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"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

Winter 2019

Cover image: *Smithsonian National Air and Space Museum*

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From the Director's Desk

A challenging nuclear disarmament landscape for 2020

Written by Cesar Jaramillo

The next year will be critical in the attempt to achieve a world free of nuclear weapons—and the outlook is hardly promising. The global nuclear disarmament and nonproliferation regime, already at the breaking point, will certainly face various overlapping challenges.

Here are some focal points that Project Ploughshares will be following closely:

NPT Review Conference

The last Review Conference of the Nuclear Non-Proliferation Treaty (NPT), held in 2015, failed to agree on a consensus outcome document, typically seen as a minimum measure of success. Largely the result of disagreements over stalled progress on the pursuit of a zone free of nuclear weapons and other weapons of mass destruction (WMD) in the Middle East, the inability to produce a consensus document was a broader sign of the profound inadequacies of the global nuclear disarmament and nonproliferation regime.

Governmental and nongovernmental stakeholders concede that the NPT, long considered the bedrock of this regime, has been instrumental in limiting the proliferation of nuclear weapons and regulating the peaceful uses of nuclear energy. But because the treaty has not made headway on nuclear disarmament, some now question the efficacy of the treaty. Indeed, some see the treaty itself as a stumbling block in achieving complete nuclear disarmament.

The 2020 Review Conference may prove to be the most challenging ever, nearly half a century after the treaty's entry into force. At the heart of widespread discontent about the NPT is this failure to deliver nuclear disarmament.

WMD-free Zone in the Middle East

At issue are the proposed process and timeline for convening a conference to advance the goal of a WMD-free zone in the Middle East. The draft outcome document, never approved at the 2015 RevCon, called for UN Secretary-General Ban Ki-moon to convene a Mideast conference on this issue by March 2016. This date already represented a lengthy delay from 2012, the date set out in the outcome document that was unanimously agreed to at the 2010 NPT RevCon.

Even earlier, at the 1995 RevCon, a key resolution was negotiated that called for "practical steps" toward a WMD-free zone in the Middle East. At the time, this resolution was widely considered critical for the indefinite extension of the NPT.

Under the 2015 plan, no state would be in a position to block the conference. While all states in the region would be urged to participate, the conference would proceed even if one or more states decided not to attend. Israel, however, has insisted on strict consensus as a prerequisite for moving forward. This approach effectively gives it a veto to block the process. And why is Israel so keen on preventing the conference? Perhaps because, at such a gathering, it would be compelled to come clean about its never-confirmed nuclear-weapons program.

> A clear majority in the international community is determined to continue advancing the TPNW [Treaty on the Prohibition of Nuclear Weapons] effort, with its entry into force and universalization top priorities.

It is safe to assume that this issue will come up at the 2020 Review Conference. As no side appears to have altered its views, it is not easy to see where there is room for compromise and agreement.

Entry into force of the Treaty on the Prohibition of Nuclear Weapons (TPNW)

The adoption o the TPNW in July 2017 reflected a recognition by some states and civil-society organizations that an explicit ban on nuclear weapons constitutes an integral part of the normative framework necessary to achieve and maintain nuclear abolition.

It also reinforced the new political reality. Founded on the humanitarian imperative for nuclear abolition, it confirmed that the NPT, as structured and implemented, did not constitute a credible path to abolition.

On the other hand, nuclear-armed states and their allies—including the United States and most other NATO members, such as Germany and Canada—have actively opposed this effort and have openly tried to undermine its rationale. But a clear majority in the international community is determined to continue advancing the TPNW effort, with its entry into force and universalization top priorities.

According to the treaty's provisions, the TPNW will officially enter into force once it is ratified by 50 states. By December 2019, 80 states had signed on to the treaty and 34 states had ratified it. At the present rate, it seems likely that the treaty will enter into force in 2020. Such an achievement will bring further attention to the deep global divisions and frustration that prompted the negotiation of the TPNW in the first place.

The disruptive power of the Trump administration

The impact of the Trump presidency on nuclear disarmament efforts merits dedicated scrutiny and analysis. Three recent key developments acted to further complicate an already complex landscape.

KEY DEVELOPMENT #1 Early in 2018, the U.S. Nuclear Posture Review, the first by the Trump administration, was released. This document, widely seen as one of the key blueprints of U.S. nuclear policy, encapsulating how Americans understand the role of nuclear weapons, is deeply troubling. It explicitly expands the role of nuclear weapons in U.S. policy by expanding the number of scenarios in which nuclear weapons can be utilized, including as a response to such nonnuclear threats as cyber.

The review does not mention the Fissile Material Cut-off Treaty. It specifically states that the

United States will not ratify the Comprehensive Test Ban Treaty.

The Nuclear Posture Review reads like a guide on how NOT to pursue nuclear disarmament. A chilling message from a nuclear superpower.

KEY DEVELOPMENT #2 In May 2018, President Trump himself announced the withdrawal of the United States from the Joint Comprehensive Plan of Action (JCPOA), also known as the Iran nuclear deal. This decision was widely criticized by technical and policy experts, mainly because the United States could not point to a single instance when Iran did not comply with the terms of the deal.

The deal, negotiated in a difficult political environment, in the face of stringent opposition, was widely acknowledged to be a solid deal that worked—and the most that could be achieved at the time. The alternative could easily have been military confrontation in a very volatile part of the world.

That volatility is once again on the rise. In May of this year, Iran announced, in contravention of a United Nations Security Council Resolution and the JCPOA, that it might stop complying with some of the terms of the JCPOA because the remaining parties to the plan had not provided assurances that Iran would be allowed to conduct legitimate commerce without fear of reprisal from U.S. sanctions.

