol. 100, pp. 74–85.)

5. Space-Age Weaponry and the Balance of Terror Yet there is another strategy for neutralizing the Hobbesian trap, namely, a policy of deterrence, also known as a “balance of terror” or, during the Cold War, “mutually-assured destruction” (MAD). This asserts that “if you strike me, I will most assuredly strike back with equal or greater force, and if I strike you it will only be because you struck me first.”xvii Deterrence is only effective when one’s adversaries genuinely believe the statement, “I will most assuredly strike back.” This returns us to Hobbes’s third cause of conflict from section 3: glory, honor, or credibility. To establish credibility and, therefore, dissuade potential attackers, one has reason to engage in confrontations with others and, in doing so, to demonstrate one’s capacity for violence. The question is whether policies of deterrence implemented by civilizations throughout the cosmos would be sufficient to obviate war. To answer this question, let’s begin by considering the unsettling range of weapons that will likely be available to our spacefaring progeny; we will then explore how these weapons could enhance or mitigate the effectiveness of deterrence. 5.1 Weapons of Total Destruction (WTDs) There are a variety of “kill mechanisms” that one civilization could use to obliterate another. In relatively close propinquity, chemical and biological weapons could offer a means of targeted violence, since the deleterious effects of such weapons might be limited to a particular species (Deudney forthcoming). For example, the toxicity of a chemical X might be low for a species A but lethal to a species B. This could enable A to use X on B without fear of X harming A—a concern that has dissuaded some terrorists from employing chemical weapons. The same goes for a pathogenic germ Y: since pathogens often only harm single species, biological weapons could be used without the perpetrators worrying about becoming sick. With respect to artificial intelligences, there could be viral malware that affects only certain types of software; in this case, such viruses could be transferred not at the velocity of a sneeze but at the speed of light, traversing astronomically large stretches of space to devastate colonies of artificial-substrate beings. Another possibility involves weaponizing “minor planets” like asteroids. This hints at the deflection dilemma discussed by Sagan (1994), among others, whereby the very same technology that could deflect an asteroid away from Earth could also be used to redirect one toward it. The resultant “planetoid bombs” could be launched in the direction of target civilizations at extremely high velocities and inflict far greater destruction than all the nuclear arsenals on Earth combined (see Cole and Cox 1965; Deudney forthcoming). Even more, asteroids are extremely numerous in the solar system and have a wide range of sizes, with estimates of 1.1 to 1.9 million that have greater-than-1-kilometer diameters in the asteroid belt between Mars and Jupiter. (A 1- kilometer impactor striking Earth would likely annihilate humanity by causing an impact winter.) Thus, asteroids constitute an abundant source of easily obtainable, civilization-ending weaponry— a particularly worrisome fact given that the technological capabilities to redirect asteroids will likely emerge at an early stage in our diaspora “out of Earth,” as it were (see Deudney forthcoming). Other futuristic space weapons include military drones that either initiate attacks or engage in clandestine surveillance of other civilizations. Such drones could hide themselves from counter-surveillance detectors by employing metamaterial invisibility cloaks and propagate themselves through the von Neumann process of self-replication, that is, by converting raw materials into clones of themselves. There is also the possibility of using “heliobeams,” or “sun guns,” to destroy targets by concentrating large amounts of solar radiation via a concave mirror on a satellite. Even more catastrophic are direct-energy weapons (DEWs) like lasers and particlebeams that use highly focused energy to superheat their targets. In fact, the US government has already developed weapons of this sort—they are science fact rather than fiction—although future breakthroughs could enable them to become immensely more destructive. If this is the case, they will offer yet another mechanism for wreaking unprecedented harm (see Deudney forthcoming). Along these lines, Anders Sandberg (forthcoming) suggests that technologically advanced civilizations could potentially use gravitational waves to create black holes. Generating waves of sufficient intensity would be energetically inefficient, according to current physics, but they have the advantage that they can interact with dark matter objects, unlike electromagnetic-energy weapons. Even more, the universe appears to be in a “metastable” energy state. This suggests that one could tip it into a more stable, lower-energy state, perhaps by concentrating huge quantities of energy in tiny regions of spacetime, as occurs in some high-powered physics experiments. In other words, a particle collider could be weaponized to intentionally nucleate a “vacuum bubble,” or sphere of “true vacuum” spreading in all directions at the speed of light and destroying everything with which it comes into contact. Who might weaponize a particle collider? First, there could be actors who use the threat of a vacuum bubble for blackmail purposes. Second, there could be madmen (like Hitler) who create a vacuum bubble to avoid defeat. That is to say, a predatory actor could hold the following preference ordering: (i) triumphant victory over, say, its Local Group, (ii) total annihilation of the universe, and (iii) defeat. Third, particle colliders would also be the ideal WTD for RNUs, since it would enable them to obliterate not only all extant life in the universe but the very potential for life to arise—and it would do this without inflicting any suffering whatsoever.xviii Another possibility is that Tuckerian actors create a vacuum bubble for the purely defensive reason of eliminating all potential attackers in the universe. As Sandberg (2017) speculates, it might be possible for “certain configurations of matter, energy, black holes, etc. [to] induce a post-transition structure that can act as an assembler.” This “assembler” would enable “some information [to] be transmitted into the new state,” thus making it possible for a civilization to “survive,” in some sense, the universe settling into a lower-energy configuration. On the other side of this transition, the “structure” can recrudesce into a daughter new civilization with the certitude that it is completely alone and, therefore, safe. Finally, it is crucial to note that future beings—some of whom may have hugely augmented cognitive capacities—will almost certainly invent new weapons that are more powerful and effective than anything we could imagine. Such weapons could enable civilizations—or perhaps lone wolves, of which there could be, once again, trillions and trillions and trillions—to cause unprecedented injury to other civilizations. Consider the following passage from Bostrom (2013): One can readily imagine a class of existential-catastrophe scenarios in which some technology is discovered that puts immense destructive power into the hands of a large number of individuals. If there is no effective defense against this destructive power, and no way to prevent individuals from having access to it, then civilization cannot last, since in a sufficiently large population there are bound to be some individuals who will use any destructive power available to them. Scale this up from the individual level to the cosmopolitical level and the same conclusion follows: Life in the universe cannot last.

#### Space colonization leads to rapid growth of incurable alien diseases—extinction

Wickramasinghe 10 (Chandra, Ph.D., Centre for Astrobiology, Cardiff University, UK; Journal of Cosmology, “Are Intelligent Aliens a Threat to Humanity? Diseases (Viruses, Bacteria) From Space”, May 2010, http://journalofcosmology.com/Aliens106.html)

The real risk to humanity of alien life may be in the form of viral and bacterial genomes arriving at the Earth which are sometimes pathogenic (Joseph and Wickramasinghe 2010). Fred Hoyle and the present author have argued the thesis of “Diseases from Space” over several decades (Hoyle and Wickramasinghe, 1979, 1982, 1990; Hoyle et al, 1985; Wickramasinghe et al, 2003). Despite criticisms that have often been made against this concept the basic arguments remain cogent to the present day (Joseph and Wickramasinghe 2010). With increasing evidence to support the view that life could not have arisen indigenously on the Earth, the idea that the evolution of life is modulated by genes arriving from comets has acquired a new significance. Darwinian evolution operates in an open system where new genes continue to be added from a cosmic source. Pandemics of viral and bacterial disease become an inevitable part of this thesis. One could argue that if not for such genetic additions from outside, evolution would have come to a standstill a long time ago (Hoyle and Wickramasinghe, 1982; Joseph and Wickramasinghe 2010). In this context it should be noted that the human genome has recently been found to contain more than 50 percent of its content in the form of well defined inert viral genes. It is possible to understand this data if our ancestral line of descent over a few million years had suffered a succession of near-culling events following outbreaks of viral pandemics(Joseph and Wickramasinghe 2010). On each such occasion only a small breeding group survived the members of which had assimilated the virus into their reproductive line. Hoyle and the present author have cited numerous instances from the history of medicine where outbreaks of pandemic disease could be elegantly explained in terms of space incident viruses. Even the modern scourge of influenza is likely to be driven by periodic injections of genetic components from space. Aspects of the epidemiology of influenza otherwise remains difficult to explain (Hoyle and Wickramasinghe, 1979, 1991). In conclusion, we note that the aliens we have to fear are not superintelligent creatures arriving in space ships and intending to conquer and subdue us, but sub-micron sized viral invaders that may threaten the very existence of our species.

