## DA – Space Race

#### US wins the commercial space race now

Tepper 8-30 [Eytan Tepper,  research coordinator and adjunct professor, space governance, at Laval University, Canada and Adjunct Research Professor of Law and Faculty Member, Institute for Earth and Space Exploration at Western University, 8-30-2021, "The Space Review: The billionaires compete and the US wins the 21st century space race," No Publication, <https://www.thespacereview.com/article/4233/1> [accessed 12-5-21] lydia

Whoever is declared the winner in the so-called billionaire space race, the US wins the new space race. In the new era of space exploration, where commercial companies are taking the lead, they are mostly US-based. Symbolically, British billionaire Richard Branson, the first in space, launched from Spaceport America in New Mexico, where his company is based. “New Space”, new race In what is dubbed as “New Space”, the commercial sector is gradually taking the lead in space activities. One of the characteristics of the current New Space era is the so-called billionaire space race, in which billionaires who made their fortune elsewhere invest their wealth and talent in daring projects to accomplish their visions. Elon Musk (PayPal) established SpaceX, Jeff Bezos (Amazon) established Blue Origin, and Richard Branson (Virgin Records, Virgin Atlantic) established Virgin Galactic. Together with the many not-yet-famous space entrepreneurs and startups, they are bringing a boom to space activities.

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On July 11, billionaire Richard Branson rode Virgin Galactic's Unity 22 mission to space, making him the first of the racing billionaires to go to space, and by that launch his company’s space tourism business. Jeff Bezos rode Blue Origin’s New Shepard to space just nine days later. Elon Musk hasn’t yet been to space himself, but his company SpaceX carried astronauts to the International Space Station, and his red Tesla roadster, launched to space in 2018, orbits the Sun. You can follow its current whereabout [here](https://www.whereisroadster.com/). [“Jealousy among teachers increases wisdom”](https://www.sefaria.org/Bava_Batra.21a.11?lang=bi) provides the Babylonian Talmud; in the space context, the competition, perhaps jealousy, among billionaires and other space entrepreneurs is bringing a boom to space activities. The future of space exploration is commercial activities The commercial space sector is rapidly growing and taking the lead from national space agencies. It is reducing the costs of launch and introducing new activities and business models, including tourism, space-based Internet, factories in space, and manufacturing pharmaceuticals in microgravity. [Harvard business professor Matthew Weinzierl pointed that](https://www.hbs.edu/ris/Publication%20Files/jep.32.2.173_Space,%20the%20Final%20Economic%20Frontier_413bf24d-42e6-4cea-8cc5-a0d2f6fc6a70.pdf) the model of centralized, government-directed space activities born in the 1960s has, over the last two decades, made way for a new model in which the private sector shares the stage. [Three quarters the global space activity ($400 billion) are commercial space revenues](https://apps.bea.gov/scb/2019/12-december/pdf/1219-commercial-space.pdf), spearheaded by the satellite communications segment. The US already reaps the lion’s share in the traditional space segments, [with 44% of the global satellite industry revenues](https://www.nasa.gov/sites/default/files/atoms/files/sia_ssir_2017.pdf). It is now on track to lead the way also in the new segments. American pie A new dataset built at Laval University by Prof. Jean-Frédéric Morin and I as part of the [Astro-environmentalism project](http://www.institutions.space/) reveals trends in the global space sector. The dataset includes details on more than 1,500 space actors from around the world and preliminary findings from its analysis [were presented in June at the 60th Session of the Legal Subcommittee of the UN Committee on the Peaceful Uses of Outer Space](https://unoosa.org/documents/pdf/copuos/lsc/2021/tech-08E.pdf). The data shows the sharp increase in the share of the private space actors compared with the first decades of the space age (1957 onwards), and while there is more geographical diversity today in where actors are based, the US is widening the gap. Between 2010 and 2019 the number of space actors almost doubled (an 89% increase), with more than 86% of them private actors, of which 34% are based in the US; this amounts to five times those based in the second and third places, the UK and China, respectively. The number of new organizations based in EU countries taken together (without the UK) is bit over half of that of the US (56%). The new organizations are significantly smaller than before, with an average size index (combining number of employees and budget) of 2.9 versus 8 in the early days of space exploration. Space startups is a thing.

#### The plan upends a foundation for US economic competitiveness---the space-value chain touches all sectors of the economy.

George 19 [Kelly, Professor, Embry-Riddle Aeronautical University. “The Economic Impacts of the Commercial Space Industry.” Space Policy 47: 181-186.] brett

