1000-1100 ET March 27th, 2025
Space and Missile Defense Virtual Discussion

[Riki Ellison, Chairman and Founder of MDAA]
Good morning, ladies and gentlemen, from just another stunning spring day here. The blossoms are out. It's gorgeous here. Welcome. I'm Riki Ellison. I'm the founder and chairman of the Missile Defense Advocacy Alliance. I've been involved with missile defense for 40 years, since I was 20 years old, and at the prelude of the SDI, which is a couple of years right after that. And we founded MDAA about 20 years ago, when NORTHCOM was founded, when MDA was founded on this. Our mission is to make our nation safer and the world safer with the deployment, evolution, and development of missile defense. And no better time in the world to have more of it that's out there.

This is our 71st Congressional Roundtable. It's a lot of them. And we are very honored to have General Mike Guetlein with us. He is the vice chief of space operations for the United States Space Force. Just a tremendous honor. And I wanted to say, Mike, from my 40 years of experience, that in the uniformed officers today, you are the most qualified and most experienced in the missile defense and space arena. And that there's second to none.

[General Michael Guetlein, Vice Chief of Space Operations]
We could be a little gracious, Riki. Frankly, because I'm sitting here, right?

[Riki Ellison, Chairman and Founder of MDAA]
But I just want to, I'm excited about that, to have a conversation with you. And I think we got to, you know, words are words. We're going to back it up a little bit, but I do want to read your bio to everyone, if I can, just a little bit. First off, he's an Oklahoma State Cowboy. So, I just, that's a great credit to him. His acquisition experience spans air and space capabilities and systems across special operations, global power projection, missile warning and detection, and counter space mission areas. General Guetlein has commanded and led at the flight squadron, division, directorate program, executive office and field man levels notable assignments, including serving as the commander, the space systems command. That's the material command for space force, the deputy director of the national reconnaissance office and commander of the air and space force element, the program executive for programs and integration at the missile defense agency. That's probably about 10 years ago. And that's when I first met you, I believe maybe earlier on that, the director of remote sensing systems, the commander of rapid reaction squadron, the military assistant to the assistant secretary of the air force for acquisition. So he is amply qualified with experience in the real world on this.

You know, I'm, I come from a generation, an old generation that the Apollo and Neil Armstrong fascinated me and captured the imagination of the world and the American public and what we did on an engineering marvel to create that ability to get to the moon and back. When we look at today and even going all the way back in the sixties and seventies, the pillar, the foundation of our missile defense, of our deterrence is sensors in space going all the way back to DSP that are able to identify early warn and

give our decision makers that ample time to be able to, to deter and keep this world a safer place. That's the fundamental piece of missile defense for, for, for coverage of our continent, for coverage of the homeland, for coverage of our allies across the world, to be able to have that capabilities up there and be able to move that data correctly, fast to the decision makers.

That remains even stronger today, from our perspective, we're seeing advanced threats that hypersonic glide, FOB, advanced ICBMs, that this becomes even more critical to be able to deter that. And we've seen that there is a policy change to be able to enable space to be able to defend itself and defend our nation with that. So that's where we're at with this discussion moving forward on that.

And Mike, so I first want to just, you know, thank you. I thank Salty for letting you come speak with us today. And Salty was with us on this Memorial, by the way, when he was a little major, excuse me, major when we did this, but let's talk about your journey from, from this whole thing to where you are today as the vice chief of the space operations for that. And give us a little flavor from your perspective of all those experiences.

[General Michael Guetlein, Vice Chief of Space Operations]
So it's been, a long journey. What you and I haven't talked about is I told my mom at age three, I was going into the air force. She has no idea why she thought it was a three-year-old thing. And it wasn't until I went to college that she realized, Hey, he really is serious. He's going, it's going to go join the air force. And I did, I went to Oklahoma state, joined the air force, thought I was going to fly. It turns out my eyesight wasn't as good as it needed to be to fly. And they said, Hey, what do you want to be? Well, I guess I'm going to be an engineer. I immediately went into a special operations aircraft doing development, did some F-22, some F-35 at the time. And then I got the opportunity of a lifetime, which is where I kind of entered this mission area as a O-1 or an O-2 at the time, a first lieutenant, the B-2 program. I got asked what I wanted to do. And I said, Hey, I want to go work in that program, but I have no idea what it is. It's down in the basement. It must be really cool. Knocked on a door, two-star escorted me to the office and said, you're now the propulsion manager for the B-2 program, which was our, you know, the backbone of our strategic bombers today, along with our B-52s.

So that's kind of where I entered the mission area. Coming out of Wright-Patt, they decided to give me a career broadening opportunity into special operations. And I actually went into taking gunships into Bosnia and into Panama and some other places.

It kind of started to really expand from the development side of the equation to the operational side and seeing how they both come together into a capability.