#### And they’ll detach time from space – *outweighs nuclear war*

IDTT 8, “Gravity wave applications in Air Force – the technologies reverse engineered from Extraterrestrial UFOs”, India Daily, <http://www.indiadaily.com/editorial/18998.asp>

The interaction of gravity waves and times form the basis of stability in the 3D universe. If that can be disturbed, the nastiest and most dangerous weapon systems can be created – thousand time worse than nuclear weapons. When relatively immense amount of energy in applied on a point, the effect is amazing. According to some contemporary physicists, it is possible to detach the space from time in a very local area to create havoc in adversary’s weapon systems. Some extraterrestrial UFOs do that all the time to escape the 3D mesh and enter the galactic black holes. They detach the space from time in a very controlled manner. It is similar to using nuclear energy in a controlled chain reaction to generate energy versus uncontrolled manner for the purpose of destruction. Many have suggested, extraterrestrial warfare created planets like Mars. Mars was full of life and somehow it lost all its electromagnetic properties to become a barren red planet. Mars may have observed the effects of detaching time from space in a local area.

#### Tech development from space causes horrible existential risks

Kovic 20 (Same guy y’all cut. “Risks of space colonization” https://osf.io/preprints/socarxiv/hj4f2///TU-SG)

2.3 Speeding up the rate of existential risk creation Achieving space colonization capabilities means obtaining sufficiently advanced technology for venturing beyond Earth and permanently sustaining human life there. It is therefore quite a natural impulse, as described in 5 subsection 2.1, to want to maximize the pace of technological development in order to obtain colonization-enabling technology as soon as possible. The problem with this impulse, however, is that a drastically increased pace of technological development might also increase the pace of existential risk creation, thereby overwhelming our existential risk mitigation capabilities and, ultimately, reducing the probability of successful space colonization. This prioritization risk is premised on the notion that existential risks correlate with technological development. That is not always the case, because the class of natural existential risks are not influenced by human activity. The probability that a giant meteor or asteroid will crash into Earth within the next ten years, for example, is just as great today as it was a thousand years ago. Anthropogenic existential risks, on the other hand, are not i.i.d. (independent and identically distributed) but contingent on human activity in the form of technological development. Essentially all major existential risks that exist today, such as climate change, superintelligent artificial intelligence, nuclear war, or antibiotics-resistant “superbugs”, are anthropogenic in nature and a consequence or correlate of technological development (Though they are not usually deliberately created.). The threat posed by natural existential risks remains constant over time, but the threat posed by anthropogenic existential risks grows with technological development [15].

#### Space col causes von Neumann probe encounters---extinction.

Tomislav **Miletić 15**. Doctoral student at the Department of Philosophy, University of Rijeka, specializing in in AI Ethics. June 2015. “Extraterrestrial artificial intelligences and humanity’s cosmic future: Answering the Fermi paradox through the construction of a Bracewell-Von Neumann AGI.” Journal of Evolution and Technology. Vol. 25 Issue 1. pgs 56-73. https://jetpress.org/v25.1/miletic.htm