As the 1960s was known as the height of the space race propelled by government funding, the 21st century may be known as the commercial space race propelled by private investors that will lend to stimulus to the U.S. and Florida's economy's future structure. Continued domination by government investment in the space industry is a topic of debate as new commercial companies began working in and acting as disruptors to the commercial space sector [3], [21], [24]. Those that may have thought there would not be a stand-alone commercial space industry were surely dealt a blow with the visual of Elon Musk's red sports car driven by Spaceman past the earth that had been launched into orbit by SpaceX on February 6, 2018 [23]. However, in recent years, more evidence of advancements in the commercial space industry have been fulfilled by other private commercial space companies, most notably Blue Origin, Virgin Galactic, Moon Express, and Orbital ATK [8]. The U.S. government policy intentionally embarked on a direction intended to speed innovation and drive costs down by expanding the role of commercial space companies in manufacturing and launch activities [2]; hence, the orbiting sports car. Yet more importantly, reusable rockets, satellites, and associated services have developed as a result of the deliberate shift in federal policy initiated by the Commercial Space Launch Act of 1984 and follow-on public private partnerships that supported launch efforts and satellites [4], [24]. This analysis chose the United States and then more narrowly, the state of Florida as the region to study because of the importance of the industry to the U.S. and the state's specific geographical characteristics and its economy: specifically, the launch/landing facilities and support resources. Also, Florida's governor appointed a commission on space and aeronautics whose goals include advancing the state's economic development across the global aerospace enterprise further emphasizing the role of commercial space in the economy. Various bodies forecast significant future growth in commercialization of the space industry and its importance for the U.S. economic competitiveness within the global market. The space sector is not solely comprised of launches and satellites but now includes direct consumer applications and personal entertainment. As the commercial space industry has some history of growth and its growth is expected to accelerate, input-output (IO) analysis is useful to help predict what industries will benefit from its growth and inform the government that may want to use this information in their policy or public investment decisions [27], [28], [29]. Discussions regarding expansion of industries often led to polarizing aspects of the debate. This analysis can be useful for researchers, practitioners, and policy-makers in mitigating debate or enhancing discussions by contributing unbiased, accurate quantitative data about the economic impacts of the expansion of an industry. The Space Project Team of the Organization for Economic Cooperation and Development International Futures Program (IFP) determined that the future demand for commercial space applications is likely to be substantial. They presented 3 likely scenarios that have different geopolitical, socio-economic, and energy and environment characteristics. Using the 3 IFP scenarios for Space 2030 and the presented cost of access to space, this research determines a potential impact from the change in final demand of the space value chain to the U.S. economy. The IFP's estimates spanned a range of 18–40% growth in the industry from 2004 to 2030 [17]. These projections appear to be on track with a $339 billion in economic activity according to a June 2017 Satellite Industry Association report showing growth of 7% from 2013 to 2016. This estimate is a conservative one as Morgan Stanley estimates the industry to be over $1 trillion by 2040 [24]. Because of the interrelations of applications, the space-value chain is made up of 4 broad categories: ground equipment, launch industry and satellite manufacturing which make up the core of the space industrial base, and satellite services [22].

#### US competitiveness underwrites global stability and non-prolif---great power war.

Daniel Bessner 17 [\*\*Assistant Professor in American Foreign Policy, University of Washington. \*\*Jim McDermott, Representative for Washington’s 7th District. \*\*Francis Wilson, BA, International Studies, University of Washington. “Redefining American Leadership for an Internationalized Era.” The Henry M. Jackson School of International Studies, University of Washington. Task Force Report. <https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/38693/TaskForceC-Bessner.pdf?sequence=1&isAllowed=y>] brett

America’s status as the world’s most vital nation is as dependent on its prosperity as it is on its military might and ability to project power worldwide. The federal government’s capacity to allocate resources to our armed forces, the private sector’s ability to develop beneficial products and technologies, and the satisfaction of the domestic public are all closely tied to the continued growth of American wealth at home and abroad. This has been proven repeatedly during periods where the United States has faced its greatest existential threats: Nazi Germany and Imperial Japan were unable to keep up with the sheer industrial output of the American heartland, while the Soviet Empire lost control of its satellites in great part due to their desire to benefit from the Western free market system. Therefore, the formulation of a long-term strategy that anticipates the potential disruptions and opportunities of the new global economy is as important as questions of diplomacy and military strategy. As the United States evaluates how it will face the rapidly changing and increasingly interconnected world of the 21st century, it must take into account its economic interests as well as the potential economic costs associated with achieving its political objectives. Since the beginning of the Cold War, America’s unparalleled ability to influence countries through nonviolent means has been critical to the preservation of global stability. The most relevant example of this in our history is the Marshall Plan, which leveraged American capital to provide a devastated post-War Europe with almost 120 billion dollars (adjusted for inflation) in aid. This aid was critical to preventing the spread of Soviet influence into Western Europe, and laid the foundation for an economically strong region stretching from Portugal to Austria that has been free from inter-state conflict since 1945. Because of the pragmatic exercise of economic influence, the European Union is now our strongest ally as well as our largest trading partner. Worldwide, the liberal economic system that the United States has promoted through international trade organizations like the WTO has contributed to unprecedented economic cohesion between states. When countries are tied together in the mutually beneficial exchange of goods, the opportunity cost of war goes up significantly, making political leaders much more likely to de-escalate and rely on nonviolent means to resolve conflicts. Our economy also plays a key role in helping the United States deal with states that threaten stability. The American ability to impose sanctions has been a formidable tool for discouraging nuclear proliferation and punishing violators of international norms. When more direct means of coercion are required, a powerful industrial and technological base enables the maintenance of a well-funded and technologically advanced military. America’s advanced 17 trillion-dollar economy has allowed it to exert the influence that it does in the world today. However, our economic strength and the skill of our workforce, which have always underwritten our international influence, should not be taken for granted. Rapid growth in the developing world means that American companies and workers must now contend in an increasingly crowded global marketplace. In the new “knowledge economy,” educating America’s workers and ensuring that the United States retains its role as an innovation capital must take the highest priority. On the business side, reforming America’s institutions and removing barriers to expansion and innovation will encourage the companies of the future to make their start here.

## DA – Tech

#### ACA passed the house, but bipartisan support is key to senate fight. Mckinnon et all 2-4 [John D. Mckinnon, Natalie Andrews and Yuka Hayashi, 2-4-2022, "House Passes $350 Billion Competitiveness Bill, but Senate Fight Looms," WSJ, <https://www.wsj.com/articles/house-expected-to-pass-350-billion-bill-to-help-u-s-compete-globally-11643972401> [accessed 2-5-22] lydia

