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### **OUTER SPACE**

Quantum realities

• Threat of an arms race

NUCLEAR WEAPONS A fragile disarmament regime **SPRING 2025** 

"and they shall beat their swords into ploughshares, and spears into pruning hooks; nation shall not lift up sword against nation; neither shall they learn war any more." Isaiah 2:4

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From the Director's Desk

# We are prepared for a turbulent year



Written by Cesar Jaramillo

The year promises to be turbulent, with resurgent geopolitical tensions, environmental degradation, and the rapid advancement of military technologies among the disruptions that threaten global peace and security. For Project Ploughshares, these disruptions underscore the importance of strengthening global norms and fostering responsible security policies. Canada can and should be a constructive player on the global stage, leveraging its unique position to foster diplomacy, strengthen international norms, and promote responsible security policies.

The challenges for all of us who work for peace, disarmament, and global security are daunting. But Project Ploughshares is ready to meet them, as we have been for nearly 50 years. Among those challenges are the following:

The Impact of a second Trump administration

Donald Trump's return to the White House has sent shockwaves through the international system. His first term in office tested America's alliances, rattled global institutions, and emboldened other authoritarian leaders. In his second term, disruptions are escalating as an unpredictable and transactional US approach to foreign policy prioritizes personal power and nationalist rhetoric over traditional diplomacy.

In the first weeks of his current term, Trump reignited trade wars by threatening to impose tariffs on Mexico and Canada; he also alienated allies by expressing an interest in taking over Greenland and the Panama Canal, and annexing Canada. These early moves signal a willingness to challenge established diplomatic norms. His disregard for the collective defence of NATO further undermines a transatlantic alliance that has underpinned Western security cooperation since 1949.

For Canada, these actions are profoundly unsettling. Long-standing assumptions about the reliability — and even the friendliness — of its southern neighbour are being called into question. Navigating this increasingly unpredictable foreign policy landscape requires Canada to rethink its diplomatic strategies, invest in stronger multilateral partnerships beyond the US sphere of influence, and assert a clearer voice in global forums.

In 2025, Project Ploughshares is ready to support Canada's efforts to strengthen multilateral alliances, uphold international norms, and promote responsible security policies.

### $\mathbf{2}$ The fragility of the nuclear disarmament regime

The global nuclear disarmament framework, anchored by the Nuclear Non-Proliferation Treaty (NPT), appears increasingly fragile in the aftermath of NPT review conferences in 2015 and 2022 (each of which failed to agree on a consensus outcome document) that revealed deepening divisions between members with nuclear weapons and those without. The latter are increasingly frustrated over the lack of meaningful progress toward disarmament. Meanwhile, States Parties with nuclear weapons persist in modernizing their nuclear arsenals and expanding nuclear capabilities, displaying no willingness to fulfill their legally binding disarmament commitments.

Meetings of NPT States Parties and of States Parties to the Treaty on the Prohibition of Nuclear Weapons (TPNW) later in 2025 will offer critical opportunities to reinvigorate global disarmament efforts. These meetings must address not only the technical aspects of disarmament and non-proliferation but also the growing mistrust that undermines each treaty's credibility.

Additionally, the eightieth anniversary of the atomic bombings of Hiroshima and Nagasaki later this year will serve as a poignant reminder of the catastrophic consequences of nuclear weapons. It provides a powerful platform from which to advocate for renewed disarmament commitments and the goal of nuclear abolition.

In 2025, Project Ploughshares is focused on fostering constructive Canadian engagement with both the NPT and the TPNW. We continue to highlight the growing nuclear risks associated with ongoing conflicts, particularly in Ukraine, where nuclear rhetoric and the presence of nuclear-armed states could lead to the use of nuclear weapons. And we consistently urge Canada to take a leadership role in promoting disarmament, supporting international legal frameworks, and holding nuclear-armed states accountable for their commitments under international law.

### **3** The erosion of humanitarian standards

International humanitarian law (IHL), designed to protect civilians during armed conflicts, is under serious attack. The recent conflict in Gaza illustrates the international community's failure to robustly defend humanitarian principles. Instead, violations of IHL — such as attacks on civilian infrastructure and disproportionate use of force — have been met with muted responses at best. This erosion of legal and moral norms not only undermines the protection of civilians but threatens to normalize the use of excessive force in armed conflicts worldwide.

Underreported but catastrophic humanitarian crises in countries including Sudan and the Democratic Republic of the Congo are driven by regional power struggles and fueled by illicit arms flows. The lack of global attention and accountability allows these crises to persist, with civilians bearing the brunt of the violence and instability.

In 2025, Project Ploughshares continues to advocate for stronger protections for civilians in armed conflicts through key initiatives such as the political declaration to protect civilians from the use of explosive weapons in populated areas (EWIPA). By highlighting both the overt erosion of humanitarian protections in widely covered conflicts and the silent suffering in neglected crises, Project Ploughshares seeks to promote greater accountability and ensure that the protection of civilians remains a priority in Canadian and international security policies.

### The rapid advancement of military technologies

The unprecedented speed of technological innovation, seen in the development of autonomous weapons driven by artificial intelligence (AI) and space-based military systems, presents one of the most dramatic challenges to international security and global stability. The integration of AIassisted technologies into military operations is rapidly outpacing the international community's ability to craft effective regulations.

There are real risks that AI-driven military systems, which are leading to diminished human oversight in life-and-death decision-making, will lead to unintended escalation of conflicts. The development of lethal autonomous weapon systems could fundamentally alter the nature of warfare, raising grave ethical and legal concerns.

At the same time, outer space — once regarded as a domain reserved for peaceful purposes — has emerged as the next frontier for military competition. Major powers are accelerating their develop-

#### Against the use of US anti-personnel landmines in Ukraine

Last December, a month after the Biden administration announced that it would supply Ukraine with anti-personnel landmines, Project Ploughshares <u>published</u> a statement, "An affront to humanitarian norms: Project Ploughshares alarmed at U.S. decision to supply landmines to Ukraine, dismayed at Canada's silence."



In it, Ploughshares argued that US claims of military necessity could not justify the use of anti-personnel landmines under international humanitarian law. It also condemned the lack of an official Canadian response:

It is disconcerting that this decision has not been denounced by Canada, given its central role as a driving force behind the Ottawa Treaty and its tradition of promoting a rules-based international order. Silence in the face of such blatant disregard for humanitarian principles is unacceptable.

Instead of "normaliz[ing] violations of international law," "Canada and other nations" were urged "to uphold the principles that have saved countless lives and safeguarded human dignity." The bottom line: "There is no place for these weapons in modern conflict."

ment of space-based weapons, while the rhetoric of some international actors features a shift toward open acceptance of space weaponization. These developments risk turning space into a battleground, with potentially catastrophic consequences for global security and the stability of the space infrastructure so vital to civilian life.

In 2025, Project Ploughshares is intensifying efforts to strengthen Canada's role in promoting global military AI governance. We advocate for robust international regulations that prevent the proliferation of fully autonomous weapons; we also promote ethical AI standards through active engagement with the tech sector. By fostering responsible development frameworks, we aim to mitigate the risks associated with AI-driven military technologies and ensure meaningful human oversight in decision-making processes.