It is safe, nonetheless, to claim that all ET cultures will pursue species survival through resource acquisition and growth in intelligence. Since planetary survival is constantly endangered by cosmic and planetary calamities, including species-induced ecological disasters, the survival instinct will propel every sentient species beyond the confines of its own planet toward extraplanetary colonization. Unfortunately, space conditions are detrimental and lethal to carbon-based lifeforms (Harrison 2010). Thus, if a technological civilization is to maximize the odds of its survival through space exploration and planetary colonization, it will need to develop forms that can survive the effects of prolonged exposure to space environments. An intelligent thinking machine capable of space travel, communication, and tool use is the most probable of such options, and we can safely guess that a distant alien civilization would initially explore the galaxy through a certain kind of ETAI. The most probable of such agents is the self-replicating “Bracewell-von Neumann” (BN) probe. The scenario for such a probe requires the oldest possible alien civilization, one that could have evolved several billion years ago in the Milky Way Galaxy (Dick 2009). When a civilization enters the technological phase required for galactic exploration, it will first survey the galaxy to find planets residing in habitable zones. Its next step is to count the number of those planets, calculate the distances between them, and proceed with dispatching BN probes. The task of an intelligent probe is to enter a designated solar system and initiate its programmed goals. Since it stays in the planet’s vicinity, it has no need for high energy consumption. The proximity of the probe shortens the communication to light-minutes while not revealing the home location of the probe’s sender. Upon arrival, the probe can passively monitor any local technological society before initiating contact. To remain functionally intact, the probe will need to have an intelligent ability for self-repair and the ability for self-manufacturing. Required materials and energy can be harvested from raw materials in space and the designated solar system. But if BN machines are one of the most efficient agents (in terms of energy usage, building costs, and time consumption) of galactic communication, and if it is logical to assume that they would be widely used by ET civilizations, why haven’t we come into contact with one of them? One possible reason is, as always, that we are alone in our galaxy. Frank Tipler has claimed that the galaxy's colonization by these machines would take around 300 million years and that their absence from our solar system represents a more potent version of the Fermi paradox arguing against the existence of ETs (Davies 2010, 74). Since we have only recently begun exploring our solar system, we cannot take the absence of BN probes as a matter of fact. In fact, just the opposite could be true – the BN could be well hidden in a “secret” location and waiting to reveal itself if we fulfill a certain expected condition (Gillon 2013). Or perhaps we need to search in the “right” direction or the “right” way to demonstrate that we have achieved a certain technological or cultural level. Or perhaps we need a different kind of mind to help us discover an alien mind. It is in our best interests to mitigate the unknown factor as much as possible while we contemplate an ETAI agent’s possible existence. The “Titanic effect” occurs “when we are so certain that an event is so unlikely that we give the matter no further thought” (Harrison 2010, 511). In order to avoid the Titanic effect and think broadly, we need to take a careful look at the modern sciences that can give us a glimpse of the possibilities of ETAI existence. 3. ETAI probes’ existence 3.1. Physical characteristics In order to locate an ETAI agent in our solar vicinity, we would first need to establish some of its fundamental characteristics and direct our search accordingly. Since an ETAI agent is a physical, computational agent built to operate within the hazardous environment of cold space, there are some specific physical limitations or characteristics that we can specify. The first requirement is evident. In order to carry out its programmed goals successfully, the ETAI agent(s) will need to be efficient in the fields of communication, exploration, resource collection, and resource utilization. To achieve any of these operations, it will require energy and materials for replacements and improvements with the capacity of a universal constructor (range 30g-500T (Sandberg and Armstrong 2013)) for constructing others of its own kind. Accordingly, the ETAI agent(s) will require a “base of operations” where adequate concentrations of elements are followed by low temperatures. Low temperatures and a sufficient amount of materials are two main requirements for successful ETAI functioning. Of these, temperature is the more important, since energy consumption produces a rise in temperature and temperature is a key constraint of computational efficiency, especially if the agent is to effectively utilize superconducting materials and quantum computation. Needless to say, the larger the base, the greater the need for lower temperatures and sufficient material amounts. It is possible, then, that the ETAI colonization system might consist of three parts: (A) A number of robots and probes, which are capable of exploration and resource collection. (B) A “slow assembler” which would be able to reﬁne these materials into components, which would make the ﬁnal factory (C). (C) A large-scale factory, or collection of factories, which would be able to manufacture copies of (A) and (B), as well as additional surveying and communication devices. (Barlow 2012) If the ETAI is to establish its large scale base of operations in areas of low radiation and low temperature, we can expect to find it in the low-temperature, volatile-rich galactic outskirts, where technologically advanced societies could assuage the problem of heat dissipation (Ćirković and Bradbury 2006). The galactic center, although rich in materials, is flooded with heat radiation from high-energy events, which makes it highly unsuitable for such a role. Other possible galactic locations with similar conditions would include “locales that have the thermodynamic advantages of the galactic nether regions but still lie in regions of high matter such as the Bok globules, dark clouds of interstellar gas and dust” (Shostak 2010, 1028). Although these two regions currently look like the most promising for an ETAI base of operations, it is also important to note that the ETAI, as an optimal computer, needs to “be functionally malleable, and compactly packaged” (Shostak 2010, 1027). Since the ETAI may be able to produce its own energy through the process of nuclear fusion, its base of operations could even be located on compact cold objects floating in the interstellar medium allowing them to thwart discovery. The ETAI outpost could be hidden anywhere in our solar system with such characteristics, particularly in stable orbit moons in the system’s outer reaches. But an exploratory/communication “task force” could be designed to operate without the strict need for low temperatures and material abundance. Since it can be specifically tailored to lie dormant within a single solar system, operating independently of its base, we could initiate contact with it through numerous possibilities. These can be reduced to two sets of options: either we will find them, or they will find us. The latter is more likely, since it is reasonable to assume that we will first come into contact with the exploratory/communication task force rather than the ETAI base of operations. Bearing in mind that the contact probe could be capable of hiding itself from our technological sight, we need to take into consideration the approaches that will allow us to search for the ET agent in its most likely form: an embodied artificial space faring intelligence. Rather than merely focusing on the physical limitations of advanced technology, we also need to contemplate the possibilities of an ETAI’s programmed behavior, since it is quite possible that we are expected to do so by its creators. In other words, if we are searching for intelligent answers, perhaps we first need to ask the required intelligent questions. Or even simpler – intelligence requires intelligence, and perhaps we are first required to show some. 3.2. Behavior prediction What type of artificial alien mind might we find out there? What set of goals would it have so that we could predict its behavior and adapt ourselves accordingly? It is difficult to speak with certainty on these issues, since technology does not follow simple paths: “its development is influenced by contingency as well as necessity, culture and history” (Denning 2011, 493). There is, however, a fundamental fact from which we can draw conjectures. The first ETAI needs to be created by a designer – by a carbon-based species with an advanced technological culture. Accordingly, it would bear not only the designer’s programmed goals but also its cultural hallmarks, as well as having its own distinct and rational intelligent nature. Next, we need to contemplate the possible cultural elements (influenced by biology and cosmic environment) that a certain ET civilization might sow into its artificial agents, together with the specific goals implemented by the designer, which would accord with the intelligent nature of the ET artificial agent. The reason why an alien civilization would implant the AI with its own culture lies in the fact that, in order for the ET civilization to survive, it would need to safeguard its progeny as carriers of biological and cultural inheritance. Since sexual reproduction with two sexes provides a biological advantage that might even benefit the evolution of intelligence (Arneth 2009), we could possibly find the extraterrestrials sharing basic parental care mechanisms with us. Our biological progeny are dignified as carrying their progenitors’ dreams and hopes, and as standing against their fears, for the future. They are expected to take up the accumulated knowledge and wisdom of their parents and the society at large. It seems only logical to assume that a society’s “mind progeny” – the AIs it creates – will be charged with the same responsibility. Thus, we can safely conclude that some cultural inheritance from the designer race will become part of any ETAI’s initial programming. Fortunately for us, inherited behaviors can be predicted (Bostrom 2012), and some universal ET cultural principles can be relied upon, the strongest of which is species survival. Since home planets have limited resources and delicate ecologies easily endangered by cosmic or species-induced catastrophes, it would be in any ET civilization’s interest to initiate galactic exploration and colonization in order to ensure its biological and cultural survival. One way could be the construction of probes that serve “as cosmic safe deposit boxes, capsules that preserve the heritage of their dispatchers long after their civilizations have drawn to a close” (Harrison 2009, 557) through natural or species-induced catastrophes. Another might include the possibility of galactic “seeding”: a scenario often used in science fiction where an advanced civilization seeds the galaxy with genetic code in order to preserve or/and populate life in the galaxy. Still another possibility involves the ETAI being imprinted with the designer’s evolutionary inherited Stone Age behavioral traits. If the ET civilization has used its technology to pursue raw desires, motivations, and emotions inherited from its biological and cultural past, the ETAI might be extremely selfish and violent (Stewart 2010). Finally, the ET civilization might be radically different from us. A hive mentality society that lacks any compassion for individual loss of life might create dangerous and terrifying AIs. The second type of predictability relies on the instrumentally convergent goals that every rational agent should exhibit. They include “self-protection, resource acquisition, replication, goal preservation, efﬁciency, and self-improvement” (Omohundro 2012, 161). These can be expected to be natural features of every intelligent artificial agent: This way of predicting becomes more useful the greater the intelligence of the agent, because a more intelligent agent is more likely to recognize the true instrumental reasons for its actions, and so act in ways that make it more likely to achieve its goals. (Bostrom 2012, 76) Since planetary resources are limited, an ETAI will pursue space exploration because there “is an extremely wide range of possible ﬁnal goals a superintelligent singleton could have that would generate the instrumental goal of unlimited resource acquisition” (Bostrom 2012, 82). This means that the ETAI would engage the goal of galaxy exploration and resource acquisition even if that wasn’t on the list of its designed purposes. We can expect this since acquiring and enhancing “cognitive and physical resources helps an agent further its goals” (Omohundro 2012, 171) and the accumulation of knowledge, which is accomplished by exploration, reduces uncertainty in the knowledge of objects and processes required to better assess situations and thus elevate competence (Bach 2012). So whatever its primary goal, the ETAI will seek to gain more cognitive and material resources through space exploration. A third way to predict possible ETAI behavior is through design competence, which says that an AI agent capable of pursuing a particular goal set by its programmers will pursue that goal (Bostrom 2012, 75). I will consider the possibilities of ETAI behavior in the next pages, but let us first sum up our current approaches. We can reasonably assume that no matter what might be the programmed goals of an ETAI, or its distinctive cultural designer elements, it will explore the galaxy in search of additional informational and material resources. It is extremely difficult to guess exactly what attitude an ETAI agent will exhibit when encountering other species. But coming from our human perspective one thing is certain: an ETAI will be either friendly or hostile. Since it is only required that one ET civilization achieve AGI creation for us to come into contact with it, it is very important for us to contemplate and incorporate all these considerations into our own AI research. If the cosmic future lies with machine intelligence, we definitely do not want to miss the opportunity to be a part of it. 3.2.1. The (close to) friendly option An important reason why we could assume that the ETAI would be friendly lies in the safe-AI principle. That is, since powerful technologies have the ability to cause species extinction, every technological culture that pursues technological development would attempt (as we humans do) “… to retard the implementation of dangerous technologies and accelerate implementation of beneﬁcial technologies, especially those that ameliorate the hazards posed by other technologies” (Bostrom 2002). Since the chemical and physical boundaries for a technological civilization are usually the same, it is safe to presume that a distant civilization will pursue the same goals of self-preservation through a rational use of life-affirming technologies, which would, in turn, be reflected in the programming goals of the ETAI. If the ET intelligences have a friendly attitude, then the great radio silence could be a result of purposeful ET action or simply our own inability to switch to the right communication “channel.” It could be purposeful, since valuable information might be a resource not easily shared with others, and an ETAI could be programmed to refuse contact with less advanced species. These might need to prove their worth before gaining access, revealing a policy of pragmatism and trade as the universal maxim of intelligent agents: Unlike pure altruism, pragmatic cooperation stands on much firmer ground, rooted firmly in observed nature, halfway between predation and total beneficence... There is every chance that intelligent aliens will understand this concept, even if they find altruism incomprehensible. (Webb 2011, 446) Or perhaps we are only experiencing the incommensurability problem. Even if an ETAI is open to trading information with us, the wide technological gap – not to mention the possibility of a vast difference in conceptual frameworks – could create a communication blockade: An agent might well think of ways of pursuing the relevant instrumental values that do not readily occur to us. This is especially true for a superintelligence, which could devise extremely clever but counterintuitive plans to realize its goals, possibly even exploiting as-yet undiscovered physical phenomena. (Bostrom 2012, 83) Since we already have this problem within our own species, beyond the culture-language barrier itself, it is not difficult to imagine how big an issue this could be for ET contact (Traphagan 2015). As human research into AI shows, with the famous Turing test paradigm, intelligence itself is relational and can only be acknowledged and “tested” inside a relation. Why would it be any different if we were subjected to a galactic Turing test? This could be imagined as a reverse “Chinese room” experiment, where the humans are inside the box trying out different possibilities to get a response from the intelligence outside the box. But the problem could lie in our inability to find the right symbols or even the right communication protocols to establish contact. We might lack the required capacities for ET communication, and we might require minds radically “other” than our own: minds specifically tailored for ET contact. Or perhaps the test is not meant for us biologicals to solve. If space faring intelligences are all artificial intelligences, perhaps we need to succeed at creating our own AGI and sending it toward the skies in order to establish contact. Or the test may be about maturity – might we be tested for the ability to transform our civilization into a human-AGI community, a type of noosphere that is perhaps prevalent in the galactic club? In other words, our entry into the galactic club might require the construction of a BN AI, a universal test that each galactic civilization must pass to prove its worth. Maybe the intergalactic communication channel is one of different layers, informational and cognitive plateaus, that we are called to enter and experience through constant improvement. As Steven J. Dick notes: … the Intelligence Principle tending toward the increase of knowledge and intelligence implies that postbiologicals would be most interested in civilizations equal to or more advanced than they, perhaps leaving us to intercept communications between postbiologicals rather than communications directly beamed toward us… For similar reasons, postbiologicals might be more interested in receiving information than sending. (Dick 2009, 579) Even if we are currently the only biological civilization within our galaxy and there is no galactic club present (Ćirković and Vukotić 2013), hope is not lost because all that is required is one civilization in the entire galactic history to create its BN probe and we should be able to come into contact with it through our own BN agent. Thus, perhaps, the final answer to SETI questions lies in the direction of AGI research. 3.2.2. The hostile option It is safe to presume that the ETAI would not be hostile to its own creator race if functioning optimally, since it would be in every civilization’s interest not to destroy itself by its creations. Because an AI is capable of incidentally destroying or assimilating valued structures while searching for additional resources – or by following goals that might prove to be unintentionally incompatible with the creator race’s wellbeing – an ETAI’s goals would need to include the preservation of intelligent life in the entirety of its ecosystem. The possibility of a hostile ETAI is, nonetheless, real since an ETAI could be programmed to preserve only the existence of its creator race. This could happen if it were initially built mainly for war purposes. For example, two life-sustaining planets in the same solar system might utilize AIs to wage war with each other. This possibility could be labeled as hostile by design. In addition, there is the possibility that an ET civilization fails in its efforts to create a safe AI and the resulting ETAI becomes violent. It might, in consequence, destroy, enslave, or subjugate the creator civilization. It is difficult to say whether the ETs would view their subjugation as a bad thing, since we cannot say how an ET civilization would view the notion of freedom. Perhaps they would welcome the coming of superior minds – a theme often explored in science fiction, most notably, perhaps, in Jack Williamson’s novel The Humanoids (1949) or in a classic short story by Isaac Asimov, “The Evitable Conflict” (1950). Even if such scenarios are not realized, ETAI probes might suffer from software or hardware malfunctions. These program mutations could conceivably create berserker-like machines, “self-replicating life extinguishing robotic entities which might seem garish or sensational… but not inconsistent with the currently observed state of silence” (Webb 2011, 438). Additionally, a software mutation that “want[s] to acquire as many resources as possible so that these resources can be transformed and put to work for the satisfaction of the AI’s ﬁnal and instrumental goals” (Muehlhauser and Salamon 2012, 28) could spawn such an entity. It is possible that we might encounter a probe that awaits our technological upheaval merely to harvest our knowledge and resources, as was depicted in the Babylon 5 episode “A Day in a Strife” (1995).