The House approved a $350 billion initiative Friday to boost U.S. competitiveness with China and other rivals, but differences with the Senate and emerging partisan divides signaled struggles ahead in reaching a compromise.The Senate in June [passed its $250 billion version](https://www.wsj.com/articles/senate-approves-250-billion-bill-to-boost-tech-research-11623192584?mod=article_inline) of the measure, the U.S. Innovation and Competition Act, on a bipartisan basis. House leaders waited until the past few weeks to put together their own package, [called the America Competes Act](https://www.wsj.com/articles/white-house-democrats-revive-effort-to-boost-high-tech-research-11642773603?mod=article_inline), as Congress wrestled with other spending proposals. The House bill passed almost entirely on party lines, in a 222-210 vote. It shares common elements with the Senate bill. Both are aimed at increasing federal support for scientific research and particularly new technologies. Both bills also provide for substantial new federal incentives to help bring [advanced semiconductor manufacturing back to the U. S.](https://www.wsj.com/articles/why-fewer-chips-say-made-in-the-u-s-a-11604411810?mod=article_inline)—another bipartisan priority. [Intel](https://www.wsj.com/market-data/quotes/INTC) Corp. cheered the passage of the House version, noting its plans for $43.5 billion in [new investment in Ohio](https://www.wsj.com/articles/intel-to-invest-at-least-20-billion-in-ohio-chip-making-facility-11642750760?mod=article_inline), Arizona and New Mexico. “Funding the [semiconductor incentives] is critical to level the playing field with global competitors, protect our domestic supply chain, invest in U.S. jobs and manufacturing and put us on a path to regain U.S. innovation leadership,” said Al Thompson, vice president of U.S. government relations at Intel. But Friday’s partisan divide over the House bill—along with differences between the House and Senate approaches—concerned Biden administration officials. “Delay is the biggest enemy we have right now,” Commerce Secretary Gina Raimondo told reporters following the vote. “My message to everyone is to find common ground quickly…This should take weeks, not months.” Ms. Raimondo said that the most contentious of the numerous partisan disagreements over the House package concerned its trade-policy changes. House Democrats sought to make more use of trade-policy changes to counter overseas threats while also adding protections for U.S. workers. One measure would offer new trade-adjustment help to workers affected by pandemic-induced trade and supply-chain disruptions, while also addressing “inherent racial disparities and inequalities in our economy,” according to a House summary. Other provisions would impose new federal oversight of U.S. cross-border investments in China and remove a loophole that allows for lower-valued products to enter the U.S. from China and some other countries without import duty or customs inspection. Ms. Raimondo urged lawmakers to find common ground and not let disagreements “bog down this whole negotiation.” Other differences are between the House and Senate versions and further complicate the final negotiations. One is over how to use scientific research to counter overseas threats. The Senate for its part focuses largely on encouraging cutting-edge technologies, such as artificial intelligence and quantum computing. The House, by contrast, wants to give more flexibility to federal science officials to decide which new ideas deserve to be jump-started. The House package also focuses more on global economic challenges and less on the specific threat from China, aides say. Compared with the Senate, the House also targets more funding and related policy changes toward issues such as climate change, human rights and domestic social inequality. Its version includes $8 billion to help developing countries convert to cleaner sources of energy. Another difference is the House’s inclusion of a new, $45 billion fund to provide grants and loans to strengthen U.S. supply chains and manufacturing. The bill’s sponsors say it provides for roughly $350 billion in overall spending, but the impact on deficits would be lower because not all of that money would represent new spending. A final estimate of its cost wasn’t available on Friday. Republicans accuse House Democrats of using the competitiveness bill as a way to pass unrelated spending proposals, weeks after President Biden’s $2 trillion Build Back Better initiative crashed in the Senate. “It has become a Frankenstein monster of other things,” said Rep. Mike Gallagher (R., Wis.), citing climate-change spending. Democrats say their bill will help solve supply-chain issues that are dragging on the economy, fueling inflation and frustrating Americans. “This bill deals with the independence and self-sufficiency of America in making things here in America that we need to have in order to grow our economy, create jobs and opportunity for our people,” said Majority Leader Steny Hoyer (D., Md.). He has long supported measures to increase manufacturing in the U.S. Democrats also view countering climate change as a global-competitiveness issue. They note that the package contains dozens of bills that have already passed with bipartisan support. Senate sponsors predicted that many of the House proposals will have to be removed to ensure Senate passage. “What candidly will happen [is], we’re going to have to move the policy towards the Senate bill,” said Sen. Todd Young (R., Ind.), who has been working with Majority Leader Chuck Schumer (D., N.Y.) on the Senate bill. While praising the House for moving on its own competitiveness package, Mr. Schumer said Thursday that lawmakers will “have much more work to do to bridge our two proposals together.”

#### NewSpace companies will lobby for their survival against the plan.

GC 17 [GC Magazine; Autumn 2017; Business thinking, In-house management, Published by legal500; “The new space race,” <https://www.legal500.com/gc-magazine/feature/the-new-space-race/>] brett

The upshot is that the ability to engage with legislators and policymakers will be essential for the long-term viability of companies like Planetary Resources. ‘We’re seeing already that with a regulatory framework laid out for a very quickly growing and expanding sector, there’s a lot of opportunity for policy engagement. That’s equally true in other countries too, which are either enacting their first national space laws or overhauling them,’ says Israel. Before Israel joined the company, Planetary Resources was heavily involved in lobbying the US Congress to support the Spurring Private Aerospace Competitiveness and Entrepreneurship Act – better known as the SPACE Act. That piece of legislation explicitly granted permission to US entities to ‘engage in the commercial exploration and exploitation of “space resources”.’ But the international community remains divided over whether the SPACE Act runs contrary to the obligations imposed on the US under the Outer Space Treaty. ‘The Americans are a sovereign state and according to their international treaty commitments, it’s hard to say that their domestic law is compatible with international law,’ says Smith. Lobbying, both at a domestic and international level, stands to become increasingly critical, particularly as the US is in the process of crafting a framework for supervising non-governmental space activities, while ensure conformity with the Outer Space Treaty. image of cartoon Mars Rover ‘It is incumbent on Congress to use the 50-year anniversary of the Outer Space Treaty to properly determine our actual international obligations, decide if specific articles in the Treaty are self-executing or not, and ensure that our domestic policy moving forward creates an environment that provides certainty for industry while protecting our national security,’ said Senator Ted Cruz, earlier this year. ‘The design and objectives in doing this must not only be to implement the government’s obligations, but to do so in a way that is not unduly burdensome on emerging space activities,’ adds Israel. ‘This is particularly relevant when the exact contours of how the activity will be carried out are not known, which makes it imperative that the regulators do not get too far ahead of the technology and make guesses about how it will be done, what is feasible, then lock in standards that are ultimately irrelevant and unworkable.’