At the same time, we are addressing the escalating threat of space weaponization by engaging with the United Nations Open-Ended Working Group (OEWG) on space security. To prevent the weaponization of outer space, we look to the advancement of transparency measures, the fostering of international cooperation, and promotion of stronger legal frameworks. These efforts are essential to maintain global stability, ensure the peaceful use of space, and prevent an arms race in this increasingly contested domain.

**5** The arms trade as a source of insecurity

A decade after its adoption, the Arms Trade

Treaty (ATT) faces significant challenges as major arms exporters continue to supply weapons to countries with well documented histories of human-rights violations, often prioritizing political and economic interests over international legal obligations. These states exploit loopholes in enforcement mechanisms, undermining the treaty's effectiveness. Such disregard for its core principles threatens to erode the ATT's credibility and weaken global efforts to regulate the arms trade responsibly.

Canada's role as an arms exporter warrants scrutiny. Although a state party to the ATT, Canada has continued to export arms to states involved in conflicts in which there is a clear risk that international humanitarian and human rights law will be violated. For example, in 2024, Canada sold arms to both Israel and Saudi Arabia.

Arms exports to Israel persisted in 2024 despite extensive Israeli military operations in Gaza that claimed thousands of civilian lives and destroyed critical infrastructure. Arms transfers to Saudi Arabia also continued despite well documented risks of misuse.

In 2025, Project Ploughshares is intensifying its scrutiny of Canada's arms exports, particularly to conflict zones and countries with established records of human-rights abuse. Urging Canada's compliance with the ATT, particularly by implementing strict controls on arms transfers when the risk of misuse is clear, remains a top priority. By pushing for greater transparency and accountability in Canada's arms trade poli-

#### Analyzing Trump's vision of peace

In early February, Project Ploughshares published "Canada must resist Trump's flawed vision of peace through strength" by Executive Director Cesar Jaramillo. In it, Cesar rejects Trump's idea that "U.S. security is best achieved through overwhelming military superiority" and urges Canada to "assert an independent foreign policy rooted in diplomacy, arms control, and multilateral cooperation."



As Cesar explains:

The peace-through-strength view is based on the assumption that military might deters adversaries and ensures stability. However, history has shown that military buildups rarely deter conflict; instead, they provoke countermeasures, intensifying arms races and deepening instability.

Not only history but today's reality supports this perspective. Cesar points to the 2025 Doomsday Clock, set by *The Bulletin of the Atomic Scientists*, which is now the closest it has ever been to Doomsday, with the world facing "an unprecedented convergence of threats, including nuclear risks, emerging military technologies such as AI-driven weapons, climate instability, and the weaponization of mis- and disinformation."

In late January, US President Trump signed an Executive Order entitled The Iron Dome for America. This dome is designed to protect against missile attack. But Cesar does not believe that such a dome will increase US security. He writes: "Such a system, already challenged on technical grounds, will certainly lead to the development of more sophisticated offensive capabilities by adversaries. For every shield, a sharper spear."

This focus on "hard power" is also seen in recent demands by the Trump administration that NATO member states increase their military expenditures to at least 5 per cent of GDP. Again, Cesar counters: "This dramatic demand ignores the fundamental reality that increasing military budgets does not guarantee security and can even undermine it by diverting resources from diplomatic, economic, and political tools that create long-term stability." Despite all the arguments being made now for newer, deadlier weapons, Cesar believes that what the world really needs is "a renewed commitment to diplomacy, cooperation, and the recognition that security is not a zero-sum game."

cies, Project Ploughshares aims to ensure that economic interests never take precedence over humanitarian principles and international legal obligations.

### **6** Climate change and security risks

Climate change is increasingly recognized as a security threat multiplier, intensifying existing geopolitical tensions and fueling new conflicts over scarce resources, displacement, and environmental degradation. Already fragile states and regions are being subjected to the cascading effects of rising sea levels, more extreme weather events, and greater resource scarcity.

Consider the militarization of the Arctic. As ice caps have melted, new shipping routes have emerged, granting eager Arctic and non-Arctic states access to previously unreachable natural resources. To secure economic and strategic interests, these states are bolstering their military presence. And so the risk of conflict in this delicate ecosystem grows, threatening both the environment and regional security. In 2025, Project Ploughshares is refining its focus on the intersections among climate change, militarization, and security. A key research topic is the role of the Canadian Armed Forces in addressing climate-related security risks, particularly their involvement in disaster response, resource protection, and Arctic defence operations. A key question: Are military strategies contributing to or mitigating climate-driven tensions?

We also want to better understand the impact of military activities on climate; armed forces are significant contributors to greenhouse gas emissions through large-scale operations, infrastructure development, and energy consumption. Understanding and mitigating the environmental footprint of military activities could be critical in ensuring that security measures do not exacerbate the very problems they seek to address.

By considering both the security implications of climate change and the environmental impacts of militarization, Project Ploughshares is positioning itself as an advocate for responsible defence policies that prioritize sustainability, conflict prevention, and international cooperation.

#### Why we do what we do

In the fractured world we now live in, Project Ploughshares strives to be a voice of reason, impartial analysis, and principled advocacy. Our mission is rooted in the belief that true security is not achieved through arms races or military dominance, but through diplomacy, disarmament, and cooperation.

We work to influence both Canadian and international policy by engaging with decisionmakers, civil society organizations, and global institutions to promote peace and reduce the risk of armed violence. At the heart of our work is the defence of international norms. Even as these norms face increasing strain, our commitment to strengthening them never wavers.

We also aim to raise public awareness. We understand that informed citizens are needed if governments are to create policies that reflect humanitarian values and uphold the principles of human rights. Our work ensures that Canada remains a force for good on the global stage.

#### Help Project Ploughshares continue this vital work

With global security challenges intensifying, the work of crafting solutions that result in sustainable peace and security has never been more necessary. Our ability to influence policy, provide independent analysis, and advocate for peace depends on the support of those who share our vision of a more just and secure world.

Please consider supporting Project Ploughshares. Your contribution — large or small will directly sustain our efforts to engage in critical international forums; produce rigorous, evidence-based research; and amplify voices advocating for disarmament, responsible security policies, and the protection of civilians in armed conflict.

In 2025, the stakes could not be higher or the need for principled, collaborative action greater. The year is bringing formidable challenges, but we at Ploughshares are prepared to take them on. Join us.  $\Box$ 

Cesar Jaramillo is the Executive Director of Project Ploughshares. He can be reached at cjaramillo@ploughshares.ca.



### Applauding an ally in the campaign to eliminate nuclear weapons

The Nobel peace laureate for 2024 is the organization Nihon Kidankyo. On December 10, one of its co-chairs, Terumi Tanaka, presented the <u>Nobel Peace Prize</u> <u>lecture</u>. Tanaka explained how Nihon Hidankyo was founded in 1956 by survivors of the atomic bombs dropped on Hiroshima and Nagasaki and victims of nuclear weapons tests. Its aims were to secure compensation for victims of A- and H-bombs and "the immediate abolition of nuclear weapons, as extremely inhumane weapons of mass killing, which must not be allowed to coexist with humanity." Over its history, Nihon Hidankyo has worked to defeat "the theory of nuclear deterrence, which assumes the possession and use of nuclear weapons."

However, while this group has been successful in helping to create "the nuclear taboo," Tanaka noted that 12,000 nuclear warheads are still in existence. Clearly, there is still a lot of work to do.

