### 1NC – OFF

#### The United States federal government should construct isolated, continuously manned, self-sufficient underground and underwater refuges that can support at least 100 people.

#### Solves extinction from nuclear war

Karim Jebari 15. Royal Institute of Technology, KTH, Teknikringen. 06/2015. “Existential Risks: Exploring a Robust Risk Reduction Strategy.” Science and Engineering Ethics, vol. 21, no. 3, pp. 541–554.

Costs While this measure would be quite expensive, it would probably be much cheaper than even the most optimistic assessments of colonizing the moon. There are already shelters that could be refitted for this purpose. A nuclear reactor with highly enriched uranium, similar to that which powers large submarines, would probably be the most costly item. Thus, a comparison with an Ohio-class submarine, with a crew of 155, seems reasonable. This submarine costs 2 billion USD. Even if this shelter would be an order of magnitude more expensive, it would still cost only a fraction of what a Moon colony would cost on the most optimistic cost assessment. Furthermore, this facility would reduce the risk of black swan extinction events with existing and proven technology. It could also be implemented at a very short notice, compared with even the most optimistic plans to colonize the Moon. Conclusion The notion of black swan extinction events present us with a daunting task. How to even start thinking about risks that are unknown? The stakes are further raised when considering that, on a large number of normative theories, an existential catastrophe implies a staggering loss of value. Thus, it is unwise to ignore the risk such an event represents. In engineering safety, a number of heuristics and strategies are device to prevent a catastrophic failure in a large number of possible scenarios. These strategies could be employed in thinking about how to reduce the risk of a black swan extinction event. Safety barriers are an instance of such a strategy. These could be actual physical barriers in some systems, or subsystems that prevent catastrophic failure by compartmentalization and physical separation. This article has discussed an example implementation of this strategy: isolated, continuously manned and self-sufficient underground refuges that could protect a large enough number of people to ensure the continued existence of mankind. While building such a ‘‘doomsday shelter’’ is less glamorous than colonizing the Moon, it may give us much more risk reduction for the money invested. The conceptual sketch of the project in this paper should be further developed in an interdisciplinary research project, which could benefit from the extensive literature on isolated, self-containing habitats. Architecture, engineering, social psychology and decision theory would probably be needed to fully assess the costs, and social and technological challenges.

### 1NC – OFF

#### **Their appeal to intrinsic value of pleasure and pain is a western ethic which ascribes violence. Vote neg to recognize ethics are always already contingent.**

Valencia, 2010, Professor of cultural studies. Sayak Valencia, *Gore Capitalism,* p. 111-120, print -zc-

In her call for a deontological ethics (made via an adaptation of the Kantian categorical imperative), Adela Cortina writes: “The first commandment is to do no harm”. That said, we turn to an analysis of the constant tendency to forget that History – or at least historical discourses – is grounded in uneven development.

If we fail to consider History’s uneven development, we quickly forget that certain concepts of humanism, ethics, and other Western discourses – which are thought to be unquestionable, desirable, and morally acceptable in the first world – lack their status in other contexts and political geographies. This means that in other societies (with distinct histories of development and distinct conceptual frames) these categories are considered empty, abstract, and removed from everyday realities.

We should not elide the fact that the establishment of concepts like *equality, liberty, and fraternity* emerged during a specific historical context in a specific culture. And yet these concepts are exported into other cultures (or there is an attempt to do so) and subsequently these cultures are asked to conform to a homogeneous code of conduct based on the thought and practices of the West.12

Nor should we naturalize or erase the fact that the acceptance and adoption of theses concepts in the West has not always been consensual – that these concepts are not inherent but the results of a process of *education* and legitimation enacted through performative utterances and metaphors that produce that with which they purport to describe. Namely, “that which has been known since the days of Cicero as humanism in the narrowest and widest sense a consequence of literacy” (Sloterdijk, 2009, 12).

We cannot expect the same results from the same variable in disparate contexts. We must break with the “solipsistic delusion that [we] live in a history solely of [our] own making” (Davis, 2002, 2) To do so, we need geopolitically situated forms of knowledge.

All of this is relevant to understand the brutal effects of extreme violence on us. The interesting thing is not that this violence affects us in a clear and unequivocal manner, but rather that it surprises us – a fact that should alert us that our inattention to the Other in our theorizations is exacting a price. We are unable to confront other dynamics because we are ignorant of them and because our efforts are wedded to the project of legitimating the West as the only reality and possibility.

Namely, while the West lives under a *pharmacopornographic and/or biopolitical* capitalism of microcellular surveillance, immersed in a high-tech and high-speed hypermodernity, subjects in other spaces live, theorize, and act based on their own realities. These realities are not disconnected from a West that they are in fact increasingly influencing and reconfiguring; when we get news of these other realities, they explode in our faces and we are horrified.

It is as if we lived in interconnected wormholes, a metaphor that interconnects space and time despite them being out of sync: a patchwork of Histories in which temporal tectonic plates interlock and crash against one another in the context of uneven development.

In light of this we can argue that Cortina’s words – and her deontological maxim, *Do No Harm* – are embedded in the reasoning and context of a First World reality governed (or which at least boasts of being governed) by a rule of law that enforces compliance with ethical norms. Notwithstanding this fact, we should remember that: “For the last five centuries, the (relative) prosperity and peace of the ‘civilized’ West was attained through the export of ruthless violence and destruction into the ‘barbarian’ Outside: the long story from the conquest of America to the slaughter in the Congo” (Zizek, 2002, 6).

Cortina’s maxim is reformulated and over-turned by the realities of gore capitalism, which are not limited to the Third World but rather are rapidly expanding with globalization and the unification of world capital across the entire planet. Cortina’s affirmation is relativized and brazenly questioned: if the first commandment (for the west) is *Do No Harm*, the response from the deprived is a question: *Do No Harm?* and an affirmation: *Receive no more harm, or Participate in harm as agents and no longer (only) as victims.* This affirmation is posited as another – an Other’s – form of empowerment (inconceivable from the viewpoint of Western Ethics).

### 1NC – OFF

#### Give disabled debaters a win—it serves as a teaching moment.

Mitchell, et. al, 16 [David Mitchell, Sharon Snyder, and Linda Ware—all of their credentials are in German so I can’t read them, 2016, Das Geschlecht der Inklusion, “Curricular Cripistemologies: The Crip/Queer Art of Failure,” <https://www.jstor.org/stable/pdf/j.ctvm201kv.5.pdf?ab_segments=0%252Fbasic_search_gsv2%252Ftest&refreqid=excelsior%3A9788d2c46ec4cbff30928c80efeade1a>, accessed 3-7-2021]JMK

The author of The Odyssey, Homer, is also blind and a singer of poems, and he employs Demodocus as a double; both actors use their devalued bodies as an opportunity to operationalize the curricular cripistemology at hand. Disability lyricism offers an alternative narrative to the themes of war, destruction, human depravity toward others, and brute survival. In recognition of Odysseus’ lesson to his fellow tribesman, the poet takes up his trade and sings of myth as he does on most nights following the denouement of the games. Significantly, the story he tells on this occasion involves Hephaestus’s cuckolding by Mars and Venus; the tale places “the crook-foot god” center stage as a protagonist who bemoans being taken advantage of by two non-disabled gods (Rose 2003: 40).

Positioned at Demodocus’s feet the Phoenician athletes transform into students of their own pre-history. They find their devotion to athleticism seriously disrupted by a web of disability content woven by a blind author (Homer), through the common disability trope of a blind poet-prophet (Demodocus), telling the story of a disabled god (Hephaestus) seeking to redress social depreciation on basis of his differential embodiment. Mars and Venus’s desirability – associated specifically with ancient Greek bodily ideals of power and beauty – come to be outflanked by Hephaestus, a god with a disability whose mobility limitation presumably makes him more vulnerable to this kind of sexual deceit. Nonetheless, Hephaestus inverts the scenario in securing the couple’s mutual humiliation for the amusement of others by catching them up in a specially forged net of steel from which they cannot escape.

The Phoenicians – and, by extension, Homer’s future audiences – experience their own ideals of capacity displaced. Rather than excessive vulnerability, disability creates an alternative value system to the naturalized desirability of physical prowess, aesthetic norms of body types, and above average expectations of functionality. The upstaging of these ideals materializes a space of interaction mapped most effectively and queerly not by bodies trained and ‘perfected’ for competition, but by the cultural products crafted of blind poets and semi-mobile gods.

### 1NC – Adv 1

#### [1] Renewable transition causes US-China war – that escalates – as per their cribb evidence – extinction.

Michael Klare 5/31/21, - professor of peace and world security studies at Hampshire College and the author of "Resource Wars," "Blood and Oil," and "Rising Powers, Shrinking Planet: The New Geopolitics of Energy.", “Will there be resource wars in our renewable energy future?”, <https://www.salon.com/2021/05/31/will-there-be-resource-wars-in-our-renewable-energy-future_partner/>, accessed 9/23/21, -zc-

Thanks to its very name — renewable energy — we can picture a time in the not-too-distant future when our need for non-renewable fuels like oil, natural gas, and coal will vanish. Indeed, the Biden administration has announced a breakthrough target of 2035 for fully eliminating U.S. reliance on those non-renewable fuels for the generation of electricity. That would be accomplished by "deploying carbon-pollution-free electricity-generating resources," primarily the everlasting power of the wind and sun.

