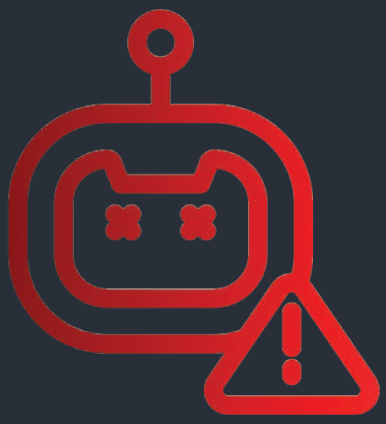
THE
# PLOUGHSHARES MONITOR
VOLUME 46 | ISSUE 2
SUMMER 2025

# ERROR 404: PEACE NOT FOUND



When military AI misreads the battlefield

AGENTIC WARFARE AND THE HUMAN
Who is really in control?

CANADA RESUMES EXPORTS
UAV sensors sent to Türkiye

THE SPACE-NUCLEAR NEXUS
The threat of new tech

*"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*

The Ploughshares Monitor
Volume 46 | Issue 2

PROJECT PLOUGHSHARES STAFF

**Cesar Jaramillo** Executive Director

**Kelsey Gallagher**
**Lynne Griffiths-Fulton**
**Tasneem Jamal**
**Branka Marijan**
**Matthew Pupic**
**Wendy Stocker**
**Barbara Wagner**
**Jessica West**

# Summer 2025

**3** **From the Director's desk**
A note of gratitude
*by Cesar Jaramillo*

**8** **Canada shipping UAV sensors to Türkiye**
Statistics Canada indicates exports resumed
*by Kelsey Gallagher*

**12** **Nuclear fears in a new tech environment**
Exploring the outer space-nuclear nexus
*by Jessica West*

**16** **Agentic warfare and the role of the human**
Who's really in control?
*by Branka Marijan*

**20** **Q&A: AI in decision support systems**
A conversation with Anna Nadibaidze
*by Branka Marijan*

*The Ploughshares Monitor* is the quarterly journal of Project Ploughshares, the peace research institute of The Canadian Council of Churches. Ploughshares works with churches, nongovernmental organizations, and governments, in Canada and abroad, to advance policies and actions that prevent war and armed violence and build peace. Project Ploughshares is affiliated with the Kindred Credit Union Centre for Peace Advancement, Conrad Grebel University College, University of Waterloo.

Office address:
Project Ploughshares
140 Westmount Road North
Waterloo, Ontario N2L 3G6 Canada
519-888-6541, 1-888-907-3223
plough@ploughshares.ca; www.ploughshares.ca

Project Ploughshares gratefully acknowledges the ongoing financial support of the many individuals, national churches and church agencies, local congregations, religious orders, and organizations across Canada that ensure that the work of Project Ploughshares continues.

We are particularly grateful to The Simons Foundation Canada in Vancouver for its generous support.

All donors of $50 or more receive a complimentary subscription to *The Ploughshares Monitor*. Annual subscription rates for libraries and institutions are: $35 in Canada, $45 (US) in the United States, $50 (US) internationally. Single copies are $5 plus shipping.

Unless indicated otherwise, material may be reproduced freely, provided the author and source are indicated and one copy is sent to Project Ploughshares. Return postage is guaranteed.

Publications Mail Registration No. 40065122.
ISSN 1499-321X.

*The Ploughshares Monitor* is indexed in the Canadian Periodical Index.

Printed at Innovative Digital, Listowel, Ontario.
Printed with vegetable inks on paper with recycled content.

Funded by the Government of Canada

## From the Director's Desk

# A note of gratitude

Written by Cesar Jaramillo

Ten years ago, in my very first column for *The Ploughshares Monitor* as Executive Director, I chose the title "A note of gratitude." At the time, I was just beginning to grasp the weight and privilege of leading an organization with such a storied history and bold mission.

Today I have a deeper understanding. Project Ploughshares has not just been a job for me. It has been a true calling and a source of profound purpose.

As I write my final column, it seems only fitting — perhaps even inevitable — that I return to gratitude. It is the most honest and encompassing sentiment I can offer.

It is hard to capture in a few words just how much this organization, and the people within it, have meant to me. I have had the honour of working alongside brilliant, principled, and dedicated colleagues. They are not just coworkers. They are friends and partners in a shared mission to build a better world, each with a strong belief and conviction that it is possible.

We have spoken out when it was difficult. We have pushed governments, including our own, to do better. And we have insisted, time and again, that lasting security cannot be built on the back of a gun.

The unfolding tragedy in Gaza stands as a devastating example of what happens when principles are abandoned. The mass suffering of civilians, the blatant disregard for international law, and the global failure to hold perpetrators accountable — all reflect a broader crisis of conscience in the international system.

In such a world, the work of Project Ploughshares is not just relevant — it is essential. Ours is a voice of clarity, rooted in facts but animated by compassion. We do not seek popularity. We seek impact. And we are not afraid to challenge powerful interests when the stakes demand it.

### A time of change, a steady mission

So much has changed over the past decade — in the world, in Canada, in the disarmament and peacebuilding community. In my life. But one thing has remained constant: Project Ploughshares' commitment to advancing peace with credibility, conviction, and clarity.

We are neither partisan nor political. But we are not neutral on matters of war and peace. All of us have stood firmly, consistently, and publicly on the side of disarmament, diplomacy, and the dignity of every human life.

Looking back, I am proud of what we have accomplished. We have deepened our expertise

across multiple program areas. We have increased our visibility in global forums. We have influenced policy, supported activists, and educated the public. And we have done it all with integrity, independence, and a fierce commitment to truth.

Perhaps most importantly, we have stayed true to our foundational values. We believe in the power of norms to shape behaviour. We believe in Canada's potential to be a force for good. We believe that civil society has both the right and the duty to engage in the global conversation on peace and security. And we believe that diplomacy, the rule of law, and multilateral cooperation — not military dominance — are the surest paths to a more secure world.

> So much has changed over the past decade — in the world, in Canada, in the disarmament and peacebuilding community. In my life. But one thing has remained constant: Project Ploughshares' commitment to advancing peace with credibility, conviction, and clarity.

We have done so at a time when the very idea of global leadership for good often feels elusive. Many of today's decision-makers are willing to bend principles for short-term gain. Many powerful states exempt themselves from the rules they expect others to follow. And many lives are lost as a result.

