### AC – Advantage

#### Plan: The appropriation of outer space by private entities in The People's Republic of China is unjust.

#### 1] China’s dependent on private companies for space expansion, satellite deployment, and mining

Fernandez 21 — (Ray Fernandez, Writer at ScreenRant, “Hundreds Chinese Companies Called To Boost Space “, ScreenRant, 11-27-2021, Available Online at https://screenrant.com/chinese-companies-boost-space-development/, accessed 1-11-2022, HKR-AR)

In a new move to boost space development, China has opened up space to private companies. China's space program is heavily linked with the military and wrapped up in secrecy. However, recent Chinese space accomplishments, rovers on the Moon and Mars, new satellites and new space stations were primarily developed by government efforts. The U.S. brought in the private sector as a strategy to boost its space program and develop expensive and ambitious new projects. Now China is doing the same. The last time China used national private companies to increase development was when it declared Artificial Intelligence a national priority. Fast forward a few years, Chinese AI dominates globally. At the 7th China (International) Commercial Aerospace Forum, national private companies presented many new and ambitious projects, including spaceplanes, space resources, a massive constellation of satellites and more. One of the companies at the event was the space giant China Aerospace Science and Industry Corp. (CASIC). The Ministry of Science and Technology, China National Space Administration, and other government arms sponsored and supervised the event. CASIC said that the Xingyun constellation — made up of 80 satellites is moving full speed ahead. The corporation announced that the intelligent space satellite production factory was operating. They are now launching rockets from their own rocket park in the city of Wuhan. Today the rocket park and smart sat factory produce 20 solid-fuel launches and 100 satellites per year but plans to increase capacities are on their way. CASIC is also working on the Tengyun spaceplane, recently flight-testing an advanced turbine-based combined cycle engine in the Gobi desert. CASIC is not the only private company developing space planes in China. The China Aerospace Science and Technology Corp. and iSpace also presented their plans for space planes and space crafts. iSpace has designed two missions to the Moon, which they assure will be the first commercial missions to the natural satellite. China is getting some **inspiration from U.S. companies**. Local companies in China are looking into space tourism with suborbital and orbital flights. And Deep Blue Aerospace is developing a reusable launcher that looks very much like the Heavy Falcon of SpaceX. The event's **main themes** were IoT space networks, multi-purpose satellite constellations, **space** resources (mining) and taking the Chinese space sector to a new level with private participation. While the U.S. has its eye on Chinese military space vehicles, it may have overlooked and underestimated the impact that the Chinese private sector will have. Hundreds of new companies have responded to the government's call to "start a new journey for commercial aerospace" in China. It is only a matter of time until their full power and capabilities are unleashed into space.

#### 2] Xi commitments, manufacturing capacity, and FDI make the CCP’s private sector integral to 21st century space competition

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Until recently, China’s space activity has been overwhelmingly dominated by two state-owned enterprises: the China Aerospace Science & Industry Corporation Limited (CASIC) and the China Aerospace Science and Technology Corporation (CASC). A few private space firms have been allowed to operate in the country for a while: for example, there’s the China Great Wall Industry Corporation Limited (in reality a subsidiary of CASC), which has provided commercial launches since it was established in 1980. But for the most part, China’s commercial space industry has been nonexistent. Satellites were expensive to build and launch, and they were too heavy and large for anything but the biggest rockets to actually deliver to orbit. The costs involved were too much for anything but national budgets to handle. That all changed this past decade as the costs of making satellites and launching rockets plunged. In 2014, a year after Xi Jinping took over as the new leader of China, the Chinese government decided to treat civil space development as a key area of innovation, as it had already begun doing with AI and solar power. It issued a policy directive called Document 60 that year to enable large private investment in companies interested in participating in the space industry. “Xi’s goal was that if China has to become a critical player in technology, including in civil space and aerospace, it was critical to develop a space ecosystem that includes the private sector,” says Namrata Goswami, a geopolitics expert based in Montgomery, Alabama, who’s been studying China’s space program for many years. “He was taking a cue from the American private sector to encourage innovation from a talent pool that extended beyond state-funded organizations.” As a result, there are now 78 commercial space companies operating in China, according to a 2019 report by the Institute for Defense Analyses. More than half have been founded since 2014, and the vast majority focus on satellite manufacturing and launch services. For example, Galactic Energy, founded in February 2018, is building its Ceres rocket to offer rapid launch service for single payloads, while its Pallas rocket is being built to deploy entire constellations. Rival company i-Space, formed in 2016, became the first commercial Chinese company to make it to space with its Hyperbola-1 in July 2019. It wants to pursue reusable first-stage boosters that can land vertically, like those from SpaceX. So does LinkSpace (founded in 2014), although it also hopes to use rockets to deliver packages from one terrestrial location to another. Spacety, founded in 2016, wants to turn around customer orders to build and launch its small satellites in just six months. In December it launched a miniaturized version of a satellite that uses 2D radar images to build 3D reconstructions of terrestrial landscapes. Weeks later, it released the first images taken by the satellite, Hisea-1, featuring three-meter resolution. Spacety wants to launch a constellation of these satellites to offer high-quality imaging at low cost. To a large extent, China is following the same blueprint drawn up by the US: using government contracts and subsidies to give these companies a foot up. US firms like SpaceX benefited greatly from NASA contracts that paid out millions to build and test rockets and space vehicles for delivering cargo to the International Space Station. With that experience under its belt, SpaceX was able to attract more customers with greater confidence. Venture capital is another tried-and-true route. The IDA report estimates that VC funding for Chinese space companies was up to $516 million in 2018—far shy of the $2.2 billion American companies raised, but nothing to scoff at for an industry that really only began seven years ago. At least 42 companies had no known government funding. And much of the government support these companies do receive doesn’t have a federal origin, but a provincial one. “[These companies] are drawing high-tech development to these local communities,” says Hines. “And in return, they’re given more autonomy by the local government.” While most have headquarters in Beijing, many keep facilities in Shenzhen, Chongqing, and other areas that might draw talent from local universities. There’s also one advantage specific to China: manufacturing. “What is the best country to trust for manufacturing needs?” asks James Zheng, the CEO of Spacety’s Luxembourg headquarters. “It’s China. It’s the manufacturing center of the world.” Zheng believes the country is in a better position than any other to take advantage of the space industry’s new need for mass production of satellites and rockets alike. Making friends The most critical strategic reason to encourage a private space sector is to create opportunities for international collaboration—particularly to attract customers wary of being seen to mix with the Chinese government. (US agencies and government contractors, for example, are barred from working with any groups the regime funds.) Document 60 and others issued by China’s National Development and Reform Commission were aimed not just at promoting technological innovation, but also at drawing in foreign investment and maximizing a customer base beyond Chinese borders. **“China realizes there are certain things they cannot get on their own,”** says Frans von der Dunk, a space policy expert at the University of Nebraska–Lincoln. Chinese companies like LandSpace and MinoSpace have worked to accrue funding through foreign investment, escaping dependence on state subsidies. And by avoiding state funding, a company can also avoid an array of restrictions on what it can and can’t do (such as constraints on talking with the media). Foreign investment also makes it easier to compete on a global scale: you’re taking on clients around the world, launching from other countries, and bringing talent from outside China.