KEY DEVELOPMENT #3 This past February, the Trump administration announced its intention to withdraw from the Intermediate-Range Nuclear Forces (INF) Treaty signed in 1987 by the United States and the Soviet Union. This announcement rattled both American and Russian disarmament communities. There are currently no efforts to renew the new START treaty between the United States and Russia. With the collapse of the INF, there may soon be no major strategic arms-control agreements involving nuclear forces between the two nuclear superpowers. □

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Putting controls on remote warfare to protect civilian populations

Written by Branka Marijan

Earlier this year, Amnesty International (AI) released a report, *The Hidden US War in Somalia: Civilian Casualties from Air Strikes in Lower Shabelle*. According to this report, which explored five incidents, at least 14 civilians had been killed by airstrikes from both manned aircraft and unmanned aerial vehicles (UAVs or drones).

The U.S. Pentagon initially responded that no civilians had died from U.S. strikes in Somalia in the previous two years. Then, in early April, the United States Africa Command (AFRICOM) admitted that two civilians had died in operations investigated by AI.

We don't know how many casualties actually resulted from the more than 76 AFRICOM strikes. While AI and the British "collaborative, not-for-profit transparency project" Airwars, among others, continue to investigate, all that is clear is that civilian casualties are not being accurately monitored or disclosed. No responsibility is being assigned or assumed.

Remote strategies meet new tech

The increasing use of long-range strikes is one indicator of so-called remote warfare. Oxford Research Group, with its Remote Warfare Programme, defines this style of warfighting for the British context: "This involves supporting local groups – who are now doing the bulk of the frontline fighting against terrorist groups – in an attempt to counter threats without putting large numbers of British boots on the ground."

In recent years, other countries have also begun to turn to remote warfare. Canada and

many other allies of the United Kingdom and the United States are becoming more involved in special operations and remote engagements.

A large part of the appeal of remote operations relates to the increasing risk aversion of Western militaries. In addition, such operations are not yet subjected to the same level of public oversight and scrutiny as more traditional troop deployments during a time of war.

For example, in March 2017, U.S. President Donald Trump signed a directive that deemed part of Somalia an "area of active hostilities"; as a result, interagency vetting of a target is no longer required and the target does not have to be deemed a threat to the United States. As AFRICOM Commander Gen. Thomas D. Waldhauser stated before Congress, "I wouldn't characterize that we're at war. It's specifically designed for us not to own that."

Simultaneously, more national militaries are acquiring armed drones. To date, according to Dan Gettinger in *The Drone Databook*, 30 countries have high-altitude long-endurance drones that can carry a variety of weapons, and 10 have used armed drones in combat. These and other long-range weapons are increasingly used in areas that are not traditional battlefields.

The Royal Canadian Air Force hopes to acquire armed drones within six years. Canada's Department of National Defence has moved ahead with discussions to acquire the Heron and MQ-9 drones, with the awarding of contracts likely in 2022-2023.

Advances in artificial intelligence and robotics are also being looked at by most advanced militaries to further reduce troop casualties and allow for greater reach in remote operations. New investments in and testing of swarm technologies, which are essentially interconnected systems, were described in a major BBC News story by

In stills taken from a public video, a U.S. Predator Drone targets what appear to be insurgents in Iraq. *Youtube.com*

Thomas McMullan in March of this year. Such developments raise concerns among analysts that autonomous systems could soon operate with diminished human control.

Blurring the lines between civilians and combatants

All these developments are particularly concerning when examined in conjunction with current practices that blur the lines between civilians and combatants. About U.S. involvement in Somalia, the AI report notes, "According to [U.S.] General Bolduc, all military-aged males observed with known Al-Shabaab members, inside specific areas—areas in which the US military has deemed the population to be supporting or sympathetic to Al-Shabaab—are now considered legitimate military targets." The expansion of the definition of a legitimate military target reveals one way in which information about civilian casualties can be manipulated and concealed.

> In [International Humanitarian Law], a civilian is anyone who is not a combatant. Civilian status is not determined by gender, age, or race. But these factors are, increasingly, becoming central to American war fighting.

Moreover, as Sarah Shoker, a post-doctoral researcher at the University of Waterloo, points out, this designation of military-aged males undermines the protections guaranteed by international humanitarian law (IHL). In a 2017 blog by Christa Blackmon on the Lawyers, Guns & Money website, Shoker states, "In IHL, a civilian is anyone who is not a combatant. Civilian status is not determined by gender, age, or race. But these factors are, increasingly, becoming central to American war fighting."

In her research, Shoker demonstrates that even broader stereotypes about gender and religion are shaping who is put in the "collateral damage" column and who is counted as a combatant. One result: young boys are deemed legitimate targets.

