The Dark Arts in Space: Developments in Counterspace Weapons
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Virtual Event

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Speakers:
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- Victoria Samson, Washington Office Director, Secure World Foundation
- Dr. Brian Weeden, Director of Program Planning, Secure World Foundation

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Kaitlyn Johnson: All right, well, the numbers keep jumping up, but we'll go ahead and get started. Again, thank you for joining. My name is Kaitlyn Johnson. I am the Deputy Director of the Aerospace Security Project at CSIS.

I am so excited to be here and be joined by my good friends from the Secure World Foundation Victoria Samson and Brian Weeden, and then also our very own CSIS military fellow Joe Moye is a member of the Marine Corps and did a big assist with this report for us helping out. Unfortunately, you might have noticed we are missing a team member, Makena Young, our research associate was unable to join it.

Unfortunately, you've got me filling in first section. I think she's pretty open and active on Twitter. If you have anything specific to ask, you can just shoot her a tweet. We will go ahead and get started with a quick overview from all of my panelists of what they think the top updates were for each country.

Then we'll walk through some overall trends and general assessment and then get into some audience questions as well. Brian, can you please kick us off?

Dr. Brian Weeden: Thanks, Kaitlyn. Happy to do so. We're going to get started. I'm going to lead off with just a brief discussion for the major new things we saw from China over the last year. One big thing I took away was that this year was a relatively quiet one for China. But there's still some evidence they have a lot going on.

We did not see evidence of any new anti-satellite tests, either from dedicated and satellite weapons, or systems that were used in an anti-satellite manner conducted by China over the last year. That said, there's fairly strong evidence that their mobile direct ascent ASAT system that can target LEO satellites, is either operational or probably will be very soon.

We did see that China conducted the first launch of a new spaceplane. We don't really know much about it. It's rumored to be something similar to the US X-37B, which itself is a much smaller, fully robotic version of the space shuttle.

There's evidence that this new space lane by China went into orbit, made a few revs, deployed a small satellite, and then landed at a military base, but aside from that, we don't know anything about it. There's a possibility that it uses some kind of space technologies, but we honestly don't know at this point.

There's a Chinese satellite called the SJ-17 that continued to do some RPO activities in the geostationary belt. It approached and did what may have been some inspections or collecting surveillance of two Chinese satellites, the SJ-20 and the ChinaSat 6B.

So far, we have not seen evidence that the SJ-17 has approached other country satellites. It's mainly stuck to approaching and being close to Chinese satellites for the time being.

There are some not yet confirmed reports of China deploying ground-based counterspace jamming systems to the Line of Actual Control near the border with India which I think would be significant. We don't have a lot of evidence of operational use of counterspace systems by China, and this might be one of those, but again, evidence on this is still pretty thin.

I'll say, in our report, we added a lot more details about what China has been doing with their ground-based, direct energy weapons program. There's now pretty good open-source evidence of four or five main sites.

All of these sites have distinctive buildings, large buildings with roofs that slide back. There's smaller buildings next door that are typically used for gas storage, which is used to power the lasers, and then, in some cases, they have smaller domes that support adaptive optics for targeting other things.

Two of these facilities are co-located with universities where there is basically research going on for atmospheric optics or engineering physics. I think one, the one that's shown here on the slide, is a bit more troubling and this is the one that appears to be more of a military-type installation.

You can see the roof shelters, you can see military features around it, and it's located about 100 kilometers from a base outside of Korla where they have conducted anti-satellite testing in the past. That indicates there's probably a couple of facilities used for R&D. This may be a facility that could be used for more operational uses.

I'll say finally, we also found some more data about the role of China's strategic support force. This was a reorganization of the military into this new unit that happened several years ago.

What we can tell this strategic support force provides oversight of pretty much all of the PLA space activities that include space launch and support, space surveillance, collecting space information, telemetry tracking, control space warfare. What we don't know yet, is what the role of the strategic support force is in actual active combat activities.

For example, do they have authority for launching kinetic and satellite attacks, or does that remain with the PLA rocket force? We're not really sure about that. That was one of those things that we're still trying to figure out. That's my wrap-up of what China's been up to over the last year.

Kaitlyn: Thanks, Brain. I am going to brief about Russia, and then ask my colleagues, Victoria and Brian to jump in case I miss anything. First, while we did find that China was relatively quiet throughout 2020, Russia was not. Russia was highly active, and there are a lot of counterspace updates to come over the past year.

The most prominent, I would say, are the two direct ascent ASAT tests from the Nudol system. I think in previous reports, both the Secure World Foundation and CSIS assess that even though Russia hadn't done as recent tests as the United States, China and India with direct ascent ASA. They were totally capable of having this capability and acting on it.