Nihon Kidankyo and Project Ploughshares have been allies in their efforts to eliminate nuclear weapons. In his lecture, Tanaka mentions events in which both participated, including Preparatory Committee meetings and Review Conferences in support of the Treaty on the Non-Proliferation of Nuclear Weapons. Both were also active at the three "Humanitarian Conferences" that paved the way for negotiations that produced the Treaty on the Prohibition of Nuclear Weapons (TPNW). Ploughshares Executive Director Cesar Jaramillo spoke at a Nihon Kidankyo event in Nagasaki that commemorated the seventieth anniversary of the dropping of the atomic bomb on that city.

Work on the TPNW continues for both groups. Tanaka concluded the Nobel lecture with this advice:

To achieve further universalization of the Treaty on the Prohibition of Nuclear Weapons and the formulation of an international convention which will abolish nuclear weapons, I urge everyone around the world to create opportunities in your own countries to listen to the testimonies of A-bomb survivors, and to feel, with deep sensitivity, the true inhumanity of nuclear weapons. Particularly, I hope that the belief that nuclear weapons cannot — and must not coexist with humanity will take firm hold among citizens of the nuclear weapon states and their allies, and that this will become a force for change in the nuclear policies of their governments.

### Canada's largest defence contracts to the US Department of Defense: FY2024



Written by Kelsey Gallagher

he Canadian Commercial Corporation (<u>CCC</u>) is a Crown corporation that supports the Canadian private sector in winning export contracts with foreign governments. Its biggest portfolio is defence and aerospace and its biggest customer, in most years, is the US Department of Defense (DOD).

As set out in the <u>Defence Production Shar-</u> ing Agreement between the United States and Canada, all potential contracts to export Canadian military goods to the United States valued at more than US\$250,000 must be brokered and facilitated by the CCC.

In fiscal year (FY)2024 (April 1, 2023 to March 31, 2024), the CCC signed contracts with the US DOD totaling \$1.08 billion,<sup>1</sup> a marked increase of 22.4 percent over the previous year's total, and 24.8 percent over the total for FY2022. In many cases, individual awards reported by the CCC in a given fiscal year are smaller subawards tied to larger prime contracts that are being executed over several years.

Following are the top Canadian military suppliers to the US DOD through CCC-brokered contracts in FY2024. All data was accessed via Access to Information and Privacy requests. All additional information on individual awards was obtained through CCC or US government press releases or secondary sources.

This data does not include CCC-brokered military contracts to other foreign nations; it does not, for example, include the \$418,000,000 sale of 55 Canadian-made light armoured vehicles to Colombia that was brokered during the period under analysis.

General Dynamics Ordnance and Tactical Systems (OTS) – Canada, Valleyfield Inc. – \$623,494,903

Far and away the largest Canadian supplier to the US DOD in FY2024 was General Dynamics Ordnance and Tactical Systems (GD-OTS)-Canada, Valleyfield Inc. The \$623,494,903 total is the largest value awarded to any single military producer through the CCC to the US DOD in the last several years, accounting for more than half the value of all of Canada's defence-related contracts to the US DOD in FY2024.

GD-OTS has four Quebec-based plants. According to the CCC, the GD-OTS Valleyfieldbased plant is responsible for filling this order. GD-OTS Valleyfield is one of the primary suppliers of propellants used in the 155mm artillery shell, particularly the M31A2 propellant.

Since Russia's 2022 invasion of Ukraine, the 155mm shell has become one of the world's most sought-after pieces of materiel. This ammunition contract is set to expand GD-OTS Valleyfield's production capacity to supply Ukraine, which, at its peak, was firing more than 10,000 artillery shells per day.

<sup>1</sup> Unless otherwise indicated, all dollar amounts are in Canadian dollars.

Supplier	Total of prime contracts
General Dynamics Ordnance and Tactical Systems (OTS) – Canada, Valleyfield Inc.	\$623,494,903
INDAL Technologies Inc.	\$38,068,471
L3Harris Wescam Inc.	\$32,393,965
Rolls-Royce Canada Ltd.	\$20,316,280
AirBoss Defense Group, Inc.	\$20,141,570
Liftking Manufacturing Corp.	\$18,524,745
Cascade Aerospace Inc.	\$17,593,560
General Dynamics Mission Systems - Canada	\$17,243,643
W.R. Davis Engineering Ltd.	\$16,291,494
CMC Electronics Inc.	\$15,672,604
Canadian Helicopters Ltd.	\$13,615,258
MTU Maintenance Canada Ltd.	\$13,159,876
Top Aces Inc.	\$12,104,706
Reivax North America Inc.	\$11,875,672
L.P. Royer Inc.	\$11,669,344
MDA Systems Ltd.	\$9,890,582
Woodward´s Oil Ltd.	\$8,484,385
URS Federal Services International, Inc. (an AECOM company)	\$6,282,807
OSI Maritime Systems Ltd.	\$5,549,350
Soucy Techno Inc.	\$5,368,191

#### Top 20 Canadian suppliers of military goods to the United States via the CCC (FY2024)

## **2** INDAL Technologies Inc. - \$38,068,471

INDAL Technologies Inc. of Mississauga, Ontario is a regular military producer for the US and other allied navies. INDAL is a unit of North Carolina-based Curtiss-Wright, which acquired the company in 2005.

Through the CCC, INDAL has <u>recently</u> supplied the US DOD with its Recovery Assist, Secure and Traverse (<u>RAST</u>) system, which operates as an arresting device to secure aircraft to the surface of maritime vessels, such as aircraft carriers. In <u>April 2024</u>, INDAL also won a contract through the CCC to supply the US DOD with its Aircraft Ship Integrated Secure and Traverse (<u>ASIST</u>) system. ASIST guides helicopters landing on aircraft carriers or other naval vessels.

According to the <u>CCC</u>, the Crown corporation and INDAL have partnered on contracts valued at more than \$300 million for the US military over the last 40 years. INDAL has also recently supplied aircraft-arresting technology to Chile, Singapore, and Türkiye, with further systems on order from Spain and Australia.

### **3** L3Harris Wescam Inc. - \$32,393,965

L3Harris Wescam Inc. in Waterdown, Ontario is one of Canada's largest producers of military goods. The company's main offerings include its MX-series of surveillance and targeting systems. These sensors are typically affixed to the bottom of aircraft, allowing users to observe 360 degrees below the aircraft and, with some models, direct smart munitions to targets during airstrikes.

In July 2020, on behalf of Wescam, the CCC signed an eight-year, \$380 million contract "in support of global U.S. Army surveillance and targeting operations" for the "U.S. Army's robust installed base of fixed-wing, aerostat and unmanned platforms while supporting expanding Foreign Military Sales requirements." Work under this contract likely contributed to some of Wescam's recorded awards during the period under analysis.

During FY2024, the CCC also awarded a number of subcontracts to Wescam under the Wescam Aggregate Services Plan (WASP); these subcontracts were tied to an original contract <u>signed</u> in January 2022 and provided a continuation of logistics support for three types of MX-series surveillance and targeting sensors installed on the AC-130 aircraft.

The CCC has boasted that, to date, it has won contracts on behalf of L3Harris Wescam Inc. with the US DOD worth more than \$1.5 billion.

### Rolls-Royce Canada Ltd. - \$20,316,280

This unit of Rolls-Royce Canada Ltd. is based in Peterborough, Ontario. Although largely known by the public as a manufacturer of high-end automobiles, Rolls-Royce is also a major manufacturer of military aerospace parts and components, aircraft engines, and technology for maritime applications.