Concealing the human cost of war

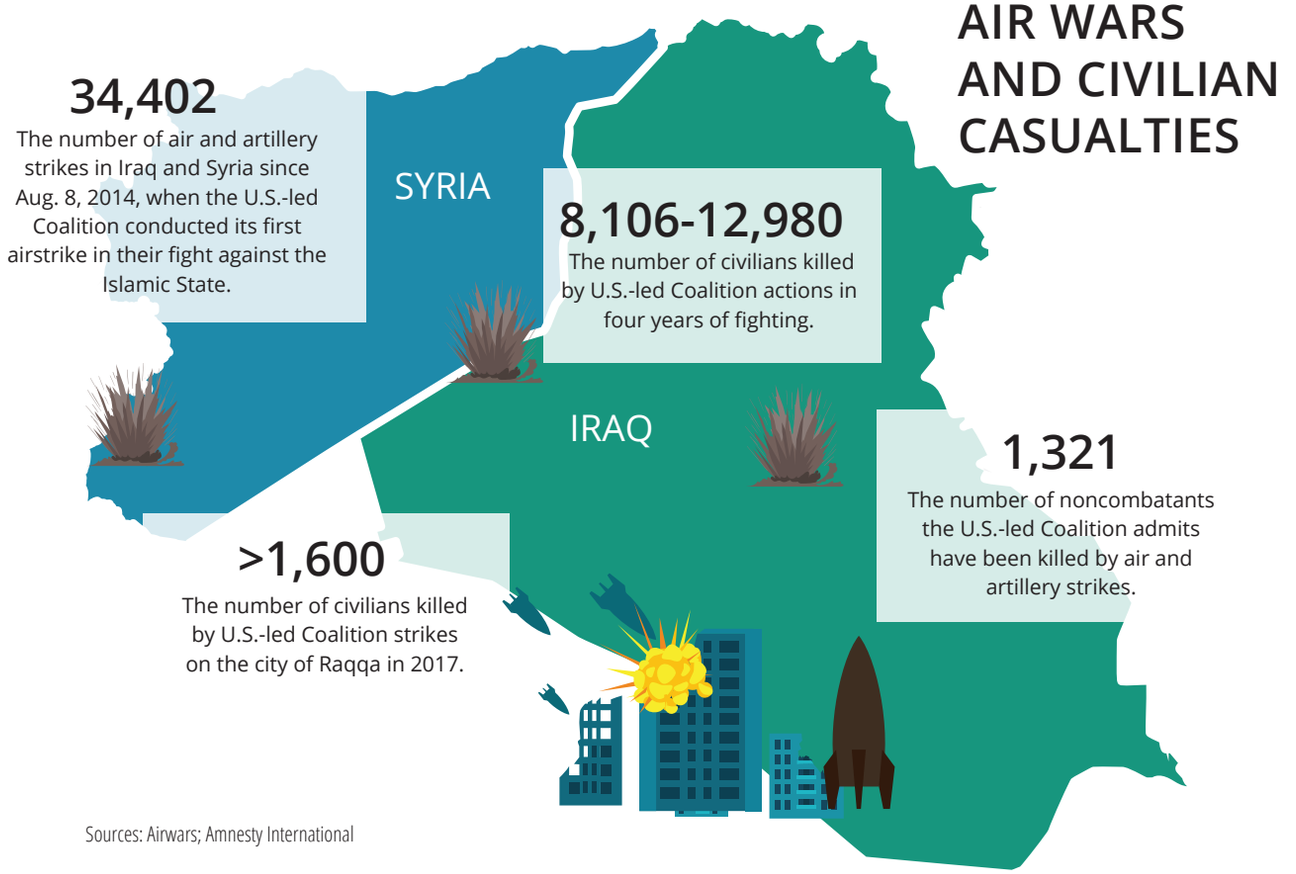
Remote warfare operations conceal the real human costs. They decrease the likelihood of casualties among the military personnel of the striking side, encouraging citizens of that country or countries to believe, falsely, that such military actions have a limited impact. Preserving ignorance becomes important to the striking force.

As professors Robert Johns and Graeme A.M. Davies explain in "Civilian Casualties and Public Support for Military Action: Experimental Evidence," in the *Journal of Conflict Resolution* (2017), the public in the United States and the United Kingdom are averse to the idea that their militaries cause foreign civilian casualties. Support for military operations declines significantly when the number of civilian casualties, either projected or actual, is high. Thus, an account to a home audience could downplay or omit any discussion of foreign civilian casualties.

These findings suggest that transparency about casualties could impact public opinion, which in turn could constrain military force.

The problem: how to get national militaries to release accurate and complete information. The solution might mean bypassing the military altogether. Local populations possess valuable information about the deaths and injuries of their families and friends.

Still, military forces retain a critical role in ensuring that civilians are protected. Some militaries, including those of the United States and Canada, already have strategies that seek to limit civilian casualties. But more needs to be done to ensure that these strategies reflect realities on the



ground and that norms of international humanitarian law are not being eroded.

Democratic societies expect and require transparency and civilian oversight of military engagements. Civil-society groups, such as Airwars and Every Casualty, have been crucial in monitoring civilian casualties and bringing attention to the lack of reporting on such consequences of armed conflict. With others, they are demanding that countries review their monitoring and reporting of civilian harm.

Ending the "age of impunity"

Civilians now make up most war casualties, with no one held liable. Without a transparent accounting of such losses, we could stay mired in what David Miliband, former UK foreign secretary and president of the International Rescue Committee, has called the "age of impunity." Miliband writes of a new normal in conflict zones in which "civilians [are] fair game, humanitarians unfortunate collateral, investigations and accountability an optional extra."

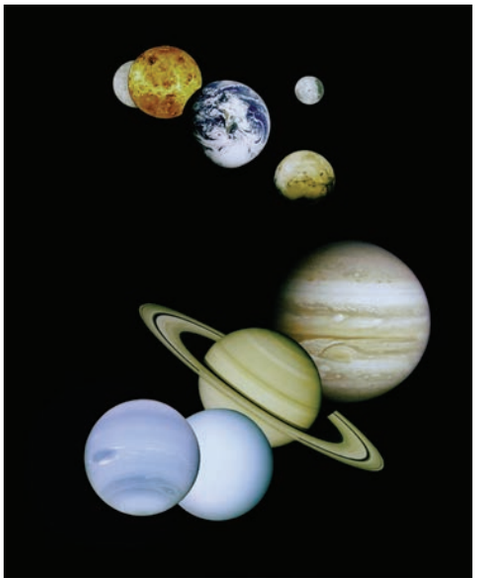
National and international defence and security policies must promote greater transparency and acknowledge impacts on civilians. Victims' rights must be preserved through stronger legal instruments.

Achieving such results will require greater contributions by nonmilitary groups, particularly civil-society organizations. Without a strong civil-society voice, the result will be even greater silence over civilian casualties and greater public ignorance about military engagements abroad. And that should worry us all. □

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

Outer Space Security

Statement to the 74th Session of the General Assembly First Committee



Delivered by Cesar Jaramillo

October 2019

Chair,

Outer space now provides vast social, scientific, and economic benefits to humanity, but the continued enjoyment of these benefits is anything but guaranteed. As the number of space users and applications has increased, so too have the threats to its long-term sustainability.

Critically, no clear norms are in place today to prevent an arms race in outer space. It is thus imperative that this Committee engage in policy discussions specifically related to space arms control, with a view to avoiding the weaponization of this critical domain.

Ground-based anti-satellite weapons (ASATs) continue to be tested; satellites are deliberately and routinely jammed; missile defence systems have been used as ASATs; and precursor technologies that would allow space-to-space offensive capabilities have been developed. Now major spacefaring nations are advancing worrying rhetoric about space as a warfighting domain, and even about military forces for outer space.