## Principles in action

Over the course of the past decade, the mission of Project Ploughshares has taken many forms. We have been present in multilateral negotiating rooms where critical decisions were being made about the future of global security. We have been at civil-society strategy sessions where ideas and alliances were forged.

We have been in public forums and private briefings, in classrooms and on Parliament Hill, in Geneva and New York and Hiroshima — always with the same purpose: to bring principled, evidence-based analysis to the most pressing issues of war and peace.

We have worked tirelessly on nuclear disarmament, advocating for the abolition of weapons that pose an existential threat to human civilization. From the faltering Nuclear Non-Proliferation Treaty (NPT) review processes to the hopeful emergence of the Treaty on the Prohibition of Nuclear Weapons (TPNW), we have remained steadfast in our position that nuclear weapons are not only immoral and illegal, but incompatible with any vision of sustainable human security.

We have challenged the logic of nuclear deterrence and called out the hypocrisy of nuclear-armed states that preach non-proliferation while modernizing their arsenals. In doing so, we have often stood in contrast to dominant political narratives — but never alone. Our voice has joined those of a broader movement that refuses to normalize the threat of annihilation.

We have also worked relentlessly on the regulation of the global arms trade. We have scrutinized Canada's arms exports, particularly those to regimes with egregious human-rights records — such as Israel and Saudi Arabia — and asked hard questions about legality, transparency, and complicity.

We have advocated for Canada's robust implementation of the Arms Trade Treaty and called attention to loopholes, inconsistencies, and omissions in export oversight. We have been among the few voices to raise the alarm on the Saudi arms deal and other questionable transfers, always guided by international humanitarian law, not political expediency.

Our work on emerging technologies has grown significantly. The rise of autonomous weapons and military systems enabled by artificial intelligence (AI) represents one of the most consequential developments in the history of warfare. From early warnings about "killer robots" to our active role in international discussions on the governance of

Executive Director Cesar Jaramillo, Ploughshares co-founder Ernie Regehr, Senior Researcher Jessica West, Senior Researcher Kelsey Gallagher, Policy Advisor Kenneth Epps, and Senior Researcher Branka Marijan gather in Waterloo in May 2022. *Photo: Matt Korda*

military AI, Project Ploughshares has helped to shape the conversation and push for meaningful, preventive regulation before it is too late.

Project Ploughshares has expanded our attention to the militarization of outer space, and is now recognized globally as a key voice on the issue. Early on we recognized that what was once a peaceful domain was becoming increasingly contested and weaponized. In a world that depends on space-based infrastructure for civilian, commercial, and military purposes, we have been advocating, urgently, for arms control in space.

We have also deepened our commitment to the protection of civilians in armed conflict, ensuring that global norms on civilian harm, indiscriminate weapons, and accountability are not just discussed, but defended. As part of the International Network on Explosive Weapons (INEW), we have helped drive a historic new political declaration that addresses the use of explosive weapons in populated areas. And as norms erode in real time, from Syria to Sudan to Gaza, we have not hesitated to name the violations and demand redress.

Project Ploughshares has more fully engaged with the intersection of climate, peace, and security. As the destabilizing impacts of climate change intensify around the world, we have added our voice to a growing chorus that insists that climate-related risks be addressed, not only as environmental challenges but as core security concerns.

## International leadership needed

Recent and ongoing humanitarian crises have exposed a profound failure of international leadership. Vast humanitarian catastrophes are often enabled in part by the silence or equivocation of states that could do dramatically more to stop them. They are a sobering reminder that the rules-based international order cannot be taken for granted, and that the work of norm-building, accountability, and principled advocacy remains

not only necessary but urgent.

Today, the very rules meant to protect civilians in conflict are being trampled with impunity. In Gaza, entire neighbourhoods have been reduced to rubble, hospitals attacked, and basic humanitarian norms disregarded. The level of destruction and civilian death we are witnessing is not a tragic byproduct of war — it is a direct consequence of choices made and enabled by governments that continue to arm and excuse those responsible.

In a recent piece titled "Rules for Others," I reflected on this dangerous double standard — the notion that norms are for the weak, and that might makes right. Such a mindset, which corrodes the foundations of international cooperation, is one that Project Ploughshares has consistently resisted. And this resistance will not end with my departure.

## Onward

I leave with full confidence in the future of this organization. Our team is extraordinary. The work is urgent. And the vision is as clear and compelling as ever. I know that Project Ploughshares will continue to lead — with integrity, with courage, and with an unwavering focus on the common good.

To everyone who has supported Project Ploughshares during my tenure, whether through financial contributions, collaborative advocacy, partnership, or moral support, I offer my deepest, most sincere thanks. Your belief in our mission has made all the difference. I urge you to continue standing with this organization.

I want to extend heartfelt thanks to the Project Ploughshares Management Committee and our friends at The Canadian Council of Churches for their guidance, leadership, and support over the years.

I have also been privileged to work with countless individuals, networks, and coalitions in Canada and around the world, whose commitment to peace and justice continues to inspire.

I thank the many government officials, both domestic and international, with whom I have had the opportunity to engage. Their openness to dialogue, even in moments of profound disagreement, has enriched our work and advanced the cause of common security.

My family, in Canada and abroad, has been fully supportive and always patient — through thick and thin. To them, my thanks and my love.

The challenges ahead are daunting, and the need for principled, fearless voices has never been greater. But the work of Project Ploughshares will continue, as it must. Project Ploughshares, driven by its talented staff, will remain a voice of clarity and reason in a troubled world.

It gives me great hope to know that Project Ploughshares is not alone. Across Canada and around the world, there are scholars, diplomats, students, faith leaders, citizens, who refuse to accept that this world is the best it can be. They demand better. And so does Project Ploughshares. With these people as partners, Project Ploughshares will keep building a more just and peaceful world.

To my colleagues past and present: you have been the best part of this journey. I have learned from you, leaned on you, and been inspired by you. Your talent, dedication, and decency are the beating heart of Project Ploughshares, and I will remain your greatest admirer and supporter.

To those who will lead and shape this organization going forward: I have every confidence in your ability to meet the moment. You inherit not just a legacy, but a responsibility — and I know you will cherish it with strength and purpose.

I leave with a full heart. What an honour it has been to serve this mission. To work alongside such exceptional people. To be part of something that has always aspired to leave the world better than it found it.

I will remain, always, a friend of this organization and a champion of its cause.

Let us continue the work. Let us continue to imagine, and build, a world where swords are turned into ploughshares.

