



War and Peace in Outer Space

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Virtual Event

Moderator: Shashank Joshi, *The Economist*

Speakers:

- Air Commodore Philip Gordon, Director General Air Defence and Space, Royal Australian Air Force
- Matthew Hersch, Harvard University
- Victoria Samson, Secure World Foundation
- Cassandra Steer, ANU College of Law

Shashank Joshi: Thank you very much for joining us all. I'm Shashank Joshi. I'm defense editor at *The Economist* here in the UK, but I'm very pleased to be joined by colleagues from all over the world.

We're here to launch "War and Peace in Space: Law, Policy, and Ethics," a collection of essays and commentaries on the future of conflict in space, the title of which and the cover of which you can see, hopefully, on the slide in front of your screen.

We are hosted today by a series of institutions, the Secure World Foundation, the Australian National University, Harvard University, and the University of Pennsylvania. I won't read out all the details, but you can see them on the screen in front of you.

Let me begin by saying we are on the record. This event will be recorded and it will be available on the Secure World Foundation website following this event.

I think we have a few more slides just to go through briefly before we begin. Here's a list of me, your moderator, and our speakers today. Let me briefly introduce each one.

Matthew Hersch is an associate professor of the history of science at Harvard University, specializing in the history of aerospace technology.

His co-editor, Cassandra Steer, is a mission specialist within the Australian National University Institute for Space, and a senior lecturer at ANU College of Law, who's published widely on space law and space security. They are the editors of the book we're launching today.

In addition to those two, we also are very lucky to have Victoria Samson, who is the Washington office director for the Secure World Foundation. She has 20 years of experience in military space and security issues, and I think many of us will know her.

We are also joined here by Air Commodore Philip Gordon, who graduated from the Australian Defense Force Academy in 1989 and is now Director-General, Air Defense and Space. Thank you all very much for joining us as panelists.

A few other points of detail. For those who would like closed captions, please, you will find a button next to the Q&A button on the bottom right, as you can see. If you click on that and click on show subtitle, you should be able to turn on closed captions for those who will benefit from that.

We're also going to hopefully leave sufficient time for a good session of questions. Please do get your questions in anytime from now, but especially as the discussion progresses.

You can go down to the bottom and find the Q&A option. You can vote on other people's questions to see which one's you'd like answered, or you can please type your own in. Keep it short and simple. I promise I will channel your questions to the panel as best as I can.

Great. Here are some details about the book. I won't go into these because we are going to begin by hearing from Matthew and Cassandra who will tell us a little bit more about this volume which looks at the growing weaponization of outer space and the potential for a space-based conflict in the new future.

This is a subject I'm very interested in. I've written a little bit about space security in the UK. We have just launched a new defense review this week which emphasizes space security in a very interesting way. I think in all of our respective countries we're seeing a torrent of interest in this area from the security community, the legal community, and many others, besides.

Matthew, would you please begin by kicking us off. Then, we'll move on to the other panelists.

Matthew Hersch: Yes, hello. Thank you very much. I hope everyone can hear me.

I'm very happy to be starting off our conversation today. As a historian, it's always wonderful when you have an opportunity to share some of the history first.

I want to start off by saying thank you, but I should say you're going to hear very many thank yous today. As a result, I'm going to be brief in my thank yous and thank only my fellow panelists and speakers, the contributors to our volume, my co-editor Cassandra Steer, and Claire Finkelstein who invited me to join this project, for which I am very grateful.

Cassandra will have much more to say about the creation of this volume. I'd like to mention only a few historical points to start us off.

As a historian of technology and of spaceflight in particular, I wage a nearly constant battle against the misremembering of the past. The history of space warfare is, itself, a collection of myths that we must shatter in order to achieve the goal that everyone on this panel hopes for, a safe and secure world free from fear.

When it comes to this story, there are three very important points to keep in mind. I'd like to mention them today.

First, that this is a long history. The ability to attack targets in Earth orbit was a technological revolution not of the last decade, but of the early 1960s. The reason why the Cold War did not extend into a violent struggle beyond the atmosphere is not because major superpowers lacked the technological wherewithal to do it.

In 1958, barely months into the era we now call the Space Age, Senator Lyndon Johnson likened the new frontier to a highway overpass from which nations might lob nuclear weapons upon adversaries as easily as children might hurl stones onto passing cars.

"There is something more important than any ultimate weapon. That is the ultimate position, the position of total control over Earth that lies somewhere out in space. That is the distant future, though not so distant as we may have thought. Whoever gains the ultimate position gains control, total control over the Earth for the purposes of tyranny or for the service of freedom."

This future though did not come to pass because nations with the capacity to fight wars in space, especially the United States, recognized that it was not a good idea.

That leads me to my second point. That is that this is an ambivalent history. Opportunities presented by space warfare were always more than equaled by the threat of incipient catastrophe that they posed. After initial testing, missiles to obliterate satellites, space guns, and other space weapons were shelved because they made little tactical and strategic sense.

The prospect of an arms race, the spread of weapons of mass destruction into the heavens, the disruption of worldwide communications produced by high-altitude nuclear detonations, the destruction of vital space assets, unintentionally by tests or purposely in attacks, and other factors convinced spacefaring nations to proceed cautiously.

My final point is that this is a changing history. During the 1950s and 1960s, mutual deterrence between the United States and Soviet Union inhibited the use of nuclear weapons and other weapons of mass destruction and created a climate for treaties on nuclear testing, space weapons, anti-ballistic missile systems, and the size of nuclear arsenals.