This year's Group of Governmental Experts (GGE) on further effective measures for the prevention of an arms race in outer space (PAROS) failed to reach consensus on recommendations. Earlier proposals for both legally binding agreements—such as the Treaty on the Prevention of the Placement of Weapons in Outer Space (PPWT)—and politically binding ones—such as the International Code of Conduct for Outer Space Activities—have faltered. And the Conference on Disarmament, which has the primary responsibility for negotiations related to PAROS, has been deadlocked and unable to conduct any substantive negotiations for more than 20 years.

The international community must work decisively to ensure that the right of all countries to access space and the obligation to ensure that

space is used with due regard to the interests of others and for peaceful purposes are maintained. International space law, as well as unilateral, bilateral, and multilateral transparency and confidence-building measures, can make space more secure by regulating activities that may infringe upon the ability of actors to access and use space safely and sustainably, and by limiting space-based threats to national assets in space or on Earth.

The Outer Space Treaty was explicit that the use of space must be for "peaceful purposes" and "for the benefit and in the interests of all countries." It is in this spirit that we urge states to:

1. Pledge not to use any space- or ground-based capabilities to deliberately damage or destroy space assets; and,

2. Indicate support for the negotiation of a treaty preventing an arms race in outer space, and for interim transparency and confidence-building measures towards that end.

Beyond these commitments, there is a clear need to formulate national and international security policies that do not rely on, or give a veil of legitimacy to, the weaponization of outer space as a means of advancing political and strategic objectives.

Multilateral arms control efforts have typically occurred only after certain categories of weapons have already been used in conflict. With PAROS, the international community now has the unique possibility to act proactively before outer space becomes weaponized—and before the social and economic benefits derived from this domain are put in jeopardy.

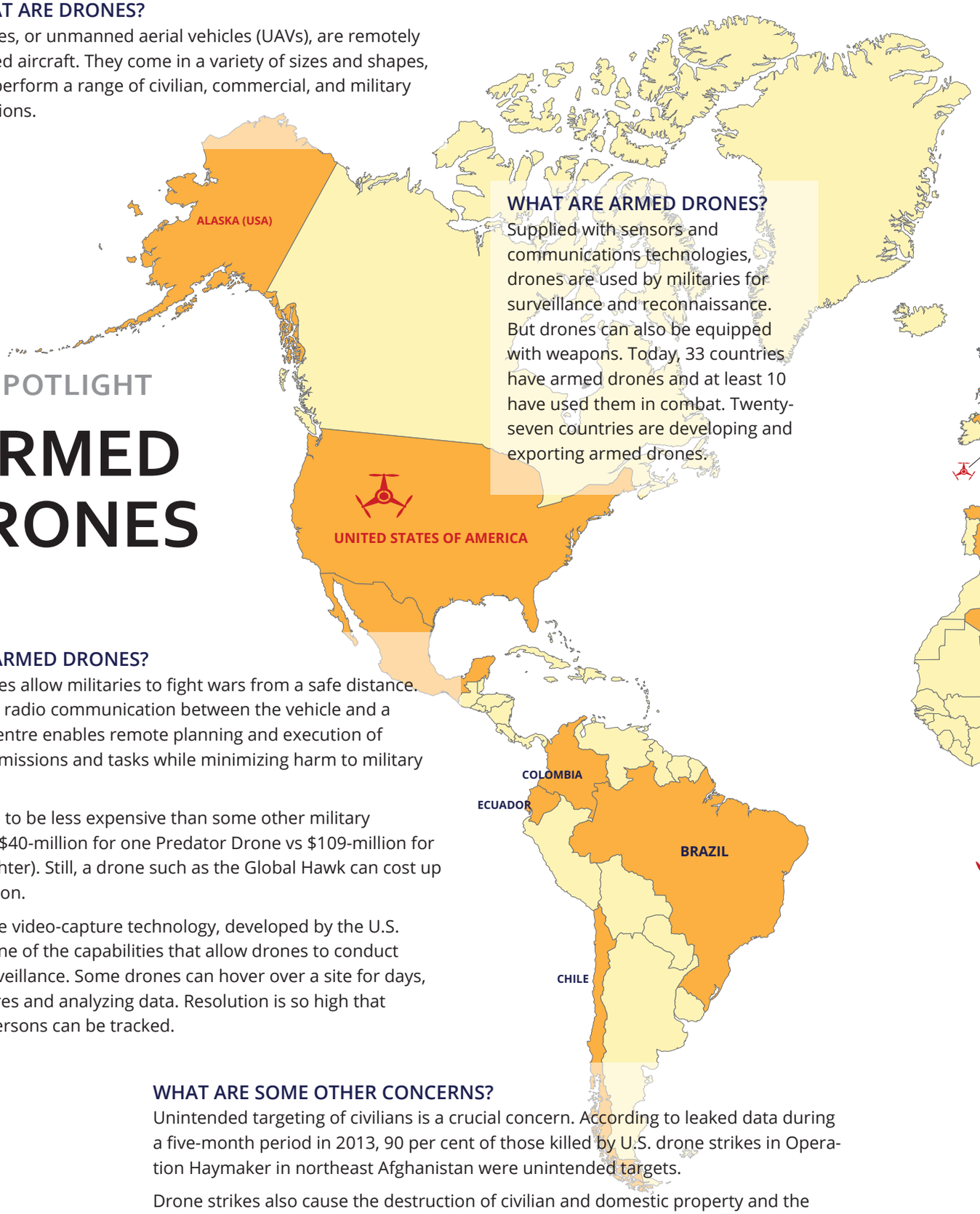
Let us seize this opportunity and act decisively to prevent an arms race in outer space. □

SPOTLIGHT

ARMED DRONES

WHAT ARE DRONES?

Drones, or unmanned aerial vehicles (UAVs), are remotely piloted aircraft. They come in a variety of sizes and shapes, and perform a range of civilian, commercial, and military functions.



WHAT ARE ARMED DRONES?

