

Center for Strategic and International Studies

TRANSCRIPT

Event

“What Comes Next for U.S.-Japan Space Cooperation?”

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FEATURING

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Kari A. Bingen: It's Golden Week in Japan. Golden Week is the unofficial name commemorating a succession of public holidays in the country. As its name suggests the period is a treasured one in Japan, with residents taking advantage of the week to vacation and to spend time with family and friends. We're fortunate that this week also marks a time when delegations of Diet members and others visit the United States to exchange views with their U.S. counterparts on a variety of security and economic issues, including space.

So, in honor of Golden Week and building off of other recent high-level engagements between Washington and Tokyo, we thought we'd give the golden treatment to space and the U.S.-Japan space relationship. We'll take stock of where the relationship stands and explore where it may be headed next.

I'm Kari Bingen, director of the CSIS Aerospace Security Project. And I'm delighted to be joined by Kevin O'Connell, former director of the Office of Space Commerce in the Department of Commerce and an all-around space guru with time also at State, Defense, the intelligence community, the National Security Council, and other places; and also Sean Wilson, the former director of international space policy on the National Space Council and a senior associate with the CSIS Aerospace Security Project. We'll also leave time for audience questions at the end, so please feel free to submit those online through the event page.

So let's kick this discussion off here with some recent high-level visits from Japanese officials. So we had Prime Minister Takaichi here in November meeting with President Trump. We had the director-general of the National Space Policy Secretariat, Kazeki-san, here in April to talk with many of his counterparts within the interagency. What was on the space agenda? Or, what was on the space agenda and, you know, what did you take away in terms of the level of space discussion in those high-level engagements? What did you see? Maybe, Sean, I'll start with you and then kick it over to Kevin.

Sean Wilson: Sure. Thanks. Thanks for having me. It's great to be here alongside both of you. I'm honored. And it's delightful to be here for Golden Week.

Look, we had the prime minister, as you noted. We had Director-General Kazeki also here. I think the takeaway I had was space is still a very strategic part of the alliance. Japan is still one of our topmost space cooperative partners across all sectors – civil, commercial, national security. So there's a lot of continuity. That hasn't changed.

What has changed is on the U.S. side there is an even heavier focus on the defense side. So while there was a lot of discussion in the runup to

her visit about what would be said about Golden Dome, there wasn't, ultimately, a big single announcement on Golden Dome, but I think at the lower levels, at sort of a programmatic level, cooperation is very strong. And through sort of fora like DICAS and PIPIR I expect the coproduction pieces will get even stronger for things like missile interceptors and potentially other areas.

You know, on the lunar side, of course, we had a big shift – and I think we'll come back to this – a renewed focus on the lunar surface, less focus on the vicinity of the Moon and things like Gateway. Japan was already well-postured for the lunar surface, but there are some things to discuss on the Gateway front. But there was a reaffirmation of that – lunar surface; and cooperation bilaterally is very important, that we'll be doing that together and that Japan is a key partner in that

With DG Kazeki, of course, he was here after almost a two-year break and the last Comprehensive Dialogue on Space, so I think part of his meetings were probably meant to get a sense from the U.S. interagency of: Where is this partnership going? How do we sort of reengage top-level discussion? So those three sectors we talked about – the civil, commercial, and the national security – are all weaving together in a kind of strategic way. But him being here I think again shows the importance of the partnership and the need to move forward together.

Ms. Bingen: And you had to get the word “golden” in there, didn't you?

Mr. Wilson: I did. Contractually obligated. (Laughter.)

Ms. Bingen: Kevin what was your takeaway?

Kevin O'Connell: Kari, thanks very much for having me. And let's wish all of our Japanese friends a restful and peaceful Golden Week as they make their travels around.

I think Sean has it exactly right. We've seen in both President Trump's visit last year, and then the prime minister's visit and the follow up by DG Kazeki, a reaffirmation that the U.S.-Japan space partnership is our cornerstone space partnership in the Pacific. Japan is spending now the third-largest amount of money in the world on space, trying to do a multitude of things. And what I like to say with Japan, we see many countries – we're seeing universal interest in doing more in space, even as traditional political relations change.

What we can say about Japan is Japan has all the ingredients to be a major global space power, and we're seeing them move forward in this. I have benefited from a trip to Tokyo back in late March and spending a

lot of time with industry and the industrial base issues. We'll come to that later. But I think it really was a full reaffirmation of the strength of the partnership going forward.

Ms. Bingen: I think you're absolutely right. I look at Japan as really our anchor in space in the Indo-Pacific, and they are a tremendous powerhouse, tremendous technical capability, industrial capability. So forget – we'll table China for a moment, but I think really our anchor from an allies and partners perspective is – it is Japan. And it's all those areas you mentioned: It's across the civil front, commercial, security, and diplomatic as well.

So, you know, we're also one-plus year into a new administration. So I guess Prime Minister Takaichi came in last fall, but with two new administrations – the Takaichi administration and the Trump administration – where are we seeing points of continuity in policy and investment? And then where are we seeing points of contrast, perhaps in contrast to previous administrations, on both sides of the Pacific?

Mr. O'Connell: So I think we're seeing an acceleration of the view that, number one, space is important to our national security, our collective national security, our economic productivity, and scientific exploration. And so that's been affirmed on both sides, if you will; that the Japanese are recognizing this in a faster way, if you will, than we have historically. A lot of changes. Sean has already mentioned, you know, the shift to the lunar surface as opposed to Gateway and things like that. And the importance of defense. And so, in many ways, Japan is pursuing new capabilities both for its own sake but also to be an effective partner with us, and frankly with other international partners.

Ms. Bingen: Well, and on this – well, actually across whole of government here in the United States, the administration released a new executive order last December on ensuring American Space superiority, a new National Security Strategy. So it emphasized things like burden sharing and burden shifting, investment, expanding our commercial space economy. So are you seeing some of those shifts actually occur?

Mr. O'Connell: Oh, very much so. I mean, the shift to integrate commercial capabilities, something we've talked about in this country for decades, is now really being accelerated – you know, the encouragement of new entrants to encourage competition, to have a very rapidly developed set of capabilities supporting us here.

Same thing in Japan. We see a very dynamic industrial base. Japan has – it has big companies and it has very small companies. And so during my trip we spent a lot of time talking about how do – how do big companies

and small companies partner – investment, JVs, subsidiaries. In the United States we do acquisition, but Japan is not quite there yet.