The multipolar world in which we find ourselves now may more closely resemble that of the early 20th century, in which competition between established and rising powers proved as destructive as that between old antagonists.

Under these circumstances, a rush by nations to arm themselves will produce not deterrence but an arms race and a variety of dangerous, shifting alliances. The solution to this problem will not be found in military dominance or even deterrence alone but in diplomacy and agreements with teeth, in the form of sanctions and international condemnation, among other things.

Cassandra and I are fortunate to have the participation of so many accomplished practitioners and scholars in a project tackling this vital subject. We look forward to telling you more about it today. Thank you very much.

Shashank: Matthew, thank you very much for that. Cassandra, would you like to follow up and build on Matthew's excellent and succinct introduction to your book?

Cassandra Steer: Sure. Thank you, Shashank. As Matthew said, there's going to be endless thank-yous. I also want to thank Matthew. He and I met, in fact, at a conference that I organized, that was hosted by the University of Pennsylvania's Center for Ethics and the Rule of the Law, one of the co-hosts for today's event.

The conference itself was called the Weaponization of Outer Space, which in itself is a bit of a contentious title to give a conference because that is exactly the question. Is space being weaponized today or not? I was hired by the Center for Ethics and the Rule of the Law really specifically to focus on that project.

At that conference, we had experts from mostly across North America, also some Europeans. Some of those were military lawyers and military personnel. Some of those had worked for the UN as space and arms control experts. Some were academics. Some were practitioners. Some were from the space industry as well.

It was an amazing collection of expertise from across disciplines and perspectives. Secure World is a rare organization that brings that kind of cross-expertise together to talk about what's going on in space. You don't often get that collaboration across so many different sectors.

It was the first time I had met Matt. It was Claire Finkelstein, the director of that center who suggested that I seek out whether Matt would want to co-edit the book with me that was to come out of that conference. It turned out to be the perfect collaboration. I focused, as a space lawyer, on space security and space policy mostly through the legal lens.

Although the legal and political history is part of my necessary lens to understand what's going on today, to have Matt's expertise, particularly around the technological history and how that paired with the political history, was really an excellent insight. It was a delight working with you on this book anyway, Matt, just on a personal level.

That conference in 2018 is what gave birth to this book. We were very honored to have as a keynote speaker at that conference General David T. Thompson, who had just been sworn in at the time, in 2018, as Vice Commodore of Air Force Space Command.

He now, of course, is Vice Commodore of Space Force, which was stood up just over a year ago. He very kindly wrote a forward for this book. I should highlight that that doesn't amount to official endorsement from Space Force, of course. He wrote that in his personal capacity.

What I appreciated about both his comments at that conference and also his forward in this book is that for some people who didn't really understand the context of why Space Force, why it exists, that it just sounds like...Particularly the timing at which it came out under the previous administration, that I think some people didn't take seriously why it was there.

General Thompson's comments in the forward highlight the reason this book is there, the reason these issues are there.

The reason why we're talking about this is because we've actually reached a new tension point in space and that what we need is greater understanding, greater collaboration, in fact greater transparency, not only amongst partners and allies who are in space, who are active in space, but also between potential adversaries, which might sound counterintuitive.

That really comes through as the golden thread in this book. It's a collection of essays of experts from around the world. We have African, Australian, European, and North American experts who have contributed to this.

The golden thread really is we need to have more transparency and confidence-building measures, more TCBMs. The jury is still out on whether we actually need a treaty for arms control in space, but without a treaty, there are still many, many more things that can be done. Space diplomacy is a huge part of that.

The conference was in 2018. Edited volumes always take a while to come together. It was also slowed down by my own circumstances - I became a mother for the first time. Then we had a pandemic. Everything got slowed down by circumstances.

In fact, the timing of this book being published and released...It released in February in North America and just this month here in Australia and across Europe. The timing has actually worked to our benefit. It may have got lost in a sea of other concerns and issues had it been released last year.

Now, we truly are in a multipolar reality again. There's a new US administration, which is shifting focus in many ways. Space Force is a real thing. Other countries, like Canada, France, Japan, and India, are all talking or have already set up equivalents to Space Force, in Australia.

The Air Commodore who's joined us today, I'm sure, will talk a little bit more about how Australia is seeking to position itself. Australia Defense is working on its very first space strategy. Now is the time for this book to come out. I'm excited about it in that sense.

Also because I feel like there's more public awareness of these issues. There's excitement around the civil space sector. We've got SpaceX shuttling humans to the International Space Station. We've seen the US, the United Arab Emirates, and China with their Mars missions all at the same time. There's reusable rockets being launched.

There's a lot of exciting stuff happening in the civil space sector. That's raising awareness of why space is so important to all of us, how dependent we are on space for our 21st century lives, which is exactly why we have to do our utmost to prevent conflict extending into space.

That's why we have the Outer Space Treaty. That was the Soviets and the US agreeing what we have to do and also the allied partners agreeing we have to ensure that conflict does not extend into space.

Some of the themes of the book look a little bit at the strategic restraint, which is what has kept space stable right throughout the Cold War and into the first part of the 21st century, which in the last 5 to maybe 10 years has come under pressure.

I would say that the US and China and Russia have started to move away from strategic restraint and have started to move into policies, strategies, and rhetoric that are, I assert, escalatory. Some of the authors in this book take that stance as well, that what we need to be doing is moving back to strategic restraint.

There are issues covered in this book like the application of the law of armed conflict to space. I co-authored a chapter on that with Dale Stephens, esteemed colleague of mine here in Australia. Looking at weaponization and arms control and the legal regimes around that, we have a piece by Jinyuan Su, who's a Chinese expert on these issues.