In December 2024, the CCC<u>announced</u> that it had won on behalf of Rolls-Royce Canada Ltd. a

### Selling strike fighters to Israel

In January, Project Ploughshares published a report, *Global Production of the Israeli F-35I Joint Strike Fighter* by Senior Researcher Kelsey Gallagher. The purpose of the report is set out in the "Summary":

The Lockheed Martin F-35 Joint Strike Fighter program exemplifies the complexity of modern joint military production. When these weapons are used in contexts marked by serious breaches of international humanitarian law, as in Israel's 2023–2025 military operation Swords of Iron in Gaza, questions arise about the accountability of the global supply chain that enables their use.

This report aims to bring clarity to the global production chain behind the F-35 aircraft, with a specific focus on the Israeli F-35I, and to assess the implications for compliance with international arms control frameworks.

Extensive research by Kelsey unearths a wealth of information, some of which is provided in several tables in the report. This data goes a long way in satisfying the need to know who was providing Israel with the fighter aircraft used in its military operation in Gaza. The report also provides a fascinating narrative of the supply chain that exists to produce military goods such as fighter aircraft.

The value of this report is made clear in the concluding paragraph:



This report lays a foundation and offers a case study to improve the understanding of the flows of arms and technology in one of the most complex joint military production programs in history. Future efforts should focus on tracing suppliers, increasing transparency, and advocating for stronger accountability on the part of weapons-producing states and arms manufacturers. By addressing these challenges, the international community can take meaningful steps to prevent further harm and uphold the principles of international law.

This uniquely Ploughshares product would not be freely available to all on our website if not for the generous support of our donors.

### "Through a glass, darkly"

At the end of January, the Centre for International Governance Innovation published *Through a Glass, Darkly: Transparency and Military Al Systems* by Ploughshares Senior



Researcher Branka Marijan. As the paper shows, "achieving transparency in military AI applications presents several challenges," such as "the inherent opacity of the technology." Other challenges involve the voluntary transparency measures adopted by many military institutions, which do not fully address "the nuances of accountability"; the "uneven testing and training standards" among states; and the realization that "military AI systems are expected to remain highly classified."

In this paper, Branka "proposes pathways to overcome these challenges and outlines a framework for comprehensive transparency, which is essential for the responsible use of AI in military contexts."

contract with the US DOD worth up to \$110 million to supply the OK-410 Handling and Stowage Group system, an advanced winch system to "deploy, tow, and recover sonar equipment." This underwater warfare system is used to locate and engage enemy submarines.

### 5

### AirBoss Defense Group, Inc. - \$20,141,570

Via the CCC, AirBoss Defense Group, based in Acton Vale, Quebec, was awarded more than \$20 million in contracts with the US DOD in FY2024; most can likely be attributed to a single large <u>award</u> valued at US\$19 million (approximately C\$27 million) to provide nuclear, biological, and chemical (NBC) equipment to the US Defense Logistics Agency, particularly rubber molded gloves to protect against potential chemical warfare attacks. As the value of this award surpasses the totals for AirBoss supplied by the CCC in FY2024, it is likely that this award is being executed over several years.

The CCC states that it has secured \$350 million in awards with the US DOD on behalf of AirBoss Defense Group since it began its relationship with the supplier.

### **6** Liftking Manufacturing Corp. - \$18,524,745

Liftking Manufacturing Corp. in Vaughan, Ontario is a manufacturer of forklifts and larger material-handling equipment for both the commercial and defence sectors. One of their largest customers is the US DOD, producing hundreds of vehicles for use by the US Army, Navy, and Air Force.

In July 2023, Liftking <u>contracted</u> with the US DOD via the CCC to supply both 4,000lb- and 6,000lb-capacity forklifts to the US Navy. As well, according to responses to Access to Information and Privacy requests submitted by Project Ploughshares in prior years, the CCC signed contracts on behalf of Liftking with the DOD valued at \$6,677,694 in FY2023 and \$9,510,987 in FY2022 (current dollars).

### Cascade Aerospace Inc. - \$17,593,560

Cascade Aerospace, a unit of IMP Aerospace & Defence, is in Abbotsford, British Columbia. It <u>describes itself</u> as a "leading Canadian specialty aerospace & defence company trusted for its engineering and maintenance expertise," providing servicing, modification, repair, and overhauling of military, specialized, and commercial aircraft.

In 2021, it began maintenance on US Navy C-130 Hercules military transport aircraft as part of a 10-year joint contract with the United Kingdom's Marshall Aerospace and Defence Group, valued at <u>\$374 million</u>. Cascade is also under contract to maintain KC-130J Super Hercules aircraft for the US Marines.

Cascade won a <u>separate award</u> in 2021 to perform upgrades to C-130J cargo aircraft for the US Air Force, valued at US\$45 million (approximately C\$63.8 million).  $\Box$ 

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### The elephant in the room

By Wendy Stocker

n 1969, Canadian <u>Prime Minister Pierre Trudeau</u> described the relationship between Canada and the United States to members of the Washington Press Club: "Living next to you is in some ways like sleeping with an elephant. No matter how friendly and even-tempered is the beast, if I can call it that, one is affected by every twitch and grunt."

What do we do when the elephant is on the rampage?

Since the results of the US presidential election became public last November, staff at Project Ploughshares have been considering how the second presidential term of Donald Trump will affect Canada's foreign policy and national security. About two weeks after the election, Ploughshares held an <u>event for donors</u> under the banner "What now? Making sense of a fractured world" to share some thoughts on this subject and on broader, ongoing concerns.

As Executive Director Cesar Jaramillo explained to this audience, Trump regained the US presidency at a critical moment in human history: "We are witnessing multiple overlapping, mutually reinforcing, global crises in the world." He referenced crises in Sudan, Gaza, and Ukraine — the last a conflict that is "the closest we have ever been to a nuclear weapons detonation" since atomic bombs were dropped on Hiroshima and Nagasaki. All these conflicts reveal "the crumbling of norms that we held dear, of norms that we thought were already settled matters, hard-won victories, including, of course, the Geneva Conventions and the resulting international humanitarian law."

Cesar explored in some detail one example of this crumbling of norms: "The Biden administration authorized the transfer of anti-personnel mines to Ukraine" (see "Against the use of US anti-personnel landmines in Ukraine" on p. 5). Although the United States has never ratified the 1997 Mine Ban or Ottawa Treaty, US administrations have <u>generally</u> abided by most of its conventions. No longer. As well, Cesar noted, the Biden administration had recently "authorized the use of US long-range missiles to be within Russian territory," which most analysts agree "carries with it great risk and a great gamble."

By the end of the Biden presidency, a resolution of the war in Ukraine seemed far in the future. Trump, with a policy of America first and US isolationism, promised during the election campaign to end the war quickly. Cesar thought that this might constitute a "win" in this particular situation, although he had no idea of the approach that Trump would take in February 2025. At the time of writing, the Trump administration's initial rapprochement — and apparent warming of relations — with Russia was reportedly unsettling both NATO allies and Ukraine, which were feeling sidelined in conversations about a possible ceasefire.