[Riki Ellison, Chairman and Founder of MDAA]
Was that rapid? You were doing rapid acquisition?

[General Michael Guetlein, Vice Chief of Space Operations]
Not at the time, not yet. This was the traditional acquisition system of taking a C-130, adding a 105-millimeter howitzer to it, and then delivering it, to the operators, and then taking it into combat for the first time.

[Riki Ellison, Chairman and Founder of MDAA]
How long did that take back then?

[General Michael Guetlein, Vice Chief of Space Operations]
That was probably about a 10-year development program. Yeah. Our timelines have remained fairly consistent over time. They really haven't gotten faster. So I kind of did that and was trying to stay in aircraft maintenance. And they said, no, you need to expand. And they sent me to space. Well, at the time I was like, I really don't want to go to space. I want to stay in aircraft. Aircraft are cool. Aircraft are fast. Aircraft, you know, are the way of the future. But I had an opportunity to take a tour down to the Cape and Florida. And I saw the Saturn V rocket and saw the size, the sheer size of that rocket, the amount of engineering that went into that rocket. And then I saw the size of the capsule that those astronauts were in. And at that point, I was just hooked. The technology was just, it was just amazing. The people were amazing. And they sent me out to my second strategic missile defense assignment to space-based infrared, which are the missile warning satellites that are up in geosynchronous orbit 22,000 miles away, unblinking eye on the earth, watching for every heat event on the face of the earth and every missile launch. And they're the ones that are warning the nation if there's an ICBM in route.

[Riki Ellison, Chairman and Founder of MDAA]
How long have we had those?

[General Michael Guetlein, Vice Chief of Space Operations]
The DSPs, which were the original ones you mentioned, the Defense Support Program, were put up in the early 60s. SBIRS came online in the 2000s, and we now have six of them on orbit. And they are an unblinking eye, 24-7, watching for every heat event on the face of the earth, not only for strategic, like ICBMs you're talking about, but even when Iran launched the salvo of missiles at Israel in April and October, SBIRS is the ones that alerted not only our warfighters but our international partners as well to, hey, these rockets are inbound. And SBIRS also handed off that fire control solution to the Missile Defense Agency and their effectors as well, so we were able to take out all those threats before they could do harm.

[Riki Ellison, Chairman and Founder of MDAA]
What's it cost? I've heard It's like an aircraft carrier, the cost of one of those.

[General Michael Guetlein, Vice Chief of Space Operations]
The first four satellites averaged about $1.3 billion apiece. They're extremely complex. The amount of processing on orbit to be able to detect a launch, to be able to determine where that launch is at in flight, determine where the impact is, and determine what that launch really is, what is the real threat, all that has to be done in fractions of minutes, and that requires an enormous amount of technology on orbit to get after that. So that's why they're about 1.3 [million dollars]. The second two that we built were right around $800 million apiece.

[Riki Ellison, Chairman and Founder of MDAA]
And so obviously that's a heck of an asset up there, and that needs to be defended.

[General Michael Guetlein, Vice Chief of Space Operations]
Absolutely.

[Riki Ellison, Chairman and Founder of MDAA]
And that's where we're seeing some threats looking at that. But that information would go down to Buckley Air Base, basically? Is that where it goes?

[General Michael Guetlein, Vice Chief of Space Operations]
Yes. The downlink comes down into Buckley Air Force Base and then gets distributed out of there after the operators type it. It goes to Cheyenne Mountain for strategic missile warning. It goes out to the operational units, to the Army uses it in JTAGs. We also send it to the Missile Defense Agency, and it gets integrated into their fire control solution in Colorado Springs and then sent out to their effectors like the GBIs on alert in Alaska.

[Riki Ellison, Chairman and Founder of MDAA]
And that was, what, 30, 40 years ago. Are we getting faster at the data transfer now, or are we doing something?

[General Michael Guetlein, Vice Chief of Space Operations]
We are getting much quicker at the data transfer. The system I would say was designed for salvos of about 10 threats at a time. But as you saw in the Iran attack, we're getting 300-plus in one salvo. The system has sped up and is now able to handle that kind of demand.
It can even go into an autonomous mode where it's automatically detecting the launch, typing the launch, and alerting the shooters so that it can take it out before it impacts.

[Riki Ellison, Chairman and Founder of MDAA]
And are we going to replace that with the next generation, or are we just adding software to it to make it?

[General Michael Guetlein, Vice Chief of Space Operations]
We are replacing it. There are several replacements out there. There's what we call next-generation geo. Those will be up at geosynchronous orbit. We have those in development today. We have next-gen polar, which will go over the polar orbit. So they go really fast around the southern pole, but they loiter over the northern pole looking for launches over the north pole. That system's in development. We also have two proliferated constellations up there, one in low-Earth orbit and one in medium-Earth orbit. Those are to be more resilient and more capable and to support the tactical fight.