Gilles Doucet, who's a Canadian former defense force technology expert who's now very much a policy and law expert as well. We have pieces on space diplomacy by people who've worked with the Union of Concerned Scientists, people who have expertise as former ambassadors and working within the UN.

We have also pieces that actually provide proposals for how to go about improving the gaps we have in our current space diplomacy and TCBMs and also a piece by Peter Hays, who many of you know, about Space Force and what Space Force should be doing.

It really covers the whole gamut. We talk about the law of war and peace in outer space in one section, the ethics of space security in the next section, current and future threats, so looking at really giving a picture of what's going on in space and what the concerns are in the very near future. This is in the next 5 to 10 years.

Then we look at moving towards stability as the final section. The conclusion that Matt and I have written together, we decided to go with the alliteration of three Cs. That's the preference in much military parlance. Our three Cs are cooperation, collaboration, and communication.

Because really, if we have an out-and-out war in space, there is no winner. We all lose. Those countries with the greatest technological dependence on space are the biggest losers. What we need is greater communication and collaboration and cooperation.

I'm happy to talk more about the actual issues in any of the chapters but definitely about the greater issues that we cover.

Shashank: Cassandra, thank you very much for expanding on the book's contents and diving into detail.

Victoria, let's go over to you now. You've published a recent piece, in December, I think, for the Arms Control Association, arguing in favor of legally binding measures on space security.

One thing I'd love to hear a bit more from you on is whether the change in administration changes the parameters on any of these discussions. Of course, today, we've had news of US-Russia space consultations, which hasn't been widely reported, but for those who watch these things will have seen it.

Do you see anything changing diplomatically on that front? That would be one thing I and I'm sure others would be interested in hearing as you give your remarks.

Victoria Samson: Sure thing, Shashank. Thank you. Thank you, everyone, for attending and for asking us these great questions we've already got from the chat. Looking forward to the conversation.

I'll start off by answering Shashank's question first about whether we see or anticipate a change in the administration affecting the US ability to continue these sort of conversations. The short version is no. I think there are common US interests in space and common US social security considerations in space.

That's why if you look at the National Space Policy for the last administration, it does not really change that much in terms of what it was like to almost every National Space Policy (with the exception of one I could think of), talking about the need supporting and space arms controls on effective, verifiable and in the national interest in the United States.

I think that sort of thing will be a continued presence. What we're seeing as well is the pendulum is swinging more towards the supporting the idea of responsible behavior and a supporting idea that a possible limitation to behavior is something that would be acceptable to me with their security interest.

That, to be honest, is not something that we haven't seen in the past very often in these international discussions. In Geneva, the US mentality was well there's no arms race in space. Therefore, we don't need legally-binding actions and procedures.

I think the US military in particular, and the US Intelligence Committee to a lesser extent, is starting to recognize that it's to the US' security benefit to make sure that there are rules of the road that there are guardrails, so that you don't have people acting irresponsibly and affecting everyone's ability to utilize space.

A couple things I'd like to go over really quickly in the time I have, and then I'll open for questions. Why is it even a consideration? What sort of things are we looking at in terms of war and peace in outer space?

A lot of people hear that and they think counterspace, and I would like to talk just really briefly about the Secure World Foundation's counterspace threat assessment. It's available on our website. Our latest version, 2021 version, is dropping in about a week or so, on April 1st.

Basically, we wanted to put it together because there's a lot of discussion and concern about counterspace capabilities being developed, but there's not a lot of good open source conversations.

We wanted to put it together in one place. What do we actually know about what's happening as opposed to wild speculation or vague considerations? What can we actually know about what's happening in terms of space, anti-satellite tests, or anything like that?

We try to contextualize this in terms of, OK, so this country carried out this exercise. What is their policy in this issue? What is their budgetary situation? What is their attitude? How does it fit into the whole context? You really want to have a holistic conversation so you can make the decisions with the most amount of information possible.

For our counterspace threat assessment, we looked at the direct ascent ASAT weapons and co-orbital ones. We looked at directed energy, looked at radiofrequency interference, and cyber. We do this for the United States, Russia, China, Iran, North Korea, Japan, India, and France.

Long story short, there's a lot of stuff happening. It's about 150-page document. We won't go into the details now. We have a release event with CSIS with their excellent counterspace threat assessment as well on April 8th.

I will say there are a whole host of counterspace capabilities being developed, but there are no kinetic counterspace capabilities being used in active conflict as of today. It still doesn't mean the international community doesn't need to do anything about this. Definitely, there's a proliferation of interest and also research and development and capacity.

That's what I want to talk about a little bit more in terms of the Arms Control Association article that my colleague Brian Weeden and I wrote, talking about the need for space arms control, the need for the United States to take leadership.

Currently, the international community has been spinning its wheels. There's been a discussion for the past few decades now about should we have some sort of treaty banning weapons in space, or should we not? It becomes a binary treaty-no treaty sort of conversation.

It hasn't been helpful because there's a dispute about, is that the best way to handle this sort of threat? I know the arms control disarmament community, when they have threats, they like to ban them. They're like, "If you don't want people to have nuclear weapons, then you prevent them from having fissile material."

With space, it's a slightly different conversation. The technology's not necessarily the threat. It's what you intend to do with it. That's where a conversation is more helpful, not to ban technologies but to look at regulating or identifying responsible behavior, actions.

