Nuclear Weapons Salon 2: Does Technological Innovation Threaten the Nuclear Balance?

George Beebe, VP and Director of Studies
Center for the National Interest

James Acton, Jessica T. Mathews Chair
Carnegie Endowment for International Peace

Elaine Bunn, Consultant on Strategic Issues
Former Deputy Assistant Secretary of Defense
Nuclear and Missile Defense Policy

Defense Writers Group
Project for Media and National Security
George Washington School of Media and Public Affairs

9 December 2020

DWG: Thanks, everyone, for joining us today for a conversation about nuclear weapons and technological change which is made possible by Carnegie Corporation of New York, for which we thank them.

The incoming Biden administration has made clear that it will take up President Putin's offer and renew for five years the New START Treaty prior to its expiration in February. Then President Biden should just have time to do that before the expiration date in I think the second week in February.

The Treaty is the last remaining significant arms control treaty between Washington and Moscow and it limits its side to 1550 strategic warheads and caps, deployed ICBMs, SLBMs and heavy bombers at 700.

Since February of 2011 when New START went into force, technological change has not stood still. If anything, it has accelerated. Russia in particular but also the U.S. and China have been working on technological advances to delivery systems and also in intrusive cyber capabilities.

So we're here today to talk about this. How serious are the risks these advances could pose to the nuclear balance? And what should the incoming administration do?

We have a knowledgeable panel here today to discuss it and to

answer questions.

George Beebe is Vice President and Director of Studies at the Center for the National Interest and he's author of the book published last year, The Russia Trap: How our Shadow War with Russia Could Spiral Into Catastrophe. He's spent more than two decades in government service as an intelligence analyst, diplomat and policy advisor, including as Special Advisor to Vice President Cheney.

James Acton holds the Jessica T. Mathews Chair at the Carnegie Endowment for International Peace of which he's co-director. A physicist by training. James' current research focuses on the escalation risks of advanced conventional weapons and the future of arms control.

And Elaine Bunn is a consultant on strategic issues with decades of experience in the U.S. government working on defense policy. From 2013 to '16 she was Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy.

I'm going to ask each of you to give us maybe five minutes and I'll ask a question.

George, may I start with you and ask you to perhaps lay out for us the nature of the problem as you see it, how worried are you by it, what are the risks to the nuclear weapons balance between the U.S. and Russia that could be posed by technological advances either in delivery systems or in cyber capabilities?

Beebe: I'm going to narrow my focus a little bit in the interest of time and in deference to my fellow panelists and look here at cyber technology as opposed to delivery systems because I think James and Elaine will have a lot to say on those topics.

On cyber technology, in the interest of being a little provocative here, I think cyber technology is revolutionary in its impact on prospects for unwanted war. I'll lay out briefly why I think that's the case.

I think that its very nature is escalatory. That it incentives offensive acts by the world's leading digital powers. And I think that we're dealing with this danger in exactly the wrong way. I think we're treating cyber technology, the cyber domain like it is essentially a deterrence model system rather than a

spiral model system. I'll explain briefly what I mean by that by talking a little bit about international relations theory, and don't worry, I won't go too far in the weeds here.

The deterrence model is rooted in the supposition that wars often begin when you've got an aggressor state that sees an opportunity that will reward aggression, so it wants a war essentially by design because it thinks it can win. The classic case is Nazi Germany in World War II. We all know what happened there and the lesson that we drew is that you've got to deal with this kind of problem through deterrence, through showing the aggressor state that it faces a fight that it can't win. The one thing you don't do is appease the other side. That just whets the appetite for aggression.

The second model, the spiral model, is rooted in a little bit different belief, and that's that in addition to wars that happen by design by aggression, there are also wars that spiral, that escalate into a conflict that the sides don't intend, don't desire. They're reactive rather than wars of choice. And they're rooted oftentimes in what's the security dilemma. This notion that states take defensive measures to protect themselves that other states perceive as threatening and they react. They take measures, countermeasures to defend themselves and those in turn alarm the first state and you get into an action and reaction cycle that can produce a conflict like World War I which is sort of the classic case of this sort of thing.

So what I would argue is that cyber technology is by its nature a spiral model domain. It incentivizes an action/reaction dynamic that can lead to outcomes that the actors don't intend.

And I want to just point out a few things about why I think that's the case. Point one is that the offense, at least right now in cyber technology, has enormous advantages over the defense. You really can't prevent an adversary that knows what it's doing from penetrating systems that it wants to penetrate and that's because software inevitably has flaws.

Human beings are inherently imperfect. So cyber defense specialists, cyber security specialists say that there are two rules in cyber security. One is that all systems can be penetrated; rule two is to see rule number one. This really produces a real sense of vulnerability in people that are charged with protecting networks. And when you can't really play

defense, there's a natural impulse to do what you can do which is to go on offense. The other side's systems at risk, to show them that there will be a price to pay if they attempt to detonate any cyber bombs in your network. It's sort of the classic deterrence model. You show the other side that aggression won't be rewarded.

The second point is that this is a much different situation than what we experienced in the nuclear balance during the Cold War. There you had a situation where mutual vulnerability between the United States and the Soviet Union produced essentially stability. It produced confidence that the other side was vulnerable to your systems. You could launch your missiles. You knew they would detonate somewhere around their target. That produced what some historians called the long peace. We had arms control that was designed to enhance that stable assurance of mutual destruction so that we outlawed, for example, missile defense systems because they were regarded as an unstable factor in this mutual destruction.