Russia decided to join the party in 2020 and did conduct these two tests. The U.S. Space Command spoke out especially after the December test as well. The graphic that you see on the slide is one that we put together to try to make a little more sense of some of the co-orbital maneuvers in low Earth orbit that Russia was performing.

These take place from July 2019. Then there's a bit of a gap. Some of the satellites were extremely active through the summer and fall of 2020. The first in July 2019, you can see Cosmos 2542 was one of those nesting dolls satellites, the "matryoshka" satellites, that birthed the second satellite 2543.

Another thing was that these are all difficult to track and does not make it easier that all of the numbers are very similar. [laughs] We've color-coded them, and so you can see 2543 after some time, performs some rendezvous operations with Cosmos 2535. It then, in July, released a projectile. U.S. Space Command, again, came out and put out a statement about this act in particular.

Brian particularly and I, after some conversations, assess that this is a smaller satellite, maybe a CubeSat. It's probably not like a bullet, which is what I think of when I hear projectile and you're talking about arms and weapons. It was released at some force and velocity, which makes it really notable from previous attempts.

Again, we saw some activity and rendezvousing in low Earth orbit through August and September with a third satellite, Cosmos 2536. People way smarter than me like John McDowell assess that 2535 is relatively stationary, possibly defunct. What we really see is 36 and 43 coming near it, rendezvousing, leaving, coming back to where it is.

What's really noticeable as well is that all of this is in low Earth orbit. We often talk about SJ-17, our favorite satellite, Luch, up in GEO performing maneuvers like this. This isn't LEO, which of course is much busier and where we see a lot of commercial investment planned in the next couple of years.

I mentioned Luch. Luch was active again this year. Popping by and doing inspections on, we assess a couple of Eutelsat, Intelsat satellites, as well as some others. I would advocate you check out their report for more detail on that. I'm going to pass this off to Joe, who's going to talk us through some Iran and North Korea updates.

Joe Moye: Thanks, Kaitlyn. I should start off, as an active-duty Marine, I need to state that my writing and comments are mine alone and don't reflect the US government Department of

Defense, Department of Navy, or the Marine Corps. I also want to make sure it's clear that my research was, like my colleagues', based on publicly available open-source material.

Kaitlyn, I would say that the bottom line for Iran and North Korea is that both countries continue to have relatively immature space capabilities. However, their electronic warfare and cyber capabilities continue to pose an increasingly serious threat.

Regarding Iran, we did observe some notable milestones this year. The most prominent was the successful launch of a military satellite in April of 2020. This was notable for three primary reasons.

The first was the launch vehicle reportedly used more advanced technology than we've seen Iran use in the past. This includes solid propellant in its second and third stages, as well as carbon fiber casing in a swiveling thrust vector control nozzle.

The second thing is that the launch was conducted by the Iranian Republican Guard Corps as opposed to the civilian Iranian Space Agency. The third is that the launch vehicle was launched from a mobile launcher instead of a fixed launch site.

There were Iranian claims in February that they had a successful military test launch, though lack of external reporting means that we have little-known details about that at this time. I would say despite these milestones by the Iranian military, current open-source information does not indicate that Iran has or is attempting to develop either direct ascent or co-orbital anti-satellite weapons.

At the same time as the launch, Iran announced the establishment of the Iranian Space Command under the Aerospace Force. There's no open-source reporting on the command's organization, capabilities and missions, but it's reasonable to expect that this organization is responsible for all of Iran's military space and counterspace-related forces and missions.

In the electronic warfare domain, there were several reports of GPS circle spoofing in Iran. Previously observed in China, the March 2020 incident involved a suspected GPS spoofing device in operation around Iran's Army Command and Staff College.

Finally, Iran has demonstrated its cyber capabilities most prominently this year through an exchange of cyber attacks with Israel. The suspected trend of leveraging contract hacking group continues over the past 12 months.

While there's no recent open-source information of cyber attacks against space ASATs specifically, the increase in cyber activity by Iran suggests that cyber attacks on space systems could be the preferred method to compensate for an imbalance in other capabilities in other domains.

Related to this, Iran signed two significant cooperation agreements this year. In January, Iran and Russia signed an information security agreement, which could signal interaction between the two countries on cyber security activities.

Then just March, Iran signed a 25-year agreement with China to strengthen their long-standing economic and political alliances. These agreements could mean that Iran could benefit from

Russian and Chinese technology, expertise, and training to further its own capabilities in the future.

Conversely, the past year was relatively quiet for North Korea counterspace activity. It remains unlikely that North Korea is capable or actively pursuing direct ascent or co-orbital anti-satellite weapons. There's little indication that North Korea has made any advancement in its non-kinetic physical activities.