With other nations moving in a similar direction, it's tempting to conclude that the days when competition over finite supplies of energy was a recurring source of conflict will soon draw to a close. Unfortunately, think again: while the sun and wind are indeed infinitely renewable, the materials needed to convert those resources into electricity — minerals like cobalt, copper, lithium, nickel, and the rare-earth elements, or REEs — are anything but. Some of them, in fact, are far scarcer than petroleum, suggesting that global strife over vital resources may not, in fact, disappear in the Age of Renewables.

To appreciate this unexpected paradox, it's necessary to explore how wind and solar power are converted into usable forms of electricity and propulsion. Solar power is largely collected by photovoltaic cells, often deployed in vast arrays, while the wind is harvested by giant turbines, typically deployed in extensive wind farms. To use electricity in transportation, cars and trucks must be equipped with advanced batteries capable of holding a charge over long distances. Each one of these devices usessubstantial amounts of copper for electrical transmission, as well as a variety of other non-renewable minerals. Those wind turbines, for instance, require manganese, molybdenum, nickel, zinc, and rare-earth elements for their electrical generators, while electric vehicles (EVs) need cobalt, graphite, lithium, manganese, and rare earths for their engines and batteries.

At present, with wind and solar power accounting for only about 7% of global electricity generation and electric vehicles making up less than 1% of the cars on the road, the production of those minerals is roughly adequate to meet global demand. If, however, the U.S. and other countries really do move toward a green-energy future of the kind envisioned by President Biden, the demand for them will skyrocket and global output will fall far short of anticipated needs.

According to a recent study by the International Energy Agency (IEA), "The Role of Critical Minerals in Clean Energy Transitions," the demand for lithium in 2040 could be 50 times greater than today and for cobalt and graphite 30 times greater if the world moves swiftly to replace oil-driven vehicles with EVs. Such rising demand will, of course, incentivize industry to develop new supplies of such minerals, but potential sources of them are limited and the process of bringing them online will be costly and complicated. In other words, the world could face significant shortages of critical materials. ("As clean energy transitions accelerate globally," the IEA report noted ominously, "and solar panels, wind turbines, and electric cars are deployed on a growing scale, these rapidly growing markets for key minerals could be subject to price volatility, geopolitical influence, and even disruptions to supply.")

And here's a further complication: for a number of the most critical materials, including lithium, cobalt, and those rare-earth elements, production is highly concentrated in just a few countries, a reality that could lead to the sort of geopolitical struggles that accompanied the world's dependence on a few major sources of oil. According to the IEA, just one country, the Democratic Republic of the Congo (DRC), currently supplies more than 80% of the world's cobalt, and another — China — 70% of its rare-earth elements. Similarly, lithium production is largely in two countries, Argentina and Chile, which jointly account for nearly 80% of world supply, while four countries — Argentina, Chile, the DRC, and Peru — provide most of our copper. In other words, such future supplies are far more concentrated in far fewer lands than petroleum and natural gas, leading IEA analysts to worry about future struggles over the world's access to them.

From Oil to Lithium: the Geopolitical Implications of the Electric-Car Revolution

The role of petroleum in shaping global geopolitics is well understood. Ever since oil became essential to world transportation — and so to the effective functioning of the world's economy — it has been viewed for obvious reasons as a "strategic" resource. Because the largest concentrations of petroleum were located in the Middle East, an area historically far removed from the principal centers of industrial activity in Europe and North America and regularly subject to political convulsions, the major importing nations long sought to exercise some control over that region's oil production and export. This, of course, led to resource imperialism of a high order, beginning after World War I when Britain and the other European powers contended for colonial control of the oil-producing parts of the Persian Gulf region. It continued after World War II, when the United States entered that competition in a big way.

For the United States, ensuring access to Middle Eastern oil became a strategic priority after the "oil shocks" of 1973 and 1979 — the first caused by an Arab oil embargo that was a reprisal for Washington's support of Israel in that year's October War; the second by a disruption of supplies caused by the Islamic Revolution in Iran. In response to endless lines at American gas stations and the subsequent recessions, successive presidents pledged to protect oil imports by "any means necessary," including the use of armed force. And that very stance led President George H.W. Bush to wage the first Gulf War against Saddam Hussein's Iraq in 1991 and his son to invade that same country in 2003.

In 2021, the United States is no longer as dependent on Middle Eastern oil, given how extensively domestic deposits of petroleum-laden shale and other sedimentary rocks are being exploited by fracking technology. Still, the connection between oil use and geopolitical conflict has hardly disappeared. Most analysts believe that petroleum will continue to supply a major share of global energy for decades to come, and that's certain to generate political and military struggles over the remaining supplies. Already, for instance, conflict has broken out over disputed offshore supplies in the South and East China Seas, and some analysts predict a struggle for the control of untapped oil and mineral deposits in the Arctic region as well.

Here, then, is the question of the hour: Will an explosion in electric-car ownership change all this? EV market share is already growing rapidly and projected to reach 15% of worldwide sales by 2030. The major automakers are investing heavily in such vehicles, anticipating a surge in demand. There were around 370 EV models available for sale worldwide in 2020 — a 40% increase from 2019 — and major automakers have revealed plans to make an additional 450 models available by 2022. In addition, General Motors has announced its intention to completely phase out conventional gasoline and diesel vehicles by 2035, while Volvo's CEO has indicated that the company would only sell EVs by 2030.

It's reasonable to assume that this shift will only gain momentum, with profound consequences for the global trade in resources. According to the IEA, a typical electric car requires six times the mineral inputs of a conventional oil-powered vehicle. These include the copper for electrical wiring plus the cobalt, graphite, lithium, and nickel needed to ensure battery performance, longevity, and energy density (the energy output per unit of weight). In addition, rare-earth elements will be essential for the permanent magnets installed in EV motors.

Lithium, a primary component of lithium-ion batteries used in most EVs, is the lightest known metal. Although present both in clay deposits and ore composites, it's rarely found in easily mineable concentrations, though it can also be extracted from brine in areas like Bolivia's Salar de Uyuni, the world's largest salt flat. At present, approximately 58% of the world's lithium comes from Australia, another 20% from Chile, 11% from China, 6% from Argentina, and smaller percentages from elsewhere. A U.S. firm, Lithium Americas, is about to undertake the extraction of significant amounts of lithium from a clay deposit in northern Nevada, but is meeting resistance from local ranchers and Native Americans, who fear the contamination of their water supplies.

Cobalt is another key component of lithium-ion batteries. It's rarely found in unique deposits and most often acquired as a byproduct of copper and nickel mining. Today, it's almost entirely produced thanks to copper mining in the violent, chaotic Democratic Republic of the Congo, mostly in what's known as the copper belt of Katanga Province, a region which once sought to break away from the rest of the country and still harbors secessionist impulses.

Rare-earth elements encompass a group of 17 metallic substances scattered across the Earth's surface but rarely found in mineable concentrations. Among them, several are essential for future green-energy solutions, including dysprosium, lanthanum, neodymium, and terbium. When used as alloys with other minerals, they help perpetuate the magnetization of electrical motors under high-temperature conditions, a key requirement for electric vehicles and wind turbines. At present, approximately 70% of REEs come from China, perhaps 12% from Australia, and 8% from the U.S.

A mere glance at the location of such concentrations suggests that the green-energy transition envisioned by President Biden and other world leaders may encounter severe geopolitical problems, not unlike those generated in the past by reliance on oil. As a start, the most militarily powerful nation on the planet, the United States, can supply itself with only tiny percentages of REEs, as well as other critical minerals like nickel and zinc needed for advanced green technologies. While Australia, a close ally, will undoubtedly be an important supplier of some of them, China, already increasingly viewed as an adversary, is crucial when it comes to REEs, and the Congo, one of the most conflict-plagued nations on the planet, is the leading producer of cobalt. So don't for a second imagine that the transition to a renewable-energy future will either be easy or conflict-free.

#### [2] Space colonization causes existential wars – secessionist movements, reactionist colonies, and inter-colonial conflict outweigh every terrestrial war in history.

Kovic ’21 [Marko; February 2021; independent researcher and PhD at Institute of Mass Communication and Media Research, University of Zurich; Futures, “Risks of space colonization,” vol. 126; kp]

5 Conflict risks

Conflict risks are risks that are created by the prospect of hostile actors or powers in the context of space colonization. Conflict risks are in principle not unlike conflicts that humankind has experienced throughout its Earth-based history, but they are much greater in scope and severity. The four conflict risks I focus on are depicted in Figure 5.

Figure 5: Conflict risks of space colonization.

I identify two catastrophic and two existential conflict risks.

5.1 Secession and independence conflicts

Human habitats beyond Earth are likely to remain modest in the near- term future. The International Space Station, humankind’s most advanced habitat-like project so far, can accommodate six people and is dependent on supplies from Earth. More ambitious colonization projects such as SpaceX’s plan for Mars colonies typically envision what amounts to very small and simple camps [39]. Managing such simple colonization projects should be doable legally and politically. With more mature colonies, however, the pic- ture changes.