#### 3] Mining basing competition causes war

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A brewing war to set a mining base in space is likely to see China and Russia joining forces to keep the US increasing attempts to dominate extra-terrestrial commerce at bay, experts warn. The Trump Administration took an active interest in space, announcing that America would return astronauts to the moon by 2024 and creating the Space Force as the newest branch of the US military. It also proposed global legal framework for mining on the moon, called the Artemis Accords, encouraging citizens to mine the Earth’s natural satellite and other celestial bodies with commercial purposes. The directive classified outer space as a “legally and physically unique domain of human activity” instead of a “global commons,” paving the way for mining the moon without any sort of international treaty. Spearheaded by the US National Aeronautics and Space Administration (NASA), the Artemis Accords were signed in October by Australia, Canada, England, Japan, Luxembourg, Italy and the United Emirates. “Unfortunately, the Trump Administration exacerbated a national security threat and risked the economic opportunity it hoped to secure in outer space by failing to engage Russia or China as potential partners,” says Elya Taichman, former legislative director for then-Republican Michelle Lujan Grisham. “Instead, the Artemis Accords have driven China and Russia toward increased cooperation in space out of fear and necessity,” he writes. Russia’s space agency Roscosmos was the first to speak up, likening the policy to colonialism “There have already been examples in history when one country decided to start seizing territories in its interest — everyone remembers what came of it,” Roscosmos’ deputy general director for international cooperation, Sergey Saveliev, said at the time. China, which made history in 2019 by becoming the first country to land a probe on the far side of the Moon, chose a different approach. Since the Artemis Accords were first announced, Beijing has approached Russia to jointly build a lunar research base. President Xi Jinping has also he made sure China planted its flag on the Moon, which happened in December 2020, more than 50 years after the US reached the lunar surface.

#### 4] Russia’s long-term space strategy is contingent on the Chinese private sector

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The Russian and U.S. space industries are the two oldest. They have a lot of space programs, experts, and related intellectual property and have been integrated into the space ecosystem. The Chinese space sector has developed primarily independently from the U.S.-Russia system. There has been some collaboration between China and Europe since the Wolf Amendment, but the absence of any kind of commercial space companies until recently, combined with the sensitivity around the International Traffic in Arms Regulations (a U.S. export-control regime), has forced the Chinese space ecosystem to develop pretty much independently. Russia, though a nation in decline, still likes projects involving space to bolster national pride. As a result, there has been a broader trend over the last five to ten years of a gradual realignment of the Russian space sector toward China in terms of both the government and the industrial base **More Russian companies are looking to China to buy products.** Historically these companies have bought material from Europe, but they have recently turned more to China because of how weak the Russian ruble is, making imports more expensive. At the same time, Chinese companies are looking to Russia as an export market as well as to Russia and former Soviet states as investment opportunities. There is synergy, for example, between a Chinese rocket company that sees a relatively cheap Ukrainian rocket company with specific technology that it wants and a Ukrainian company that has all the technology, intellectual property, and “know-how,” but does not have that much money. The international lunar research station is beneficial to the commercial space sector to the extent that the national team would be occupied with the space station. As the national team gets bigger and takes on more sophisticated projects, this may help free up the kind of lower-end work companies were doing before and create more room for commercial competition.

Moving forward, if there are massive lunar projects and a large Chinese space station, these developments are all things that will occupy a lot of top engineers and SOEs. There will be a need for a bigger commercial sector to contribute to emerging projects and complete the technological development of the more commercial, as opposed to institutional or national-level, projects in the space sector. What is the relationship between China’s space industry development and its Military-Civil Fusion strategy, and how is this affecting the commercial space sector? There are two main types of impact: the technological impact and the broader policy impact. As part of the Military-Civil Fusion strategy, the Chinese government wants to develop specific capabilities and emphasize specific technologies, which produce the technological impact. From that perspective, this strategy dictates what the commercial space sector does in terms of R&D, and the technological direction it takes. Zhuhai satellite is an example of this strategy. Since Zhuhai satellite was a spinoff from the Harbin Institute of Technology, which has a military link, there is a possibility that it is pursuing more space technologies that are related to Military-Civil Fusion. The second type is the broader policy impact. Because the central government makes Military-Civil Fusion a significant policy objective, there will be industrial bases that are built to support related technologies. More money and resources will be available for a startup that will support China’s strategic and tech ambitions. Because of the money and resources that are available, the development of the space industry will change as companies adapt their activities to what the government is emphasizing and to what kind of support they can get from different stakeholders in order to survive.

#### 5] Sino-Russian alliance causes space conflict and nuclear war

Taichman 21 — (Elya Taichman, Elya Taichman is the former legislative director for then-Rep. Michelle Lujan Grisham, where he focused on space, national security, and foreign policy., “Opinion“, POLITICO, 1-29-2021, Available Online at https://www.politico.com/news/2021/01/29/biden-space-diplomacy-russia-china-455963, accessed 1-12-2022, HKR-AR)

Instead, the Artemis Accords have driven China and Russia toward increased cooperation in space out of fear and necessity. China opposes the Artemis Accords, with experts likening the American-led coalition of ten nations to Britain’s colonial Enclosure Movement. Dmitry Rogozin, Chief of Roscosmos, the Russian space agency, compared them to an invasion of the moon and their international coalition to the NATO military alliance. Moreover, Russia’s space program required increased funding that China could provide in exchange for the Russian expertise it craved. The pair even announced they were considering building a lunar research base together. Nevertheless, it is clear this new friendship will create a destabilizing counter-system in space. To be fair, there is good reason for the United States to pursue the Artemis Accords without Russia and China. China’s official policy is to become the preeminent space power by 2045. This means a nuclear-powered space fleet, space transport for humans, and mining colonies on the Moon, Mars, and asteroids. President Xi Jinping described the Chinese space program as “part of the dream to make China stronger.” Furthermore, for nearly a decade the annual Commerce, Justice, and Science Appropriations bills included the Wolf Amendment, which has prohibited NASA from cooperating with China to prevent technology theft. Russia also represents a serious threat in space and the need for a counter-coalition. In November 2019, Russia launched a single satellite that subsequently and unexpectedly “birthed” a twin. In January 2020, the pair floated near KH-11, a multi-billion-dollar U.S. military reconnaissance satellite. After the United States complained, Moscow moved the satellites away from KH-11. However, on July 15, 2020, the “birthed” satellite launched a missile into outer space. Russia claimed the satellites were non-military, but these “Nesting Doll” satellites demonstrate the dual nature of space technology: that Russia and China can readily turn allegedly benign infrastructure into military weapons to threaten the United States. Thus, although the Artemis Accords govern commercial space activities, assembling a like-minded coalition ready to challenge American foes seems prudent. The Sino-Russo partnership not only undermines national security, but also risks the very aim of the Artemis Accords: the expansion of space commerce. A competing alliance in space will prevent the Artemis Accords from developing into customary international law that would increase stability. For example, under the Artemis Accords, nations agree to increase transparency and employ “safety zones” for activities like lunar mining. As nations and corporations compete over the best locations on the moon to extract lunar ice to create rocket fuel, it is important that a single system govern who may operate where. Otherwise, potential conflicts lack peaceful means of resolution.

#### 6] That goes nuclear – space is fragile and offense dominant, so even small incidents escalate

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Why space is a particular problem for crisis stability

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

The vulnerability of satellites and first strike incentives

Satellites are inherently fragile and difficult to protect; in the language of strategic planners, space is an “offense-dominant” regime. This can lead to a number of pressures to strike first that don‘t exist for other, better-protected domains. Satellites travel on predictable orbits, and many pass repeatedly over all of the earth‘s nations. Low-earth orbiting satellites are reachable by missiles much less capable than those needed to launch satellites into orbit, as well as by directed energy which can interfere with sensors or with communications channels. Because launch mass is at a premium, satellite armor is impractical. Maneuvers on orbit need costly amounts of fuel, which has to be brought along on launch, limiting satellites‘ ability to move away from threats. And so, these very valuable satellites are also inherently vulnerable and may present as attractive targets.