That's not the case when you're talking about cyber bombs. They're inherently unstable. They're designed on a custom basis to exploit particular vulnerabilities. And these vulnerabilities pop in and out of existence. Software gets patched, it gets updated. Malware gets discovered and neutralized. So if you're going to hold the other side's systems at risk you've constantly got to be engaged in a process of discovering and exploiting and holding these things at risk. You never reach that point of stasis. You never reach confidence that the other side has reached a point of stable mutual deterrence.

The last thing I'll say is that cyber technology is blurring old lines between espionage and warfare that once were pretty clear and they're not anymore. So when I wanted to spy on the Soviet union I could use technological systems. I could use human spies. The other side new pretty much that this was an act of espionage. Today if I'm engaging in cyber espionage, digital espionage, and I penetrate the other side's system, the other side doesn't know why I'm there. It could be just to gather information. But when in another side's system I can not only gather information, I can destroy information. I can sabotage the workings of that system. And it's not clear until I actually do something like that that that's my intention.

What this does is it means normal espionage which has gone on

between states forever and will go on forever, is no longer as distinguishable from acts of warfare as it used to be. That enhances the sense of vulnerability on the part of cyber defenders. And it also incentivizes them to try to figure out what are the intentions on the other side. Guess what the best way to do that is? It's to engage in cyber espionage of your own, to penetrate the other side's system to figure out what he's up to.

But that kicks off the same dynamic on the other side. They in turn don't know why you're there. You might think you're there for espionage purposes but they have that same ambiguity about what your intentions are, which is incentivizing them to further penetrate your system.

So I think you end up in what I essentially an escalatory cycle where the vulnerabilities of your own system, the ease with which offense can occur, the ambiguity about intentions, all incentivizes more and more activity.

Now you may think that all of this is fine but it doesn't sound particularly threatening and I think that's true if there's an assumption here that's also true and that assumption is that all of this will remain contained in the digital domain. But if you have a situation where all of the stuff in the digital domain is connected, that it's all intermeshed with the bricks and mortar world, with the world of early warning systems, guidance systems, GPS systems on which all of our economy and our weapon systems and critical infrastructure depends, and you can't really protect all of this stuff and each side is incentivized to penetrate and hold these systems at risk, you have a situation where this could spill out in ways that you don't anticipate from the digital world into the bricks and mortar world.

I think the risk is particularly acute in a crisis situation where there's a lot of feeling of vulnerability, a lot of suspicion, not very much time to make decisions, a lot of incentives to preempt the other side because you feel so vulnerable, because of the advantages of preemption, and it creates, I think, crisis instability. And this is something that I think we have to address and nobody has given the kind of thought to this, at least not that I'm aware of, that's necessary to mitigate the dangers that we're facing here.

That's all I'll say for now.

DWG: Let me just ask one short question before we turn to James next.

Can you say anything or do you know anything or can we talk about the nuclear command and control systems that our country has and whether they are in any way threatened by cyber offense?

Beebe: I think you've put your finger on a critical issue. It's one of the most sensitive and closely guarded secrets in our national security system so it's not something that can be talked about in unclassified discussion. But I'll make a general point that I think underscores my concerns here about the dangers.

If you go back to what I said about the vulnerability of systems, those two rules of cyber security that any system is vulnerable and rule two is see rule number one. I think we need to be concerned about how vulnerable that command and control system is. And obviously in a crisis situation it's a high priority target. It's a high priority target certainly for espionage, for information gathering, to try to figure out what the other side is up to. And it's a high priority target for reasons of warfare. We spent decades trying to create offensive nuclear systems that were capable of decapitating command and control on the other side. And a lot of worry on our part that we would be vulnerable to that sort of decapitation, that disruption of our command and control.

It used to be that the only way you could really do that would be highly accurate, highly destructive strategic nuclear weapon systems that could actually physically destroy that command and control. I think you're in an entirely ne era when you can do that sort of thing with software and we need to be addressing that, obviously. And that's not a comment on how vulnerable I think those systems are to cyber penetration. That's not something that I'm in a position to judge. But I know enough about cyber security to think we should be worried about it.

DWG: Thank you.

James, let me turn to you. In setting up this conversation I made a list, no particular order, of areas that could be of concern where technological advances might have an impact including artificial intelligence, hypersonics, antisatellite weaponry, low yield nuclear tipped cruise missiles and then cyber

threats that George has covered so thoroughly just now.

Let me ask you to talk about these a bit and maybe start by telling us which of them you think poses the greatest risk to stability.

Acton: First off, thanks for convening this today.

I think it might be helpful if I talk through -- rather than thinking about individual weapon systems is to think through the kind of different effects that they can have and to structure my remarks that way. And I do think antisatellite weapons is the single thing that worries me the most, but let me get onto that in a second.

During the Cold War the nuclear and non-nuclear domains were largely separate. There were important exceptions but they were fairly isolated exceptions. Basically we worried that the Soviet Union was going to nuke our nuclear forces; they worried that the U.S. was going to nuke their nuclear forces. It was primarily nuclear attacks against nuclear weapons that we worried about.

A lot of what I've been thinking about recently is the way in which the nuclear and non-nuclear domains are becoming increasingly entangled. And this form of entanglement has various different manifestations.

So one of them is advanced non-nuclear weapons, Advanced conventional weapons. Backed up by sophisticated information gathering equipment, data processing capability at least in theory could compromise other states' nuclear forces. This is where I think AI comes in most of all, is its potential ability to sift through huge quantities of information to detect the location of other countries' nuclear forces. This is where advanced conventional weapons like boost glide weapons come in. The Russians and the Chinese are worried about low yield cruise missiles from this perspective. The developments that could compromise the survivability of other states' nuclear forces.