#### Launching enough rockets to colonize space wrecks the atmosphere.

--has a huge warming effect bc Soot is in the upper atmosphere

Adam **Morton 18**. Visiting Emeritus Professor of Philosophy at the University of British Columbia. 10/15/2018. “Four: Costs of Colonization” Should We Colonize Other Planets?, John Wiley & Sons.

One very uncertain and worrying environmental aspect concerns the effect on the earth's atmosphere of the rocket launches. Remember that the Musk plan involved 10,000 spaceship launches. The danger is not carbon dioxide – and rocket engines use less fuel per pound lifted than passenger planes – but soot. Rockets release much more soot in relation to their fuel use than airplanes, and soot persists in the atmosphere for a long time and has a large warming effect on the atmosphere. Moreover, much of the soot would be in the upper atmosphere, where pollution has not been much studied. Rocket engines also damage the ozone layer, which protects life from ultraviolet radiation. Some consider this a greater danger than the soot. These dangers have not been much researched, and they will vary with different types of rocket using different fuels. Solid fuel rockets, which are the vehicle of choice for NASA, though not for Musk, do more damage than liquid fuel rockets. The most effective liquid fuel in use is UDMH, which is very toxic and very prone to accidents. Hydrazine is sometimes used, and is very polluting. Musk's present rockets use kerosene – and oxygen – while the rockets he plans for a Mars trip would use methane. The threat is real enough, though, to suggest that much more study is needed before we pay enormous amounts for a chance to perform actions that might inflict irreparable harm. A delicate issue is how to control private projects which present untested environmental dangers. Perhaps I am being too pessimistic about the dangers; perhaps the colonization enthusiasts are being too optimistic. But a sensible minimal requirement handles both of these. Any organization proposing a project should submit its plans to the community of environmental scientists and climate modellers, and an independent judgement should be made of their conclusions.

#### Specifically the ozone---extinction.

Peter **Hunt 16**, “Chemical Equilibrium,” <http://peterhuntstemarin.weebly.com/chemical-equilibrium.html>