And so we're seeing more interest in integrating commercial capabilities, really on behalf of speed. Speed is very important here, especially for Japan. If we had a decade to let the Japanese space ecosystem play out on its own, it would do perfectly well. We're worried, because of potential conflict in the region, that we may have to go faster. And so that really strengthens the opportunities for partnership between us and Japan.

Ms. Bingen: Well, and then let's just talk the civil space arena for a moment – Sean, I think this is right up your alley – as we think about continuity of policy or contrast in policy. Probably one of the biggest announcements so far out of the administration has been a change to the Artemis program. So this is the program getting us back to the Moon, working with international partners to do so. So can you unpack for us some of the big contrasts in this – on the civil space front?

Mr. Wilson: Yeah, of course. You know new NASA Administrator Jared Isaacman had a day at NASA they called Ignition Day, and there was a sort of plethora of announcements that came out of that. So I'll try not to forget the important ones, and I'm sure people will correct me in the comments where I forget things.

You know, the most important one was to get the architecture, I think, on a more sustainable footing. So a lot of that pertains to the SLS getting to sort of more repeatable baseline configuration. So there will be, basically, a cancellation of sort of out-year changes to that; so, essentially, lock down that architecture, get it cheaper, get it more repeatable.

A new mission was introduced. So, previously, the landing mission, the first one to occur with crewed landing was going to be Artemis III. That has now shifted back to be IV; III will now be a sort of docking mission in low-Earth orbit to test out some of these landers that we will need to make that happen. And the hope is that then there will be two crewed landing missions in 2028. That's, obviously, a very, you know, aggressive schedule, but that's what NASA's on track for.

One of the ways they're trying to speed it up – and speaking of Kevin and the need for speed – is to essentially take the Gateway – and they called it a pause. I think it'll be more permanent than a pause. But for now the Gateway is, you know, pushed well into the out-years, and they're looking at how do we reuse some of this equipment. Of course, there's also been testimony and press reporting that some of the equipment is corroded. So how they do that, the repairs that might be

needed for that, how the equipment could transport the lunar surface, I think probably NASA's doing a lot of really intense study of that right now.

Another piece that has changed is I think the budgets that we're seeing for things like Commercial Lunar Payload Services 2.0 are going to go way up. Administrator Isaacman is talking about, you know, 30 landings in just a couple years, everything from, you know, aircraft to rovers to you name it, to help sort of build out the baseline surface architecture.

And then there's this emphasis on nuclear power and – not just for the surface of the lunar economy or the lunar base in the future, but also just for propulsion. And so there's a mission that's been announced, I believe, to Mars to sort of practice that. And there's a lot of international interest, including from Japan – and we can come back to this – with: What is this reactor going to look like on the lunar surface? How can it be built, you know, safely and quickly? And what will it be powering in terms of infrastructure on the surface of the Moon?

So that's the Moon piece.

You know, the big shift that occurred on Ignition Day that I took note of was vis-à-vis the future of the ISS and what comes after that for commercial stations. I think I'll save some of that for a little bit later, but those are some of the big takeaways I had from kind of the initial time with Mr. Isaacman.

Ms. Bingen: Do you want to jump in on –

Mr. O'Connell: Yeah, no, no, no. I mean, I think Sean said it exactly right.

Ms. Bingen: OK.

So, yeah, let's pull that back a bit further, because Japan had a pretty significant role to play in Gateway, which was this orbiting, you know, module that would allow, you know, resupply and support to astronauts on the Moon. Now that that has been paused or tabled, you know, that begs the question of where is Japan's role in this Artemis program as we go back to the Moon. So can you just explain where Japan fits into that new architecture announcement?

Mr. Wilson: Yeah. I think it's a really good question. You know, fortunately for Japan, they were already very heavily focused on the lunar surface due to the pressurized lunar rover.

Ms. Bingen: Ah. Got it.

Mr. Wilson: And the announcement of that rover, which is very expensive program, in 2024 during a visit of the prime minister to the United States, was also what led to the commitment that two Japanese astronauts will eventually join us on the surface of the Moon, and that the Japanese will be the first international Artemis astronaut alongside the Americans. The timing of that is very much, you know, TBD. So I think that piece of it, in that sense, Japan was already well-postured.

I think they will probably have heartburn with the Gateway pieces, whether it's money already spent or money they were going to spend. There's flight opportunities associated with the Gateway. What happens to – if you invest that money but there's no Gateway, what happens to the astronaut? I think that's not specific to Japan, but also ESA and UAE and some other partners on what would have been the Gateway. I think they probably have that question.

But also, Japan has technology for the lunar surface. We have companies like ispace and certain other companies –

Ms. Bingen: That's a great point, yeah.

Mr. Wilson: – looking at in situ resource utilization. I think they're probably wondering: How do I participate in this? There's not currently a Japanese CLPS program to leverage that kind of technology. Obviously, we have procurement rules in the U.S. that have things like, you know, majority U.S. ownership, et cetera, for bidding on these larger government contracts. So as we think about what partnership looks like, I'll be curious to see how Japanese companies with high tech can help fill out these manifests, you know, for those 30-odd landing missions we were talking about that don't involve humans but do involve very, you know, crucial inputs to a future lunar base.

Mr. O'Connell: Let's not forget the nuclear reactor piece on the Moon, either, because this is a place where Japan really has interests as well. You know, obviously, when you think about a future lunar economy, if we don't have nuclear power and propulsion – and this is reflected in the president's executive order – it's still a small, mostly government-driven economy. If you're going to have a truly commercial, larger economy on the Moon, you're going to have to have nuclear power and propulsion. And I know Japan is interested in partnering in that particular area as part of their civil discussion as well.

Ms. Bingen: Well, and what struck me as well with that Artemis Ignition Day announcement is, you know, we are absolutely committed to returning

to the Moon, creating a sustainable longer-term presence there, but also beating China. And so, frankly, what were a lot of activities, really narrowing them down and focusing on that prime objective – you know, Japan focusing on the lunar rover – I think there’s opportunity for us to actually meet those timelines, right?

And then you mentioned the International Space Station. I think the Japanese are – you know, they’ve long been a partner, really from the beginning almost. But as we also make this shift to commercial stations, I think they’re also looking at opportunities there as well.

Mr. Wilson: Yeah, that’s right. I can go first, if you want to –

Mr. O’Connell: No, no, go ahead.

Mr. Wilson: Yeah. I think the Japanese investors have now invested in every one of the major sort of CLD hopeful concepts that are being advanced. I think the challenge will be – there’s a policy challenge; there’s, I think, a money challenge; and now we have a programmatic challenge; and we can walk through them.