Now in one sense I'm kind of skeptical of this. I'm generally somebody who believes that U.S. adversaries who act sensibly will ensure that their nuclear forces are survivable, whatever we do. I would think they don't share my [sanguineness]. I think the Russians and the Chinese and almost certainly the North Koreans worry enormously about the survivability of their nuclear forces,

and in a deep crisis or a conflict, the fear that we might attack those nuclear forces, the possibility that we might accidentally or inadvertently destroy some components of their nuclear forces. You know, if we're going after Chinese conventionally armed dual use missiles and we inadvertently hit Chinese nuclear armed dual use missiles. Those kinds of operations could really lead them to fear that we really are going after their nuclear forces and that in turn could lead them to escalate the crisis.

One set of technologies are developments in non-nuclear, low yield nuclear technology that threaten the survivability of other states' nuclear forces.

The second kind of area is dual use weapons. A lot of these high precision conventional weapons, I've kind of alluded to this in the case of China already is dual use. That is to say they could hold nuclear or non-nuclear weapons. You know, China's DF-26 missile is a good example of that. The Russians including their 9M729 cruise missile. We have dual user bombers.

One of the fears that's long been discussed is the idea that a country might launch a conventional weapon but the other side might misinterpret and believe it's nuclear armed. This was a big thing in the mid-2000's, I'm sure. I know Elaine remembers extremely well with the conventional Trident modification and the U.S. had this idea of putting non-nuclear warheads on Trident missiles.

I worry actually a lot more pre-launch than I do post-launch. Imagine, for example, that China disburses some conventional DF-26 missiles and we get it wrong. We think they're nuclear armed. We think China is sending up a nuclear signal that it's willing to escalate the crisis and potentially use nuclear weapons when in fact it's just conducting a purely conventional operation. That could actually be quite escalatory.

Conversely, and I've already mentioned this, but if China disburses nuclear armed missiles that we think are conventionally armed and we attack them, we will have inadvertently destroyed Chinese nuclear weapons. So these dual use weapons, on the one hand they can exacerbate the threat to nuclear forces, but they can also create their own unique escalation.

Then finally is this area of dual use command and control. And actually when, I think it's probably easier for somebody who's

never held clearances to talk about this stuff with George, but you know, actually there's a huge amount of information available about U.S. nuclear command and control. And almost every, maybe every publicly acknowledged command and control system the U.S. has is dual use. That's it's used for both nuclear and conventional operations.

Now I'm sure there's a bunch of classified stuff that's nuclear only, but of the stuff that's acknowledged, everything is dual use or almost everything is dual use.

MILSTAR and advanced extremely high frequency satellites that would be used to transmit emergency action messages to nuclear forces, the vast majority of that bandwidth is used on conventional operations on a day to day basis. The early warning satellites that provide early warning of a nuclear attack. These things would cue ballistic missile defenses against non-nuclear ballistic missiles, they can detect aircraft, they're exquisite and sophisticated.

And to the extent we understand it, the same is true of Russia and China. They use dual use command and control systems. And each of the three countries -- the U.S., Russia and China -- thinks about fighting a war by attacking, thinks about fighting a conventional war by attacking nuclear command and control, so by attacking dual use command and control.

The Russians or the Chinese would attempt to interfere with our conventional forces by attacking conventional command and control [inaudible], but if they're dual use that would have the incidental effect of undermining the U.S. nuclear command and control system.

Conversely, the kind of operations the U.S. has acknowledge it contemplates could involve attacking Russian or Chinese command and control. Again, for the purpose of winning the conventional war. But could have the incidental effect of undermining their nuclear operations.

And this is where cyber capability could be used for that, antisatellite capability is super relevant for that, advanced conventional capability for ground-based assets. And this is my big fear, the thing I've written about most, but it's the way that in a conventional conflict states might inadvertently degrade one another's nuclear command and control infrastructure.

I think Pat's on the line, CCMY in particular has been enormously helpful to me in making this research possible.

Those are kind of -- and that is my big fear is these conventional attacks against nuclear command and control. And suffice it to say we have designed a nuclear command and control system perfectly sensibly to withstand to the extent possible a nuclear war. Not to withstand conventional attacks before a nuclear war. And I think we have to be thinking much more of this nature about, we have lots of implications of disentanglement, but one is how do we build a nuclear command and control system that is more resilient before the nuclear war begins. Everything I see DoD doing at the moment in terms of procuring new command and control suggests that we have not learned that and is not thinking about this problem.

DWG: One quick follow-up for you then before we go on which is this. You talked about nuclear entanglement. Targeting, I guess, of dual use satellites being a prominent example. Are satellites America's Achilles heel?

Acton: Almost every way you can think about doing nuclear command and control is going to be, is going to have vulnerabilities and weaknesses. I don't think satellites are unique in the fact that they have vulnerability. Ground-based transmitters, ground-based radars are vulnerable. And indeed by sticking satellites in super high orbit one can mitigate that vulnerability to an extent. Though how long those satellites will remain survivable for, indeed how survivable they are at the moment, it's tough to assess. But I worry about that.

The first thing to say is there is no totally survivable way of doing nuclear command and control. The only assets I can think of that are really very, very survivable at the moment are the aircraft used for communications. The doomsday planes. Which incidentally, some of you may have seen stories that Russia's state media has acknowledged that these managed to get onto one of their planes parked on the tarmac which is just like unbelievable, but you know. One has managed to attack the outside of one of the facilities of the U.S. facilities I think in Tennessee, so we've all had embarrassing security moments. And indeed, those U.S. key communication aircraft for command and control, they're not going to remain survivable indefinitely.

So I think talking about an Achilles heel kind of almost implies

that you're looking for a single way of designing a single kind of asset that makes command and control survivable and that just doesn't exist.