[Riki Ellison, Chairman and Founder of MDAA]
So the ones in geo, there's only a couple of them, right? You said six.

[General Michael Guetlein, Vice Chief of Space Operations]
Six it up there today.

[Riki Ellison, Chairman and Founder of MDAA]
So that's – and they're, I guess, vulnerable a little bit. If you take one of those out, it hurts us, right?

[General Michael Guetlein, Vice Chief of Space Operations]
Correct. They are large satellites. They don't have a lot of ability to maneuver. They don't have a lot of ability to protect and defend themselves. So they are very vulnerable. And we are currently building out space defense capabilities to add more resilience to that constellation, and that's kind of where we are today.

[Riki Ellison, Chairman and Founder of MDAA]
Okay. I think I was in Sunnyvale seeing one of those SBIRS back in the 80s before they moved up. Let's carry on with your journey.

[General Michael Guetlein, Vice Chief of Space Operations]
So after space-based infrared program, I got involved into the dark side of space, which is the classified programs, generation tanker, C-5 upgrades, C-130 upgrades. So I've done a lot of aircraft. I've done a lot of space at this point. And then I got picked up, you kind of mentioned it, the Rapid Reaction Squadron. The Rapid Reaction Squadron is a unique rapid capability squadron. They are charged with solving the combatant's commander problem in real time. So within that squadron, we built the capability, tested the capability, and it built the end of the field on six-month timeframes. So trying to really jump in and start solving the combatant commander's problems in real time. And it takes a different mindset to do that kind of acquisitions. You have to go fast.

You have to not be enamored with the 100% solution. You have to have massive partnerships.

[Riki Ellison, Chairman and Founder of MDAA]
Your PKO go down to do that?

[General Michael Guetlein, Vice Chief of Space Operations]
Yes.

[Riki Ellison, Chairman and Founder of MDAA]
What was a couple of the things that, I mean, what was the fastest you were able to do that outside the 10-year process?

[General Michael Guetlein, Vice Chief of Space Operations]
In the Rapid Reaction Squadron, we had capabilities in the field within 30 days that were doing some really cool things to some really bad people.

[Riki Ellison, Chairman and Founder of MDAA]
And was that 10 years ago?

[General Michael Guetlein, Vice Chief of Space Operations]
That was 2008 to 2010 is when I was in that squadron. And that squadron still exists today.

[Riki Ellison, Chairman and Founder of MDAA]
And we're advanced now, and we can get stuff in there quicker, more adjusting?

[General Michael Guetlein, Vice Chief of Space Operations]
Absolutely. And that squadron was doing it on a signals intelligence kind of level, a cyber kind of level. But we have other units now that are doing it for space, doing it for air. You have the Rapid Capabilities Office for air. I've done a lot of work with them. We have Space Rapid Capabilities Office out in Albuquerque. They are building out purely space capabilities on rapid timelines.

And I would say this is how successful we are. When I challenged them a year ago and said, I want you to be able to solve a commander's problems with a space capability. I want you to bring a rocket and a satellite together. I want you to make it, encapsulate it, and launch it, and have it on orbit in 24 hours. They told me that was absolutely impossible. They did it in 27 hours.

[Riki Ellison, Chairman and Founder of MDAA]
Wow.

[General Michael Guetlein, Vice Chief of Space Operations]
They missed it by three hours because they had to wait for the Earth's rotation to come around to put the satellite where they wanted it.

[Riki Ellison, Chairman and Founder of MDAA]
And this is without SpaceX. This is U.S. rocketry?

[General Michael Guetlein, Vice Chief of Space Operations]
Absolutely. That was with Firefly and Millennium.

[Riki Ellison, Chairman and Founder of MDAA]
That's Firefly. Yeah. That was out in Vandenberg?

[General Michael Guetlein, Vice Chief of Space Operations]
Yes, sir. And that is now the way we are approaching rapid space capabilities going forward is on those kind of timelines.

[Riki Ellison, Chairman and Founder of MDAA]
For small sats.

[General Michael Guetlein, Vice Chief of Space Operations]
For small sats. And it is to answer the combatant commander's requirements on tactically relevant timelines. The combatant commander can't wait 10 years for a new system to come on. They need capabilities within a matter of hours or days.

And we from the Space Force need to change our culture and our capabilities to be able to meet that demand.

[Riki Ellison, Chairman and Founder of MDAA]
How do we still stay with the 10-year process? Because we're 10 years out. That's all out of date.