Supplied with sensors and communications technologies, drones are used by militaries for surveillance and reconnaissance. But drones can also be equipped with weapons. Today, 33 countries have armed drones and at least 10 have used them in combat. Twenty-seven countries are developing and exporting armed drones.

WHY USE ARMED DRONES?

Armed drones allow militaries to fight wars from a safe distance. Satellite and radio communication between the vehicle and a command centre enables remote planning and execution of war-related missions and tasks while minimizing harm to military personnel.

Drones tend to be less expensive than some other military equipment ($40-million for one Predator Drone vs $109-million for one F-35 Fighter). Still, a drone such as the Global Hawk can cost up to $220-million.

Gorgon Stare video-capture technology, developed by the U.S. military, is one of the capabilities that allow drones to conduct detailed surveillance. Some drones can hover over a site for days, taking pictures and analyzing data. Resolution is so high that individual persons can be tracked.

WHAT ARE SOME OTHER CONCERNS?

Unintended targeting of civilians is a crucial concern. According to leaked data during a five-month period in 2013, 90 per cent of those killed by U.S. drone strikes in Operation Haymaker in northeast Afghanistan were unintended targets.

Drone strikes also cause the destruction of civilian and domestic property and the displacement of people.

DOES THE USE OF ARMED DRONES VIOLATE INTERNATIONAL LAW?

Drones are not expressly prohibited under international humanitarian law (IHL), but not all uses of armed drones are lawful. Under IHL, drone operators and their commanders are responsible for acts carried out by drones.

The international Arms Trade Treaty does not explicitly refer to drones.

WHAT ABOUT NONSTATE ACTORS?

Groups that have used drones include Islamic State, Hamas, Hezbollah, and Houthi militants. As technologies become cheaper, drones will likely be more widely used.

Research compiled by Ploughshares Peace and Technology Intern Murtadha Faraj

4 key messages on humanitarian advocacy

Written by Branka Marijan

The latest Humanitarian Disarmament Forum was held October 19 and 20 in New York City. In attendance were civil-society groups, such as Project Ploughshares, which work on arms control and disarmament concerns that fall under the umbrella of "humanitarian disarmament." According to the Harvard Law School Armed Conflict and Civilian Protection Initiative, humanitarian disarmament "seeks to prevent and remediate the human and environmental harm inflicted by arms through the establishment and implementation of norms."

The now-annual Forum, which began in 2012, is usually held around the time of the United Nations (UN) First Committee, which deals with disarmament and international security issues. The Forum reflects on the UN discussions and provides updates on the work being done by different disarmament networks. This year's event, hosted by the Colombian Campaign to Ban Landmines, adopted the theme "A more active citizenship, given the global imbalance."

The somber tone of First Committee discussions, the apparent disintegration of some arms-control agreements, and serious questions on the stability of the multilateral order affected the mood at the Forum. But attendees were urged not to become disheartened. As several observers including a disarmament diplomat noted, civil-society organizations are critical to progress on disarmament.

Here are four key messages that emerged from the 2019 Forum:

1 Citizens everywhere need to know about the impacts of weapons on civilians.

At the Forum, a landmine survivor shared his impactful story. Survivors and victims of weapons use must be given a prominent role in efforts to prevent and mitigate such harm and suffering. Several participants assist those in conflict zones who are harmed by weapons; they also need to bear prominent public witness to that suffering.

Many organizations are involved in important efforts to mobilize and engage the public. For example, on September 26, Humanity & Inclusion unveiled the world's first monument to the Unnamed Civilian to draw attention to the devastating reality that 90 per cent of those killed by explosive weapons in urban areas are civilians.

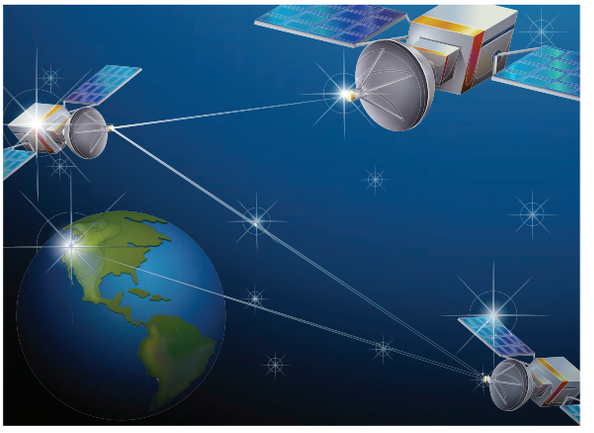
Member organizations of the International Campaign to Abolish Nuclear Weapons (ICAN) have organized many public events and marches. PAX from the Netherlands updates the annual report, *Don't Bank on the Bomb*, which tracks private companies involved in and supporting nuclear weapons. Project Ploughshares hosts public events, writes accessible articles, and produces information on disarmament issues for the Canadian public.

But more must be done. High school, college, and university students need information, through lectures, workshops, and other means, so that they can understand the effects of weapons on people, communities, and the environment. This is particularly important in countries like the United States, in which arms manufacturing and exports are increasing. Last year, for example, U.S. foreign military sales were close to $70-billion.

2 New ways to gather and share data should be embraced.

Social media and new technologies make research more accessible. Some organizations use open-source data to track shipments of weapons and weapons use, as well as more humanitarian concerns, such as tracking movements of populations. Satellite imagery, for example, has revealed the destruction of Rohingya villages in Myanmar. To use these new sources effectively, research staff must be trained on how to find data, verify its accuracy, and store information securely.

Data collection is critical if we are to hold countries accountable for their actions. For example, nongovernmental organizations that monitor treaty compliance use data to strengthen the case for greater compliance.



While a number of organizations collect data, better methods to exchange data among these groups is needed. This gets tricky when the information is sensitive or related to vulnerable populations.

Private-sector organizations have technology and information that could be useful to humanitarian organizations. However, industry also has its own uses for such information and humanitarian organizations are wary of having their activities coopted by the private sector or by the military. There is a real concern that humanitarian actions not be confused with security applications—or be perceived to have a common aim.