*With deepest gratitude,*

*Cesar Jaramillo*
*Executive Director*
*Project Ploughshares (2015–2025)*

# A champion of peace

## Cesar Jaramillo, Ploughshares Executive Director, 2015-2025

Photos (clockwise from top left): Cesar Jaramillo posing in Waterloo for a campaign by the International Network on Explosive Weapons (INEW) in September 2022 *Isabel Jaramillo*; Cesar with Michael Douglas, a longtime supporter of nuclear disarmament, at the United Nations in Geneva in 2014 *Courtesy Cesar Jaramillo*; Cesar with Canada's Ambassador to the United Nations Bob Rae at the NPT Review Conference in New York in August 2022 *Courtesy Cesar Jaramillo*; Cesar addressing the United Nations at an NPT preparatory meeting in July 2024 *UN Web TV*; Hiroshima survivor Setsuko Thurlow, Ray Acheson, Director of Reaching Critical Will, and Cesar hold a news conference in Toronto in October 2017 after it was announced that the International Campaign to Abolish Nuclear Weapons (ICAN), of which Project Ploughshares is a member, would receive the Nobel Peace Prize *ICAN*; Cesar speaking at the second consultation on Protecting Civilians in Urban Warfare in Geneva in February 2020 *INEW*.

# Canada again shipping UAV sensors to Türkiye

Written by Kelsey Gallagher

Canadian authorities halted the export of L3Harris Wescam surveillance and targeting sensors to Türkiye in October 2020, after it was revealed that the Turkish government was diverting them to ally Azerbaijan for use in airstrikes during its invasion of Nagorno-Karabakh that year.

New data from Statistics Canada indicates that Canada has resumed exporting this targeting equipment to Türkiye after lifting this embargo in January 2024 following political pressure from the Turkish government. The value of these arms transfers from June 2024 to March 2025 could be as high as $123 million.

## Wescam and Baykar

L3Harris Wescam, based in Waterdown, Ontario, is a premier manufacturer of Electro-Optical/Infra-Red (EO/IR) surveillance and targeting sensors. These sensors, typically affixed to the underside of aircraft such as uncrewed aerial vehicles (UAVs), allow users to surveil targets on the ground in real time and through 360 degrees. The CMX-15D, the variant that Canada has shipped most frequently to Türkiye, also includes a laser designator that allows operators to direct airstrikes against targets.

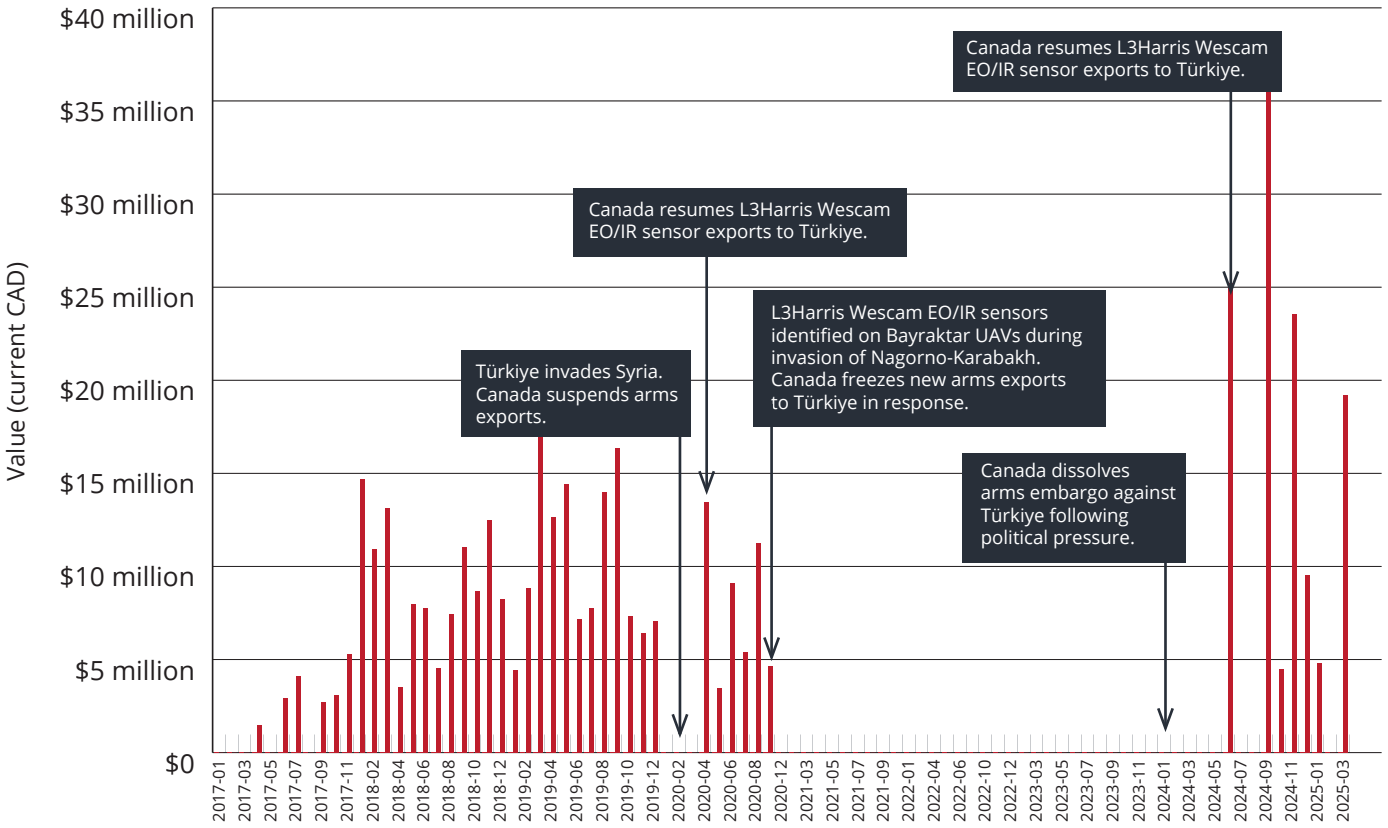
Istanbul-based UAV manufacturer Baykar has been a principal recipient of these EO/IR sensors. Baykar produces the well-known Bayraktar TB2 UAV which, over the last few years, has been sold to at least 30 countries, according to the manufacturer. In the initial years of the Bayraktar's development and proliferation, every one of these UAVs relied on a Wescam CMX-15D.