But last November, Cesar did express fear of the effects that the Trump presidency would have on US policies related to nuclear weapons (see "Analyzing Trump's vision of peace" on p. 6). He noted that the first Trump administration had withdrawn from the <u>Iran nuclear deal</u>. The result? "Today [the deal is] in its death throes and Iran has increased the uranium that it's enriching." Cesar concluded:

The reality was that the Trump administration, not as an evidence-based decision but as a politically influenced impulsive decision, sent this very important deal unravelling. There's a broader reflection there that the erosion of the US as a credible leader of arms control and disarmament may continue under Donald Trump.

Senior Researcher Kelsey Gallagher, who focuses on the arms trade, portrayed the United States as the Michael Phelps of the global arms trade: American companies "sell the most weapons, produce the most weapons." This has been true under the last several US presidents. He also pointed out what his own work has consistently shown: that the United States is "the largest consumer of Canadian weapons in any given year." It is also the case, however, that the United States sends on many Canadian weapons to third parties, including Israel (see "Selling strike fighters to Israel" on p. 10).

Senior Researcher Branka Marijan, who analyzes emerging military technologies and their governance, predicted a permissive US regulatory environment under Trump, one that encouraged the ongoing development of technology enhanced by artificial intelligence (AI). She expected a "walking back" of policies that related to the responsible use of AI, including the US political declaration on responsible military AI, which involves only voluntary measures. This change in direction could be challenging for Canada, which had been cooperating with the United States on its political declaration and had signed on as a co-chair of a working group on accountability and transparency.

Branka focused on the great faith that the United States has in emerging technologies to provide it "with a competitive edge." The likely outcome: "It's going to be really difficult in the multilateral forums that we follow to see actual progress on regulations, not to say that we've seen a lot of progress." (See also "Harms and risks of military AI," p. 22 and "Through a glass, darkly," p. 11.)

During the election campaign, Trump called for increased investment by NATO member states in defence spending. Branka rejected this call as arbitrary and narrow-minded — "it doesn't make sense for Canada." She called for more funding for diplomacy.

In his opening remarks last November, Cesar spoke of "the militarization of public debate." Proposing a negotiated settlement has become "a fringe position." This is how Ploughshares responds:

We resist the notion that we — civil society, Canadians — need to sit idly as these things are happening....[At Ploughshares], we try to understand reality. We try to communicate that reality to our supporters....We continue working, with steadfast commitment.

Cesar explained that the work of Ploughshares represents a nuanced approach to conflict, as opposed to the "good-guys, bad-guys mentality" so often expressed in today's political environment. "They say the first casualty of war is truth; well, the second is nuance."

It seems likely that the Trump administration will lead to an even greater loss of nuance — and of truth. And so this pledge by Cesar to supporters of Project Ploughshares takes on even more significance:







Last November, Ploughshares held an event for donors in Waterloo, featuring (from left) Cesar Jaramillo, Branka Marijan, Kelsey Gallagher, and moderator Tasneem Jamal. Co-founder Ernie Regehr (standing) made a special appearance. *Photos: Motthew Pupic/Project Ploughshares.* 

If we have the facts, if we're comfortable about every word we're saying, be fearless. It doesn't matter what they throw at you. It doesn't matter the opposition or the characterizations of our positions, go at it. Because we're backed by credible evidence. □

### Quantum realities: Adapting security and governance for the 21<sup>st</sup> century



Written by Jessica West

hat if we could unlock the fundamental rules that govern the universe at its most basic level? Quantum science does just that, reshaping our understanding of reality and transforming the technologies we rely on every day.

In recognition of the century since the beginning of quantum mechanics — the branch of physics that explains the behaviour of particles at the smallest scales — the United Nations has declared 2025 the <u>International Year of Quan-</u> tum Science and Technology.

When applied to technology, quantum mechanics promises to provide unbreakable encryption, ultra-sensitive detection, and revolutionary computing power. These innovations will affect all elements of life on Earth, from manufacturing and medicine to finance, transportation, energy, and the environment.

Quantum mechanics is likely to reshape global security by offering both enhanced defence capabilities and new vulnerabilities. It could strengthen international security or fuel geopolitical tensions. To ensure the best outcome, the power of quantum technologies must be harnessed responsibly around the globe.

So far, global governance is lagging, as states focus on besting the competition rather than developing a shared approach to security. As quantum capabilities advance, we must rethink security strategies, embracing resilience, adaptability, and cooperation. Achieving this requires more than innovation — it demands a shift in mindset.

### The quantum revolution

The twentieth century was powered by classic mechanics and thermodynamics. It was a time of industrial and technological revolutions that gave us engines, electricity, and computers, and a worldview predicated on predictable systems that could be measured, controlled, and made more efficient.

The twenty-first century is being shaped by quantum science and complexity, which exemplify uncertainty and interconnectedness. This type of thinking spurs the development of adaptable networks, technologies that harness probability, and <u>systems</u> that don't behave in simple, linear ways.

To grasp why quantum science is so powerful, it helps to understand a few of its key <u>features</u> strange but fundamental properties that operate at the subatomic level:



1 Wave-particle duality: Everything waves

In the quantum world, things aren't just particles or waves — they're <u>both</u> at the same time. Light, electrons, even whole atoms behave as tiny points and rippling waves simultaneously. This means that reality is far more fluid and complex

Peace and security applications	Risks and challenges
<b>Unbreakable communications:</b> Quantum encryption or key distribution (QKD) ensures completely secure messaging, thus protecting diplomatic, military, and financial communications.	<b>Cybersecurity threats:</b> Quantum computers could break existing encryption, thus exposing sensitive data and enabling more powerful cyberattacks on critical infrastructure.
<b>Advanced weapons detection:</b> Quantum sensors can detect minute changes in the environment, thereby improving nuclear monitoring, stealth aircraft detection, and submarine tracking.	<b>Enhanced weapon capabilities:</b> Quantum sensors can be used to develop more precise targeting, autonomous weapons, and advanced surveillance tools.
<b>Tamper-proof data &amp; authentication:</b> Quantum-secured digital signatures make it nearly impossible to forge documents, produce deepfakes, or manipulate critical information.	<b>More convincing misinformation:</b> Quantum-powered Al can generate highly realistic deepfakes and synthetic media, making disinformation harder to detect.
Secure global networks: A quantum internet would enable instant, hack-proof communication, strengthening international cooperation on climate action, conflict prevention, and global security.	Widening technological divide: States or groups without access to quantum technology will be left vulnerable, increasing geopolitical instability.

### Quantum technology: Opportunities and risks for global peace and security

than what we perceive on the surface of everyday life. If you've ever seen ripples on a pond interfere with each other, you've seen how quantum objects behave.





Entangled particles are so deeply <u>linked</u> that no matter how far apart they are — even across galaxies — changing one instantly changes the other. And if one particle is measured, we automatically "know" the status of the other. What Einstein called "spooky action at a distance" makes quantum communication unhackable — theoretically. Picture entanglement as a flock of birds moving in perfect synchronization — except that they are "correlating without communicating."

Quantum mechanics acts as a conductor, amplifying and connecting the impact of technologies. Quantum computing doesn't just make computers faster; it allows us to solve problems that standard computing can't handle. Additionally, quantum computing enhances artificial intelligence (AI) by enabling faster data processing and more advanced algorithms, which could revolutionize decision-making in areas like healthcare, finance, and climate modeling. But the unpre-

2 Superposition: Existing in multiple states at once

Imagine a coin that, when flipped, lands on both heads and tails at the same time — until you look at it. This is an example of superposition; quantum objects exist in multiple possible states simultaneously until something (like a measurement) forces them to "choose" one. <u>Schrödinger's</u> famous cat-in-a-box thought experiment illustrates this: until you open the box, the cat is both alive and dead. Superposition gives quantum computers their power; rather than working through calculations one at a time, they process many possibilities simultaneously. It also makes quantum sensors incredibly precise as they measure multiple states at one time.