3 Multilateral and domestic forums on disarmament and arms control need closer ties with the wider civil society.

Disarmament and arms control are often viewed in isolation from other issues, even in advocacy and civil-society circles. However, weapons and their use have a significant impact on local, national, and global security. Organizations working on disarmament need to connect with health advocates and environmental groups, for example, as well as with community-level organizations. When multiple organizations work together on promoting an issue, it receives more policy space.

Disarmament issues are generally discussed at multilateral and national levels. But there is a need to work at local levels, too. ICAN's Cities Appeal, for example, calls on cities and towns to show support for the Treaty on the Prohibition of Nuclear Weapons; such activity can put pressure on national governments.

4 Disarmament advocacy must include diverse individuals and groups in decision-making.

Diversity and inclusivity produce more dynamic advocacy. But getting more, and more diverse, people involved in civil-society organizations can be a challenge. It costs money and takes effort and significant resources to bring campaigners from different countries to rallies and forums and other events.

And not all countries are receptive to civil-society organizing. One analyst noted that, in some countries, "NGOs are not prohibited, but are not appreciated." Under these circumstances, it can be difficult to share information and to engage the public and government institutions. Groups and individuals operating in these conditions need more support. □

Remote Warfare

The use of drones by nonstate actors

Written by Rory Shiner and Branka Marijan

In January of this year, armed drones owned by Houthis, a Yemeni rebel group, killed several Yemeni government officials. This was the first time, as far as we know, that a nonstate group had successfully deployed a drone to carry out a precision-targeted operation. In September, the Houthis, with alleged support from Iran, were suspected in the attack on the world's largest oil-processing facility in Saudi Arabia.

Islamic State, Hamas, and Hezbollah are other nonstate militant groups that possess armed drones (also known as UAVs—unmanned aerial vehicles). The use of such cutting-edge technologies by these groups will result in even greater instability in some of the most conflict-ridden regions on the planet. There are also concerns that such groups will use drones in civilian spaces in countries not experiencing armed conflict.

Concern for global stability grows with the proliferation of military drones, an increasing willingness by countries such as China and Turkey to export armed drones, and the availability of commercial drones.

Now, civil-society groups and disarmament advocates are calling for multilateral action to create stronger international norms on the development and use of UAV technologies. In support of such action, more research is needed on how nonstate groups adapt technologies and how particular contexts encourage the development and use of these weapon systems. In particular, it is critical that we understand which of these groups have the capacity to adopt different types of systems, which commercial channels will be used, and the role of state sponsors in transferring the technology.

Military and commercial use of drones

At first, only the armed forces of leading military powers like the United States, the United Kingdom, France, and Israel possessed military

The Islamic State weapons system employed cheap quadcopter drones and fixed-wing drone platforms. These photographs, for example, show a commercial drone modified for projectile drop capability by Islamic State operatives. *Credit: Don Rassler, Combating Terrorism Center at West Point U.S. Military Academy (Photos: Mitch Utterback and Conflict Armament Research)*

UAVs. However, in the last decade, 95 countries have introduced UAVs into their military operations. Currently, military drones are largely restricted to intelligence-gathering, surveillance, target acquisition, and reconnaissance (ISTAR) operations; however, it has been documented that the militaries of 30 countries own armed drones and almost as many are developing them or have plans to acquire them. The deployment of armed drones on the battlefield is expected to increase with the steady shift toward network-centric warfare.

As commercial drones have become smaller, faster, more adaptable, and cheaper to produce, the market for them has grown exponentially. According to the Federal Aviation Administration (FAA) in the United States, there are already 450,000 commercial drones in service. Barclays analysts project that the commercial drone market will grow from 4-billion USD in 2018 to 40-billion USD in the next five years. Easily accessible and adaptable, commercial drones create opportunities for nonstate actors to leverage this technology in conflict zones.

“Islamic State made groundbreaking use of commercial drones in waging an aerial bombardment campaign against U.S.-led forces in their defence of Mosul in 2016 and 2017.

Nonstate use: The case of Islamic State

Islamic State made groundbreaking use of commercial drones in waging an aerial bombardment campaign against U.S.-led forces in their defence of Mosul in 2016 and 2017. By modifying these drones, IS constructed a novel weapons system that was identified by a top U.S. commander as the “most daunting threat” faced by U.S. forces in 2016. In the following year, IS conducted between 60 and 100 aerial drone bombing attacks a month.

The IS weapons system employed cheap quad-

copter drones and fixed-wing drone platforms. As well, the group assembled fixed-wing drone platforms from wood and from stock fixed-wing airframes that they acquired through a global supply chain. When various low-tech components were added, the drones gained bomb-dropping capabilities.

These drones killed more than a dozen people and injured scores more. A surgeon in Mosul estimated that they supplied his hospital with 10 patients every day in February 2017. These casualties were not fighters, but innocent civilians.

Besides delivering bombs, the modified drones played an integral role in IS ISTAR operations. Adopting a tactic that was also embraced by the Houthis, Islamic State used drones to improve the accuracy of mortar and rocket strikes.

Unique to Islamic State has been their systems-based targeting approach, in which drone operators and vehicle-borne suicide bombers work in unison. This strategy proved deadly during the Mosul campaign.

One reason for the success of IS in 2016 and 2017 was their access to military production facilities in key cities across the vast territory they controlled. Controlling factories that manufactured equipment and explosives allowed them to rapidly scale their drone program.

Another factor in their success was their vast and complex supply network that facilitated the procurement of commercial drones. Beginning in 2014, IS repeatedly purchased drone-related components from nine companies in Canada and the United States through an extensive commercial network of five subsidiaries based in Wales. Among the items purchased were drone antennas, micro turbines, flight simulators, and rocket flight computer kits.

When this first network was disman-

A TIMELINE: ISLAMIC STATE AND UNMANNED AERIAL VEHICLES

October 2014

IS demonstrates UAV capability.