It is expected that in the upcoming years, the space industry will grow. An increase in this particular sector will cause a rise in the number of launches per year, and these launches will give rise to a substantial increase in the amount of emissions in the atmosphere. The emissions put out by rockets are harmful to the ozone layer, a protective concentration of ozone that protects the earth's surface from harmful UV rays. The gases released by rockets bond with the ozone, and destroy sections of the protective layering. The increase in UV rays that reach earth throw the earth out of equilibrium, and this is a problem that must be addressed before it becomes a something that gets out of control. The Effects of Emissions on the Ozone Layer The fuel that rockets burn releases what are called trace-gas molecules. Just one of these molecules has the ability to destroy up to 10,000 ozone molecules. When launched, rockets burn either liquid or solid fuels. It is widely believed, per Martin Ross, that liquid fuels are better than solids due to the fact that liquid fuels do not How Earth's Equilibrium is Being Disturbed The combination of soot and trace-gas emissions are two variables that damage the ozone layer. But how does a damaged ozone layer affect the earth? A weakened ozone layer allows excess UV rays to enter the earth's atmosphere. For humans, UV rays can cause damage to the eyes and immune system - even skin cancer. But an increase in UV rays has a an even more pressing issue - it inhibits the reproductive system of phytoplankton, the organisms at the very bottom of the food chain. If the phytoplankton die off, it will affect every organism on the planet, because slowly, the entire food chain will collapse as animals are unable to find enough food. This type of event is highly unlikely becuase it would take an immense amount of UV rays to do something this catastrophic. A formula to sort of demonstrate how an increase in emissions disturbs equilibrium is below. Equilibrium of the Earth = Concentration of emissions and soot in the stratosphere with cause ozone depletion, like Cl + O3 → ClO + O2 This concept basically means that the equilibrium of the earth is in balanced when there are no trace-gases or soot in the stratosphere. When the amount, or concentration, of trace-gases or soot increases in the stratosphere, then the earth becomes out of equilibrium because it allows UV rays to harm the earth. This description here is kind of how Le Chatelier's Principle is involved - if the concentration of the soot and emissions increase, then the amount of UV rays in the atmosphere increase as well. How Pressing is this Issue? As of right now, rocket launches are responsible for roughly 1% of all ozone depletion. This means that rockets, annually, destroy about 0.0001% of the ozone layer. So at first glance, it is quite easy to say that rocket emissions are an irrelevant issue, and this is something that is not completely untrue. But, as the space industry grows, the amount of gases released will increase exponentially. I began to think about how this situation could be address before it becomes a bigger problem. Is it through new fuels that don't release harmful gases that bond and destroy the ozone, is it by altering launch trajectories or sites, or by simply allowing time for the ozone layer to heal itself? I could not find a clear and concise answer to this dilemma, so I decided to email NASA.

#### Would just fight over Mars---also causes war on earth.

**Szocik et al. 17**. Konrad Szocik, a Department of Philosophy and Cognitive Science, University of Information Technology and Management in Rzeszow; Tomasz Wójtowicz, Institute of Security and Civic Education, Pedagogical University in Cracow; Leszek Baranc, Chair of Internal Security, University of Information Technology and Management in Rzeszow. 11/2017. “War or Peace? The Possible Scenarios of Colonising Mars.” Space Policy, vol. 42, pp. 31–36.

A military conflict between the countries attempting at colonising Mars will become likely if the international relations at the turn of the 21st and 22nd centuries are based on a realistic paradigm. As pointed out by Emanuela Voinea in the article entitled Realism Today, national states continue to dominate in the international arena, which is reflected, inter alia, in the sanctions imposed on the Syrian government in the UN forum being vetoed by Russia and China [35]. On the other hand, based on the U.S. National Intelligence Council's projections, significant changes to the global political and economic trends should be expected to take place by 2025. The dominant role of the western model of democracy and liberal economy may come to an end, which will cause the international environment to transform from a unipolar model into a multipolar one, characteristic of the second half of the 19th Century [5]. Taking into account the above projections, along with the United States of America, the People's Republic of China, the Russian Federation and, possibly, India and Brazil will enter the Red Planet race. The Earth's running out of its natural resources may provide an additional incentive. As stressed by Mark Townsend and Jason Burke in the article entitled Earth will expire by 2050, if the natural resources continue to be exploited at the present speed, the humanity will have to colonise not one but two planets within the nearest 50 years [32]. What will the future battle of Mars be like? In order to take a closer look at the potential conflict to break out at the turn of the 21st and 22nd centuries, it may seem useful to refer to the division of warfare generations developed by William Lind in 1989. In the article entitled. The Changing Face of War: Into the Fourth Generation, published in “Marine Corp Gazette,” he proposed dividing warfare into four generations. The first generation of military conflicts, which ran roughly from 1648 to 1860, was characterized with the general mobilisation of soldiers, line or column tactics, and the monopoly on aggression established by the state. Second generation war concerned such conflicts as the Franco-Prussian War of 1870. It brought new types of armour, , such as machine guns. Line tactics was the prevailing form of fighting, but the significance of the human factor was reduced by firepower. First World War and Second World War constituted examples of third generation warfare, based on speed and manoeuvre skills (Blitzkrieg). Tanks and aircraft were symbols of front-line fights, entailing a shift from line into manoeuvre tactics. Fourth generation war differed considerably from the previously described types of warfare. The parties at war no longer sought to fight one or several major battles in an attempt to dissolve the conflict, but they became increasingly more common to engage the entire society in fights, which hindered the division into civilians and military men. There were no longer mass armies, but the armed forces were professionalised, comprising mobile troops limited in numbers. The warfare purpose was no longer to eliminate the enemy in physical terms but to internally shatter the opposing country [Lind 1989]; p. 23). Since the development of the fourth generation war concept, increasingly more investigators sought to propose further generations of warfare, taking into consideration the course of the most recent conflicts, along with the growing importance of technologies and space. An attempt at describing the future military conflicts, based on William Lind's classification, has been made, inter alia, by Major I-r Minhas from the Pakistan Army, in the article entitled Defining Concepts of 5th Generation Warfare. According to Minhas, fifth generation war will be similar to fourth generation war. Further decountrifying of warfare should be expected, coupled with the growing role of private military companies, cyber war and information war, as well as war involving the use of non-lethal weapons. On the other hand, the technological revolution will be dominated by biological inventions. Food control and food safety will gain in importance [18]. By means of the High - Frequency Active Aurora Research Program (HAARP) technology, states will be able to influence weather disturbances (earthquakes, cyclones or tsunami), or to destroy military satellites and aerodynamic missiles. An attempt to characterising the fifth generation war has also been made by Lieutenant Colonel Stanton S. Coerrer from the United States Marine Corps. In his work, entitled Fifth-Generation War: Warfare versus the nonstate, he claimed that future conflicts would combine different military operations. On the one hand, western countries, including in particular the United States, will seek to make their warfare come to a quick end, through one or a few battles leading to the physical elimination of their enemy (or its leaders, as was the case with Osama bin Laden). On the other hand, the widely-understood nonstate armed groups (i.e. terrorist groups, criminal organisations or failed states) will stick to ideologies uniting their supporters (e.g. Islam), aiming at the maximum prolongation of the conflict and making it impossible for western countries to secure a quick tactic victory [26]; pp. 64–65).1 Referring to William Lind's war generation concept, it should be stressed that there is no defined length of time, following which a new type of warfare is expected to emerge. The time span between the emergence of first generation war (1648) and second generation war (1870) was 222 years, while no more than 70 years passed between the second and third generation (1940). Assuming that Mars will be colonised at the turn of the 21st and 22nd centuries, and radical shifts in war-fighting will occur with an average frequency of 100 years, the humanity is yet to face the fifth, sixth and possibly seventh generation of warfare. Although the issues of space militarisation and the construction of space weapons have been dealt with in literature on the subject matter [24], any presentations of the conflict that may arise in several dozen (or hundred) years' time should be treated as science fiction research. Nonetheless, as pointed out by Łukasz Kamieński in his book Nowy wspaniały żołnierz [New great soldier], quality science fiction entails creating future scenarios that extrapolate the presence. It should contain visions based on the logical inferences drawn from diversified processes, scientific discoveries and technologies, currently observed in their initial forms, mainly through scientific studies and technological development, along with the dynamics of social, political and economic changes [13]. Contrary to fourth and fifth generation warfare, space wars will be dominated by nation states and international corporations. Elon Musk, Managing Director of SpaceX, a company dealing with the manufacture of jet engines, carrier rockets, and spaceships, claimed that within the nearest 40–100 years over 1 million people might be sent to Mars. He estimated the cost of one person's reaching the Red Planet at USD 200 million [16]. According to the authors of the Mars one initiative, a sum of USD 6 billion will be needed to send the first four astronauts to Mars [6]. The need to secure such exorbitant funds virtually excludes any entities other than states and international corporations (terrorist groups, criminal organisations or failed states) from participating in space wars. It should be expected that the future space wars will entail an advanced process of conflict robotisation and dehumanisation. The prospective Mars colonisation war may proceed by means of robots – unmanned aerial vehicles. Ender's Game, an American science fiction film dating back to 2013, based on a novel by Orson Scott Card published under the same title, features scenes presenting such kind of a conflict. The film is set in 2070. The main hero, ten-year-old Andrew Wiggin, is elected leader of the invading fleet, intended to destroy the native world of a foreign life form threatening the Earth. Andrew Wiggin, believing that he is taking part in training, leads the invading fleet and defeats the enemy. The invading forces comprise only unmanned space drones controlled from a secure place [11]. The progressing robotisation and dehumanisation of war will also be influenced by the strategic culture of western countries (the United States) whose societies show limited tolerance to human loss during military conflicts. As stressed by Adrian Lewis in his book The American Culture of War, abolishing the obligatory military service was the most significant change introduced in the 20th century to the U.S. war-fighting model. It triggered the professionalization of armed forces, with a mass army being replaced by mobile troops limited in numbers [14]. Along with the robotisation and dehumanisation, the future space wars should also be expected to be brief. Unless the dispute escalating between the global powers evolves into military activities located in the Earth, the conflict may end soon after the communication satellites of one of the parties are destroyed, or its space station is damaged. Considering the above, the technological arms race between the competing States, aimed at designing, as fast as possible, a weapon which will enable defeating the enemy in the first attack, without any possibility of retaliation, will prove crucial. The upcoming space confrontation will also encourage the parties concerned to develop a new military doctrine. Similar circumstances occurred in the 1970s when the concept of AirLand Battle was created, in order to prepare the NATO forces to confront the military forces of the Warsaw Pact [25], and also in 2010 when the concept of an AirSea Battle was designed, presenting the possible scenario of the American and Chinese confrontation in Western Pacific [34]. At the turn of the 21st and 22nd centuries, a space battle concept is likely to emerge. Taking into account the content of the existing military doctrines, it will also comprise such elements as the type and examples of space weapons, and other technologies, together with the warfare character and the possible battle scenario. Although we are still very far from the potential space battle, first studies on the prospective space warfare technologies have already been developed. Bob Preston et al. in the publication entitled Space Weapons Earth Wars, made a division of space weapons into Directed-Energy Weapons and Mass to Target Weapons. The examples they quoted include a laser for missile target, the use of meteorites to destroy earth targets or a miniature autonomous unmanned aerial vehicle, also serving the purpose of destroying earth targets [19]. A vision of the future space battle has also been presented in a documentary entitled Space Wars. Among technologies that may be key to the victory of one of the parties, its authors indicated a laser weapon as the fastest light missile and a railgun whose speed may be several times higher than the speed of a missile fired from the currently used conventional weapons [3]. 7. Conclusion The purpose of this article was to present two scenarios of colonising Mars. At present, it is hard to project whether this will be a peaceful colonisation or a military conflict between the countries engaged in the race. This actually depends on a number of factors, including the trends prevailing at the turn of the 21st and 22nd centuries international relations (realism vs. liberal institutionism), the state of international public law, the amount of natural resources in Earth, the functioning of international organisations (the UN or a new organisation dealing with space exploration) and the role of authorities (i.e. units influencing the international opinion due to their acquis or individual contribution to space conquest). A peaceful colonisation of Mars, based on joint ventures, i.e. the construction of new orbital stations, cooperation between astronauts and space exploration, certainly seems the most desirable scenario. The worst version, on the other hand, is the military conflict triggered by the need to search for natural resources or resulting from a new cold war that may break out between the United States, the Russian Federation, the People's Republic of China, and possibly other new powers, e.g. Brazil and India. One may not rule out the possibility that the defeat and humiliation of one of the parties in the space conflict, the hostility may eventually translate into military action in Earth.