Satellite imagery and analysis by 38 North suggest a relative dormancy at North Korea's launch facilities, which is consistent with the lack of reported launch activity. North Korea continues to exercise its downlink jamming capabilities, however.

In April of 2020, they announced that it was preparing to deploy a new GPS jamming device against South Korea. Since then, there have been multiple reports, as recent as this January, that North Korea continues to conduct jamming operations along the peninsula.

Most reports highlight that jamming has focused on commercial radio broadcast and civilian GPS signals rather than military targets at this time.

The greatest North Korean counterspace threat to the United States, according to US government officials -- and my lights just went off -- is cyber attacks. That was most notably mentioned by Secretary of State, Mike Pompeo, back in December that he considered North Korea a greater threat than Russia in cyber activities.

This sentiment was echoed by the current administration when the State Department spokesman, in February, mentioned that North Korea's malicious cyber activities threatening the United States was influencing US policy towards North Korea.

While North Korea's cyber attacks have not specifically targeted space systems, they demonstrate North Korea's continued focus on developing more sophisticated and viable cyber capabilities. As North Korean hackers acquire more advanced technology, likely through illicit means, and gain experience and expertise, for us, the US space systems and ground stations will become more credible.

The last thing I would say is that we should watch for any additional indications that Iran and North Korea are cooperating in space and ballistic missile technology, which could mean that progress in one country is likely to be transferrable to the other.

Kaitlyn, the last thing is of the four counterspace capabilities, I would pay close attention to Iran and North Korea pursuits and advancements in electronic warfare and cyber in any domain, as increase frequency and sophistication could indicate a higher level of cyber threats to space systems.

Kaitlyn: Thanks, Joe. Victoria is next. She's going to cover India and the United States.

Victoria Samson: Thank you, Kaitlyn. Hello, everyone. For India, the update that I would like to point out here is left over from March 2019 when India held its first, and so far, only direct ascent ASAT test where they intercepted on of their own satellites.

At the time, officials said that they had done it at a low enough altitude at 300 kilometers, roughly, that all debris created from the test would be back down within six weeks. A lot of it did come back down fairly quickly, although not quite six weeks.

As of March 2021, that is to say two years after this test, there are still three pieces of debris that we know about still in orbit. This is because while the test was at 300 kilometers, just due to the nature of physics, a few pieces got kicked up to about 1,000 kilometers. That is also what happened when the US had a test in 2008. It's not unexpected.

As well, India started working on directed energy weapons, and we did include that in our update this year. However, they are in the very early stages. So far their test targets seem to be aerial or electronic in nature, and they do not appear to be developing this for counterspace capability.

Then finally, the biggest update I think I would add for India is that Israel announced that its SSA Control Center in Bangalore is operational as of December 2020.

Then moving on to the United States, one thing that we filled in the blanks this year for secure worlds counterspace document when looking at the United States is we added in a lot of the historical anti-satellite weapons, testing, and programs because the US had been very active from the very beginning.

Oftentimes when you read about counterspace capabilities, it seems everything started in 2007, and it absolutely did not. They're pretty much from the beginning of the space age. One project, I would like to detail because I thought it was pretty interesting, was Project SAINT.

In the late 1950s, the Air Force did studies about how to defend against hostile satellites, and they had initially three ideas for how to do this. They said, "One. The uncrewed and ground-launched. One will be uncrewed and air-launched. A third that would be crewed," which is wild in my opinion is having a crewed anti-satellite capability.

In the end, they decided to go ahead in 1960 with a satellite inspector version of the program, but it was canceled in 1962 before it could hold any of its intercept tests. I won't go into as much detail for the other ones, but I want to point out at roughly the same time, there were the Bold Orion and High Virgo air-launched direct-ascent ASAT tests.

There was also the Project Hi-Ho air-launched direct-ascent ASAT program. It had two tests in space. In 1962, the Nike Zeus ground-based direct-ascent ASAT program, which did intercept a rocket stage in 1963.

Then you had the Program 437 ground-based direct-ascent ASAT program, which is a follow up to the Nike Zeus. It was tested multiple times between 1964 and 1965 against rocket bodies. Again, to say, there was a lot of activity even from the very beginning.

Another update that we did is we included some more information about the X-37B. Always a topic of interest, particularly. We discussed counterspace capabilities globally. The latest launch was in May of 2020 with OTV-6, and this time it was carrying a new service module that would give them more room for payloads and experiments.

We released a subsatellite at the end of that month of May, which could be something I thought it was carrying. Built by students at the US Air Force Academy, we don't know for sure. It was not been identified by the US military as such.

It also tested an on-orbit power beaming system that collects solar power and transforms it into a microwave beam, which could then be put to Earth, and change its energy that can run devices. It could also lead to capabilities that provide offensive direct energy space capabilities.