Unfortunately, the treaties that have been discussed to date have focused solely on actual weapons being put in space. It hasn't really dealt with the situation that we have right now for the instability of the space domain.

What we've been arguing is that there's a need to have a conversation moving ahead, looking at OK, we need to identify responsible behavior, need to figure out what are the common threats. That's been also an issue in these conversations in Geneva at the Conference on Disarmament.

The US and its allies tend to look at stress to operating in space as almost an environmental issue. It's cluttered. It's congested. That sort of thing. Whereas Russia, China, and their allies tend to look at it more as they're focusing on space-based weapons, mostly missile defense, looking at and concerned about the United States.

It's hard. How do you solve a problem if you can't even agree on what it is? You need to get on the same page for that.

That's why, I know I'm getting close on time, the UK resolution that Shashank mentioned earlier on in December that was passed by the UN General Assembly with exceedingly positive number of support, it's a step in the right direction.

It could be very helpful to get us off that rut that the international community has really dug itself into multilaterally, and try and move ahead, and actually get progress of the UK resolution.

It calls for three things. It asks for all nation states to submit to the UN secretary-general by the beginning of May a report that consists of three things. One, what do they determine to be threats to operating in space? Two, what do they want identified as responsible, irresponsible space

behavior? Three, suggestions for the ways forward. That sort of thing can help spark the conversation.

In terms of where we go from here, once we have a common understanding as to what the concern is and what sort of behavior you want to call out, that's when you can do things.

You could talk about verification through situational awareness. You could talk about non-legally-binding issues that eventually might become legally binding later on, things like a kinetic energy anti-satellite test ban, or something about agreeing on responsible behavior for non-consensual close approaches, almost like an INCSEA, but for space.

You could do things like talking about improving notification. There's all sorts of things you can be doing in getting on board, but we need to make sure we're looking toward the same place. I'm really hoping that the conversations we'll be having over the next year will allow us to get to that point.

With that, I'll stop, and I look forward to the questions. Thank you.

Shashank: Victoria, thanks very much for that and for expanding our discussion.

I'm very pleased now to ask Air Commodore Philip Gordon to step in. It's incredibly valuable that we have a military perspective, an operator's perspective, here as well.

We're really interested to hear how this problem looks from your perspective, particularly as I understand Australia is currently writing its first space strategy. We'd be interested in perhaps hearing a little bit more about whether elements of this discussion will be incorporated into that as well in your view.

Philip Gordon: Thanks very much for the opportunity here. I'm not sure, Cassandra, whether I should thank you or come chasing you off. I do feel like the odd one out here, but as I'll talk about, having a diversity of views is really important. I'll present my personal views from an Australian-defense perspective about space.

I'll just start by thanking everyone who's undertaken this important body of work because it is an absolutely the discussion we need to have. We are in the process of developing our first space strategy, so we want to be informed by the best thinking, challenged by the best minds. We don't want to just take the easy path to landing on our approach.

As Australia moves from being a consumer of space capability to a contributor of space capability, we've really got a great opportunity to decide what it is Australia seeks to be as a middle player in space and what is the approach that we want to take to all of these elements of space capability.

In some ways, being a little bit behind gives us that blank slate to imagine our future. We are certainly working to try and build up our resources, our commitment, and our thinking around space so that we make deliberate steps going forward.

I mentioned diversity. Diversity of views are very important. I would say off the outset I don't necessarily agree with all of the arguments in the book or the conclusions that are drawn, and that's OK. We should be open to being challenged on our approach.

I would say, as Matthew noted at the start, the technology has existed to conduct warfighting in space since the 1960s. Of course, the challenge is how do you put that genie back on the bottle? This is a problem all militaries face. They can unilaterally make decisions about what they do, but how does that affect or not affect what any potential adversary would choose to do?

We have in Australia recognized space as a warfighting domain. I know that runs counter to what the book asks for, but that's largely based on the reality of actions we're seeing in space as we speak. A number of tests throughout the last 12 months, both direct descent and on-orbit capabilities, indicate that other people see space as a place where they can get military advantage.

I don't for a second downplay the consequences to the worldwide economy and life if we are heavy-handed in space and we don't think it through.

I would say that any military's ultimate aim, or any Western military, is to prevent the outbreak of war, to manage any tensions, and to be an instrument of government power to prevent a conflict. That's certainly the case for Australia.

Our recent defense strategic update described our approach as shaping the environment, deterring aggression, and then, if necessary, responding with credible force. We do not seek to be part of conflict in space, but we do seek to shape, deter, and, if necessary, respond with credible force.

I'd like to focus in on that word deter for a moment. Going back to the Cold War, there's a lot of great minds that have given a lot of thought to deterrence. I think that's equally true about the space domain as it is in all of the other terrestrial domains as well.

Deterrence is about imposing costs, and that's the bit that's very familiar to us, mutually destroyed destruction, you strike us, we strike you. No one's the winner in that. The real area to be explored in deterrence is in denying the benefits. That's certainly what we're looking at in Australia.

How do we make it such that our space systems and our reliance on space is resilient such that there is no incentive for an adversary to conduct an attack in space on our capabilities because we can still prevail? We can still get the job done in other ways.

There are many ways to achieve resilience in space capability. I would say our focus in Australia is on shape, deter, and respond, and, importantly on that deterrence piece is understanding how we can be resilient, how we can deny the benefit of an adversary seeking to strike our capabilities in space so that we can avoid that conflict.

I fully agree that diplomacy along with all of the other instruments of national power have a huge role to play in preventing conflicts generally, but also conflicts in space.