[General Michael Guetlein, Vice Chief of Space Operations]
Correct. But there is always physics-based problems that we're going to need the larger capabilities for. Our next generation strategic satellite communications has to survive a nuclear attack. That technology is very complex. That technology takes a little while to develop. That program is going to take 10 years. That program is going to cost money. But there are other capabilities like tactical SATCOM today where we're able to put up capabilities a lot faster. We're able to partner with industry, partner with our allies, into what we call now hybrid architectures, which is the full-on integration of DOD, commercial, and allied systems. That buys you resiliency through redundancy. It buys you resiliency through proliferation.

[Riki Ellison, Chairman and Founder of MDAA]
We're doing this today.

[General Michael Guetlein, Vice Chief of Space Operations]
We're doing that today in SATCOM. We're doing that today in Space Domain Awareness.

[Riki Ellison, Chairman and Founder of MDAA]
Can you give us an example, SmallSats? What products are we doing this with our allies?

[General Michael Guetlein, Vice Chief of Space Operations]
Most of those are small satellites in low-Earth orbit.

[Riki Ellison, Chairman and Founder of MDAA]
Sensor satellites.

[General Michael Guetlein, Vice Chief of Space Operations]
Lower cost. Sensor satellites and communication satellites. Lower cost. But we're also integrating in the larger commercial capabilities that are out in the other orbits further out that are larger platforms. It took them a little while to get up there. But now that they're up there, we can take advantage of it, take advantage of the synergy to integrate and network those capabilities together.

[Riki Ellison, Chairman and Founder of MDAA]
Are you able to put software – you've got that hardware up, and you get it up quick. Is there a way to adjust the software updating all this stuff?

[General Michael Guetlein, Vice Chief of Space Operations]
Many of the platforms have the ability to do real-time software updates, and we're also trying to go to digital radios now, digital software-defined radios. That allows us to rapidly inject new capabilities while the satellites are in orbit. That is something we didn't have 10 years ago. That is a new technology that is starting to be proliferated on orbit that buys this enormous amount of capability.

[Riki Ellison, Chairman and Founder of MDAA]

And the power for this – I mean, obviously, we're working on some self-power, like ion power, to keep those up longer than they naturally fall down at the low-Earth orbit aspect of it. You have to replace them, right?

[General Michael Guetlein, Vice Chief of Space Operations]
There's new propulsion technology that keeps them up there longer. But space is a harsh environment, a harsh radiation environment, so a lot of times you're losing your systems just over time just because of the environmental effects. You can't really account for that unless we want to add more redundancy and resiliency onto a single platform, and that significantly increases the cost.

But the innovation coming out of the industry today has got the technology down to a point where I can build low-cost platforms, get them up on orbit in a much cheaper manner than what we were able to do 10 years ago. So they basically become almost like disposable satellites. That's kind of the SpaceX model. They've got almost 8,000 satellites on orbit.

[Riki Ellison, Chairman and Founder of MDAA]
That's your resiliency too. Absolutely. Okay, so you can put them up. Let's carry on with your journey.

[General Michael Guetlein, Vice Chief of Space Operations]
Oh, wow. I don't remember where I left off there, Riki. So I did the Rapid Capabilities Office. Then I got pulled back into Strategic Capabilities, and I was actually the SPO Director for the Next Generation Missile Warning Satellites and Weather Satellites. I did that for a couple years.

[Riki Ellison, Chairman and Founder of MDAA]
Any of those products in today's world?

[General Michael Guetlein, Vice Chief of Space Operations]
They are. There's at least six satellites up there today that we built during that time frame that are all doing great, wonderful things for the nation up there. And then that's where I met you. After doing Strategic Missile Warning again, then I got the assignment over to Missile Defense Agency, and that's kind of where you and I first started off.

[Riki Ellison, Chairman and Founder of MDAA]
That was with Admiral Syring?

[General Michael Guetlein, Vice Chief of Space Operations]
That started off with Syring and then went to General Greaves. And I left about the same time General Greaves reached out.

[Riki Ellison, Chairman and Founder of MDAA]
Just explain what you did there. What were you put in charge of there?

[General Michael Guetlein, Vice Chief of Space Operations]

So I was the PEO for all of the ground-based effectors, so THAAD. I was doing some of the upgrades to the SM-3s. I was doing the Israeli program, which is the Iron Dome that we're talking about today.

[Riki Ellison, Chairman and Founder of MDAA]
All the way up to the small one down at the rockets?

[General Michael Guetlein, Vice Chief of Space Operations]
I had all of it all the way up to the Arrow system.

So I had working with the Israelis, helping them build out the Iron Dome. I had the Saudi program.

[Riki Ellison, Chairman and Founder of MDAA]
Because the Iron Dome in Israeli terms is not just the small kind of rocket mortar.

[General Michael Guetlein, Vice Chief of Space Operations]
Correct.

[Riki Ellison, Chairman and Founder of MDAA]
It's the whole layered approach. Is that correct?