Another update for the X-37B is it is now being run by the United States Space Force's Delta 9, which is responsible for overseeing its operations once it's in orbit. This is interesting because Space Delta 9's mission is to "protect and defend operations in space and provide response options to deter and defeat adversary threats in space." I will say that the GSSAP satellites are also controlled by Delta 9.

I'm running overtime now, so really quickly I would add that there was a Meadowlands update to the counter-communication system, which was initiated in 2003 as an electronic warfare system for jamming communication satellites.

There is a lot of news because even though it's been around for a couple of decades, and May of 2020, a block update was reached initial operating capability was deemed to be the Space Force's first offensive weapon. Again, it's something that's been around for some time.

Medalens, it's going to be a further upgrade. It's going to be lighter, jam a broader spectrum of frequencies, and use open architecture software that is more easily updated. Finally, want to point out that there we have updates for those 2020 US National Space Policy, the US Space Force Space Capstone Publication, the Space Command's Commander Strategic Vision, then the updates to the Advanced Battle Management System exercise to support US Space Command.

With that, I'll stop. I think Brian wanted to go into a little bit about the stoplight chart.

[pause]

Dr. Weeden: One of the things we tried to do in our report is provide these broad things, colloquially they're referred to as stoplight charts, you got red, yellow, and green, to give an easier way to look at what's going on in one picture. Last year, we had done just ones for US, Russia, and China. This year, we did one for every country. We always tried to provide this global overview.

I'll say right off the bat, these are harder to do than one might think going into it. There's a lot of subjectivity that goes into trying to make these assessments in terms of how do you compare things. Take, for example, let's look at space situational awareness. In general, most people say that the US has by far the best situational awareness.

Would you say then that Russia and China are then yellow, but they obviously have better space situational awareness than, let's say, India, Iran, or Japan? That's one little snapshot of trying to figure out how to make some of these assessments and judgment calls.

The takeaway is, I would use these charts as an initial guide and also as a discussion point because I think even among the four or five of us that are involved in this project between Secure

World and CSIS, we probably have a little bit different assessments of where things might want to go.

I do want to point out one thing as I'm looking at this. I realized that we made a mistake in this. China for LEO Co-Orbital, should be yellow and Russia should be assessed as green. Based on what we talked about earlier, both Russia and China have been conducting rendezvous and proximity operations in low Earth orbit, as has United States.

The difference being that of those three countries, Russia is the one that in the last several years has done things RPOs that look more like counterspace tests and co-orbital laser tests than just intelligence surveillance.

That is why we would have put Russia as having a green significant dot, whereas the US and Russia would just have yellow, indicating that US and China could probably develop co-orbital and satellite weapons in low Earth orbit if they wanted to. At the moment, we've not really seen them test.

Also, keep in mind, during the Cold War, the Soviet Union had an operational co-orbital and a satellite program so they have that experience and that legacy to draw from when building their current capabilities. Victoria, anything you want to add from our discussions on this?

Victoria: Yeah. If you are on our document, we have breakdowns per country. We go into a lot more specifics about what we did with the stoplight charts. Oftentimes for certain capabilities, we will have no data. We want to point out that no data doesn't mean nothing's happening. The absence of evidence is not the evidence of the absence. It's what we can best do at that point.

A couple of other things. Some feedback we got about this. Someone pointed out it's not friendly to people who are colorblind, and we are updating that to reflect this, so it's more accessible. The other thing is a more interesting theoretical construct, and that typically you think of red as being bad, but in this case the red means that nothing is happening. It was confusing to some people.

You probably want to see more red than green. The point of doing this is, this is not meant to be a moral value discussion about these capabilities. That could be a whole other conversation. We were trying to say, where do we see activity happening. As Brian said, how do you determine between some and significant? That can be a very fine line.

Again, when we go into the individual countries, we talk about whether something is operational or not. Different countries have different concepts, "What operational is?" I would say the United States likes to test a lot, whereas other countries do something like, "Check. We got it. We can consider that operational if we need it."

There's a lot of flexibility for all this, but we thought it was helpful to give a general picture of where these things are, and then also to see whether it changes over time. We'll see what happens for next year. With that, I'll stop.

Kaitlyn: I love it. Thank you, guys. I'm not sure we've ever told you, but we also considered doing something like this a couple of years ago. Ours were report cards, not stop lights. We just found the methodology challenging, as you described, and we ran out of time. We just [laughs] threw it in a bin for later.

I want to remind people to put their questions into the Q&A. Upload other people's questions, if you think they're really important and I should then ask the panelists about them. A quick plug for our follow-up discussion next week on Thursday at this time. Here are our incredible panelists. It will be moderated by Victoria.