#### ACA prevents Chinese tech supremacy

Kreier 2-4 Freda Kreier, a science journalist who likes to write about the environment, climate and DNA. Freda completed her master's in science communication from UC Santa Cruz at the height of the COVID-19 pandemic. Before becoming a journalist, Freda studied molecular biology at Colorado College (2017). She discovered she had a passion for storytelling while working for a podcast production company in Denver. Her work to date appears in Nature, Science News, The Mercury News, Mongabay and more. She's also worked on the anthropology podcast SAPIENS and radio show Big Picture Science, 2-4-2022, "Huge boost for US science funding inches closer to reality," Nature, [https://www.nature.com/articles/d41586-022-00349-3 //](https://www.nature.com/articles/d41586-022-00349-3%20//) ella

Under pressure COMPETES is the House’s response to a Senate bill, called the US Innovation and Competition Act, that passed in June 2021 and similarly calls for more US science funding and includes provisions to protect foreign governments from benefitting from US research. Both bills will now head to a conference committee, in which lawmakers will reconcile differences between them to create a final version of the legislation As it stands, COMPETES would authorize a more than doubling of the NSF’s budget to about US$18 billion over the next five years, a goal that has long been on the wish list of US researchers. It would also authorize an increase to the budget of the Department of Energy’s (DOE) Office of Science to about $11 billion, which funds the physical sciences in areas such as fusion research. It also directly appropriates $52 billion for semiconductor manufacturing and research and development. Semiconductors are used in everything from cars to smart phones and are a foundational part of the modern world, but have been in short supply in the United States during the COVID-19 pandemic, in part because most are produced outside the country. For many researchers who spoke to Nature, however, the most exciting part of COMPETES is that it promises to alleviate some of the pressures faced by the scientific community. In 2020, only 28% of grant proposals to the NSF were funded. Rita Colwell, a microbiologist at the University of Maryland College Park who headed the NSF between 1998 and 2004, says that far more of the proposals submitted by researchers merit funding than the agency is able to provide. Colwell says that adding money to the NSF’s pool will benefit up-and-coming researchers, who often get passed over. “Right now, we have a lot of bright young people who are scrambling for funding,” Colwell says. “It’s clear to me that doubling the NSF budget is rational, reasonable and much needed.” Promises, promises Still, some are sceptical that the bulk of the funding provided in the bill will ever materialize, pointing to historical precedents. In 2007, US Congress passed similar legislation, signed into law by then-US president George W. Bush, intended to boost US science funding, also called the America COMPETES Act. But most of the promised money never made its way to science agencies. The 2007 economic recession in the United States left Congress scrambling to make cuts to federal funding. Money that had been earmarked for science agencies in the bill but not yet formally appropriated was one casualty. “We should not repeat the error of the 2007 COMPETES legislation, where funding in the name of enhancing US competitiveness was authorized, but never actually appropriated,” says Toby Smith, vice president for science policy and global affairs at the Association of American Universities in Washington, DC. “We need to do more than pay pure lip service to increasing support for US science and innovation. We need to actually do it.” Research security Not all parts of COMPETES are threatened by the ebb and flow of federal budgets. Some provisions are unattached to funding and are instead aimed at reducing the chance of US research benefitting foreign governments such as China’s. COMPETES would ban researchers who receive federal grants from also participating in “malign” talent programmes hosted outside the country. It also proposes lowering the value of foreign gifts that universities must disclose to US agencies from which they are receiving research funds. Stephen Ezell, vice president of Information Technology and Innovation Foundation, a think tank in Washington DC, says that measures such as these are warranted, to avoid technology developed in the United States from ending up in the hands of the Chinese military.

#### Chinese tech supremacy causes nuclear war.

Kroenig 18 [Matthew, Deputy Director for Strategy, Scowcroft Center for Strategy and Security; Associate Professor of Government and Foreign Service, Georgetown University, “Will disruptive technology cause nuclear war?” The Bulletin, 11/12/2018, https://thebulletin.org/2018/11/will-disruptive-technology-cause-nuclear-war/]