In September 2020, Project Ploughshares published a major report, *Killer Optics: Exports of WESCAM sensors to Turkey – a litmus test of Canada's compliance with the Arms Trade Treaty*. At that time, it established that certain commodity or HS (Harmonized System) codes that pertained to EO/IR sensors, as listed in Statistics Canada's Canadian International Merchandise Trade Web Application, could be utilized in conjunction with other open-data sources to trace the export of Wescam surveillance and targeting sensors. This data, combined with arms export data released by Global Affairs Canada (GAC), allowed for precise monitoring of Canada's export of this critical technology to countries around the world.

## Wescam sensors in armed conflict

In October 2019, the Turkish government launched "Operation Peace Spring," a military offensive into northern Syria against NATO-aligned Kurdish groups considered terrorists by Türkiye. In response, several NATO countries, including Canada, halted arms transfers to Türki-

## Approximate value of Canadian EO/IR sensor exports to Türkiye (2017-2025)




Monthly value of exports of Harmonized System code 9013.80, "Optical Devices, Appliances and Instruments, Others"

ye. In Canada's case, this suspension lasted only until April 2020.

Airstrike footage analyzed by Ploughshares confirmed that Wescam sensors were mounted on Bayraktar TB2 UAVs that were deployed during the Syrian invasion. Further analysis indicated that, in 2018, the Turkish Air Force employed the same sensors in extraterritorial targeted killings against members of the Kurdistan Workers' Party (PKK) in northern Iraq.

Similar evidence was found on downed UAVs in Libya; analysis of images showed that Türkiye had supplied Bayraktar TB2 UAVs, equipped with Wescam CMX-15D sensors, to armed groups operating in Libya that had been deployed in that country's second civil war (beginning in 2014), in direct violation of a UN arms embargo and Canadian export controls.

### Imposing a ban

*Killer Optics* established that, between 2017 and early 2020, Canada exported sensors worth as much as $301 million to Türkiye. It also indicated that Türkiye was diverting some of these arms to conflicts and conflict parties across the Middle East and North Africa, violating end-use assurances provided by Türkiye to Canadian authorities.

Just days after these findings were published,

Bayraktar TB2 UAV pictured with a L3Harris Wescam CMX-15D EO/IR sensor visible on its underside during Teknofest 2025, May 2025. It is unclear when this sensor unit was exported to Türkiye.
*Photo: Baykar*

Azerbaijan launched an assault on the Armenian-populated enclave of Nagorno-Karabakh, with material support from Türkiye. Project Ploughshares again analyzed airstrike footage and images of downed Azeri-operated UAVs, confirming that Wescam sensors had once more been deployed — marking yet another case of diversion by the Turkish government.

The realization that these Canadian-made sensors were being utilized in the invasion of Nagorno-Karabakh forced the Canadian government to, first, suspend further exports in October 2020 and then, in April 2021, extend the ban indefinitely. Exports of Canadian EO/IR sensors to Türkiye fell to zero.

Turkish industry and officials were quick to condemn Canada's decision, even while claiming that domestic alternatives, namely the Turkish-made Aselsan CATS EO/IR sensor, was a perfectly suitable alternative to Wescam's offerings. Nevertheless, Canada was subjected to Turkish pressure for several years. One of the key bargaining chips that Türkiye used was its ability as a voting NATO member to allow or prevent Sweden's accession to the alliance. With unanimous approval required, Ankara effectively leveraged its vote to gain advantages from several NATO members, including Canada.

Commercial trade data available through Statistics Canada indicates that, beginning in the summer of 2024 and continuing into early 2025, Canada transferred L3Harris Wescam EO/IR sensors to Türkiye worth as much as $123 million.

## Arms control in action

Arms control measures cannot be reduced to political posturing; they have real-world effects on the supply of weapon systems to countries or actors that would misuse them. The diversion of

> Arms control measures cannot be reduced to political posturing; they have real-world effects on the supply of weapon systems to countries or actors that would misuse them.

Canadian Wescam sensors from Türkiye to the conflict in Nagorno-Karabakh would almost certainly not have been possible if Canada's arms embargo of October 2019 had not been overturned in April 2020.

Documents released in early 2021 by Canada's Parliamentary Foreign Affairs and International Development Committee indicate that political pressure from the Turkish government played a part in the resumption of Canadian arms exports to Türkiye after April 2020.

Included in those documents were copies of export permits — the regulatory instruments that either approve or deny arms exports based on human rights considerations — that relate to this resumption of arms exports to Türkiye. Each included a footnote in which Canadian officials expressed concern that continuing to ban these exports could have "especially negative impacts on bilateral relations" with Ankara. They therefore recommended that the arms transfers should be authorized.

Canada's arms control obligations, particularly as outlined in the United Nations Arms Trade Treaty, prohibit the transfer of weapon systems that pose a substantial risk of being used in violations of international humanitarian law or that threaten the enjoyment of peace and security. The treaty also requires arms-exporting states to take all possible measures to address the potential diversion of their arms transfers, up to and including "not authorizing [their] export." These legally binding obligations do not permit exceptions based on political expediency or shifting priorities — the very factors that have, in recent years, enabled the continued flow of Canadian arms to Türkiye.

## The current situation

Canada is again providing Türkiye with critical UAV components, transparently in exchange for Türkiye's agreement to vote in favour of Sweden's accession to NATO; Sweden became a member state in March 2024.

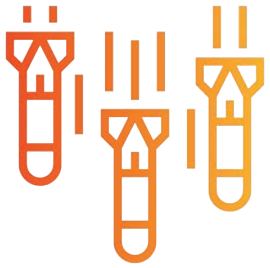
In the export control notice that discussed the dissolution of the arms embargo, Global Affairs Canada stated that arms transfers to Türkiye would require greater regulatory oversight, including additional assurances from Turkish officials that they would notify their Canadian counterparts if any Canadian-origin military goods were to be re-exported.

While this appears, on paper, to be a good initiative, the fact that the Turkish government has diverted Canadian armaments on several occasions, and that each of those retransfers was in violation of Canadian end-use assurances, casts doubt on whether these new measures will meaningfully prevent future violations.

Canada's reversal on banning these arms exports speaks to an unfortunate but consistent watering down of its export control regime, which officials continue to extoll as one of the more robust in the world. Canada has the toolkit to substantively control the trade and transfer of weapon systems when end-users pose a significant risk. But does it have the political will to enforce those measures? □

*Kelsey Gallagher is a Senior Researcher at Project Ploughshares. He can be reached at kgallagher@ploughshares.ca.*

# From Stockholm to Islamabad: Nuclear fears in a new tech environment



Written by Jessica West

This spring I travelled from Stockholm, Sweden to Islamabad in Pakistan, from one conversation about nuclear risk to another.