I want to get at what each panelist thinks about the impact of these reports. We've been doing this for four years. This is our fourth report. It's led to some, I think, incredible collaboration between CSIS and Secure World. I enjoy Space Threat season, even if it's a [inaudible 28:53] topic to celebrate. I'm interested in your perspective on the impact.

Then also, maybe Joe, because you offer such a different perspective as you sit as a military fellow within CSIS, what have you seen as the impact of these reports as well? Maybe I'll pass it off to Brian first.

Dr. Weeden: Thanks, Kaitlyn. Wow. It's been that long already. One of the big motivations for us to start this was the lack of information that was available in the public domain on these topics. Of course, we heard a lot of the word "charter" from the military and from the government about growing threats, and we saw little indications here and there.

A lot of there was considered classified information coming from intelligent sources. They weren't sharing a lot of that. In its place, what you had was what I'll describe as hyperbolic discussions in the media or in other sources that were going off of, honestly, I'll say a lot of science fiction.

We thought there was a need for someone to come along and figure out what can we figure out using open sources? Can we try and put more information out there in the public domain that has been examined and has been vetted?

Can we use that to help improve not only the understanding of what's going on, but also what we do about it? The discussion of what about it. That has to be a discussion that happens not just behind closed doors but also in public.

We've seen some indications that there's been some change in this. Was it two years, last year, the year before? The US government started releasing some of their own counterspace reports, making them public, which was a big change. We certainly have seen more discussion about these issues.

Maybe biased in the fact this is what we were hoping to see, but I think we have improved the situation and driven a little bit different change in how these things are discussed. Victoria, happy for your thoughts on this as well.

Victoria: I'll just add on to that. A couple things. One, something that's frustrated me working on space issues is there's just a knee-jerk reflex to classify things just immediately. It's hard to have a good policy discussion when there's no way to dig into what is the situation that we're dealing with.

The CSIS and Secure World reports help because it provides an open-source assessment where we think things are. It could be a starting off point for conversations so that we could try and

move away from the classification. Although, I will say, old habits die hard. Space is still oftentimes too classified, in my opinion. Again, another discussion, another day.

The other part that's been helpful for me is that Secure World Foundation does a lot of work with multilateral discussions on space security and stability. Oftentimes within those organizations there is a difference of opinion in terms of what the threat is.

It's been helpful to have something to be able to say OK, outside of your political issues and geopolitical considerations, here's what is actually going on in space. The diplomats, when they're trying to figure out how can we make space a more secure and stable domain, they have a good starting point. They have hopefully the same starting point. We're getting to that point.

We'll talk about this more next week at the April 15th seminar. Thanks.

Joe: I guess, my turn. Two things for me. As a previous consumer of this report, I find these two reports, plus the one you did this year, "Defense Against the Dark Arts in Space," as great centralized resources for someone to learn and begin to understand this domain and this subject. They're very user-friendly documents that anyone in any place and any occupation or interest can understand.

From a military perspective, it's a very useful tool, especially from Victoria's comment about classification, because public perception, public opinion and policy is driven by the information that people have.

I, as a military person, could have this firewall of classified understanding the information and view this report and go, "Wow, they got it completely wrong," but that's what the public and policy are seeing.

It should help inform government officials and intelligence and defense officials to go, "I need to correct that misperception," or, "I need to validate that correct perception," so that policymakers are making good policy decisions.

I find that it is a good tool to say, "This is what people were able to see on the public." If we're able to break down some of those walls and say, "Yes, that's absolutely correct and this," or, "This part isn't correct, and this is what you need to understand."

That's what driving policy decisions. If policy decisions are based off of not accurate information, then that provides us an opportunity to correct that or validate that so that we're using the right information. Maybe just one lens.

Kaitlyn: That's a valuable perspective from inside the government. As someone who's only ever worked at a think tank and doesn't hold a clearance, we do only see one thing. That's what makes these reports so great and so challenging to write. [laughs]

I want to ask to the panelists, it's a question on the Chinese ASAT capability. We can take it towards everybody -- the US, Russia, China. Can you speculate on a Chinese shot doctrine? Under what circumstances might China choose to employ an ASAT?

When we think about this question more broadly of what circumstances might cause any nation to use an ASAT, whether that's a direct ascent, ASAT weapon, or another ASAT or anti-satellite technology like jamming and lazing. I mean, it changes. I want to maybe pick one type and talk about that, but I want to see what you guys think.

Dr. Weeden: This really is one of the most important questions. I'll also start by saying it's really hard for us to compile evidence on this because it's easy for us to see evidence on things flying through space, or things destroying getting fragmented, multiple things.

That's much easier to see. Trying to figure out internal doctrine and TTPs that a country might use for how they employ these things that is much more difficult.