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

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

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

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

Short timelines and difficulty of attribution

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

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

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

Entanglement of strategic and tactical missions

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

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

Misperception and dual-use technologies

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

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

Higher-powered lasers coupled with satellite-tracking optics have fewer legitimate uses. Because midcourse missile defense systems are intended to destroy long-range ballistic missile warheads, which travel at speeds and altitudes comparable to those of satellites, such defense systems also have inherent ASAT capabilities. In fact, while the technologies being developed for long-range missile defenses might not prove very effective against ballistic missiles—for example, because of the countermeasure problems associated with midcourse missile defense— they could be far more effective against satellites. This capacity is not just theoretical. In 2007, China demonstrated a direct-ascent anti-satellite capability which could be used both in an ASAT and missile defense role, and in 2009, the United States used a ship-based missile defense interceptor to destroy a satellite, as well. US plans indicated a projected inventory of missile defense interceptors with capability to reach all low earth orbiting satellites in the dozens in the 2020s, and in the hundreds by 2030.22 DiscriminationThe consequences of interfering with a satellite may be vastly different depending on who is affected and how, and whether the satellite represents a legitimate military objective. However, it will not always be clear who the owners and operators of a satellite are, and users of a satellite‘s services may be numerous and not public. Registration of satellites is incomplete23 and current ownership is not necessarily updated in a readily available repository. The identification of a satellite as military or civilian may be deliberately obscured. Or its value as a military asset may change over time; for example, the share of capacity of a commercial satellite used by military customers may wax and wane. A potential adversary‘s satellite may have different or additional missions that are more vital to that adversary than an outsider may perceive. An ASAT attack that creates persistent debris could result in significant collateral damage to a wide range of other actors; unlike terrestrial attacks, these consequences are not limited geographically, and could harm other users unpredictably.

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

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

Lack of shared understanding of consequences/proportionality

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

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

#### 7] China will long-term outpace the US in space – mining, first-mover advantage, lunar projects

Fabian 21 — (Chris Fabian, Capt. Chris Fabian, U.S. Space Force, is a crew commander in the 3rd Space Operations Squadron supporting the Delta 9 mission. , “A call to action for strategic space competition with China“, TheHill, 6-22-2021, Available Online at https://thehill.com/opinion/national-security/558979-a-call-to-action-for-strategic-space-competition-with-china?rl=1, accessed 1-12-2022, HKR-AR)

To compete with China’s space power, the United States needs ambitious visions, not business as usual. China aims to be a dominant space power by 2045, raising concerns that it seeks to establish itself as a space hegemon. The meteoric rise of China’s space program and its lofty ambitions could result in China outpacing the United States in space. China understands that a vibrant space industry is critical infrastructure for economic development, would achieve potent soft-power effects, and provide vital capabilities to Chinese national security and economic development.

China sent its first astronaut into orbit in 2003, yet in 2018 conducted more space-oriented operations than any other nation. Last December, China landed on the moon, planted its flag, collected moon rock samples, returned to Earth, and plans to install a permanent lunar space station by 2031. Months after China reached Mars’ orbit, its Zhurong rover landed on the red planet surface in May. China has begun talks with Russia to secure partnership for a lunar base project. Between 2036-2045, China plans to have a long-term human presence at the Lunar South Pole. These are amazing accomplishments and an ambitious vision for a nation that launched its first satellite only recently, in 1970.

China’s space diplomacy and science efforts are biased toward exploring and exploiting natural resources in near-Earth objects and on the moon. China’s behavior in space may mirror its patterns of resource nationalism on Earth — that is to say, spending incredible political and economic capital to secure exclusive access to strategic resources. As Earth-based resources become scarce and technology makes space-mining feasible, space will become a frontier for strategic competition, especially resource nationalism. Mining even a single asteroid could disrupt global iron, nickel, platinum group metals (PGM) and precious metal-based economies, markets and industry supply chains, especially if controlled by a single state and used for in situ manufacturing and re-supply. Establishing a presence in cislunar space, as China clearly intends, provides capabilities and capacity for space mining, positioning, navigation and timing (PNT), and first-mover locational advantages for space settlement.

This emerging competition differs from the Cold War-era race for symbolic space milestones that sought to prove the superiority of the U.S. market-based economic system for the benefit of unaligned nations. Today’s space race is about the actual economics of space-derived capabilities, access to space resources, and the technologies for acquiring and controlling them. The United States is at a crossroads: It can either prepare itself for this new paradigm, or be relegated to second-class status and look back on what could have been. Efficient and advantageous strategic investment now is better than doubling down later with a patchwork of expensive, rushed space programs.

#### 8] NEA scarcity and ilaw ambiguity makes US-China competition go nuclear

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Finally, a lack of coordination increases the risks for lunar crewmembers, once these arrive on the moon. The disruptions of the kind described above should be self-explanatory in their risk to humans attempting to establish a permanent presence. However, more insidious factors also abound. One of these is the lack of standardisation driven by a bifurcation into geopolitical blocs of lunar activity. As has been pointed out, widely adopted standards of lunar exploration promise considerable benefits[16]. A balkanisation of standards would do the opposite, limiting any attempt of future cooperation in exploration and scientific endeavour. In the most extreme cases, it endangers lives. Mutual aid is a core tenet of both the Outer Space Treaty and the Artemis Accords. Yet, a lack of universally accepted technological standards for lunar (and beyond) crewed operations potentially makes such action considerably more difficult. As the ISS has proven, any inter-operational system must be designed from the outset to be inter-operational. For future lunar activities, this presently seems impossible. Though currently remote, the possibility of the loss of life due to conflicting standards of crewed lunar technology is nevertheless a tragedy worth contemplating.

Again, the described issues are most likely to occur should terrestrial geopolitical tensions between the US and China preclude proactive coordination and information sharing. While the establishment of separate lunar operations can, at this point, be taken as a given, it is far from too late to establish functionally sufficient coordination mechanisms to prevent a major international incident. While US-China coordination is limited by the Wolf Amendment, it is not wholly precluded, as indicated by NASA’s monitoring of the Chang’e 4 mission, utilising the Lunar Reconnaissance Orbiter[17], and, more recently, an exchange of data to mitigate the risks of an orbital collision of Mars orbiters[18]. Ideally, therefore, the United States would proactively take the necessary bilateral steps to work with China to coordinate its respective beyond-Earth surface activities and prevent harmful interference.

Alongside, and regardless of, these efforts, it will be the task of members of international bodies, such as The Committee on the Peaceful Uses of Outer Space (COPUOS) to facilitate coordination activities. In the midst of such efforts, ESA member states are primary actors eligible for leading such initiatives, with ESA having engaged in collaborative activities in space with both the US and China. While diplomats active within UN COPUOS will be well aware of these issues, and their role in enabling such necessary coordination, it is incumbent upon national governments allied to the US to recognise these flashpoints and spearhead broader policy responses to proactively support coordination and the activities of their diplomats at the UN. The UK government, whose diplomats already play a major role in coordinating international space activities, must lend them its full support.

Beyond the moon, the issue of geographically concentrated sites of interest is only likely to prevail. While space is boundless, areas of economical or scientific value are nonetheless often concentrated. Some preliminary analysis, for example, places the number of economically viable near-Earth asteroids at around only ten[19], due to the fact that metallic, accessible, and economically viable near-Earth asteroids are comparatively rare in number. Given the considerable geographic challenges associated with on-asteroid operations, the need for multi-actor coordination will only become more pressing, especially if terrestrial US-China competition intensifies.

Failures to Coordinate

The risks outlined above are non-exhaustive, and do not touch upon the military dimension of space which carries equal if not greater weight. However, they demonstrate clearly the fact that US-China coordination in space will become ever more pressing as the exploration and commercialisation of space advances. Such risks will only manifest themselves if the US and China are unable to coordinate their activities sufficiently and allow geopolitical tensions to obstruct this crucial work.