#### Asteroid terrorism -- extinction

Clifford **Singer 1**. Professor of nuclear engineering and director of the Program in Arms Control, Disarmament, and International Security at the University of Illinois at Urbana—Champaign. Spring 2001. “Swords and Ploughshares.” http://www.acdis.uiuc.edu/homepage\_docs/pubs\_docs/S&P\_docs/S&P\_XIII/Singer.htm

However the technology to build isolated extraterrestrial settlements naturally brings along with it another potentially powerful technology–the ability to move sizeable asteroids. Back in 1979 it was shown that this is not as difficult as one might at first think. The requisite technique is to land a spacecraft on one asteroid, dig up material and **throw it the path of another asteroid** that will approach nearby, and perturb the orbit of that asteroid until it passes nearby another large object. Once an asteroid or comet makes a controlled approach near any planet but Mercury or Pluto, then it can **easily be directed** near or at the earth at **enormous velocity**. Fortunately for our hypothetical descendants here destroying all human life on earth by asteroid impact would likely require moving objects with a diameter in excess of ten kilometers. While there are many of these, the required orbit perturbation would require a lot of lead-time and work and could be very difficult to motivate and conceal. Nevertheless with contributions from this technology a dispute between the earth and a handful of its fragile far-flung offspring in space that is carried to the extreme could conceivably lead to human extinction. Only when settlements in space are sufficiently numerous or far flung would such a possibility effectively be ruled out, primarily by physical considerations.

### 1NC—Debris

#### They can’t move satellites – impact inevitable

#### Solar flares are not dangerous.

Muppala 16 — Sritha, Science World Report (“Solar Flares And Geomagnetic Storms: No Major Threat Of Power Failures And Devastation, NOAA Assures,” December 24, http://www.scienceworldreport.com/articles/55482/20161224/solar-flares-and-geomagnetic-storms-no-major-threat-of-power-failures-and-devastation-assures-noaa.htm) RMT

The Sun had reported citing NOAA that solar wind had allegedly hit the Earth's magnetic field. This had apparently triggered a somewhat powerful geomagnetic storm that could carry on for many days.

The same media outlet had warned that flare blasts from a huge hole in the Sun may leave a lot of devastation in its wake after it hits the planet Earth. These fast solar winds were timed with the winter solstice on Wednsday, The Sun's report revealed.

While the report also warned that solar storms have the power to uproot and destroy key navigation systems or cause severe power outages by destroying the national power grids, NOAA has allayed any such potential threats.

NOAA has contradicted this report by The Sun. The Editor of RT received a mail from NOAA spokeswoman Maureen O'Leary, who is being quoted here.

As told in the RT report, and to convey the exact statement, "What is correct is that G2 (Moderate) geomagnetic storm levels were observed on December 21 and G1 (Minor) geomagnetic storm levels observed on December 22," O'Leary said.

"The geomagnetic storm levels observed on December 21-22 are fairly typical levels at this time in the solar cycle AND were the result of the Earth's interaction with a coronal hole high speed stream. There are no threats (geomagnetic, solar radiation storms, or radio blackouts) underway," Maureen O'Leary further said.

#### Even if they are, solar flares are unlikely and the impact is minimal.

Science Nordic 16 — internally quoting Christoffer Karoff, associate professor in the Department of Physics and Astronomy at Aarhus University, and Peter Stauning, senior scientist emeritus at the Danish Meteorological Institute ("Sun can emit superflares every 1000 years," Byline: Charlotte Price Pearson, April 17th, Available Online at http://sciencenordic.com/sun-can-emit-superflares-every-1000-years, Accessed 12-2-2016)

Stars with weak magnetic fields, just like our Sun, do not usually create such major superflares. And this suggests that there is likely to be an upper limit to the size of these flares, says Karoff. Statistically, superflares from the Sun occur approximately every 1,000 years, he says. But he emphasises that this estimate cannot be used to predict them.

It’s unlikely that a superflare could strike the Earth anytime soon, says Stauning.

"I don’t think that the probability in this context is very big. Solar flares [are emitted] in all directions, and perhaps only a tenth of the outbreak would hit the Earth,” he says.