NASA has changed its approach, potentially, to acquiring the future station to succeed the ISS twice now in as many years. Previously, the plan before these kind of changes were put into place was that the ISS would be retired circa 2030. There’s a U.S. deorb vehicle being procured right now, built by SpaceX, to bring the station down safely, and then one or more commercial stations was going to succeed that.

The plan briefly changed last year. It has now changed again, with NASA putting out an RFI and an announcement that it’s thinking about a(n) ISS-anchored acquisition approach. So a new module would be procured called the core module that would dock to the ISS, and then these CLD hopefuls would potentially dock to that module to sort of verify their capabilities, sort of meet safety standards, and then in the fullness of time detach and become a free flyer. I think there’s a number of challenges with that approach, and we’ll see what the industry feedback was like to the RFI and where NASA winds up.

But, you know, one is that you’re talking about a much longer ISS extension, I think, than policymakers at the White House or potentially in the Congress had previously thought about. I think there was some thought that maybe it goes to 2032. I think if we have to acquire a new module and then test vehicles to it, that, of course, is probably longer than 2032. That takes money from partners like Japan. It also takes political buy-in. And so they will have to go not just to Japan, but to all

the ISS partners to get that approval, including Russia, the Europeans, Canadians.

You know, and as I think about a policy matter, of course, it costs money to buy a new module. So that will crowd out, I think, potentially the money that would go to these commercial stations. So for the commercial stations raising more funds to finish off their concepts, get them flown into space, it's probably an unwelcome shift, I imagine. And so that will be kind of a key question, is, you know, if we don't have money to sort of fund commercial stations right out of the gate but we do have money for a module, is NASA in a way competing with private industry? And are we applying the lessons learned from previous efforts like commercial crew or commercial cargo to make sure we're creating an ecosystem and slowly stepping back the leading role of the U.S. government in that?

Mr. O'Connell: But I think there's a positive signal as well, both on the U.S. commercial space station side but also from what I hear from our colleagues in Tokyo. And the message really is this: Do not expect NASA to take 97.9 percent of the capacity of the commercial space stations that first go to orbit. You have to do a harder amount of work with different industrial sectors to say this is the real benefit of operating in low-Earth orbit, et cetera.

We've seen some of that already in Tokyo, gathering those industrial sectors together and saying: This is what you can do. This is what you can't do. We're already seeing this globally, where agriculture, pharmaceuticals, new materials, those sectors are already saying, gee, it's a lot easier to get access to space and lot cheaper than it used to be; why don't we try and experiment? And I think this is personally the application for the Moon, is to say for space stations you're going to have to draw more of that demand out explicitly. You'll have an anchor tenant from the government, but it may not be as much as you thought it was going to be originally.

Ms. Bingen: And that's what we've always wanted in space, right –

Mr. O'Connell: Absolutely. Absolutely.

Ms. Bingen: – is that kind of diversification.

Mr. O'Connell: You need to go in that direction anyway. And the faster we can go that way, the better off we'll be.

Ms. Bingen: OK.

I'm going to shift gears here now to security space because that's, from an investment perspective, probably the biggest change that we're seeing, not just in the U.S. – we just had a Space Force budget almost double –

Mr. O'Connell: Exactly.

Ms. Bingen: – but in Japan too. I mean, it has been striking to me. I think the proposed fiscal year 2026 budget for space security has topped over a trillion yen, so over \$7 billion. It was about a third of that just a few years ago. So they are rapidly accelerating their investment in space capabilities.

All of that is happening, though, as Japan is transforming their defense enterprise and their defense capabilities writ large, and really expanding those. So, you know, we have – this is an interesting time in Tokyo right now. This summer, Japan is about to launch into updating three key security documents – so their National Security Strategy, their National Defense Strategy, and their five-year defense buildup plan. So what do you see as the – as Tokyo is launching into that process? What do you see as some of the key issues that will have implications for space and space security?

Mr. O'Connell: So I think the first thing you'll see is an explicit recognition of the importance of space for all of the things that we use it for, but in particular defense given the three documents you've spoken about. I think you'll also see some initiatives to try to mature the industrial base in a – in a more rapid way than we might have seen just operating naturally on its own course: bringing together big companies, smaller companies, you know, encouraging them to work together; using the Space Strategy Fund, for example, more explicitly in a way that leads to procurement as opposed to just sponsors research. And so I think you'll see that.

One of the things I focused on a lot in Tokyo is the role of private finance. And it surprises me, given the size of the finance ecosystem in Tokyo, that they're not spending a lot of money in this particular area, partly because of the size of the – of the Space Strategy Fund. And we've done some work – we did some work there last year; I did some work on this last trip – to say: What exactly is impeding private investment in the sector?

And the good news is I think we're seeing change. I think we're seeing explicit results from the Space Strategy Fund leading private investors in Japan to say, hey, that's worth investing in. It's not just about the money; it's about helping early-stage Japanese companies to develop a

mindset to become a globally competitive company, OK? And that's really what's going to be required in the world we're headed into.

When you think about partnerships, one dimension of partnership is you bring world-class capabilities to the table that everyone can benefit from in the partnership. That's different from the way we thought about partnerships historically.

Ms. Bingen: Yeah. That's a great point.

And you know, Japan, as they're modernizing their overall defense kit and they're looking at threats beyond their shores, they're recognizing that we need longer – we need connectivity. We need to see at longer and longer ranges.

So that brings back a couple of questions, and the three of us have talked quite a bit about this. I mean, they have some big issues on their plate right now in terms of, so, space-based ISR – intelligence, surveillance, and reconnaissance. I think they're about to make some big decisions there on where they go with their ISR architecture. Missile warning and missile tracking, space situational awareness, satellite communications – I mean, there's a bunch of areas.

So maybe, I thought, Sean, I'll start a bit with you here.

Mr. Wilson: Sure.

Ms. Bingen: You know, where do you see the ISR need going? And you know, there's things that, obviously, they need to do as a sovereign nation, but you know, a big theme in all of this discussion is how does the U.S. and Japan partner to help accelerate their capability, but then also create benefit for the collective security of both our nations? So how are you seeing that ISR discussion play out? And what are some – what are some of the areas that you would encourage focus on?

Mr. Wilson: Yeah. As you noted at the top, right, the defense spending is going way up. They're going to hit 2 percent soon. I think the U.S. administration will keep pushing them to go even higher. And space is a big part of that, and it will probably double or triple over the next five-year spending plan.