Looking forwards, all third-party actors in space should closely monitor terrestrial US-China relations and map these to their own activities relating to space (be this in the realm of space exploration or applications), taking mitigating measures as necessary should tensions spill over beyond Earth. In tandem, states with notable diplomatic influence should increase further efforts to enable frictionless coordination and information sharing between the two great powers. Crucially, should formal coordination mechanisms in orbit, on the moon, or beyond be in sight, imperfect coordination should be prioritised if institutional gridlock driven by the pursuit of national interest is the alternative.

#### 9] Space competition is inevitable and will determine hegemonic power on Earth–it’s just a question of who wins the race.

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The strategic competition between the U.S. and China is fierce even in space outside of the earth. What do the two countries compete for in space? What are their objectives and what strategic calculations did they start from? Will the space race between the two countries lead to competition over space hegemony? This is one of the most interesting issues for U.S.-China observers in recent days. The space race between the U.S. and China is not just a number fight. How many satellites and spaceships have been launched and how many space stations have been established are the questions that mattered in the past. These mattered for the convenience and benefit for mankind. It could also make possible for some of the curiosity about the universe to be solved. However, starting the 21st century, the space race between the U.S. and China has progressed into an intense, high-level strategic battle. Whoever rules space rules the future There is one reason why the two countries' space strategy competition will inevitably lead to a hegemony competition. This is because they try to conquer the space order. Conquering the space order is to define and establish the space order. Those who dominate space will dominate almost all sectors of the future world, including economy, technology, environment, cyberspace, transportation and energy. That's why the United States is considered as a hegemonic country on Earth today. The U.S. is recognized as a hegemonic country because it establishes and leads the economic, financial, trade, political, and diplomatic order. There are two areas in the world today where international order has not been established. One is virtual space, which is the cyber world. The other is the space. Since the international order of these two areas is closely correlated with each other, it is likely that the establishment of the order in these two areas will be pursued simultaneously. This means that cyber order cannot be discussed without discussing satellite issues. The Communist Party of China recognized this early on. At the 19th National Communist Party Congress in 2017, it expressed its justification for establishing space order. President Xi Jinping declared that China's diplomatic stage in the 21st century has expanded beyond the Earth into space and virtual space. It was the moment when China defined the concept of diplomatic space as the "universe" beyond the Earth. He then explained that the establishment of a system that can even manage the order of the universe and the virtual world eventually means the establishment of practical governance. Therefore, he justified that China's diplomatic horizon has no choice but to expand into space. Furthermore, he stressed that he is confident that the ideation of building such governance serves as the foundation for the community of common destiny for mankind which China pursues. In other words, he publicly urged China to have the capabilities and means to become a key country in building governance in these two areas. This led the Trump administration to spare no effort to develop space science and technology and space projects, which are the basis of space order. Since President George W. Bush, the maintenance work for supremacy in space has been carried out. President Obama also introduced a policy to encourage U.S. private companies to participate in space projects to expand the foundation for supremacy in space. It was President Trump who actualized all these. He was the one who legalized private companies' space development projects under the Space Policy Directive-I. He also thoroughly reflected his “America First” principle in the space business. For example, all the substances obtained in space, including minerals, were no longer defined as "common goods." He also promised that space activities by private companies in the United States would be free from restrictions such as the Outer Space Treaty and the 1979 resolution by the United Nations Committee on the Peaceful Uses of Outer Space. Space and the moon were known as repositories of resources. As it became known that the resources that are scarce or will be depleted on Earth are very abundant outside the Earth in space, the space race has gotten intense. This is why the space race has been promoted on a geoeconomic level. However, in order to secure these benefits of geoeconomic strategies, geopolitical strategies must be accompanied. In other words, military defenses should be backed up to protect the resource acquisition process. Fearing this, the United Nations Committee on the Peaceful Uses of Outer Space strictly regulates the military use of space. However, the fact that the logic of developing naval power to protect long-range foreign interests on Earth is reflected in the strategic thinking of securing space profits is the decisive factor that has driven the space race today. The repositories of resources and future energy sources There are three strategic benefits that drive the U.S.-China competition for supremacy in space. The first is the infinite resource in space. There are endless resources buried in more than 10,000 asteroids orbiting the Earth. They are known to have an abundance of resources such as carbon, zinc, cobalt, platinum, gold, silver and titanium, in which platinum and titanium, for example, can be sold for $30,000 to $50,000 per kilogram. Second, the future energy source lies in space. Power supply using solar energy will be possible by establishing a space power plant that concentrates solar energy in the Earth-Moon area and transmitting it to Earth through laser beams. Here, the supplied solar power is known to be 35 to 70% more powerful than the solar energy on Earth. By 2100, 70 terawatts of energy will be needed, and it is expected that 332 terawatts can be supplied through the development of space solar power plants in a geostationary orbit. Third, the desire to dominate space for hegemony has established the space competition relationship between the U.S. and China. Although each started from different strategic interests, in the end, they have one common goal. First of all, China wants to be free from the U.S. GPS system. This is because only through the freedom China can prevent its future weapons system from becoming vulnerable to U.S. control and restrictions. It is planning to achieve its goal of establishing a so-called "Space Silk Road" by expanding China's "BeiDou" navigation system to the regions within One Belt One Road and the national satellite and communication systems. The U.S. also plans to spend $25 billion to develop GPS3 systems with stronger defense capabilities against Chinese space and cyberattacks, by 2025. The competition between the U.S. and China to establish a space station in order to secure the benefits from space strategies is inevitable. This is because a space station is the foundation for establishing space order. As the space station has the purpose of protecting and defending from enemies, militarization is inevitable in the process. It is clear that the outcome will lead to a space arms race. This is why the competition over supremacy in space between the U.S. and China has the aspects of the New Cold War outside the Earth. Space is a blue ocean. It is a world without order. Preemption is therefore important. In order to prepare space order and accompanying laws, norms, and systems, the U.S. and China have been engaged in a fierce battle through space projects. This is because space is the decisive factor in the operation of energy, resources, environment, communication, and advanced military weapons systems in the future. Space is no longer a dream world. Of course, it takes a lot of time for these strategic benefits to become a reality. However, the Fourth Industrial Revolution and the development of AI (Artificial Intelligence) technology will speed up the pace. This is because economic problems can be solved if spacecraft recycling is made possible with the participation of private companies and facilities related to space stations and mineral mining equipment are set up with 3D printers.

#### 10] Heg solves nuclear war and global fascism

Kroenig 20 [Matthew Kroenig is an American political scientist, best-selling author, and an award-winning national security strategist. "The Return of Great Power Rivalry Democracy versus Autocracy from the Ancient World to the U.S. and China." https://www.google.com/books/edition/The\_Return\_of\_Great\_Power\_Rivalry/dXLKDwAAQBAJ?hl=en&gbpv=1&printsec=frontcover]

Indeed, China itself has been among the greatest beneficiaries of a U.S.- led international order. American military and economic power have provided the peace and macroeconomic stability that allowed China to grow into the major power that it is today.

There is little reason to believe that Russia and China will be as kind. These autocratic powers long to establish spheres of influence in their near abroad, and they have shown little concern for the sovereignty or personal freedoms of their own citizens or subjected populations. To get a vision of a world led by Russia or China, just look at how they treat the people that fall under their influence today. Russian dictator Vladimir Putin invades neighboring countries and murders critical journalists. And China takes contested territory from its neighbors through brute force and locks up one million Muslim minorities in “re-education” camps. And this is but a small taste of the brutality of these governments. If readers doubt these claims, they can simply ask citizens of American allies in Eastern Europe or East Asia whether they desire continued American leadership, or whether they would prefer to live under the thumb of Moscow or Beijing, respectively. Moreover, just as consequentially for the globe, the decline of the United States could very well result in war. As noted earlier, international relations theory maintains that the decline of one dominant power and the rise of another often results in great power conflict.24 According to this telling, World War I and World War II were primarily the result of the decline of the British Empire and the rise of Imperial and then Nazi Germany. Falling powers fight preventive wars in a bid to remain on top, and rising powers launch conflicts to dislodge the reigning power and claim their “place in the sun.”25 Many fear that a power transition between Beijing and Washington would produce a similar catastrophic result.26 Continued American leadership, therefore, could forestall this transition and may be necessary for continued peace and stability among the major powers.

