# JF21 Nanowarfare Aff

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#### Plan: States should ban autonomous nanoweapons.

#### SSNs are the largest threat to human existence. They’re coming now and a ban is our only hope—anything else causes international nuclear cascades and global wars.

[Patrick M. Milott (1-14-2019), Major in the USAF, “Nanoweapons: A Growing Threat To Humanity,” Air University Press, [https://www.airuniversity.af.edu/AUPress/Book-Reviews/Display/Article/1731239/nanoweapons-a-growing-threat-to-humanity/]//SLC](https://www.airuniversity.af.edu/AUPress/Book-Reviews/Display/Article/1731239/nanoweapons-a-growing-threat-to-humanity/%5D//CHS) PK

The author’s main thesis is that nanoweapons are a danger to humanity that demand greater attention. Despite the secrecy surrounding the development of nanoweapons, Del Monte is confident of their threat. This fear is based in part on the ranking of nanotech­nology weapons by the Global Catastrophic Risk Conference at the University of Oxford as the most probable means to cause human extinction by the end of this century. Ex­amples of nanoweapons discussed in the book include nano-enhanced lasers, smaller munitions with increased explosive force, and self-replicating smart nanorobots (SSN). SSNs search for and destroy targets without human input and self-replicate with materi­als found in the environment. According to the author, SSNs are gravely dangerous nanoweapons that humanity should prohibit. Central to his concern for humanity’s sur­vival is what he sees as the inherent difficulty in mounting defenses to nanoweapons given their capability to avoid detection and the ability of those who use these arms to escape attribution. While considerable resources have been dedicated to countering nu­clear weapons, little is publicly known about protection from nanoweapons. This is espe­cially concerning to the author because some nanoweapons have characteristics similar to biological pathogens. Giving his readers reason to be apprehensive, Del Monte turns to explaining how today’s nanotechnology can be used to create nanoweapons.

While nanotechnology is already improving our computers, sunscreens, and building materials, the first section of the book provides the nontechnical reader an easy-to-understand introduction to nanotechnology and how it may be used in arms development. The author organizes nanoweapons into five categories: offensive strategic, defensive stra­tegic, offensive tactical, defensive tactical, and passive. Examples are provided for each category, along with an explanation of its offensive, defensive, or passive nature. For in­stance, the offensive strategic category includes artificially intelligent nanorobots that can target particular individuals, hypersonic glide missiles (whose development will rely on developing certain nanomaterials), nano-enhanced fuels, and nonelectric guidance sys­tems. The other categories include additional guidance for organizing nanoweapons. While readers will find these categories helpful, a workable definition of nanoweapons is missing.

With this deep level of organization dedicated to understanding nanoweaponry, the reader would hope for a more useful definition of nanoweapons. Nanoweapons are de­fined in the book’s glossary as “any military technology which exploits the use of nano­technology (229).” Although this definition will capture all nanoweapons, it will also include many items that are not weapons. This definition would include a military fi­nance office using a publicly available desktop computer with a nanomanufactured mi­crochip. Is building a weapon with nanomanufactured components all that is required to make the weapon a nanoweapon? If a dry-docked ship is sprayed with anticorrosive nanocoating—increasing its hull strength tenfold (as an MIT study referenced in the book suggests)—is the ship now a nanoweapon? The book makes clear that nanotechnol­ogy is an enabling technology that will empower a wide range of civilian and military applications. But it does not wrestle with the problem that an SSN is fundamentally different than an anticorrosive nanocoating. This issue of defining nanotechnology is a common attribute of nascent scientific fields, but the reader is nevertheless left wanting more. Without addressing this definitional problem directly, Del Monte instead uses other methods to discover what nations are emerging as nanoweapon leaders.

He categorizes the factors needed to facilitate nanoweaponry development and sorts nations by these factors into the Nanoweapons Offensive Capability of Nations (NO­CON) list. The most powerful group, nanoweapon nations—such as the United States and China—has the ability to commercialize nanotechnology, possesses a national desire to strengthen its militaries, and demonstrates an ability to partner with other leading nanotechnology nations. Del Monte goes on to mention other nations on his NOCON list, all of which have varying interactions with nanotechnology. Giving the reader reason to be concerned for the international implications his NOCON suggests, he then high­lights the events that may tip us into a nanoweapon-driven war.

He predicts two singularities that will spawn nanoweapon-related international dis­ruptions. In addition to the creation of SSNs, the other singularity is the advent of arti­ficial intelligence (AI) that will exceed human intellect. AI will solve many of humanity’s greatest problems, the author posits, but it will also create better SSNs. If AI and SSNs are combined, alliances will form to maintain advantages in a new cold war around the development of AI-powered SSNs. Given their importance, international power will then be rebalanced around nanoweapon capabilities. Nuclear weapon use will increase since nanotechnology will empower their miniaturization and reduce their fallout. It is these disruptions, brought on by the AI and SSN singularities, that Del Monte claims will dramatically increase the chance of human extinction by 2100. Given this pessimistic prediction, Nanoweapons next discusses reasons for hope.

The author maintains some optimism for humanity. He notes that humanity has en­gaged in conflict since the beginning of our existence, but recent developments, such as the Treaty on the Non-Proliferation of Nuclear Weapons and the Biological Weapons Convention, show that humanity can act to prevent its extinction. Once humanity comes to know the existential threat that nanoweapons represent, humanity will act to limit their use and thus avert disaster. What we recognize when we use a new personal com­puter, he argues, is not the nanotechnology enabling its use but the impressive perfor­mance it achieves. The author states that humans understand technology by its function, not the technology itself. Thus, to forestall the need to demonstrate a nanoweapon’s threat to humanity, he indicates that current treaties and conventions concerning weap­ons of mass destruction should also regulate strategic nanoweapons.

#### First, they are exponentially more dangerous than nuclear weapons—they take an axe to the nuclear balance, spark use or lose pressures, create unavoidable scenarios for miscalc, and make terrorism infinitely more devastating.

[Louis A. Del Monte (2017), Award winning physicist, inventor, futurist, featured speaker, CEO of Del Monte and Associates, Inc., “Nanoweapons: A Growing Threat To Humanity,” Potomac Books, p. 107-110]//SLC PK

The use of autonomous weapons is in its infancy. There are many military and moral questions regarding their use. However, nations are developing and deploying them even as I write these words. To my eye, it appears they make the world more dangerous because these first- generation autonomous weapons lack human judgment. Will later generations have the capability of human judgment? At this point no one can definitively answer the question. That is why the United Nations is working with its members to ban the use of autonomous weapons, but that process is just beginning, and it appears to be almost at a standstill.

Let us use this information to understand what this may mean regarding nanoweapons. In my view, we can formulate three critical implications regarding nanoweapons in the 2030s:

1. Computers, with ai equal to human intelligence, will design nanoweapons, especially electronics and robots. Humans will define the nanoweapon parameters, and the computer will perform the design with low human and computer interactions.

2. Nanoweapons will become autonomous, including weapon systems like drones and nanobots.

3. A nation’s military prowess will equate primarily to its nanoweapons capabilities and less on its nuclear weapons capabilities. Thus nanoweapons will define the balance of power.

To understand the basis of these implications, let’s discuss them in detail. The first two points are already happening. Nanoweapons and nanoelectronics are designed using computers. This is not new. The more sophisticated a weapon system or integrated circuit, the more we rely on computers to assist with the design. As computers become more capable, this trend will increase. The term that describes this methodology is “computer- aided design,” or cad. We are also seeing a trend toward more autonomy in weapon systems, like the Navy swarmboats we discussed in chapter 5. The reason for this trend is that computers can function faster than humans and typically with greater expertise. The rationale for the third point is multifold. Let us consider a nanobots attack versus a nuclear weapons attack.

A nuclear attack aimed at destroying a nation requires the use of missiles. Military powers are capable of detecting a nuclear missile launch. Indeed, with the use of satellites, the United States can detect when a potential adversary begins fueling their land- based nuclear missiles. In essence, it would be difficult for any nation to launch nuclear missiles and avoid detection. This would invite a counterstrike. In the case of a nuclear attack on the United States, all nato nations would consider it an attack on them as well. The retaliation would be devastating. In contrast, a nanoweapons attack that involves the release of billions of autonomous ai nanobots would be hard to detect prior to the attack. Their ai capability may allow them to attack only when all nanobots are strategically in place. In a matter of hours, a nation may have no leadership or even a clue as to the nature of the attack. The stealth and lethal capabilities of a nanoweapons attack suggest that nations with smart nanoweapons will overshadow other nations with less advanced nanoweapons and even nations with nuclear weapons. The same applies to weapon systems that rely on nanoelectronics, such as hypersonic ballistic missiles with nuclear warheads. A hypersonic missile attack could occur faster than a nation could respond or determine the adversary. Nuclear submarines, the “boomers,” would not know which nations to target. Even if they do launch their nuclear missiles at likely perpetrators, the adversary would be expecting retaliation and would be ready with antimissile defenses. The boomers themselves would give away their positions by launching their missiles and become targets for “killer subs.”

It is conceivable that a nation could develop autonomous smart nanobots capable of traversing space and water, like viruses, to attack a nation’s land- based, air- based, and sea- based weapons.

Again, they could lie dormant until all nanobots are in place before performing their assigned military tasks. For example, a military commander could assign nanobots to find and destroy enemy submarines, missile silos, and bombers with nuclear weapons. This would render the doctrine of mutual assured destruction useless. I recognize that today this example sounds like science fiction. However, given sufficient funding, nanotechnologists could develop such nanobots. No law of science prohibits their existence. The task would be monumental, similar in scope to putting a man on the moon, which was once also science fiction. In addition, given that such nanobots may require years to carry out their assigned mission, it would likely require nanobots to generate their own power. For example, they could use solar power or wind power to charge a nanoscale battery. Similar to nuclear- powered submarines that are able to generate their own power for decades, self-powered nanobots would pose a viable threat indefinitely.

Even if nations control their nanoweapons, terrorists and mad scientists may still initiate an attack. Consider this scenario. A disgruntled nanoweapons scientist decides to seek revenge for some perceived unjust treatment. The scientist makes billions of autonomous smart nanobots at home and takes them to a reservoir in a suitcase. There, the scientist releases the nanobots, which contaminate the drinking water of a major metropolis. Within a few weeks, people drinking the contaminated water begin to show signs of illness. However, at this point, it is too late for countermeasures. Millions of innocent people begin to die. The nation is in shock, and its citizens live in fear. The government wants to act, but it is not clear what they should do. Even if they discover the mad scientist, beyond prosecuting him, what can they do to prevent a similar attack?

One nanoweapons attack could ignite a global conflict. Consider the mad scientist scenario, but replace him with a terrorist group. If terrorists launch autonomous smart nanobots on a nation, that nation may retaliate against any nation known to harbor such terrorists. Such a widespread retaliation may ignite a global conflict as nations attempt to defend themselves. In the fog of war, it may be impossible to determine who is doing what to whom. A nation may face a “use it or lose it” situation. This means that if they do not use their weapons, they may lose them. In such a scenario, any outcome is possible.

I have examined many scenarios related to autonomous smart nanoweapons attacks. Every scenario led me to the same two conclusions:

1. Nanoweapons are inherently dangerous, even to the nations that deploy them. One incident, intentional or accidental, could ignite a global conflict.

2. Nations deploying nanoweapons will garner military respect, but they will also garner high scrutiny, even to the point of paranoia. We may find ourselves in a new and even more dangerous cold war.

By 2045, most researchers and futurists in artificial intelligence predict that computers will exceed the combined cognitive intelligence of humanity. Google’s director of engineering, Ray Kurzweil, calls this point in time the “singularity.” In my opinion, singularity level computers will design nanobots capable of self- replication, and they will do this with minimal human assistance. Once self- replicating nanobots become a reality, just a few nanobots gaining entry to a submarine would eventually result in the swarms necessary to destroy it. I have found that the easiest way to think about nanobot attacks is to liken them to biological agents. In effect, self- replicating nanobots become an artificial life- form, and we become their gods.

#### Second, nanoweapon arms racing fundamentally shifts geopolitics leading to guaranteed proliferation and numerous escalation scenarios—also means PICs can’t solve the aff.

[Louis A. Del Monte 2 (2017), Award winning physicist, inventor, futurist, featured speaker, CEO of Del Monte and Associates, Inc., “Nanoweapons: A Growing Threat To Humanity,” Potomac Books, p. 118-120]//SLC PK

The desire to acquire offensive nanoweapons will, I judge, strongly guide international relations starting in the late 2020s. With the advent of artificial intelligence that rivals human intelligence, smart nanoweapons will become weapons of choice. There are seven reasons for this:

1. Nanoweapons in the late 2020s will be less expensive than nuclear weapons.

2. They will be easier to deliver than nuclear weapons.

3. Detecting nanoweapons manufacturing will be difficult.

4. The destructive power of nanoweapons will rival nuclear weapons and offer the potential to be more selective, minimizing collateral damage.

5. The use of nanoweapons will appear more ecofriendly compared to nuclear weapons.

6. Detecting a nanoweapons attack will be difficult until significant damage occurs.

7. Determining the source of a nanoweapons attack will be difficult.

Items 1– 7 essentially guarantee the proliferation of nanoweapons, and even small nations may wield significant military might. The definition of a superpower will change. It will focus not solely on a nation’s nuclear arsenal and delivery systems but also on its nanoweapons arsenal and delivery systems. To my eye, this guarantees a new cold war

In particular, I expect nations in the Middle East to be among the first to buy their way into becoming nanoweapons nations. I also expect the emergence of cold wars in the late 2020s and early 2030s:

1. The East versus West: China and Russia will square off against the United States and other NATO nations, like the United Kingdom and France.

2. The Middle East: Nations within the Middle East, and militant groups within those nations, will square off against each other for the same historical reasons that have engulfed that part of the world in conflict for thousands of years.

3. Korea: North Korea will square off against South Korea, as it has for over half a century.

4. Terrorism versus the rest of the world: Radicalized Islamist militant groups will square off against the United States, the United Kingdom, France, and Russia, which they see as having exploited the Middle East to control the flow of oil.

#### Third, nanoterrorism is uniquely dangerous and distinct from nuclear terror threats—it’s impossible to track and gives terrorists practical functionality.

[Louis A. Del Monte 3 (2017), Award winning physicist, inventor, futurist, featured speaker, CEO of Del Monte and Associates, Inc., “Nanoweapons: A Growing Threat To Humanity,” Potomac Books, p. 120-121]//SLC PK

Numerous authorities and volumes profile terrorists. These two, to my eye, capture the essence of most of the information. I conclude that the cold war with terrorists presents the greatest danger. Even if the suicide bombers represent only a tiny fraction of all terrorists, they are a serious threat that could turn a cold war into a full- out conflict.

As of this writing, numerous nations have thwarted terrorists’ plots to gain nuclear weapons. However, in the late 2020s and early 2030s, nanoweapons will be available on the black market. Numerous manufacturers will make them. Unlike nuclear weapons, if some go missing, they will be harder to find than nuclear weapons. They will not give off a telltale radiation signature. I am concerned that it may be possible for suicide terrorists to gain access to offensive nanoweapons via the black market. Another issue is the portability of nanoweapons. A disgruntled employee in a nanoweapons factory may be able to find a way to steal them. One briefcase filled with nanoparticles may be enough to wipe out a metropolis. I believe authorities will apprehend the perpetrator, but only after the fact. By that point, millions of people may be dead and many others dying. Whether the disgruntled employee is a lone wolf or a mad scientist will not matter. Given the large workforce of the nanoweapons military industrial complex, the probability of this occurring is high.

#### Fourth, countries will attempt to control it through defensive countermeasures but SSNs are uniquely suited to circumventing them, leading to a vicious cycle of arms racing.

[Louis A. Del Monte 4 (2017), Award winning physicist, inventor, futurist, featured speaker, CEO of Del Monte and Associates, Inc., “Nanoweapons: A Growing Threat To Humanity,” Potomac Books, p. 135-136]//SLC PK

We need to stop offensive smart nanobots at their own level using defensive smart nanobots. In this context, by “smart nanobots” we mean they are autonomous and have ai functionality. Unfortunately, using defensive smart nanobots to fight offensive smart nanobots becomes problematic. Here are some of the problems:

The defensive smart nanobots may not be completely effective, just as antiviral medications are not effective on all viruses. Even today, we don’t have a cure for the common cold.

The defensive smart nanobots may prove harmful to some people, just as an antiviral medication can have serious side effects for some people

• The offensive smart nanobots that are able to evade the defensive smart nanobots become, in a sense, resistant, much the same way that influenza viruses can become resistant to antiviral medications

• If the defensive smart nanobots have an extensive longevity, their ai code could eventually become corrupt, causing them to become a danger to animals and humans.

#### Independently, self-replication becomes uncontrollable and destroys the biosphere.

[Sean Martin (7-7-2017), Science Reporter for Express.co.uk, “Self-replicating Nanobots could DESTROY all life on Earth, warn experts,” Express, [https://www.express.co.uk/news/science/825989/nanotechnology-nanobots-grey-goo-end-of-the-world]//SLC](https://www.express.co.uk/news/science/825989/nanotechnology-nanobots-grey-goo-end-of-the-world%5D//CHS) PK

Nanobots, which are theoretical tiny robots a single nanometre wide – one billionth of a metre – are currently being worked on and in the future may dominate the planet if they get out of control.

They can be used for several purposes but boffins hope to use them mainly for in-body procedures, such as replacing cells in the body for fighting things such as cancer.

Such would be the technology that the nanobots would be able to act as if they are cells and self-replicate, most likely through protein folding, where they can split and create another version of themselves.