I'll probably close with that and look forward to your questions as the odd one out, the military person in the room. Go easy on me, thanks.

Shashank: Thank you very much there, Commodore. Thank you to all the panelists for their opening remarks. We now have just short of 30 minutes for a broad discussion. I'm pleased to see a number of interesting questions piling up. Please do add any further questions into the mix, and I'll try and get to as many as I can. Let's begin by the one that's top of my list.

Malcolm Davis asks, "Given the nature of some counterspace capabilities, including cyber threats to space systems, how do you verify and monitor adherence to any agreement on responsible behavior in space? It's fine to have a UNGA resolution, but all members have to honor it. The nature of soft-kill capabilities opens up gray zone activities that can circumvent any agreement."

Victoria, it might be useful to begin with you. I noticed that you addressed this point in the piece that you published a few months ago. I think it would be helpful to start before we then expand that discussion onto any of the other panelists who would like to take it on.

Victoria: Sure thing. That's the thing it comes down to any time you talk about these international discussions. How do you ensure compliance? In the grand scheme of things, the way you assure compliance is you shape the agreements to everyone's benefit to comply with it.

That sounds very obvious, but it's one of those things you understand because, in the grand scheme of things, it's not like you're going to be able to come out with a hammer and punish people. In terms of naming and shaming or criticizing them internationally, that's really the tools and toolkit we have.

When you're talking about verifying behavior, you need to make sure you have all the stakeholders involved in the conversation. Sometimes, it takes a while. This is a feature, not a bug. I will point out, for example, this is possible. The United Nations Committee on Peaceful Uses of Outer Space, or COPUOS, spent the better part of a decade creating long-term sustainability guidelines.

I am very biased towards that because my current boss was the working group chair, Peter Martinez. We liked it even before he was our boss because it was a helpful conversation talking about what best practices do we want to see. The COPUOS community came up with 21 guidelines and a preamble.

COPUOS operates on consensus, which means all -- at that point, 92 member states -- had to agree. These are countries like the United States, like Russia, like Iran, had to come to agreement in terms of best practices. It takes a while. You need to be able to build up that foundation and go off from there.

I think it's beneficial. I think the COPUOS discussion indicates that there is an understanding in the international community that it is helpful to have non-legally binding solutions. You need to figure out, "OK, where do we go from here in terms of compliance? How do you implement them?"

It wasn't like space is suddenly sustainable, "Check that box, we're good," but it's the start of a conversation. I would argue, in terms of conversations about responsible behavior, from the security and stability aspects, you need to start up and you need to build that foundation, get to a common understanding.

Then you're at a better place to verify irresponsible or bad actors. Then use the international community to figure out where you go from there. Thank you.

Shashank: Thanks, Victoria. I'm not going to make every panelist answer every question, but if anyone would like to chip in, please raise their hand so I could see you. Cassandra, please, go ahead.

Cassandra: I'd love to answer that because I think the key part of Malcolm's question there is agreements on responsible behavior in space. In fact, it's very easy to monitor adherence to responsible behavior norms. That actually goes to another question that's in there.

Almudena Azcárate Ortega has asked if the difficulty with having treaty norms as control norms is defining what is a space weapon. That's part of the reason that we've been a little bit stymied. Russia and China have had this draft treaty on prevention of placement of weapons in space, so focused very much on space-based weapons, not on ground-based weapons that might threaten space systems.

There's a huge problem in terms of defining what a space weapon is. It's also a problem in terms of monitoring compliance because all of these technologies are dual use. As Victoria pointed out in her first comments, it's more about what you use the technologies for rather than the development of an actual capability.

If we're focusing on norms of responsible behavior, which I think is the better way to go, it's why populous has focused on it. It comes through in a lot of chapters in this book that arms control itself has so many problems.

If we focus one's responsible behavior, then it's much easier to come up with agreed norms. It's also much easier to monitor. Are you doing what we all agreed? Is it OK in space? Are you threatening the stability and usability of space?

One example is that these kinetic shoot to kill weapons that China, US, and now India have demonstrated shooting a missile and targeting a satellite and blowing it up in space, destroying it in space. The fact that that creates so much debris and that there is absolutely no way of containing where that debris growth goes, so it creates any increases the threat environment, the hazard environment in space.

To me -- and I think to a lot of people says -- well, that is irresponsible. You can talk about how militaries are using space how to shape norms but how to protect and defend assets in space responsibly. Debris creation is a responsible full stop.

Then, we can also have more discussions about the long-term sustainability guidelines. Maybe, they will turn into national laws. Maybe, they could turn into something that's a little bit harder and more enforceable.

As long as we're focusing on responsible behavior, I think it's much easier to come to agreement and also very easy to monitor.

Are people behaving in accordance with that or not? Are states and entities behaving in accordance with that?

Shashank: Thank you, Cassandra. I'd like to put you to all of you a question by Natalia Archinaud who asks, how do you see commercial competition on the drive to enclose or capture land, for example, purchase the moon, in spaces drivers of conflict would laws that maintain space as part of the commons help build peace?

Matthew, I'll go to you. Then, afterwards, I'll go to the Commodore because I think this gets to something interesting about the changing actors in space, the balance of non-state actors and state actors, and the complexities that may introduce. Matthew, please, why don't you have a first crack at that?

Matthew: Thank you. It's very easy to find examples of agreements, particularly regarding defense or national security matters that didn't work quite as well as we would have liked to, the Washington Naval Treaty of 1922, many other examples. What's very important to keep in mind is that there are quite a few that have worked very well.