#### Canada should resist the Iron Dome

In mid-February, *The Hill Times* published "Canada should resist Trump's 'Iron Dome' fantasy" by Ploughshares Senior Researcher Jessica West. The opinion piece was a revised version of "Hubble, bubble, toil, and trouble: stirring up an arms race in space" by Victoria Samson and Jessica, which <u>appeared</u> on the SpaceNews website a week earlier.

Both articles make convincing technical and policy arguments against this new Trumpendorsed version of ballistic missile defence that includes the placement of interceptors in outer space.

dictable nature of quantum advancements means that the changes they bring will include both unforeseen opportunities and risks.

#### Quantum technology and global security

Even in the near term, quantum technology will dramatically reshape global security by changing how sensitive information is secured, detected, and processed. But because these changes can serve multiple purposes, they are likely to both enhance and <u>threaten</u> international peace and security. The chart on the previous page illustrates just a few of these parallel possibilities.

#### Bridging the quantum governance gap

While quantum technology has made rapid gains in recent years, there has been only limited global discussion on security implications. Defence alliances, including <u>NATO</u>, are beginning to explore possible security impacts; and states, including <u>Canada</u>, are striving to develop the technology to achieve research leadership and economic gain. But broader governance efforts lag. Reflecting on Canada's approach, <u>Kristen Csenkey and Aniska</u> <u>Graver</u> note that strategies to advance quantum capabilities still do not include any consideration of values and ethics. Organizations such as the Stockholm International Peace Research Institute (SIPRI) have noted the lack of dedicated policy forums that allow for structured dialogue on the global development, adoption, and use of quantum technologies.

Initiatives are emerging to improve access to quantum technology. By providing a much needed opportunity to raise awareness, foster collaboration, and promote inclusivity, the UN-designated International Year of Quantum Science and Technology is helping to mitigate the potential to intensify global inequalities and encourage new arms races. As well, the <u>Open Quantum Institute</u> promotes global and inclusive access to quantum computing, while <u>Open Quantum Design</u> in Waterloo, Ontario is building the first open-access quantum computer.

However, from a peace-and-security perspective, gaining access to this innovative technology is not enough. What's needed is a fundamental shift in mindset to reflect the unique challenges and opportunities that quantum presents.

#### A quantum mindset

Quantum science not only transforms technology; it redefines reality. If our thinking remains focused on control, efficiency, and predictability, we risk misunderstanding or mismanaging these new technologies. To navigate a quantum future wisely, we need to embrace the principles behind it: uncertainty, adaptability, and deep interconnection.

Old concepts that underpin security strategies, such as calculated deterrence, managed escalation, command-and-control, and absolute security should be discarded; they are based on the false belief that we can control and dominate the world around us. A quantum reality requires a shift to security strategies that prioritize adaptability, resilience, and cooperation. States and institutions that fail to adapt won't be able to keep up with emerging threats, technological advances, or shifting realities and will become increasingly vulnerable. Those that do adopt a more flexible and cooperative approach will be better equipped to navigate uncertainty and foster lasting security in a profoundly interconnected world. □

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# DeepSeek and the reality check for military Al



Written by Branka Marijan

or years, the contest to be dominant in military applications of artificial intelligence (AI) has been framed as a race between the United States and China. The prevailing wisdom among analysts tracking the development of autonomous and intelligent military systems held that the United States enjoyed a clear lead, with China trailing by several years. This conclusion was in part due to US investments and the significant breakthroughs in AI that had come from American technology firms. This head start was expected to translate into a decisive advantage for the Pentagon in applying AI to defence and warfare.

However, a seismic shift occurred this past January, when <u>DeepSeek AI</u>, a Chinese startup, released its R1 generative AI model, claiming it rivaled OpenAI's ChatGPT but at a fraction of the cost. The Chinese company asserted that it had developed this model for a mere <u>\$6 million</u>, <u>utilizing just 2,000 chips</u> (semiconductors) — an astonishing claim when compared to the 16,000 chips reportedly used by OpenAI for its latest model.

A closer examination of these figures revealed that the quoted cost reflected only the <u>marginal</u> <u>expenses</u> of training the model, omitting broader financial considerations such as the initial procurement of high-performance chips, infrastructure for data centres, and the salaries of a highly skilled research team.

Nevertheless, the news that a Chinese startup had managed to develop a generative AI product approaching the sophistication of OpenAI's offerings while seemingly more efficient sent shockwaves through both the defence community and financial markets. Investors reacted swiftly in a sell-off that erased nearly <u>\$1 trillion</u> in market value across the AI sector. More significantly, the revelation forced a fundamental reassessment of China's standing in AI research and development. The notion that Beijing was years behind Washington in cutting-edge AI innovation suddenly seemed outdated.

#### Can China lead in AI development?

The key question now: can China surpass the United States in AI development, or will it remain a fast follower?

Beijing's AI push has been methodical and well funded. The Chinese government has invested billions in AI research, aligning its technological ambitions with national security priorities. Both state-backed entities and private firms have benefited from a concerted strategy to close the gap with the West by acquiring advanced semiconductor manufacturing capabilities, expanding computational resources, and accelerating AI talent development. Moreover, a new generation of innovators or "disruptors," such as DeepSeek founder Liang Wengfeng, seems to be emerging. As **<u>Charles Mok</u>** notes in a commentary piece published on the Stanford Cyber Policy Centre website, Wengfeng has claimed that China needs to innovate more, rather than copying and following other countries.

But China still faces obstacles. The United States holds a critical advantage in semiconductor technology, while China faces supply chain vulnerabilities from export restrictions on advanced AI chips, such as Nvidia's A100 and H100. These chips are indispensable for training large-scale AI models.

While China is rapidly developing alternatives,

it is not clear that domestically produced chips can match the performance of their US counterparts in the near term. Although China has made much of the homegrown innovation exemplified by DeepSeek, tech researchers Tye Graham and Peter W. that Singer note DeepSeek is using Nvidia H800 chips, which are not subject to US trade restrictions. Moreover, DeepSeek had access to Nvidia A100 chips that were purchased

entering an era in which autonomous weapons become as ubiquitous as conventional arms but with no clear legal frameworks to govern their use. Without international agreements to establish standards, the likelihood of accidental escalation or unintended conflict due to AI misjudgments increases dramatically.

before restrictions were put in place. Thus, the reality is that recently revealed advances had been made with sophisticated chips, some of which are no longer accessible.

As well, China's AI ecosystem operates within a regulatory framework that, while supportive of state objectives, also imposes constraints. While research in the United States thrives on openness and collaboration, China's AI industry is subject to tighter government oversight, particularly in politically sensitive domains, which can limit engagement by Chinese researchers with global AI communities and fundamental research.

Nonetheless, DeepSeek AI's achievement might be seen to exemplify the age-old adage that "necessity is the mother of invention" - or innovation. If Chinese firms continue to develop sophisticated AI models at lower costs, they could gain a significant advantage, particularly in military applications in which cost efficiency and rapid deployment matter as much as raw capability.