Louis A Del Monte, physicist and author of the book Nanoweapons, wrote in an article for the Huffington Post: “You can think of them as the technological equivalent of bacteria and viruses.”

The minuscule bots are expected to arrive in the 2050s, according to Dr Del Monte, following the rise of artificial intelligence, which will help to create the revolutionary bots.

While experts are developing nanobots for the good, there are fear this could quickly get out of control.

Eric Drexler, an engineer who is considered one of the pioneers of nanotechnology, warned in his book Engines of Creation way back in 1986: “Imagine such a replicator floating in a bottle of chemicals, making copies of itself…the first replicator assembles a copy in one thousand seconds, the two replicators then build two more in the next thousand seconds, the four build another four, and the eight build another eight.

“At the end of 10 hours, there are not thirty-six new replicators, but over 68 billion.

“In less than a day, they would weigh a ton; in less than two days, they would outweigh the Earth; in another four hours, they would exceed the mass of the Sun and all the planets combined — if the bottle of chemicals hadn't run dry long before.”

He goes on to warn that they could begin destroying and replacing all biological life on Earth – leading to the end of humanity in what is known as “The Grey Goo Scenario”.

Mr Drexler: “Early assembler-based replicators could beat the most advanced modern organisms. 'Plants' with 'leaves' no more efficient than today's solar cells could out-compete real plants, crowding the biosphere with an inedible foliage.

“Tough, omnivorous 'bacteria' could out-compete real bacteria: they could spread like blowing pollen, replicate swiftly, and reduce the biosphere to dust in a matter of days.

“Dangerous replicators could easily be too tough, small, and rapidly spreading to stop — at least if we made no preparation.

“We have trouble enough controlling viruses and fruit flies.”

Chris Phoenix, Director of Research of the Center for Responsible Nanotechnology (CRN) however says that there are other things to worry about with nanotechnology.

He wrote in a paper titled Safe Exponential Manufacturing along with Mr Drexler, who has tried to distance himself from the grey goo scenario – a term he coined: “Runaway replication would only be the product of a deliberate and difficult engineering process, not an accident.

“Far more serious, however, is the possibility that a large-scale and convenient manufacturing capacity could be used to make powerful non-replicating weapons in unprecedented quantity, leading to an arms race or war.

“Policy investigation into the effects of molecular nanotechnology should consider deliberate abuse as a primary concern, and runaway replication as a more distant issue.”

#### SSNs also open up the possibility of existential chemical warfare impossible to defend against.

[Louis A. Del Monte 5 (2017), Award winning physicist, inventor, futurist, featured speaker, CEO of Del Monte and Associates, Inc., “Nanoweapons: A Growing Threat To Humanity,” Potomac Books, p. 5-6]//SLC PK

Although the preceding scenario is fictitious, it is entirely plausible. Nanoweapons are real and a new arms race is under way. Based on publicly available information, China, Russia, and the United States are competing in a multibillion dollar nanoweapons arms race. Other nations, like Germany, are close on their heels. A new paradigm fuels this race. The superpowers of the future will be those nations with the most capable nanoweapons. This is easy to illustrate. Recall the first sentence of this chapter: “An enemy could kill you before you finish this sentence.” Here is how such a nanoweapons attack could happen. Assume one nation develops artificially intelligent nanobots, with functionality similar to mosquitos. Also, assume the nanobots are capable of seeking and injecting toxin into another nation’s humans. The smallest known flying insects are fairyflies, belonging to the family of chalcid wasps. Fairyflies are approximately 139 microns long (139 millionths of a meter). This suggests a plausible size for a lethal nanobot. If the toxin is botulism, the human lethal dose is 100 nanograms. If we assume the toxin payload each nanobot carries is 1,000 nanograms, similar to the weight ratio of a fighter aircraft to its ordinance payload, each nanobot could theoretically kill ten humans. An autopsy will reveal the presence of botulism and may attribute the death to food poisoning, not foul play. Even worse, if it is botulinum toxin type H, the most deadly in existence, there is no known antidote. Once injected, it becomes only a matter of days before your brain shuts down and you die. Most medical examiner labs are unfamiliar with botulinum toxin type H and not able to detect it. The injection point would be invisible to conventional autopsy techniques. This means that it is entirely possible that the medical examiner will attribute your death to an unknown cause, but not suggest foul play. The actual injection could take place within seconds. You may not be aware of it. You may never have heard of nanoweapons and botulinum toxin type H. It does not matter. Once injected, you are going to die.

Above, we discussed mosquito- like nanobots. They do not exist now, but the technology to build such a nanoweapon is only one or two decades away. No nation has a defense against such a nanoweapon. You may think this is far- fetched, but the idea of poisoning someone with a nearly imperceptible device is not new. A well- documented case involves Georgi Markov, novelist, playwright, and broadcast journalist for the BBC World Service. As a Bulgarian dissident, Markov was critical of the incumbent Bulgarian communist regime under Chairman Todor Zhivkov. Because of his criticism, many speculate that the Bulgarian government decided to silence him. On September 7, 1978, Markov walked across Waterloo Bridge spanning the river Thames. While waiting to take a bus to his job at the BBC, he felt a sharp pain in the back of his right thigh. He described the pain as a bug bite or sting. The pain caused Markov to look behind him. He saw a man picking up an umbrella and hurriedly crossing the street, where he got into a taxi and sped away. After arriving at the BBC World Service offices, Markov noticed a small red pimple had formed at the site of the sting, which continued to cause pain. He told one of his colleagues at the BBC about this incident. That evening he developed a fever and sought treatment at St. James’ Hospital in Balham. He died on September 11 at the age of forty- nine. Due to the suspicious circumstances, the Metropolitan Police ordered an autopsy, which revealed a spherical metal pellet the size of a pinhead embedded in Markov’s leg. The pellet had two holes drilled through it, producing an X- shaped cavity, which showed traces of ricin. A sugary substance coated the tiny holes, trapping the ricin inside. Once the pellet was injected into Markov’s body, the sugary coating melted and the ricin found its way into his bloodstream. At the time, there was no known antidote to ricin. The intelligence communities term this event the “Umbrella Murder.” In this case, a tiny pellet carried the toxin. Although this is arguably much larger than mosquito- like nanobots, it demonstrates a significant point. Something extremely small, with an almost miniscule amount of toxin, can kill a human.

If you imagine 50 billion mosquito- like nanobots, each carrying 1,000 nanograms of botulinum toxin H, released into the world’s population, it is easy to understand that nanoweapons could represent a threat capable of rendering humanity extinct. Even more frightening, these nanobots could be carried in a suitcase.

#### New advancements mean that causes extinction.

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In the decades to come, **advanced bioweapons could threaten human existence**. **Although the probability of human extinction from bioweapons may be low**, **the** **expected value** **of** **reducing the risk** **could still be large**, **since such risks jeopardize the existence of all future generations**. We provide an overview of biotechnological extinction risk, make some rough initial estimates for how severe the risks might be, and compare the cost-effectiveness of reducing these extinction-level risks with existing biosecurity work. We find that reducing human extinction risk can be more cost-effective than reducing smaller-scale risks, even when using conservative estimates. This suggests that the risks are not low enough to ignore and that more ought to be done to prevent the worst-case scenarios. How worthwhile is it spending resources to study and mitigate the chance of human extinction from biological risks? The risks of such a catastrophe are presumably low, so a skeptic might argue that addressing such risks would be a waste of scarce resources. In this article, we investigate this position using a cost-effectiveness approach and ultimately conclude that the expected value of reducing these risks is large, especially since such risks jeopardize the existence of all future human lives. Historically, **disease events** **have been responsible for the greatest death tolls on humanity**. **The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone**.2 **The Black Death was responsible for killing over 25% of the European population**,3 **while other pandemics**, such as the plague of Justinian, **are thought to have killed 25 million in the 6th century**—constituting over 10% of the world's population at the time.4 It is an open question whether a future pandemic could result in outright human extinction or the irreversible collapse of civilization. **A** **skeptic** **would have many good reasons to think that existential risk from disease is unlikely**. **Such a disease would need to spread worldwide to remote populations**, **overcome rare genetic resistances**, **and evade detection, cures, and countermeasures**. Even evolution itself may work in humanity's favor: **Virulence and transmission is often a trade-off**, and so evolutionary pressures could push against maximally lethal wild-type pathogens.5,6 **While these arguments point to a** very **small risk** of human extinction, **they do not rule the possibility out entirely**. Although rare, **there are recorded instances of species going** extinct due to disease—primarily in amphibians, but also in 1 mammalian species of rat on Christmas Island.7,8 There are also historical examples of large human populations being almost entirely wiped out by disease, **especially when multiple diseases were simultaneously introduced into a population without immunity**. **The most striking examples of total population collapse include native American tribes exposed to European diseases,** such as the Massachusett (86% loss of population), Quiripi-Unquachog (95% loss of population), and the Western Abenaki (which suffered a staggering 98% loss of population).9 **In the modern context**, **no single disease currently exists that combines the worst-case levels of transmissibility, lethality, resistance to countermeasures, and global reach**. But many diseases are proof of principle that each worst-case attribute can be realized independently. For example, some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment, such as rabies or septicemic plague. Other diseases have a track record of spreading to virtually every human community worldwide, such as the 1918 flu,10 and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population.11,12 Under optimal virulence theory, natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. **But advances in biotechnology** **might allow the creation of diseases that combine such traits**. Recent **controversy has already emerged** **over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics**.13-17 **Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective**.18 In addition to transmissibility and lethality, **studies have shown that other disease traits**, such as incubation time, environmental survival, and available vectors, **could be modified as well**.19-21 Although these experiments had scientific merit and were not conducted with malicious intent, their implications are still worrying. This is especially true given that there is also a long historical track record of state-run bioweapon research applying cutting-edge science and technology to design agents not previously seen in nature. The Soviet bioweapons program developed agents with traits such as enhanced virulence, resistance to therapies, greater environmental resilience, increased difficulty to diagnose or treat, and which caused unexpected disease presentations and outcomes.22 **Delivery capabilities** **have** also **been subject to the cutting edge of technical development**, **with Canadian, US, and UK bioweapon efforts playing a critical role in developing the discipline of aerobiology**.23,24 **While there is no evidence of** state-run bioweapons **programs directly attempting to** develop or **deploy bioweapons** that would pose an existential risk, **the logic of deterrence and mutually assured destruction could** **create such incentives** **in more unstable political environments** **or following a breakdown of the Biological Weapons Convention**.25 **The possibility of a war between great powers could also increase the pressure to use such weapons**—during the World Wars, bioweapons were used across multiple continents, with Germany targeting animals in WWI,26 and Japan using plague to cause an epidemic in China during WWII.27

#### Genetically engineered pathogens attach to non-human hosts- that kills biodiversity and leads to species extinction

Abboud 18

Catastrophic Impacts of Biological Warfare on Biodiversity By Nura A. Abboud | September 22, 2018 | Environment, Nature, Pollution <https://www.ecomena.org/impacts-of-biological-warfare-on-biodiversity/> Nura A. Abboud is an environmental activist and Founder of the Jordanian Society for Microbial Biodiversity (JMB), the only NGO in the Middle East concerning the microbial biodiversity. Nura specializes in molecular biology, biological sciences, microbial biodiversity, genetic fingerprinting and medical technologies. Her vision is to establish an eco-research center in the astonishing desert south of Jordan. She has received several scholarships and awards including honorary doctorate in Environmental leadership.//qlsms

Biological weapons are considered the most dangerous of all known weapons of mass destruction. They are used to deliberately cause epidemics among humans; destroy the environmental components, including water, air, and soil; and target crops and livestock. Examples of diseases used in biological warfare include anthrax, smallpox, plague, cholera, and avian flu. In addition to the catastrophic effects of biological warfare on the biodiversity and the environment, their danger lies in their low cost and rapid spread, as well as their easy preparation, transport, and use.

Unlike nuclear and chemical bombs, biological bombs are without odor or color and therefore cannot be detected. Additionally, bioweapons are dangerous because of their effects on untargeted organisms in a military attack, and the clinical symptoms they create may be difficult to distinguish from normal diseases. Bioweapon pathogens remain in nature for several years and are able to survive in harsh environmental conditions.

Threat to Natural Resources

Bioweapons spread germs that contaminate air, food, water, and the environment, causing epidemiological diseases for different living organisms.

Air: A wide variety of germs can contaminate air and are used in biological warfare. Fungi are the most common, and they travel by air over long distances to infect healthy plants.

Food: Food contamination is also one of the most powerful methods used to carry out biological warfare attacks. Disease is transmitted either directly to humans through contaminated food or drink or indirectly by hosts.

Water: Water can spread a number of lethal infectious agents as well. For example, one gram of Clostridium tetani poison is able to kill eight million people within six hours.

Threats to Biodiversity

Diseases are one of the main drivers of extinction in endangered species; therefore, disease control is fundamental to preserve biodiversity. Despite the presence of vaccines and drugs for most bioweapons, they may not be available in adequate quantities to cope with an epidemiological disease outbreak.

Biological attacks pose a threat to naturally rare wild plants and animals and to species whose natural habitats have been degraded by human activities. Furthermore, diseases that humans, domestic animals, and domestic plants have been able to develop immunity to can be fatal in wild animals and plants. Bioweapons are not only having direct effects on the genetic biodiversity of indigenous species but also are having direct and indirect catastrophic effects on vital plant and animal communities.

Threats to Animal Biodiversity

Conservation of livestock breeds is essential to maintaining genetic diversity, which in turn is vital to increasing the ability of living organisms to adapt to environmental changes. The danger of bioweapons regarding animal biodiversity is summarized in three main points:

The direct impact of diseases on wild species

Some deadly diseases in humans or domestic animals can infect wild animals. For instance, an epidemic destructive impact on endangered species is reflected in the effects of Canine distemper, a natural viral disease that infects wild dogs and wild animals belonging to the same group. Canine distemper was also developed in bioweapon laboratories.

Over the past decade, the spread of this disease has resulted in habitat loss and in the extinction of a large number of wild species in North America. Additionally, it led to the elimination of about one-third of the lion population in Tanzania and had serious impacts on the endangered leopard population.

Invasive species

The history of rinderpest in Africa provides a model for predicting the potential effects of lethal diseases on wild species and livestock. In 1887, European colonial armies introduced the rinderpest virus to Africa through imported cattle, which led to a rinderpest outbreak among domestic cattle breeds and wild species, killing an estimated 90–95% of African cattle and buffaloes within three years.

To control the epidemic, African herds and buffaloes have been destroyed in most parts of Africa. Despite efforts to combat rinderpest over the past century, the disease is still strong, and its outbreak in the region occurs frequently.

Elimination of animal species, hosts, and vectors

Threatened species may be destroyed in areas that have been subjected to biological attacks with the aim of eradicating the disease. For example, in the United States, programs to control brucellosis in livestock have resulted in killing large numbers of wild animals, including the Bison and the white tailed deer.

Threats to Plant Biodiversity

Microbes can be used in crop destruction. For instance, “Rice blast” is a disease affecting rice and therefore leads to crop destruction and genetic changes in the plant.

Conclusion and Recommendations

The discussion about controlling destructive bioweapons is growing, as they pose a vast danger to both humanity and the environment alike. Any failure to prevent biological attacks can lead to the deterioration of genetic diversity in animals and plants, the extinction of endangered species, and the destruction of human livelihoods and traditional cultures.

Biotechnology has increased the economical value of genetic diversity of living organisms; hence, it has increased the risk of eliminating genetic diversity through the use of GMO bioweapons. Most of all, the environment will be the silent victim of this war..

#### Biodiversity loss causes extinction – outweighs and is a threat multiplier

**Torres 16** [Phil Biologist, conservationist, science advocate & educator. 2 years based in Amazon rainforest, now exploring science around the world. “[Biodiversity Loss: An Existential Risk Comparable to Climate Change](http://futureoflife.org/2016/05/20/biodiversity-loss/)” http://futureoflife.org/2016/05/20/biodiversity-loss/]

According to the Bulletin of Atomic Scientists, the two greatest existential threats to human civilization stem from climate change and nuclear weapons. Both pose clear and present dangers to the perpetuation of our species, and the increasingly dire climate situation and nuclear arsenal modernizations in the United States and Russia were the most significant reasons why the Bulletin [decided](http://thebulletin.org/press-release/doomsday-clock-hands-remain-unchanged-despite-iran-deal-and-paris-talks9122) to keep the Doomsday Clock set at three minutes before midnight earlier this year.

But there is another existential threat that the Bulletin overlooked in its Doomsday Clock announcement: biodiversity loss. This phenomenon is often identified as one of the many consequences of climate change, and this is of course correct. But biodiversity loss is also a contributing factor behind climate change. For example, deforestation in the Amazon rainforest and elsewhere reduces the amount of carbon dioxide removed from the atmosphere by plants, a natural process that mitigates the effects of climate change. So the causal relation between climate change and biodiversity loss is bidirectional.

Furthermore, there are myriad phenomena that are driving biodiversity loss in addition to climate change. Other causes include ecosystem fragmentation, invasive species, pollution, oxygen depletion caused by fertilizers running off into ponds and streams, overfishing, human overpopulation, and overconsumption. All of these phenomena have a direct impact on the health of the biosphere, and all would conceivably persist even if the problem of climate change were somehow immediately solved.

Such considerations warrant decoupling biodiversity loss from climate change, because the former has been consistently subsumed by the latter as a mere effect. Biodiversity loss is a distinct environmental crisis with its own unique syndrome of causes, consequences, and solutions—such as restoring habitats, creating protected areas (“biodiversity parks”), and practicing sustainable agriculture.