Why ISR? I think, you know, it's good to step back and think about, you know, they already have a Cabinet Satellite Intelligence Center; why do they need any ISR – space ISR in MOD? Well, the reason they need it is because they're developing what they call counter-strike capabilities to target mobile targets in the region of potential adversaries. So that

means they need a sort of targeting and kill-chain complex that can help them find those things, see if they hit it, if necessary find it again, hit it again in a sort of, you know, virtuous cycle, if you will.

Space is a critical sensory input into building that data stack. And so they need data that is both good but also timely, and that is often revisited. So that's, I think, why MOD has chosen to focus on ISR, correctly, in the near term.

What have they done so far? Just late in last December they announced that they were going to procure space ISR services through what is called a Private Finance Initiative, or PFI. So think a commercial consortium that is acquiring this data for startups. There's sort of larger Japanese companies involved that are then kind of integrating it and getting all this to MOD, to oversimplify. It's a good first step. It's the first time MOD has done this. They're new to this area. But there are problems with it.

So, to go back to the kind of original motivation, they need a targeting and a kill-chain system. What they're procuring currently is not high enough quality data and it's not fast enough to do that. There's a report out from the Yomiuri Shimbun last time I was in Japan that Chinese ISR revisit rate over Japan is somewhere around once every 10 minutes. With this initial baseline architecture with the PFI, we're probably looking at like a days-long process to get that data. So too slow, right? You're talking a Chinese sort of OODA loop that is a hundred times faster than MOD. So that won't work for targeting purposes.

And so I think moving forward that initial first step will have to be supplemented through I think what Kevin rightly touched on, which is: How do I get to the state of the art more quickly? And that will involve, I think, foreign partnerships for both satellites and data. And I think that's necessary because, as CSIS' own report noted not that long ago, when you look across the gold and silver and bronze rankings for remote sensing companies around the world, noticeably absent are Japanese companies. And so getting them caught up and into that more competitive tier is absolutely critical.

Mr. O'Connell:

So let's acknowledge the progress. You know, it's one thing to say I'm going to acquire a 50-to-75-satellite constellation; it's another thing to do it. You know, we know the history here in the United States is legendary of some of the battles that we've had over how to do it, what to try to support out of it. So it's a difficult task, especially when you're doing it for the first time and when you're doing it under pressure, and so by definition the first cut at it will not be perfect. And so the key here for Japan will be to adapt as they go.

I see a couple of bright notes in this story. Number one, I'm seeing much more of a recognition in Tokyo that we need scalable, modular production of small satellites. As the small satellites become an opportunity to innovate a lot faster, we're seeing companies say we have to move to that kind of production – not the once-every-10-year satellites that, you know, we've been all too –

Ms. Bingen: Yeah, that we've been used to. (Laughs.)

Mr. O'Connell: – accustomed to here. And we've moved off that as well, to be – to be fair, as well.

But the other thing – and I focus a lot on this – is the benefits on the ground. You know, it's one thing to have satellite capabilities in space – radar, hyperspectral, electro-optical – the key question for me is: What do you do with it on the ground? And that's everything from how do I incorporate the new technologies – artificial intelligence, quantum, other things like that – natural language processing is going to change how people access satellite imagery globally. How do I bring those things in in the way a government would, which has always got some risk aversion associated to it, or, on the other hand, doing business a completely different way?

So I've talked in Tokyo about our history in the United States of outsourcing satellite imagery analysis. It's very controversial when I talk about it, the idea of briefing the prime minister with something that was developed by a company. You know, piece of information developed by a company is still fairly controversial, but it's something we have been accustomed to. And obviously, in law now I can use commercial satellite imagery, for example, in National Intelligence Assessments. And so it's just a natural progression, but we're seeing developments in Tokyo recognize that that's the direction they also have to go, in addition to what they put up in space.

Ms. Bingen: Well, and it's just, you know, back to the partnership discussion, right, is they absolutely should develop their own sovereign capabilities, build up greater satellite production scale/proficiency. And, Sean, to your point, it's not just about building the satellites, but it's a what do you do with the data – the processing, the analysis, closing your kill chains in a very timely, militarily relevant manner. But you know, as they're building up their sovereign capabilities, that takes time.

Mr. Wilson: Definitely.

Ms. Bingen: So there's also an urgency piece to this. You know, we keep talking 2027, 2028. How do you just – yeah, how do you accelerate that? And you know, I know we've talked a lot about – a lot about the role of commercial and U.S. industrial partnerships. I mean, what's a way to think about it that it's kind of a win-win for all parties?

Mr. O'Connell: So it's a time when we're – when we're talking a lot about America first, Japan first, but this is a natural place for licensed coproduction. You know, where – when you need to go quickly. What you do is you work, in this case, with an American partner. You work side by side. The engineers work side by side. You develop a capability rapidly on an established production line, you know, pick the number that you want to do. Meanwhile, you develop the capacity back in Tokyo to do the same kinds of things. That's not gone over completely well, you know, in terms of that discussion. But I still think it's an opportunity to go faster than if the countries just go on their own.

Ms. Bingen: That's a great point.

And this, you know, when we talk – we'll stick just on ISR for a moment. It is across phenomenology I think there's opportunities here, whether it's EO, electro-optical; IR, infrared; SAR, synthetic aperture radar; you know, signals collection. It's really across the board. And to your point, I think a lot of it is just integrating that data into their processes.

You know, the other area that I – that I would also emphasize here is, you know, it's not space for space's sake. I think, Sean, you were teasing this out as well, is: How do you ensure that this space data is integrated into the joint force? How do they train and exercise with targeting data generated by satellite imagery or, you know, the protected communication services, that missile warning data? How do they train and exercise with that information every day so that they're also pumping back into the space acquisition ecosystem here's what we need as the warfighter, as the operator – here's the capabilities we need you, space community, to deliver for us?

And that, I think, is still – you know, we're still seeing that evolve. I think this new Joint Operations Command that Japan established will help, and then you now have a Space Operations – Wing?

Mr. O'Connell: Wing.

Ms. Bingen: Yeah. I had a chance to meet with Major General Ishii a couple weeks ago – that now they plan to convert into a Space Operations Command.

Mr. O'Connell: Right.

Ms. Bingen: I think those kind of operational perspectives will also help drive this forward.

Mr. O'Connell: Definitely.

Ms. Bingen: So we talked ISR. What about space domain awareness? I know, Kevin, you've worked a lot on this in some of your past jobs.