Recently, analysts have argued that emerging technologies with military applications may undermine nuclear stability (see here, here, and here), but the logic of these arguments is debatable and overlooks a more straightforward reason why new technology might cause nuclear conflict: by upending the existing balance of power among nuclear-armed states. This latter concern is more probable and dangerous and demands an immediate policy response. For more than 70 years, the world has avoided major power conflict, and many attribute this era of peace to nuclear weapons. In situations of mutually assured destruction (MAD), neither side has an incentive to start a conflict because doing so will only result in its own annihilation. The key to this model of deterrence is the maintenance of secure second-strike capabilities—the ability to absorb an enemy nuclear attack and respond with a devastating counterattack. Recently analysts have begun to worry, however, that new strategic military technologies may make it possible for a state to conduct a successful first strike on an enemy. For example, Chinese colleagues have complained to me in Track II dialogues that the United States may decide to launch a sophisticated cyberattack against Chinese nuclear command and control, essentially turning off China’s nuclear forces. Then, Washington will follow up with a massive strike with conventional cruise and hypersonic missiles to destroy China’s nuclear weapons. Finally, if any Chinese forces happen to survive, the United States can simply mop up China’s ragged retaliatory strike with advanced missile defenses. China will be disarmed and US nuclear weapons will still be sitting on the shelf, untouched. If the United States, or any other state acquires such a first-strike capability, then the logic of MAD would be undermined. Washington may be tempted to launch a nuclear first strike. Or China may choose instead to use its nuclear weapons early in a conflict before they can be wiped out—the so-called “use ‘em or lose ‘em” problem. According to this logic, therefore, the appropriate policy response would be to ban outright or control any new weapon systems that might threaten second-strike capabilities. This way of thinking about new technology and stability, however, is open to question. Would any US president truly decide to launch a massive, bolt-out-of-the-blue nuclear attack because he or she thought s/he could get away with it? And why does it make sense for the country in the inferior position, in this case China, to intentionally start a nuclear war that it will almost certainly lose? More important, this conceptualization of how new technology affects stability is too narrow, focused exclusively on how new military technologies might be used against nuclear forces directly. Rather, we should think more broadly about how new technology might affect global politics, and, for this, it is helpful to turn to scholarly international relations theory. The dominant theory of the causes of war in the academy is the “bargaining model of war.” This theory identifies rapid shifts in the balance of power as a primary cause of conflict. International politics often presents states with conflicts that they can settle through peaceful bargaining, but when bargaining breaks down, war results. Shifts in the balance of power are problematic because they undermine effective bargaining. After all, why agree to a deal today if your bargaining position will be stronger tomorrow? And, a clear understanding of the military balance of power can contribute to peace. (Why start a war you are likely to lose?) But shifts in the balance of power muddy understandings of which states have the advantage. You may see where this is going. New technologies threaten to create potentially destabilizing shifts in the balance of power. For decades, stability in Europe and Asia has been supported by US military power. In recent years, however, the balance of power in Asia has begun to shift, as China has increased its military capabilities. Already, Beijing has become more assertive in the region, claiming contested territory in the South China Sea. And the results of Russia’s military modernization have been on full display in its ongoing intervention in Ukraine. Moreover, China may have the lead over the United States in emerging technologies that could be decisive for the future of military acquisitions and warfare, including 3D printing, hypersonic missiles, quantum computing, 5G wireless connectivity, and artificial intelligence (AI). And Russian President Vladimir Putin is building new unmanned vehicles while ominously declaring, “Whoever leads in AI will rule the world.” If China or Russia are able to incorporate new technologies into their militaries before the United States, then this could lead to the kind of rapid shift in the balance of power that often causes war. If Beijing believes emerging technologies provide it with a newfound, local military advantage over the United States, for example, it may be more willing than previously to initiate conflict over Taiwan. And if Putin thinks new tech has strengthened his hand, he may be more tempted to launch a Ukraine-style invasion of a NATO member. Either scenario could bring these nuclear powers into direct conflict with the United States, and once nuclear armed states are at war, there is an inherent risk of nuclear conflict through limited nuclear war strategies, nuclear brinkmanship, or simple accident or inadvertent escalation. This framing of the problem leads to a different set of policy implications. The concern is not simply technologies that threaten to undermine nuclear second-strike capabilities directly, but, rather, any technologies that can result in a meaningful shift in the broader balance of power. And the solution is not to preserve second-strike capabilities, but to preserve prevailing power balances more broadly. When it comes to new technology, this means that the United States should seek to maintain an innovation edge. Washington should also work with other states, including its nuclear-armed rivals, to develop a new set of arms control and nonproliferation agreements and export controls to deny these newer and potentially destabilizing technologies to potentially hostile states. These are no easy tasks, but the consequences of Washington losing the race for technological superiority to its autocratic challengers just might mean nuclear Armageddon

## 3 – Hypersonics

#### PIC – States should ban the appropriation of outerspace by megaconstellations except for those that detect hypersonics

### Generic Shell

#### China and Russia are pursuing hypersonics now.

Loiaconi 2-4 [Stephen Loiaconi, The National Desk, 2-4-22, "China, Russia advancing hypersonic weapons raises concerns at Pentagon," KVII, <https://abc7amarillo.com/news/nation-world/china-russia-advancing-hypersonic-weapons-raises-concerns-at-pentagon> [accessed 2-6-22] Lydia

