# 1NC vs Northland Christian LB

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T-Private Entities

#### Interpretation: Private entitites are companies not affiliated or controlled by a government.

US SSA NO DATE [US Social Security Administration is an independent agency of the USfg. “Determining Public vs Private Entities.” https://www.ssa.gov/section218training/documents/course\_9.doc]

1. What is the definition of a governmental entity? A governmental entity is that which is closely affiliated, generally by government ownership or control, with State and local governments. 2. What is the definition of a non-governmental or private entity? A non-governmental entity is that which is not affiliated, through ownership or control, with State and local governments.

#### China's "private" sector companies aren't private

Olson 20 [Stephen Olson, research fellow at the Hinrich Foundation. "Are Private Chinese Companies Really Private?" The Diplomat, 9-30-2020, accessed 1-14-2022, https://thediplomat.com/2020/09/are-private-chinese-companies-really-private/] HWIC

China has often been criticized for a lack of transparency, especially with regard to its economic and trade policies. While in many cases these criticisms are valid, it belies the fact that in other instances, China is remarkably open and transparent about its intentions and ambitions.

Such is the case with China’s “Opinion on Strengthening the United Front Work of the Private Economy in the New Era,” recently released by the Central Committee of the Chinese Communist Party (and further elaborated on by President Xi Jinping himself). This document tells us in no uncertain terms that Chinese private companies will be increasingly called upon to conduct their operations in tight coordination with governmental policy objectives and ideologies. The rest of the world should take note.

A Different Vision of “Private” Business

The 5,000 word “opinion” aims to ratchet-up the role and influence of the CCP within the private sector in order “to better focus the wisdom and strength of the private businesspeople on the goal and mission to realize the great rejuvenation of the Chinese nation.” The objective is to establish a “united front” between business and government and facilitate the “enhancement of the party’s leadership over the private economy.” According to the plan, “private economic figures are to be more closely united around the party,” thereby achieving “a high degree of consistency with the Party Central Committee on political stand, political direction, political principles, and political roads.”

All of this stands in stark contrast to long-accepted concepts of how private companies function in a free market. The overriding purpose of business, according to these traditional precepts, is to earn profits through the provision of value-added products and services, in response to marketplace signals and under the constraint of basic economic realities. Government ideology plays no role in that equation.

But China has a very different vision. Government officials and government ideologies are directly infused into business operations. Private sector employees are “educated” on government policies and ideologies, with the expectation that this “enlightenment” will help inform their business decisions. This government-business symbiosis is further cemented by the provision of massive government subsidies (estimated to be about 3 percent of China’s GDP) to Chinese companies.

#### Vote NEG for limits and ground --- jettisoning private entity explodes NEG prep burdens and opens the topic to any permutation of public sector activities from space situational awareness to banning space militarization to space traffic management and destroys NEG generics like the innovation DA, biz con DA, and unilateral action CP. There’s a qualitative difference between public sector and private sector appropriation that makes it impossible to be NEG. And, view this as an independent solvency deficit --- if they win a W/M, it proves the plan changes nothing b/c there aren’t private Chinese space companies.

#### Use competing interps - Topicality is a binary question, you can’t be reasonably topical and it invites a race to the bottom of intervention

#### Drop the debater – dropping the argument doesn’t rectify abuse since winning T proves why we don’t have the burden of rejoinder against their aff.

#### No RVIS – it’s your burden to be topical

### 1NC - OFF

Manufacturing DA

#### Commercial space manufacturing is booming and solves disease, but the plan kills it --- private launch and appropriation is key