Mr. O'Connell: (Laughs.)

Ms. Bingen: Where is the opportunity there?

Mr. O'Connell: So, you know, there's two dimensions here. One is, first and foremost, the space safety aspect, OK? Everybody benefits from space safety. You know, the militaries benefit. Obviously, commercial and civil space operators benefit as well. I think we're still at the point where people are focused more on the data available than actually someone to bring together a coherent picture of the space environment. And that picture should be recognized equally in Colorado Springs, and London, you know, and in Tokyo, and in Wellington. You know, that's the piece that's still missing, how do I take this wonderfully diverse set of data – some government some commercial on the safety side – and just paint a coherent picture of where things are and how they behave. Very important to do that.

On top of that, you know, what are we going to do to support the distinctly different military missions? You know, the SDA piece. And bringing concepts like tip and cue in, when we bring the allies into tip and cue, how will they do that? There's a lot of work to be done in this area. I think we need to still get the basics right, though. Japan does not spend a lot of money in this area, by my understanding. You know, what role can they play in, what we'll call, a global hub and spoke system between allies for the space safety piece, which underpins everything else going on?

Meanwhile, you saw at Space Symposium, the Space Force has now announced that it's opening up an office to focus on cislunar. And so if the problem was originally hard, OK, it gets exponentially harder as we, rightly, start to think about cislunar space. We're going to need our allies to participate in this. We're going to need new ways of thinking about describing where things are in space, atop what is already an unsolved problem.

Ms. Bingen: And, I mean, space domain awareness, the more that we see objects maneuvering, the more debris on orbit, we need to have better space domain awareness. One of the things I – the conversation I keep having with our friends in Tokyo is, you know, in this area as you evolve your space domain awareness capabilities, you don't want to follow the U.S. model. I mean, I think about our model today. We had decades, legacy, you know, the old Cheyenne Mountain, right, these exquisite systems that were built up over time. A little clunky. You know, that's why the U.S. is making investments in some of the modern technology.

But actually, think Japan has an opportunity here – almost a greenfield approach, right, is they have – you know, they have some great sensors and data that they use today from JAXA, but this is where I think partnering with, particularly U.S., industry and some of these U.S. commercial space situational awareness and data companies, they could really leapfrog and build an entirely – a new architecture based off of the most modern technology, modern solutions. And wouldn't that be cool?

Mr. O'Connell: Yeah. No, no, I fully agree with you on this. There is still an opportunity space for them to jump ahead and, you know, again, to my partnership point, you know, bring something world-class to the table by doing a lot more experimentation in this area, looking at different datasets, focusing on how to squeeze value out of that data. Because, again, I have the same problem. I tend – because of my background, I tend to look at the parallels between the satellite imagery markets and how they evolved and where we are on SSA. And we're making some of the same mistakes we made in the first with the second. I think there's a tremendous opportunity to leap ahead by focusing on the things you're talking about, you know, and do it in concert with U.S. companies.

Ms. Bingen: Right. You know, and the other area that we've talked a lot about with our friends in Tokyo is the area of missile warning and missile tracking. And I know, Sean, you worked a lot on that topic in your previous jobs. You know, what's your take on where there's opportunity and where there's a door to push on? Particularly in the next year.

Mr. Wilson: Yeah. I think – look, the window is open for the next seven months as the Japanese think about what they want to spend on in defense space for five years. So the discussions that are going on right now between the U.S. government and the Japanese government, are absolutely critical in this area. I think, in particular to convey from the U.S. side what the expectation is, but also the standards that will be required to link to our systems. And those standards, I think, will be high, since this is a capability that's intimately connected with decisions about war and

peace, missile launches, Golden Dome. All of these things, right, connected to missile detection and tracking.

In terms of where the opportunity space is, in 2024 when I was in government this got announced. The idea was that this evolving architecture would leverage U.S. commercial. And we didn't know at that time what that would be. Obviously, it's left vague intentionally to allow flexibility for the future. But the idea was, I think, to Kevin's point earlier, you could do this in an evolutionary way that builds up Japanese industrial capacity over time. And I think everybody understands the political need, the industrial need, to have these capabilities to produce for yourself, to be more self-reliant in the current world we're in.

And so I think what we'd envisioned, at least at that time, was initially probably the 1.0 architecture is going to have to be based off U.S. technology. So we're talking U.S. buses coming off the line for PWSA, now Tranche 3. We're talking sort of sensors that the U.S. can ensure get through the export control wickets. And the pipes that all this data is moving through have to be absolutely secure and trusted. If none of this architecture sort of comes together in a trusted way, I don't think the U.S. side is going to want to touch it, given the risk that I sort of touched on at the outset.

So as I look at opportunities, I think, from U.S. side, what the policymakers are probably looking for, what the warfighter are looking for, is, where is the U.S. industry involvement? What is that going to look like? What kind of engagements are occurring in the track one to ensure that the Japanese are receiving, very clearly, an expectation of what standards will be used for communications, for cybersecurity, these types of things. Because, you know, to Kevin's point, just like space domain awareness, information security is also a foundational capability. It enables more advanced security cooperation in space. And without it, we just can't get there. So that's sort of in a nutshell where I sort of view it. But happy to unpack that after Kevin fixes everything, I just said. (Laughter.)

Mr. O'Connell: No, no. I think you're spot on with that.

Ms. Bingen: Well, and you actually went where my head went next, is we tend to focus a lot on the satellites but so much of where you derive value out of satellites is getting that data down to the ground and doing magic with it, right? But then also, to your point, Sean, is, you know, one of the barriers, I think, to some of this deeper technology cooperation, including in areas like missile warning which has long been very sensitive U.S. technology, how do we tackle some of those barriers that we know we're going to have on the U.S. side as well? So you mentioned

the export policy piece. You know, so how do you – how do you look at those dimensions of this?

Mr. Wilson: Yeah. One of the initiatives we pushed when I was a government, which is still solid, is to overhaul the space-related export controls, which neither reflect kind of U.S. foreign policy or defense needs with allies and partners in this day and age for space, but they also don't even reflect where the commercial market is and foreign availability of these kind of technologies. And so there's a lot and so there's a lot of areas in space right now. I think SAR is very famous for this, but also things like RF and IR, where U.S. guys cannot export stuff that other countries can, even friendly countries. And so it is a sort of unilateral restraint on our ability export at a time when we have an administration that's very clearly pro-exporting, pro-strengthening the industrial base, you know, pro-moving quicker and cutting regulations wherever we can, right? This is the ten out one in rule for regulations that the administration signed out very early.