One of them is the 1967 UN Outer Space Treaty, which made it quite clear what is available for appropriation in space and what is not, and represented a shared agreement about best practices for the exploration of space. This was also an agreement that is perfectly compatible with today's drive-by certain private entities, to profit from space exploration.

In the same way that we've made decisions and kept to them regarding the international status of the polar regions, we can have similar agreements that remain in effect, governing territories outside of Earth. Does this mean that we won't eventually modify, or alter, or expand upon the Outer Space Treaty to accommodate new discoveries and new technologies? This is in the nature of law and is perfectly appropriate.

I don't think that we need to throw the baby out with the bathwater on this. We have a good legacy. We have a good series of legal precedents. We've had decades of peace without major superpower competition and conflict in space, that could have been profoundly destructive.

I think that what we're seeing now is probably when it comes to commercial spaceflight, about 90 percent hype and 10 percent reality. Let's not be too quick to argue that we have to completely demolish the very wise restrictions and the very wise understandings that we've developed about how to utilize this environment.

Shashank: Thank you. Air Commodore, can I go to you? Particularly, if you could say a little bit more on how the commercial aspect figures into your work at all. Clearly, there's a much greater commercial involvement in the space domain than there would have been 30 years ago. Correct me if I'm wrong on that. How does that change the nature of your business here?

Philip: Absolutely. If I just address the first part of the question, the military is an instrument of national power. The government will equip and use the military to pursue international interests. We'll basically do what the government wants us to do, and I won't try and preempt what the

government's views is on colonizing the moon or anything like that. I don't see that as something I need to worry about soon.

With regards to the role of commercial operators, I think space more than just about anything else, there's really dual-use applications, where commercial systems have military applications and military applications have commercial uses as well.

I think this kind of stovepipe view where there's military stuff, then there's commercial stuff, is not valid in the space domain.

If I use an example in our case, where we're looking to deliver our own sovereign resilient satellite communication capability later this decade, part of what we're seeking to deliver there is support for our emergency services out fighting bushfires, dealing with floods, as we're experiencing right now.

We've very much got a whole-of-government approach which blends all aspects of government. Military and all that will leverage and contribute to commercial capabilities as well.

I think there's an absolute role for commercial capabilities to both contribute to and benefit from military requirements and military capabilities, and we should be seeking to work together as closely as we can.

Space domain awareness or space situational awareness is another area where we all have a vested interest in avoiding collisions. In the future, maybe we have an interest in planetary defense, but we don't want to keep the information to ourselves. We should find ways to share and collaborate with that information for the greater good.

Shashank: Thank you.

Victoria: Shashank, could I jump on that, just a quick follow-up? Can I?

Shashank: Please, of course. Yes. Of course. Absolutely.

Victoria: Thank you. This is a complicated issue because within the United States, at least, there is a certain element of the national security community that is very concerned about China getting the ultimate high ground, getting to cislunar and somehow having the drop on the United States there.

That's kind of against the laws of physics, but there is competition about, what do we do in this next stage of using space? How does this evolve?

There are geopolitical rivalries that extend up in space, and part of this is looking at the moon, especially since we have so many missions planned for there over the next couple years or so, and countries going back to the moon or trying to get to the moon for the first time.

I think things like the Artemis Accords that the US announced last fall -- we had eight countries come on and a ninth come on later, and Australia was one of those countries -- talk about basically as we go to the moon and beyond, how can we do this in a cooperative approach? How can we do these in manners that allow a sustainable use of this?

I think it's helpful because basically it picks out principles from the Outer Space Treaty and says, "OK, we're going to apply these and make sure they apply to the moon as well as pick a few others like non-interference and transparency and things of that nature."

I think it's helpful in shaping the conversation in terms of, as our use of space evolves, as Matthew said, how does the governance structure evolve along with it? This is one way in which to do that, so I think it's going to be a helpful conversation.

Hopefully, it'll allow us to be able to use space in a sustainable manner for all.

Shashank: Thank you, Victoria. Could I ask a question that's been posed by an anonymous attendee but I think is very interesting, which is, in the emerging competition to dominate space, will Africa ally with the United States or with Russia and China?

I think what's interesting about that is a lot of these discussions are focused on great power or big power rivalries -- obviously US-China, to some extent Russia, Europeans.

To what extent are states beyond those cluster of big powers involved in this discussion? Do they have distinctive perspectives?

Cassandra, could I pose that to you, and then perhaps anyone else who'd like to chip in to that as well.

Cassandra: Yeah, thank you. It's a great question because it's very easy to focus on the great power paradigm, but I think what we really need to focus on is the fact this new multilateral reality that we are in as of 2021 -- it is a fait accompli. It's a fact, and it's not the same multipolar world that we were in in the 20th century. It's a different one.

There's still the traditional great power rivalries that we're seeing reemerge, but China is an enormous economic power. India is a rising economic power. Many African nations -- obviously the Organization of African States means that they can work regionally, but there are different alliances depending on which African nation you're talking about.

Some of them are more closely aligned with China for economic reasons. Others have longer traditions and ties with European nations. It's not a matter of Africa will align over here. It's not going to turn into a new Cold War dialectic.

It's interesting for countries like Australia. We are a traditional middle power, who I think we have a really important role to play, as does Canada, in this new multipolar world, where middle powers, I don't know if we have more of a role to play than we did in the 20th century, but we have any credibly important peace-brokering role and also a tempering role.

Australia, for instance, has also incredibly close trade ties with China, which means we have very different interests bilaterally with China than does the US, but also regionally. Our position regionally, we could be an incredibly influential power region, and so what we can do with the middle of space power is important.