Giulianotti et. al 21 [Marc A. Giulianotti1\*, Arun Sharma2,3, Rachel A. Clemens4 , Orquidea Garcia5 , D. Lancing Taylor6, Nicole L. Wagner7 , Kelly A. Shepard8 , Anjali Gupta4, Siobhan Malany9 , Alan J. Grodzinsky10, Mary Kearns‐Jonker11, Devin B. Mair12, Deok‐Ho Kim12,13, Michael S. Roberts1, Jeanne F. Loring14, Jianying Hu15, Lara E. Warren1 , Sven Eenmaa1, Joe Bozada16, Eric Paljug16, Mark Roth17, Donald P. Taylor18, Gary Rodrigue1, Patrick Cantini19, Amelia W. Smith1, William R. Wagner19,20\* 1 Center for the Advancement of Science in Space, Melbourne, FL, USA 2 Board of Governors Regenerative Medicine Institute, Cedars‐Sinai Medical Center, Los Angeles, CA, USA 3 Smidt Heart Institute, Cedars‐Sinai Medical Center, Los Angeles, CA, USA 4 Axiom Space, Inc., Houston, TX, USA 5 Johnson & Johnson 3D Printing Innovation & Customer Solutions, Johnson & Johnson Services, Inc., Irvine, CA , USA. 6 University of Pittsburgh Drug Discovery Institute and Department of Computational and Systems Biology, University of Pittsburgh, Pittsburgh, PA, USA 7 LambdaVision Inc., Farmington, CT, USA 8 California Institute for Regenerative Medicine, Oakland, California, USA 9 Department of Pharmacodynamics, College of Pharmacy, University of Florida, Gainesville, FL USA 10 Departments of Biological Engineering, Mechanical Engineering and Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, MA, USA 11 Department of Pathology and Human Anatomy, Loma Linda University School of Medicine, Loma Linda, CA, USA 12 Department of Biomedical Engineering, Johns Hopkins University School of Medicine, Baltimore, MD, USA 13 Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD, USA 14 Scripps Research Institute, San Diego, CA, USA 15 Center for Computational Health IBM Research, Yorktown Heights, NY, USA 16 Joseph M. Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, PA, USA 17 Pittsburgh, PA, USA 18 The Ohio State University, Columbus, OH, USA 19 McGowan Institute for Regenerative Medicine, Pittsburgh, PA, USA 20 Departments of Surgery, Bioengineering, Chemical Engineering, University of Pittsburgh, Pittsburgh, PA, USA. “Opportunities for Biomanufacturing in Low Earth Orbit: Current Status and Future Directions.” August 2, 2021. https://www.preprints.org/manuscript/202108.0044/v1/download]

The use of LEO by governments and commercial enterprises is a complex ecosystem for providing opportunities and financing. In the last two decades, governments around the world, led by the U.S. and China, have heavily supported private space companies (2019 Report). These investments have focused on launch technologies, as high launch costs are perceived to be the greatest limiting factor to expanded space exploration and utilization (Werzt et al., 1996) and have led to recent reductions in the cost of transporting cargo to LEO by a factor of more than 20. Between 1970 and 2020, the average cost to launch a kilogram of payload into LEO on the space shuttle remained constant at about $54,500. Now, the cost per kilogram is $2,720 on a SpaceX Falcon 9 rocket (Figure 1) (Jones, H. W. et al., 2020). Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 2 August 2021 doi:10.20944/preprints202108.0044.v1 4 Figure 1: The cost of launching payloads to LEO has dropped considerably over the last 50 years. Note: Data is not to scale. Additionally, several private companies are now pursuing commercial space stations. Axiom Space, headquartered in Houston, is currently developing what promises to be the first‐ever privately operated space station, with the initial module scheduled to launch to the ISS in 2024. Axiom plans to dock multiple modules to the ISS that will eventually detach to become a standalone station. As the cost of transport to LEO has decreased—and is expected to decrease further—and plans for new platforms in LEO continue to advance (Dinkin S., 2019), opportunities in areas such as satellite deployment, biomedical research, in‐space manufacturing, and space tourism increase. Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 2 August 2021 doi:10.20944/preprints202108.0044.v1 5 As the past half century has witnessed the opening of space for exploration and commercial opportunities, in this same period, we have experienced exponential growth in our understanding of biology and physiology. This knowledge has been translated and commercialized for the benefit of human health and continues to accelerate as new technologies create additional tools to explore and cure. One aspect of this biomedical revolution is in the field of regenerative medicine, built upon advances in stem cell biology, biomaterials, and bioengineering. Remarkable advancements have been made in the design of MPS, also called tissue chips or organs‐on‐chips, and organoids that can mimic complex organ systems outside of the body for drug development or potential implantation to restore function. Stem cell isolation, characterization, and manipulation is advancing, with target applications broadly spread across tissues impacted by disease, trauma, and congenital conditions. Biomaterials and bioengineering advances have created new medical devices, targeted drug delivery platforms, biosensors and new imaging modalities, and the bioprinting of tissue constructs. To take advantage of these significant advances—more frequent and more affordable access to LEO and exponential progress in biomedical technology—the question is: How do these intersect, and what new opportunities arise as both advance? How can the unique LEO environment be leveraged to further advance biomanufacturing? Compelling answers to these questions will introduce economic drivers for investment in space‐based R&D that extend beyond the initial focus on pure discovery and into the expansion of commercial development in LEO. Over the past decade, the ISS National Lab has supported important space‐based research in the areas of tissue engineering and regenerative medicine that lays the groundwork for more complex studies and future investment. This critical research addressed fundamental questions such as: How does the LEO environment affect the organ function mimicked by tissue chips, and how do these changes relate to human disease? How does microgravity affect stem cell proliferation and differentiation? And how might 3D bioprinting benefit from the absence of gravity? Continued access to LEO through the ISS National Lab provides a unique opportunity for R&D that enables the jump from this initial work to the development of a sustainable market for biomanufacturing in space. The ISS is a powerful platform with a limited lifetime and thus limited time left for utilization; therefore, now is the time to leverage this invaluable orbiting laboratory to conduct R&D that demonstrates the value of biomanufacturing in space. This work will set the stage for increased private investment and the transition to larger and more numerous platforms in LEO that can support further discovery and development in the coming decades.