So I think for companies thinking to explore. not just IR technology but other technology, there needs – that regulatory overhaul needs to get completed. It is it was drafted. There was a lot of industry feedback. A lot of it negative. I think that needs to be taken on board. It needs to also reflect the changes that have happened in U.S. MTCR policy to make sure that is tracking. And that needs to get done, you know, yesterday, because I think the Japanese colleagues probably thinking about exporting these technologies are worried, rightly, that it will get held up on this, the most critical pieces of the tech stack, which is the sensor and how the data is handled. And so I think it's fair to the Japanese, if they think about investing in a(n) architecture that should operate with ours, that we also make sure that their way will be made clear for that technology to get released, or how that's going to happen.

Ms. Bingen: And to your – and to your point, I mean, there's a simple – I guess it's a triple win, right, a win-win-win –in that, you know, we have policy now that is emphasizing burden sharing and burden shifting. So this is an opportunity, really, for our industry to benefit, you know, as Japan's putting more resources into space. Hey, work with our companies. Invest in our companies because it will help you. It will help advance your own industry. So, second win. But then third, it will help advance our collective security. So there's a lot of wins here. And I think we need to look at it from that more strategic standpoint.

Mr. O'Connell: No, so I would – I would have as cranky a commentary on export control issues as Sean did. He was polite about it, actually. (Laughter.) But I think what I what I like to tell people is, if you have a specific export control issue – and we should talk for a minute about the Japanese

review of export controls that just took place to allow for them to further export capabilities. But when you talk about export controls, rather than – you know, we policy people, we love to talk about export controls. You know, we can talk about them day and night, at parties, et cetera. But when you have a real export control issue between companies, take them to your governments and say, OK, I know you've got bigger problems here, but we have a specific issue that enables the partnership to be stronger, our security to be better. Focus on the individual case, not the general case of export controls. Because we'll just keep talking about them and not solve them specifically.

Ms. Bingen: Yeah, that's a great point.

Mr. Wilson: And the data point of how much money does this mean to the U.S. economy? How many jobs?

Mr. O'Connell: Yeah, what's the consequence? Absolutely.

Ms. Bingen: Yeah. Yeah. That's a great point. I want to go back to pull on a couple of threads from both of your comments. Is, you know that the co-production as I think there are opportunities – I'll just use ISR as an example, but we could probably do it in any of these areas. But, you know, as Japan – as we look at opportunities for, say, co-production, you're building up Japan, Japan's capacity, you're also improving or aiding our own industry. And they're seeing benefit from it. But now, you know, let Japan start building satellites. We can also help on the ground infrastructure side.

I mean, we are – we have tremendous companies that are doing work on advanced processing. You just – I mean, we're learning as well, as we're putting up these proliferated architectures of tens, hundreds of satellites. You don't have enough people on the ground to look at every image. So you need to take advantage of the data analytics, the processing, artificial intelligence, automation. To your point, Kevin, you can't just have a whole bunch of people looking at one image and running it into – up to higher-level offices. So that's an area I think that – you know, we tend to focus on the satellites, but I think there's a lot more opportunity in kind of the ground piece as well.

Mr. O'Connell: And, again, it's reflective of our experience here in the United States. A gentleman whom I won't name, a senior gentleman, said to me, you know, Kevin-san, we're drowning in data. OK, as more and more data is proliferated, we're just drowning in more and more data, and the small number of people we have. Again, this is not an uncommon problem to what we went through here in the United States at NGA and, you know, and other places like that. The extent to which technology or different

business processes can help with that are places that Japan should be thinking about innovation.

Ms. Bingen: Great, great point. OK, I'm going to shift here to two questions from the audience, and I'll go back to my last question, and we'll wrap up here. The first one, which I think is really interesting here, is what role do you see our partnerships, our allies and partners playing as we look at the Global South. And we know China is doing a lot in space in the Global South right now. Building up space infrastructure, ground stations, radome, antenna farms, et cetera. They're also striking a lot of deals, you know, building off of their 5G telecommunications infrastructure deals. We're now going to bundle space services, remote sensing, satellite communications, et cetera. So where is there an opportunity for us to leverage our partnerships to do something in the Global South?

Mr. O'Connell: So I think there's a tremendous opportunity. You know, I think one of my frustrations – you've heard me talk about this before – is that we're in an economic competition. And when the Chinese talk about this, they also talk about it in economic terms. And at some level, we know the Department of War and NASA are always going to be involved in space. I think we've made the case for the Commerce Department to be involved in space. But there are a whole host of organizations in the federal government that are not in the game, OK, that are economic organizations. And so we need to do more to bring those agencies in partnership with American private industry.

Similarly, in Japan we need to have a presence in the Global South to basically go up against the opportunity created by the Belt and Road Initiative, where there's no response, or almost no response. And some of it is in day-to-day business dealings that we have. You know, we've heard people complain that, you know, getting visas out of the United States are particularly difficult, and then the export control issues, and things like that. The Chinese are all sweetness and light when they show up in these countries. And it's when the deal is done that the pain begins, OK?

We have much better capabilities. We have much greater opportunities to leverage those, both U.S. and Japan, in the Global South. I mentioned a minute ago Japanese reform of export controls. I think that's partly designed to recognize Japan's role in Southeast Asia especially, and the excellence that they're seen as having with countries that want to do more in space. With the Philippines, with other countries that really want to do more in space. I think it's a tremendous opportunity. We just have to take it.

Ms. Bingen: Yeah. That's a great point. Did you want to add anything on that?

Mr. Wilson: No, I think you took the words right out my mouth. I'll just say, look, our poor commercial guys are not fighting on a level playing field. We have the things on our side that make us not go particularly fast, or in some cases, not go at all because they're scared about export controls or some kind of other issue. But there's also the competitor is coming in sometimes with the capability that is free or better than free, right, because all the real debt is on the back end with the port I just took from you.

Ms. Bingen: Yeah. There's lots of strings attached.

Mr. O'Connell: Exactly.

Mr. Wilson: And we're used to this for things like Belt and Road. And, you know, P.S., the Chinese are working on multiple competitors to Starlink. And so just as we've seen 5G and Huawei and things like that, we should expect for space broadband communications that we're going to start to see some of these similar kind of dynamics. Of, hey, we're coming in. There's free space broadband for you here. Here, also join our whole tech ecosystem of all these other things. And that's where our U.S. guys really need a lot more support, for the economic tools in the toolbox to help them. If we need a DOD solution or a NASA solution, I think those are big organizations. They know how to do these things. We're not as good at matching, you know, our ExIm Bank, or DFC folks, or other things, to our space guys at the lower level in these smaller markets,.