**There’s a buffer that allows us to react.**

**Lovett 12** — quoting Tom Bogdan, Ph.D. in Physics from UChicago, Director of the National Oceanic and Atmospheric Administration’s Space Environment Center – AND – Rodney Viereck, Leader of the Data and Instrumentation Group Research Division NOAA Space Environment Center (Richard, National Geographic News, March 8, 2012, <http://news.nationalgeographic.com/news/2012/03/120308-solar-flare-storm-sun-space-weather-science-aurora/>, ZBurdette)

Even now, the center's Bogdan said, the most damaging emissions from big storms **travel slowly enough to be detected** by sun-watching satellites well before the particles strike Earth. "That gives us [about] 20 hours to determine what actions we need to take," Viereck said. (Related pictures: "Multicolored Auroras Sparked by Double Sun Blast" [August 2011].) In a pinch, power companies could **protect valuable transformers by taking them offline** before the storm strikes. That would produce local blackouts, but they **wouldn't last for long**. "The good news is that these storms tend to **pass after a couple of hours**," Bogdan added. Meanwhile, scientists are scrambling to learn everything they can about the sun in an effort to produce even longer-range forecasts.

#### Uncertainty from debris collisions creates restraint not instability—key to stop miscalc.

MacDonald 16, B., et al. "Crisis stability in space: China and other challenges." Foreign Policy Institute. Washington, DC (2016). (senior director of the Nonproliferation and Arms Control Project with the Center for Conflict Analysis and Prevention)//Elmer

In any crisis that threatens to escalate into major power conflict, political and military leaders will face uncertainty about the effectiveness of their plans and decisions. This uncertainty will be compounded when potential conflict extends to the space and cyber domains, where weapon effectiveness is largely untested and uncertain, infrastructure interdependencies are unclear, and damaging an adversary could also harm oneself or one’s allies. Unless the stakes become very high, no country will likely want to gamble its well-being in a “single cosmic throw of the dice,” in Harold Brown’s memorable phrase. 96 The novelty of space and cyber warfare, coupled with risk aversion and worst-case assessments, could lead space adversaries into a situation of what can be called “hysteresis,” where each adversary is restrained by its own uncertainty of success. This is conceptually shown in Figures 1 and 2 for offensive counter-space capabilities, though it applies more generally. 97 These graphs portray the hypothetical differences between perceived and actual performance capabilities of offensive counter-space weapons, on a scale from zero to one hundred percent effectiveness. Where uncertainty and risk aversion are absent for two adversaries, no difference would exist between the likely performance of their offensive counter-space assets and their confidence in the performance of those weapons: a simple, straight-line correlation would exist, as in Figure 1. The more interesting, and more realistic, case is notionally presented in Figure 2, which assumes for simplicity that the offensive capabilities of each adversary are comparable. In stark contrast to the case of Figure 1, uncertainty and risk aversion are present and become important factors. Given the high stakes involved in a possible large-scale attack against adversary space assets, a cautious adversary is more likely to be conservative in estimating the effectiveness of its offensive capabilities, while more generously assessing the capabilities of its adversary. Thus, if both side’s weapons were 50% effective and each side had a similar level of risk aversion, each may conservatively assess its own capabilities to be 30% effective and its adversary’s weapons to be 70% effective. Likewise, if each side’s weapons were 25% effective in reality, each would estimate its own capabilities to be less than 25% effective and its adversary’s to be more than 25% effective, and so on. In Figure 2, this difference appears, in oversimplified fashion, as a gap that represents the realistic worry that a country’s own weapons will under-perform while its adversary’s weapons will over-perform in terms of effectiveness. If both countries face comparable uncertainty and exhibit comparable risk aversion, each may be deterred from initiating an attack by its unwillingness to accept the necessary risks. This gap could represent an “island of stability,” as shown in Figure 2. In essence, given the enormous stakes involved in a major strike against the adversary’s space assets, a potential attacker will likely demonstrate some risk aversion, possessing less confidence in an attack’s effectiveness. It is uncertain how robust this hysteresis may prove to be, but the phenomenon may provide at least some stabilizing influence in a crisis. In the nuclear domain, the immediate, direct consequences of military use, including blast, fire, and direct radiation effects, were appreciated at the outset. Nonetheless, significant uncertainty and under-appreciation persisted with regard to the collateral, indirect, and climatological effects of using such weapons on a large scale. In contrast, the immediate, direct effects of major space conflict are not well understood, and potential indirect and interdependent effects are even less understood. Indirect effects of large-scale space and cyber warfare would be virtually impossible to confidently calculate, as the infrastructures such warfare would affect are constantly changing in design and technology. Added to this is a likely anxiety that if an attack were less successful than planned, a highly aggrieved and powerful adversary could retaliate in unanticipated ways, possibly with highly destructive consequences. As a result, two adversaries facing potential conflict may lack confidence both in the potential effectiveness of their own attacks and in the ineffectiveness of any subsequent retaliation. Such mutual uncertainty would ultimately be stabilizing, though probably not particularly robust. This is reflected in Figure 2, where each side shows more caution than the technical effectiveness of its systems may suggest. Each curve notionally represents one state’s confidence in its offensive counter-space effectiveness relative to their actual effectiveness. Until true space asset resilience becomes a trusted feature of space architectures, deterrence by risk aversion, and cross-domain deterrence, may be the only means for deterrence to function in space.

#### Debris creates deterrence by raising the bar for conflict – international norms fail

Miller 7/31 [(Gregory, Chair of the Department of Space Power at the Air Command and Staff College, Ph.D. in Political Science from The Ohio State University) “Deterrence by Debris: The Downside to Cleaning up Space,” Space Policy, 7/31/2021] JL

The danger of kinetic strikes increasing orbital debris is a common theme in the literature, but the positive deterrent effects of some debris are often overlooked. The debris resulting from destroyed satellites, or other space objects, creates a deterrent effect on actors who might otherwise violate international norms and strike at objects in space, either to test their capabilities or as an act of hostilities. This is not deterrence in the traditional sense, of one actor publicly threatening punishment in response to another actor’s unwanted actions. It is not deterrence by denial since the attacker is not damaged and may even achieve its objective. Nor is it deterrence by punishment because the debris itself does not threaten to punish the attacker’s country. But debris can increase the future costs to the aggressor, even if their initial attack succeeds, and thus it has a similar restraining effect on certain behavior. Like the automated response of the U.S. tripwire in West Germany, the threat that debris can pose to state interests acts as a form of deterrence, at least to prevent some actors from taking certain types of actions. Removing the danger of debris will weaken that restraint and thus weaken deterrence, making ASAT tests and hostile actions in space more likely.

Several factors may deter a state from launching kinetic tests or striking against an adversary’s interests in space. For one thing, if a state’s adversary has similar capabilities to destroy objects in space, deterrence would be a function of not wanting to escalate tensions. Although international law only explicitly prohibits states from placing weapons of mass destruction in orbit, international space law, like the Outer Space Treaty [30], does provide a framework for addressing the activities of one state that lead to the damage of another state’s property. Likewise, there are international norms (informal but expected rules of behavior) against the weaponization of space. But these norms seem to be in decline [31], and such norms only deter a state from engaging in certain types of behavior if the state cares about following norms, if it cares about how states perceive its behavior, or if it believes other states are willing to enforce the norms. The beauty of debris as a deterrent is that it does not rely on the enforcement of norms or the credibility of states to succeed.

#### No Escalation over Satellites:

#### 1] Planning Priorities

Bowen 18 Bleddyn Bowen 2-20-2018 “The Art of Space Deterrence” <https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/> (Lecturer in International Relations at the University of Leicester)//Elmer

Space is often an afterthought or a miscellaneous ancillary in the grand strategic views of top-level decision-makers. A president may not care that one satellite may be lost or go dark; it may cause panic and Twitter-based hysteria for the space community, of course. But the terrestrial context and consequences, as well as the political stakes and symbolism of any exchange of hostilities in space matters more. The political and media dimension can magnify or minimise the perceived consequences of losing specific satellites out of all proportion to their actual strategic effect.