To me it's about ideas like redundancy, resiliency, developing -- I have no idea if things like high altitude, long endurance UAVs that could be disbursed rapidly in a crisis for nuclear command and control could work. These are tough ideas. But coming up with backup systems you could deploy rapidly in a crisis. Nothing is perfect but you have to have a redundance and resilience in our system that it can continue to last as long as you need it to.

Beebe: Just a quick comment on that. I would underscore James' point about redundancy and resilience. Those are things that we've not given nearly enough attention to in approaching these sorts of problems. They tend, I think, to enhance stability, particularly crisis stability and it's something that I think we need to be thinking a lot more about. That goes not just to nuclear command and control. I think it goes to critical infrastructure systems more broadly.

Bunn: You stole the words from my mouth. While we're talking about this I'll just say the idea of trying to figure out what would you do if, if you don't have access to this then what's the work-around? If you can't do it that way, then what's the work-around. And I know that there have been exercises to do this, whether it's for space assets or others, it's the, you get operators in the room and go okay, you don't have access to AEH, you don't have access to something. Now what do you do? And it's amazing, they'll come up with ways, and what we need to do is think through those and put in place the resilience or redundancy. But say what do you do if?

DWG: Elaine, let me turn the microphone completely over to you now and ask you to talk to us a bit about, well, you were in the policy side of government. And you had to think from that perspective. So here we are in the transition to a new Democratic administration. In this area of nuclear weapons, arms control, or for that matter weapons we ought to build maybe, I don't know. What should -- the [Lenin] question. What must be done? What should Biden do in this area?

Bunn: The first thing I would do because there's only 16 days to do it after inauguration is, go ahead and renew New START. And I

would renew it for more than a year myself, because negotiating a follow-on agreement that really addresses some bigger issues is going to take longer than a year. So I would do it for the fie years, but if you want to do it within the administration, do it for three years. Because you want to keep in place the on-site inspections, the processes that go on now because the treaty's in place. You want to keep those going while you're negotiating the next follow-on. So that would be number one.

Then get a review going. The kind of review that most administrations do coming in. I've been involved in way too many Nuclear Posture Reviews going back to the first one in the Clinton administration but that review I think should not just be a Nuclear Posture Review for all the reasons we've been talking about already. It needs to be a broader I call it strategery, thank you George W. Bush -- Saturday Night Live. I call it a strategery review because look, it needs to be all the kinds of capabilities that have the effects that we've been talking about.

I would call it a Strategic Posture Review, but it would bring in -- and it needs to have some focus. I would put the focus on what are the things that others are doing that may lead to escalation, to nuclear use. Whether it's intentional or inadvertent nuclear use. And then what is it that we need to do given what we see in the world? So it's looking at multiple actors. Yes, Russia, but yes, North Korea, China, Iran. How broad you want to make it. Do you want to make it threats to us and our allies? That's where my focus would be, what are the threats to us and our allies? And what are the capabilities that we have and that others have that may lead to escalation to nuclear use? And then what do you do about that?

Then once that posture review that is more strategic posturing -- yes, it would include conventional, Prompt Global Strike or hypersonics. It would include cyber as it relates to nuclear. You can't have a posture review that brings in everything. This is already so complex. You need to make it as complex as it needs to be, but you can't -- this is not a review of all things cyber or all things convention, but it's as it impacts on this, the very central nuclear -- preventing escalation of nuclear use question.

You might, we saw this work pretty well in 2008, put together an outside commission a la the Perry-Schlesinger Strategic Posture Commission which really did focus mostly on nuclear, and have an

[inaudible] people from both parties. If you can get something like that together and represent the range of reasonable views. That one had I guess Johnny Foster and Mort Halperin and then it was chaired by Schlesinger and Perry. So it really had a pretty big range of views.

And then have that build some of the thinking and unclassified work that needs to be done to build some kind of posture on this bigger strategic capabilities that hopefully could last longer than an administration. Because what we don't need I think is the jerk-around that we've had recently. We don't need it, our allies don't need it. It's really bad for allies.

But allies are worried too about these other capabilities. They're worried about gray areas. They're worried about escalation. It's no longer the big one, the big exchange, bolt out of the blue. That's just not today. It has to be in the back of the head. You have to make sure that the incentives for that are kept very low. But the incentives aren't there for that. It's exactly what George and James have already been describing so I think that needs to be the focus of a posture review.

Then you take what you learn in that posture review and that's where you build your arms control proposal from that. It may be that the next follow-on agreement, you'd like for it to be, I would like for it to be not just strategic nuclear. Yes, non-strategic nuclear. But also what are the things that the other side, the other party worries about? What do we worry about? Maybe they think something they're doing is no big deal and we think it's a damn big deal. That's pretty much where escalation comes from isn't it? When one party does something that they go well of course I'm going to attack the conventional command and control for your conventional forces if we're in a conventional crisis or conflict. Of course I am. And you say oh, no. That's a damn big deal because it's also my nuclear command and control. That's the kind of thing that does lead to escalation. So it's the negotiation of what's a damn big deal for you and maybe not for me, and what is the big deal for you but I think God, you're worried about that? Really? There may be tradeoffs there for arms control purposes, and if not for formal treaties and agreements, then for confidence building measures, transparency kinds of things. It doesn't all have to be treaties that go through the Senate.

DWG: What you've just been saying I think underscores the importance of dialogue with, for example, the Russians. We haven't had much of that lately. And that leads me to ask you, do you think we even can have that? Relations are at a pretty low ebb. Obviously a new President comes in and maybe there's some wind behind his sails, but it's hard to see quite where a dialogue with Russia starts.