Mr. O'Connell: It's costlier and clunkier, but we do a much better job at training our partners with partner capacity. And at some level, that's underpinning this entire conversation we're having. You know, the Chinese are essentially going in abroad and basically saying, hey, don't worry about it, we'll give you the answers. If you think about, in a geospatial context, the map of the world, that should scare the hell out of you, OK? We at least work with our partners to help them understand, to do capacity building, to help them understand what we're doing, how they might do the same thing, or do it slightly differently. That's a real strength of ours. We just have to do more of it.

Ms. Bingen: Yeah. That's very well said.

Mr. Wilson: And, to Kevin's point, the Japanese – actually, speaking of Japan – are a leader in APRSAF, right, which is format that they run. That, to me, is a natural hub for a lot of this work that Kevin is talking about in the region. It's well regarded. It has a lot of participation from around the world. And the Japanese are seen as sort of a more neutral and

friendlier partner for a lot of these kind of activities. And so we could definitely be leveraging, in the U.S.-Japan context, the areas where they can do this kind of better than we can.

Ms. Bingen: OK. So the next question here – and I apologize because I don't think I'm going to say your name right – but Fanaaka Chidakwa at Penn State University.

And the thing I'll say is I think this person is taking advantage of us having two great space gurus and professionals here sitting – joining me today. And I do love that the work that we do here at CSIS, it doesn't just inform policymaking, you know, program folks, government industry folks. We also have outreach to the next generation and new students. And I really love that that part of our mission. So the question here is, what kind of opportunities and challenges do you see for young people seeking a career in this space domain?

Mr. O'Connell: Wow. Fabulous. So I think the opportunity here – and you can see it in the Artemis mission, you can see it in some of the plans for the lunar surface, et cetera – is we're going to need astronauts. We're going to need people with high levels of technical skills. We're going to need all of that we can possibly get our hands on. But as we go back to the Moon permanently and sustainably, we're going to need every skill that you could possibly imagine. Too many people have already heard my story about, you know, a woman at a conference saying that she was a chef and wanted to make food taste a lot better in space. (Laughter.)

Again, when you went to the Moon for five days, you could put up with anything. When you go back for six months or a year, you're going to have to have at least some of the creature comforts at home in order to make that a livable experience. So I think the opportunity space is actually much larger than we think about when we talk about space. You know, we think it's a very narrow – it's much, much, much larger than we think about that. And so we want to encourage people from all walks of life to think about the role that they can play in the future space economy.

Ms. Bingen: You know, it's funny you say that. I was reminded – I think it was at Space Symposium as well – where somebody, maybe it was you that said it, is, you know, we're going to need plumbers and electricians on the Moon as well.

Mr. O'Connell: Absolutely.

Ms. Bingen: And I thought about that for a moment. And I thought, you know, it's those trade – it's that unique tradecraft, those are the people that are going to build a sustainable presence for us on the Moon.

Mr. O'Connell: Absolutely:

Ms. Bingen: So, yeah, I absolutely agree. OK, let me end here on – oh, actually, Sean, I wanted to give you that same question. Anything that you have for our next generation folks joining us today? Any advice you have?

Mr. Wilson: Well, look, I didn't start as a space guy. I kind of fell into it by accident. So, you know, it sounds like you're in school right now, obviously at a better university than I went to. You should – (laughter) – you started way ahead of me. So don't feel like there's a gatekeeping of, like, you can't do this because you haven't studied space, or you're not an engineer, or you're not in the right technical track. As Kevin noted, there's room for everybody. So if you're interested just explore it.

And the other thing I would just say is I benefited from a lot of opportunities. One was to go to Japan. Another was to go to the Space Council. If those come up and you're interested, try to take it. They don't always last forever. Programs get canceled, or space councils go away, or come and go. And so I encourage people, if you want to try something just try it. And you'll learn as you go. Nobody ever knows everything they wish they knew. I don't know everything about this topic that I wish I knew, coming into today. And so I think there's always room to learn. And don't feel like there's a set path. I think space is so new and it's so dynamic that I don't think anybody knows the path. And so feel free to, you know, explore and figure it out.

Ms. Bingen: That's so well said. Stay curious, right? OK, I'm going to end on a speed round here, but let's get your advice. I'm going to put you in Tokyo, and then I'm going to put you back here in Washington, D.C. So in Tokyo right now, they're getting ready to kick off this process to develop these three new security documents – national security strategy, national defense strategy, and their defense buildup plan. Any specific recommendations that you would give to our friends in Tokyo as they're getting ready to launch that process? Particularly from a space perspective.

Mr. O'Connell: So I think they're ahead of us already in this discussion, because the prime minister's economic growth strategy includes an explicit conversation about space and aerospace, and how it can fuel that. Again, the recognition of how important space is from an economic perspective. I think Japan is already well ahead in starting to think about this in a more detailed way than historically. Having a strong industrial

base is as important as having some sort of capability on orbit, for example. It's not the way we've historically thought about it, but they are already starting to think about that. Making sure the economic dimension is embedded in all three of those documents, in particular in the industrial base.

And, again, a personal obsession of mine, you know, making sure that the private finance's contribution to that is also recognized. You know, what I like to say is government funding is important. And the Space Strategy Fund, of course, is a large government fund. But it's private innovation that comes from private capital that basically looks at things in a different way than governments do, and also seeks differentiation between ideas. And that tends to accelerate innovation. And so I hope there's some recognition of that in these documents as well.

Ms. Bingen: Great point. OK, Sean. You're the advisor here. You're the outside advisor brought in from their close ally, the United States.

Mr. Wilson: The outside advisor, yeah. (Laughter.) Yeah. You know, when I was out there recently it was clear to me they were taking a lot of lessons from Ukraine and Iran and what's going on and this – I think in their words, they would call it a new character of war, or a new type of war that is emerging. So I think they're starting to diagnose the problem correctly in their strategy documents. And the space money, the investment is flowing in. If I had to recommend anything vis-à-vis the security piece in particular, it's sort of just some of the themes we've talked about today. It's you got to hit the foundation. So the information security piece has to be as bulletproof as you can make it. This is a data game vis-à-vis space for the most part. And then it's space demand awareness that Kevin touched on. That's a foundation capability.