[General Michael Guetlein, Vice Chief of Space Operations]
It has three layers. It goes all the way up to the upper tier with the Arrow-3 weapon system, where they can take out an RV in space. All the way to David's Sling, which is medium. And then all the way to the lower tier system, which is the one we see the most.

[Riki Ellison, Chairman and Founder of MDAA]
And I think that's what our president was referring to when he talked about the Iron Dome was a layered, not a small mortar [defense system].

[General Michael Guetlein, Vice Chief of Space Operations]
Right. As you know, we call that integrated air and missile defense. It's integrated, which means all those different levels of effectors are integrated in with the radar system, integrated in with the C2 system, and it can be automated. So the system automatically detects a threat and automatically picks what's the best effector at the best altitude with the highest probability of kill, aligns that effector to that threat, and then automatically gives it the permission to fire. And by the way, if there's a threat coming in that we don't believe is going to hit a populated area, we just let that go through.

That's the beauty of Iron Dome and the beauty of where we think we need to go as a nation is we need to integrate and network these various capabilities that were never intended to be network integrated together, which is a huge heavy lift from multiple different facets, primarily a C2 problem, command and control.

[Riki Ellison, Chairman and Founder of MDAA]

And you got to give a lot of credit to MDA because MDA with Israel, you go all the way back to the MOU with Reagan, but to what they did in working that architecture in partnership with Israel to create that.

[General Michael Guetlein, Vice Chief of Space Operations]
Right.

[Riki Ellison, Chairman and Founder of MDAA]
I mean, you were part of it.

[General Michael Guetlein, Vice Chief of Space Operations]
And they've done the same thing for our nation, right? They've been protecting our nation from a strategic missile attack for the past 20 years. They've had an unblinking eye dome over the ballistic missile dome over the United States with missiles on alert up at Greeley, Alaska and at Vandenberg, California, capable of shooting down any threat headed towards homeland.

[Riki Ellison, Chairman and Founder of MDAA]
Your time at MDA, what was some of the biggest achievements or learning lessons from?

[General Michael Guetlein, Vice Chief of Space Operations]
Well, a lot of learning lessons. The biggest learning lesson was, hey, we need to integrate and network this capability.

[Riki Ellison, Chairman and Founder of MDAA]
So the C2BMC, their integration?

[General Michael Guetlein, Vice Chief of Space Operations]
Yes.

[Riki Ellison, Chairman and Founder of MDAA]
C2BMC which is phenomenal right? It's the only one that's done that.

[General Michael Guetlein, Vice Chief of Space Operations]
Absolutely. Correct.

[Riki Ellison, Chairman and Founder of MDAA]
That goes from your DSPs all the way down to terminal.

[General Michael Guetlein, Vice Chief of Space Operations]
Yep. And they integrate in all of the large ground-based radars that were built in the 1960s.

They integrate that into their solution. They integrate in the mobiles, like the Army's THAAD system and the Navy's Aegis system. So you're integrating multiple services into your solution, not just, you know, what MDA is building. And on top of that, they had the commercial advisors. So they had the industry advising council of Boeing, Raytheon, Northrop Grumman, Lockheed, all advising on what the ballistic missile defense system should look like. So they were able to leverage academia. They were able to leverage

industry. And they were able to leverage all the other services in an integrated manner to deliver integrated effects.

[Riki Ellison, Chairman and Founder of MDAA]
And you also were involved with the silos?

[General Michael Guetlein, Vice Chief of Space Operations]
Yes.

[Riki Ellison, Chairman and Founder of MDAA]
With the new silos.

[General Michael Guetlein, Vice Chief of Space Operations]
Yes. I expanded the Greeley Field out in Alaska and added in the new Next Generation Interceptor.

[Riki Ellison, Chairman and Founder of MDAA]
How long ago was that?

[General Michael Guetlein, Vice Chief of Space Operations]
2017.

[Riki Ellison, Chairman and Founder of MDAA]
How long have those silos been empty? That's what I'm just saying.

[Riki Ellison, Chairman and Founder of MDAA]
Just because they're empty.

[General Michael Guetlein, Vice Chief of Space Operations]
Yes, because we're waiting on the Next Generation Interceptor now.

[Riki Ellison, Chairman and Founder of MDAA]
But you were ahead of your time, right? The demand for that was back in those years with that. Okay. And so those are your best experiences from them?

[General Michael Guetlein, Vice Chief of Space Operations]
I think at Missile Defense Agency, my greatest experience was FTG-15.

[Riki Ellison, Chairman and Founder of MDAA]
Explain that to everybody.