#### 11] Heg solves unstable nuclear alliances that cause war (don’t read if no time)

Hayes 18 [Peter Hayes, Nautilus Institute, Berkeley, California, USA; Center for International Security Studies, Sydney University. Trump and the Interregnum of American Nuclear Hegemony. November 8, 2018. <https://www.tandfonline.com/doi/full/10.1080/25751654.2018.1532525>]

During a **post-hegemonic era**, **long-standing** nuclear **alliances** are likely to be **replaced** by **ad hoc nuclear coalitions**, aligning and realigning around different congeries of threat and even actual **nuclear wars**, with **much higher levels** of **uncertainty** and unpredictability **than** was the case in the **nuclear hegemonic system**.

There are a number of ways that this dynamic could play out during the interregnum, and these dynamics are likely to be inconsistent and contradictory. In some instances, the sheer **momentum** of past policy combined with bureaucratic inertia and the potency of political, military service and corporate interests, may ensure that **residual aspects** of the formerly **hegemonic postures** are adhered to even as formal nuclear alliances rupture. Even as they **reach for** the **old anchors**, these states may be forced to adjust and retrench strategically, or start to **take** their own **nuclear risks** by making **increasingly explicit nuclear threats** and deployments against nuclear-armed adversaries – as **Japan** has begun to do with reference to its “technological deterrent” since about 2012.9 This period could last for many years **until and when** **nuclear war breaks out** and leads to a post-nuclear war disorder; or a new, post-hegemonic strategic framework is established to manage and/or abolish nuclear threat.

**Under** full-blown **American nuclear hegemony**, **fewer states** had **nuclear weapons**, the **major nuclear** weapons **states** entered into **legally binding restraints** on force levels and they learned from nuclear near-misses to **promulgate rules** of the road and tacit understandings. The lines drawn during full-blown collisions involving nuclear weapons were stark and concentrated the minds of leaders greatly. In a nuclear duel, it was clear that only one of two sides could fire first; the only question was which one. Now, with nine nuclear weapons states, and conflicts conceivably involving three, four or more of them, no matter how much leaders concentrate, it will not be evident who is aiming at who, who may fire first, and during a volley, who fired first and even who hit whom.

In a highly proliferated world, nuclear-armed states may feel driven to obtain larger nuclear forces able to deter multiple adversaries at the same time, sufficient to conduct not only a few nuclear attacks but configured to fight **more than one** protracted **nuclear war** **at a time**, especially in nuclear states torn apart by civil war and post-nuclear attack reconstruction. The first time nuclear weapons are used since 1945 will be shocking, the second time, less so, the third time, the **new normal**.

#### 12] China space commercialization uniquely risks cascades – they ignore norms and don’t register satellites which prevents tracking

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Of the 3,000-odd operational satellites currently in orbit, a little over 400 belong to China or Chinese companies. The number of commercial companies in the West launching satellites has skyrocketed in recent years, and SpaceX now operates more satellites than any other company or government.

But refusing to be left behind, China is planning both state and commercial deployments of constellation satellites in huge numbers in the coming years, which could post an increased risk to in-orbit operations if Chinese companies don’t take due care in how they behave.

The new commercial space race

A report by the Secure World Foundation says a 2014 document from the Chinese Government known as “Document 60” (Official English Language Title: Guiding Opinions of the State Council on Innovating the Investment and Financing Mechanisms in Key Areas and Encouraging Social Investment) was the start of China’s modern commercial space sector. And in 2020, satellite Internet was included in the scope of China’s New Infrastructure policy initiative. Space is also part of China’s expansive Belt and Road initiative, which all combined have led to an explosion in the country’s commercial space ambitions.

China is beginning to “get its act together” around commercial use of space, Jonathan McDowell of the Harvard-Smithsonian Center for Astrophysics tells DCD. Whereas in previous years he says China has had many government satellites and some quasi-commercial satellites with strong ties to government, but now there are true commercial Chinese companies in space.

“We have the same phenomenon as the US companies in that they're moving fast and they're innovative and doing new things.”

But as Chinese companies look to follow the likes of SpaceX and OneWeb in deploying large numbers of satellites, he warns their lack of care in operations could potentially damage space for everyone.

China’s commercial space industry blasts off

A number of private space companies including LinkSpace, OneSpace, iSpace, LandSpace, and ExPace, have all launched in recent years. As well developing their own rockets, these companies are launching satellites of all shapes and sizes into Low Earth Orbit (LEO) with the aim of forming their own constellations to rival those of Western companies.

Bao Weimin, member of the National Committee of the Chinese People’s Political Consultative Conference and director of the Science and Technology Committee of the Aerospace Science and Technology Group, recently announced plans to establish a national satellite network company to be responsible for “coordinating the planning and operation of space satellite Internet network construction.”

The China Aerospace Science and Industry Corporation (CASIC), a state-owned enterprise, outlined its plans to preliminarily finish the construction of the Xingyun project, an 80-satellite LEO narrowband Internet of Things constellation, by 2025 in addition to 320 Hongyan communications satellites. China Telecom’s satellite communications reportedly has plans to launch 10,000 satellites in the next five to ten years under the name ‘China StarNet’. Spacety is also launching a constellation of imagery satellites and has launched at least 20 so far. Another company called GW has filed for spectrum allocation from the International Telecommunication Union for two broadband constellations called GW-A59 and GW-2 that would include almost 13,000 satellites.

A report from IDA into China’s commercial space industry found others including Zhuhai Orbita, GalaxySpace, MinoSpace, LaserFleet, Head Aerospace and numerous others are also developing constellations from which, like US counterparts, these companies aim to provide satellite broadband, 5G, IoT, and various data services. Though many are in the early stages of development, most plan to launch the first of what could be hundreds or even thousands of satellites within the next few years.

While most companies can’t boast the same level of funding as US space companies – VC funding for Chinese space companies was up to $516 million in 2018 compared to the $2.2 billion US companies raised – they are bringing in investment; earlier this year Beijing Commsat received more than $4.5 billion in funding from the China Internet Investment fund, with more than $10 billion in additional funding promised in the future.Xie Tao, founder of Beijing Commsat Technology Development Co., Ltd, told China Money Network he expects the country to launch 30,000 to 40,000 Satellites in the future, compared to 40,000 to 60,000 launched by the US.

“Space in the orbit is allocated on a first-come, first-served basis and the onus will be on these latecomers to ensure their satellites will not collide with existing ones,” Commsat’s Xie previously said. “The low-Earth orbit is becoming increasingly crowded and the space land grab is on.”China isn’t up to speed in orbital norms

While the UN tightly controls GEO orbits, offering countries licenses for a set number of slots in the closely-packed and highly valuable planes, there is no such limit at lower orbits. The number of satellites that companies can launch at LEO is limited only by what local regulators will permit, despite the machines circling the entire planet in around 90 minutes.

And space is becoming increasingly crowded. The number of satellites being launched annually is beginning to reach the thousands, leftovers parts from previous launches and satellites can mount up if not properly disposed of, and debris from previous in-orbit incidents means LEO is full of thousands of pieces of potentially satellite-destroying junk and debris.