#### Chinese commercial space is key --- they’re leading in biomedicine

Anqi 21 [Fan Anqi, reporter. “Chinese tech start-up sends bio-payload to space, a bold and steady step to build its own space lab.” December 17, 2021. https://www.globaltimes.cn/page/202112/1241736.shtml]

With 2021, the most ambitious and fruitful year in China's aerospace history drawing to an end, the country has seen yet another major progress in its commercial aerospace sector with the successful launch of the HY-1 sub-orbital rocket on Friday, sending China's first biological payload developed by a private Chinese company, Sparkle-1, to an altitude of 250 kilometers above Earth. The payload will verify the biological experiment devices in a microgravity environment in space, with the aim of providing an R&D platform for near-Earth life science research, space biomedical research, and biotechnology experiments, Rocket Pi, the payload's developer, told the Global Times on Friday. With the help of cloud computing and Artificial Intelligence, Sparkle-1 will establish a preliminary framework for cell's in-orbit counting and identification detection during the mission. As China has ushered in the era of self-developed space stations, microgravity-related studies including pharmaceuticals, biotechnology, and materials science, are about to enter a disruptive phase with the presentation of such a historical opportunity," Zhuang Fengyuan, an academician at the International Academy of Astronautics, told the Global Times. "A microgravity environment can significantly shorten the development cycle of new drugs and vaccines, and accelerate the development process of protein crystals and new materials, which are both of scientific value and have huge commercial benefits," noted Zhuang.

#### Extinction

Yaneer Bar-Yam 16, Founding President of the New England Complex Systems Institute, “Transition to extinction: Pandemics in a connected world,” NECSI (July 3, 2016), http://necsi.edu/research/social/pandemics/transition