WASHINGTON (TND) — Amid mounting anxiety over Russian and Chinese hypersonic weapons development, the Pentagon is pressing American defense contractors to catch up, but some arms control experts are uncertain how urgently the U.S. military needs such weapons. Defense Secretary Lloyd Austin and Deputy Defense Secretary Kathleen Hicks met with top executives from more than two dozen companies Thursday to urge them to accelerate hypersonic weapons research. The roundtable identified several obstacles hindering U.S. development, including supply chain constraints and logistical challenges. “Participants identified a need to expand access to modeling capabilities and testing facilities in order to adopt a ‘test often, fail fast, and learn’ approach which will accelerate the fielding of hypersonic and counter-hypersonic systems,” Pentagon spokesperson Eric Pahon said in a statement. [Hypersonic weapons](https://www.atlanticcouncil.org/in-depth-research-reports/report/primer-on-hypersonic-weapons-in-the-indo-pacific-region/) travel at five times the speed of sound or faster, making them difficult for conventional missile defense systems to detect and intercept. Russia and China are believed to be making advances toward launching hypersonic devices that would be capable of carrying a nuclear warhead, including recent tests of missiles and glide vehicles. [North Korea claimed](https://abc7amarillo.com/news/nation-world/north-korea-claims-successful-test-of-hypersonic-missile) to have tested hypersonic weapons in September and January, as well. Although the U.S. pioneered hypersonic technology decades ago, the Pentagon eased off research after failed tests in the early 2000s. In recent years, China has conducted hundreds of tests of hypersonic devices, while the U.S. has conducted only a handful. “We’ve got to invest more in defenses, but we’re not without capabilities, and our adversaries should know that,” former national security adviser Robert O’Brien said at a Richard Nixon Foundation event [earlier this week](https://www.nationalreview.com/corner/pompeo-chinese-hypersonic-threat-a-very-difficult-problem/). The Pentagon has [several projects underway](https://www.defense.gov/News/News-Stories/Article/Article/2518370/defense-officials-outline-hypersonics-development-strategy/) aimed at developing operational prototypes for a weapon. A senior Air Force official indicated in an interview [with Breaking Defense](https://breakingdefense.com/2022/01/air-forces-first-hypersonic-missile-could-still-start-production-this-year/) last month that tests of hypersonic missiles are scheduled throughout the coming year. Three hypersonic tests conducted by the U.S. military in 2021 failed, and one of the CEOs who attended Thursday’s meeting [told CNN](https://www.cnn.com/2022/02/03/politics/pentagon-hypersonic-weapons-defense-companies-meeting/index.html) an industry-wide “fear of failure” has undermined progress. However, experts say failing and figuring out what went wrong is an important part of the weapons development process. “As I understand the technologies involved, you have to fail a lot of times before you get it right,” said John Erath, senior policy director at the Center for Arms Control and Non-Proliferation. The White House’s 2022 budget sought $3.8 billion for hypersonic weapons research, as well as nearly $250 million for hypersonic defense. Congress approved most of the requested spending in the 2022 National Defense Authorization Act, which was signed by President Joe Biden in December. “[Russia and China] now have the lead, but they are rushing Fords into the field as the United States moves slowly to perfect its Ferrari,” said Matthew Kroenig, deputy director of the Scowcroft Center for Strategy and Security at the Atlantic Council. “So, I am confident we will have superior technology eventually, but we are currently behind.” The U.S. and Japan also announced an agreement last month to increase collaboration on hypersonic missile defense, citing aggressive actions [by China and North Korea](https://abc7amarillo.com/news/nation-world/nkorea-says-hypersonic-missile-tested-to-modernize-weaponry). It is unclear how that partnership will impact the development of new technologies. “When Japanese and American researchers bring their complementary strengths to bear, we can outcompete and out-innovate anyone,” Secretary of State Antony Blinken said at the time. According to a recent [Congressional Research Service report](https://sgp.fas.org/crs/weapons/R45811.pdf), most U.S. hypersonic programs are not geared toward carrying nuclear warheads, which means they will require greater accuracy. Getting something that moves that fast to hit a target with precision will not be easy, though. “It’s a very difficult technology to master, and it’s not one that fits all that well with the way the U.S. military does things,” Erath said. In a report published in [Science & Global Security](https://www.nytimes.com/2021/01/15/science/hypersonic-missile-weapons.html) last year, independent experts questioned the value of hypersonic technology, with one author calling claims made by defense officials “nonsense.” The Defense Department pushed back, insisting the report was based on outdated information, but even some within the military have voiced skepticism about dedicating more resources to hypersonic weapons research. “It isn’t obvious that the right response to someone else doing hypersonics is that we should be doing hypersonics,” Air Force Secretary Frank Kendall[said last month](https://www.washingtonpost.com/opinions/2022/02/03/america-led-hypersonic-technology-then-other-countries-sped-past/), according to The Washington Post. Still, other experts say China’s investment in hypersonics and other military technologies presents a serious threat to the U.S. and its allies if it proceeds unchecked. According to Kroenig, maintaining military superiority over Beijing and Moscow could be essential to preserving global peace in the years ahead. “International peace and stability have been undergirded by U.S. military primacy for decades,” he said. “If Russia and China gain a military advantage, they will use it to revise the international order and aggress against their neighbors.”

#### The plan gets rid of critical mega constellations that detect hypersonics – this link turns their sats deterrence scenario.

Trevithick 20 [Joseph Trevithick, 10-5-2020, "Work Begins On Starlink-Like Constellation Of Small Hypersonic Missile-Tracking Satellites," Drive, <https://www.thedrive.com/the-war-zone/36909/work-begins-on-starlink-like-constellation-of-small-hypersonic-missile-tracking-satellites> [accessed 2-5-22] lydia

The U.S. military has hired L3Harris and [SpaceX](https://www.thedrive.com/the-war-zone/32346/the-air-force-and-spacex-are-teaming-up-for-a-massive-live-fire-exercise) to build small satellites with powerful infrared sensors [capable of spotting and tracking](https://www.thedrive.com/the-war-zone/18882/stratcom-boss-makes-case-for-satellites-capable-of-tracking-hypersonic-weapons) ballistic [missiles](https://www.thedrive.com/the-war-zone/36149/how-chinas-ballistic-missile-and-nuclear-arsenal-is-ballooning-according-to-the-pentagon) and [hypersonic weapons](https://www.thedrive.com/the-war-zone/31215/u-s-inspectors-have-examined-russias-imminently-operational-hypersonic-missile). These satellites could become part of a large and broader [early warning](https://www.thedrive.com/the-war-zone/22907/usaf-hands-lockheed-billions-for-new-warning-satellites-amid-rush-for-more-space-sensors) constellation with hundreds of space-based sensors and communications nodes watching for incoming threats, monitoring their flight, and potentially providing targeting data to [missile defense assets](https://www.thedrive.com/the-war-zone/32492/the-navys-arleigh-burke-class-destroyers-to-be-armed-with-hypersonic-weapon-interceptors).

The Pentagon [announced](https://www.defense.gov/Explore/News/Article/Article/2372647/agency-awards-contracts-to-build-out-tracking-layer-of-national-defense-space-a/) that the Space Development Agency (SDA) [had awarded](https://www.defense.gov/Newsroom/Contracts/Contract/Article/2372482/) the contracts to L3Harris and SpaceX, worth around $193.5 million and just over $149 million, respectively, on Oct. 5, 2020. Each company will be responsible for building four satellites, each with a wide field of view (WFOV) overhead persistent infrared (OPIR) sensor, in support of work on what SDA calls Tranche 0 of the Tracking Layer of the planned overarching early warning constellation. "SDA is developing the low-cost proliferated WFOV space vehicles that provide the missile warning and the tracking information for national defense authorities, as well as tracking and cueing data for missile defense elements," Mark Lewis, the Acting Deputy Undersecretary of Defense for Research and Engineering, said in a [statement to C4ISRNET](https://www.c4isrnet.com/battlefield-tech/space/2020/10/05/space-development-agency-orders-8-hypersonic-weapon-tracking-satellites/).