[General Michael Guetlein, Vice Chief of Space Operations]
I got to launch two ICBMs out of the Marshall Islands at the United States, two live ICBMs. And I got to launch two ICBMs out of Vandenberg in response. And it was a hit-to-kill test. It was to demonstrate to the North Koreans that without a shadow of a doubt, we can absolutely defend against their capabilities. And the test was so successful. It did exactly everything that we asked it to do. I had over 900 people deployed around the globe. It was

just a great experience watching all of MDA in action, but all the joint forces. Well, we had two F-35s in the air. We had Aegis cruisers.

We had THAAD batteries. It was all integrated, all operating together. All the agencies and services got together to get after.

[Riki Ellison, Chairman and Founder of MDAA]
So we've come a long ways from 2000, right? One of the highlights of MDA with that full integration. Okay and then where did you go after MDA?

[General Michael Guetlein, Vice Chief of Space Operations]
After MDA, they sent me to the National Reconnaissance Office to do development and operations with the intelligence community. And that was during COVID. So, I got to learn about the IC, but at the same time, I got to experience how to do remote work and all that in a classified environment and what kind of culture change that was going to require across that agency. A tremendous amount of professionals.

[Riki Ellison, Chairman and Founder of MDAA]
And you go, I mean, because MDA is a different culture. You have experienced different cultures with these different careers, right?

[General Michael Guetlein, Vice Chief of Space Operations]
Right. Yeah.

[Riki Ellison, Chairman and Founder of MDAA]
They're like teams, right? And they have a different way.

[General Michael Guetlein, Vice Chief of Space Operations]
Right. And they're all very good at their independent missions.

The IC is very good at delivering their capabilities. MDA is very good at delivering their capabilities. Special ops guys are very good at delivering their capabilities.

[Riki Ellison, Chairman and Founder of MDAA]
And some of the recon sats dual use with missile defense warning sats?

[General Michael Guetlein, Vice Chief of Space Operations]
We're getting that direction. So we are in partnership, the Space Force is in partnership with the National Reconnaissance Office now building some radar satellites to give us ground moving targets and air moving targets in real time that we can detect the movement, pass that down to an effector and be able to hold that threat in check.

[Riki Ellison, Chairman and Founder of MDAA]
Okay. Can we just discuss a little bit on discrimination up there?

[General Michael Guetlein, Vice Chief of Space Operations]
Yes.

[Riki Ellison, Chairman and Founder of MDAA]
Because it looks, we're focused on everything looking at the earth coming up on the heat. But now on ballistic trajectories going over the satellites and looking the other direction to discriminate the warheads from all the debris. This has been an issue for 40 years, 20 years and higher now. Are we getting better at being able to figure out the actual target for firing?
[General Michael Guetlein, Vice Chief of Space Operations]
We're getting better at detecting and identifying the target as well as integrating across multiple organizations. So the Space Force in collaboration with MDA built the HBTSS satellite.

[Riki Ellison, Chairman and Founder of MDAA]
Yup.

[General Michael Guetlein, Vice Chief of Space Operations]
So the ability to do hypersonic tracking and targeting.

[Riki Ellison, Chairman and Founder of MDAA]
That's a different problem. That's looking down.

[General Michael Guetlein, Vice Chief of Space Operations]
Looking down and looking through the limb. We have the missile warning satellites in both LEO and MEO able to hold track custody and pass those fire control solutions to MDA and to some of our other shooters. We're in the middle of proliferating out that constellation. And we're having conversations with MDA on building other capabilities as well to help with their fire control solutions from space.

[Riki Ellison, Chairman and Founder of MDAA]
So being less dependent on the EKV, on the GBI missiles to do their own discrimination. Are we getting discriminating data from space to give to that?

[General Michael Guetlein, Vice Chief of Space Operations]
We're getting discrimination from space. So the way MDA does it, they use their ground-based radars, whether that be the TPY-2, the SBX out in the Pacific, It could be any of our ground-based radars, LRDR in Alaska. They integrate all of that in real time through their C2BMC command and control system. And then they send those fire control solutions out to the shooters. We are now able to contribute from space into that fire control.

[Riki Ellison, Chairman and Founder of MDAA]
So we hadn't been able to do that.

[General Michael Guetlein, Vice Chief of Space Operations]
Hadn't been able to do that. We are now doing it.

[Riki Ellison, Chairman and Founder of MDAA]
And that gets right into the EKV.

[General Michael Guetlein, Vice Chief of Space Operations]
Correct. They communicate directly with the exoatmospheric kill vehicle.

[Riki Ellison, Chairman and Founder of MDAA]
To do that.

[General Michael Guetlein, Vice Chief of Space Operations]
Correct.

[Riki Ellison, Chairman and Founder of MDAA]
And that gives you much better probability of kill because you're able to discriminate.

[General Michael Guetlein, Vice Chief of Space Operations]
Use multiple sensors get discrimination.