Watch as one of the more aggressive—brighter red — strains rapidly expands. After a time it goes extinct leaving a black region. Why does it go extinct? The answer is that it spreads so rapidly that it kills the hosts around it. Without new hosts to infect it then dies out itself. That the rapidly spreading pathogens die out has important implications for evolutionary research which we have talked about elsewhere [1–7].¶ In the research I want to discuss here, what we were interested in is the effect of adding long range transportation [8]. This includes natural means of dispersal as well as unintentional dispersal by humans, like adding airplane routes, which is being done by real world airlines (Figure 2).¶ When we introduce long range transportation into the model, the success of more aggressive strains changes. They can use the long range transportation to find new hosts and escape local extinction. Figure 3 shows that the more transportation routes introduced into the model, the more higher aggressive pathogens are able to survive and spread.¶ As we add more long range transportation, there is a critical point at which pathogens become so aggressive that the entire host population dies. The pathogens die at the same time, but that is not exactly a consolation to the hosts. We call this the phase transition to extinction (Figure 4). With increasing levels of global transportation, human civilization may be approaching such a critical threshold.¶ In the paper we wrote in 2006 about the dangers of global transportation for pathogen evolution and pandemics [8], we mentioned the risk from Ebola. Ebola is a horrendous disease that was present only in isolated villages in Africa. It was far away from the rest of the world only because of that isolation. Since Africa was developing, it was only a matter of time before it reached population centers and airports. While the model is about evolution, it is really about which pathogens will be found in a system that is highly connected, and Ebola can spread in a highly connected world.¶ The traditional approach to public health uses historical evidence analyzed statistically to assess the potential impacts of a disease. As a result, many were surprised by the spread of Ebola through West Africa in 2014. As the connectivity of the world increases, past experience is not a good guide to future events.¶ A key point about the phase transition to extinction is its suddenness. Even a system that seems stable, can be destabilized by a few more long-range connections, and connectivity is continuing to increase.¶ So how close are we to the tipping point? We don’t know but it would be good to find out before it happens.¶ While Ebola ravaged three countries in West Africa, it only resulted in a handful of cases outside that region. One possible reason is that many of the airlines that fly to west Africa stopped or reduced flights during the epidemic [9]. In the absence of a clear connection, public health authorities who downplayed the dangers of the epidemic spreading to the West might seem to be vindicated.¶ As with the choice of airlines to stop flying to west Africa, our analysis didn’t take into consideration how people respond to epidemics. It does tell us what the outcome will be unless we respond fast enough and well enough to stop the spread of future diseases, which may not be the same as the ones we saw in the past. As the world becomes more connected, the dangers increase.¶ Are people in western countries safe because of higher quality health systems? Countries like the U.S. have highly skewed networks of social interactions with some very highly connected individuals that can be “superspreaders.” The chances of such an individual becoming infected may be low but events like a mass outbreak pose a much greater risk if they do happen. If a sick food service worker in an airport infects 100 passengers, or a contagion event happens in mass transportation, an outbreak could very well prove unstoppable.

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Lift Wolf CP

#### CP Text: The United States federal government should lift the Wolf Amendment.

#### Solves the AFF --- creates global international norms for space and checks back against separate spheres of influence

Ronci 19 [Rob Ronci, exec director of CAELUS. “Dividing Heaven - Effects of the Wolf amendment on the developing system of global space governance.” October 2019. *International Astronautical Conference.* https://swfound.org/media/206870/ronci\_1\_iac2019\_paper.pdf]

This paper investigates how the U.S. policy limiting NASA’s bilateral cooperation with China, colloquially known as the “Wolf amendment”, is influencing the developing system of global space governance. As technological advancements improve access to outer space, policymakers around the world are crafting institutions that will regulate humanity’s access, participation, and activities in the final frontier. However, the rapid pace of technological advance is creating policy challenges faster than policymakers can address them. While international space policymaking continues to trend toward voluntary norm building and emphasis on national laws rather than firm international treaties, the policies of perceived leaders will remain key drivers of norm and infrastructure development. As the current dominant space actor (the United States) and an increasingly influential space power (China) are effectively barred from working together in major space projects, the challenge international policymakers face becomes greater. While the Wolf amendment is already an oft debated subject, its true effects on international collaboration remain poorly understood. The Wolf amendment is only a small piece of the overall U.S. – China space relationship, yet it exerts significant influence on the patterns of interaction between the two space programs with implications for the greater system of global space governance. This presents key findings from a research project that analyzed congressional hearing transcripts, legal documents, personal letters, research reports, and public statements utilizing a qualitative complex systems approach to identify how the Wolf amendment exerts influence upon the political systems within which the amendment is embedded. Matching this analysis to current trends and patterns occurring in these systems enables an understanding of how the Wolf amendment is influencing the evolutionary trajectory of global space governance. The findings of this study reveal that the persistence of the Wolf amendment’s influence forces the U.S. - China relationship to remain primarily competitive, rather than cooperative, in space exploration activities. With U.S. policymakers preventing participation in major joint activities with China, the creation of multiple spheres of influence in the development of space-based infrastructure becomes inevitable. Given current patterns of development, such a division of influence will likely lead to a persistently fragmented and competitive environment in outer space. These outcomes will exacerbate challenges for international policymakers working to secure the sustainable usage of outer space, but may also create opportunities for a wider range of space actors.