Imagine, for example, the large, self-sustaining habitat on Venus that consists of 2 billion people that I mentioned in a thought experiment before. That hypothetical habitat is truly self-sustainable, in the sense that survival on Venus is not contingent in any way on resources or other kinds of support from Earth. If prior human history is an indication, it is conceivable that the Venusians could at some point seek to change their political status. They might want to no longer be governed by Earth or Earth-based governements and instead have sovereignty to autonomously and freely shape Venus’ future. They might, in other words, seek to seceede and become an independent political entity.

Given prior human history of secession and independence movements, such a claim to independence in the context of space colonization could easily result in violent conflict, and given the scale of the conflict parties in this scenario, the bloodshed could be much greater than all the wars that happened in Earth’s history so far. Of course, we do not know what the dominant political philosophy of the future will be. Perhaps popular sovereignty and the wish for autonomy will be fully respected and met with unconditional, enlightened understanding. But that prospect is, at best, uncertain, and the prospect of catastrophic violent conflicts seems at least possible.

5.2 Reactionary colonies

Let us assume for the sake of argument that the risks surrounding secession- ist claims of extraterrestrial colonies will eventually have been overcome and that there are colonies which have attained a country-like or world-like status. What should the political systems in and the moral foundations of those independent colonies look like? Ideally, they would be at least as democratic, liberal, and generally morally progressive as the most democratic, liberal, and morally progressive countries today. More specifically, independent fu- ture colonies should have socio-political systems that do not lower average wellbeing or create (disproportionately) more suffering compared to their pre-existing peers such as Earth-based countries (Or whatever the dominant polity on Earth in that future might be.). However, there is no guarantee that independent colonies will meet that socio-political and moral bar. It is possible that there will be colonies whose socio-political systems are regressive in one way or another, marked by a relative moral decay compared to the baseline of political systems and moral frameworks. I call such potential undesirable entities reactionary colonies.

The emergence of reactionary colonies might seem implausible given that humankind has, very roughly speaking, so far morally improved over the course of its history8. But reactionary colonies might actually be a fairly common future development. If humankind at some point achieves the tech- nological means for creating colonies with relative ease, creating new colonies might be an attractive option for extremist groups and beliefs. Imagine, for example, a religious group that believes in the fundamental superiority of men over women. Such a religious group might find it difficult adhering to their flawed moral principles in a pluralistic society. Opting for colonial exodus might represent an attractive opportunity for that religious group to build a society from scratch which is based on their notions of female inferiority and subjugation.

The specific risk posed by reactionary colonies ist twofold. Reactionary colonies would by definition lower the average happiness and wellbeing of humankind and create unnecessary, preventable suffering. Reactionary colonies would also represent potential rogue actors that could greatly amplify the aberration risks described in section 4. For example, a dictatorial regime that causes great suffering to its population might be tempted to expand its dictatorial ideology to other colonies. Or that dictatorial colony could be led by a psychopathic elite that enjoys letting sentient simulations suffer as much as possible. The potential catastrophic and even existential multiplicator effects of reactionary colonies are, unfortunately, numerous.

5.3 Inter-colonial conflict

Let us, again for the sake of the argument, assume that the previous problem of reactionary colonies has somehow been solved or avoided. Humankind has continued its path of technological development, and it has established several large clusters of colonies beyond the Solar system. Assuming that the fundamental problem of faster-than-light communication has not been solved yet, communication between the clusters lags months or even years, and physical contact between the clusters is rare since travel takes even longer than communication.

The inevitable consequence of such a splintering of human civilization is that the different clusters of colonies would over time develop distinct cultures, and with only scarce and delayed contact with other clusters, a form of intergroup bias [40], the moral preference of one’s own in-group over the out-group, would likely start to manifest. Over time, that us-versus- them heuristic could help create distinct and solidified social identities within the colony clusters [41], and the beliefs and preferences about the outgroup colonies could become more overtly negative. Given enough time and great enough idiosyncratic development within each colony cluster, the cultural and moral connections between the colony clusters could further erode, and in their place, a sense of dread and looming danger about the others’ goals and preferences could take hold. Over a long enough period of time and great enough separation, the perception that other colonies are a threat could grow; so much so that taking preventative action and attacking and suppressing them might seem like the most rational course of action [42]. Given the scale and the likely technological sophistication of future weapons systems, a violent conflict between advanced colonies and colony clusters would create suffering on an astronomical scale.

Of course, the prospect of inter-colonial conflict is somewhat speculative [43]. But given humankind’s past experiences, violent conflict clearly seems within the realm of the possible. That does not mean that such an almost immeasurably terrible conflict is unavoidable. Even the slightest probability of such conflict, however, means immense potential expected disvalue.

#### S risks outweigh.

Kovic ’21 [Marko; February 2021; independent researcher and PhD at Institute of Mass Communication and Media Research, University of Zurich; Futures, “Risks of space colonization,” vol. 126; kp] – [bracketed for readability]

4.3 Astronomical suffering Space colonization means that humans and human actions will spread beyond Earth and possibly cover, relatively speaking, vast areas of the reachable universe. This will potentially create immense positive value, but it also makes possible a form of existential risks that are astronomical in scope and hellish in severity — that are, in other words, orders of magnitude worse than anything humankind has caused or encountered so far. This subset of extreme existential risks is referred to as suffering risks [S-Risks] [35]. Suffering risks are risks that are far worse than humankind going extinct or entering permanent moral stagnation because they mean that the suffering that is created through these risks is far greater than all suffering that has existed on Earth so far. There are different vectors of potential astronomical suffering. For example, it is conceivable that future human generations will spread wildlife throughout the colonized space, either inadvertently or actively. Wild animals on Earth generally lead short, miserable lives full of sometimes the most brutal suffering [36]. In in the history of Earth, wildlife suffering has not really improved at all, so astronomical wildlife suffering would likely represent a constant source of disvalue. Another vector for suffering risks are sentient simulations. Given growing computational power, it is conceivable that we will eventually be able to simulate sentience, and as soon as simulated sentience is possible, simulated suffering will be as well. This technological path is not necessarily depen- dent on space colonization, but a colonizing humankind might have greater capabilities for running such simulations, for example by tapping into the power of stars in different Solar systems. Instances of simulated suffering could create more suffering than has ever occurred in the biological universe, within fractions of a second. The risk of astronomical suffering is more uncertain than other existential risks, but it is at the same time more severe. At stake is not just humankind’s total potential positive future moral value, but disvalue that is decoupled from humankind and is potentially many orders of magnitude greater than all the happiness and wellbeing that could be created by human colonization of space.

#### [3] Tech’s spurring smart cities AND innovation now

Tarry Singh 19. Columnist, CEO, Founder and AI Neuroscience Researcher of AI startup https://deepkapha.ai. deepkapha.ai. 03/04/2019. "AI Economy Will Further Accelerate The Pace Of Innovation." Forbes. https://www.forbes.com/sites/cognitiveworld/2019/03/04/ai-economy-will-further-accelerate-the-pace-of-innovation/#4c584a4b2f29

Technological Innovation - why is it speeding up? I've been writing on Linkedin occasionally and thought of summarizing some massively trending posts that might help explain my motivation for posting these mini-videos. Trending Video #1 - Pace of innovation in tech is driving traditional companies out of business This example clearly shows how Apple came from near-bankruptcy to take the crown of the most loved brand in the world. Same applies for companies that did not even exist 20 years ago like Google, Amazon, Facebook. Future outlook: If your company is not investing heavily in data-driven intelligence, then it will not last the next decade. Trending Video #2 - Learning genetically programmed cells to hunt and kill cancer cells Today In: Innovation This innovation in Nanotech cancer research medicine is one such example. Future benefit: Here where technology has made it possible for us to see how the right drugs, programmed drugs or cells could save humanity's worst curse. Trending Video #3 - Learning a Car to Drive Using Evolutionary Algorithms This example is in the area of Deep Reinforcement Learning that uses the NeuroEvolution Technique to teach a car to learn about racing. Future outlook: In the 60s driving was fun and a privilege. These days densely connected cities and traffic have made driving a big problem. Algorithms like these will help us develop self-driving cars that can do the job better than us without stress! WHY is it speeding up? Fast broadband internet, inexpensive commodity hardware and soon inexpensive HPC hardware too for individual researchers and scientists. Engineers and managers too may have fast computers under their desks soon! PART 2: What is HPC and why is it becoming the backbone of AI innovation High performance computing is in the backend making cities smarter, organisations data-driven and decision making a streamlined process that can sift through yottabytes (meaning: huge quantities of data) with ease. AI will speed up the pace of innovation HTTPS://WWW.HPCWIRE.COM/2018/01/18/NEW-BLUEPRINT-CONVERGING-HPC-BIG-DATA/ Technological innovation is happening at a very rapid pace and with Artificial Intelligence and the associated architectures that come with it, it will even go faster! PART 3: Artificial Intelligence will further accelerate this pace, but HOW? This all started when Google open sourced its Machine Learning library TensorFlow, AI library and Tensor Processing Unit. Someday we will look back and say how this was the turning point of the AI Economy - or whatever fancy term it will be then in 2030. Obviously Facebook too followed the open source path releasing PyTorch. Today we hear that Uber, Netflix, Tesla and practically all fast growing companies are using some form of Machine Learning and/or Deep Learning architectures. Nvidia obviously is running ahead with their GPUs (Graphic Cards) but two things will define the next wave of this revolution : We will have architectures all about Tensors We will see decline and slow death of 32-bit and 64-bit IEEE 754 floating-point architectures You might wonder: "Wait, What is a Tensor" Moving on... [I apologize in advance for making math out of this fun storytelling but it is crucial, stay with me] It's nothing new, you've been using this in the 80s as well: Tensor languages have actually been around for years. Programming languages like APL and Fortran have used it in the past. Numerical computing optimization has been going on for a while: In the 1950s already programmers knew how to make linear algebra go faster by blocking the data to fit the architecture. Matrix-matrix operations, in particular, run best when the matrices are tiled into submatrices, and even sub-submatrices. Dot Product - Huh? Perhaps you've have heard from your engineers or employee of this term. If not, you've done this in high school math some time ago. All the pictures or text corpus that your Machine Learning or Deep Learning engineers are using to do face recognition, securing devices from hacks or analysing traffic for self-driving cars are essentially (somewhere) Matrix-matrix operations. OK, I'll stop now before your head hurts! AI will dramatically make many computing paradigms of the 90s and 2000s obsolete as new models, architectures and hardware solutions will flood the market in the next 5-7 year.