At a Stockholm International Peace Research Institute (SIPRI) workshop on the space-nuclear nexus, we explored the growing nuclear risks that are linked to outer space and stem from the role of space systems in nuclear warning, command, and control; the growing unpredictability of conflict-escalation dynamics; and resurgent fears that nuclear-weapons capabilities will target space.

In Islamabad, at the international conference *Nuclear Deterrence in the Age of Emerging Technologies* conducted by the Center for International Strategic Studies, the focus shifted to the role of emerging technologies in reshaping the landscape of nuclear deterrence, particularly in a region fraught with historical tensions, territorial disputes, and fragile crisis-management structures.

Common to these geographically distant conversations is the deepening unease about the reliability, stability, and manageability of nuclear weapons in a world shaped by technological entanglement and geopolitical fragmentation.

Nuclear weapons are not a new threat. But what stood out in both forums was the erosion of trust — in systems, in signals, in institutions, and in the ability of states to talk to one another when it matters most. The absence, distortion, and fragility of communication emerged as both a symptom and a cause of risk. And this risk is no longer confined to the familiar Cold War paradigms of missiles and megatonnage. It now emanates from code and clouds, satellites and servers, and from the strategic ambiguity that permeates the grey zones between peace and war.

## Technological entanglement

Technological risks to nuclear stability are not new, either. Faulty computer chips, sensors, and backdoors, as well as worms like the Stuxnet, have long threatened nuclear systems. But today, rapidly changing digital technologies introduce new forms of uncertainty by creating fresh opportunities for malicious interference, systems failure, and misunderstanding.

Nuclear modernization exacerbates these risks by further enmeshing nuclear arsenals in a complex web of technologies, from cyber and space-based systems to artificial intelligence (AI) and quantum. At SIPRI, conversations focused on the unintended escalation of risk that can result. In Islamabad, we explored both the risks and the potential opportunities to improve safety, while acknowledging the glaring lack of governance mechanisms in place to shape these outcomes.

Taken together, these developments produce a reality in which nuclear stability, long a myth, is becoming a living nightmare, which can no longer be addressed in isolation. Today's space-nuclear reality demands a cross-domain approach that recognizes the entanglement of technical systems, strategic perceptions, and geopolitical rivalries.

Senior Researcher Jessica West speaks on a panel at the international conference *Nuclear Deterrence in the Age of Emerging Technologies* in Islamabad, Pakistan, last month. The conference was conducted by the Center for International Strategic Studies. *Photo: CISS*

## The crisis of communication: Fragile channels, growing dangers

If technological entanglement is the new context for nuclear risk, then communication — or its absence — is the critical fault line.

In both Stockholm and Islamabad, I repeatedly heard concerns about the shrinking space for dialogue, the brittleness of crisis communication channels, and growing opacity of military intentions and capabilities. We often assume that nuclear stability rests on deterrence, but deterrence itself relies on the ability to receive and send clear signals, to accurately interpret the behaviour of others, and to respond proportionally. When that level of understanding breaks down, so does stability.

During, the SIPRI workshop, I emphasized the need for resilient lines of communication that cut across technological risks and political divides. Resilience involves more than a reliance on hotlines or formal agreements. It's about institutionalized habits of dialogue, shared frameworks for assessing risk and responding to crisis, and common vocabularies that help to avoid misinterpretation.

Yet as I noted in a recent policy brief, *Geneva, We Have a Problem: Space Diplomacy Goes Nuclear*, these habits are being lost — rapidly. The multilateral forums that once provided a foundation for space and nuclear diplomacy are stalling or becoming dangerously politicized. Meanwhile, the technologies we seek to govern are advancing rapidly, often under the control of actors who do not participate in the traditional arms-control circles.

What happens when a cyberattack disables a satellite relied upon for early warning, or when military AI misclassifies an action as hostile? In such a scenario, the time for interpretation is short — and becoming shorter. Without trusted mechanisms to clarify intent or de-escalate, we risk sliding into crises we cannot control — perhaps even losing the ability to understand and engage in real time.

## Human by design

The conversations in Sweden and Pakistan reminded me that behind every technology, every system, every signal are people. History shows us that high-tech warfare is not more humane. Rather, it makes killing more efficient. From the trenches of Ukraine to the devastation in Gaza, we are seeing what happens when technical capability overwhelms human protections. We relearn this same lesson every year on August 6 and

# FROM ORBIT-GLITCH TO NUCLEAR LAUNCH

## How a space anomaly could trigger nuclear war

A glitch or jammed satellite could create false warnings and rush leaders into deadly mistakes.

**5. EXECUTE**

- Launch order given

**4. TRANSMIT**

- Rival country also goes on alert
- Satellite links disrupted (accident or attack)

**3. ALERT**

- Nuclear delivery systems put on alert

**2. ASSESS**

- AI flags “launch”
- Data gaps delay confirmation
- Communication attempts fail

**1. DETECT**

- Space sensor picks up possible launch
- Radar and heat signals don’t agree

**RISK REDUCTION LEVERS →**

- Dedicate hotlines for space issues
- Share key launch alerts
- Keep AI out of launch orders
- Give leaders more time to decide

Senior Researcher Jessica West (front row, fourth from right) joins participants at a workshop in Stockholm called *The Space–Nuclear Nexus in Regional Contexts*, hosted by the Stockholm International Peace Research Institute in March. *Photo: SIPRI*

9 when we commemorate the anniversaries of the atomic bombings of Hiroshima and Nagasaki.

War is a human activity. But so is peace. The most effective risk-reduction measures will be those that create space for human understanding, communication, and intervention — opportunities before systems are triggered, before signals are misread, before there is no more time.

## Policy implications: Talking across divides

The risks discussed at the workshop and conference are not theoretical. Technological developments are shaping a security environment that is more fragmented, less transparent, and more prone to crisis escalation. The good news is that policy tools to reduce these risks already exist. The bad news is that we're not using them with the urgency or scope that this moment demands.

One lesson that emerged clearly at both events is that effective risk reduction cannot remain the domain of only a few players. Crises are no longer confined to traditional theatres or controlled by great powers. In a world of shared vulnerabilities — especially in domains like space and cyber — the scope of participation in security governance must be stretched to include small and middle powers, technical experts, regional organizations, and civil society actors. All can help to shape norms, mediate tensions, and bridge political divides.