Then you have the feeling, certainly by the Trump administration and many in the Republican party, that there's not a lot of point in an arms control treaty that doesn't include the Chinese. The Chinese are not interested. They have far fewer weapons. They sort of say wait until we catch up or wait until you cut back, then we can talk. So where are we? Is it even conceivable that there could really be a really meaningful dialogue on this that helps both, at least helps the United States and Russia to get to a single --

Bunn: You're right. Every side has to want it because you don't sign onto arms control agreements that you don't think are in your national interest. I don't know of any nation that does that. But there has to be something in it for you that you care about.

But again, that's the point of, and that's why I think it's going to be a long set of negotiations, just with Russia, and especially if you bring in China, to get to even confidence-building measures or here's what we're doing, let me just be transparent about it. Let me up front about it. Transparency has a lot of baggage with the Chinese too. So let's just declare what we're doing maybe is a better point.

Again, it will be a long set of discussions, but again, I think it starts with what are you worried about? And yes, we know some of it.

I can see people who have been through this before going right, nah, nah, nay, same talking points. We've heard that already. But it has to be in the sense of well, I'm really worried about this. You're really worried about that. And we're both worried about these over here.

So it's in that context. You may say no, I don't want to trade away this thing that you're worried about for the thing I'm worried about on your side. You may decide in the end not to do

that deal. But you don't know that until you have the real discussion and I think that's the problem.

With Russia, I don't know, you tell me what Putin will or will not agree to do. I don't know. George, you tell me. But again, I've never seen the Russians give up something for nothing. They've got to feel like they're getting something out of it.

DWG: At this stage let me open up the conversation, and George if you have a comment we can start with that, but let me just say that Jen DeMascio, you're more than welcome to come in at any point and ask questions.

And let me introduce Professor Hugh Gusterson of George Washington University who is also welcome to join the conversation.

Gusterson: Actually I'm at the University of British Columbia these days. Vancouver.

DWG: Oh, okay.

Beebe: Just a couple of points in reaction to your question and some of Elaine's comments.

I think we're certainly capable of talking to the Russians and negotiating with them. The threat that they pose to the United States I would argue is less than what it was during the period in the Cold War that the Soviet Union posed to us. We were able to talk with them then. We didn't trust them much but we were still able to work out both legal restrictions on what each side would be able to do and political understandings, informal understandings, confidence building measures during that period.

If we could do it with the Soviet Union I think we can do it with Russia, in principle.

Now a couple of problems I think, though, get in the way of doing what's possible in principle. One is existential threat perceptions that each side has right now, which I think paradoxically are more acute than what they were during the Cold War.

During the Cold War, we thought this is a clash between two symbols, a global competition between market democracy and

communism. We fairly early on reached some understanding, some belief on each side that the other side had more interest in stability than it did in destroying and defeating the other side. That was the foundational understanding that enabled arms control discussion.

We don't have that foundational understanding with the Russians right now. We think they're trying to destroy the United States. And I'm sorry to be somewhat hyperbolic about that, but the idea has become quite mainstream that Russia hates democracy and is trying not to watch a nuclear attack that would physically destroy the United States, but it's trying to divide and conquer our society, to destroy us from within so that we're at each other's throats, so that we break up in some way and in so doing eliminate the competition from the United States ideologically and geopolitically.

The Russians feel much the same way about our intentions toward them. They think that we're trying to overthrow the Putin regime, the Kremlin, from within. And to a greater or lesser degree there have been a lot of U.S. actors that have said yeah. We don't think we can get along with Russia until Putin leaves, until there's some fundamental change inside of Russia itself.

Not surprisingly, the Russians regard that as quite an acute threat and it's difficult with those beliefs on each side to engage in a constructive and productive dialogue about how you ensure broader strategic stability. So that's something we're going to have to address I think as a prerequisite to making real progress on the technical aspects of these kinds of agreements.

DWG: Jen?

DWG: We touched on this a bit but I just wanted to kind of zero in on the development of hypersonic weapons and the implications that has for any kind of deterrence calculation that we've made previous to the era of hypersonic weapons. How does that change things? If at all.

Bunn: James has written about this, but I do have some views about what it does and does not change.

Hypersonics, I think the bugaboo of hypersonic weapons in oh my God is a little overblown in that ballistic missiles go faster than hypersonic weapons so the speed of them is not a new thing.

Their maneuverability -- cruise missiles do that, maneuvering warheads do that. So the unpredictability of where they're going is not new. They combined in some sense those two things. So I don't see them as a different type of threat to forces or populations or whatever. They may pose a somewhat different, not really, threat to command and control and being able to disburse leadership, for instance. It's the warning, the warning of an attack that may be a little bit different and that's a sensor issue, not a -- it's not a different type of threat in its effect, I don't think. As long as you can know it's coming and do the things you need to do for leadership disbursal, for instance.

And I would be interested to hear if James -- I think James is on the same sheet.

Acton: I'd make three points about hypersonic weapons. Firstly, I totally agree with Elaine that it's not the speed or maneuverability that's new, per se. I think what hypersonic weapons do get you is they reduce the need to make tradeoffs between accuracy, range, speed, maneuverability and payload. Cruise missiles are super accurate, highly maneuverable. They can have quite long ranges but not super long ranges and they're quite slow. Ballistic missiles are very, very fast, can have enormous ranges. Their accuracy can be a bit limited especially if you're not terminally maneuvering, and therefore they're not maneuverable, right? But hypersonic boost glide weapons reduce the need to make tradeoffs between these different things. It's not that they're better in any one particular axis, but they reduce the need to make tradeoffs between axes.