### The militarization of AI and its consequences

The DeepSeek AI breakthrough raises urgent questions about the trajectory of military use of

If AI competition continues unchecked, the world risks

AI. As AI systems become increasingly sophisticated, their role in warfare is growing, in applications that span logistics optimization and support in broader decisionmaking and targeting. Indeed, Chinese military analysts have claimed that DeepSeek's AI models can already perform many military functions.

The implications of this technological acceleration are profound.

The global AI arms race could become

more intense. Washington and Beijing have long recognized AI as a strategic frontier, but the realization that China is closer to parity than previously thought may prompt the United States to double down on its AI investments.

The Pentagon has already established partnerships with private tech firms to integrate AI into defence systems. Recent policy shifts indicate a growing willingness to streamline AI adoption within the military. The Trump administration, on the second day after taking office, announced that the budget of Stargate, an AI infrastructure project, is expected to reach <u>\$500 billion</u> before the end of the current Trump presidency. Investment is focused on building data centres that will then be used by OpenAI for a variety of research and development purposes. Another announcement shed more light on the type of work, including a partnership with the <u>US National Laboratories</u> on scientific and nuclear security.

Google recently dropped its promise not to use AI for weapons and surveillance. Company leadership expressed the view that "democracies should lead in AI development." What appears to be happening in the United States, pushed by tech companies, is a mirroring of the <u>militarycivil fusion strategy</u> that China is pursuing. If China's AI firms continue to advance, the pace of US military AI development could quicken in response, setting off a feedback loop of heightened competition.

Other countries are also making major investments in AI technologies for defence. If they also make important strides forward, the world will see a greater use and testing of these technologies, likely without much disclosure. As retired Australian Army Major General <u>Mick Ryan</u> notes in his post on X, "the fact that DeepSeek-R1 is such a surprise proves again that humans will continue to surprise each other despite the presence of advanced technology." In practice, many states see revelations about DeepSeek as the signal to double down on military AI investments, adding loops to the Great Power competition.

This escalation carries risks. AI-enabled weapons systems introduce new dimensions of unpredictability to conflict scenarios. Autonomous drones and missile systems, for example, could reduce human decision-making in warfare, raising ethical and legal concerns about accountability. An AI-driven escalation, in which autonomous and intelligent systems misinterpret intent and trigger conflicts, adds another layer of instability to an already volatile geopolitical environment.

### Governing military AI: A diplomatic minefield

Rapid advancements in AI-driven military technologies have reignited debates over AI governance. In the last few years, there have been more efforts to establish international norms for responsible military AI development, but little consensus among major powers. International forums, such as United Nations gatherings on lethal autonomous weapons systems, have made limited headway in crafting binding regulations.

It is not clear if existing processes, including the Responsible Military AI summits and the political declaration on responsible military AI and autonomy led by the United States, have the backing of the new US administration. Given the apparent instability of alliances in the Euro-Atlantic relationship, the path forward remains uncertain.

If AI competition continues unchecked, the world risks entering an era in which autonomous weapons become as ubiquitous as conventional arms but with no clear legal frameworks to govern their use. Without international agreements to establish standards, the likelihood of accidental escalation or unintended conflict due to AI misjudgments increases dramatically.

#### What comes next?

The revelation of DeepSeek AI's capabilities reminds us that technological superiority is neither static nor guaranteed. While the United States still enjoys key advantages in AI infrastructure and semiconductor manufacturing, China's ability to develop competitive AI systems at lower costs should not be underestimated.

For policymakers, the imperative is clear: the AI arms race must be met by robust diplomatic efforts to mitigate the risks of unfettered militarization. Discussions on AI governance need to evolve from broad guidelines to concrete and enforceable agreements. Achieving this end will require engagement not just between Washington and Beijing but among a broader coalition of nations that want to prevent AI from becoming an unregulated force multiplier in military conflicts.

The era of AI-powered warfare is no longer a distant prospect. It has arrived. Whether it leads to greater stability or deeper insecurity will depend on how states navigate the challenges of AI governance, technological competition, and military strategy.  $\Box$ 

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# Freedom in outer space at risk



Written by Jessica West

hat happens when space is no longer open to all — when it becomes locked down by military defences and dominated by a few powerful states or groups or even individuals?

For decades, space has been a realm of exploration, technology development, and global cooperation. Today, satellites power our daily lives, enabling everything from global shipping and local package delivery to climate monitoring and international communication. Even the military functions of most military satellites are largely construed as peaceful.

Now, the renewed pursuit by some powers of space-based missile defence — such as the US "<u>Iron Dome</u>" — and other weapons capabilities in space threatens to turn this shared environment into an armed garrison.

Imagine if a few powerful states built an "Iron Dome" over the world's oceans — a vast network of armed naval barriers designed to control the seas and intercept vessels deemed a threat. Global shipping routes would be disrupted; access to fishing and other resources would be limited; and the oceans would be transformed from a space for commerce and connection into zones of military confrontation. The freedom of the seas, long considered essential for trade and cooperation, would be lost.

This is the future some envision for space.

#### Peace and the freedom of space

The story that takes us from the first satellite in 1957 to more than 11,000 today is all about freedom. It began with the successful launch of Sputnik, which orbited Earth without hindrance, sending its iconic beeps down from space. Even though this first satellite caught much of the world by surprise, no one objected to or threatened this new space object. A precedent and a crucial principle were established: space would be open for all to explore and use.

As with international waters, no single country is permitted to claim or control outer space. It is considered a global commons — a resource shared so that all may benefit.

To maintain such freedom of access, the world needs peace. Early space programs emphasized the concepts of "space for peace" and "peaceful co-existence," which were later enshrined in the Outer Space Treaty (OST). The promise of peacefulness has been universally upheld by leaders in space and respected as the cornerstone of international cooperation and global benefit.

But this aura of peacefulness — this "fog of <u>peace</u>" — has also hidden military activities and competition that have always existed in a <u>gray</u> <u>zone</u> of outer space, in which military programs can be framed as defensive or even <u>essential</u> to freedom and peace.

Now the fog of peace is dissipating, revealing a more aggressive push to weaponize space for

### Getting a Canadian perspective on space security

Ploughshares Senior Researcher Jessica West was quoted in two February 4 articles. The first related to the US government's plans to build "The Iron Dome for America." In "How Trump's 'Iron Dome for America' upends four decades of nuclear doctrine" by Theresa Hitchens and Michael Marrow, published on the Breaking Defense website, Jessica says:

The pursuit of space-based interceptors is a blueprint for instability. History shows that chasing invulnerability only fuels arms races. The hard truth? SBI won't shield us; it will spark a wave of new threats while offering limited real protection in return.

The second is "Are We on the Verge of an Arms Race in Space?" by Ramin Skibba, which appeared in *Popular Mechanics*. Jessica comments on the role of commercial businesses in current wars on Earth:

Commercial spacecraft...are now legitimate military targets. They're involved in warfighting and are profiting off of it. But we don't really talk about what their responsibilities are and to what extent they're complicit in war crimes or other human rights violations.

Jessica also talks about the role that transparency—more open communication about intended functions of spacecraft and space technologies—can have in lowering tensions and, perhaps, halting an arms race in space. She sees the United States and its allies taking one approach to "navigate out of this diplomatic impasse" while Russia, China, and their allies take another. In her view, "transparency is one way to bring these two discussions together."

warfighting. As peace evaporates, so too does freedom.