Around 28,200 pieces of space junk and debris are currently being tracked in orbit but ESA estimates there could be up to hundreds of thousands of potentially harmful pieces in orbit. At its most extreme, Kessler syndrome predicts a scenario where the space around Earth is so full of satellites and debris that it becomes unmanageable and collisions begin to cascade, causing a chain reaction of collisions which render many orbits out of use for generations. China has as much right to operate satellites as Western companies, but the current lack of adherence to ‘space norms’ could increase risks further. McDowell warns the ‘explosion’ of Chinese activity could have a massive impact on the usability of space. “Chinese adherence to things like space debris norms and registration norms is, I would say, about 10 years behind everybody else, if not more” he says. “In UN registration of satellites, they're being very incomplete. They're not registering a lot of their CubeSats and things like that. They're not really being as careful, and they're not as transparent in what's going on.”

Chinese commercial satellites are subject the same risks as Western ones in space; extreme temperatures, crowded operating environment, and new companies seeing large numbers of failures as they go through rapid development. But a lack of proper registration can create more risk of collisions, which can have catastrophic effects, especially with larger satellites at higher orbits.

#### 13] Debris cascades---nuclear war

Les Johnson 13, Deputy Manager for NASA's Advanced Concepts Office at the Marshall Space Flight Center, Co-Investigator for the JAXA T-Rex Space Tether Experiment and PI of NASA's ProSEDS Experiment, Master's Degree in Physics from Vanderbilt University, Popular Science Writer, and NASA Technologist, Frequent Contributor to the Journal of the British Interplanetary Sodety and Member of the American Institute of Aeronautics and Astronautics, National Space Society, the World Future Society, and MENSA, Sky Alert!: When Satellites Fail, p. 9-12 [language modified]

Whatever the initial cause, the result may be the same. A satellite destroyed in orbit will break apart into thousands of pieces, each traveling at over 8 km/sec. This virtual shotgun blast, with pellets traveling 20 times faster than a bullet, will quickly spread out, with each pellet now following its own orbit around the Earth. With over 300,000 other pieces of junk already there, the tipping point is crossed and a runaway series of collisions begins. A few orbits later, two of the new debris pieces strike other satellites, causing them to explode into thousands more pieces of debris. The rate of collisions increases, now with more spacecraft being destroyed. Called the "Kessler Effect", after the NASA scientist who first warned of its dangers, these debris objects, now numbering in the millions, cascade around the Earth, destroying every satellite in low Earth orbit. Without an atmosphere to slow them down, thus allowing debris pieces to bum up, most debris (perhaps numbering in the millions) will remain in space for hundreds or thousands of years. Any new satellite will be threatened by destruction as soon as it enters space, effectively rendering many Earth orbits unusable. But what about us on the ground? How will this affect us? Imagine a world that suddenly loses all of its space technology. If you are like most people, then you would probably have a few fleeting thoughts about the Apollo-era missions to the Moon, perhaps a vision of the Space Shuttle launching astronauts into space for a visit to the International Space Station (ISS), or you might fondly recall the "wow" images taken by the orbiting Hubble Space Telescope. In short, you would know that things important to science would be lost, but you would likely not assume that their loss would have any impact on your daily life. Now imagine a world that suddenly loses network and cable television, accurate weather forecasts, Global Positioning System (GPS) navigation, some cellular phone networks, on-time delivery of food and medical supplies via truck and train to stores and hospitals in virtually every community in America, as well as science useful in monitoring such things as climate change and agricultural sustainability. Add to this the crippling of the US military who now depend upon spy satellites, space-based communications systems, and GPS to know where their troops and supplies are located at all times and anywhere in the world. The result is a nightmarish world, one step away from nuclear war, economic disaster, and potential mass starvation. This is the world in which we are now perilously close to living. Space satellites now touch our lives in many ways. And, unfortunately, these satellites are extremely vulnerable to risks arising from a half-century of carelessness regarding protecting the space environment around the Earth as well as from potential adversaries such as China, North Korea, and Iran. No government policy has put us at risk. It has not been the result of a conspiracy. No, we are dependent upon them simply because they offer capabilities that are simply unavailable any other way. Individuals, corporations, and governments found ways to use the unique environment of space to provide services, make money, and better defend the country. In fact, only a few space visionaries and futurists could have foreseen where the advent of rocketry and space technology would take us a mere 50 years since those first satellites orbited the Earth. It was the slow progression of capability followed by dependence that puts us at risk. The exploration and use of space began in 1957 with the launch of Sputnik 1 by the Soviet Union. The United States soon followed with Explorer 1. Since then, the nations of the world have launched over 8,000 spacecraft. Of these, several hundred are still providing information and services to the global economy and the world's governments. Over time, nations, corporations, and individuals have grown accustomed to the services these spacecraft provide and many are dependent upon them. Commercial aviation, shipping, emergency services, vehicle fleet tracking, financial transactions, and agriculture are areas of the economy that are increasingly reliant on space. Telestar 1, launched into space in the year of my birth, 1962, relayed the world's first live transatlantic news feed and showed that space satellites can be used to relay television signals, telephone calls, and data. The modern telecommunications age was born. We've come a long way since Telstar; most television networks now distribute most, if not ali, of their programming via satellite. Cable television signals are received by local providers from satellite relays before being sent to our homes and businesses using cables. With 65% of US households relying on cable television and a growing percentage using satellite dishes to receive signals from direct-to-home satellite television providers, a large number of people would be cut off from vital information in an emergency should these satellites be destroyed. And communications satellites relay more than television signals. They serve as hosts to corporate video conferences and convey business, banking, and other commercial information to and from all areas of the planet. The first successful weather satellite was TIROS. Launched in 1960, TIROS operated for only 78 days but it served as the precursor for today's much more long-lived weather satellites, which provide continuous monitoring of weather conditions around the world. Without them, providing accurate weather forecasts for virtually any place on the globe more than a day in advance would be nearly impossible. Figure !.1 shows a satellite image of Hurricane Ivan approaching the Alabama Gulf coast in 2004. Without this type of information, evacuation warnings would have to be given more generally, resulting in needless evacuations and lost economic activity (from areas that avoid landfall) and potentially increasing loss of life in areas that may be unexpectedly hit. The formerly top-secret Corona spy satellites began operation in 1959 and provided critical information about the Soviet Union's military and industrial capabilities to a nervous West in a time of unprecedented paranoia and nuclear risk. With these satellites, US military planners were able to understand and assess the real military threat posed by the Soviet Union. They used information provided by spy satellites to help avert potential military confrontations on numerous occasions. Conversely, the Soviet Union's spy satellites were able to observe the United States and its allies, with similar results. It is nearly impossible to move an army and hide it from multiple eyes in the sky. Satellite information is critical to all aspects of US intelligence and military planning. Spy satellites are used to monitor compliance with international arms treaties and to assess the military activities of countries such as China, Russia, Iran, and North Korea. Figure 1.2 shows the capability of modem unclassified space-based imaging. The capability of the classified systems is presumed to be significantly better, providing much more detail. Losing these satellites would place global militaries on high alert and have them operating, literally, in the blind. Our military would suddenly become vulnerable in other areas as well. GPS, a network of 24-32 satellites in medium-Earth orbit, was developed to provide precise position information to the military, and it is now in common use by individuals and industry. The network, which became fully operational in 1993, allows our armed forces to know their exact locations anywhere in the world. It is used to guide bombs to their targets with unprecedented accuracy, requiring that only one bomb be used to destroy a target that would have previously required perhaps hundreds of bombs to destroy in the pre-GPS world (which, incidentally, has resulted in us reducing our stockpile of non-GPS-guided munitions dramatically). It allows soldiers to navigate in the dark or in adverse weather or sandstorms. Without GPS, our military advantage over potential adversaries would be dramatically reduced or eliminated.