The simple answer is that there's no simple answer. We can't just say Africa is going to ally with one of the great powers. We need to be looking at the different kinds of tides in geopolitics,

because space is just another expression of geopolitics. It's another domain in which all of these issues are playing out.

Shashank: Thanks. Is anyone else eager to jump in on that point? If not, I'll...Matthew, is that you saying you'd like to chip in?

Matthew: I had a brief comment. During the Cold War, one of the most powerful arguments for reform and civil rights in the United States was the fact that it's very difficult to produce agreement and goodwill among nations of the developing world when you have a national policy that's white supremacist.

This particular question sheds a very important light on aspects of the American political process that may be inclined to speak of the nations in the developing world in a way that is less than respectful, which is not helpful for our national security and not helpful for the competitions that we're going to face in the future.

Shashank: Thank you.

Victoria: Shashank, I'd like to add one more thing quickly, because I know we're nearly on time.

Shashank: Please.

Victoria: It was a fantastic question. The thing that I would like to emphasize coming out of it is that I think a lot of times in the multilateral discussions, a lot of countries that were not US, Russia, or China basically said, "Space security is interesting. It's nice, but it doesn't affect us. It's for the great powers to argue and sort it out, and we'll come in and do it as a vote for whoever we're with at that point."

The thing is, all it takes is one actor to affect everybody's ability to utilize space. You don't necessarily have to be involved in a conflict to be affected by it. Literally every person on this planet is a user of space, in terms of space data, so it affects them.

It's been heartening to me to see more interest by the countries of the G77 in being part of these space security conversations. They're recognizing that whether or not they have actual space programs, whether or not they're launching satellites, whether or not they're owner-operators, they are affected by space security instability issues, and they wanted to have a say in that conversation.

It's absolutely fantastic, and I hope that that continues to broaden and enrich in the conversations multilaterally. Thank you.

Shashank: Thanks, Victoria. I'm struck as someone who covers defense across the board, the sort of similarity with other areas where states may not possess certain types of advanced technology but may be affected by them profoundly.

That includes nuclear technologies, it includes, in emerging areas, autonomous weapons systems, and other areas in the military sphere. We see that across the board.

I'd like to move to, again, to a slightly more technical question, but one that has a political or geopolitical ramification. Mark Hilborn asks, "Attribution in space is very difficult. Non-kinetic effects, such as manipulation or jamming, are difficult to identify. Can we ever limit this? If not, what impact will this have on any agreement on behavior in space?"

It strikes me this a separate to the question of, can you define a space weapon? This is about the way in which they're used and the ease of attributing use.

I'm interested in this, because, of course, if I look at the defense review in the UK this week, it transforms our armed forces, in many ways, into a force that is optimized for competition in the gray zone, not for overt warfighting. It's a big shift. We see some of these questions in space as well.

Air Commodore, could I put that to you? How does that aspect of space behavior change the nature of deterrence or change the challenge to you? Then, I could move on to anyone else who'd like to have a go at that.

Philip: Thanks for throwing to me, and a fantastic question. I use the word attribution a lot and I put it right up there as one of the most important things we need to be able to do. It comes through that deterrence place as well.

If people think, "I could take action and not be found out," then the threshold for making the choice to do things is lower. If they know it's going to be seen, it's going to be attributed to them, then that weighs much more heavily on them before they choose to do it.

The ability to attribute bad actions in space is a critical part of deterrence and it's also a critical part of diplomacy in the whole national power. What we want to get to is as soon as someone does something inappropriate in space, we need to be able to call them out on that behavior and take action through the whole spectrum.

That might be sanctions, it might be an angry tweet, but we need to call out that behavior and prevent the escalation. Attribution and technical capabilities that give us the ability to attribute bad actions in space, absolutely critical to preventing escalation and to preventing a conflict in space.

Shashank: Cassandra, I think that your answer hand is raised.

Cassandra: Thank you, Commodore. Attribution is one of the key questions. I would say in terms of regulating this stuff, international norms, if you're talking about hard norms and binding norms, the only thing we're going to get agreement on is a top threshold.

It's something like, "What do we all agree is absolutely unacceptable." This is why the 1967 Outer Space Treaty places a prohibition on nuclear weapons and weapons of mass destruction.

It was like a top threshold, where everyone could agree, "That's going to be so destructive to everyone's interest, we're just going to place it a straight out prohibition." We're not going to get the more refined, despite the China-Russia proposal for a treaty on that.

I don't think we're going to get a treaty that is going to define space weapons and that is going to talk about something well within these absolute unacceptables. In that middle area is perhaps where it gets more difficult.

Then, you've got a bottom area, where it's, what is acceptable, responsible behavior in space? Our biggest threat is the amount of space traffic and space debris that we have. We're continuing to add to that on, at the moment, a monthly basis, with the number of launches going up.

We've gone from, every time I give an estimate of how many satellites that are in space that are operational, I say about 3,500. Every month, I've got to update that number right now. The debris is about 128 million pieces as far as we're able to track.

We have a massive problem with safety. The problem with attribution -- if you have a failure of one of your systems, or even just on a single satellite, was that a piece of debris that hit it, was it a solar flare, or was it an intentional interference?

Even just identifying the cause of a failure is really difficult today. What we need to do at this bottom level is have total cooperation on space situational awareness. Both Australia and the US now call it space domain awareness from a military perspective.