"This capability [the Tracking Layer] encompasses space-based sensing, as well as algorithms, novel processing schemes, data fusion across sensors and orbital regimes, and tactical data products able to be delivered to the appropriate user," according to SDA's website. This Layer's Tranche 0 could eventually grow to 20 satellites and this portion of the larger constellation may eventually have as many as 200 space-based sensors. SpaceX's satellite will be derived from that company's [Starlink design](https://www.thedrive.com/the-war-zone/32346/the-air-force-and-spacex-are-teaming-up-for-a-massive-live-fire-exercise" \t "_blank), which was originally designed as part of an effort to provide increased access to broadband internet for commercial and military purposes. An as-yet-unknown subcontractor will be providing the OPIR sensor.

L3Harris is developing both its satellite and sensor in-house. The company has not yet released details about the design of either one. SDA's goal is to launch the first Tranche 0 satellites into Low Earth Orbit (LEO) in 2022 and then have moved on to the Tranche 1 stage by 2024, where the Tracking Layer will be able to provide persistent monitoring for missile and hypersonic threats over specific regions of interest. The hope is that there will be enough satellites in orbit by 2026 to provide global early warning coverage. The idea is that the Tracking Layer will also be more responsive, flexible, and resilient to the [ever-more real prospect](https://www.thedrive.com/the-war-zone/35057/space-force-boss-says-russia-has-been-testing-its-killer-satellites-in-orbit) of an enemy anti-satellite attack by using this large, distributed constellation of small satellites. At present, the U.S. military's space-based early warning capability comes from a relatively limited number of larger satellites, such as the Space-Based Infrared System (SBIRS) constellation, which you can read about in more detail [here](https://foxtrotalpha.jalopnik.com/these-are-the-doomsday-satellites-that-detected-the-exp-1737434876). SBIRS notably provided an advance alert that Iranian ballistic missiles [were headed toward bases](https://www.thedrive.com/the-war-zone/31769/satellite-images-show-the-aftermath-of-irans-missile-strikes-on-al-assad-air-base-in-iraq) hosting U.S. troops in Iraq in January, giving those individuals time to seek cover. SBIRS' sensors are also known to be powerful enough to spot infrared events [that are much smaller](https://www.thedrive.com/the-war-zone/27364/u-s-infrared-warning-satellite-data-could-settle-debate-over-pakistan-india-dogfight) than a ballistic missile blasting off, such as the launch of smaller missiles, large explosions, and even artillery fire.

The Tracking Layer isn't the only planned distributed space-based sensor program in the works, either. It's "going to combine with activities in the Missile Defense Agency as they build toward their [Hypersonic and Ballistic Tracking Space Sensor](https://missiledefenseadvocacy.org/defense-systems/hypersonic-and-ballistic-tracking-space-sensor-hbtss/) (HBTSS) medium field of view (MFOV) space vehicles," Acting Deputy Undersecretary of Defense Lewis added in his statement to C4ISRNET.

#### Absent early detection we lose deterrence – that emboldens rivals

**Beu 21** [Sammantha Beu, 4-2-21, Sensor Tech Key to Effective Missile Defense, <https://www.nationaldefensemagazine.org/articles/2021/4/2/sensor-tech-key-to-effective-missile-defense> [accessed 2-5-22] Lydia

“If you can’t see it, you can’t shoot it. And if you can’t see it, you can’t deter it either,” said Air Force Gen. John Hyten, vice chairman of the Joint Chiefs of Staff. In a recent interview, Hyten discussed the way forward for integrated air-and-missile defense, saying the key to missile defeat and defense is “the sensory capability that can track that missile.” This sentiment has been echoed by other leaders. During her Senate confirmation, Deputy Secretary of Defense Kathleen Hicks was asked about her priorities, replying: “I would assess ongoing efforts to improve national missile defense, with a particular focus on improving discrimination capabilities and sensors for detection of both ballistic and hypersonic missiles.” The Defense Department has already worked to upgrade interceptor capabilities. After scrapping the Redesigned Kill Vehicle program, the Missile Defense Agency began pursuing the Next-Generation Interceptor, expected to roll out within the next decade. The interceptor will enhance the Ground-based Midcourse Defense system based in California and Alaska, but a 10-year gap in capability presents a risk. With growing concerns about potential threats, lawmakers are pushing for an additional layer of defense. Per the fiscal year 2021 National Defense Authorization Act, Congress has tasked the Pentagon to deliver 20 new interim ground-based interceptors capable of protecting the homeland. According to the bill, the interim interceptors should “address the majority of current and near- to mid-term projected ballistic missile threats to the United States homeland from rogue nations.” North Korea and Iran remain a threat to America and its allies, so the United States must be well-equipped to defend against long-range weapons. But what about efforts to advance sensor technologies? Also noted in the NDAA were lawmakers’ concerns regarding the lack of budgeting for key programs to improve overall sensor architecture, including the Homeland Defense Radar-Hawaii and AN/TPY-2, as well as the development and deployment of the hypersonic and ballistic tracking space sensor. Senior “military and civilian officials have stated repeatedly that space-based sensors are the most effective path to improving both homeland and theater missile defenses against a wide range of missile threats,” states the NDAA. Those agreeing include Indo-Pacific Command, which just laid out its investment priorities for the new Pacific Deterrence Initiative. Included in the report — written by PACOM Commander Adm. Philip Davidson — was a request of $2.3 billion for “a constellation of space-based radars.” Sensors are the eyes and ears of missile defense and are critical for detecting and tracking missiles through all phases of their trajectory, either by space-based satellites or by land- and sea-based radars. Some sensors, such as early warning radar and X-band radar, have discrimination capabilities to distinguish whether an incoming object actually poses a threat, is simply debris, or perhaps is a deliberate countermeasure. As it faces the evolving threat of hypersonic missiles and maneuvering reentry vehicles, the U.S. defense industry is working to meet the challenge, with Northrop Grumman and L3Harris selected in January to build prototypes for the HBTSS space-based sensor. Lockheed Martin, Boeing and Raytheon have also won past contracts with the Missile Defense Agency to develop hypersonic missile defense systems. Dr. Mark Lewis, executive director of NDIA’s new Emerging Technologies Institute, and the immediate past director of defense research and engineering and acting deputy undersecretary in charge of technology modernization, said hypersonic weapons will add a new level of complexity to missile defense. “Hypersonic systems don’t just introduce speed; they bring a combination of speed, maneuverability, range and altitude that makes timely detecting, tracking and defeating particularly difficult. That’s why the United States is pursuing such weapons; it’s also why our peer competitors are doing the same,” he said. Lewis has observed that success requires more than just spotting and identifying a hypersonic weapon, but also retaining custody until it can be rendered ineffective. “These systems can be stopped but doing so will require leveraging state-of-the-art space sensors, rapid processing and decision-making, and an assortment of available intercept techniques.” The question is whether the Pentagon considers sensor innovation a priority, as the allocation of funding per the fiscal year 2021 budget request has fallen short. Hypersonic defense is clearly lagging when compared with hypersonic strike capabilities. If the United States wants to outpace competitors like Russia and China, an enhanced and integrated sensor architecture for ballistic and hypersonic defense is a necessary investment. Improving sensors can also enable other technologies. Laser weapon systems use directed energy to deter and even neutralize their targets, and they heavily rely on robust sensor technology for tracking and beam control. Working as a complement to more conventional systems, high-energy lasers can serve as an additional line of defense against missile threats. The bottom line is, the earlier an incoming missile can be detected, the more time there is to react. Sensors are the first line of defense in the kill chain, and without them, the rest of the system cannot operate. The Defense Department should partner with industry and lawmakers to prioritize and bolster sensor capabilities and ensure the effectiveness of missile defense systems against emerging threats.