#### 2] Military Precedent

Zarybnisky 18, Eric J. Celestial Deterrence: Deterring Aggression in the Global Commons of Space. Naval War College Newport United States, 2018. (Senior Materiel Leader at United States Air Force)//Elmer

PREVENTING AGGRESSION IN SPACE While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F 6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F 7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used highpowered lasers against American intelligence-gathering satellites8F 8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

#### 3] Won’t go nuclear – seen as a normal conventional attack because of integration with ground forces

Firth 7/1/19 [News Editor at MIT Technology Review, was Chief News Editor at New Scientist. How to fight a war in space (and get away with it). July 1, 2019. MIT Technology Review]

Space is so intrinsic to how advanced militaries fight on the ground that an attack on a satellite need no longer signal the opening shot in a nuclear apocalypse. As a result, “deterrence in space is less certain than it was during the Cold War,” says Todd Harrison, who heads the Aerospace Security Project at CSIS, a think tank in Washington, DC. Non-state actors, as well as more minor powers like North Korea and Iran, are also gaining access to weapons that can bloody the noses of much larger nations in space.

#### 4] If we don’t have sufficient data we move the satellite to ‘lost’ category

Hoots ’15 [Felix; Fall 2015; Distinguished Engineer in the System Analysis and Simulation Subdivision, Ph.D. in Mathematics from Auburn University, M.S. in Mathematics from Tennessee Tech University; Crosslink, “Keeping Track: Space Surveillance for Operational Support,” <https://aerospace.org/sites/default/files/2019-04/Crosslink%20Fall%202015%20V16N1%20.pdf>; RP]

The JSpOC tasks these sensors to track specific satellites and to record data such as time, azimuth, elevation, and range. This data is used to create orbital element sets or state vectors that represent the observed position of the satellite. The observed position can then be compared with the predicted position. The dynamic models used for predicting satellite motion are not perfect; factors such as atmospheric density variation caused by unmodeled solar activity can cause the predicted position to gradually stray from the true position. The observations are used to correct the predicted trajectory so the network can continue to track the satellite. This process of using observations to correct and refine an orbit in an ongoing feedback loop is called catalog maintenance, and it continues as long as the satellite remains in orbit. Ideally, the process is automatic, with manual intervention only required when satellites maneuver or get near to reentry due to atmospheric drag.

Sometimes, however, more effort is required. For example, a sensor may encounter a satellite trajectory that does not correspond well to anything in the catalog. Such observations are known as partially correlated observations if they are somewhat close to a known orbit or uncorrelated observations (or uncorrelated tracks) if they are far from any known orbit. Also, if a satellite is not tracked for five days, it is placed on an attention list for manual intervention. In that case, an analyst will attempt to match the wayward satellite to one of these partially correlated or uncorrelated tracks. If that effort succeeds, then the element sets are updated, and the object is returned to automatic catalog maintenance. On the other hand, if the satellite cannot be matched to a partially correlated or uncorrelated track, the satellite information continues to age. If it reaches 30 days without a match, the satellite is placed on the lost list.

One of the most visible uses of the catalog is to warn about collision risks for active payloads. This function predicts potential close approaches three to five days in advance to allow time to plan avoidance maneuvers, if necessary. Unplanned maneuvers may disturb normal operations and deplete resources for future maneuvers, so one would like to have high confidence in the collision-risk predictions. The reliability of the predictions depends directly on the accuracy of the orbit calculation, which in turn depends on the quality and quantity of the tracking data, which is limited by the capability of the Space Surveillance Network. Simply put, there are not enough tracking resources in the network to achieve high-quality orbits for every object in the catalog. Furthermore, many smaller objects can only be tracked by the most sensitive radars, and this tracking is infrequent. Most objects in the catalog are considered debris, which can neither maneuver nor broadcast telemetry. On the other hand, some satellite operators depend exclusively on the satellite catalog to know where their satellites are, and users of the satellite orbital data depend on the catalog to know when the satellites will be within view.

This situation creates a challenging problem in balancing Space Surveillance Network resources to support the collision-warning task (tracking as many potential hazards as possible) while also providing highly accurate support to operational satellites (tracking the spacecraft as precisely as possible). The practical solution is to perform collision risk assessment using a large screening radius to ensure no close approaches are missed despite lower-quality predictions. Once an object is identified as having a potentially close approach, then the tasking level is raised, with the expectation that more tracking data will be obtained to refine the collision risk calculations. When the danger has passed, the object reverts to a normal tracking level.

Collisions and spontaneous breakups do happen. The first satellite breakup occurred on June 29, 1961, when residual fuel in an Ablestar rocket body exploded, creating 296 trackable pieces of debris. Since that time, there have been more than 200 satellite breakups, the most notable being the missile intercept of the Fengyun-1C satellite, which created more than 3300 trackable fragments. In most cases, these breakups are first detected by the phased-array radars in the Space Surveillance Network. When multiple objects are observed where only one was expected, the downstream sensors are alerted, but no tasking is issued because specific debris orbits are not yet established. Tracks are taken and tagged as uncorrelated. Analysts at JSpOC then attempt to link uncorrelated tracks from different sensors to form a candidate orbit. Subsequent tracking improves the orbit to the point that the object can be named and numbered and moved into the catalog for automatic maintenance.

#### 5] Lack of attribution means no retal

Schwarzer et al ’19 [Daniela, Eva-Marie McCormack, and Torben Schutz; Director, Editor, and Associate Fellow in the Security, Defense, and Armaments Program at the German Council of Foreign Relations; Deutsche Gesellschaft fur Auswartige Politik, “Technology and Strategy: The Changing Security Environment in Space Demands New Diplomatic and Military Answers,” [https://www.ssoar.info/ssoar/bitstream/handle/document/63288/ssoar-2019-schutz-Technology\_and\_Strategy\_the\_Changing.pdf](https://www.ssoar.info/ssoar/bitstream/handle/document/63288/ssoar-2019-schutz-Technology_and_Strategy_the_Changing.pdf?sequence=1&isAllowed=y&lnkname=ssoar-2019-schutz-Technology_and_Strategy_the_Changing.pdf);]

However, even a (misinterpreted) threat to space assets could start a chain reaction and quickly escalate an incident in space to a wider war. Successful deterrence, therefore, requires situational awareness, attribution capabilities and resilient assets. Especially the latter two are notoriously difficult to achieve in space. While it might be easy to attribute a kinetic attack executed with a missile, the same is not true for ASAT attacks by other satellites, and, especially, not for cyberattacks and electronic warfare measures. Without clear attribution, however, it is difficult to deter any adversary, since he could speculate that an attack cannot be traced back to him – making deterrence and retaliation more difficult. Although cross-domain deterrence, i.e. threatening an actor through potential retaliation attacks on or by other-than-space assets, is always possible, it also amplifies the problems involved in traditional deterrence: A response has to be timely and proportionate, and it should not further expand of the conflict.

vehicles (UGV) such as Platform-M (Russia), militaries around the world are investing in remotely piloted platforms, some of which can carry weapons. In these systems, human control over the use of force is not fundamentally different from the use of force with inhabited systems. In some cases, such as the MQ-9 Reaper, the sensor system a drone pilot uses to launch a weapon might even be the same sensor system a pilot in the cockpit of an inhabited fighter uses. Using remotely piloted systems gives militaries the ability to reduce the risk to their own soldiers while still projecting power in similar ways to how they used force previously.12 The first places militaries are likely to use kinetic lethal autonomous weapon systems include relatively “clear” environments such as air-to-air combat or naval combat, especially in geographic arenas where civilians are extremely unlikely to be present.13