Deforestation of the Amazon rainforest decreases natural mitigation of CO2 and destroys the habitats of many endangered species.

The sixth extinction.

The repercussions of biodiversity loss are potentially as severe as those anticipated from climate change, or even a nuclear conflict. For example, according to a 2015 [study](http://www.ncbi.nlm.nih.gov/pubmed/26601195) published in Science Advances, the best available evidence reveals “an exceptionally rapid loss of biodiversity over the last few centuries, indicating that a sixth mass extinction is already under way.” This conclusion holds, even on the most optimistic assumptions about the background rate of species losses and the current rate of vertebrate extinctions. The group classified as “vertebrates” includes mammals, birds, reptiles, fish, and all other creatures with a backbone.

The article argues that, using its conservative figures, the average loss of vertebrate species was 100 times higher in the past century relative to the background rate of extinction. (Other scientists have suggested that the current extinction rate could be as much as 10,000 times higher than normal.) As the authors write, “The evidence is incontrovertible that recent extinction rates are unprecedented in human history and highly unusual in Earth’s history.” Perhaps the term “Big Six” should enter the popular lexicon—to add the current extinction to the previous “Big Five,” the last of which wiped out the dinosaurs 66 million years ago.

But the concept of biodiversity encompasses more than just the total number of species on the planet. It also refers to the size of different populations of species. With respect to this phenomenon, multiple studies have confirmed that wild populations around the world are dwindling and disappearing at an alarming rate. For example, the 2010 [Global Biodiversity Outlook](https://www.cbd.int/gbo3) report found that the population of wild vertebrates living in the tropics dropped by 59 percent between 1970 and 2006.

The report also found that the population of farmland birds in Europe has dropped by 50 percent since 1980; bird populations in the grasslands of North America declined by almost 40 percent between 1968 and 2003; and the population of birds in North American arid lands has fallen by almost 30 percent since the 1960s. Similarly, 42 percent of all amphibian species (a type of vertebrate that is sometimes called an “ecological indicator”) are undergoing population declines, and 23 percent of all plant species “are estimated to be threatened with extinction.” [Other studies](http://commondreams.org/views/2016/02/10/biodiversity-loss-and-doomsday-clock-invisible-disaster-almost-no-one-talking-about) have found that some 20 percent of all reptile species, 48 percent of the world’s primates, and 50 percent of freshwater turtles are threatened. Underwater, about 10 percent of all coral reefs are now dead, and another 60 percent are in danger of dying.

Consistent with these data, the 2014 [Living Planet Report](http://bit.ly/1ssxx5m) shows that the global population of wild vertebrates dropped by 52 percent in only four decades—from 1970 to 2010. While biologists often avoid projecting historical trends into the future because of the complexity of ecological systems, it’s tempting to extrapolate this figure to, say, the year 2050, which is four decades from 2010. As it happens, a 2006[study](http://science.sciencemag.org/content/314/5800/787) published in Science does precisely this: It projects past trends of marine biodiversity loss into the 21st century, concluding that, unless significant changes are made to patterns of human activity, there will be virtually no more wild-caught seafood by 2048.

48% of the world’s primates are threatened with extinction.

Catastrophic consequences for civilization.

The consequences of this rapid pruning of the evolutionary tree of life extend beyond the obvious. There could be surprising effects of biodiversity loss that scientists are unable to fully anticipate in advance. For example, prior research has shown that localized ecosystems can undergo abrupt and irreversible shifts when they reach a tipping point. According to a 2012 [paper](http://www.nature.com/nature/journal/v486/n7401/full/nature11018.html) published in Nature, there are reasons for thinking that we may be approaching a tipping point of this sort in the global ecosystem, beyond which the consequences could be catastrophic for civilization.

As the authors write, a planetary-scale transition could precipitate “substantial losses of ecosystem services required to sustain the human population.” An ecosystem service is any ecological process that benefits humanity, such as food production and crop pollination. If the global ecosystem were to cross a tipping point and substantial ecosystem services were lost, the results could be “widespread social unrest, economic instability, and loss of human life.” According to Missouri Botanical Garden ecologist Adam Smith, one of the paper’s co-authors, this could occur in a matter of decades—far more quickly than most of the expected consequences of climate change, yet equally destructive.

Biodiversity loss is a “threat multiplier” that, by pushing societies to the brink of collapse, will exacerbate existing conflicts and introduce entirely new struggles between state and non-state actors. Indeed, it could even fuel the rise of terrorism. (After all, climate change has been [linked](http://thebulletin.org/climate-change-and-syrian-uprising) to the emergence of ISIS in Syria, and multiple high-ranking US officials, such as former US Defense Secretary [Chuck Hagel](http://www.defense.gov/News-Article-View/Article/603441)and CIA director [John Brennan](http://www.cnsnews.com/news/article/cnsnewscom-staff/cia-director-cites-impact-climate-change-deeper-cause-global), have affirmed that climate change and terrorism are connected.)

The reality is that we are entering the sixth mass extinction in the 3.8-billion-year history of life on Earth, and the impact of this event could be felt by civilization “in as little as three human lifetimes,” as the aforementioned 2012 Nature paper notes. Furthermore, the widespread decline of biological populations could plausibly initiate a dramatic transformation of the global ecosystem on an even faster timescale: perhaps a single human lifetime.

The unavoidable conclusion is that biodiversity loss constitutes an existential threat in its own right. As such, it ought to be considered alongside climate change and nuclear weapons as one of the most significant contemporary risks to human prosperity and survival.

#### The aff is try or die—countries underestimate the threat of SSNs meaning there won’t be a treaty before potential Armageddon.

[Louis A. Del Monte 6 (2017), Award winning physicist, inventor, futurist, featured speaker, CEO of Del Monte and Associates, Inc., “Nanoweapons: A Growing Threat To Humanity,” Potomac Books, p. 166-167]//SLC PK

Conclusion 1: Once presented with evidence that a class of weapons can threaten human extinction, humanity will act to protect itself. This will be true of strategic offensive/defensive nanoweapons. Unfortunately, most of the world’s population is oblivious to the existence of nanoweapons. They garner no headlines or primetime news coverage. There are no treaties adopted to prevent nations from developing and deploying them. This suggests that strategic offensive/defensive nanoweapons will be developed, deployed, and used in conflict before the world understands the threat that they pose to our existence.

Unfortunately, even deploying strategic nanoweapons represents a risk, which is greater than deploying nuclear weapons. I judge the risk to be greater because strategic nanoweapons will embody artificial intelligence, and we risk losing control over them and the Singularity Computers that built them.

Conclusion 2: The threat of a full- out nano war will loom large in the second half of the twenty- first century. This threat is large because identifying the source of a nanoweapons attack will be problematic due to the inherent stealth associated with them. As a result, nations and terrorist groups will find it compelling to unleash offensive tactical nanoweapons on an adversary. However, any attack increases the possibility of a full- out nano war, which like a full- out nuclear war would threaten humanity’s survival.

The new cold war of the 2050s and beyond will be extremely dangerous, even more so than the first Cold War. The world knew what was at stake regarding nuclear weapons. This knowledge forced nations to dial back the threat of nuclear war. This is not the situation with nanoweapons. Currently the bulk of the world population does not even know that nanoweapons exist, and major powers are in a new nanoweapons arms race. This argues that the next cold war has a greater probability of escalating into a strategic nano war, which would push humanity to the brink.

#### We outweigh on timeframe—multiple countries are investing billions and they’re primed for theft.

[Jeff Daniels, (3-17-2017), “Mini-nukes and mosquito-like robot weapons being primed for future warfare,” CNBC, [https://www.cnbc.com/2017/03/17/mini-nukes-and-inspect-bot-weapons-being-primed-for-future-warfare.html]//recut](https://www.cnbc.com/2017/03/17/mini-nukes-and-inspect-bot-weapons-being-primed-for-future-warfare.html%5D//recut) SLC PK

Several countries are developing nanoweapons that could unleash attacks using mini-nuclear bombs and insect-like lethal robots. While it may be the stuff of science fiction today, the advancement of nanotechnology in the coming years will make it a bigger threat to humanity than conventional nuclear weapons, according to an expert. The U.S., Russia and China are believed to be investing billions on nanoweapons research. “Nanobots are the real concern about wiping out humanity because they can be weapons of mass destruction,” said Louis Del Monte, a Minnesota-based physicist and futurist. He’s the author of a just released book entitled “Nanoweapons: A Growing Threat To Humanity.” One unsettling prediction Del Monte’s made is that terrorists could get their hands on nanoweapons as early as the late 2020s through black market sources. According to Del Monte, nanoweapons are much smaller than a strand of human hair and the insect-like nanobots could be programmed to perform various tasks, including injecting toxins into people or contaminating the water supply of a major city. Subs: Zika mosquito research 160621 Getty Images Another scenario he suggested the nanodrone could do in the future is fly into a room and drop a poison onto something, such as food, to presumably target a particular individual. The federal government defines nanotechnology as the science, technology and engineering of things so small they are measured on a nanoscale, or about 1 to 100 nanometers. A single nanometer is about 10 times smaller than the width of a human’s DNA molecule. While nanotechnology has produced major benefits for medicine, electronics and industrial applications, federal research is currently underway that could ultimately produce nanobots. For one, the Defense Advanced Research Projects Agency, or DARPA, has a program called the Fast Lightweight Autonomy program for the purpose to allow autonomous drones to enter a building and avoid hitting walls or objects.

#### And expert opinion proves that it’s probabilistically the most likely scenario for human extinction.

[Louis A. Del Monte 7 (2017), Award winning physicist, inventor, futurist, featured speaker, CEO of Del Monte and Associates, Inc., “Nanoweapons: A Growing Threat To Humanity,” Potomac Books, p. xi]//SLC PK

Nanoweapons are the most likely military weapons to render humanity extinct in this century. This is not a philosophical issue. This is about whether you and yours will survive through this century. Having made such a dire assertion, you may wonder if I am being an alarmist. Consider this. The events that most people consider likely to cause humanity’s extinction, such as a large asteroid impact or a super- volcanic eruption, actually have a relatively low probability of occurring, in the order of 1 in 50,000 or less. In 2008 experts surveyed at the Global Catastrophic Risk Conference at the University of Oxford suggested a 19 percent chance of human extinction by the end of this century, citing the top four most probable causes:

1. Molecular nanotechnology weapons: 5 percent probability

2. Super intelligent ai: 5 percent probability

3. Wars: 4 percent probability

4. Engineered pandemic: 2 percent probability

Obviously nanoweapons are at the top of the list, having a 1 in 20 probability of causing human extinction by the end of this century. Notice that biological weapons (item 4), which have been a mainstay apocalyptic theme in both fiction and nonfiction, come in as a distant fourth, with only a 1 in 50 probability of causing human extinction.

#### Unregulated nanotech causes extinction BUT overregulation drives black market development that is further destabilized—the plan’s balanced approach of restricting the most dangerous nanoweapons is key.

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Onu John Chigbo. July. “Safe Utilization of Advanced Nanotechnology” Academic Journal of Interdisciplinary Studies Vol 2, No. 5. <http://www.mcser.org/journal/index.php/ajis/article/view/607>

As early as 1959, Richard Feynman proposed building devices with each atom precisely placed1. In 1986, Eric Drexler published an influential book, Engines of Creation2, in which he described some of the benefits and risks of such a capability. If molecules and devices can be manufactured by joining individual atoms under computer control, it will be possible to build structures out of diamond, 100 times as strong as steel; to build computers smaller than a bacterium; and to build assemblers and mini-factories of various sizes, capable of making complex products and even of duplicating themselves. Drexler's subsequent book, Nanosystems3, substantiated these remarkable claims, and added still more. A self-contained tabletop factory could produce its duplicate in one hour. Devices with moving parts could be incredibly efficient. Molecular manufacturing operations could be carried out with failure rates less than one in a quadrillion. A computer would require a miniscule fraction of a watt and one trillion of them could fit into a cubic centimeter. Nanotech-built fractal plumbing would be able to cool the resulting 10,000 watts of waste heat. It seems clear that if advanced nanotechnology is ever developed, its products will be incredibly powerful.

As soon as molecular manufacturing was proposed, risks associated with it began to be identified. Engines of Creation2 describes one of the most famous: gray goo. A small assembler capable of self-replication could in theory replicate itself too many times4. If it were capable of surviving outdoors, and of using biomass as raw material, it could eventually devour the biosphere5. Others have analyzed the likelihood of an unstable arms race6, and many have suggested economic upheaval resulting from the widespread use of free manufacturing7. Some have even suggested that the entire basis of the economy would change, and money would become obsolete8.

Sufficiently powerful products would allow malevolent people, either hostile governments or angry individuals, to wreak havoc. Destructive nanomachines could do immense damage to unprotected people and objects. If the wrong people gained the ability to manufacture any desired product, they could rule the world, or cause massive destruction in the attempt9. Certain products, such as vast surveillance networks, powerful aerospace weapons, and microscopic antipersonnel devices, provide special cause for concern. Gray goo is relevant here as well: an effective means of sabotage would be to release a hard-to-detect robot that continued to manufacture copies of itself by destroying its surroundings.

Clearly, the unrestricted availability of advanced nanotechnology poses grave risks, which may well outweigh the benefits of clean, cheap, convenient, self-contained manufacturing. As analyzed in Forward to the Future: Nanotechnology and Regulatory Policy10, some restriction is likely to be necessary. However, as was also pointed out in that study, an excess of restriction will enable the same problems by increasing the incentive for covert development of advanced nanotechnology. That paper considered regulation on a one-dimensional spectrum, from full relinquishment to complete lack of restriction. As will be shown below, a twodimensional understanding of the problem—taking into account both control of nanotech manufacturing capability and control of its products—allows targeted restrictions to be applied, minimizing the most serious risks while. preserving the potential benefits

Nanotech Manufacturing and Its Products

The technology at the heart of this dilemma is molecular manufacturing. A machine capable of molecular manufacturing—whether nanoscale or macroscale—has two possible functions: to create more manufacturing capacity by replicating itself, and to manufacture products. Most products created by molecular manufacturing will not possess any capacity for self-replication, or indeed for manufacturing of any kind; as a result, each product can be evaluated on its own merits, without worrying about special nanotech risks. A nanotech-based manufacturing system, on the other hand, could build weapons, gray goo, or anything else it was programmed to produce. The solution, then, is to regulate nanofactories; products are far less dangerous. A nanotech-built car could no more turn into gray goo than a steel-and-plastic car could.

Some products, however, will be powerful enough to require restriction. Nanotech weapons would be far more effective than today's versions. Very small products could get lost and cause nano-litter, or be used to spy undetectably on people. And a product that included a general molecular manufacturing capability would be, effectively, an unregulated nanofactory—horrifyingly dangerous in the wrong hands. Any widespread use of nanotech manufacturing must include the ability to restrict, somehow, the range of products that can be produced.

If it can be done safely, widespread use of nanotech manufacturing looks like a very good idea for the following reasons:

The ability to produce duplicate manufacturing systems means that manufacturing capacity could be doubled almost for free.

A single, self-contained, clean-running nanofactory could produce a vast range of strong, efficient, carbon-based products as they are needed.

Emergency and humanitarian aid could be supplied quickly and cheaply.

Many of the environmental pressures caused by our current technology base could be mitigated or removed entirely.

The rapid and flexible manufacturing cycle will allow many innovations to be developed rapidly.

Although a complete survey and explanation of the potential benefits of nanotechnology is beyond the scope of this paper, it seems clear that nanotech has a lot to offer.

All of these advantages should be delivered as far as is consistent with minimizing risks.

Humanitarian imperatives and opportunities for profit both demand extensive use of nanotechnology. In addition, failure to use nanotechnology will create a pent-up demand for its advantages, which will virtually guarantee an uncontrollable black market. Once nanotech has been developed, a second, independent development project would be both far easier and far more dangerous than the original project. The first nanofactory must be made available for widespread use to reduce the impetus for independent development.

Development of nanotechnology must be undertaken with care to avoid accidents; once a nanotechbased manufacturing technology is created, it must be administered with even more care. Irresponsible use of nanotech could lead to black markets, unstable arms races ending in immense destruction, and possibly a release of gray goo. Misuse of the technology by inhumane governments, terrorists, criminals, and irresponsible users could produce even worse problems—gray goo is a feeble weapon compared to what could be designed. It seems likely that research leading to advanced nanotechnology will have to be carefully monitored and controlled.

However, the same is not true of product research and development. The developer of nanotech-built products does not need expertise in molecular nanotechnology. Once a manufacturing system is developed, product designers can use it to build anything from cars to computers, simply by reusing low-level nanotech designs that have previously been developed. A designer may safely be allowed to play with pieces 1,000 atoms on a side (one billion atoms in volume). This is several times smaller than a bacterium and 10,000,000 times smaller than a car.

Working with modular “building blocks” of this size would allow almost anything to be designed and built, but the blocks would be too big to do the kind of molecular manipulation that is necessary for nanotech manufacturing or to participate in biochemical reactions. A single block could contain a tiny motor or a computer, allowing products to be powered and responsive. As long as no block contained machinery to do mechanochemistry, the designer could not create a new kind of nanofactory.

Once designed and built, a nanotech product could be used by consumers just like a steel or plastic product. Of course, some products, such as cars, knives, and nail guns, are dangerous by design, but this kind of danger is one that we already know how to deal with. In the United States, Underwriter's Laboratories (UL), the Food and Drug Administration, and a host of industry and consumer organizations work to ensure that our products are as safe as we expect them to be. Nanotech products could be regulated in the same way. And if a nanofactory could only make approved products, it could be widely distributed, even for home use, without introducing any special nanotech risks.