#### The 1AC is a self-fulfilling prophecy, but lifting Wolf reverse-causally solves competition, while boosting US heg

Ronci 19 [Rob Ronci, exec director of CAELUS. “Dividing Heaven - Effects of the Wolf amendment on the developing system of global space governance.” October 2019. *International Astronautical Conference.* https://swfound.org/media/206870/ronci\_1\_iac2019\_paper.pdf]

Within this context, the Wolf amendment’s persistence creates a strong possibility that cooperative space projects will fragment into at least two different blocks of political influence. In an environment where new international treaties are becoming non-operative, the U.S.-China divide in space projects may indicate a persistent, bi-polar order in global space governance. In the context of these evolving systemic trends, the Wolf amendment remains only a driver, rather than a root cause. But by applying basic principles of complex systems thinking to the Wolf amendment, it is possible to recognize how the amendment exerts influence upon these systems. As U.S. policymakers feared losing their leadership and dominance in space, the Wolf amendment emerged as a tool to help maintain a sense of security against a rising China. This created a positively reinforcing feedback loop: not allowing China to become a cooperative or collaborative partner with the U.S., thereby pushing China to create its own competing projects, which in turn perpetuates the fear of a rising opponent, and thus the cycle as a whole. The increasing resilience of these patterns has created the possibility of a long-term division in the spheres of influence in major space projects. In such a scenario, U.S. policymakers will have legitimized an external sphere of influence where it has little to no authority, thus risking the very leadership those policymakers fear losing. 6. Conclusions This paper has presented the manner in which the Wolf amendment exerts influence, and the implications of this influence by briefly discussing the conditions in which that influence exists. Primarily, the Wolf amendment prevents Chinese participation in major U.S. civil space projects. By doing so, it does not prevent most cooperation in space between the two countries, but rather it perpetuates an effective perception that the two nations do not, and should not, work together. This lack of potential cooperation in major space activities perpetuates the perception of China as an opponent to the U.S. in space, and encourages the discourse that the U.S. should fear losing its outer space dominance. This self-reinforcing divide between the U.S. and China in space activities is particularly significant given current trends in global space governance. As international space policy trends towards decentralized and voluntary norm-building rather than firm laws, the roles and actions of perceived leaders will become more influential. As major space exploration projects develop without the U.S. and China participating in joint endeavors, it is increasingly likely that a divide in major government funded space projects will occur. As these projects are likely to be particularly influential in both soft-power norm-building and space infrastructure development, this divide will likely have significant influence on the future development of space governance.

#### International space legal regime are needed to solve space war --- norm-setting in space becomes CIL

Hart 21 [Amalyah Hart, Amalyah Hart is a science journalist based in Melbourne, 11-19-2021, "Do we need new space law to prevent space war", Cosmos Magazine, https://cosmosmagazine.com/people/society/space-law-to-prevent-space-war/] simha