#### [4] Squo solves urbanization

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Smart cities are entering a new phase, as not only are city leaders readily installing digital solutions to improve efficiencies, such as cutting down the minutes spent on a daily commute, but residents are now able to use their smartphones as the keys to the city that unlock further capabilities by injecting additional data into the ‘smart’ ecosystem, according to a 2018 report from the McKinsey Global Institute.

Smart cities are also spreading from the major metropolitan areas where they’ve typically originated, to smaller locales.

“What we’ve seen is this funnel down from large metropolitan, high density, urban areas. The projects that they have in New York, Boston, Jakarta – really large global cities – have started to come down to some of the more medium-sized urban environments – Arlington, Texas, Kansas City – where you’re seeing deployment of certain technology that’s getting them used to the process needed to cooperate between the public and private entities,” said Thom Rickert, vice president and emerging risks specialist of Trident Public Risk Solutions.

Toronto, Singapore, Amsterdam, and Paris are just a few of the other cities across the globe getting attention for their smart city initiatives, though they’re far from the only ones. Some, like Copenhagen, are also employing sustainability models and going ‘green’ through, for example, the replacement of street lights with LED lighting, which brings an almost immediate benefit in terms of maintenance and electricity costs, explained Rickert. Citizens in turn see improvements from walking in better lit areas.

#### [5] Cyber scenarios are a self-fulfilling prophecy.

Overland 19 – Indra Overland heads the Centre for Energy Research at NUPI and is Professor II at Nord University. He did his PhD at the University of Cambridge and has since worked extensively on the post-Soviet energy sector, including oil, gas and renewables, March 2019 (“The geopolitics of renewable energy: Debunking four emerging myths”, *Energy Research and Social Science*, Vol. 49, pp. 36-40, Available online at <https://www.sciencedirect.com/science/article/pii/S2214629618308636?via%3Dihub>, Accessed 03-23-2021)

5. Cybersecurity as a geopolitical risk The growth of renewable energy is occurring simultaneously with another major development: digitalization. Digitalization can help keep grids balanced, even as large numbers of renewable energy producers raise and lower production depending on the weather [61]. This causes academics, security think tanks, intelligence and security organizations, parliamentary committees, and consultancies to fear that terrorists or the intelligence services of hostile countries may hack the computers that control utilities and grids [39], [62]. Clearly, there is cause for these concerns as society becomes dependent on new technologies and the growing complexity of digital systems for grid management can give rise to new cybersecurity challenges. However, sometimes such concerns are overstated, as in when the potential large-scale hacking of smart meters was likened to “the modern day equivalent of a nuclear strike” [63] cited in [62]. Those who raise concerns about the cyber-security of electricity grids at seminars and conferences often invoke the case of a cyber-attack against three energy distribution companies in Ukraine in 2015 [64]. As a result of this attack, substations in 30 locations in Western Ukraine were shut down, cutting off the electricity supply to 230 000 people for a period of between 1 and 6 hours [65]. While utilities and electricity distribution networks in many countries are subject to frequent hacking attempts, this is considered to have been the first successful attack on this scale and with such geopolitical significance, foreshadowing the role of cyber-attacks in the future energy system. However, it is worth noting that Ukraine was a special case, comprising unusually dilapidated infrastructure, a high level of corruption, a military conflict with Russia, and exceptional possibilities for Russian infiltration due to the historical linkages between the two countries [66]. Despite all these issues, only 0.015% of Ukraine's daily electricity consumption was affected, and only for a few hours [67]. The use and associated risks of electricity are not new per se, as all homes, companies, and institutions in developed countries already depend on electricity grids, and grids have been controlled digitally for decades. It is also probable that increased use of renewable energy will lead to greater decentralization, with millions of prosumer households supplying electricity. This may actually make the system more resilient, as many different units will have to be hacked to destabilize the system as a whole. Like many pessimistic, policy-oriented forecasts, those concerning digitalization and cybersecurity have merit, but are also potentially self-destructing predictions: the more such predictions are made, the greater the likelihood that incumbents will be encouraged to implement counter-measures. In other words, the predictors are part of the social context about which they are trying to make a prediction and may influence that context in the process. As a source of policy recommendations, discourse on cybersecurity is therefore clearly useful; as a prediction about the future energy system it is trickier. As one of the rare critical contributions in the cybersecurity field put it, “Moderate and measured takes on cyber security threats are swamped by the recent flood of research and policy positions in the cyber research field offering hyperbolic perspectives based on limited observations” [68] (see also [69]).

### 1NC – Adv 2

#### [8] Humans survive nuclear war but industrial society doesn’t – lack of resources and knowledge makes it impossible to recover.

Lewis Dartnell 4/13/15, - UK Space Agency research fellow at the University of Leicester, working in astrobiology and the search for microbial life on Mars., writing for aeon, “Out of the ashes” (for some reason other people cite this as “Could we reboot a modern civilisation without fossil fuels?”), <https://aeon.co/essays/could-we-reboot-a-modern-civilisation-without-fossil-fuels>, accessed 5/9/21, famous card, recut by -zc-