Nanofactory Technology: Regulating Risk, Preserving Benefit

It is generally assumed, incorrectly, that devices built with nanotechnology must be quite small. This has led to fears that nanotech manufacturing systems will be hard to control and easy to steal. In fact, as analyzed by Drexler and others in the field, the products of nano-scale mechanochemical plants can be attached together within the enclosure of a single device. Small building blocks can be joined to make bigger blocks; these blocks can be joined with others, and so on to form a product. This process is called convergent assembly, and it allows the creation of large products from nano-scale parts. In particular, convergent assembly will allow one nanofactory to build another nanofactory. There is no need to use trillions of free-floating assembler robots; instead, the assemblers are securely fastened inside the factory device, where they feed the smallest conveyor belts. A typical nanofactory might be the size of a microwave oven. Since the assemblers are fastened into the factory and dependent on its power grid, they have no need to navigate around the product they are building—this improves efficiency—and they have no chance of functioning independently. In addition, the entire nanofactory can be controlled through a single interface, which allows restrictions to be built into the interface. It can simply refuse to produce any product that has not been approved. (The improved security of tethered nanotech factories has been a theme in at least one work of science fiction12.)

If a nanofactory will only build safe products, and will refuse to build any product that has not been approved as safe, then the factory itself can be considered safe. It could even build a duplicate nanofactory on request. With the restrictions built in, the second one would be as safe as the first. As long as the restrictions work as planned, there is no risk of gray goo, no risk of undesirable weapons or unapproved products, and no risk of producing unrestricted nanofactories that could be used to make bad products.

At the same time, products that were approved could be produced in any quantity desired. The products could even be customized, within limits—and the limits could be quite broad, for some kinds of products. If desired, the nanofactories (and the products) could have tracking devices built in to further deter inappropriate use.

With nanofactories that can only produce approved designs, the safety of nanotech manufacturing does not depend on restricting the use of the factories. Instead, it depends on choosing correctly which products to approve. The nanofactory itself, as a product, can be approved for unlimited copying. This means that the abundant, cheap, and convenient production capability of advanced nanotechnology can be achieved without the risks associated with uncontrolled nanotech manufacturing. A two-dimensional view of the risks of nanotechnology, which separates the means of production from the products, allows the design and implementation of policy that is minimally restrictive, yet still safe.

Using Nanotechnology Safely

A safe nanofactory design must build approved products, while refusing to build unapproved products. It must also be extremely tamper-resistant; if anyone found a way to build unapproved products, they could make an unrestricted, unsafe nanofactory, and distribute copies of it. The product approval process must also be carefully designed, to maximize the benefits of the technology while minimizing the risk of misuse. Restricted nanofactories avoid the extreme risk/benefit tradeoff of other nanotech administration plans, but they do require competent administration.

One way to secure a nanofactory is to build in only a limited number of safe designs. The user could ask it to produce any one of those designs, but with no way to feed in more blueprints, the factory could never build anything else. This simple scheme is fairly reliable, but not very useful. It also poses the risk that someone could take apart the factory and find a way to reprogram its design library.

A more useful and secure scheme would be to connect the nanofactory to a central controller, and require it to ask for permission each time it was asked to manufacture something. This would allow new designs to be added to the design library after the nanofactory was built. In addition, the nanofactory would have to report its status back to the central controller. The system could even be designed to require a continuous connection; a factory disconnected from the network would permanently disable itself.

This would greatly reduce the opportunity to take the factory apart, since it could report the attempt in real time, and failed attempts would result in immediate arrest of the perpetrator. This permanent connection would also allow the factory to be disabled remotely if a security flaw were ever discovered in that model. Finally, a physical connection would allow the location of the factory to be known, and jurisdictional limits to be imposed on its products.

Current cryptographic techniques permit verification and encryption of communication over an unsecured link. These are used in smart cards and digital cellular phones, and will soon be used in digital rights management13. Using such techniques, each nanofactory would be able to verify that it was in communication with the central library. Only designs from the library could be manufactured. In addition, each design could come with a set of restrictions. For example, medical tools might only be manufactured at the request of a doctor. Commercial designs could require payment from a user. Designs under development could be manufactured only by the inventor, until they were approved and released. A design that did not come from the central library would not have the proper cryptographic signature, and the factory would simply refuse to build it.

Product Design Parameters

Rapid innovation is a key benefit of nanotechnology. The rapid and flexible manufacturing process allows a design to be built and tested almost immediately. Because designers of nano-built products do not have to do any actual nanotech research, a high level of innovation can be accommodated without giving designers any access to dangerous kinds of products. As mentioned above, a design with billion-atom, submicron blocks— permitting specification of near-biological levels of complexity—would still pose no risk of illicit selfreplication. The minimum building block size in a design could be restricted by the design system. A fully automated evaluation and approval process could also consider the energy and power contained in the design, its mechanical integrity, and the amount of computer power built in. The block-based design system provides a simple interface to the block-based convergent assembly system. A variety of design systems could be implemented using the same nanofactory hardware, and the designer would not have to become an expert on the process of construction to create buildable designs.

With a safe-design nanofactory, adults—and even children—could safely play with advanced robotics, inventing and constructing almost anything they could imagine.

(Today, adults as well as children find it worthwhile to play with the Lego MindStorms™ system14.) More powerful products would require an engineering certification. This could be given to any responsible adult, since even a malicious product engineer would be unable to bypass the factory's programming and cause it to make illicit fabricators. A product that included chemical or nanomechanical manipulation ability would have to be carefully controlled, even during the design phase, to prevent the designer from building something that could be used for illicit nanomanufacturing. Risks and dangers associated with products could be assessed on a per-product basis. Many products, produced with simplified design kits, could be approved with only automated analysis of their design. Most others could be approved after a safety and efficacy assessment similar to today's approval processes. Only rarely would a new degree of nanotechnological functionality be required, so each case could be carefully assessed before the functionality was added to appropriately restricted design programs. Product approval for worldwide availability could depend on any of several factors. First, unless designed with a child-safe design program, it could be evaluated for engineering safety. Second, if the design incorporated intellectual property, the owner of the property could specify licensing terms. Third, local jurisdictional restrictions could be imposed, tagging the file according to where it could and could not be manufactured. Finally, the design would be placed in the global catalog, available for anyone to use.

Conclusion

Nanotechnology offers the ability to build large numbers of products that are incredibly powerful by today's standards. This possibility creates both opportunity and risk. The problem of minimizing the risk is not simple; excessive restriction creates black markets, which in this context implies unrestricted nanofabrication. Selecting the proper level of restriction is likely to pose a difficult challenge.

This paper describes a system that allows the risk to be dealt with on two separate fronts: control of the nanotech manufacturing capacity, and control of the products. Such a system has many advantages. A wellcontrolled manufacturing system can be widely deployed, allowing distributed, cheap, high-volume manufacturing of useful products and even a degree of distributed innovation. The range of possible nanotechbuilt products is almost infinite. Even if allowable products were restricted to a small subset of possible designs, it would still allow an explosion of creativity and functionality. Preventing a nanofactory from building unapproved products can be done using technologies already in use today. It appears that the nanofactory control structure can be made virtually unbreakable. Product approval, by contrast, depends to some extent on human institutions. With a block-based design system, many products can be assessed for degree of danger without the need for human intervention; this reduces subjectivity and delay, and allows people to focus on the few truly risky designs.

In addition to preventing the creation of unrestricted nanotech manufacturing devices, further regulation will be necessary to preserve the interests of existing commercial and military institutions. For example, the effects of networked computers on intellectual property rights have created concern in several industries15, and the ability to fabricate anything will surely increase the problem. National security will demand limits on the weapons that can be produced.

Forthcoming papers will give recommendations for a multi-purpose system of administration that preserves commercial rights and security imperatives, while still allowing humanitarian and innovative use.

This paper has outlined a scenario for the safe development and use of advanced nanotechnological manufacturing. Unrestricted nanotech manufacturing creates several high-stakes risks. The use of a restricted nanofactory design that is safe for widespread deployment can mitigate some of these risks, and other risks can be dealt with piecemeal by making many low-stakes decisions about the factory's products. Careful attention must be paid to security during the initial nanofactory development, and wise administration must be implemented to prevent both undesired products and pressure for black markets or independent development. With these caveats, however, the system presented here preserves almost all the benefits of unrestricted nanotechnology while greatly reducing the associated risks.

# F/L—Case

## 1AR—XT: CASE

#### XT War—Nanoweapons collapse deterrence and lead to global war more destructive than nuclear war. Plan solves by prohibiting the weapons before they can be implemented.

#### XT Arms Racing—Nanoweapons proliferation is happening now and leads to numerous world ending escalation scenarios. Plan solves by prohibiting the weapons before they can be implemented.

#### XT Terrorism—Nanoweapon terrorism is imminent. It’s undetectable and coming now and is the likeliest scenario for extinction. Plan solves by prohibiting the weapons before they can be implemented.

#### XT Self Replication—Nanoweapon development gets out of control and leads to self-replication—that outcompetes natural flora that destroys the biosphere and causes extinction. Plan solves by prohibiting the weapons before they can be implemented.

#### XT Chemical Warfare—Nanoweapon use leads to incentives for chemical warfare—that ends life on earth. Plan solves by prohibiting the weapons before they can be implemented.

## 1AR—AT: Impact Turn

### 1AR—Toplevel

#### Framing issue is that we don’t end all nanotech—we just ban the usage and production of it for autonomous weaponry which doesn’t affect nanotech related to [1NC Impacts].

### --AT: Medical Nanotech

#### Even if it has potential, medical nanotech goes badly wrong.

[Catharine Paddock Ph.D. (5-4-2012), Ph.D. from Manchester Business School, writer for Medical News Today, “Nanotechnology In Medicine: Huge Potential, But What Are The Risks?”, MedicalNewsToday, [https://www.medicalnewstoday.com/articles/244972#What-of-the-Future-and-Concerns-Surrounding-Nanomaterials?]//SLC](https://www.medicalnewstoday.com/articles/244972#What-of-the-Future-and-Concerns-Surrounding-Nanomaterials?]//CHS) PK

But, there are also concerned parties, who highlight that while the pace of research quickens, and the market for nanomaterials expands, it appears not enough is being done to discover their toxicological consequences.

This was the view of a science and technology committee of the House of Lords of the British Parliament, who in a recent report on nanotechnology and food, raise several concerns about nanomaterials and human health, particularly the risk posed by ingested nanomaterials.

For instance, one area that concerns the committee is the size and exceptional mobility of nanoparticles: they are small enough, if ingested, to penetrate cell membranes of the lining of the gut, with the potential to access the brain and other parts of the body, and even inside the nuclei of cells.

Another is the solubility and persistence of nanomaterials. What happens, for instance, to insoluble nanoparticles? If they can’t be broken down and digested or degraded, is there a danger they will accumulate and damage organs? Nanomaterials comprising inorganic metal oxides and metals are thought to be the ones most likely to pose a risk in this area.

Also, because of their high surface area to mass ratio, nanoparticles are highly reactive, and may for instance, trigger as yet unknown chemical reactions, or by bonding with toxins, allow them to enter cells that they would otherwise have no access to.

For instance, with their large surface area, reactivity and electrical charge, nanomaterials create the conditions for what is described as “particle aggregation” due to physical forces and “particle agglomoration” due to chemical forces, so that individual nanoparticles come together to form larger ones. This may lead not only to dramatically larger particles, for instance in the gut and inside cells, but could also result in disaggregation of clumps of nanoparticles, which could radically alter their physicochemical properties and chemical reactivity.

“Such reversible phenomena add to the difficulty in understanding the behaviour and toxicology of nanomaterials,” says the committee, whose overall conclusion is that neither Government nor the Research Councils are giving enough priority to researching the safety of nanotechnology, especially “considering the timescale within which products containing nanomaterials may be developed”.

They recommend much more research is needed to “ensure that regulatory agencies can effectively assess the safety of products before they are allowed onto the market”.

It would appear, therefore, whether actual or perceived, the potential risk that nanotechnology poses to human health must be investigated, and be seen to be investigated. Most nanomaterials, as the NCI suggests, will likely prove to be harmless.

But when a technology advances rapidly, knowledge and communication about its safety needs to keep pace in order for it to benefit, especially if it is also to secure public confidence. We only have to look at what happened, and to some extent is still happening, with genetically modified food to see how that can go badly wrong.

### --AT: Gaudin

#### Their author concedes that it could just as easily be harmful—here’s the part of their evidence they don’t read.

**Gaudin 9** (Sharon Gaudin is a science writer at Worcester Polytechnic Institute and an experienced technology reporter. Citing Ray Kurzweil, received the 1999 National Medal of Technology and Innovation, the United States' highest honor in technology, inducted into the National Inventors Hall of Fame, established by the U.S. Patent Office, received 21 honorary doctorates, BS in Computer Science from MIT. <KEN>"Nanotech could make humans immortal by 2040, futurist says," Computerworld. October 1, 2019. DOA: 1/1/20. [https://www.computerworld.com/article/2528330/nanotech-could-make-humans-immortal-by-2040--futurist-says.html)//SLC](https://www.computerworld.com/article/2528330/nanotech-could-make-humans-immortal-by-2040--futurist-says.html%29//CHS) PK

But that doesn't mean there aren't parts of this future that don't worry him. With nanotechnology so advanced that it can travel through our bodies and affect great change on them, come dangers as well as benefits.

The nanobots, he explained, will be self-replicating and engineers will have to harness and contain that replication.

"You could have some self-replicating nanobot that could create copies of itself... and ultimately, within 90 replications, it could devour the body it's in or all humans if it becomes a non-biological plague," said Kurzweil. "Technology is not a utopia. It's a double-edged sword and always has been since we first had fire."

### --AT: Immortality

#### This is irrelevant—nanoweapons cause extinction in the late 2020s and 2030s before immortality—1AC Del Monte.

### --AT: Hypersonics

#### Hypersonics increase the chances of a first strike and destroy deterrence.

Simon 20 [Steven Simon is an analyst at the Quincy Institute and teaches international relations at Colby College.] The New York Times, January 2th, 2020, “Hypersonic Missles are a Game Changer,
<https://www.nytimes.com/2020/01/02/opinion/hypersonic-missiles.html>, VM

**“**The United States has been developing its own hypersonic program, under the project name Prompt Global Strike. But the Russians got there first because they’ve made hypersonics a priority: They offset Russia’s inability to sustain an expansive high-tech military infrastructure, and they represent a direct response to Donald Trump’s withdrawal from the Intermediate-Range Nuclear Forces Treaty. Mr. Trump withdrew presumably so America could develop stronger defenses against a nuclear attack; with the Avangard in its arsenal, Russia doesn’t have to worry too much about penetrating whatever defenses the American military had in mind. It gets worse. China, India, France and others are all developing similar weapons. The age of hypersonics, when even medium-size powers can deliver unstoppable damage on an American (or Russian, or Chinese) city, is a whole new game. For starters, hypersonics change the way we think about crisis management. Suppose the United States detected an adversary’s launch of a missile — or mistakenly thought it had detected a launch, as American authorities had actually done in January 2018. At a moment like this, the stakes are high, and the time frame for decision making is extremely compressed. Throw in exhaustion, intense emotions and uncertainty about the other side’s intentions, and you have a seriously volatile situation. If the contending parties are armed with hypersonic missiles, the time frame for deciding what to do is even shorter, and the uncertainty about what your enemy is targeting and the nature of an incoming warhead — is it nuclear or conventional? — is virtually total. In such a situation, the overwhelming incentive is to shoot first. Think of two gunslingers in a dark room. Moreover, hypersonics are a weaponized moral hazard for states with a taste for intervention, because they erase barriers to picking fights. Is an adversary building something that might be a weapons factory? Is there an individual in an unfriendly country who cannot be apprehended? What if the former commander of Iran’s Revolutionary Guards, Qassim Suleimani, visits Baghdad for a meeting and you know the address? The temptations to use hypersonic missiles will be many. Hypersonics also push us toward a slippery slope. They blur the line between conventional and strategic weapons, and their easy, justifiable use — say, to kill a single terrorist leader in a crowded city — could make it easier to accept their widespread use, with much more destructive consequences. Hypersonics might look like just a zoomier version of existing weapons, but in fact they are game-changing. When the United States used nuclear weapons against Japan, they were thought to be a dramatic advance on bombs already in use, even those used to generate firestorms that had already devoured the cities of Germany and Japan. It was not until later that they were understood to be categorically different and ultimately too destructive to use. If past is prologue, deployment of the systems is going to take place well before their ramifications are fully understood. By 1950, as the Chinese Army was overrunning American and South Korean forces, the Truman administration had already grasped the dilemmas intrinsic to nuclear weapons; the Soviet detonation of a hydrogen bomb a few years later drove the lesson home. But between the exuberance of acquiring a new military capability and the sobering realization of its dangers, there is plenty of opportunity to use them. As someone who worked on counterterrorism on the National Security Council staff, I feel my pulse racing just to consider these possibilities. I’ve been in too many situations where I know hypersonics would have been compellingly presented as the best possible response. The allure of such a weapon would be nearly irresistible. The biggest threat from hypersonics is that they come at a time when the world’s arm control treaties are falling apart. We need a multilateral agreement to limit hypersonic arsenals and their use, but unfortunately, the United States, which would have to take the lead in orchestrating the negotiation of such an agreement, is uninterested in any deals that might tie its hands.”