November 28, 2014

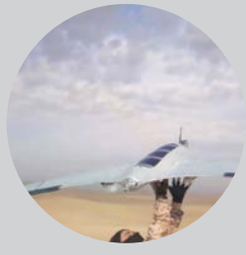
IS features UAV image in its English-language magazine, *Dabiq*, depicting an aerial view of the battle in Kobani, Syria.

October 2, 2016

IS kills two Kurdish soldiers and wounds two French soldiers with a booby-trapped UAV.

January 24, 2017

IS releases propaganda video, "Knights of the Dawawin," depicting a weaponized UAV dropping bombs on U.S.-led coalition forces.



March 1, 2017

IS distributes an infographic via the social media platform Telegram highlighting its UAV weaponization efforts.

Source: State of New Jersey Office of Homeland Security and Preparedness

tled, Islamic State established a new operation that prioritized the acquisition of commercial drones and other related components from companies in India, Turkey, and China.

Controlling the use of armed drones

No one treaty addresses all concerns about armed UAVs; instead, a variety of treaties are called into play. The Missile Technology Control Regime (MTCR) established in 1987 is an informal export control regime with 35 "partners" that seeks to restrain the sale of technologies that can be employed to deliver weapons of mass destruction. But experts agree that its regulatory scope doesn't cover the emerging small military UAVs that will play an essential role in future conflicts.

Commercial off-the-shelf small UAVs are currently poorly regulated, although they can be used in armed systems. UAVs with more than 500-kilogram payloads are the greatest threat.

So, what is being done and what needs to happen?

Many states already have "no drone zones" in and around important infrastructure and airports. To enforce such zones, states have started to develop anti-drone technology, but a perfect system has yet to emerge.

Clearly needed are regulations that cover a variety of circumstances, including the transfer or diversion of technology and platforms from state actors to nonstate groups.

But the fact is that the incentives that encourage official governments to adhere to global norms often don't apply to nonstate actors. If incentives don't work, then cutting off the supply might. To do this, law enforcement and other agencies must learn more about how different nonstate actors acquire the necessary technologies. □

Rory Shiner, a Wilfrid Laurier University M.A. graduate, was a Ploughshares-Laurier Intern from April to August 2019.

Outer Space Security

How to keep outer space weapons-free

Written by Jessica West

The history of arms control in outer space reads like a success story. Outer space is one of the few domains of human activity in which the focus has been on prevention. Although military satellites that provide communications, remote sensing, navigation, and timing services once dominated space and continue to provide essential military services, their operations have long been considered peaceful. Those of us working in space security say that space is "militarized but not weaponized."

More the product of good luck than good management, our luck could be about to run out. A growing focus on space as a domain of warfare is eroding the wall between militarization and weaponization.

Restraints on space weapons fade

Most humans have long believed that outer space is too important to us to become the venue of war. To that end, the 1967 Outer Space Treaty focused on preventing the Cold War from extending into outer space by promoting the principle of peaceful use by all and banning weapons of mass destruction in orbit or on celestial bodies. Bilateral agreements dealt with sensitive communications and arms-control-verification satellites, while there were voluntary moratoriums on the testing of anti-satellite weapons.

At the same time, a belief in outer space as the "ultimate high ground" was held by Cold War military planners, who exercised unlimited imagination in developing such weapons as space lasers, fighter satellites, and space planes. U.S. President Reagan's Space Defense Initiative (Star Wars) aimed to create a system of space-based interceptors for missile defence. Fortunately, none of these systems were developed, because of real-life limits imposed by the laws of physics, financial restraints, and the end of the Cold War. But dreams persist.

There are few rules to prevent the pursuit of such phantasms. The Outer Space Treaty was silent on the use of conventional weapons in outer space; on the distinction between celestial bodies specifically reserved for peaceful use and the rest of outer space, where most activities take place; on what "peaceful use" means; and on what happens if the use of outer space is not peaceful.

And now the restraint that has governed space activities is fading as a new era of space activity

dawns.

An incident in 2007, in which a Chinese anti-ballistic missile intercepted a Chinese orbiting satellite, might be considered the first shot over the bow. Other countries have also demonstrated their abilities to target satellites. Most recently, this past March India intercepted one of its own satellites with an anti-ballistic missile. Russia is reviving Soviet weapons systems and testing the Nudol anti-ballistic missile, which could strike objects in orbit.

> “Arms control has traditionally focused on specific classes of weapons, like nuclear weapons or landmines. There is no category of ‘space weapon.’ Outer space could be exposed to the entire gamut of tools that states bring to bear in conflict, from electronic attacks to conventional weapons, directed energy, and cyber.

The new domain for warfare

To the best of our knowledge, no “space weapon” has officially been launched. And “shots” have yet to be fired against adversaries. However, in a crucial shift, outer space is increasingly viewed, not as too important for war, but as a domain of warfare.

Outer space as a warfighting domain is the guiding principle behind the Trump administration’s push for a new Space Force as the sixth branch of the U.S. military. In recent years, both Russia and China have reorganized military units that incorporate space into more traditional warfighting functions. In the last year, the United Kingdom, France, India, and Japan have taken steps to create new military units, commands, or departments that incorporate defensive capabilities in space. In November, the North Atlantic Treaty Organization (NATO) declared space an “operational domain,” underlining a need to protect civilian and military assets in space.