[Riki Ellison, Chairman and Founder of MDAA]
So you don't have to wait. In the old days, I think we had to – a lot of the discrimination was having to come back in. And you could – the space layer would get rid of all that. And then you rely on your terminal to do it. But now we're much better than we were.

[General Michael Guetlein, Vice Chief of Space Operations]
We are.

[Riki Ellison, Chairman and Founder of MDAA]
Discuss the hypersonic problem, right? The hypersonic where the terrestrial radars or ship or whatever, it goes so fast that you can't track it from that. That's the reason why space is so important for that threat.

Just to help with that.

[General Michael Guetlein, Vice Chief of Space Operations]
So it used to be the problem that we were solving with the Missile Defense Agency as well as the Space Infrared capabilities was a ballistic threat. The ballistic threat is pretty simple. Object in motion stays in motion. And as long as that object is in motion, I can predict where that object is in space. I can predict where it's going to be 10 minutes from now, and I can depict where it's going to impact.

[Riki Ellison, Chairman and Founder of MDAA]
Like a baseball.

[General Michael Guetlein, Vice Chief of Space Operations]
Just like a baseball.

[Riki Ellison, Chairman and Founder of MDAA]
Right fielder can see the thing.

[General Michael Guetlein, Vice Chief of Space Operations]
Right. Because that thing can't maneuver. So once that baseball is hit, it's going where it was hit to. The problem with the hypersonic threat is twofold. One is it's traveling in excess of 3,800 miles an hour. So that's an extremely high-velocity object. So you're having to hand

off from multiple sensors simultaneously in a rapid fashion. But now those hypersonics are also maneuverable. So we're no longer predicting a ballistic threat.

I now have to hold custody of that threat from the time it's launched to the time of impact because it's maneuvering around. It's not following the laws of ballistics. That's a hard challenge that we've got to get after. And from a homeland defense perspective, our current capabilities were really built for ballistics, not for maneuvering targets. So we are now needing to pivot our entire architecture to be able to hold objects in custody for perpetuity, as well as more rapid handoff from sensor to sensor to sensor to shooter. That'll take out those threats.

[Riki Ellison, Chairman and Founder of MDAA]
But in space, you don't have to do that as much with a terrestrial because you can see the whole thing?

[General Michael Guetlein, Vice Chief of Space Operations]
Correct. The advantage of space is if you have enough satellites in orbit, you can have persistent coverage on the globe of the Earth. So I can see any object moving on the face of the Earth. And if I have enough sensors on orbit, I can actually hold that object custody from the time it starts to move to the time it stops moving. You can't do that from any other domain.

[Riki Ellison, Chairman and Founder of MDAA]
So we're doing that right now. That's the HPTSS?

[General Michael Guetlein, Vice Chief of Space Operations]
We are doing it on a smaller scale. And we are in the process of scaling that up today for ground moving targets, air moving targets, missile threats, both cruise missile, hypersonic missile and ICBMs. We're in the process of scaling up that sensor infrastructure.

[Riki Ellison, Chairman and Founder of MDAA]
Just for concept, how would you take out? What's the effector? If you track it, what is that? Besides a terminal. I mean, if we know where it's going, if you have terminal.

[General Michael Guetlein, Vice Chief of Space Operations]
If you have exquisite coverage, you're holding it custody, and you have shooters in sight of where the object is going to be, and you have communication capability from the sensor to the shooter, I can take it out with anything.

[Riki Ellison, Chairman and Founder of MDAA]
But you don't know where that target is going to be, right?

[General Michael Guetlein, Vice Chief of Space Operations]
That's why we have to have persistence. I have to hold that object custody from the time it's launched. I can't blink. I've got to keep an eye on it.

[Riki Ellison, Chairman and Founder of MDAA]
That's below space, right?

[General Michael Guetlein, Vice Chief of Space Operations]
That's below space.

[Riki Ellison, Chairman and Founder of MDAA]
So shooting from space down to that is not, is that viable or is that?

[General Michael Guetlein, Vice Chief of Space Operations]
In some cases, it's viable, but it's a wicked hard physics problem.

[Riki Ellison, Chairman and Founder of MDAA]
So it's easier to shoot from [the ground]?

[General Michael Guetlein, Vice Chief of Space Operations]
It's easier to shoot from terrestrial or from air. Okay. It's not impossible to shoot from space down, but you got to keep in mind all your satellites in space are screaming around the earth at about 22,000 miles an hour. So they're always in motion. So I may have one satellite may have a target in sight, but then the satellite is still moving and it moves out of sight. You need to have another satellite ready to pick it up and do a rapid handoff. That is a complex communication and control problem. It's also an expensive option to put that many satellites.

[Riki Ellison, Chairman and Founder of MDAA]
And that's the hardest problem we got right now. With all the missile threats, is that hypersonic or is the fractional orbital bombardment deal? What's the hardest thing?