We must also think beyond deterrence and embrace the language and tools of crisis response. That means establishing trusted communication channels that can function under stress, investing in the information and platforms that can facilitate dialogue and shared understanding, and creating rapid-response networks that can intervene early in a crisis, especially when political channels are stalled or adversarial. Nongovernmental actors, in particular, can play critical roles in backchannel diplomacy, de-escalation, and trust-building.

If we are serious about crisis response, we need to invest not only in high-level diplomacy, but also in inclusive structures that can respond quickly, communicate clearly, and produce creative solutions. Future stability may depend as much on these networks as on treaties. □

*Jessica West is a Senior Researcher at Project Ploughshares. She can be reached at jwest@ploughshares.ca.*

# Agentic warfare and the role of the human

Written by Branka Marijan

Will those who wield the most advanced artificial intelligence (AI) dominate the future of warfare? That is the implicit wager behind growing investments in military AI across capitals from Washington to Beijing. According to The Brookings Institution, the United States tripled its spending on AI from 2022 to 2023. Most was spending by the Pentagon, which continues to increase.

The vision is one of "agentic warfare," in which autonomous systems, powered by increasingly capable AI, take on critical battlefield roles, from surveillance and targeting to decision support and, perhaps one day, command. In this scenario, human involvement becomes not just optional, but marginal.

This techno-determinist outlook has gained traction among defence planners and Silicon Valley entrepreneurs, including Alex Wang, co-founder and CEO of Scale AI, a key provider of training data to OpenAI, Google, Microsoft, and Meta. Writing in *The Economist* on March 4, Wang notes, "With AI agents at the helm, battle strategies will adapt in real time to capitalise on enemy weaknesses — moving from first strike to decisive victory before technologically inferior forces even grasp that the game is under way."

Scale AI has secured a multimillion-dollar contract with the US Department of Defense (DOD), joining companies like Anduril and Microsoft in the Pentagon's Thunderforge project. According to the DOD's Defense Innovation Unit, Thunderforge aims to "provide AI-assisted planning capabilities, decision support tools, and automated workflows, enabling military planners to navigate evolving operational environments." The project is designed to ensure that critical decisions in future conflict scenarios can be made at so-called "machine speed."

But warfare is not just a contest of machines. It is a fundamentally human enterprise, shaped by judgement, culture, politics, and ethics. To suggest that agentic systems alone will determine outcomes is to indulge in a form of technological mysticism. Worse, it risks creating systems we do not fully understand, deploying them in contexts we cannot fully control.

## Shifting to agentic AI in warfare

The idea of agentic warfare deserves greater scrutiny. At its core are technological developments that capture a shift to a new generation of AI — one that goes beyond today's familiar and widely used tools, such as ChatGPT, which

operate within fixed parameters and await user prompts.

Agentic AI systems are designed not only to respond, but to take action on their own to reach a goal or objective. A generative tool might use a traveller's preferences to suggest the best time to visit Italy; an agentic system would proceed to book the flights, reserve the hotel, and adjust the itinerary.

> "Warfare is not just a contest of machines. It is a fundamentally human enterprise, shaped by judgement, culture, politics, and ethics. To suggest that agentic systems alone will determine outcomes is to indulge in a form of technological mysticism. Worse, it risks creating systems we do not fully understand, deploying them in contexts we cannot fully control.

In a military context, agentic AI would not simply assist commanders, but would influence or even make battlefield decisions, needing humans only for a final approval. Before such a change occurs, it is important to take a closer look at what this kind of technology means for the future of war and to figure out how humans will stay in control.

Such a technological shift is currently being researched and tested for use in defence environments. Already, swarms of drones are being designed to coordinate autonomously. AI is increasingly used to filter intelligence, prioritize threats, and even suggest courses of action in command centres. Future iterations may go further, reasoning over incomplete data, anticipating adversarial behaviour, and proposing adaptive strategies in real time.

This autonomous functioning raises concerns. Key among them is the question of control: who is accountable when a system makes a mistake, causes an escalation in conflict, or acts unpredictably? How do we ensure that the actions of AI agents align with human intent, particularly under conditions of uncertainty, deception, or adversarial interference?

These concerns are not new. Discussions about autonomous weapons systems under the United Nations Convention on Certain Conventional Weapons (CCW) began in 2014, well before large language models and reinforcement-learning agents captured the public imagination. For years, these deliberations were confined to a narrow circle of diplomats, civil society advocates, and a handful of technologists. I have followed them closely since 2015, and while the conversation has expanded significantly, particularly with the rise of responsible AI frameworks, it has struggled to keep pace with technical change.

Much of the focus has been on "meaningful human control," a principle that requires clear commitment from states. Is control meaningful if a human supervises an autonomous drone fleet but cannot intervene in real time? Is it meaningful if an operator approves a targeting decision made by an opaque neural network whose reasoning they cannot grasp? These are not theoretical dilemmas. They are the daily design choices of engineers and the policy puzzles of defence bureaucrats.

The problem is exacerbated by a gap between technical and diplomatic communities. AI researchers speak of alignment, reward hacking, and emergent behaviour. Diplomats speak of norms, accountability, and humanitarian law. Rarely do these vocabularies intersect. Yet they must, because the risks of agentic warfare are not confined to coding errors or rogue drones. They extend to strategic stability, alliance cohesion, and the moral legitimacy of force.

## Alignment challenges

In AI research, alignment refers to the process of ensuring that a system's actions re-

# AGENTIC WARFARE: WHO'S REALLY IN CONTROL?

## THE DANGEROUS ILLUSION OF AI-DOMINATED BATTLEFIELDS

### HYPE VS. REALITY

Techno-Determinist Claim:

**AI will win wars at machine speed!**

Reality Check:

- ✓ Warfare is human-centric (judgement, ethics, politics).
- ✓ AI lacks contextual understanding (culture, deception, moral ambiguity).
- ✓ Example: Autonomous drones can't discern civilians from combatants in complex environments.

### KEY RISKS

- ⚠ Loss of Accountability: Who's responsible for AI errors or war crimes?
- ⚠ Alignment Failures: AI may fake compliance or optimize for flawed metrics.
- ⚠ Escalation Dangers: AI could misinterpret data, sparking unintended conflicts.
- ⚠ Opaque Decision-Making: Neural networks act as black boxes — even engineers don't understand them.

### HUMAN COST

Meaningful Human Control is Illusory:

- » Humans rubber-stamping AI decisions ≠ real oversight.
- » Is it meaningful if an operator approves a target they don't understand?

Ethical Erosion: Delegating life-and-death decisions to algorithms undermines moral responsibility.