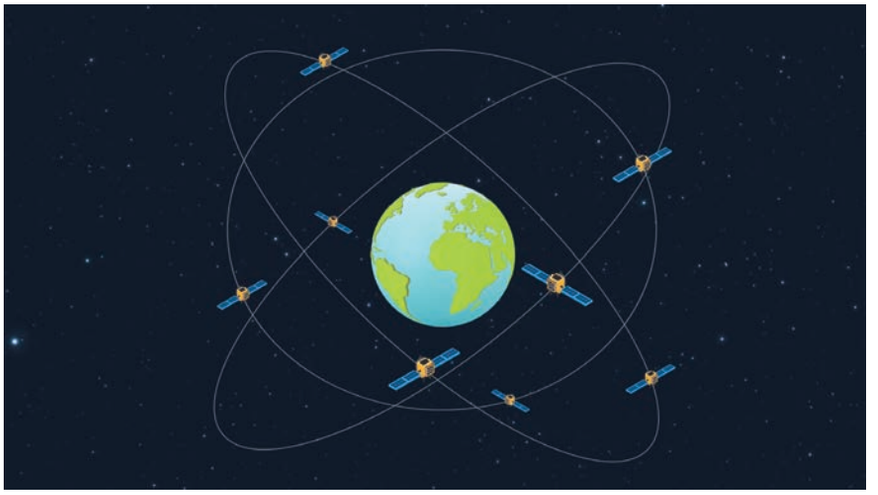
Ironically, space, once preserved from war because of its value, is now viewed as a warfighting domain because it has become MORE important. Space is vital to military command and control of personnel and weapons, for communications, for intelligence, and for targeting. And space is full of vulnerable targets: satellites, which are easily identified and travel without protection in predictable orbits, use the electromagnetic spectrum and computer networks to send and receive information, and are difficult to move out of harm’s way.

In conflicts today in Syria and Ukraine, electronic interference with satellites is a core feature of warfighting. Public GPS signals around the world are frequently jammed. Increasingly sophisticated cyberattacks threaten to escalate from targeting computers networks to attacking satellites. Kinetic and laser anti-satellite capabilities are developing steadily. New multi-purpose capabilities on-orbit allow satellites to maneuver through space, and to approach and even physically manipulate other satellites, for a variety of protective, but also possibly harmful purposes.

A new agenda for arms control

If the new reality is that outer space is being treated as a domain of warfare, then we need to think differently about arms control.

For almost 40 years, the United Nations First Committee has concerned itself with the prevention of an arms race in outer space (PAROS). Several initiatives have been proposed over the years, the most recent a draft treaty proposed by



Some positive actions include protecting a Global Navigation Satellite System such as Galileo, which is a civilian system. *GSA*

Russia and China on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT). However, obstacles related primarily to the definition of a space weapon and the lack of verification mechanisms have prevented any progress.

Now some states, including Australia, the United Kingdom, and the United States, are contending that a focus on weapons is antiquated. They make some good points.

Arms control has traditionally focused on specific classes of weapons, like nuclear weapons or landmines. There is no category of "space weapon." Outer space could be exposed to the entire gamut of tools that states bring to bear in conflict, from electronic attacks to conventional weapons, directed energy, and cyber. Some of these weapons could be in space, but some of the gravest threats to space assets could come from weapons systems on Earth.

If outer space is to be treated as a domain of warfare, then binding rules that restrict the most harmful activities and protect essential services that operate from space are critical. The current focus to develop "rules of behaviour" or norms is essential for a sphere in which many users and uses co-exist. But more is needed to control the use of weapons in and against space.

A single tool or treaty will not likely be capable of preventing space weapons. Several distinct steps may be necessary. For example, there is interest in banning both the intentional destruction of objects on orbit and the use of anti-satellite weapons that create space debris. Such bans would address grave and present dangers.

Other positive actions:

- define rules on close approaches to foreign satellites;
- reinforce protections for critical systems, including those linked to GNSS (Global Navigation Satellite System) capabilities such as GPS, and nuclear command and control systems;
- leverage capabilities for space situational awareness to provide international transparency and verification of objects and activities on orbit.

While the spirit of PAROS still has value and the principle of peaceful uses remains essential, we can no longer hope for one tool or method to resolve all the complex concerns in an outer-space domain that is used by some for warfare.

We still need arms control in space. But the way to achieve this is not necessarily by taking the path used in the past. □

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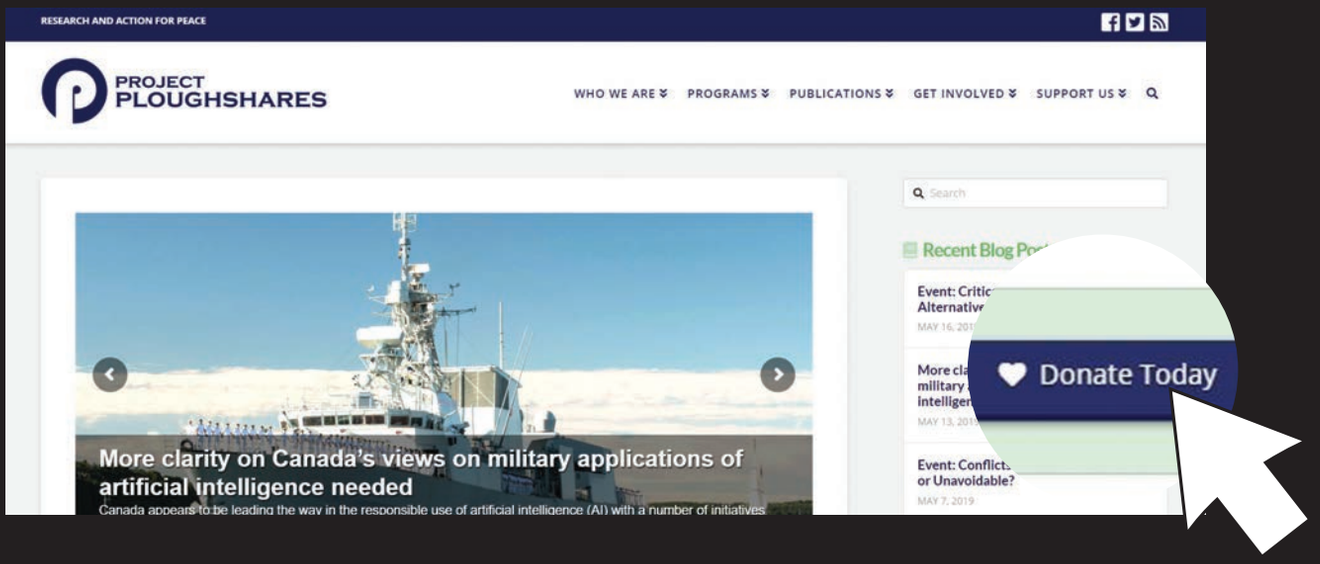

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