First, I'll just say this is also hard to answer because we have no historical evidence. A orbit ASAT weapon or a direct as an ASAT weapon has ever been used in a military conflict. We don't really have any actual evidence of how these things have been used in the past like we do for a whole range of other military technologies.

Keep that in mind as we're going through this. To me reading through what we can of the way China talks about its counterspace doctrine. My sense is, this is all about holding satellites at risk, to keep a country like United States, deter them from interfering in what China would say is its internal business. It's filled with things like Taiwan.

Clearly if the US was trying to get involved in that, they'd be playing what I call an away game, they're fighting thousands of miles away from the US homeland, and space capabilities are critical for being able to communicate, understand what's going on, and conduct military operations in a South China Sea campaign, the senses from China's perspective.

If we can at least threaten those capabilities and maybe even then interdict them in the case of a conflict, that might keep the US out of that conflict. That's my sense as to what might be going on. Again, with all those caveats of there may be other reasons.

One is, sometimes countries pursue technology capabilities because they think it's going to be a good idea, and they're not really sure how it's going to be used operationally.

Victoria: I'd like to build on that last part. Oftentimes, in my opinion, it seems countries are looking at the global domain and they're saying, "OK, to be a global power, it's not enough to be able to have my own satellite. It's not enough even to be able to launch my own satellite." It seems to be now, "OK, I guess global powers need to have some counterspace capabilities."

When you talk about, "What's your military utility?" All you hear is just a vague discussion of, "Well, we need to be able to protect our satellites." "How? How does this actually do that?" Then you get some mumbling, and, "Next question," that sort of thing. I think it's part of that conversation.

I would like to point out as well, when saying, when would the country decide to use an ASAT? Again, Kaitlyn made this point, but there's an ASAT and there's an ASAT. There's something that's destructive, and there's something as non-destructive. Non-destructive stuff is being used now. That's already happening. It's a destructive step that could be more escalatory.

Frankly, I don't see China, for example, using a direct destructive ASAT, unless there's a military conflict going on terrestrially. Really and truly, I don't see it coming out of nowhere. At which point, you have a larger conversation to worry about.

Finally, one thing I will point out, and this is a bit of concern as different countries have different concepts of what escalation is. China believes that they can dial it up and down. United States believes it's a one-way street.

This can be a little disconcerting if the Chinese think that they can do something that's highly escalatory, but they can eventually come back from it, whereas we don't necessarily view it as that.

That's where it's helpful to have conversations about capabilities in deterrence theory because you have to make sure the message you're sending is the one that's being received, and that's not always the case for counterspace stuff. Thank you.

Kaitlyn: Just building on this, this fall, summer I wrote a piece on this triangle between direct-ascent ASAT technology, missile defense technology, and nuclear weapons, and how they all are interlinked, and one is providing some deterrence against the other.

While we think about direct-ascent ASATs, we have to consider the Chinese and Russian perspective, especially on US missile defense technology, and how perhaps their direct-ascent ASATs might be their assurance that they could still penetrate in the case of an attack.

I want to jump to another question, which is building on the same topic but I will caveat with. This is also a great conversation for our next [laughs] event next Thursday at 1:00, but we have a question on what are the next steps that can be done to prevent further escalation in these areas.

Also, I would pose to the panelists, what is worrisome to you, and then, in that specific sense, how can we prevent specific escalation in that area?

Dr. Weeden: Look. The thing that's most worrying is that all this stuff is perfectly legal and perfectly allowed. Nothing we've discussed in every report breaks any international laws or goes against any kind of rules.

The only international law, that basically says you can't place weapons of mass destruction in orbit or conduct these sorts of tests, activities and exercises on the Moon or other celestial bodies. Aside from that, anything is fair game, even the close approaches, rendezvous and proximity operations.

You can get as close as you want as long as you don't touch or physically interfere with another satellite. To me, that's pretty worrying because that leaves a whole lot of ground.

On the one hand, you have countries expressing increased concerns about these capabilities that are being developed, but that seems to be used mostly for a justification for them to develop their own capabilities, not that anyone's going to try and do anything to halt this proliferation.

We use that word in our report deliberately, proliferation of counterfeit capabilities. These technologies are no longer limited to just two superpowers. They are spreading around. It's becoming easier to do.

The barriers to entry are getting lower, and there are more incentives for countries to go down this path because more countries are using space to support and enhance their conventional terrestrial capabilities. That's a dangerous mix of different incentives.

I see that there's a question here about the UK, and whether or not we should include them in our report. We talked about that. You guys have in your report, Kaitlyn, a sort of ones to watch, up and coming counterspace powers.

I bring that up because this gets to this notion of proliferation. We think, unfortunately, more and more countries are going to be thinking about, if not going down this path, and that could be a real challenge.