**14] Nuke war violent**

**Madrigal 18** (Alexis C. Madrigal, "The People Who Would Survive Nuclear War," Atlantic, 1-25-2018, available at https://www.theatlantic.com/technology/archive/2018/01/that-time-the-government-commission-fiction-about-nuclear-war/551303/, accessed 12-17-2019, HKR-cjh)

Somehow, some way, **nuclear war is once again a live possibility.** The most startling incident came earlier this month when a state employee accidentally clicked the wrong choice in a piece of emergency-alert software, sending a notice of imminent destruction to everyone with a phone in Hawaii. But what’s striking is that people believed the message. For much of the past 30 years, it would have been implausible enough to be received as a likely mistake. But **2018 has already seen President Donald Trump and North Korean leader Kim Jong Un trade barbs about their nuclear buttons. People are buying potassium iodide pills again**. The December 2017 issue of Harper’s magazine featured seven writers “taking stock of our nuclear present.” **Atomic weapons—and their horrifying effects—are back** in the national consciousness. Of course, they never really went away. But a combination of peace activism’s successes, **the fall of the Soviet Union, and the rise of the other threats that have been lumped together in the war on terror simply pushed the prospect of nuclear war out of sight and mostly out of mind.** It has been possible to consider the government planning reports of the Cold War with historical detachment or even bemusement. For example, the U.S. Post Office once printed 60 million change-of-address cards and sent them to regional offices, just in case of a major nuclear exchange that created tens of millions of refugees. The Federal Civil Defense Administration created cartoons showing kids how to duck and cover, which would not have been of much use in a nuclear exchange that killed hundreds of millions of people. There were detailed, practiced plans of possible governmental succession based on endless reports. Looking back in 2003, Slate declared “it’s hard today to do anything but laugh at these Cold War inanities.” Even just last April, The Washington Post reviewed a book on the American government’s Cold War plans and found the details ridiculous.“For all the ominous directives and war scenarios, there is something random and even comical about planning for Armageddon,” wrote Carlos Lozada. “How many Export-Import Bank staffers rate rescuing? How many from the Department of Agriculture?” The sociologist Lee Clarke has described these sorts of reports as “fantasy documents.” Faced with the unthinkable—a tragedy equivalent to World War II many times over, and executed in just a few hours, carrying the possibility of ending technological civilization—they created process and documentation as a way of feeling in control. Did anyone have a plan for nuclear war? Every bureaucracy did. And they used them to reassure themselves and the public that they had a plan. They’d built bomb shelters made of paper. But these were, like the neatly stocked basements with flashlights and canned food, exercises in imagination, or more simply, fiction. And so it is appropriate that in 1978, the government commissioned an actual piece of fiction, which was tucked into an appendix of a congressional report until it found a wild afterlife as a key source for the most popular made-for-TV movie ever produced. \* \* \* The report was titled The Effects of Nuclear War. It was a product of the Office of Technology Assessment. **The OTA**, before it was disbanded by Newt Gingrich’s Republican leadership in 1995, **was an independent research bureau that carried out research for members of Congress**. In this case, **the Senate Committee on Foreign Relations had asked the OTA to “examine the effects of nuclear war on the populations and economies of the United States and the Soviet Union,” in such a way that the “abstract measures of strategic power” could be translated into “more comprehensible terms.” The Senators were preparing for a debate on the Strategic Arms Limitation Treaty, which ultimately never happened after the Soviet invasion of Afghanistan. Nonetheless, the report was written. The project fell under the direction of Peter Sharfman, the researcher who headed National Security Studies at the OTA**. The executive summary does not mince words. “**A militarily plausible nuclear attack, even ‘limited,’ could be expected to kill people and to inflict economic damage on a scale unprecedented in American experience; a large-scale nuclear exchange would be a calamity unprecedented in human history,”** the report says. **“The mind recoils from the effort to foresee the details of such a calamity, and from the careful explanation of the unavoidable uncertainties as to whether people would die from blast damage, from fallout radiation, or from starvation during the following winter.” The report goes on to outline several different scenarios—single detonations, attacks on oil refineries, attacks on military installations, and an all-out nuclear war leading to the deaths of up to 160 million Americans.** Pages from the 1982 version of the report, The Day After Midnight. In the last scenario, **the authors propose that there would be some structure to the days and months after the war. There’d be the first few days when people were seeking shelter and trying to deal with what had happened, however, the report predicts, “boredom will gradually replace panic, but will be no easier to cope with.” Then there would be the “shelter period” followed by the “recuperation period.”** “**Major changes should be anticipated in the societal structure as survivors attempt to adapt to a severe and desponding environment never before experienced,” the report states. “The loss of 100 million people, mostly in the larger cities, could raise a question on the advisability of rebuilding the cities ... The surviving population could seek to alter the social and geopolitical structure of the rebuilding nation in hopes of minimizing the effects of any future conflicts.”** And it is this longer-term set of difficulties to which the fictional work, **Appendix C, titled “Charlottesville,”** addresses itself. The story **was written by Nan Randall, a journalist who had reported for The Washington Post and Newsweek and put in a couple of years at the National Committee for a Sane Nuclear Policy as a program director.** **In the spring of 1978, the St. Petersburg Times commissioned William Kincade, the executive director of the Arms Control Association, to write a story that “looked at life after a nuclear exchange.” He brought in Randall, and they produced a scenario that focused on two bombs falling near Tampa Bay as part of a large-scale nuclear war. It was published across four days, on A1, beginning February 25, 1979. They called the series “Doomsday.”** The front page of the February 25, 1979, St. Petersburg Times featuring the first “Doomsday” story **The work is something between fiction and nonfiction, envisioning the precise bomb locations in the area, the movements of the president, the predicament of the fictional Wechek family, who had barricaded themselves inside the “large walk-in closet in their home’s master bedroom” when a second bomb blast destroys their home, and the ambulations of the Braggs, who wait out the first few hours inside a bank’s barely functional fallout shelter**. The story is rich with detail. Each day follows the Wecheks and Braggs, and **there are disturbing and emotional scenes. After Mrs. Wechek dies, Mr. Wechek is “recruited”** (quotes in the original) **to build a food warehouse. “His daughter followed him each day and watched silently. She was unable to let him out of her sight. She spoke to no one and barely ate. At night, she tried to curl up at the foot of her father’s thin pallet, even though he was now in a makeshift men’s dormitory, and no women or girls were allowed there,” the story relates. “For a time, the authorities permitted the daughter and father to stick together, but eventually the girl was sent inland to a special camp for the elderly and children suffering from shock.”** It’s brutal, compelling stuff, especially measured on the scale of fantasy documents and other government reports. **This work—or her connection to Kincade—probably brought Randall to the attention of the Office of Technology Assessment. From contemporary reports, we know she both read the report and went to Charlottesville herself.** In the report, **the story is preceded by a short introduction that explains that the fiction is “an effort to provide a more concrete understanding of the situation that survivors of a nuclear war would face.”** It adds that **while it only considers one possible scenario, “it does provide detail that adds a dimension to the more abstract analysis presented in the body of the report.”** “Charlottesville” is also a mix of fiction and facts, but it lacks the characters of the St. Petersburg Times story, concentrating on the community-level action in a postnuclear world. We see the “world building” common to this kind of science fiction, but after the exposition that sets up what’s happened, no human narratives actually enter the work. **In the weeks leading up to the war, Americans begin to desert the cities in preparation for nuclear war that they can see coming. They begin to shelter in place, keeping their children home from school, awaiting the onset of the war. Before the nukes begin to fall, refugees have already overwhelmed the town’s shelters. When the nukes hit, there’s almost a sense of relief in the story, as Charlottesville retains its status as a “genteel sanctuary.” Over time, things begin to fall apart, however, as foodstuffs start to run out and people struggle to return to an agrarian way of life, without access to plentiful oil and electricity. Food riots break out**