Imagine that the world as we know it ends tomorrow. There’s a global catastrophe: a pandemic virus, an asteroid strike, or perhaps a nuclear ~~holocaust~~. [war] The vast majority of the human race perishes. Our civilisation collapses. The post-apocalyptic survivors find themselves in a devastated world of decaying, deserted cities and roving gangs of bandits looting and taking by force. Bad as things sound, that’s not the end for humanity. We bounce back. Sooner or later, peace and order emerge again, just as they have time and again through history. Stable communities take shape. They begin the agonising process of rebuilding their technological base from scratch. But here’s the question: how far could such a society rebuild? Is there any chance, for instance, that a post-apocalyptic society could reboot a technological civilisation? Let’s make the basis of this thought experiment a little more specific. Today, we have already consumed the most easily drainable crude oil and, particularly in Britain, much of the shallowest, most readily mined deposits of coal. Fossil fuels are central to the organisation of modern industrial society, just as they were central to its development. Those, by the way, are distinct roles: even if we could somehow do without fossil fuels now (which we can’t, quite), it’s a different question whether we could have got to where we are without ever having had them. So, would a society starting over on a planet stripped of its fossil fuel deposits have the chance to progress through its own Industrial Revolution? Or to phrase it another way, what might have happened if, for whatever reason, the Earth had never acquired its extensive underground deposits of coal and oil in the first place? Would our progress necessarily have halted in the 18th century, in a pre-industrial state? It’s easy to underestimate our current dependence on fossil fuels. In everyday life, their most visible use is the petrol or diesel pumped into the vehicles that fill our roads, and the coal and natural gas which fire the power stations that electrify our modern lives. But we also rely on a range of different industrial materials, and in most cases, high temperatures are required to transform the stuff we dig out of the ground or harvest from the landscape into something useful. You can’t smelt metal, make glass, roast the ingredients of concrete, or synthesise artificial fertiliser without a lot of heat. It is fossil fuels – coal, gas and oil – that provide most of this thermal energy. In fact, the problem is even worse than that. Many of the chemicals required in bulk to run the modern world, from pesticides to plastics, derive from the diverse organic compounds in crude oil. Given the dwindling reserves of crude oil left in the world, it could be argued that the most wasteful use for this limited resource is to simply burn it. We should be carefully preserving what’s left for the vital repertoire of valuable organic compounds it offers. But my topic here is not what we should do now. Presumably everybody knows that we must transition to a low-carbon economy one way or another. No, I want to answer a question whose interest is (let’s hope) more theoretical. Is the emergence of a technologically advanced civilisation necessarily contingent on the easy availability of ancient energy? Is it possible to build an industrialised civilisation without fossil fuels? And the answer to that question is: maybe – but it would be extremely difficult. Let’s see how. We’ll start with a natural thought. Many of our alternative energy technologies are already highly developed. Solar panels, for example, represent a good option today, and are appearing more and more on the roofs of houses and businesses. It’s tempting to think that a rebooted society could simply pick up where we leave off. Why couldn’t our civilisation 2.0 just start with renewables? Well, it could, in a very limited way. If you find yourself among the survivors in a post-apocalyptic world, you could scavenge enough working solar panels to keep your lifestyle electrified for a good long while. Without moving parts, photovoltaic cells require little maintenance and are remarkably resilient. They do deteriorate over time, though, from moisture penetrating the casing and from sunlight itself degrading the high-purity silicon layers. The electricity generated by a solar panel declines by about 1 per cent every year so, after a few generations, all our hand-me-down solar panels will have degraded to the point of uselessness. Then what? New ones would be fiendishly difficult to create from scratch. Solar panels are made from thin slices of extremely pure silicon, and although the raw material is common sand, it must be processed and refined using complex and precise techniques – the same technological capabilities, more or less, that we need for modern semiconductor electronics components. These techniques took a long time to develop, and would presumably take a long time to recover. So photovoltaic solar power would not be within the capability of a society early in the industrialisation process. Perhaps, though, we were on the right track by starting with electrical power. Most of our renewable-energy technologies produce electricity. In our own historical development, it so happens that the core phenomena of electricity were discovered in the first half of the 1800s, well after the early development of steam engines. Heavy industry was already committed to combustion-based machinery, and electricity has largely assumed a subsidiary role in the organisation of our economies ever since. But could that sequence have run the other way? Is there some developmental requirement that thermal energy must come first? On the face of it, it’s not beyond the bounds of possibility that a progressing society could construct electrical generators and couple them to simple windmills and waterwheels, later progressing to wind turbines and hydroelectric dams. In a world without fossil fuels, one might envisage an electrified civilisation that largely bypasses combustion engines, building its transport infrastructure around electric trains and trams for long-distance and urban transport. I say ‘largely’. We couldn’t get round it all together. When it comes to generating the white heat demanded by modern industry, there are few good options but to burn stuff While the electric motor could perhaps replace the coal-burning steam engine for mechanical applications, society, as we’ve already seen, also relies upon thermal energy to drive the essential chemical and physical transformations it needs. How could an industrialising society produce crucial building materials such as iron and steel, brick, mortar, cement and glass without resorting to deposits of coal? You can of course create heat from electricity. We already use electric ovens and kilns. Modern arc furnaces are used for producing cast iron or recycling steel. The problem isn’t so much that electricity can’t be used to heat things, but that for meaningful industrial activity you’ve got to generate prodigious amounts of it, which is challenging using only renewable energy sources such as wind and water. An alternative is to generate high temperatures using solar power directly. Rather than relying on photovoltaic panels, concentrated solar thermal farms use giant mirrors to focus the sun’s rays onto a small spot. The heat concentrated in this way can be exploited to drive certain chemical or industrial processes, or else to raise steam and drive a generator. Even so, it is difficult (for example) to produce the very high temperatures inside an iron-smelting blast furnace using such a system. What’s more, it goes without saying that the effectiveness of concentrated solar power depends strongly on the local climate. No, when it comes to generating the white heat demanded by modern industry, there are few good options but to burn stuff. But that doesn’t mean the stuff we burn necessarily has to be fossil fuels. Let’s take a quick detour into the pre-history of modern industry. Long before the adoption of coal, charcoal was widely used for smelting metals. In many respects it is superior: charcoal burns hotter than coal and contains far fewer impurities. In fact, coal’s impurities were a major delaying factor on the Industrial Revolution. Released during combustion, they can taint the product being heated. During smelting, sulphur contaminants can soak into the molten iron, making the metal brittle and unsafe to use. It took a long time to work out how to treat coal to make it useful for many industrial applications. And, in the meantime, charcoal worked perfectly well. And then, well, we stopped using it. In retrospect, that’s a pity. When it comes from a sustainable source, charcoal burning is essentially carbon-neutral, because it doesn’t release any new carbon into the atmosphere – not that this would have been a consideration for the early industrialists. But charcoal-based industry didn’t die out altogether. In fact, it survived to flourish in Brazil. Because it has substantial iron deposits but few coalmines, Brazil is the largest charcoal producer in the world and the ninth biggest steel producer. We aren’t talking about a cottage industry here, and this makes Brazil a very encouraging example for our thought experiment. The trees used in Brazil’s charcoal industry are mainly fast-growing eucalyptus, cultivated specifically for the purpose. The traditional method for creating charcoal is to pile chopped staves of air-dried timber into a great dome-shaped mound and then cover it with turf or soil to restrict airflow as the wood smoulders. The Brazilian enterprise has scaled up this traditional craft to an industrial operation. Dried timber is stacked into squat, cylindrical kilns, built of brick or masonry and arranged in long lines so that they can be easily filled and unloaded in sequence. The largest sites can sport hundreds of such kilns. Once filled, their entrances are sealed and a fire is lit from the top. The skill in charcoal production is to allow just enough air into the interior of the kiln. There must be enough combustion heat to drive out moisture and volatiles and to pyrolyse the wood, but not so much that you are left with nothing but a pile of ashes. The kiln attendant monitors the state of the burn by carefully watching the smoke seeping out of the top, opening air holes or sealing with clay as necessary to regulate the process. Brazil shows how the raw materials of modern civilisation can be supplied without reliance on fossil fuels Good things come to those who wait, and this wood pyrolysis process can take up to a week of carefully controlled smouldering. The same basic method has been used for millennia. However, the ends to which the fuel is put are distinctly modern. Brazilian charcoal is trucked out of the forests to the country’s blast furnaces where it is used to transform ore into pig iron. This pig iron is the basic ingredient of modern mass-produced steel. The Brazilian product is exported to countries such as China and the US where it becomes cars and trucks, sinks, bathtubs, and kitchen appliances. Around two-thirds of Brazilian charcoal comes from sustainable plantations, and so this modern-day practice has been dubbed ‘green steel’. Sadly, the final third is supplied by the non-sustainable felling of primary forest. Even so, the Brazilian case does provide an example of how the raw materials of modern civilisation can be supplied without reliance on fossil fuels. Another, related option might be wood gasification. The use of wood to provide heat is as old as mankind, and yet simply burning timber only uses about a third of its energy. The rest is lost when gases and vapours released by the burning process blow away in the wind. Under the right conditions, even smoke is combustible. We don’t want to waste it. Better than simple burning, then, is to drive the thermal breakdown of the wood and collect the gases. You can see the basic principle at work for yourself just by lighting a match. The luminous flame isn’t actually touching the matchwood: it dances above, with a clear gap in between. The flame actually feeds on the hot gases given off as the wood breaks down in the heat, and the gases combust only once they mix with oxygen from the air. Matches are fascinating when you look at them closely. Wartime gasifier cars could achieve about 1.5 miles per kilogram. Today’s designs improve upon this To release these gases in a controlled way, bake some timber in a closed container. Oxygen is restricted so that the wood doesn’t simply catch fire. Its complex molecules decompose through a process known as pyrolysis, and then the hot carbonised lumps of charcoal at the bottom of the container react with the breakdown products to produce flammable gases such as hydrogen and carbon monoxide. The resultant ‘producer gas’ is a versatile fuel: it can be stored or piped for use in heating or street lights, and is also suitable for use in complex machinery such as the internal combustion engine. More than a million gasifier-powered cars across the world kept civilian transport running during the oil shortages of the Second World War. In occupied Denmark, 95 per cent of all tractors, trucks and fishing boats were powered by wood-gas generators. The energy content of about 3 kg of wood (depending on its dryness and density) is equivalent to a litre of petrol, and the fuel consumption of a gasifier-powered car is given in miles per kilogram of wood rather than miles per gallon. Wartime gasifier cars could achieve about 1.5 miles per kilogram. Today’s designs improve upon this. But you can do a lot more with wood gases than just keep your vehicle on the road. It turns out to be suitable for any of the manufacturing processes needing heat that we looked at before, such as kilns for lime, cement or bricks. Wood gas generator units could easily power agricultural or industrial equipment, or pumps. Sweden and Denmark are world leaders in their use of sustainable forests and agricultural waste for turning the steam turbines in power stations. And once the steam has been used in their ‘Combined Heat and Power’ (CHP) electricity plants, it is piped to the surrounding towns and industries to heat them, allowing such CHP stations to approach 90 per cent energy efficiency. Such plants suggest a marvellous vision of industry wholly weaned from its dependency on fossil fuel. Is that our solution, then? Could our rebooting society run on wood, supplemented with electricity from renewable sources? Maybe so, if the population was fairly small. But here’s the catch. These options all presuppose that our survivors are able to construct efficient steam turbines, CHP stations and internal combustion engines. We know how to do all that, of course – but in the event of a civilisational collapse, who is to say that the knowledge won’t be lost? And if it is, what are the chances that our descendants could reconstruct it? In our own history, the first successful application of steam engines was in pumping out coal mines. This was a setting in which fuel was already abundant, so it didn’t matter that the first, primitive designs were terribly inefficient. The increased output of coal from the mines was used to first smelt and then forge more iron. Iron components were used to construct further steam engines, which were in turn used to pump mines or drive the blast furnaces at iron foundries. And of course, steam engines were themselves employed at machine shops to construct yet more steam engines. It was only once steam engines were being built and operated that subsequent engineers were able to devise ways to increase their efficiency and shrink fuel demands. They found ways to reduce their size and weight, adapting them for applications in transport or factory machinery. In other words, there was a positive feedback loop at the very core of the industrial revolution: the production of coal, iron and steam engines were all mutually supportive. In a world without readily mined coal, would there ever be the opportunity to test profligate prototypes of steam engines, even if they could mature and become more efficient over time? How feasible is it that a society could attain a sufficient understanding of thermodynamics, metallurgy and mechanics to make the precisely interacting components of an internal combustion engine, without first cutting its teeth on much simpler external combustion engines – the separate boiler and cylinder-piston of steam engines? It took a lot of energy to develop our technologies to their present heights, and presumably it would take a lot of energy to do it again. Fossil fuels are out. That means our future society will need an awful lot of timber. An industrial revolution without coal would be, at a minimum, very difficult In a temperate climate such as the UK’s, an acre of broadleaf trees produces about four to five tonnes of biomass fuel every year. If you cultivated fast-growing kinds such as willow or miscanthus grass, you could quadruple that. The trick to maximising timber production is to employ coppicing – cultivating trees such as ash or willow that resprout from their own stump, becoming ready for harvest again in five to 15 years. This way you can ensure a sustained supply of timber and not face an energy crisis once you’ve deforested your surroundings. But here’s the thing: coppicing was already a well-developed technique in pre-industrial Britain. It couldn’t meet all of the energy requirements of the burgeoning society. The central problem is that woodland, even when it is well-managed, competes with other land uses, principally agriculture. The double-whammy of development is that, as a society’s population grows, it requires more farmland to provide enough food and also greater timber production for energy. The two needs compete for largely the same land areas. We know how this played out in our own past. From the mid-16th century, Britain responded to these factors by increasing the exploitation of its coal fields – essentially harvesting the energy of ancient forests beneath the ground without compromising its agricultural output. The same energy provided by one hectare of coppice for a year is provided by about five to 10 tonnes of coal, and it can be dug out of the ground an awful lot quicker than waiting for the woodland to regrow. It is this limitation in the supply of thermal energy that would pose the biggest problem to a society trying to industrialise without easy access to fossil fuels. This is true in our post-apocalyptic scenario, and it would be equally true in any counterfactual world that never developed fossil fuels for whatever reason. For a society to stand any chance of industrialising under such conditions, it would have to focus its efforts in certain, very favourable natural environments: not the coal-island of 18th-century Britain, but perhaps areas of Scandinavia or Canada that combine fast-flowing streams for hydroelectric power and large areas of forest that can be harvested sustainably for thermal energy. Even so, an industrial revolution without coal would be, at a minimum, very difficult. Today, use of fossil fuels is actually growing, which is worrying for a number of reasons too familiar to rehearse here. Steps towards a low-carbon economy are vital. But we should also recognise how pivotal those accumulated reservoirs of thermal energy were in getting us to where we are. Maybe we could have made it the hard way. A slow-burn progression through the stages of mechanisation, supported by a combination of renewable electricity and sustainably grown biomass, might be possible after all. Then again, it might not. We’d better hope we can secure the future of our own civilisation, because we might have scuppered the chances of any society to follow in our wake.