#### Hypersonics create use or lose pressures that destroy crisis stability.

Aarten 20 [S. R. Aarten “*The impact of hypersonic missiles on strategic stability*” Published: Militaire Spectator, April 21, 2020; Accessed: February 10, 2021] [<https://www.militairespectator.nl/thema/strategie/artikel/impact-hypersonic-missiles-strategic-stability>] [Aarten: PhD researcher in deterrence and stability at the Faculty of Military Sciences of the Netherlands Defense Academy. Senior policy officer Innovation and Adaptivity at the Netherlands Defence College.] [Brackets in original] || श्री || Recut VM

Deterrence is an influencing strategy involving threats of the use of force to manipulate behaviour in such a way that an opponent refrains from taking action. Deterrence stability, then, is often understood as a classic balance-of-terror, which is reached when two or more powers are equally capable of inflicting such levels of damage upon each other that it becomes unappealing to initiate an attack.[32] This balance can be tilted through the introduction of offsetting capabilities, such as new technologies and doctrines. The US/NATO missile shield in Poland and Romania as well as the introduction of the THAAD missile defence system in South Korea briefly tilted the balance of terror in favour of the US. To counter this move, Russia and China invested heavily in A2/AD-capabilities. Hypersonic weapons buttress this capability. In both regions, the US and its allies do not have the means to counter this capability.[33] This affects US power projection abilities, making it more difficult to reassure its allies in the region which rely on its extended deterrent. In the Pacific region, for example, the deployment of aircraft carriers and troops becomes more costly (in terms of vulnerability). With hypersonic weapons, Russia and China reinforce their ability to manipulate US behaviour because it raises the costs of retaliation.[34] According to existing theory, stability restores as soon as actors in a contesting relationship possess equivalent capabilities. This logic, however, stems from the bipolar context of the Cold War that fits uneasily in a system where multiple great powers are competing for their own share of (regional) hegemony. The continuous action-reaction cycle between multiple actors makes the management of stability more difficult than in bipolar systems. Additionally, even under conditions of parity, the speed and precision of hypersonic weapons (and the lack of defences against them) continue to leave open the option of a decapitating first strike. Such developments are inherently destabilising because they invite pre-emptive strategies, launch-on-warning policies and create a dynamic in which competitors continue to seek ways to offset each other’s capabilities. Moreover, if deterrence were stable, contestants would not feel the need to react and counter-react on their pursuit of hypersonic weapons. Crisis stability If deterrence is unstable, crisis stability is all the more important. Crisis stability refers to the extent to which crises may escalate into actual conflict. Escalation can be intentional or unintentional (‘inadvertent’): conflict as a result of calculated decision-making vis-à-vis conflict as a result of accidental, undeliberate events. Intentional escalation is the result of a contemplated decision which requires time to think through the scenarios and risks involved. Hypersonic weapons, however, compress the decision-making time to minutes[35] – assuming that a launch has been spotted from the earliest stage. This promptness and ability to penetrate through enemy air defences give hypersonic weapons an appealing first-mover advantage, for example, by taking out an enemy’s C4ISR nodes. What results may be a classic ‘use-or-lose scenario’: when a state feels that it is under threat of a decapitating strike, it may seek to pre-empt or even prevent the threat by taking it out before it materializes. What is more, Russian and Chinese hypersonic missiles can be fitted with both nuclear and conventional warheads. Thus, when a hypersonic weapon launch is detected, decision-makers cannot be certain about the type of warhead that has been fitted on these projectiles. Compounding the problem of this dual-use capability is the fact that both the Russian and Chinese armed forces have integrated nuclear and conventional missiles under the same command. Such ‘entanglement’ makes it difficult to discriminate between a nuclear or conventional threat – even with an effective early warning system.[36]

#### Target ambiguity from emerging hypersonics ensure escalation.

Klare 19 [Michael T. Klare “*An ‘Arms Race in Speed’: Hypersonic Weapons and the Changing Calculus of Battle*” Published: Arms Control Association, June 2019; Accessed: February 10, 2021] [https://www.armscontrol.org/act/2019-06/features/arms-race-speed-hypersonic-weapons-changing-calculus-battle] [Klare: Professor emeritus of peace and world security studies at Hampshire College. B.A. and M.A. from Columbia; Ph.D. from the Graduate School of the Union Institute] || श्री || Recut VM

Some analysts fear that the mere possession of such weapons might induce leaders to escalate a military clash at the very outbreak of a crisis—believing their early use will confer a significant advantage in any major engagement that follows—while reducing the chances of keeping the fighting limited. It is easy to imagine, for example, how a clash between U.S. and Chinese naval vessels in the South China Sea, accompanied by signs of an air and naval mobilization on either or both sides, might prompt one combatant to launch a barrage of hypersonic weapons at all those ships and planes and their command-and-control systems, hoping to prevent their use in any full-scale encounter. This might make sense from a military perspective, but would undoubtedly prompt a fierce counterreaction from the injured side and restrict efforts to halt the fighting at a lower level of violence. The introduction of hypersonic weapons also raises concerns over the escalation from conventional to nuclear warfare. The United States has focused primarily on the development of hypersonic weapons carrying conventional warheads, but there is no fundamental reason why they could not be nuclear armed. Indeed, Russia’s Avangard missile is intended to deliver a nuclear warhead, and it is assumed that China’s DF-ZF is also designed with this in mind.

This leads to what is called “warhead ambiguity”: the risk that a defending nation, aware of an enemy’s hypersonic launch and having no time to assess the warhead type, will assume the worst and launch its own nuclear weapons.13 Concern over this risk has led the U.S. Congress to bar funding for the development of ICBM-launched hypersonic glide vehicles, thereby helping to propel the Pentagon’s shift away from such systems and toward the development of medium-range weapons more suitable for use in a regional context. Nevertheless, warhead ambiguity will remain a feature of any future landscape involving the deployment of multiple hypersonic weapons, as a defender will never be certain that an enemy’s assault is entirely non-nuclear. With as little as five minutes to assess an attack—the time it would take a hypersonic glide vehicle to traverse 2,000 miles—a defender would be understandably hard pressed to avoid worst-case assumptions.

Equally worrisome is the danger of “target ambiguity”: the possibility that a hypersonic attack, even if conducted with missiles known to be armed only with conventional warheads, would endanger the early-warning and command-and-control systems a defender uses for its nuclear and conventional forces, leading it to fear the onset of a nuclear attack. This is especially dangerous in light of what James Acton, a security analyst at the Carnegie Endowment for International Peace, calls the “entanglement” problem. Although almost everything involving nuclear decision-making is secret, the nuclear and conventional command-and-control systems of the major powers are widely assumed to be interconnected, or entangled, making it difficult to clearly distinguish one from another. Therefore, any attack on command-and-control facilities at the onset of crisis, however intended, could be interpreted by the defender as a prelude to a nuclear rather than a conventional attack and prompt the defender to launch its own nuclear weapons before they are destroyed by an anticipated barrage of enemy bombs and missiles.14

### --AT: Warming Generic

#### Reliance on new AI tech to solve warming only delays real meaningful action and undermines commitment.

[Lancaster University (4-20-20), Lancaster University is a collegiate public research university in Lancaster, Lancashire, England, Why relying on new technology won't save the planet, ScienceDaily, [https://www.sciencedaily.com/releases/2020/04/200420125510.htm]//SLC](https://www.sciencedaily.com/releases/2020/04/200420125510.htm%5D//CHS) PK

Overreliance on promises of new technology to solve climate change is enabling delay, say researchers from Lancaster University.

Their research published in Nature Climate Change calls for an end to a longstanding cycle of technological promises and reframed climate change targets.

Contemporary technological proposals for responding to climate change include nuclear fusion power, giant carbon sucking machines, ice-restoration using millions of wind-powered pumps, and spraying particulates in the stratosphere.

Researchers Duncan McLaren and Nils Markusson from Lancaster Environment Centre say that: "For forty years, climate action has been delayed by technological promises. Contemporary promises are equally dangerous. Our work exposes how such promises have raised expectations of more effective policy options becoming available in the future, and thereby enabled a continued politics of prevarication and inadequate action.

"Prevarication is not necessarily intentional, but such promises can feed systemic 'moral corruption', in which current elites are enabled to pursue self-serving pathways, while passing off risk onto vulnerable people in the future and in the global South.

The article describes a history of such promises, showing how the overarching international goal of 'avoiding dangerous climate change' has been reinterpreted and differently represented in the light of new modelling methods, scenarios and technological promises.

The researchers argue that the targets, models and technologies have co-evolved in ways that enable delay: "Each novel promise not only competes with existing ideas, but also downplays any sense of urgency, enabling the repeated deferral of political deadlines for climate action and undermining societal commitment to meaningful responses.

They conclude: "Putting our hopes in yet more new technologies is unwise. Instead, cultural, social and political transformation is essential to enable widespread deployment of both behavioural and technological responses to climate change."

#### Turn – nanoparticles are terrible for the environment and increase atmospheric warming.

Slezacova et al 13 [Klára Slezáková currently works at the Departamento de Engenharia Química, University of Porto. Klára does research in Environmental Sciences and in Public Health. Her work focuses on air pollution and its environmental and health impacts with emphasis on particulate and carcinogenic pollutants. Currently, her research areas include ultrafine particles and novelty exposure methods (biomonitoring assays), both from occupational and public health perspective, and the assessment of healthy life style. Klára has authored and co-authored 35 articles in international journals, with 30% of papers published in journals ranking as "TOP 10". The most recent publication is "Indoor air quality in health clubs: Impact of occupancy and type of performed activity"] May 15th, 2013, “Atmospheric Nanoparticles and Their Impacts on Public Health,” <https://www.intechopen.com/books/current-topics-in-public-health/atmospheric-nanoparticles-and-their-impacts-on-public-health>, VM

“Climate system, atmospheric chemistry and even life on the Earth are dependent on solar radiation (Boubel et al., 1994). Approximately 30% of the incoming solar energy is reflected back to space. The remaining 70% is absorbed by the surface–atmosphere system of the Earth. This energy heats the planet and the atmosphere. As the surface and the atmosphere become warm, they release the energy in form of infrared radiation. This process continues until the incoming solar energy and the outgoing heat radiation are in balance. This radiation energy balance provides a powerful constraint for the global average temperature of the planet (Ramanathan & Feng, 2009). Atmospheric greenhouse gases (such as like carbon dioxide and methane) and particles affect the climate by altering the incoming solar and outgoing thermal radiations. In other words changing the atmospheric abundance or properties of these gases and particles can lead to a warming or cooling of the climate system. The influence of a factor (pollutant) that cause change of climate system are typically evaluated in terms of its radiative forcing, which is an estimate of how the energy balance of the Earth-atmosphere system is influenced when the factor in question is altered (IPCC, 2007). Atmospheric nanosized particles are the main precursors of larger particles. They promote their growth and modify the optical properties thus affecting the radiative properties of the atmosphere. It was generally believed that particles reflect sunlight back to space before it reaches the surface, and thus contribute to a cooling of the surface (i.e. negative radiative forcing; Monks et al., 2009). During time as the concentrations of particles increased (along with greenhouse gases) their cooling effect has masked some of the greenhouse warming (Ramanathan & Feng, 2009). This masking effect could be relative large considering that estimated negative radiative forcing of particles is –1.2 W m-2 compared with +2.63 W m-2 for greenhouse gases (+1.66 W m-2 for carbon dioxide, +0.48 W m for methane and +0.16 W m-2 for nitrous oxide, +0.34 W m-2 for halocarbons; IPCC, 2007). However, in the last years the view of particle role in climate change has deepened. It was found that atmospheric particles may also enhance scattering and absorption of solar radiation thus causing direct warm-up (i.e. positive radiation; IPPC, 2007). Especially, carbonaceous particles are considered as one of the major contributors to global warming (i.e. +0.34 W m-2); if they are coated with sulphate or organic compounds their radiative forcing can increase up to about +0.6 W m-2 (Kumar et al., 2010). Indirectly nanoparticles can also cause a negative radiative forcing through changes in cloud formations and properties (IPCC, 2007). They can act as cloud condensation nuclei and modify size and number concentrations of cloud droplets. In clean air, clouds are composed of a relatively small number of large droplets. As a consequence, the clouds are somewhat dark and translucent. In polluted air with high concentrations of particles (such as urban areas) water can easily condense on the particles, creating a large number of small droplets. These clouds are dense, very reflective, and bright white. Due to the decrease of the size of water droplets these clouds are less efficient at releasing precipitation. They cause large reductions in the amount of solar radiation reaching Earth’s surface, a corresponding increase in atmospheric solar heating, changes in atmospheric thermal structure, surface cooling, disruption of regional circulation systems such as the monsoons, suppression of rainfall, and less efficient removal of pollutants (Ramanathan & Feng, 2009). In general the indirect effects of particles are only partially understood. The interactions between aerosol particles (natural and anthropogenic in origin) and clouds are complex and most instruments cannot measure aerosols within the clouds. Climatologists thus consider the role of clouds to be the largest single uncertainty in climate prediction.”

#### Turn - Diesel soot, a nanoparticle, largely contributes to global warming.

University of Maryland ND [Research at the University of Maryland - Michael Zachariah works with the National Institute of Standards and Technology to measure nanoparticles precisely and catalog their effects on everything from individual cells to the environment. Specific and consistent manufacturing and measuring are critical for determining the properties of nanoparticles, including toxicity factors and side effects.] <https://research.umd.edu/sites/default/files/documents/brochures/health-effects-nanoparticles.pdf> VM

“Michael Zachariah manages the NM2 , which makes, measures, and characterizes nanoparticles, including those with special bio-medical properties. For example, the laboratory characterizes carbon nanotubes and gold nanoparticles, both used for diagnostics and targeted drug delivery. As more materials such as these are created, manipulated, and then manufactured on a large scale, questions of safety become increasingly important. NM2 therefore develops research protocols needed to standardize toxicology for nanotechnology research. No one yet understands the health impact of nanoparticles, and no research team is better positioned than Zachariah’s to establish industry standards for investigating toxicity. Zachariah’s work supports innovations across the spectrum of nano-based health applications. He characterizes pathogens, runs tests for optimizing drug dosages, synthesizes aerosol materials with unique properties, develops thin film deposition methods, improves nano-based modeling devices that facilitate gasto-particle conversion, and creates technologies to study cellular reactions to nanoparticles in real time. Yet another health application Zachariah examines is the effect of diesel soot on the environment. Diesel soot, a nanoparticle that appears to contribute significantly to global warming, contains metal traces that might be manipulated to prevent its release into the atmosphere. Zachariah’s research provides data for computer models that measure and predict global warming**. “**

#### Effective control of soot, not carbon dioxide, is key to solve climate change.

Levy 01 [Dawn Levy is a science writer for Stanford Report at Stanford University.] “Diesel soot added to list of global warming culprits,” December 12th, 2001, <https://news.stanford.edu/news/2001/december12/agudiesel-1212.html#:~:text=Soot%20may%20be%20the%20second,of%2050%20to%201%2C000%20years>, VM

“Why is soot worse than greenhouse gases like carbon dioxide and methane? A particle made primarily of elemental black carbon, soot warms the air by absorbing sunlight and radiating the heat to the air. Greenhouse gases, in contrast, do not absorb sunlight; they warm the air by absorbing the Earth's heat and radiating it to the air. Soot does this as well. Soot may be the second-leading cause of global warming after carbon dioxide, says Jacobson. But controlling soot will cool climate faster than will controlling carbon dioxide because soot has a very short lifetime in the air -- weeks to months -- whereas carbon dioxide has a lifetime of 50 to 1,000 years. That means soot leaves the atmosphere quickly and no longer has a warming effect.”

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### --AT: Nano Carbon Capture

#### CCS worsens pollution – new study

**Vorrath 19** Sophie Vorrath [Sophie is editor of One Step Off The Grid and deputy editor of its sister site, Renew Economy. Sophie has been writing about clean energy for more than a decade], 10-29-2019, "Carbon capture technology could make pollution worse, says Stanford report," RenewEconomy, <https://reneweconomy.com.au/carbon-capture-technology-could-make-pollution-worse-says-stanford-report-34071/> // ash

There is no shortage of research questioning the credibility of carbon capture and storage as an effective tool in the fight against climate change, but a new report out of America’s Stanford University goes one step further, arguing that adding CCS to coal plants could be worse than having none at all.

The research, by Professor Mark Jacobson, compares the data from a coal plant with carbon capture and use (CCU) and a plant that removes carbon from the air directly (synthetic direct air carbon capture and use, or SDACCU), both of which use gas to power the carbon capture technology.

It finds that both of the plants either increase or hold constant their contributions to air pollution and reduce little more than 10 per cent of carbon emissions, before even considering sequestration or fugitive emissions.

And then there are the other drawbacks of the technology, including the high social cost of unfettered pollution and the high financial cost of installing the equipment.

“All sorts of scenarios have been developed under the assumption that carbon capture actually reduces substantial amounts of carbon,” said Jacobson.

“However, this research finds that it reduces only a small fraction of carbon emissions, and it usually increases air pollution.

“Even if you have 100 percent capture from the capture equipment, it is still worse, from a social cost perspective, than replacing a coal or gas plant with a wind farm because carbon capture never reduces air pollution and always has a capture equipment cost.”

On the other hand, he adds, “wind replacing fossil fuels always reduces air pollution and never has a capture equipment cost.”

The report is not alone in slamming the door on CCS as an effective carbon “escape route” for countries like Australia that wish to keep their coal fires burning. There have been many.

One, published late last year from consultancy Lazard, estimated that energy from an integrated gasification combined-cycle (IGCC) plant with carbon capture would cost $US231 per megawatt hour (MWh), far more expensive than both solar and wind generation.