**when raw grain arrives from the federal government instead of flour.** The animating conflict in the story is the animosity between people who were native to Charlottesville and refugees who showed up from the surrounding destroyed cities. They form an underclass that speaks to the anxieties of 1970s racial strife. **“One of the major problems, it was obvious to everyone, was the drag the huge refugee population had on the recovery effort,” Randall writes, echoing the tone of reports from big northern and western cities after the Great Migration brought African Americans to these areas. What civic spirit the Charlottesville residents have is local, racial, and class-based, not pan-American or linked to a broader humanity.** “Blacks distrusted whites, the poor distrusted the rich, and everyone distrusted the refugees as ‘outsiders,’” Randall writes. The white attitude toward black people is not recorded. **There are no named people, though a “city manager” makes regular appearances creating “highly centralized, almost totalitarian rule” within the city. The narrative perspective is synoptic, almost academic were it not for the colorful details that distinguish it from the traditional governmental scenarios. CB radio enthusiasts, we’re told, “tried to set up a relay system on the lines of an electronic pony express.” We read that “horse thievery had made an anachronistic appearance,” and that people fight over bicycles. There is a long section at the end about a postapocalyptic panel held on the grounds of what had been the University of Virginia.** In many ways, it tracked the tendencies of most nuclear-war fiction**. “One might assume that the depiction of the immediate consequences of a nuclear war would be a primary subject of the fiction under consideration here,” wrote Paul Brians in his literature survey, Nuclear Holocausts. “Far from it. Aside from those few authors whose subject is the atomic bombing of Japan, only a relative handful of authors concern themselves with the detailed description of the effects of atomic bombing. Many are more interested in the politics or long-range social effects of war.” The people and press appeared to be more interested in that, too.** Randall’s fictional account turned out to be the portal through which the report’s findings would be explored by the media. **A review of the report in New Scientist found Charlottesville “by far the most telling part” of the massive document. “Fictionalized accounts certainly bring home the quality of the catastrophe much more credibly than such technical details as fallout ellipses on maps of Detroit and Leningrad,” it concludes. In an NPR segment on the report, the Charlottesville story was the main focus of the interview.** There were many, many fictional accounts before this particular one, but none had the imprimatur of the government’s own researchers. It was a different type of fantasy document, one designed to open up the imagination to the horrors of war, rather than foreclose them. “**I tend to think we picked a somewhat optimistic scenario. We assumed that the civic spirit survives; that people for the most part treat their neighbors well; that you don’t have riots or anarchy or mass looting or martial law. But you can’t be sure,” Sharfman, the report’s director, told NPR. “Remember, in a nuclear-war environment you’re talking about tens of millions of people dying. In such an environment, one of the things that goes by the board is the attitude that a single human life is precious. I suppose that is one of the ways you would know the war was over, that the recovery period was over, that the survivors had gotten over the war, would be when human life could again become precious. That could take a very long time.”**

**15] Extinction**

**Baum and Barrett 18** (Seth D. Baum and Anthony M. Barrett, Global Catastrophic Risk Institute, “A Model for the Impacts of Nuclear War,” Global Catastrophic Risk Institute Working Paper 18-2, 3 April 2018, available via SSRN, accessed 12-5-19, HKR-cjh)

Module: Shifted Norms Nuclear weapons detonations and nuclear wars can influence some important societal norms. The influence comes from two sources: human perceptions of the detonation/war itself, and human perceptions of the ionizing radiation released by nuclear detonations. In practice, it can sometimes be hard to distinguish between the two. To a large extent, the two are intertwined: **one cannot have a nuclear detonation without the release of ionizing radiation.** However, one can discern distinct perceptions and norms. For example, ionizing radiation is not a significant factor for the high-altitude detonations that can cause damaging electromagnetic pulses. It is also not a significant factor for the very-high-altitude detonations that have been proposed for deflecting asteroids and comets (Remo 2015; Su 2015). Meanwhile, **detonations are not a significant factor for ionizing radiation from other sources, such as nuclear power plants,** for which strong human perceptions and norms exist. **The ionizing radiation of nuclear weapons can** likewise **play a distinct role in shifting norms, including norms about nuclear power.** 28 **Figure 24 shows three norms that can be shifted by nuclear detonations, nuclear wars, and the ionizing radiation they release**. **The first is the norm against nuclear weapons. This norm is a major factor in nuclear arms control and the substantial general hesitance to use nuclear weapons in war.** The norm may have been strengthened by Hiroshima and Nagasaki, with one observer calling the norm part of the “legacy of Hiroshima” (Schelling 2006). Indeed, following the Hiroshima and Nagasaki bombings, U.S. military officials sought to hide or downplay evidence of illnesses from ionizing radiation due to concerns that this would reduce public support for the U.S. nuclear weapons program (Tannenwald 2005), though the same fear has also been reportedly leveraged by the U.S. military to enhance nuclear deterrence (Jaworowski 2010). What would the norm against nuclear weapons be **if nuclear weapons were not used in WWII**? A wide range of answers are plausible. On one end of the spectrum, **it is plausible that the norm would be even stronger, because there would be no precedent for nuclear weapons being used in war. A common (but contested) belief is that the nuclear bombings helped the U.S. win WWII while avoiding a costly land invasion** (Wilson 2013). **Had the U.S. refused to conduct the nuclear bombings, this could have sent a strong message that these weapons should not have been used under any circumstance.** On the other end of the spectrum, the norm could be weaker. The Hiroshima and Nagasaki bombings provided a vivid and enduring image of the horrors of nuclear war—hence the norm can reasonably be described as a legacy of the bombings. Without this image, there would be less to motivate the norm. A weaker norm could in turn have led to a nuclear war occurring later, especially during a near-miss event like the Cuban missile crisis. A later nuclear war would likely be much more severe, assuming some significant buildup of nuclear arsenals and especially if “overkill” targeting was used. **A new nuclear war could bring a similarly wide range of shifts in nuclear weapons norms.** It could strengthen the norm, hastening nuclear disarmament. Already, there is a political initiative drawing attention to the humanitarian consequences of nuclear weapons use in order to promote a new treaty to ban nuclear weapons as a step towards complete nuclear disarmament (Borrie 2014). It is easy to imagine this initiative using any new nuclear attacks to advance their goals. Alternatively, **it could weaken the norm, potentially leading to more and/or larger nuclear wars. This is a common concern, as seen for example in debates over low-yield bunker buster nuclear weapons** (Nelson 2003). **Given that the impacts of a large nuclear war could be extremely severe, a shift in nuclear weapons norms could easily be the single most consequential effect of a smaller nuclear war.** Norms about nuclear power can also be highly consequential. Fear of ionizing radiation from nuclear power inflates public concern about nuclear power relative to the actual medical risk (e.g., Slovic 2012). Some of this fear appears to derive from perceptions of nuclear weapons, especially Hiroshima and Nagasaki (e.g., Cwikel 1997). A new nuclear attack could strengthen general fears of nuclear radiation, further reducing support for nuclear power. Reduced support for nuclear power can in turn have major consequences to energy systems and the environment. Energy analysts are divided on the details, with some warning that increased use of fossil fuels 29 could lead to more local air pollution and greenhouse gas emissions (Kharecha and Hansen 2013) and some instead seeing benefits from an increased use of renewable energy (Sovacool et al. 2013). **Given the high stakes associated with energy systems, air pollution, global warming, and related issues, any shift in norms about nuclear power from nuclear war can have large impacts.** Finally, there could be general shifts in norms on global catastrophic risk. There is a general consensus that global catastrophic risk should be reduced. However, there is no consensus on how aggressively society should seek to reduce it. A large enough nuclear war could potentially be a global catastrophe. **A smaller war could make people less interested in reducing global catastrophic risk by creating a perception that human civilization is invulnerable**. Alternatively, it could increase interest by drawing attention to the fragility of human civilization.