Victoria: Yes, and again, not to step on next week's conversation too much, but there are a couple of things that could be done. We are not helpless.

This is not determined that this is the way it's going to have to be, and there's a lot of things to be done short of a treaty banning space weapons, because, as we'll say next week, that's not a very helpful conversation. Frankly, the international community has been running around circles for decades now about this binary treaty, no treaty, conversation getting nowhere.

Some recommendations that we have made, again not in this report but in other discussions, are looking at some sort of ASAT test ban. Try and prevent having ASAT tests that creates debris. Whether, and I said test ban, it could be a moratorium or something like that that could, I would say, reverse the norm that is being established right now.

I would argue there's a negative norm that's being established that, if you have an ASAT test, a direct ascent ASAT test, and you do it in a low enough altitude and don't create a lot of debris, it's not great but the international community will accept it. Some ASAT test moratorium would try and reverse that norm.

Another option that could be discussed is some sort of replication of the Incidents at Sea agreement the United States and the Soviet Union had during the cold war, but do it for space and do it for non-consensual rendezvous and proximity operations.

There's a bunch of different things that can be done. There just needs to be political will and an interest in following through and looking at these things in order to make sure that space is a more stable and predictable domain. Thank you.

Kaitlyn: I would just add real quickly that if you're interested in this conversation, join the discussion next week because this is all that we're talking about.

Also on the UK question, we do have an "others" chapter. Not to just throw away [laughs] all the other nations, but to track different counterspace proliferation amongst other nations and non-state actors. We have found in the past non-state actors getting their hands on this lower

threshold technology that is, by our definition, a counterspace weapon because it does affect space systems.

We found different organizations around the world using technology like jamming that they bought off RadioShack or eBay or build themselves, and being able to use that to affect the downlink signal from a satellite.

It's not just proliferation of these big investment anti-satellite systems that are either direct ascent or co-orbital, but these lower-level threshold technologies is what keeps me up at night, as well as cyber.

I do want to pose a question in here that's talking about North Korea's cyber capabilities to Joe specifically and to the colleagues at Secure World who maybe looked at this as well in their assessment.

How or why do you find that North Korea's cyber capabilities are potentially more dangerous than Russia's or what about the cyber capabilities worries you most and makes you assess that they are something we need to be watching?

Joe: Thanks, Kaitlyn. I would say, and I saw the question in the chat, that the reason to highlight Secretary Pompeo from the previous administration was to highlight in comparison to the other threats. If you are looking at North Korea, you're not really looking at direct ascent co-orbital or those types of things.

That's one administration's perspective on the level of threat in comparison to another nation. To me, it highlighted the fact that if you're looking at North Korea, you're looking at that threat when you're looking at counterspace threats.

If you were looking across the spectrum, North Korea's activities, the increased frequency, the increased sophistication, the places that they're targeting is why it makes it more notable than other areas. That's why I wrote it the way that I did.

Dr. Weeden: It's a great point. I would disagree with former Secretary on the severity of the North Korean cyber threat. Just look at what's happened in the last few months with some of these cyber attack campaigns that have the fingerprints of Russia all over them.

The point Joe's making is good in that you can get a lot done with cyber and electronic warfare, and you might not need the big shiny hardware that goes up into space and directly takes other satellites. That's an important thing to keep in mind.

When a military commander is looking about it, they care more about the ultimate effects than they do in most cases about how it gets there. If you can get most of the effect for a much cheaper thing, that may be what is actually used.

Also, the electronic warfare cyber is a little bit more of a proliferation threat, I would say. We're not talking about big, expensive hardware. It's knowledge that is a little bit more easily transferred. It's harder to monitor. It's harder to track.

North Korea absolutely has some pretty darn good cyber capability. Along with Iran, we've seen those in exercise over the last several years.

Joe: I would just add, when the North Koreans turned my lights out again, that's the greatest threat North Korea is...To Brian's point, is that when you're looking at cost savings risk versus reward, the attribution and the reversibility, and the additional rewards that aren't space related is what we see in a lot of their cyber attacks is finance-based, which is feeding and funding other activities.

That is where we focused our...When you're looking at trying to figure out what you can get the best bang for your buck, for the North Koreans, it's in their cyber and electronic domain.

Kaitlyn: I want to jump to a question that was posed about to what degree is an action considered aggression, a threat, an attack? We're throwing out a lot of word around here. This is a question that we asked our workshop panelists, which I think all three of you were at our workshop for the Defense Against the Dark Arts Report.

We had a couple of space lawyers in the group who loved answering this question. Maybe from the policy side, we can talk about what the scale of aggression is and how it's being talked about or considered, especially in multilateral fora as we talk about arms control for space.