Just our ability to accurately track what is out there, where it's moving, who it belongs to, if it's active or was active, and to start working on removing it. That is responsible norms and behavior.

Agreements like SpaceX has just entered into with NASA in terms of who's going to maneuver out of the way if there's a likely collision, how can we have better data sharing across the board, and that's going to be military and civil. That's got to be, everyone knows as much as possible about what's happening physically in space. You're not giving away capabilities by doing that.

That's where we need to have better, stronger norms and agreement and adherence. That's where we can get it as well.

The two extremes -- we can regulate. We can also monitor adherence too, and then that stuff in between is what's difficult. That's just going to happen. That's the nature of the game. States are going to be jamming each other. States are going to be finding ways to operate in that gray zone.

That's OK if the effects are not as catastrophic as either of those two extremes.

Shashank: Thank you. I think we have five minutes left, and so we can probably squeeze in one more question briefly if we're very succinct.

I'd like to take one up from Larry Martinez, who asks, "Isn't cyber the most likely mode for space conflict? How do the legal regimes for space and cyberspace coincide or differ in terms of their jurisdictions, and especially the lack of clear definitions on what constitutes a cyber attack?"

Victoria, perhaps you can have the first attempt at this, and then anyone can step in afterwards.

Victoria: I shall indeed attempt it, not being a cyber expert. Larry, you bring up a very good point. I will point out, in terms of how the laws of armed conflict apply to cyberspace, there is a

manual for that. There's the "Tallinn Manual" that in theory spells it out very clearly and has been sorted out by the international community.

Is there such a thing for space? Kind of, sort of, not really. Cassandra can probably speak more about that, but there are two what I would hopefully are complementary efforts.

The Woomera Manual, which is based out of a university in Australia. And the MILAMOS, the manual coming out of a university in Canada. I'll have Cassandra speak with those efforts a little bit.

They're trying to figure out how the laws of foreign conflict apply to space. They're not entirely clear. They're working on it. In theory those manuals will be released this year, one hopes. Then of course the next consideration is how do you go ahead and get those implemented?

It's going to take a while to proliferate the decisions that were made there. I'll let Cassandra go on from there. I'm sure she has a lot more insights in that. I keep bringing it up because she's involved in the conversations.

Cassandra: I'll be really brief because there's so much we can say about that. There is a chapter in this book that goes into some of those issues in detail. I was involved with the MILAMOS that's coming out of Canada. It is focused more on what happens to military activities and the space law in times of peace. The Woomera Manual is looking at what is use of force in space and if we enter into an armed conflict, how would the laws of armed conflict apply in space?

Those manuals are written based on we have the Tallinn Manual for cyberspace. We have manuals that were written for air and missile warfare, looking at how we don't need to update those laws of armed conflict. We just need to look at how do these principles apply to a new set of facts and new technologies.

Those manuals are written in such a way that hopefully states could then implement those into their national manuals and potentially into their laws.

That crossover in the question that was asked between cyber and space is something that I think we don't have enough people looking at, to be honest.

We've got the cyber experts working in the cyber area. We've got the space experts working the space area. There are some people who've been involved in both manuals, so there is some crossover there. That's a pretty small community, so we need to have more of those crossover of expertise.

I'm sure that's what's going on in Australia's defense forces and many other countries' defense forces where they're starting to realize that the expertise and the skills base and beyond military context as well.

We need to be building that skills base and that understanding of how all of these domains interact with each other.

Shashank: Thanks, Cassandra. Matthew, would you like a last word on this topic before I end with the Air Commodore after you?

Matthew: As a historian, I prefer never to make predictive statements about the future. I feel my role is to correctly characterize the present. I agree with my fellow speakers.

This is an emergent technology of course that people are very concerned about, but there are lots of ways that you can do damage in space. I'm very curious actually to hear Air Commodore Gordon's take on this, so I'd rather not take up his time.

Shashank: Air Commodore.

Philip: All right. You put me on the spot. Look, putting the legal stuff aside, from a military perspective, we don't draw distinctions and hard boundaries between the different military effects in different domains. Yes, cyber and space are absolutely linked, as are all of the domains with both dependencies and contributions.

If I could give an example of that, if there's bad actions in space and we can attribute it, then the imposed costs, part of deterrence, might be delivered through another mechanism and another domain. We're not saying that you have to...if you receive a shot in space, you have to shoot back in space.

It's about the full weight of national power, diplomatic information, military, and economic, and that's across all physical domains.

Cyberspace is I think critical to all domains, all the terrestrial domains, and in fact, all aspects of national power. It's not a unique problem to space, and we certainly don't see it as something different from the challenges we're already tackling in cyber.

Shashank: Thank you very much. Victoria, would you like to just sum up the last concluding comment?

Victoria: After this whole hour, I realize I never actually congratulated the co-editors of their fantastic book. I think it's going to be a real contribution to the conversation. Secure World was a sponsor of the conference back in 2018. You can go to our website and look for the event page for that.

We're really pleased to see what legs that conversation had, and how Cassandra and Matthew really took it as co-editors and expanded it. We will be adding the link of the books, Oxford University Press, to our event page for this tonight's event. I would encourage everyone to check it out, as there's a lot of really fascinating details in there. Thank you very much.

Shashank: Thank you. Can I just apologize to all those whose questions I didn't convey? I'm sure you'll have other opportunities. Just to remind you of the book's title, it's "War and Peace in Space: Law, Policy, and Ethics," a collection of essays and commentaries on the future of conflict in space.

Can you please all join me in thanking all of our panelists for an extremely stimulating and informative discussion? Thank you all.