#### [9] Future tech causes extinction – particle accelerators ensure it and black swans are likely due to lack of regulations.

Landfish (Real Name: Jeffery Ladish), 2/3/20, - Security Consultant, specializing in existential risks: specifically nuclear war, pandemics, AI, and bioengineering. Founder of Gordian Research – writing for Lesswrong, “Absent coordination, future technology will cause human extinction”, <https://www.lesswrong.com/posts/awyDhCjptukxKdwih/absent-coordination-future-technology-will-cause-human>, accessed 5/9/21, -zc-

Nick Bostrom, of the Future of Humanity Institute, uses an evocative metaphor to describe the future of humanity’s technological development: One way of looking at human creativity is as a process of pulling balls out of a giant urn. The balls represent possible ideas, discoveries, technological inventions. Over the course of history, we have extracted a great many balls — mostly white (beneficial) but also various shades of grey (moderately harmful ones and mixed blessings). What we haven’t extracted, so far, is a black ball: a technology that invariably or by default destroys the civilization that invents it. The reason is not that we have been particularly careful or wise in our technology policy. We have just been lucky. The atom bomb, together with the long range bomber, marked the first time a small group of people could destroy dozens of cities in a matter of hours. The physicists who worked on the bomb knew that this invention had the capacity to threaten human civilization with unprecedented destruction. They built it out of fear that if they did not, an enemy state like Nazi Germany would build it first. With this development, the destructive power of humanity increased by several orders of magnitude. History barely had time to catch its breath before many of these same physicists created a new type of nuclear bomb, the hydrogen bomb, that was hundreds of times more powerful than the atom bomb. They did it for the same reasons, out of fear that a rival state would build it first. The Soviet Union used the same justification to build their biological weapons program during the Cold War, producing large quantities of anthrax, plague, smallpox, and other biological weaponry. As far as we know, the United States did not have a comparably large program, but the fear that the US might have one was sufficient to motivate the Soviet leadership. Examples like this are not exceptions; they are the norm. It’s clear from the history of warfare that the fear of a rival getting a technology first is sufficient to motivate the creation of purely destructive technology, including those that risk massive blowback from radiation, disease, or direct retaliation. This desire to get there first is not the only incentive to develop civilization-threatening technology, but it is the one that seems to drive people to take the most risks at a civilizational level. Even when there is no perceived threat, the other motivations for technological innovation — profit, prestige, altruism, etc. — drive us to create new things. For most technologies this is good, and has enabled most of the progress of human civilization. The problem only arises when our technology becomes powerful enough to threaten civilization itself. While innovation is hard, it’s even more difficult to anticipate potentially dangerous innovations and prevent their creation. It’s made more difficult by the lack of personal incentive. We all know the names of famous inventors, but have you ever heard of a famous risk analyst who successfully prevented the development of a dangerous technology? I doubt it. Still, while long term trends favor aggressive tech development, there are controls in place which slow the development of known dangerous technologies. The Non-Proliferation Treaty, the Biological Weapons Convention, and other efforts put pressure on states not to build new nuclear, chemical, or biological weapons, with variable success. Within their own borders, most countries create and enforce laws forbidding private citizens from researching or building weapons of mass destruction. Some disincentives for dangerous technology development are cultural. The Asilomar Conference on Recombinant DNA in 1975 was an impressive effort by biologists to make sure their field did not create dangerous new kinds of organisms. A strong safety culture can lead to a reduction in accidents and an inclination towards safe exploration, though it’s not always clear how to create such a culture. In the private sector, companies balance the benefits of “moving fast and breaking things” with the negative PR that comes from developing safety-critical tech without adequate safeguards. After one of Uber’s driverless cars killed a woman last year and the details were released, the poor safety practices of Uber were revealed. We can hope that the backlash from such accidents will incentivize a safer exploration of these technologies in the future. Other AI companies appear more inclined to invest in safety & robustness measures upfront. Both Deepmind and OpenAI, two leaders in deep learning research, have dedicated safety teams that focus on minimizing negative externalities from the technology. Whether such measures will be sufficient to curtail dangerous methods of exploration of powerful AI systems remains to be seen. A limitation of current regulations is that they focus on technologies known to pose a risk to human life. Entirely new innovations or obscure technologies receive far less attention. If a particle accelerator might inadvertently set off a chain reaction that destroys all life, only their internal safety process and self-preservation instincts prevent them from taking risks on behalf of everyone. There is no international process for ensuring a new technology won’t end up being a black marble.

#### [10] Nano-tech causes extinction.

Sterling 18 (Bruce Sterling, 6-1-2018, Wired, "**When Nick Bostrom says “Bang**”, <https://www.wired.com/beyond-the-beyond/2018/06/nick-bostrom-says-bang/>, accessed 1/27/21, michigan pr, ~emm@)

4.1 Deliberate misuse of nanotechnology In a mature form, molecular nanotechnology will enable the construction of bacterium-scale self-replicating mechanical robots that can feed on dirt or other organic matter [22-25]. Such replicators could eat up the biosphere or destroy it by other means such as by poisoning it, burning it, or blocking out sunlight. A person of malicious intent in possession of this technology might cause the extinction of intelligent life on Earth by releasing such nanobots into the environment.[9] The technology to produce a destructive nanobot seems considerably easier to develop than the technology to create an effective defense against such an attack (a global nanotech immune system, an “active shield” [23]). It is therefore likely that there will be a period of vulnerability during which this technology must be prevented from coming into the wrong hands. Yet the technology could prove hard to regulate, since it doesn’t require rare radioactive isotopes or large, easily identifiable manufacturing plants, as does production of nuclear weapons [23]. Even if effective defenses against a limited nanotech attack are developed before dangerous replicators are designed and acquired by suicidal regimes or terrorists, there will still be the danger of an arms race between states possessing nanotechnology. It has been argued [26] that molecular manufacturing would lead to both arms race instability and crisis instability, to a higher degree than was the case with nuclear weapons. Arms race instability means that there would be dominant incentives for each competitor to escalate its armaments, leading to a runaway arms race. Crisis instability means that there would be dominant incentives for striking first. Two roughly balanced rivals acquiring nanotechnology would, on this view, begin a massive buildup of armaments and weapons development programs that would continue until a crisis occurs and war breaks out, potentially causing global terminal destruction. That the arms race could have been predicted is no guarantee that an international security system will be created ahead of time to prevent this disaster from happening. The nuclear arms race between the US and the USSR was predicted but occurred nevertheless.