But the data from Jacobson is damning about the ability of the technology to do its “one job” of preventing carbon from getting into the atmosphere in the first place. According to the data, the carbon captured at the two plants amounts to around 10-11 per cent of overall emissions produced, averaged over 20 years.

This is in stark contrast to some of the more optimistic and common estimates of carbon capture technologies, the report notes – including those bandied about by some of Australia’s top politicians – of around 85-90 per cent of emissions.

The research also looks at the social cost of carbon capture – including air pollution, potential health problems, economic costs and overall contributions to climate change – and finds it hardly an improvement at all on a coal plant without the technology.

Even when the capture equipment is powered by renewable electricity, Jacobson concluded that it is always better to use the renewable electricity instead to replace coal or natural gas electricity or to do nothing, from a social cost perspective.

“The low net capture rates are due to uncaptured combustion emissions from natural gas used to power the equipment, uncaptured upstream emissions, and, in the case of CCU, uncaptured coal combustion emissions,” the report says.

“Moreover, the CCU and SDACCU plants both increase air pollution and total social costs relative to no capture.”

#### Carbon capture can’t remove CO2 from ambient air and disposal causes earthquakes and CO2 leakage

CDR = Carbon Dioxide Removal

NRC 15 – National Research Council, Marcia K. Mcnutt (Chair), Science, Washington, DC, PhD in Earth Sciences, Scripps Institution of Oceanography, Waleed Abdalati, Ph.D, Geography, University Of Colorado, Boulder, former NASA Chief Scientist, Ken Caldeira, Carnegie Institution For Science, Stanford, California, Ph.D in Atmospheric Sciences in 1991 from the New York University Department of Applied Science, Scott C. Doney, Woods Hole Oceanographic Institution, Massachusetts, Paul G. Falkowski, Rutgers, The State University Of New Jersey, New Brunswick, Steve Fetter, University Of Maryland, College Park, James R. Fleming, Colby College, Waterville, Maine, Steven P. Hamburg, Environmental Defense Fund, Boston, Massachusetts, M. Granger Morgan, Carnegie Mellon University, Pittsburgh, Pennsylvania, Joyce E. Penner, University Of Michigan, Ann Arbor, Raymond T. Pierrehumbert, University Of Chicago, Illinois, Philip J. Rasch, Pacific Northwest National Laboratory, Richland, Washington, Lynn M. Russell, Scripps Institution Of Oceanography, La Jolla, California, John T. Snow, University Of Oklahoma, Norman, David W. Titley, Pennsylvania State University, University Park, Jennifer Wilcox, Stanford University, California (“Climate Intervention: Carbon Dioxide Removal and Reliable Sequestration,” *The National Academies Press*, Committee on Geoengineering Climate: Technical Evaluation and Discussion of Impacts, Board on Atmospheric Sciences and Climate, Ocean Studies Board, Division on Earth and Life Studies, http://www.nap.edu/catalog/18805/climate-intervention-carbon-dioxide-removal-and-reliable-sequestration)

Other CDR approaches involve capturing CO2 from the atmosphere and disposing of it by pumping it underground at high pressure. These include bioenergy with carbon capture and sequestration (BECCS), which uses plants to remove the CO2 from the air, and direct air capture and sequestration (DACS), which includes various techniques to scrub CO2 directly from ambient air. Proposals to capture CO2 from the atmosphere have challenges and uncertainties including cost and maximum scale of feasible deployment. Removing CO2 from ambient air is more difficult than removing CO2 from the stack gas of power plants that burn conventional fuel or biomass because of its much lower concentration in ambient air; thus, it will involve higher costs in most circumstances. CDR approaches such as DACS and BECCS require reliable long-term disposal or sequestration of carbon to prevent its return to the atmosphere. Reliable disposal has challenges, environmental risks, and uncertainties, including cost, longterm monitoring, potential induced seismicity, and leakage.

#### Negative emissions is impossible

CDR = Carbon Dioxide Removal

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As discussed throughout this report, CO2 removal from the atmosphere can be enhanced using a range of approaches from biological to chemical. To remove enough CO2 from the atmosphere to offset a substantial fraction of today’s CO2 emissions represents a major challenge given available technology and physical constraints (e.g., available land for growing bioenergy feed stocks, and disposing of sequestered CO2). To take enough CO2 out of the atmosphere to cause atmospheric concentrations to markedly decrease would be extraordinarily difficult. The challenge is to capture climatically important amounts of CO2 out of the atmosphere, to sequester it reliably and safely, and to do this in a way that is economically feasible, environmentally beneficial, and socially, legally, and politically acceptable.

### --AT: Molecular Biofuel

#### RNG/biogas can’t produce enough energy, pollutes more, and is unreliable

Food and Water Watch 18. [Food & Water Watch mobilizes regular people to build political power to move bold & uncompromised solutions to the most pressing food, water, and climate problems of our time. We work to protect people’s health, communities, and democracy from the growing destructive power of the most powerful economic interests.] “FACT SHEET: Dirty Biogas Has No Place in the United States’ Clean Energy Future.” Food and Water Watch. December 11, 2018. <https://www.foodandwaterwatch.org/insight/dirty-biogas-has-no-place-united-states-clean-energy-future> TG

Biogas is dirty energy

Burning biogas releases greenhouse gases like carbon dioxide and other pollutants, including smog-forming nitrogen oxides, ammonia and hydrogen sulfide. In 2018, there were over 850 manure digesters and landfill plants producing electricity in the United States.

A Michigan digester that processed food waste to feed electricity into a municipal utility was permanently shut down in 2018 after complaints of foul smells. In October of that year, a Nebraska biogas facility riddled with environmental violations had its sixteenth lawsuit filed against it. Yet natural gas companies, such as SoCalGas and Pacific Gas and Electric Company, have promoted biogas as “renewable natural gas.” In 2018, Dominion Energy announced a joint venture with Smithfield Foods, the world’s largest hog producer, to use methane from hog manure in Dominion’s gas infrastructure.

Factory farm manure digesters: In 2018, there were 253 operating factory farm digesters across the United States using the manure from 1.1 million hogs, 1.4 million chickens and over 500,000 cows to power the electricity grid. Manure digesters have received government subsidies, but methane combustion emissions, methane leaks, accidental manure spills and explosions mean that digesters provide neither clean nor safe energy.

Between 2011 and 2014, a state-subsidized livestock biodigester in Wisconsin experienced an explosion of methane gas and pipeline breaks that caused three different manure spills, spewing more than 400,000 gallons of manure onto land and into waterways. Digester subsidies and on-farm power generation create incentives to expand the unsustainable, environmentally destructive and socially unjust factory farm food production system.

Landfill gas: There are over 600 landfill digesters in the United States, some with histories of water contamination, methane leaks and nitrogen oxide emissions. In 2011, a San Jose, California landfill digester faced an $882,200 fine for a chemical spill the previous year that contaminated a nearby creek with toxic pollutants. Despite drastic environmental impacts, landfill gas delivered a mere 0.3 percent of total U.S. electricity generation in 2016.

Digesters are expensive, inefficient and polluting, and they primarily generate power for the facilities themselves. Approximately two-thirds of the energy from sewage gas digesters and half of the energy from manure digesters may be needed to power the digesters themselves. The world’s largest sewage power facility — in Washington, D.C. — powers the digester but supplies only one-third of the complex’s energy needs.

Biogas has no place in a clean energy future

The natural gas industry pushes the “renewable natural gas” narrative to justify the expansion of fossil fuel infrastructure and to greenwash fracking. Proponents say that the supposedly clean biogas could be pumped into the existing natural gas pipeline network, further entrenching natural gas infrastructure. Methane from fracked gas or biogas is a potent greenhouse gas, nearly 90 times more powerful than carbon dioxide. Gas pipelines, storage facilities and other infrastructure leak tremendous volumes of methane that contribute to climate change. SoCalGas’ Aliso Canyon gas storage facility was the site of the worst methane leak in history, which displaced 8,000 families.

The fracking and natural gas industries are promoting biogas to greenwash their climate-destroying industry. Dirty biogas releases greenhouse gases and other air pollutants but generates little reliable power. Investing in natural gas infrastructure prolongs fossil fuel dependence, delays the shift to clean renewable energy and forestalls meaningful reductions in greenhouse gas emissions. It is time to invest in a just transition to a 100 percent, zero-emission, clean energy future.

### --AT: Space Colonization

#### Space colonization increases the chance of miscalculation and hacking, has functionally zero benefit, and would be impossible anyways.

Morton 18 [Adam Morton FRSC was a Canadian philosopher. Morton's work focused on how we understand one another's behaviour in everyday life, with an emphasis on the role mutual intelligibility plays in cooperative activity. He also wrote on ethics, decision-making, philosophy of language and epistemology.] “Colonizing Other Planets Could Trigger War on Earth,” November 22nd, 2018, <https://www.newsweek.com/colonizing-other-planets-could-trigger-war-earth-and-ecological-disaster-1226630>, VM

“Plans for the exploration and even colonization of other planets are very much in the air, and getting to Mars in particular has become a billionaire's hobby lately. [Elon Musk would like to establish a human colony on Mars](https://www.newsweek.com/elon-musk-sxsw-mars-spaceship-will-be-ready-first-flights-2019-840823) in a matter of decades. (For the foreseeable future—a century, I would venture—Mars will be the only real possibility.) But planetary colonies may be a bad idea, even a disastrous idea. So, it is important to see the arguments against them, as well as their appeal. I begin with a reason that is sometimes made central to proposals for colonies—the idea that we should achieve them as soon as it is feasible. It is a call for escape from imminent danger. The idea is that nuclear war, ecological catastrophe, or the rise of artificially intelligent robots, will wipe out humans on Earth. But a colony far away might survive, so that the species continues. [Stephen Hawking is among those who have argued, or usually just pronounced, for versions of this](https://www.newsweek.com/stephen-hawking-predicted-genetically-engineered-superhumans-could-destroy-1171801) (and if you want scientific authority, it is hard to do better). But the idea has serious flaws. It is hard to think of even a post-apocalyptic Earth that is less hospitable to any terrestrial life than Mars, let alone elsewhere in the solar system, so the challenges are enormous. But let us ignore that. Suppose that a colony had a reasonable chance of surviving, would the argument from danger justify founding it soon? I think not. One danger is nuclear and biological war: One nation or ethnic group fears or hates another enough to unleash bombs or viruses. In a bad scenario they succeed. Millions die, and their territory becomes uninhabitable. In the worst scenario, the other side retaliates or the affliction spreads and eventually everyone is dead. But people survive on Mars. Which people? They will include members of one group or their opponents, so if the aim really is to wipe out this group it will be directed at the colonists as well. They are hated, and they are capable of retaliation. Bomb-bearing rockets are much simpler to make than people-bearing rockets. And someone crazy enough to push the button would be crazy enough to direct them at the hated enemy wherever they are found. So, the colony would not be safe. At any rate, it will not be not safe enough that founding it is a better bet than making war less likely on Earth. Worse, any nation party to founding a colony will arouse suspicion in its enemies that it is scheming to start and survive a war. And this makes war more rather than less likely. Another danger is the rise of smart robots. But again, there is no escape in space. Space travel and running a colony use as much computation as they can get. This was true of the moon landings and it is even truer now. Human beings have an essential role in plans and design, but on the trip itself they are mostly just going along for the ride. So, imagine, just for the sake of argument, that hyper-calculating artificial intelligences are in a position to threaten human civilization. The extension of that civilization on another planet relies even more on those very powers, which will have to be networked to earthly computation. If mere humans can hack into machinery in targeted countries to disrupt them, then these super-capable but malevolent AIs will have no problem. Whatever their "motives," these will be the same elsewhere as on earth, and space is less of an obstacle to the flow of (mis)information and commands than to the flow of people and physical objects. No safety there. The third danger is ecological. We are ruining the climate and polluting the oceans. We could develop technology that mitigated or even reversed the dangers. It would be easier than developing technology for surviving on Mars, where we must grow food and create oxygen in a very cold and dark environment without much protection from radiation and a limited supply of water. Moreover, getting enough people to Mars to make a colony that could survive without help from home, self-sufficient technologically and with enough genetic diversity that our already rather uniform species would have a future, would involve a lot of rockets. Musk talks in terms of 10,000 flights, although some plans require more. And this would be just to get things started. We just do not know what the impact on the earth and its atmosphere of the launches and the prior manufacturing would be. It would not be positive, at any rate. And industrial power and scientific brains would be diverted away from the needs of earth to the well-being of the colony. It is not what we need; you would only think that we could afford it if you were blind to how desperate things really are. So again, the colony solution is likely to make the earthly situation even more dire.”

# F/L—T/Theory

## 1AR—T Plans Bad

#### 1] CI: Affs may defend subset of countries/weapons.

#### 2] Generic statements most predictably proven true by subsets.

Cimpian et al, PhDs, 10

(Andrei, Amanda C. Brandone, Susan A. Gelman, Generic statements require little evidence for acceptance but have powerful implications, Cogn Sci. 2010 Nov 1; 34(8): 1452–1482)

Generic statements (e.g., “Birds lay eggs”) express generalizations about categories. In this paper, we hypothesized that there is a paradoxical asymmetry at the core of generic meaning, such that these sentences have extremely strong implications but require little evidence to be judged true. Four experiments confirmed the hypothesized asymmetry: Participants interpreted novel generics such as “Lorches have purple feathers” as referring to nearly all lorches, but they judged the same novel generics to be true given a wide range of prevalence levels (e.g., even when only 10% or 30% of lorches had purple feathers). A second hypothesis, also confirmed by the results, was that novel generic sentences about dangerous or distinctive properties would be more acceptable than generic sentences that were similar but did not have these connotations. In addition to clarifying important aspects of generics’ meaning, these findings are applicable to a range of real-world processes such as stereotyping and political discourse. Keywords: generic language, concepts, truth conditions, prevalence implications, quantifiers, semantics Go to: 1. Introduction A statement is generic if it expresses a generalization about the members of a kind, as in “Mosquitoes carry the West Nile virus” or “Birds lay eggs” (e.g., Carlson, 1977; Carlson & Pelletier, 1995; Leslie, 2008). Such generalizations are commonplace in everyday conversation and child-directed speech (Gelman, Coley, Rosengren, Hartman, & Pappas, 1998; Gelman, Taylor, & Nguyen, 2004; Gelman, Goetz, Sarnecka, & Flukes, 2008), and are likely to foster the growth of children’s conceptual knowledge (Cimpian & Markman, 2009; Gelman, 2004, 2009). Here, however, we explore the semantics of generic sentences—and, in particular, the relationship between generic meaning and the statistical prevalence of the relevant properties (e.g., what proportion of birds lay eggs). Consider, first, generics’ truth conditions: Generic sentences are often judged true despite weak statistical evidence. Few people would dispute the truth of “Mosquitoes carry the West Nile virus”, yet only about 1% of mosquitoes are actually carriers (Cox, 2004). Similarly, only a minority of birds lays eggs (the healthy, mature females), but “Birds lay eggs” is uncontroversial. This loose, almost negligible relationship between the prevalence of a property within a category and the acceptance of the corresponding generic sentence has long puzzled linguists and philosophers, and has led to many attempts to describe the truth conditions of generic statements (for reviews, see Carlson, 1995; Leslie, 2008). Though generics’ truth conditions may be unrelated to property prevalence (cf. Prasada & Dillingham, 2006), the same cannot be said about the implications of generic statements. When provided with a novel generic sentence, one often has the impression that the property talked about is widespread. For example, if we were unfamiliar with the West Nile virus and were told (generically) that mosquitoes carry it, it would not be unreasonable to assume that all, or at least a majority of, mosquitoes are carriers (Gelman, Star, & Flukes, 2002). It is this paradoxical combination of flexible, almost prevalence-independent truth conditions, on the one hand, and widespread prevalence implications, on the other, that is the main focus of this article. We will attempt to demonstrate empirically that the prevalence level that is sufficient to judge a generic sentence as true is indeed significantly lower than the prevalence level implied by that very same sentence. If told that, say, “Lorches have purple feathers,” people might expect almost all lorches to have these feathers (illustrating generics’ high implied prevalence), but they may still agree that the sentence is true even if the actual prevalence of purple feathers among lorches turned out to be much lower (illustrating generics’ flexible truth conditions). Additionally, we propose that this asymmetry is peculiar to generic statements and does not extend to sentences with quantified noun phrases as subjects. That is, the prevalence implied by a sentence such as “Most lorches have purple feathers” may be more closely aligned with the prevalence that would be needed to judge it as true. Before describing our studies, we provide a brief overview of previous research on the truth conditions and the prevalence implications of generic statements. 1.1. Generics’ truth conditions Some of the first experimental evidence for the idea that the truth of a generic statement does not depend on the underlying statistics was provided by Gilson and Abelson (1965; Abelson & Kanouse, 1966) in their studies of “the psychology of audience reaction” to “persuasive communication” in the form of generic assertions (Abelson & Kanouse, 1966, p. 171). Participants were presented with novel items such as the following: Altogether there are three kinds of tribes—Southern, Northern, Central. Southern tribes have sports magazines. Northern tribes do not have sports magazines. Central tribes do not have sports magazines. Do tribes have sports magazines? All items had the same critical feature: only one third of the target category possessed the relevant property. Despite the low prevalence, participants answered “yes” approximately 70% of the time to “Do tribes have sports magazines?” and other generic questions similar to it. Thus, people’s acceptance of the generics did not seem contingent on strong statistical evidence, leaving the door open for persuasion, and perhaps manipulation, by ill-intentioned communicators. A similar conclusion about the relationship between statistical prevalence and generics’ truth conditions emerged from the linguistics literature on this topic (e.g., Carlson, 1977; Carlson & Pelletier, 1995; Dahl, 1975; Declerck, 1986, 1991; Lawler, 1973). For example, Carlson (1977) writes that “there are many cases where […] less than half of the individuals under consideration have some certain property, yet we still can truly predicate that property of the appropriate bare plural” (p. 67), as is the case with “Birds lay eggs” and “Mosquitoes carry the West Nile virus” but also with “Lions have manes” (only males do), “Cardinals are red” (only males are), and others. He points out, moreover, that there are many properties that, although present in a majority of a kind, nevertheless cannot be predicated truthfully of that kind (e.g., more than 50% of books are paperbacks but “Books are paperbacks” is false). Thus, acceptance of a generic sentence is doubly dissociated from the prevalence of the property it refers to—not only can true generics refer to low-prevalence properties, but high-prevalence properties are also not guaranteed to be true in generic form.