If I'm buying really advanced satellites and do space domain awareness and maneuver and fly around, but I don't know where they're going, or who the red is, or what red is doing, or his pattern of life, that's a real problem. So those foundations, I think, need a lot of attention. A lot of that – to both of your points – is ground stuff. We talked a lot about ISR, so won't belabor that, but welcome the first steps on that. It's really hard. Now is the time to supplement that and sort of jump ahead to a state-of-the-art capability. For missile warning and tracking, I think we need to kind of structure industrial partnership to get you guys – you, being the Japanese person I'm talking to now – to capability as fast as you can, that is state of the art, and the U.S. will trust and leverage.

It's helpful for you, because your system is interoperable with ours. There's deterrence benefits from interweaving with ours, entangling with ours. The U.S. benefits too. We have a more resilient architecture.

So that's a clear area of, I think, common interest. But we also know you want to get to a place where you can do most of this yourself. And so I think it's fine to have a phased partnership that gets you to, more or less, fully indigenous capability. Communications, they're already kind of on the path to procure more resilient communications. But I think, you know, keep going on that.

You know, and finally it's the human dimension, right? I think you guys both touched on it. JMOD has labor shortages. Japan's population is going down. So the ability to leverage AI, automation, to do things differently than the U.S., to take lessons learned from how I speed all of this up and use less humans, I don't think it's just a nice-to-have for Japan. I think it's a must-have, or this is not going to work, for a whole host of reasons. Because really, like, we talked about space a lot today. Space is sort of one key input into this tech stack that powers all the things at the high end of this new way of warfare that Japan is studying so hard.

And so I hope that as they think about how do I build this full stack, the same discussion that we had about what has to be sovereign, what do I have to build in-house, or design in-house, or produce in-house, versus where can I partner with others, that has to happen kind of consistently at every stage of the stack or all these things will not connect together at the most important moment.

Ms. Bingen:

So I'll answer my own question as well here. And I go back to first principles of just the urgency of the security environment that we're in right now. And their past defense strategy talked very clearly about we need to have, you know, fielded capabilities by the, you know, I think it was '28 time - 2028 timeframe. So, you know, reminding - I think reminding us collectively that space is critical to modern warfare, to defense, and to deterrence.

Our former vice chairman, Admiral Chris Grady, had said - actually, I think it was at an event here at CSIS - that, basically, space is the most critical domain because it enables everything terrestrial. And I think that's true here in the United States. And then I think even as Japan goes further and further afield with their capabilities, it's going to be critical to their connectivity and their ability to see a distance as well. So urgency. But it's also urgency in terms of integrating these space effects, these space capabilities, in with their joint force. I mean for us, the Army is the biggest user of space capabilities. So we need to - I think they need to continue to push on that piece.

And then finally, I think to both of your points, I mean, the U.S. partnership, U.S. industry, the commercial space sector, they can really

help supercharge Japan's – their industry and their capabilities as they're building it up. I mean, they have exquisite – I think, really an exquisite sector. But if we're looking at we need fielded capabilities over the next couple of years, the quickest way you do that is you partner with U.S. companies that have already been doing that and are building at scale. So those would be my three areas.

Let's now flip it. We are now advisors. You know, Sean, may be back in your old job here – (laughter) – but we're now advisors sitting here back in D.C. So what advice would you give the new administration? And I'll say, you know, we've finally got to a point where, you know, several key space leaders on the national security, commerce, civilian side, they're all in the seats now. So we'll switch this around a bit. Sean, what advice would you give them? I'll go, and then, Kevin, I'll end on you.

Mr. O'Connell: OK.

Mr. Wilson: Yeah. I think it's the – space partnership with Japan hits a lot of your objectives, boss, all at once. You want more exports. Well, exporting more satellites to help with these new JMOD constellations could help with that. We want to increase investment. Kevin talked about this earlier. We have both the bilateral investment commitment for Japan of \$550 billion into the United States. A lot of that has gone to things like critical minerals and energy. Some of that could also go into space, because the government, under the president's EO, also needs to bring in \$50 billion of new space investment by, what was it, 2028, something like that. So we're hitting two birds with one stone on the foreign direct investment piece, I think, if we do that.

And then finally, look, we're asking allies to do more in their own defense. The U.S. has a lot of other things on its plate. Japan wants to do that with space. And so to the extent the U.S. government can help them do that, we should. That's exactly what we're asking them to do anyway, and they want to. So they need communication, though, from both the White House side, and particularly the DOD side, of what is expected of them. Sorry, Department of War side as well. Because I think they want to buy things that are interoperable, that will integrate. They don't always know what that is because they're new to this game. And so to the extent, once all the policy reviews and other things are out of the way, at this phase of the administration it'd be good for somebody to sort of go and tell them what is expected.

Ms. Bingen: So that's exactly where my head went, because I wanted to focus on the security piece. You know, as we emphasize in policy burden sharing and burden shifting, I think we need to have clarity on what do we need out of our partners. You know, they have more than tripled their space

security budget. It's in our interest to encourage them to invest in areas with fieldable capability that help us as well. You know, help them, but also help us. And so that's exactly where my head goes as well, Sean, is clarity on what we need from them, and then, you know, communicate that to them.

So, Kevin.

Mr. O'Connell: So let's end where we started. You know, we think – and I think everybody at the table agrees – this is the cornerstone space partnership in the Indo-Pacific, OK? Given that, we need to be communicating at all levels about things we need, things we have, things that we want to keep protected in a way that only we can do that. And I think communication needs to happen at all levels. You know, industrial communication between companies. What are the issues? What are the opportunities? We're seeing a lot of different people talking at different levels. For the government, the government needs to be clear in what it's communicating. Recognizing, again, to use an oft-used phrase these days, war fighting in space is a team sport. And that's very much going to include Japan as a key player on that team. And then in the industrial base area, there are many opportunities for us to collaborate to advance the state of the art, both for exploration, both for economic productivity, and security, together. That requires us to cooperate together and to communicate continuously with one another.

Ms. Bingen: That's so well said, Kevin. And I think, you know, as I end here, I'll just say the three of us are very fortunate to have worked with these issues for a long time. And you two in particular have done a lot of work, and tremendous work, with our Japanese allies in space and in other areas. So, one, thank you for that. But we're in a very privileged position to be able to work both of these and to help advance the relationship in ways that is mutually beneficial and, obviously, beneficial to U.S. interests.

So, with that, we'll end, and we'll say happy Golden Week to our friends over in Tokyo and across the country. Have a safe and healthy next couple of days. Thank you.

(END.)