#### [11] Lab universes create infinite suffering.

**Dawrst 8**– pen name for Brian Tomasik, Swarthmore College (Alan, “Creating Infinite Suffering: Lab Universes”, <http://www.utilitarian-essays.com/lab-universes.html>, dml)

Starting a chain of eternal inflation in the laboratory would produce infinitely many new universes. But what types of universes would emerge? Suppose we assume--as do Jaume Garriga and Alex Vilenkin in their 2001 article "Many worlds in one"--that there are only finitely many possible universe histories of a particular duration (say, 13.7 billion years, the age of our universe); call these "histories" for short. The existence of infinitely many universes needn't, in general, imply the existence of all possible histories. As Alex Vilenkin notes in his 2006 book Many Worlds in One, the sequence 1, 3, 5, 7, ... contains infinitely many integers but doesn't contain all possible integers, and one might imagine an analogous situation for universe histories (p. 114). However, because "the initial conditions at the big bang are set by random quantum processes during inflation" (p. 114), the theory of inflation does imply that lab universes would instantiate all possible histories infinitely many times.[1] This would, of course, include infinitely many replications of the Holocaust, infinitely many acts of torture, and so on. Indeed, there would be infinitely many universes in which Hitler won World War II, as well as infinitely many universes that would be as close as physically possible to "hell on earth" (or on any other planet). The assumption of finitely many possible histories is not really important. As long as we assume that the probability is greater than zero that suffering will emerge in a random universe, creating infinitely many universes would create infinite amounts of suffering.[1] For negative utilitarians, this consequence is automatically infinitely terrible. For classical utilitarians, the question arises as to what the relative amounts of suffering vs. happiness would be in the new universes. Of course, the total amount of both suffering and happiness would be infinite, but one might hope still to find some meaningful way to compare their relative proportions.[2] I'll point out some reasons for thinking that pain would significantly preponderate over pleasure. For one thing, I think suffering outweighs happiness right now on earth.[3] While it's dubious whether this is true for humans, it probably is the case for the tremendous numbers of animals that live and die in the wild (including large numbers of small organisms that die at a very young age, since most species produce far more offspring than reach adulthood). If insects are sentient, the evidence for net suffering over happiness becomes even stronger. Furthermore, we should be cautious of taking our own observable universe as typical because of anthropic considerations. We necessarily find ourselves in a world containing intelligent life (where our intelligence has allowed us partially to overcome some of the pains of ordinary existence), but there are likely many more worlds on which only low-level sentient organisms (perhaps similar to insects, other invertebrates, fish, etc.) have emerged. As Dave Pearce notes, Darwinian life is statistically far more common in the Multiverse than post-Darwinian life. For what it's worth, Frank Drake estimated the fraction of planets containing life that would go on to develop intelligent life at 0.01, and modern estimates put the figure at 0.0000001 (source). And given the Fermi Paradox, this fraction is plausibly much smaller. (Of course, not all life is sentient -- many planets would probably just contain unicellular microorganisms like bacteria -- so the fraction of planets with intelligent life out of all those containing sentient life is considerably bigger than the fraction of planets with intelligent life out of all those merely containing life.) Finally, it's worth considering that some of the organisms that would emerge in the new universes might endure infinite amounts of suffering, say in hell. (Even if only humans could go to hell, the new universes would contain infinitely many humans.[1]) Thus, creating lab universes would, in that case, cause infinitely many new instances of eternal torment.