#### 3] Debate solves arbitrary linguistic intuitions—we can determine the most predictable interp based on clash, limits, topic lit, and community norms. Semantics are a floor not ceiling—if we are sufficiently predictable, division of ground is more important.

#### 4] Aff ground—PICs cause same debates in reverse which is worse 1] creates 13-7 time skew by restarting the debate in the 1AR 2] negs have generics—Soft Law, Torts, Kant, Realism Ks, deterrence DA while affs don’t have any vs PICs

#### 5] Functional limits check—only countries that a] are developing LAWs b] disrupting international norms are viable

#### 6] Clash— overlimiting discourages in depth research because the unifying aff ground is only surface level and one aff for 2 months produces stale debates

#### 7] Aff RVIs A] Topic ed—deters frivolous violations and forces neg to think twice before skewing 1AR B] Reciprocity—T is a unique avenue to ballot that aff can’t access—makes it structurally unfair without RVI

## 1AR—T Ban=Prohibit

#### Counter-interp: affs can specify an LAW to ban

#### Partial bans are T – only we have ev about the topic

Kallenborn 20 [Zachary, expert on drone swarms, weapons of mass destruction, and WMD terrorism. His work has been published in the Nonproliferation Review, Studies in Conflict and Terrorism, Slate, Defense One, and War on the Rocks. Middlebury Institute of International Studies at Monterey Master of Arts in Nonproliferation and Terrorism Studies ] "A Partial Ban on Autonomous Weapons Would Make Everyone Safer," Foreign Policy, https://foreignpolicy.com/2020/10/14/ai-drones-swarms-killer-robots-partial-ban-on-autonomous-weapons-would-make-everyone-safer/ 10-14-2020 RE

Countries might not be willing to ban the weapons outright, but banning the highest-risk autonomous weapons—drone swarms and autonomous weapons armed with CBRN agents— could provide a foundation for reducing autonomous weapons risks. Great powers would give up little, while improving their own security.

#### Prefer defintiions that directly define the word as opposed to define ban as prohibit and then define prohibit as something – they’re more predictable.

#### Reject evidence from PEDIAA – it’s a user-submitted blogging website like Yahoo Answers or reddit, their author is a nameless admin with no quals citing nobody, it is as credible as a card written by a debater.

#### Prohibit means limit or restrict – prefer a real author

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

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

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## 1AR—T Autonomous

#### 1. They don’t have a violation—we meet.

#### It doesn’t matter if not all nanoweapons are autonomous—we’ve isolated a specific subset that are and can operate without human input once released—that’s 1AC Milot.

#### We meet lethal—they are built to kill people, that’s all the impact ev in the 1AC.

#### 2. CI—Lethal Autonomous Weapons are AI weapons that use kinetic force to kill. Degree of autonomy doesn’t determine a LAW—it just needs AI.

[Matthew Achilles Kokkinos (4-16-2020), The Fletcher School of Law and Diplomacy—Tufts University, “Global Governance of Autonomous Weapon Systems: The Russia Case Study,” Tufts University, [https://sites.tufts.edu/fletcherrussia/files/2020/05/The-Global-Governance-of-AWS-Russia-Case-Study.pdf]//SLC](https://sites.tufts.edu/fletcherrussia/files/2020/05/The-Global-Governance-of-AWS-Russia-Case-Study.pdf%5D//CHS) PK

LAWS is the overarching umbrella terminology and category that includes many drone, SAWS, and AWS technologies, but there is one further distinction regarding the actions which it conducts. Specifically, weapons within the LAWS category use kinetic, lethal force, regardless of the level of autonomy, spanning “in-the-loop,” “on-the-loop,” and “out-of-the-loop,” technologies. Not all UCAV, SAWS, and AWS, however, deliver kinetic or lethal force, creating a headache for terminology relating to definitions and governance. For example, the US currently employs use of the Miniature Air Launched Decoy (MALD) and Miniature Air Launched Decoy – Jammer (MALD-J), decoy air-launched vehiclesthat deceive radar and use non-kinetic and non-lethal force to jam radar, respectively.17 LAWS, therefore, do not include these types of autonomous weapon systems which are non-lethal and non-kinetic in use.

#### 3. These are the best definitions—in the absence of a universal definition, err heavily aff on author quals..

[Matthew Achilles Kokkinos (4-16-2020), The Fletcher School of Law and Diplomacy—Tufts University, “Global Governance of Autonomous Weapon Systems: The Russia Case Study,” Tufts University, [https://sites.tufts.edu/fletcherrussia/files/2020/05/The-Global-Governance-of-AWS-Russia-Case-Study.pdf]//SLC](https://sites.tufts.edu/fletcherrussia/files/2020/05/The-Global-Governance-of-AWS-Russia-Case-Study.pdf%5D//CHS) PK

For this analysis, a synthesis of technical definitions of weapon systems held by governments, leading experts in academia, and relevant non-governmental organizations forms the foundation of examination, as there are no universally-held definitions. Next, international law, manifested through conventions, customary norms, and relevant bodies, serves as a framework against which the weapon systems are reconciled for legality. Afterwards, statements by government officials, excerpts from government documents, and relevant third-party information from academia and media sources are investigated to determine how the Russian develops and applies autonomous weapon systems. In light of this, any possible impact on global governance is discussed, and the ramifications for it are analyzed.

#### 4. Overlimiting—their definition concedes no weapons have full autonomy now which means it’s impossible to garner inherency for a LAW. Our definition allows for inherent topical affs which allows the neg to also gain disad uniqueness.

#### 5. Functional limits—the only LAWs that exist in the status quo under our interp are HARPY, Iron Dome, Poseidon, some drone swarms, and nanoweapons while excluding systems such as NC3. That sets a clear brightline on topical affs while preserving plenty of ground for the neg. You should be prepared to debate 5 affirmatives by TOC.

# F/L—Counterplans

## 1AR—Agriculture PIC

#### 1. Framing issue - we don’t end all nanotech—we just ban the usage and production of it for autonomous weaponry which doesn’t affect nanotech related to agriculture.

#### 2. Solvency deficit – only a complete ban can solve: otherwise, the nanotech gets circulated throughout black markets and exacerbates nanoterrorism: cross-apply 1AC Daniels – the solvency deficit o/w any potential benefit of agricultural nanotech on both timeframe and magnitude

#### 3. Circumvention applies to the PIC but not the aff – the mere perception of US nanotech development causes rivals to break the ban in fear of an attack – that’s 1AC Del Monte

#### 4. Turn – agricultural applications of nanotech kill off biodiversity and has a litany of detrimental effects

Agrawal et al 14 [Shweta Agrawal and Pragya Rathore are part of the Department of Biotechnology, at the Sanghvi Institute of Management and Science.] International Journal of Current Microbiology and Applied Sciences, 2014, “Nanotech Pros and Cons to Agriculture: A Review,” <https://www.ijcmas.com/vol-3-3/Shweta%20Agrawal%20and%20Pragya%20Rathore.pdf>, VM]

“All substances, from arsenic to table salt are toxic to cells, animals or people at some exposure level. Before interpreting toxicological data, it is thus essential to characterize the expected concentrations of engineered nanoparticles that may be present in the air, water and soil. A useful way to approach the problem is to consider how human populations, both in the present and near future, may be exposed to engineered nanoparticles (Colvin 2003). Toxicological studies of fibrous and tubular nanostructures have shown that at extremely high doses of these materials are associated with fibrotic lung responses and result in inflammation and an increased risk of carcinogenesis. Single- walled carbon nanotubes (SWCNT) have been shown to inhibit the proliferation of kidney cells in cell culture by inducing cell apoptosis and decreasing cellular adhesive ability. In addition, they cause inflammation in the lung upon instillation. Dosing keratinocytes and bronchial epithelial cells in vitro with SWCNT has been shown to result in increases in markers of oxidative stress. Multiwalled carbon nanotubes (MWCNT) are persistent in the deep lung after inhalation and, once there, are able to induce both inflammatory and fibrotic reactions. Proteomic analysis conducted in human epidermal keratinocytes exposed to MWCNT showed both increased and decreased expression of many proteins relative to controls. These protein alterations suggested dysregulation of intermediate filament expression, cell cycle inhibition, altered vesicular trafficking/exocytosis and membrane scaffold protein down-regulation. Charge properties and the ability of carbon nanoparticles to affect the integrity of the blood-brain barrier as well as exhibit chemical effects within the brain have also been studied. Reportedly, the neutral nanoparticles and low concentration anionic nanoparticles can serve as carrier molecules providing chemicals direct access to the brain and that cationic nanoparticles have an immediate toxic effect at the blood-brain barrier. Tests with uncoated, water soluble, colloidal C60 fullerenes have shown that redox-active, lipophilic carbon nanoparticles are capable of producing oxidative damage in the brains of aquatic species. The bactericidal potential of C60 fullerenes was also observed in these experiments. This property of fullerenes has possible ecological ramifications and is being explored as a potential source of new antimicrobial agents (Oberdorster et al. 2005). A pioneering study showed that uncoated fullerenes exerted oxidative stress and caused severe lipid peroxidation in fish brain tissue, a possible negative impact of nanomaterial on the health of aquatic organisms (Lin and Xing 2007).”

#### 5. No impact – your evidence just said it could be used to increase productivity but doesn’t make a uniqueness claim as to why productivity is an issue in that status quo: AI innovation definitively solves

#### 6. PICs are a voting issue – they steal aff offense and restart the debate in the 1AR, shifting debates from core literature towards the margins by letting them pick the most desirable slice of offense in the resolution – reading it as a disad solves content education, but the PIC artificially inflates the worth of a bad net benefit

## 1AR—Country PIC

### 1AR—Topshelf

#### 1. Doesn’t solve—

#### Self-replication—even 2 nanobots left in the world causes extinction in 3 days—that’s 1AC Martin.

#### Arms racing—one country having nanoweapons creates paranoia that leads to other countries developing.

#### Terrorism—conceded that no one will notice a few nanoweapons missing so it can’t solve.

#### Use or lose—one country having nanoweapons leads to nuclear first strikes because other countries fear new capabilities.

#### 2. Permutation do the aff and allow [country] to develop other military AI—logical limited intrinsicness where we get to add the subject of the net benefit to the aff is justified to test whether the PIC is a real opportunity cost to the aff.

#### 3. Universality key—C/A 1AC Del Monte 2—allowing one country to have nanobots incentives them to decimate adversaries because they know there’s no defense against it and they can feign ignorance to avoid retaliation.

### --AT: US PIC

#### This solves zero percent of the aff.

[Louis A. Del Monte (2017), Award winning physicist, inventor, futurist, featured speaker, CEO of Del Monte and Associates, Inc., “Are Nanoweapons Paving the Road to Human Extinction?”, HuffPost, [https://www.huffpost.com/entry/are-nanoweapons-paving-the-road-to-human-extinction\_b\_59332a52e4b00573ab57a3fe]//SLC](https://www.huffpost.com/entry/are-nanoweapons-paving-the-road-to-human-extinction_b_59332a52e4b00573ab57a3fe%5D//SLC) PK

Nanotechnology researchers continue their relentless journey to develop nanobots and they are succeeding. Nanomedicine is using [nanobots to cure to cancer](http://www.marketwatch.com/story/nanobots-are-waiting-in-the-wings-to-cure-cancer-and-clean-up-ocean-pollution-2016-06-09). Military nanotechnologies, especially nanobots, will emerge as the defining weapons of the twenty first century.

The United States military already deploys nanoweapons, such as [nanotechnology based lasers](http://www.theglobaljournal.net/article/view/1132/), toxic nanoparticles, nanoparticle catalysts, and nano electronics. These nanoweapons give the United States significant capabilities in asymmetrical warfare. However, the US military’s greatest quest is the development of nanobots, tiny robots built with nanotechnology.

What is it about nanobots that make them the ideal weapons? Let us address this question by taking several examples. About a third of all US fighter planes today are drones. Today’s drones are approximately one-third the size of a manned fighter jet, like the F-35. However, a new class of drones is in development, bird and even insect size drones. For example, in [2014, the Army Research Laboratory announced the creation of a “fly drone”](http://www.defenseone.com/technology/2014/12/military-wants-smarter-insect-spy-drones/101970/) weighing only a small fraction of a gram. This drone could conceivable fly into an adversary’s command post and provide surveillance or into the adversary’s dining area to deposit a nano poison. An insect fly drone provides the military with both surveillance and assignation capabilities. This gives a completely new meaning to “fly on the wall.”

As electronic processors shrink into the nanoscale, becoming nanoprocessors, about 1/1000 the diameter of a human hair, conceivably they could provide the fly drone with artificial intelligence. In effect, it could autonomously carry out its programmed mission.

You may wonder, How does all of this threaten human extinction? To address this question, imagine a scenario where the US military releases millions of artificially intelligent fly drones within an adversary’s borders, programmed to target the populace via commonalities in their DNA. If each fly drone had the capability to assassinate a few people, conceivably they could wipe out an entire nation.

Although this may sound like science fiction, the United States is within a decade of having the capability. The US Army is already testing a fly drone. As for poisons, as little as 100 nano grams of [botulism H](http://www.natureworldnews.com/articles/4442/20131015/botulinum-toxin-type-h-deadliest-known-antidote-discovered.htm) will kill a human. That quantity of poison is too small to see or taste, yet lethal and small enough for a fly drone to carry. In my book, [Nanoweapons: A Growing Threat To Humanity](http://www.louisdelmonte.com/nanoweapons-a-growing-threat-to-humanity-2/), I classify this type of weapon as a strategic nanoweapon. This classification parallels strategic nuclear weapons that have the capability to destroy nations.

While artificially intelligent insect drones are already a scary proposition, the next step in their development is even more frightening, namely self-replicating insect drones, or more generically [self- replicating nanobots](https://www.huffpost.com/entry/59273e43e4b0d2a92f2f423f). Given the exponential advance in nano electronics and artificial intelligence, characterized by [Moore’s law](https://en.wikipedia.org/wiki/Moore%27s_law), it is likely we will see the emergence of self-replicating nanobots in the 2050s.

Self-replicating nanobots are the ultimate invention. In medicine, they will flow through our blood preventing diseases and curing injuries. In military applications, they will have the capability to completely destroy an adversary, from its populace to its structures. This scenario was depicted in the sci-fi movie, [The Day the Earth Stood Still](https://en.wikipedia.org/wiki/The_Day_the_Earth_Stood_Still_%282008_film%29).

Strategic nanoweapons, like their nuclear counterparts, pose a threat to humanity. The major issue is control. Will we be able to deploy strategic nanoweapons and maintain control over them? If, for example, we lost control of self-replicating nanobots, we would face a technological plague, one that we currently have no way of stopping.

In a decade, we will see the emergence of nanobots. In medicine, they will cure cancer. In warfare, they may kill millions. In the 2050s, we will see the emergence of self-replicating nanobots. In medicine, they will offer immortality. In warfare, they will pose a threat to humanity.

# F/L—Disadvantages

## 1AR—Biden Political Capital DA

#### 1. Thumpers – your Link is to any treaty:

#### a] TPP

Maizland 1-21 Lindsay Maizland 1-21-2021 "Biden’s First Foreign Policy Move: Reentering International Agreements" <https://www.cfr.org/in-brief/bidens-first-foreign-policy-move-reentering-international-agreements> [Lindsay Maizland writes about Asia for CFR.org. Before joining CFR, she covered breaking news for TEGNA’s central digital team and reported on world news for Vox. She holds a BA in international relations and journalism from American University.] Recut VM

In 2017, Trump removed the U.S. signature to the Trans-Pacific Partnership (TPP), a massive trade agreement that was the centerpiece of former President Barack Obama’s policy toward Asia but was never approved by Congress. After the United States left, the eleven other countries forged ahead with a new version of the pact, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). As vice president, Biden backed the TPP and told CFR in 2019 that “the idea behind it was a good one.” During the Democratic primaries, he said he would potentially try to renegotiate the TPP and address concerns raised by some Democrats, including by adding protections for workers and the environment.

#### b] Iran Deal

Maizland 1-21 Lindsay Maizland 1-21-2021 "Biden’s First Foreign Policy Move: Reentering International Agreements" <https://www.cfr.org/in-brief/bidens-first-foreign-policy-move-reentering-international-agreements> [Lindsay Maizland writes about Asia for CFR.org. Before joining CFR, she covered breaking news for TEGNA’s central digital team and reported on world news for Vox. She holds a BA in international relations and journalism from American University] Recut VM

Biden has promised to rejoin the Iran nuclear agreement, formally known as the Joint Comprehensive Plan of Action (JCPOA), but resurrecting the deal won’t be easy. After exiting the JCPOA in 2018, the Trump administration ratcheted up sanctions on Iran. Tehran responded by exceeding limitations on its nuclear program set under the agreement. Biden has said that he will reenter the deal if Iran returns to compliance, which Iranian officials have indicated they’re willing to do. But he has also signaled that he wants to negotiate a successor agreement that addresses Iran’s missile program and support for regional armed partners, an idea Iranian officials have rejected so far. A renegotiated agreement could require congressional approval.