### The rise of space weapons

The call for an Iron Dome for America resurrects the idea of space-based missile defence that has been pursued intermittently by the United States since the launch of the Space Age. Although the ostensible intention in developing an impenetrable shield is to defend against nuclear weapons, missiles, and other aerial threats that are launched from Earth, the creation of such a shield has significant implications for the freedom of space.

Under consideration are space-based interceptors that are intended to exploit the vulnerabilities of ballistic missiles in the early flight or "boost" phase. Just after launch, missiles are relatively slow, easy to track with radar, and without the decoys and countermeasures that make interception more difficult. But this window of opportunity vanishes in the blink of an eye; interception thus requires both speed and proximity — both more readily achieved from space, theoretically.

In reality, space-based missile defence is a lo-

gistical nightmare. Satellites in orbit close to the Earth move at more than 7 km/second. This means that <u>thousands</u> of interceptors would be required to provide "persistent" (continuous) coverage of even a small region on Earth. Global coverage would require many tens of thousands. The technological hurdles, financial burdens, and likely strategic blunders of such a system have been well <u>explained</u>. What has not been adequately explored is how such a defence system affects free access and use of space.

### How an arms race erodes freedom

The creation of a fleet of armed satellites that circle Earth is more than just a dystopian fantasy. Such a system is being actively considered by security experts as a response to missile threats and could have far-reaching consequences for space access, security, and governance.

We don't have to imagine what this might look like; we have seen it before on the high seas. Throughout history, dominant naval powers have used their fleets to control trade routes, enforce territorial claims, and dictate the terms of maritime access. Gunboat diplomacy — the use of such force to coerce weaker states — was once a



### Harms and risks of military AI

In early December, Senior Researcher Branka Marijan attended a two-day event, "Harms and Risks of AI in the Military," put on by Mila, the Quebec Artificial Intelligence Institute in Montreal. At this "cross-disciplinary workshop," Branka presented a <u>lecture</u>



entitled "The battle for control: The struggle to regulate military AI & AWS" and was a member of a <u>panel</u> that discussed "Technical issues and responses to the risks of the use of AI in the military."

In her lecture, Branka presented "key trends" in tech development and "competing governance processes," as well as "interesting insights from both humanitarians and defence analysts, which will help us understand the types of governance that we need" to regulate the use of artificial intelligence and autonomous weapon systems by the world's militaries. Her conclusion: "We're going to need a multilayered governance response" that will include "a legally binding instrument." According to Branka, "governments still have a role to play." While she fully recognized the difficulties that exist in getting any sort of international agreement on regulating military tech, she insisted that such work was "not as problematic as the deployment of force."

In the panel discussion, Branka focused on the need to integrate technical and policy expertise. She zeroed in on the "tricky question of explainability": "We need to figure out explainability for several reasons, one of which is accountability." She also mentioned the need to ensure transparency so that the exporter of technological systems can clearly "communicate that these systems have been properly tested and evaluated."

key tool of global power projection. Today, we see similar practices in the <u>South China Sea</u>, where militarized artificial islands are used to assert control over disputed waters, restrict freedom of navigation, and challenge international norms.

The development of armed satellites and spacebased interceptors could erode freedom in space in multiple ways:

#### **1.** Deny access to space

A few states (perhaps even nonstate actors) with the ability to create a system to intercept rocket launches or satellites could control space access. Such actors could choose to deny space capabilities to rivals, threatening the principle of space as a global commons.

#### 2. Create no-fly zones in space

Military powers already impose no-fly zones on Earth; some could deploy weapons in space that could restrict access to orbits critical for command-and-control, navigation, surveillance, and commercial operations.

#### 3. Escalate space conflicts

History shows that military buildups lead to conflict. As more actors develop space weapons, the risk of miscalculation, accidents, and preemptive strikes increases. The very technologies meant to "defend" could instead increase the likelihood of armed confrontation, turning space into a battlefield.

### 4. Contaminate the space environment

The testing and use of weapons in space would generate long-lasting debris fields, making critical orbits hazardous or even unusable for civilian, commercial, and scientific activities.

### **Rules or military force?**

Whether or not an armada of space-based interceptors ever materializes, the drive to develop such capabilities is part of a broader shift to offensive space postures.

Missile defence is only one feature of this trend. The United States has declared its intent to become "<u>combat-ready</u>" in space by developing offensive counterspace capabilities, among other initiatives. France has announced plans to launch "bodyguard satellites" armed with <u>lasers</u>. Many other states are pursuing weapons <u>capabilities</u> that range from anti-satellite missiles and dual-purpose satellites to electronic and cyber mechanisms.

With no clear rules and governance mechanisms in place, outer space could become a weaponized and restricted domain, access to which is not guaranteed under international law, but established by military superiority.

The lessons of history are clear: when weapons are used to control access, many actors no longer have any access at all. Will the international community repeat these mistakes in space — or choose a different path?  $\Box$ 

### Effective implementation of Canada's new Arctic foreign policy

In late January, Project Ploughshares <u>published</u> a Spotlight feature by Balsillie Technology Governance Intern Jessica Stewart and Ploughshares Senior Researcher Branka Marijan entitled *Canada's new Arctic foreign policy: Can it meet a complex reality?* It puts the policy released last December in the context of a changing Arctic environment; the authors write that the policy sees "climate change as a 'threat multiplier' that creates security risks not previously considered."

The Spotlight also highlights increasing Great Power tensions that include new competitive interests in Arctic trade routes and resources. The authors believe that Canada, with the second-largest Arctic landmass, "cannot afford to ignore" the hostile moves of some states, including Russia and China.

So, this new foreign policy requires complex, nuanced, thoughtful implementation. For example, Jessica and Branka write that strategies to mitigate climate change "must be carefully balanced with more traditional enhancements of military capabilities for deterrence and detection." While the

new policy features the intent to establish "deeper collaboration with the United States and the maintenance of strong ties with Nordic NATO allies," the authors recognize that "engaging with the new Trump administration will be a significant challenge."

Recommendations include the following:

- "Canada must strengthen its position as a responsible Arctic power by leading climate diplomacy and investing in scientific research that monitors and mitigates the region's changing conditions."
- "Canada must ensure its sovereignty is well protected." But militarizing the Arctic is a "knee-jerk reaction." Instead, the government should take a "measured approach" "focused on cooperation, multilateral institutions like the Arctic Council, and investment in northern infrastructure."
- Canada must prioritize "diplomatic engagement" with likeminded states but, when possible, should aim to "address shared challenges and opportunities in the region" with Russia and China. "Engagement among the scientific community" might be an entry point.
- When responding to environmental change, the Canadian government must accept Indigenous Peoples as "stewards of the land and key voices in decision-making."

Key words to take away from this report: cooperation, stewardship, partnership.





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I hereby want to congratulate Cesar Jaramillo for his article "Hope for a troubled world" in the winter 2024 *Ploughshares Monitor.* I noted in reading Murray Sinclair's book *Who We Are* that he was made chair of the Senate Ethics Committee shortly after he was appointed to the Senate. I discovered that Project Ploughshares was one of the few journals I read that had a consistent ethical perspective. Almost every article in the *Monitor* mentioned ethics.

Fortunately some people beyond Murray Sinclair are interested in ethics. Keep up your important work.

- Barry Hammond, Ploughshares supporter

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