Does that actually help you militarily? My critique here is the development in the U.S. and for what it's worth I believe China and Russia too, have been largely driven by technology. Nobody in the Pentagon has ever said we need to develop these weapons for this purpose. Weapon development has always been kind of done by technologists who think this will be really exciting and then the policy people like Elaine can go what are they actually for further down the line.

I think that's completely the wrong way to do technology development. I'm not necessarily assuming there isn't a role for boost glide weapons to fulfill, but I think you need to identify the military need first, then compare alternatives. For specific missions there are always alternatives.

If you think boost glide weapons were important because they give you low warning time, stealth can give you low warning time. If you think they're important in some given mission because of its short delivery times, forward deployed systems can give you short delivery times. You have to do the tradeoffs. You have to understand each given scenario, whether boost glide weapons are better than any of the alternatives. I'm not making any assumptions about whether or not that's the case. But I'm saying that DoD should tell us what the mission is, should compare hypersonic to other alternatives to the end given mission need, and then we can come to a sensible conclusion about whether or not they fulfill a unique role and can really enhance deterrence in warfighting.

I do think there are escalation risks associated with boost glide weapons. I'm not sure I would say they're not associated with other weapons, but I think they're more severe than with other weapons. And again, perceptions here are extremely important.

But you have things like Elaine pointed out, destination ambiguity. We don't know where a boost glide weapon is going to land, what the target is. That's true for cruise missiles but boost glide weapons have shorter travel times and can travel further distances. So arguably that enhances that sort of ambiguity.

You can have risk associated with the fact that I think this kind of risk is exacerbated because boost glide weapons are very, very hard to track potential. You know if they have a satellite pointing in the right direction you can the launch of a boost glide weapon and they know it's heading roughly in their direction. But the weapon could then under-fly their radar. That is kind of a particularly worrying situation where you know someone has launched something at you and it's highly maneuverable but you then can't track it.

So I do think there are particular escalation risks that are probably more severe with boost glide weapons than others, and I think that, as I say, my big critique here is that I think DoD has not done a good job understanding what we're building them for, what the best weapon to build that is, what the risks are, and how to mitigate those risks.

Beebe: I don't at all dispute the notion that the United States'

own development of these weapons systems is driven more by technology than by mission. I'm not sure that applies quite so much to the Russians. I think their investment in researching and developing these kinds of weapons was very much a direct results of our withdrawal from the ABM Treaty.

Acton: I partially agree with that.

I know Jen had a follow-up question.

DWG: I was wondering if you think there will be an emphasis in a Biden administration that's different from what we've seen under Trump where they might think about hypersonic weapons in a different way or shift -- and then going back to the earlier discussion, or shift funding from development of GBSD into protecting nuclear command and control, some of those financial tradeoffs that might get made.

Acton: I think the big programmatic shift we saw in what was then called Conventional Prompt Global Strike, it happened really at the end of the Obama administration which was from global range systems to [redraw] to shorter range systems. The Trump administration accelerated that development but didn't fundamentally change the focus of the program.

For better or for worse, I'd be pretty surprised if a Biden administration majorly changed the focus of that program. There are lots of hypersonic systems the U.S. has currently developed. Not all of those, in fact most of those are never going to reach this point of deployment. We've already seen, I forget the name, but we're [raising] the development of one or two systems [inaudible]. I think a Biden administration will inevitably focus down on fewer of those systems but I don't expect it to change in any major way. And unfortunately I'm not terribly optimistic it will do the kind of homework that I'm advocating it should do.

I think Elaine would have more insight here than I would do. I think it's pretty likely that a Biden administration is going to want us to go back to the nuclear modernization program at least somewhat. I would love it to spend more on nuclear command and control. No idea if it's going to do that.

I think the most obvious target for the Trump [inaudible] is the nuclear SLCM. That is at a very early stage and it's going to be

pretty expensive and I've never been remotely clear what it gets you above and beyond the LRSO.

The W-93 I think would be on the chopping block.

I'm kind of skeptical GBSD is going to be on the chopping block. I think the programmatic of this means big changes are very difficult and it's a lot easier to kill it off at an earlier stage, so that's what -- if I were the program managers for W-93 or the nuclear armed SLCM, I'd be worried. Much less so if I were the manager of GBSD. For better or for worse.

And then, as I say, I'd love them to spend more on nuclear command and control but I have literally no idea one way or the other whether that will happen.

I'd just say in response to George's point, when it comes to Avanguard, the super long range nuclear armed system, I one hundred percent agree with George, that that was a direct, that program was reinvigorated after the U.S. exit from the ABM Treaty and that is unquestionably not like a technology program, that is about penetrating U.S. missile defenses cold stop.

I think there are other hypersonic developments going on in Russia that I think are much less obviously serving a mission need and they're much more about providing what we could claim the hypersonic space too.

Bunn: I would agree that the nuclear sea-launched cruise missile is probably -- I just assume it's going away. I can't believe that the Navy really supports it. They hated the last one. They hated having to carry it on non-SSBN submarines and on surface ships and it's a new program, it's still under study. I think it's probably gone.

I don't know about the 93. We'll see.

DWG: 93 is a type of nuclear warhead, right?

Bunn: It is. I'm sorry, it is a type of nuclear warhead. It would be another one for the Trident missile. And maybe for other things too. IT's still in the planning stages so whether it's only for Trident or whether it would have another, you know, it could be for ICBMs. It's to be determined. But it would be, you have to be careful about is it a new warhead, is it using

parts from the others, is it a new design. Who knows? But it's a new designation.

And I'm not a physicist, unlike James.