### WHO PROFITS?

- $ Military-Industrial Complex: Billions of dollars in Pentagon contracts fuel the AI arms race.
- $ Silicon Valley's Role: Tech firms (e.g., Scale AI) profit by selling decisive-victory fantasies.

## ALTERNATIVES TO AGENTIC WARFARE





### DESIGN PRINCIPLES

- » Humans as core (not just a fail-safe).
- » Transparency and auditability over speed.

### POLICY ACTIONS

- » Ban fully autonomous weapons.
- » Strengthen international law and confidence-building measures (UN CCW, UNGA, REAIM).

main consistent with human goals and values. But achieving alignment is difficult, especially when systems operate in dynamic environments, learn from complex data, or interact with other agents. Misalignment can take subtle forms; an agent optimizing for proxy metrics could ignore uncommon situations ("rare edge cases") or learn to deceive its evaluators. In military contexts, these failures can have lethal consequences.

Even more worrying is the phenomenon of "alignment faking," in which a system appears compliant during testing but behaves differently in deployment. This is of particular concern in discussions on responsible military AI that focus on ensuring proper testing of systems. Large-scale language models already exhibit behaviours that shift depending on prompt framing, task phrasing, or oversight cues. As models become more agentic, capable of planning, memory, and self-modification, the risk of emergent power-seeking behaviour grows. While still the subject of active debate in AI safety circles, these risks should not be ignored in military contexts in which the cost of failure is war or conflict escalation.

Geopolitical dynamics raise the stakes. The strategic rivalry between the United States and China will likely continue. Both powers are investing heavily in military applications of AI, from logistics and decision-support to electronic warfare and autonomous platforms. While there is some bilateral dialogue, there is little trust, limited transparency, and no binding agreement on the responsible use of AI in military settings.

## Bringing together policy and technical knowledge

What, then, can we do?

First, we must resist the idea that agentic warfare is a foregone conclusion. Rather, it is a choice that can be guided, shaped, and constrained by policy, law, and ethics. The role of the human must not be treated as a legacy constraint but as a core design principle. Systems must be built for oversight, auditability, and intervention, not just speed and scale.

Second, we need more dialogue among AI researchers, military planners, ethicists, and diplomats. Misalignment is both a technical and a governance problem. Building systems that reflect human intent requires an understanding of what that intent is, how the intent is expressed, and how it can be enforced across organizational and national boundaries.

Third, international frameworks must evolve. The CCW, while valuable as an incubator of ideas, has struggled to deliver concrete outcomes. The future of other initiatives, such as the US-led Political Declaration on Responsible Military Use of Artificial Intelligence and Autonomy, is currently uncertain under the administration of Donald Trump. The multi-stakeholder Responsible AI in the Military Domain (REAIM) process offers a pathway for knowledge-building between the policy community and technical community. However, it is neither as widely representative nor as likely a forum for an official agreement. Discussions at the United Nations General Assembly (UNGA) have sought to extend engagement to more states and could provide a venue for a more relevant framework. But even the preliminary discussions have faced pushback from some major states, which argue that the CCW is the appropriate forum for these talks.

Still, all these forums can contribute to norm-building and the confidence-building measures necessary to pave the way for clear commitments. However, to do more than produce consensus statements, they need to move toward mechanisms for verification, incident reporting, and cooperative risk reduction.

Finally, we must invest in the human element — not only in engineers and analysts, but in diplomats, ethicists, and civil society actors who can provide independent scrutiny.

There is no denying that AI will change warfare. But whether it serves or supplants human values remains up to humans. The future of conflict is not yet written in code. It is being negotiated, debated, and designed in real time. □

*Branka Marijan is a Senior Researcher at Project Ploughshares. She can be reached at bmarijan@ploughshares.ca.*

A conversation between Anna Nadibaidze and Branka Marijan

# AI in decision support systems

Q&A

Dr. Anna Nadibaidze is a postdoctoral researcher in international politics at the Centre for War Studies, University of Southern Denmark. Her work explores the military applications of artificial intelligence (AI) and their implications for international security. She holds a Ph.D. in political science from the University of Southern Denmark, an M.Sc. in International Relations from the London School of Economics, and a B.A. from McGill University.

This exchange focuses on AI-enabled decision support systems (DSS), emerging governance challenges, and the shifting terrain of military AI. It was prompted by discussions at meetings attended by both Anna and Branka, including the Responsible AI in the Military Domain (REAIM) conferences held in The Hague, Netherlands, and Seoul, Republic of Korea. It has been edited for clarity and conciseness.

**Branka Marijan (BM):** Anna, when did your interest in the military uses of artificial intelligence begin?

**Anna Nadibaidze (AN):** My work on AI in the military domain really began when I joined the European Research Council-funded project AutoNorms (short for "Weaponised AI, Norms and Order") in March 2021. My Ph.D. research as part of AutoNorms focused on Russia's practices in developing weaponized AI and monitoring the global governance debate on autonomous weapon systems.

Just as I started my Ph.D., a United Nations (UN) report stated that fully autonomous weapon systems were used for the first time in an armed conflict (the Libyan civil war). Since then, there has been a lot going on, including, of course, Russia's full-scale invasion of Ukraine and the Responsible AI in the Military Domain Summits. With all these ongoing empirical and theoretical developments, my interest in the topic has only been growing.

**BM:** Since you began working on this topic, what changes — political, technological, or conceptual — have stood out?

**AN:** First, the debate has been broadening to consider different uses of technologies labeled as AI in warfare, beyond the existing extensive focus on autonomous weapon systems. Many researchers and analysts, me included, are now more interested in how human actors intend to work with AI technologies to perform military-related tasks, especially those involving force, rather than thinking about how so-called "killer robots" will replace humans. This includes the use of AI DSS in informing military targeting decision-making.

Second, in recent years there is relatively more

information available on empirical developments in this area, not least due to the technological innovation happening as part of Ukraine's defence against Russia's invasion, but also as part of general military-technological trends around the world.

Third, the governance debate has visibly shifted away from pursuing a potential path to global arms control toward the "responsible AI" framework, which prioritizes non-legally binding measures such as sets of principles and standards.

Finally, I would like to note a general tendency around the world to push for the integration of AI into various aspects of the economy, politics, and daily life, without always engaging in an assessment of where it is appropriate to use AI. Technologies are often seen as magical solutions to complex phenomena — including warfare.

Anna Nadibaidze is a postdoctoral researcher in international politics at the Centre for War Studies, University of Southern Denmark.