#### [12] Nuclear war doesn’t cause extinction – assumes every warrant and model.

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A number of people have claimed that a full-scale nuclear war is likely to cause human extinction. I have investigated this issue in depth and concluded that even a full scale nuclear exchange is unlikely (<1%) to cause human extinction. By a full-scale war, I mean a nuclear exchange between major world powers, such as the US, Russia, and China, using the complete arsenals of each country. The total number of warheads today (14,000) is significantly smaller than during the height of the cold war (70,000). While extinction from nuclear war is unlikely today, it may become more likely if significantly more warheads are deployed or if designs of weapons change significantly. There are three potential mechanisms of human extinction from nuclear war: 1) Kinetic destruction 2) Radiation 3) Climate alteration Only 3) is remotely plausible with existing weapons, but let's go through them all. 1) Kinetic destruction There simply aren't enough nuclear warheads to kill everyone directly with kinetic force, and there likely never will be. There are ~14,000 nuclear weapons in the world, and let’s suppose they have an average yield of something like 1 megaton. This is a conservative guess, the actual average is probably closer to 100 kilotons. With a 1 megaton warhead, you can create a fireball covering 3 km², and a moderate pressure wave that knocks down most residential houses covering 155 km². The former kills nearly everyone and the latter kills a decent percentage of people but not everyone. Let's be conservative and assume the pressure wave kills everyone in its radius. 14,000 \* 155 = 2.17 million km². The New York Metro area is 8,683 km². So all the nuclear weapons in the world could destroy about 250 New York Metro areas. This is a lot! But not near enough, even if someone intentionally tried to hit all the populations at once. Total land surface of earth is: 510.1 million km². Urban area, by one estimate, is about 2%, or 10.2 million km.² Since the total possible area destroyed from nuclear weapons is ~2.17 million km² is considerably less than a lower bound on the area of human habitation, 10.2 million km², there should be basically no risk of human extinction from kinetic destruction. [model omitted] If you want to check my work there, I was using nuke map. The even more obvious reason why kinetic damage wouldn't lead to human extinction is that nuclear states only threaten one or several countries at a time, and never the population centers of the entire world. Even if NATO countries and Russia and China all went to war at the same time, Africa, South America, and other neutral regions would be spared any kinetic damage. 2) Radiation Radiation won't kill everyone because there aren't enough weapons, and radiation from them would be concentrated in some areas and wholly absent from other areas. Even in the worst affected areas, lethal radiation from fallout would drop to survivable levels within weeks. Here it's worth noting that there is an inherent tradeoff between length of halflife and energy released by radionuclides. The shorter the half life the more energy will be released, and the longer the half life the less energy. The fallout products from modern nuclear weapons are very lethal, but only for days to several weeks. [graph omitted] Let's try the same calculation we used with kinetic damage, and see if an attack aimed at optimizing fallout for killing everyone could succeed. Using Nukemap again, I'll go with the fallout contour for 100 rads per hour. 400 rads is thought too be enough to kill 50% of people, so 100 rads per hour is likely to kill most all people not in some kind of shelter. We need to switch to using a groundburst detonation rather than an airburst detonation, because groundbursts create far more fallout. A 1mt ground burst would create an area of about 8,000 km² of >100 rads per hour. Okay, multiple that by 14,000 warheads, and we get 112 million km². That's a lot! It's still less than the 510.1 million km² of earth's land mass, but it's a lot more than the ~10.2 million km² of urban space. Presumably this is enough to cover every human habitation, so in principle, it might be possible to kill everyone with radiation from existing nuclear weapons. [model omitted] In practice, it would be almost impossible to kill every human via radiation with the existing nuclear arsenals, even if they were targeted explicitly for this purpose. The first reason is that fallout patterns are very uneven. After a ground burst, fallout is carried by the wind. Some areas will be hit bad and some areas will be hardly affected by fallout. Even if most human population centers were covered, a few areas would almost certainly escape. Two other things make extinction by radiation unlikely. Many countries, especially in the southern hemisphere, are unlikely to be affected by fallout much at all. Since most of these countries are likely to be neutral in a conflict, and not near combatant countries, they should be relatively safe from fallout. While fallout might travel hundreds of kms, it still won't reach places separated by greater distances. Fallout that reaches the upper atmosphere will eventually fall back down, but usually after the period of lethal radioactivity. The other mitigating factor is that in typical nuclear war plans, ground bursts are usually restricted to hardened targets, and air bursts are favored for population and industry centers. This is because air bursts maximize the size of the destructive pressure wave. Air burst detonations result in little lethal fallout reaching the ground, so populations not downwind of military targets would likely be safe from the worst of the radiological effects in a war scenario. The final protection from extinction by radiation is simply large amounts of mass between people and the radiation source, in other words, fallout shelters. After several weeks, the radionuclides in fallout from ground burst detonations will have decayed to the point where humans can survive outside of shelters. Many fallout shelters exist in the world, and many more could be made easily in a day or two with a shovel, some ground, and some boards. Even if lethally radioactive fallout from ground bursts covered all population centers, many humans would still survive in shelters. The risks of extinction from nuclear-weapon-induced-radiation wouldn't be complete without discussing two factors: nuclear power plants and radiological weapons. I'm only going to cover these briefly, but they both don't change the conclusions much. Nuclear power plants could be targeted by nuclear weapons to create large amounts of fallout with a longer half-life but less energy per unit time. The main concern here is that nuclear power plants and spent fuel sites contain a much greater \*mass\* of radioactive material than nuclear missiles can carry. The danger comes primarily from spreading the already very radiative spent or unspent nuclear fuel. The risk this poses requires a longer analysis, but the short version is that while nuking a nuclear power plant or stored fuel site would indeed create some pretty long-lived fallout it would still be concentrated in a relatively small area. Fortunately, even a nuclear detonation wouldn't spread the nuclear fuel more than several hundred km at most. Having regions of countries covered in spent nuclear fuel would be awful, but it doesn't much raise the risk of extinction. Radiological weapons are nuclear weapons designed to maximize the spread of lethal fallout rather than destructive yield. The particular concern from the extinction perspective is that they can be designed to create fallout that continues to emit levels of radiation that can make an area uninhabitable for months to years. These kind of radiological weapons kill more slowly, but they still kill. In principle, radiological weapons could be used to kill everyone on earth. However, in practice, the same constraints that apply to standard nuclear weapons apply to weapons optimized for long-lasting fallout, as well as some additional constraints. Radiological weapons wouldn't produce more fallout than standard warheads, they would just produce fallout with different characteristics. As a result the amount of radiological weapons required to cover every part of earth's surface would be massively expensive (likely as expensive as the largest existing nuclear arsenals), and serve no military purpose. Their inefficiency in destruction and death compared to standard nuclear weapons is probably why radiological weapons have never been developed or deployed in large numbers. This makes them an ongoing theoretical concern, but not an existential risk in the immediate future. A concerning development is Russia's claim to have developed a large-yield (100mt) submersible nuclear weapon with the suggestion that it could be used as a radiological weapon, but even if this is true, it's unlikely to be deployed in large numbers. 3) Climate alteration The bulk of the risk of human extinction from nuclear weapons come from risks of catastrophic climate change, nuclear winter, due to secondary effects from nuclear detonations. However, even in most full-scale nuclear exchange scenarios, the resulting climate effects are unlikely to cause human extinction. Reasons for this: a) Under scenarios where a severe nuclear winter occurs as described by Robock et al, some human populations would likely survive. b) The Robock group’s models are probably overestimating the risk c) Nuclear war planners are aware of nuclear winter risks and can incorporate these risks into their targeting plans Before diving into each subject, it’s worth understanding the background of nuclear winter research. In the 1980s a group of atmospheric scientists proposed the hypothesis that a nuclear war would result in massive firestorms in burning cities, which would loft particles high into the atmosphere and cause catastrophic cooling that would last for years. Many found it alarming that such an effect could be possible and go unnoticed for decades while the risk existed. Some scientists also thought the proposed effect was too strong, or unlikely to occur at all. Until a few years ago, if you looked only at peer reviewed literature you would only find papers forecasting severe nuclear winter effects in the event of a nuclear war. Understandably, many people assumed that this was the scientific consensus. Unfortunately, this misrepresented the scientific community’s state of uncertainty about the risks of nuclear war. There have only ever been a small numbers of papers published about this topic (<15 probably), mostly from one group of researchers, despite the topic being one of existential importance. I’m very glad Robock, Toon, and others have spent much of their careers studying nuclear winter effects, and their models are useful in estimating potential climate change caused by nuclear war. However, I’ve become less convinced over time the Robock model is largely correct. See section B below for why I’ve changed my mind. However, I’m quite uncertain about the probability of strong cooling effects from nuclear war, and am still quite concerned about the potential for severe cooling, even if the risk of extinction from such events is small. A: Under scenarios where a severe nuclear winter occurs as described by Robock et al, some human populations would likely survive. The latest and most detailed model of potential cooling effects from a fullscale nuclear exchange comes from, Robock et al., “Nuclear winter revisited with a modern climate model and current nuclear arsenals: Still catastrophic consequences” found here. The effects from this model are severe. In the 150Tg case, after a year, summer temperatures in the Northern hemisphere are 10-30 degrees C cooler. The effects are less severe at the equator (5 degrees C), but basically all places in the world are affected. The most likely outcome is that most people starve to death. Many would freeze too, but starvation is likely the greatest risk. Even in this model, it appears that in equatorial regions, some farming would still be possible, enough for some populations to survive. After a 10-15 years, agriculture in most of the world would be possible at reduced capacity. [model omitted] Carl Shulman asked one of the authors of this paper, Luke Oman, his probability that the 150Tg nuclear winter scenario discussed in the paper would result in human extinction, the answer he gave was “in the range of 1 in 10,000 to 1 in 100,000.” This strikes me as quite plausible, though one expert opinion is no substitute for a deep analysis. The Q&A with Oman contains his reasoning for this assessment. Two different analyses are required to calculate the chances of human extinction from nuclear winter. The first is the analysis of the climate change that could result from a nuclear war, and the second is the adaptive capacity of human groups to these climate changes. I have not seen an in depth analysis of the latter, but I believe such an assessment would be worthwhile. My own guess is that humans are capable of surviving far more severe climate shifts than those projected in nuclear winter scenarios. Humans are more robust than most any other mammal to drastic changes in temperature, as evidenced by our global range, even in pre-historic times. While a loss of most agriculture would likely kill most people on earth, modern technology would enable some populations to survive. Great stores of food currently exist in the world, and it is l likely that some of these would be seized and protected by small groups, providing enough food to last for years. While even such populations with food stores wouldn’t have enough to survive for 10-15 years, such food stores would give groups time to adapt to new food sources. The organization ALLFED has explored a number of alternative food sources that could keep populations alive in the event of a nuclear war or other large solar disruption, and I expect great necessity to drive the discovery of even more in the event of such a disaster. B: The Robock group’s models are probably overestimating the risk The nuclear winter model at its simplest: Nuclear detonations →[to] Fires in cities →[to] Firestorms in cities →[to] Lofted black carbon into the upper atmosphere →[to] black carbon persists in upper atmosphere, reflecting sunlight and causes massive cooling Each step is required in order for the effect to occur. If nuclear war causes massive fires in cities but does not lead to firestorms that loft particles, then no long term cooling is going to occur. Some of these steps are easier to model than others. Based on my reading of the literature, the greatest uncertainties involve the dynamics of cities burning after a nuclear attack, and whether the conditions would produce firestorms sufficient to loft large numbers of particles high enough in the atmosphere to persist for years. We’re finally beginning to see some healthy debate about some of these questions in the scientific literature. Alan Robock’s group published a paper in 2007 that found significant cooling effects even from a relatively limited regional war. A group from Los Alamos, Reisner et al, published a paper in 2018 that reexamined some of the assumptions that went into Robock et al’s model, and concluded that global cooling was unlikely in such a scenario. Robock et al. responded, and Reisner et al responded to the response. Both authors bring up good points, but I find Reisner’s position more compelling. This back and forth is worth reading for those who want to investigate deeper. Unfortunately Reisner’s group has not published an analysis on potential cooling effects from a modern full scale nuclear exchange, rather than a limited regional exchange. Even so, it’s not hard to extrapolate that Reisner’s model would result in far less cooling than Robock’s model in the equivalent situation. C: Nuclear war planners are aware of nuclear winter risks and can incorporate these risks into their targeting plans A very simple way to reduce risks from nuclear winter is to refrain from targeting cities with nuclear weapons. The proposed mechanism behind nuclear winter results from cities burning, not ground bursts on military targets. I’ve spoken with some of the officials in the US defense establishment responsible for nuclear war planning, and they’[a]re well aware of the potential risks from nuclear winter. Of course, being aware of the risks does not guarantee they will have reasoned about the risks well, or have engaged in good risk management practices. However, the fact that this risk is well publicized makes it more likely that nuclear war planners will take steps to minimize blowback risk from climate effects. It’s hard to know to what extent this has been done. Nuclear war plans are classified, and as far as we know current US nuclear war plans do target cities under some circumstances but not under others. However, the defense establishment has access to classified information and models that we civilians do not have, in addition to all the public material. I’m confident that nuclear war planners have thought deeply about the risks of climate change from nuclear war, even though I don’t know their conclusions or bureaucratic constraints. All else being equal, the knowledge of these risks makes military planners less likely to accidentally cause human extinction. Conclusion This post discussed the three plausible mechanisms of human extinction caused by nuclear weapons. The fact that one of these mechanisms, nuclear winter, wasn’t characterized until the 1980s, is a good reminder of the possibility of unknown unknowns. While nuclear tests provided information about the effects of these weapons, the test environments were significantly different than war environments. Large model uncertainties remain. Given that the greatest existential threat from nuclear war appears to be from climate impacts, it would be great to see more researchers study the climate effects from nuclear war and the resilience capacity of different human groups. There appear to be several interventions possible for reducing existential risk from nuclear war. At the policy level, a commitment from the largest nuclear powers to refrain from targeting the majority of cities would reduce risk of accidental omnicide. Improving the maximum resilience capacity of human populations best positioned to survive a nuclear winter would also make humanity less vulnerable to nuclear winter, and could also protect against other existential threats.