The Avanguard and the Russian missile defense issue, it's always amazed me that I guess because I see how difficult missile defense even against North Korea which is what our homeland missile defense has been about all these years, certainly for the last three administration. It's been about North Korea and not about Russia. But Russia and China really worry about it.

I guess it's the idea that the U.S. once it gets started, once it gets the industrial base going, once it gets technology development going, who knows where they'll go? And yes, they change every four years and maybe someday somebody's going to decide we're going to build a big shield no matter how. How many GDPs do you want to spend for that, but okay. And can you technologically get there.

So the Russians and the Chinese have much more confidence in our homeland missile defense program than I do, than the U.S. does. We're having enough trouble even trying to make it effective against North Korea.

So it's one of those, I don't know how you deal with this -- it's not even particularly Russian or Chinese, it's this human, yeah, but they could do that. It may not be that they're doing that right now, but they could do that in the future and therefore I have to anticipate that and do something about it now because they may build you bigger missile defenses. Right now the Russians and the Chinese know perfectly well they can get through our missile defenses. No problem. Certainly our homeland missile defense.

DWG: Hugh?

Gusterson: Sure, at the risk of changing the frame a little bit. I've been listening to the conversation with great interest and I'm not a physicist, I'm not a political scientist, I'm a professor of anthropology. So I'm sort of struck by who's mentioned in the conversation. The only countries I've heard mentioned are the U.S., Russia and China, which is not even 50 percent of the countries that have nuclear weapons. There's been a vague reference to some allies. I'm struck that this

conversation is happening in a context where a treaty recently entered into force declaring nuclear weapons to be illegal. I have no idea what that means in practice. The U.S. is behaving as if the treaty doesn't exist. I noticed the Washington Post never informed its readers that the treaty existed. The New York Times did but as far as I could tell the Washington Post didn't.

But we're talking as if it's sort of the 1980s but with better technology. Where this is largely a two power game with maybe the Chinese up and coming being part of the game as well. But it set a context where dozens of countries have ratified a treaty declaring that these weapons should not exist. Does that matter at all?

Bunn: I did mention North Korea. In fact I worry most probably about North Korea and escalating nuclear use. Especially when you -- it depends on who the President of South Korea is, but some of their conventional strike and -- anyway, there are many paths to potential nuclear use by somebody out there I didn't mention India, Pakistan, Israel. I usually focus on who is it that are assessed to be threats to us or our allies. I mean allies to whom we extend a nuclear deterrence commitment explicitly -- India not being one of those. Pakistan not being one of those. Israel not being one of those. So you're right. I did not mention those.

The treaty for the, the TPNW, Treaty for the Prohibition of Nuclear Weapons, it has been signed by enough nations to put it into force. It has not been signed by any nuclear weapon state.

I certainly understand the impetus and the reasoning that people are worried about nuclear weapons. We've been -- this has been a thread in the U.S. and globally since 1945. It's been the oh my God, what these things can do to the world. And my view is that anybody who works in this field who doesn't understand that almost gut level response to nuclear weapons shouldn't be working in the field. If you don't get that -- we wish they just didn't exist and they could go away, yeah. So I don't belittle the TPNW movement, but I also see it almost as a wouldn't it be nice. You know, the old saw, wouldn't it be nice if we were -- I see it as a wouldn't it be nice movement that doesn't have a lot of practical effect because it doesn't have a way forward on how do you get there? It puts pressure on democracies, it puts pressure on some countries but it doesn't do away with nuclear weapons. It doesn't get rid of the materials, it doesn't get rid of

nations wanting to have them, it doesn't get rid of any of those things so it's not a practical way forward.

I guess my lack of mention of it is because the next administration is going to have to take into account that others in the world have nuclear weapons, we have nuclear weapons, they're not going away any time, as Obama said in Prague, they don't go away probably in my lifetime and I would say probably in our children's lifetime. I'm not sure when it will be. But you have to then manage the issue until you can figure out a way that they can go away. That's why I didn't raise them.

DWG: I completely agree that the TPNW doesn't have any practical mechanism for achieving what it's declared. The reason I bring it up, though, is we have been talking not just about false configurations, we've been talking about relationships between countries particularly the pathological levels of distrust between the U.S. and Russia at this moment, right? So the TPNW to me indicates some sort of broader global shift within which these conversations are situated.

I appreciate the reference that ever since nuclear weapons were invented there have been movements to try and think about how to do away with them.

I wonder if this is a little bit different. You'd be contextualizing it in the story of nuclear arms control. Being an anthropologist, I look at it in terms of the current eruption of the global movement, the decolonization, and that is much bigger than the Black Lives Matter Movement. Speaking from Canada, there's been a huge eruption of indigenous here in Canada. And I'd say it also indicates it's no coincidence that the countries that signed the treaty are largely non-white countries that feel that the arms race is just sort of largely a white game being played potentially at the risk of extermination of their populations, right?

So in some ways it reminds me a little bit of that moment in the '50s when you start to see colonial independence. I have no idea what it portends, but expert discussions about force considerations do take place within a much larger political/economic content. A lot of countries spent a lot of time negotiating, and not just signing but ratifying this treaty. It clearly matters to them in some way. Maybe they'll shrug and say okay, well, it was just symbolic. I don't know that they

invest all that time just to sort of shrug and go away.

So if we speak as if it's business as usual I'm wondering if it's possible to keep going.

DWG: We're up to our hour. I'd like to ask each of our speakers to give us just a couple of minutes of closing thoughts. If they want to refer to the points that Hugh as raised, that would be fine, but up to you.

Acton: I mostly wanted to off my thoughts to Hugh. I don't have any particular closing.