The week before last, a UN panel approved the creation of a working group to discuss next-generation laws to prevent the militarisation of space. The move comes as space 2.0 seems to be going into hyper-drive, with countries and corporations racing to claim their stake in the final frontier. It’s timely, as the potential for friction is gathering by the day, with China, India, Russia and the US testing anti-satellite missiles on their own satellites and creating worrisome clouds of debris. This week’s destruction by Russia of its “dead” satellite, Cosmos 1408, underlined the issue. Meanwhile, the orbital space around Earth is becoming jammed with machinery; currently, there are 3,372 active satellites whizzing around Earth, but in one or two decades that number is set to leap to potentially 100,000 or more. And that’s ignoring the space stations, telescopes and spyware already in orbit as countries flex their aerospace muscles. It’s a cosmic fracas. And contested territory is prime fodder for international disputes, as we know. It’s these kinds of disputes the group of UK diplomats who proposed the UN motion want to prevent, by coming to an agreed-upon set of norms for behaviour in space. Space law: what are the issues at stake? The current international framework for law in space is the UN’s 1967 Outer Space Treaty (OST), which sets governing principles for the exploration of space, including that space should be free for use by all nations, that celestial bodies like the Moon should be used exclusively for peaceful purposes, and that outer space should not be subject to national appropriation. Under international law, any and all objects being launched into space must be registered to avoid collisions. On top of these global laws, each nation-state has its own legal framework around the registering and launching of objects into space. But as technology evolves and new opportunities arise, are these old laws equipped to govern new problems? The UN’s 1967 Outer Space Treaty sets governing principles for the exploration of space, including that space should be free for use by all nations. “There exists an incredible amount of applicable law already, and it has served us really well,” says space law expert Steven Freeland, an emeritus professor at Western Sydney University and professorial fellow at Bond University. Freeland is vice-chair of a UN Committee on the Peaceful Uses of Outer Space (COPUOS) working group that is developing laws around the exploitation of resources in space. “There’s a lot of law at the multilateral level that then filters down to other layers of bilateral or ‘minilateral’ agreements and national laws. But clearly things move so quickly with technology, we’re doing so many more things in space that were beyond the contemplation of the drafters of the original treaties. Ideally we need more.” Freeland says there are myriad complex, interconnected issues in space that need tighter laws. These include the increasing militarisation of space; the proliferation of satellites, which can lead to overcrowding of “popular” orbits and increased demand for radio-wave spectra; ethical issues around human spaceflight; and the possible extraction of resources on celestial bodies like the Moon. Resource exploitation It might sound like science fiction, but mining in outer space is looking increasingly likely in the not-too-distant future. In September 2020, NASA announced that it would award contracts to private companies for the extraction and purchase of lunar regolith (rock matter) from the surface of the Moon, which could be mined and then studied in situ by the company, before the data and rights are transferred to the space agency. The move heralds what our space-based future might look like, with private companies mining celestial bodies for their precious resources. In our solar system, composed of millions of celestial bodies both large and small, the opportunities for cashing in look potentially endless – provided technology advances to the level of practical spaceflight. “Most wars on Earth have historically been fought over a quest for resources,” says Freeland, “so it’s incredibly important [to have appropriate space laws].” Just last month, scientists announced the discovery of two extraordinarily metal-rich near-Earth asteroids (NEAs), comprised of roughly 85% metals like iron, nickel and cobalt, which are thought to exceed Earth’s entire known metallic reserves. These three highly valuable metals, often known as the “iron triad”, are particularly critical for the energy supply chain and a renewable energy future; they’re used to build lithium-ion batteries, electrochemical capacitators for storing energy, and nano-catalysts for use in the energy sector. Under the OST, outer-space resources cannot be appropriated by nations, but the law and principle around the commercial use of space resources is less clear. The 1979 Moon Treaty holds that any celestial body is under the jurisdiction of the international community and therefore subject to international law. The treaty outlaws the military use of any celestial body as well as providing a legal framing for the “responsible” exploitation of celestial resources. But, to date, no space-capable nation has ratified the treaty. Militarisation That brings us to the militarisation of space. As technology advances, the potential avenues for weapons that cross the border from terrestrial to cosmic continue to proliferate. So, what laws protect us from a space war? “The issues about security in space have historically been dealt with by the CD, the Conference of Disarmament, but more recently the UK has led discussions at the United Nations that effectively seek to change the diplomatic language and thinking about space security,” says Freeland. Currently, the principles for governing space under the OST forbid the military use of space, but space is already used for military purposes such as surveillance, and some missiles carve a path through outer space on their journeys to their targets. As it currently stands, the only weapons found in space are