#### c] Arms Control – Treaties are inevitable: it’s one of Biden’s main goals.

Bender 1-27 Bryan Bender 1-27-2021 "‘This is going to be quite a show’: Biden’s arms control team eyes nuclear policy overhaul" <https://www.politico.com/news/2021/01/27/biden-nuclear-weapons-policy-463335> [Bryan Bender is a senior national correspondent for POLITICO, where he focuses on the Pentagon, NASA, and the defense and aerospace industries. He was previously the national security reporter for the Boston Globe, where he covered U.S. military operations in the Middle East, Asia, Latin America, and the Balkans. He also writes about terrorism and government secrecy. He is an adjunct professor at the Walter Cronkite School of Journalism at Arizona State University and the author of “You Are Not Forgotten,“ the story of an Iraq War veteran’s search for a missing World War II fighter pilot in the South Pacific.] Recut VM

President Joe Biden is assembling a national security team with an unusually ambitious agenda to negotiate new arms control treaties, scale back the nuclear arsenal, and review decades of military doctrine. But veterans of the last administration fear this newly empowered group of progressives may be naive about what can be achieved without undermining U.S. security, and are already warning them to prepare for a shock when they read the latest intelligence. Taking up posts at the Pentagon, State Department and National Security Council are a cadre of experts who collectively have their sights on a renaissance in nuclear restraint, after President Donald Trump withdrew from three arms control pacts, threatened a nuclear war with North Korea and expanded the role of nuclear weapons in war planning. Biden has already agreed to extend the last remaining nuclear agreement with Russia, the New Strategic Arms Reduction Treaty, and called for further negotiations with Moscow to place new limits on their arsenals, the world's largest. And the group of arms control experts he is enlisting to carry out his agenda represents the vanguard of a decades-long progressive push to pull back from the nuclear brink and seek the elimination of atomic weapons. "The stars are aligned," said Joe Cirincione, a veteran nonproliferation advocate who mentored a number of Biden’s picks. "Extending New START for five years is just the opening gambit. This is going to be quite a show." Yet former Trump officials predict the appointees will be hit by a new reality when they learn more about real-world threats, including China's major nuclear buildup in recent years. "I think a lot of these guys who are going into government are going to finally start getting classified briefings about what China has been up to," said Tim Morrison, who oversaw the arms control portfolio on the National Security Council under Trump and is now at the Hudson Institute. "I want to be a fly in the room. The color is going to drain out of their faces, they are going to sit back in their chairs, and they are going to say 'oh s---.'" Under Trump, the United States significantly increased spending on nuclear weapons and also fielded a new submarine-launched warhead, citing Russian and Chinese nuclear buildups and more aggressive efforts by North Korea to increase its arsenal and develop more advanced long-range missiles. Others see Biden's willingness to accept Russia's offer to extend New START a full five years without preconditions as a worrying sign the new team won't be tough enough on the Russians. "I think that is a bad signal and suggests that Biden may be a pushover when it comes to this sort of thing because even those who still see value in New START agree there are some things the United States should be pushing for," former Republican Sen. Jon Kyl, a leading skeptic of arms control agreements, said in an interview. Trump' chief arms control negotiator, former Ambassador Marshall Billingslea, is also critical about Biden's first move. "They gave away all of the leverage that they had in order to get additional arms control done," he said. "It's not at all clear to me what further interest the Russians have in negotiating anything with the Biden administration." But the team advising Biden has big ambitions. One leading player is Ambassador Bonnie Jenkins, a veteran of the Obama State Department who coordinated efforts to combat the spread of chemical, biological, and nuclear weapons. She has been nominated to be undersecretary of State for arms control and international security. MOST READ Bruce Castor Trump impeachment lawyer says he'll use video of Dems' own remarks at trial Sasse inflames GOP with anti-Trump video Congress Still Has One More Way to Ban Trump from Future Office Florida Democrats regroup to oust DeSantis amid disarray Parscale urges Trump to run again as a 'martyr' Jenkins has recently argued for declaring a “no first-use” policy when it comes to nuclear weapons, which arms control advocates consider a major step toward reducing nuclear tensions. “We are trying to say, 'we are not going to attack you with a nuclear weapon unless you attack us with a nuclear weapon," she explained in a podcast this month. “That's kind of the direction it was going. However, in 2018 we kind of took some steps back on that. We have added all these conditions where we can actually use a nuclear weapon. We have gone backwards." She is joined by a growing roster of progressive-minded national security experts who have advocated for some of the most drastic changes in U.S. nuclear policy in recent years. For example, several key players in the new administration have ties with the Center for Arms Control and Non-Proliferation, the research arm of the liberal Council for a Livable World, which aims to "reduce and eventually eliminate nuclear weapons." Alexandra Bell, a former State Department official who most recently was the center's policy director, has been appointed as deputy assistant secretary of State in the Bureau of Arms Control, Verification and Compliance. Leonor Tomero, former chief counsel for the House Armed Services Committee who was the think tank's director, will oversee nuclear and missile defense programs for the undersecretary of Defense for policy.

#### 2. Non-Unique – Political capital is already being sapped because of corona

Cook 2-5 Charlie Cook 2-5-2021 "Biden Is Wasting His Political Capital" <https://cookpolitical.com/analysis/national/national-politics/biden-wasting-his-political-capital> (American political analyst who specializes in election forecasts and political trends. Cook writes election forecasts and rankings in his own publication, The Cook Political Report, and in other media. He is a political analyst for the National Journal and since 1994 with NBC] Recut VM

As this column is being written, President Biden and Vice President Kamala Harris are sitting down in the White House with 10 Republican senators to talk about coronavirus relief. Given the 50-50 split in the Senate (with Harris the tie-breaking vote), this should not be terribly surprising. What is surprising, at least to me, is just how Biden and his White House have been playing this over the last week, especially compared with how he portrayed himself during the campaign. While “take it or leave it” demands are certainly not new to politics or the legislative process, it is rather odd that the White House’s initial offer has also become its final demand. Democrats’ immediate and instinctive threat to ram their package through using the budget-reconciliation process, which would require only a simple majority rather than a filibuster-proof supermajority, was tone deaf to say the least. One might have assumed that Biden had made a campaign pledge to never negotiate with Republicans. First, a few numbers are in order: 1.9 trillion, 43, 900 billion, and 618 billion. The first is the $1.9 trillion cost of Biden’s relief proposal. The 43 is the number of days since Dec. 21, when Congress passed its last coronavirus package. The $900 billion is the cost of the coronavirus relief portions of the larger $2.3 trillion bill, passed six weeks ago, that funds the government through Sept. 30. The $618 billion is the price tag of GOP senators’ counteroffer. The fact is there is a lot of room for negotiation between $1.9 trillion and $618 billion. So why start making threats from the get-go? For starters, virtually every Democrat I know assumes (if they’re not outright convinced) that Republicans are operating in bad faith. Maybe the 10 Republican senators are, maybe not, but by acting on that assumption, Democrats put themselves in the position of being no better. Sen. Susan Collins, for example, raised the point early on that under the proposal, a family making as much as $300,000 could still qualify for a stimulus payment, albeit a reduced one. That the package was a bit too generous, particularly at the top end, seemed to be central to the concerns of many Republicans. Perhaps that should have been treated with a little more respect than being swatted away as partisan claptrap? Biden won a close race, not so much because of an agenda he ran on but because he was not Donald Trump and would not behave or govern like Donald Trump. He won more because of who he wasn’t than what he ran on. To the extent that he did win on anything else, it was that he was a unifier. He’d spent almost two-thirds of his 78 years as either a member of the Senate or presiding over it as vice president. He had an understanding of its relationships and institutions. That being the case, why recklessly discard what little political capital he has? As this column noted last week, each of the past four presidents have lost their party’s majorities in both the House and Senate. Washington wise man Bruce Mehlman points out in a slide in another of his essential presentations, just out this week, that “[p]residents historically start fast, do most in [their] 1st 2 years,” and that “major initiatives get launched early (before losing Congress).” Mehlman points to an array of major accomplishments that Presidents Clinton, George W. Bush, Obama, and Trump had in their first two years. Yet some of these very accomplishments so crippled those presidents politically that considerably fewer wins were possible in the remaining two or six years in office. A Pyrrhic victory is not much of a victory at all. My assumption is that a deal will be reached. It won’t be everything Biden and his party wants, but it will be more than Republicans want. (To be sure, there are plenty in the GOP who will simply vote against anything that comes up.) But why soil your nest this early? Why force a minimum-wage hike into this bill right now? Quite simply, this looks bad and does not help future legislative endeavors.

#### 3. Fiat solves the Link – your link ev says Treaties drain political capital because of time of negotiations – Fiat means the plan is immediate

#### 4. Prefer specificity in determining probability – our 1AC scenarios are specific instances of escalation while your scenario is very vague w/ no specific scenario for Biden climate agreements

#### 5. Biden doesn’t matter – his PC isn’t enough to get fed commitments, non-federal cuts are inevitable and solve, and squo is on track to meet global targets

Harder 20 Amy Harder 12-7-2020 “Biden faces new climate diplomacy as Paris deal turns five” <https://www.axios.com/biden-paris-deal-five-years-fd6b5b28-0b18-4794-b112-5776dbafccf4.html> [an energy and climate change reporter at Axios. She is the author of the weekly Harder Line column and she covers the industry’s biggest news stories] Recut VM

President-elect Joe Biden faces a tough balancing act as he calls for more global action on climate change while also reassuring the world that America is on board for the long haul. Driving the news: World leaders will convene virtually on Saturday to mark the fifth anniversary of the Paris Climate Agreement, which was agreed to by nearly all countries on Dec. 12, 2015. How it works: The Paris deal calls on nations to submit plans every five years to cut their greenhouse gas emissions, limiting the global temperature rise to below two degrees Celsius compared to pre-industrial levels by the end of this century. Biden has said he will rejoin the deal on the first day of his presidency, which, according to the deal’s rules, will become official a month later. Although Biden may still recognize the anniversary, he isn't going to be involved in the Dec. 12 summit. "President-elect Biden and his team respect the principle that there is one president at a time," said Ned Price, a spokesman for the transition team. John Kerry, who as Barack Obama’s secretary of state signed the Paris deal in 2015, is returning to government as Biden’s special envoy for climate change. It’s a new role that will position Kerry as America’s central diplomat in this area. Where it stands: A lot has changed on the climate front over the five years since the deal was inked. Most notably, President Trump announced in 2017 he was withdrawing America from the deal. That actually marked the second time America retreated from a global climate deal after a change from a Democratic president to a Republican one. (The other was the Kyoto Protocol in the early 2000s, which George W. Bush left after Bill Clinton joined it.) “World leaders welcome the U.S. coming back into Paris and the international stage,” said Alden Meyer, a longtime strategist on global climate policy. “The concern will be, how can we be sure that whatever this administration does has some staying power beyond changes in administration?" Much of the world has moved forward, despite Trump’s retreat. Europe has been pushing aggressive climate policy over the last five years, and recent comments suggest it may not let America lead like it has in the past. “Europe will be at the forefront of brokering ambitious commitments,” said European Commission President Ursula von der Leyen in comments last month. “The U.S. is also well placed to support us.” This fall, China, South Korea and Japan all announced aggressive goals to drastically cut emissions over the next three decades. These announcements, critical given that they’re coming from energy-hungry Asia, were made in anticipation of a Biden presidency, said one former U.S. diplomat. “The analysis they were reading was that Biden would win. I think if the analysis had been the other way, you wouldn’t have seen these announcements forthcoming.” — Jonathan Pershing, who worked on the Paris deal under Obama The intrigue: The official U.S. commitment to the deal is not expected immediately in the new administration, according to Pershing and other experts familiar with the process. That's because it takes time — and technical experts — to determine what policies are possible and how much emissions reduction would result. "There will likely be an announcement of intent and then delivery of the plan within the first year," Pershing said. By the numbers: Given the limits of Biden’s domestic political agenda, the pledge is likely to lean more heavily than ever before on non-federal action, which there's been a lot of over the last four years. Action by states, cities and private business could cut U.S. emissions up to 37% by 2030 compared to 2005 levels, according to a 2019 report by a consortium of environmental groups and former state leaders. That percentage could rise to nearly 50% if the federal government reengaged, the report said. To be on a steady path to achieve Biden’s 2050 goal of a zero-carbon economy, he would need to achieve a cut of 43% by 2030, according to analysis done by research firm Rhodium Group. That would be a 2.7-3.3% reduction per year. Reality check: U.S. emissions have never dropped by so much so consistently. They’re forecast to drop a record 11% this year, purely because the pandemic choked economic activity — not a desirable way to cut emissions. What we’re watching: The recent wave of 2050 and 2060 targets has put the Paris goal “within striking distance,” according to a new report by the Climate Action Tracker, a consortium of climate research groups.”

#### 6. Nanotech development outweighs on timeframe – that’s 1AC Daniels – it’ll shape 21st century international relations and countries are investing billions – warming takes centuries to cause extinction

## 1AR—Innovation DA

#### Turn – Nanotech innovation in [XYZ] is terminally unsustainable, has a litany of adverse effects, and are being heavily regulated anyways.

Johansson et al 17 [Mikael Johansson works at the Gothenburg Research Institute, University of Gothenburg in Gothenburg, Sweden. Asa Boholm - School of Global Studies, University of Gothenburg, Box 100, 405 30 Gothenburg, Sweden.] “Scientists’ Understandings of Risk of Nanomaterials: Disciplinary Culture Through the Ethnographic Lens,” https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5712326/, VM

“**Nanomaterials are compounds manipulated at the nanometer scale, i.e., the level of single atoms and molecules.** More and more consumer products, such as cleaning products, clothing, and personal care products, are manufactured from engineered nanomaterials at the same time as the hazard potential for humans and the environment is largely unknown [1]. When bulk materials are separated into nanoparticles, the surface-to-volume ratio increases, making nanosized materials more chemically reactive. The smaller size of the particles can also influence toxicity ([2]: 157–158; [3]: 485). Nanoparticles can pass through cell walls and accumulate inside the body. Inhaled nanoparticles, for example, can enter the bloodstream and be transported to organs where they accumulate and possibly create adverse health effects. While the European Union (EU) adopts a more process-oriented stance towards regulating nanoparticles, the USA is more product-oriented [4]. Process-oriented risk assessment focuses on nanomaterials in themselves as a potential threat, while product-oriented risk assessment targets products made from nanomaterials. The EU has regulated nanomaterials in cosmetics and defined some types of nanomaterials in electronic equipment as hazardous substances [5]. Meanwhile, in the USA, nanosized particles are not regulated differently from the bulk form, leading to no special regulations ([6]: 87–88). Regulation of (engineered) nanomaterials is fragmented in the EU as well as in the USA due to a variety of existing bodies of legislation in a number of policy areas such as environmental protection, chemicals, food safety, drugs, and work place safety [7, 8]. The challenges for risk assessment and risk management of nanomaterials are substantial [9] due to high uncertainty regarding potential negative effects and their probability, lack of information regarding actual commercial use and exposure, difficulties to implement and enforce regulatory regimes, and lack of standardization of toxicological assessment.”

#### Turn – a ban on autonomous nanotech makes innovation in the status quo much easier.

Freedberg 19 [Sydney J. Freedberg Jr. is the deputy editor for Breaking Defense. During his 13 years at National Journal magazine, he wrote his first story about what became known as “homeland security” in 1998, his first story about “military transformation” in 1999, and his first story on “asymmetrical warfare” in 2000. Since 2004 he has conducted in-depth interviews with more than 200 veterans about their experiences, writing stories that won awards from the association of Military Reporters & Editors in 2008 and 2009. Sydney graduated summa cum laude from Harvard and holds masters’ degrees from Cambridge and Georgetown.] “Should We Ban ‘Killer Robots’? Can We?”, Breaking Defense, <https://breakingdefense.com/2019/03/should-we-ban-killer-robots-can-we/>, VM

Russell emphasizes he doesn’t oppose all military uses of artificial intelligence, only AI that can kill without a human authorizing each attack. And if the US did agree to a ban on lethal artificial intelligence, it would make it much easier for computer scientists and engineers to work with their Pentagon on those other kinds of military AI, Russell argued, just as the Biological Weapons Convention let biologists develop defenses against germ warfare without fear their work would be perverted for offense. (In the US, that is. The Soviet Union massively violated the BWC, which had no inspection mechanism: just ask around about [Bio Preparat and Ken Alibek](https://www.nlm.nih.gov/nichsr/esmallpox/biohazard_alibek.pdf)). *Stuart Russell* “Having a ban in place would make it much easier to develop [ATLAS](https://breakingdefense.com/2019/03/atlas-killer-robot-no-virtual-crewman-yes/)-like technologies that can protect soldiers’ lives,” Russell said, citing an [Army program](https://breakingdefense.com/2019/03/atlas-killer-robot-no-virtual-crewman-yes/) to use AI to assist in aiming and targeting (but not firing) weapons. “Quite possibly there would have been much less pushback against [Project Maven](https://breakingdefense.com/tag/project-maven/) at Google, because researchers would have some assurance that the technology would not be used in autonomous weapons. There would be a big steel gate closing off the slippery slope.”

# F/L—Kritiks