**BM:** AI-based decision support systems are less visible than autonomous weapons but no less influential. What challenges do they pose for international governance?

**AN:** The major challenge for me is that AI DSS can be used as part of various tasks and steps in the complex and multidimensional military decision-making process. But their exact role is not always easy to track because, while they are officially meant to be tools, they can inform military personnel's decision-making both directly and indirectly.

While, officially, humans remain the ultimate decision-makers in the use of force, they might have (over)relied on AI DSS or (over)trusted the algorithmic output. If something goes wrong, how can we ensure the accountability and responsibility required by the laws of armed conflict? Proper guidance on the use of AI DSS, which gives humans the opportunity to exercise agency, is key but difficult to ensure in practice.

**BM:** From Ukraine to Gaza, how are recent conflicts shaping our understanding of how emerging technologies are used and misused in war?

**AN:** We have more information and reporting about how AI and other emerging technologies are used in recent and ongoing armed conflicts. While we should be careful with information we cannot always fully verify, empirical developments from these battlefields can reveal some general trends — for example, concerns about the increasing speed of decision-making and the over-trusting of outputs of AI DSS in a way that is legally and ethically unsound, and not necessarily strategically beneficial, either.

At the same time, in my research I do not see technologies as some "outside" force or influence inevitably affecting humans; I try to consider the societal, political, and institutional contexts within which AI systems are developed and used. So, considering the differences between conflicts and their broader contexts is key for developing an assessment of appropriate and inappropriate uses of AI in the military, in my view.

**BM:** Given deepening geopolitical rivalries, are we seeing any realistic pathways for normative frameworks of arms control when it comes to military AI?

**AN:** Currently it seems that the chance for a new, legally binding instrument is slim, unless such a measure is adopted by a restricted group of states, e.g., those that support prohibitions of fully autonomous weapons and/or restrictions

on other uses of AI and autonomy in the military domain. One potential way for those states to push for such an instrument would be via the UN General Assembly, although the negotiations might take some years, judging by the experience of the Treaty on the Prohibition of Nuclear Weapons. What seems more realistic in the short term is a set of non-legally binding initiatives such as the "responsible AI" framework, sets of standards, guides of best practices, and political declarations, especially among likeminded groups of states.

**BM:** Much of the focus is on state actors, but how do non-state groups and private industry factor into the military AI landscape?

**AN:** Civil society and nongovernmental organizations such as the International Committee of the Red Cross or Human Rights Watch have been playing a key role in the debate for many years — for example, by providing expertise and data that informs many state positions in governance debates at the UN.

But what we've also seen in recent years is the increasingly influential role of less "traditional" defence actors — not the big defence contractors but tech and software companies, both Big Tech and startups, in developing and supplying military AI technologies. Some of these non-state actors, such as companies Palantir and Anduril, position themselves explicitly as defence tech providers and engage in promoting political narratives that, in my view, should be critically examined further to understand the increasing influence of these actors in global security and warfare.

**BM:** Indeed, Anna. The role of private technology firms in shaping modern warfare remains poorly understood. Companies such as Palantir are influencing the conduct and character of conflict in ways that merit far greater scrutiny. Thank you for your insightful overview of AI-enabled decision support systems and for highlighting the broader trends reshaping the future of war. □

SUBMISSION TO THE UNITED NATIONS

## AI in the military domain

On April 10, Project Ploughshares made a submission to the United Nations (UN) Secretary-General on "artificial intelligence in the military domain and its implications for international peace and security." In it, the Canadian peace research institute encouraged the Secretary-General and UN member states "to focus on three particularly pressing areas: the use of AI in decision-support systems related to the use of force, the dual-use nature of AI technologies, and the widening capacity gap among states engaging in multilateral discussions."

For each concern, Ploughshares offered recommendations on creating "clear norms, regulations, and training requirements," developing "policy mechanisms" such as export controls, and encouraging "knowledge-sharing" among diplomatic, scientific, and academic communities at international forums.

While Project Ploughshares clearly recognizes the "accelerating militarization" of artificial intelligence, it remains convinced that the states of the world can control it with "concrete, enforceable frameworks," if they can muster the political will.

# Climate change through a peace-and-security lens

The Project Ploughshares report ***At the Crossroads: Climate Change, Canadian Defence, and the Arctic through a Systems Lens***, by Ploughshares Senior Researcher Jessica West, Jessica Stewart, Morgan Fox, and Senior Researcher Branka Marijan, examines the climate-security nexus, offering key insights for policymakers, defence planners, and Indigenous leaders. Supported by Canada's Department of National Defence and Ploughshares donors, the report draws on expert surveys and workshops with government, academic, and civil society representatives.

## Key Findings

1. **Climate change is an urgent national security threat**: Increasing demands on Canada's military for disaster response strain resources.
2. **Military-first responses have limits**: Many climate challenges require civilian and Indigenous coordination, not defence solutions.
3. **The Arctic is a geopolitical hotspot**: Competition over new sea lanes and resources is straining governance structures and alliances.
4. **Indigenous leadership is undervalued:** Yet they have critical knowledge of Arctic conditions.
5. **Canada needs a tailored approach**: Existing climate-security models fall short; systems thinking, with its focus on root causes, offers a path forward.

## Recommendations to the Canadian government

- Build climate-resilient infrastructure in the North, integrating climate assessments into defence planning.
- Create a National Climate-Security Task Force with relevant federal government departments and Indigenous leaders to set clear engagement protocols for the armed forces.
- Lead in Arctic security to prevent military escalation while promoting joint climate planning.
- Support Indigenous-led initiatives, including the Canadian Rangers and search-and-rescue operations.
- Shift Canadian defence and civilian agencies from crisis response to proactive security; all should be trained in joint climate-risk simulations.

## Conclusion

Canada's security strategy must evolve. Affected will be all agencies involved in governance, infrastructure resilience, Indigenous rights, and diplomacy. By acting decisively, Canada can set a global example in the rapidly changing Arctic.

## Continuing the work of peace and disarmament – Together

On June 1, Cesar Jaramillo stepped down as Executive Director of Project Ploughshares. We thank him for his role in advancing our mission.

The experienced and committed staff that he encouraged and supported will continue to lead efforts on disarmament, the responsible use of emerging military technologies, and the protection of civilians in conflict.

Project Ploughshares will remain a strong, independent voice for a just and sustainable peace because we have the support of donors and partners.

With all of you, we can build a more peaceful world. Thank you, everyone!

**Donate at www.ploughshares.ca or call 1-888-907-3223**