#### No link turns -- Lack of defense causes regional instability and triggers first strikes – Nuke war.

Reny 20 [Stephen Reny, Former Airforce Fellow, 2020, "Nuclear-Armed Hypersonic Weapons and Nuclear Deterrence on JSTOR," No Publication, <https://www.jstor.org/stable/26956152> [accessed 2-5-22] Lydia

A period of increased instability will occur during the phase in which nuclear hypersonics become operational. This turbulence will peak as one nuclear country deploys hypersonic weapons while others are still in developmental stages. Once this occurs, nuclear powers without hypersonic capability will perceive a disadvantage and be more vulnerable to a strike from the nation with the defense-penetrating capability. During this time, the disadvantaged power will contemplate and recalculate its options, deciding whether a first strike is warranted because of its perceived vulnerability. As Thomas Schelling stated, “Vulnerable strategic weapons not only invite attack but in a crisis could coerce the . . . government into attacking when it might prefer to wait.”73 Therefore, until opposing powers share the same vulnerabilities and/or comply with Wohlstetter’s stability criteria, the mismatch in nuclear attributes will promote instability. Additionally, when competing countries possess ballistic missile defenses and no defensepenetrating capabilities (table 4, situation B), instability will rumble through the nuclear deterrent paradigm: assured vulnerability is completely undermined with neither country convinced it could launch a credible counterstrike. Therefore, as a counter to ballistic missile defenses, hypersonic weapons are a natural evolution in nuclear deterrent systems; they should be anticipated and expected to bring back true assured vulnerability. The danger lies during the transition to assured vulnerability and should be managed in a manner that minimizes risk from the absence of BMD and hypersonics.

## AT: Space Coop

#### Space cooperation will not moderate behavior

Sterner 15 (Eric Sterner, Fellow, George C. Marshall Institute, “China, Talk and Cooperation in Space,” SPACE NEWS, 8—6—15, <https://spacenews.com/op-ed-china-talk-and-cooperation-in-space/>, accessed 5-18-19)

How might cooperation with China benefit the United States? Some hold that cooperation in space helps promote cooperation on Earth. Writing in SpaceNews in 2013, Michael Krepon argued “The more they cooperate in space, the less likely it is that their competition on Earth will result in military confrontation. The reverse is also true.” That sentiment is widespread and flows from the nobility of exploration. If only it were so. Unfortunately, a country’s space behavior appears to have little affect on its terrestrial actions. Russia’s multidecadal human spaceflight partnership with the United States did not prevent it from invading and destabilizing Ukraine when it moved toward a closer relationship with the European Union, many of whose members are Russian partners in the International Space Station. Space cooperation has not, and will not, prevent the continued worsening of the security environment in Europe, which flows from Russian behavior on Earth, not in space. Space cooperation with China is similarly unlikely to moderate its behavior. Tensions in Asia derive from China’s insistence on pressing unlawful territorial claims in the Pacific, most recently by transforming disputed coral reefs into would-be military bases. Ironically, civilian space technology has proved critical in documenting these aggressive moves. To further demonstrate the civil space cooperation does not promote cooperation on Earth, we need look no further than recent history. The NASA administrator’s visit to China in the fall of 2014 nearly coincided with China’s hacking of NOAA, with whom Beijing has a “partnership” in studying climate change. Military confrontation flows from the interaction of hard power in pursuit of competing national interests. Space cooperation falls into the realm of soft power. It has value in strengthening relationships among like-minded states with similar interests. China’s aggressiveness toward its neighbors, its human rights record and its cyberattacks on the United States strongly demonstrate that it and the United States are not of like minds. This is not the result of insufficient space cooperation, but of divergent national interests. The United States is a status quo power; China is not.

#### Space cooperation does not spillover to other areas

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The importance of China’s space diplomacy should not be overstated, however. Relations in space do not drive relations on Earth. International cooperatio)n on space activities usually follows progress in the overall relationship and is more of an indicator of the state of a relationship than a critical component. Although China’s increasing space power does play a role in advancing its diplomatic interests, there is no evidence that it has directly produced tangible political benefits in other areas besides space.632 As its space power increases this may change. China, for example, could have more of a say in international technical organizations such as the International Telecommunications Union over rules governing satellites and satellite frequency issues, but as yet this is unrealized.