Dr. Weeden: I'll quickly start and say I've been involved in a project called the MILAMOS manual, which is a whole bunch of international, military, and academic lawyers trying to answer this exact question.

How does the existing body of international law apply to military of space? What constitutes a use of force and armed attack? Things like countermeasures and retortion, and internationally wrongful act. All of these things are very specific legal terms that are used in other domains.

One of the challenges is we don't really know fully what they mean in the space domain because we don't have a lot of examples. If you look back to the maritime warfare, air warfare, other domains, there's tons of historical precedent, unfortunately, that you can draw from as to what constitutes what.

There's all of these International Criminal Court or ICJ cases where you have the highest body of law on the globe saying this was a breach of the UN charter, or this was a violation of this, or this was a justified use of force. We don't have any of that for space.

I would say, at the moment, I don't think anybody really knows. Also, a lot of this is even if something legally might constitute one of these things, that doesn't necessarily mean you go to war over it. I'll remind people that a couple of years ago, Iran shot down a US drone, and the Trump Administration decided not to go to war over that when we probably could have if they chose to do so.

There's been other cases in history of aircraft getting shot down, people losing their lives and country deciding that it did not mean we're now at war. Other times, it does. It's one variable in a bigger political calculation.

Victoria: I'd like to build upon that last part because it's really key in addition to whatever the lawyers say, love lawyers, they're important. It just depends on how you view the country, to be honest.

The biggest example I would use for that is just looking at the international community's response for when China has anti-satellite test in 2007, pretty critical. That's fair assessment. To when India had its anti-satellite test in 2019, pretty quiet actually.

The only part of the US Government that even said something slightly critical was the director of NASA who was furious because he has people in the National Space Station and within a day he had to submit a retraction and dial it back. That's because India and China are viewed there very differently by the national community.

That's going to shape whether or not something is perceived to be a threat, whether or not the lawyers and the military lawyers have determined it to be as such.

Kaitlyn: I would just post one last question, moderator's privilege. What do you guys see as the next step for your counterspace assessment? Like I said, we've been doing this for four years.

What is our value add? What's our utility? How can we think about Space Policy and doing these open source assessments? Are there new areas to expand into? Are there different things that we should consider looking at? What is your opinion, Victoria?

Victoria: One thing that we're trying to do more of is offering our documents in different languages because that does help with people being able to understand it, not just here but internationally. Last year, was the first year we had our executive summary translated into French and Spanish.

This year, we're getting our executive summary translated into French and Spanish, but also Mandarin and Russian. We're looking forward to continuing to make this information more accessible for policymakers from all over.

Dr. Weeden: The boundaries are doing that is because there are international discussions going on in multilateral fora on these issues. We want to try and help inform the countries that are participating in those discussions so that we can have the discussions on some things of substance. That's one of the big things.

The other big thing we did this year and trying to continue in the future is the imagery. We worked through and we did a big update to the imagery. We're trying to slowly work through and trying to add in satellite imagery of all the places and the things we talk about in our report.

We hope in the future that'll be expanded. Maybe even be a separate portal that lives on the Web somewhere where we go through and zoom around the world and see different places where these things are happening. That be on my wish list of things that I'd like to have in the future.

Joe: The last thing I would say is, both documents do touch on it, but one area that I think would be valuable, at least from a military perspective is, instead of always looking at effects against space, what are those things that are ground-based?

We talked about North Korea and other countries that don't have the ability to do things upward, but there are activities that they can do on the surface that have counterspace implications. Maybe expanding upon that might help people understand that there are threats to space that non-state and lesser state actors can use and have at their disposal that are threats to the space assets.

Kaitlyn: That's a great point. In our classification of space threats for kinetic fiscal, we do always include a little bit of language about attacks or ground stations, but we don't really talk about it. It's not really happened, but ground stations are not well-protected. They're very identifiable. They're all over the world. They're not just synchronous.

Therefore, they could be pretty vulnerable to a cyber attack, to an actual kinetic attack. I think that's really important.

I want to thank all of you for joining us. I want to once again plug our event next Thursday, at this time, where we will dive even deeper into these questions on escalation, deterrence of how to defend against space threats.

Our director, Todd Harrison, will brief our Defense Against the Dark Arts in Space Report where we've outlined a couple of different ways to defend your satellites against these exact space threats that we have identified for the past four years.

More broadly, talking about what in the international community can we do, as Victoria said, to change the norms from allowing direct descent anti-satellite tests that create debris, what can we do to proactively get in front of some of this proliferation that we've all identified.

Thank you again, all of you. I hope all of our viewers have a great rest of your day. You can find all of our stuff online or follow us on Twitter. We're very chatty. Thank you and have a great afternoon.

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