the TP-82 Cosmonaut survival pistols that Russian astronauts regularly take on board the Soyuz spacecraft, intended to protect them from a potential wild animal attack if they are forced to emergency land in “off-the-map” territory. But as technology proliferates, the opportunities for space-based militarisation also grow. The existing laws were drafted long before many of these technologies were even dreamed up. The most worrisome technologies currently being trialled are anti-satellite missiles. “We have this strategic competition going on amongst the major powers,” says Gilles Doucet, a space security consultant based in Canada who worked for 35 years with the Canadian Department of National Defence. Doucet is both an engineer and an expert in space law. “They all wish to be dominant and make sure that their national security is secured by controlling, or at least not having other people control, outer space.” But what kinds of defence technologies are being developed in space? Doucet says the most worrisome technologies currently being trialled are anti-satellite missiles of the sort that Russia deployed earlier this week. Known as direct-ascent anti-satellite missiles (DA-ASAT), they can destroy satellites in low Earth orbit. “This essentially looks a lot like ballistic missile defence, but it’s happening in outer space against satellites,” he says. In fact, DA-ASAT technology is dependent on the same technology used for midcourse ballistic missile defence – the technology that the US, for example, deploys to defend itself from potential ballistic missile attacks on North America. These missiles fly at altitudes of around 3,000 to 4,000 kilometres, well within the low-Earth orbit many satellites operate in. This technology is being developed and tested by the US, China, India and Russia. “Destroying another country’s satellites would only occur in an armed conflict scenario,” Doucet says. “It would be because the other country’s satellite is providing an important military role – for example, a GPS satellite for directing munitions or an imagery satellite for locating your forces.” Other military applications in space, Doucet says, include the jamming of satellite communications and navigation, as well as interference with some GNSS signals, of which GPS – the satellite navigation system we all use for things like Google Maps – is one. Satellite jamming can have major disruptive potential. “You might be conducting an operation in a conflict – let’s say you wish to target a certain facility. Your missile system or your drone-launching missiles rely on GPS to guide them,” Doucet says. “So if you’re on the other end of it wanting to protect yourself, then you’ll send out jamming signals.” But while these signals can help defend a military target, Doucet says many satellites provide services for military and civilian companies and organisations at once. In this case, jamming a satellite’s signal may also interfere with civilian services it provides, including aircraft and ship navigation, car mapping, even timing signals for financial transactions. This means satellite jamming has major disruptive potential. And there are other areas where satellite technology could have duplicitous or combative potential. “Close proximity operations seem to get countries a bit upset,” says Doucet. Close proximity operations, as the name suggests, involve satellites moving close to other satellites. “One reason might be intelligence or inspection, just to take close images to understand how it’s built. But you may be getting close to intercept signals or to interfere with signals. “So that is a concern, because it’s one thing to get close for passively collecting information, but if you’re close you may also be in a position to interfere.” What might new space law systems look like? “We have a lot of space systems that are dual use, that have the potential to do harm,” Doucet says. “I’d like to see some transparency on the mission, on what you’re doing, to help alleviate concerns. “That might sound like a small step, but to militaries it’s actually a really big step to provide transparency.” Doucet says he’d also like to see clarification of the existing principles for space law already set out in the OST and other treaties. In fact, he’s currently working on the MILAMOS Project, developing a Manual on International Law Applicable to Military Uses of Outer Space at Canada’s McGill University. “I would like to see the existing legal regime being given a bit of life,” he says. “We’ve got tremendously good outer space principles, but over several decades countries have kind of refused to give them life because it’s too controversial. “The third thing I’d like to see is the major space powers sit down and talk. They’re all potentially losers if this keeps going down this path. I don’t think there’s a winner in a space war.” For all these complex problems, Doucet is cautiously optimistic about our chances of avoiding a space war. “I don’t think the issue about space security is as unique as people think,” he says. “Yes, it’s a very unique domain, but the actors are all the same, the interests are all the same. It’s the same people that have struggled over ballistic missile proliferation, nuclear weapons proliferation, treaties about the high seas, about aviation and all kinds of things. “So, we shouldn’t think this is an unsolvable problem. We may take lessons from how we’ve managed to agree to disagree in other areas beyond national jurisdiction.” Freeland agrees that even if international tensions may simmer at home, it’s in the best interest of major global powers to come to agreements about laws in space. “When it comes to these really big issues, particularly issues that have the propensity to go horribly wrong if we follow an irresponsible path, in the end it’s in [governments’] common interest to agree to the rules of the road,” he says. “The important element is that they have had the opportunity to buy in on the framing of those rules.“I think we need to be optimistic. With a great deal of caution, cool heads will prevail.”