I'd make two points here. The first one is a nuclear war between two nuclear armed powers would be a catastrophe for everybody not just the powers. And there are four dyads in which I really worry about that. U.S.-Russia, U.S.-China which are the two that I know about most and tend to focus on those because that's where my research focuses. But U.S.-North Korea, and India-Pakistan are kind of the four. Between nuclear powers. Israel and its neighbors is not between two nuclear powers, but there's still plenty of risk there.

And I don't like, if you think that there are -- I know the states that signed the TPNW would simply say if you get rid of them the problem goes away which I think ignores the risks of rearmament. You can't keep a world without nuclear weapons free from that. But in the time it takes you to get rid of nuclear weapons it seems to me that every state ought to have a really strong interest in not wanting there to e a nuclear war and if you think that the kind of strategic technical dynamics, as arcane as they seem, can add to the risk of escalation in the event of a crisis, and I really do, then a kind of [inaudible] of these discussions, yeah. I think what underlines them is an honest to God fear of nuclear war and wanting to prevent that which is something, it's a global interest.

And secondly, these dynamics make it harder to get rid of nuclear weapons. This is where I think there is a direct connection with the TPNW. Russia and Chinese fears about the survivability of their nuclear forces leads them to do things like develop new types of weapons. To build up those nuclear forces. And their buildup in turn leads to a corresponding reaction from the U.S. I'm simplifying here because time is short, bit you have competition at the so-called non-strategic level. You have

competition at the strategic level driven by both nuclear and conventional capabilities. These two levels are connected. And to the extent that we can manage and eventually roll back both these arms race dynamics and escalation, it makes it harder to fulfill the goal of the TPNW.

I fully expect that many experts and government officials from non-nuclear weapon states listening to this conversation will simply go this stuff is just crazy, Dr. Strangelovian, just get rid of them. But as I say, I think for that to be practical policy these are key considerations in actually getting there.

Beebe: I would echo everything James just said on this topic.

But in terms of wrapping up the discussion, I would offer three thoughts on this that I think we need to think more deeply about and this is over and above this narrower issues of technology and its relationship to war and conflict.

One is that the world is going through a fundamental change, a fundamental shift. We were in a bipolar situation during the Cold War. We went essentially to a unipolar situation in the immediate aftermath of the Cold War and the dissolution of the Soviet Union. The U.S. was the world's by far most predominant power and there weren't a lot of limits on what we thought our ambitions could achieve in the world.

That is changing rather rapidly. The rise of China. The relative multipolarity of the world. The United States has a number of peer competitors now. Russia is not a peer competitor globally but certainly the balance of power in specific parts of the world, in specific regions. And that's what's most important, of course. It's how those correlation of forces look in specific circumstances, in specific geographic areas.

Russia is most definitely a peer competitor of the United States in certain key parts of the world. And they've demonstrated that over the past decade. That's a new situation. We have to figure out how to deal with that. We have to figure out how do you achieve strategic stability in a world where multipolarity is becoming the rule. That's number one.

Number two, what is the United States' purpose in the world? That is changing. We thought we knew that purpose pretty clearly during the Cold War and we carried it out pretty successfully in

a bipartisan basis. A lot of domestic support for what we were doing.

IN the immediate post Cold War period we thought our purpose was fundamentally to make the world more liberal. More democratic. More market oriented and that stability would flow from that. That I think has failed. Now that's a matter that's under debate. It's beyond what we can get at in this particular discussion. But I think what the United States ought to be doing in the world is now a point of contention in ways that it hasn't been for a long time.

Should we approach the world on a universalist basis? Are we making the world safe for particularism? Recognizing that different countries have different cultures, different histories, different ways of doing things, and as a result we ought to approach this on a more particularist basis, making the world safe for diversity, if you want to call it that.

And then finally technology. Technology is an overlay on all of this. But fundamentally I think that nuclear technology during the Cold War actually paradoxically made the world both much more dangerous but also more stable. The risks of instability were obviously much greater than they had ever been in the world but that balance of nuclear terror actually helped prevent war.

I don't think that's where we are right now. I don't think technology is actually a stabilizing element the way it was during the Cold War. We have to come to grips with how to deal with that.

Bunn: Coming back to the complexity of where we are. The complexity with the multiple actors. All the each's that George was just talking about. With the technologies and their effects as James pointed out. And with the past, the multiple paths that could lead to escalate and lead to nuclear use. That complexity really means that we need more analysis -- now generation, next generation analysts who can look at all this and come to the what does it mean? And more journalists who dig out, put into context, with all this complexity, put into context and educate about this. We really need that more than ever.

DWG: That's why we're having this conversation which, as I mentioned, we will transcribe, we will post and I will send links to all of the journalists who signed up for this and perhaps to

the whole Defense Writers Group. I really think that this issue needs intelligent coverage. IT gets some, but not enough. I'm hoping that we can contribute however modestly to improving that.

Hugh, go ahead.

Gusterson: I really appreciated what George said, which I thought hit the nail on the head. From where I sit, the U.S. looks like a superpower in decline. It lost the wars in Iraq and Afghanistan. COVID, its mismanagement of COVID has dealt it a huge reputational blow.

To me the key question now is what happens with the rise of China? Is it possible to socialize China as a rising power, into some new kind of international system? How can the U.S. and China co-construct a new international system. Does China just step into the Soviet Union's shoes and we have the same sort of relationship with them that we had with the Soviet Union? Or can we create something better?

DWG: Absolutely key question.

Thank you all very much. It's been a rich and fascinating conversation. I'll make sure others at least read it and maybe watch it. So again, thank you very, very much for joining us today and I think we better close things out at that point. All the best.

# # # #