[General Michael Guetlein, Vice Chief of Space Operations]
I think hypersonics are going to continue to be our pacing challenge. The fractional on orbit bombardment system, FOB, is a challenge.

[Riki Ellison, Chairman and Founder of MDAA]
Could you explain that?

[General Michael Guetlein, Vice Chief of Space Operations]
Yeah. It's basically an ICBM that enters space and comes back in and maneuvers into a target.

[Riki Ellison, Chairman and Founder of MDAA]
What's the difference between that and hypersonic?

[General Michael Guetlein, Vice Chief of Space Operations]
Hypersonics aren't going into space.

[Riki Ellison, Chairman and Founder of MDAA]
Okay. So this is going into space.

[General Michael Guetlein, Vice Chief of Space Operations]

Right. The hypersonics will go near space or they'll become hypersonic after they come out of space. But a FOB basically allows you to launch an ICBM out of a threat territory, go around the earth, enter back in, maneuver around our radars, enter back in, maneuver into the target and then strike a target with the impunity. That's an enormous challenge to counter and also keep custody of.

[Riki Ellison, Chairman and Founder of MDAA]
And we're using the same tools? Can you speak to that?

[General Michael Guetlein, Vice Chief of Space Operations]
We're using the same tools. But what we've got to do is proliferate more ground-based sensors, maritime sensors, and space-based sensors to be able to hold that object in custody.

[Riki Ellison, Chairman and Founder of MDAA]
And the only people doing this is the Missile Defense Agency? Who does it?

[General Michael Guetlein, Vice Chief of Space Operations]
Missile Defense Agency is doing some of it. The Air Force is doing some of it. The Navy is doing some of it. The Space Force is doing some of it. The intelligence agencies are doing some of it.

[Riki Ellison, Chairman and Founder of MDAA]
So those are two threats. And then the advancements of non-North Korean missiles. I mean, you said near-peer/peer [threats]. So is that more difficult with discrimination?

[General Michael Guetlein, Vice Chief of Space Operations]
It is.

[Riki Ellison, Chairman and Founder of MDAA]
What they're trying to do to try to pull us?

[General Michael Guetlein, Vice Chief of Space Operations]
It is. Near-peers are very difficult for many different reasons. One is they are very good at having dim burning targets.

[Riki Ellison, Chairman and Founder of MDAA]
Okay.

[General Michael Guetlein, Vice Chief of Space Operations]
Dim burning missiles. And right now we primarily use our infrared satellites to detect those missile launches. So the lower that they can get their heat signature down, the harder it is for me to track. They are very good at having multiple reentry vehicles simultaneously. So it's not just one warhead on top of one rocket. It's multiple warheads on top of a rocket.

But that multiple warheads is commingled with decoys. So it makes the discrimination that you were talking about much more difficult. No longer am I looking just for one RV from one

rocket. I'm looking for multiple RVs from one rocket mixed in with decoys. And our discrimination has to be a lot.

[Riki Ellison, Chairman and Founder of MDAA]
So, it's that space aspect of it.

[General Michael Guetlein, Vice Chief of Space Operations]
Space as well as more sensors proliferated.

[Riki Ellison, Chairman and Founder of MDAA]
So, this is a whole different deal than what we've been doing the last 20 years.

[General Michael Guetlein, Vice Chief of Space Operations]
Correct.

[Riki Ellison, Chairman and Founder of MDAA]
Where we're just focused on a very simplistic North Korean or Iranian missile.

[General Michael Guetlein, Vice Chief of Space Operations]
We are focused on a ballistic threat, not from a near-peer.

[Riki Ellison, Chairman and Founder of MDAA]
So this is now, and we spent probably $10 billion a year with MDA to try to deal with that. With this thing, is this going to skyrocket that cost? What's the investment cost do you think to be able to handle those threats?

[General Michael Guetlein, Vice Chief of Space Operations]
I don't know what the investment cost is going to be to protect the homeland. It's not going to be cheap. But I will argue, whereas MDA has been maturing technology over the past 20 years, today I don't have a technology problem as much. I still have technology. My biggest problem today is organizational behavior. How do I integrate capabilities that were built in the Army with an Air Force platform? How do I integrate an airborne platform in with the Aegis cruisers? How do I take satellites that were built by the intelligence community and repurpose those for warfighting?

We are all really good at operating in our stovepipes, but we're not really good at integrating across organizational boundaries. I would say the other thing that has changed from a space perspective, significant change from a space perspective, is we used to believe we had to own and operate our own kit. I needed to build everything myself, and I needed to operate it myself. That was primarily because we owned the corner of technology. We had the best technology on the planet. But at the same time, I didn't think I could trust my allies and my commercial partners to always be there during times of crisis or conflict when I needed them without debate.

The last thing that has changed a little bit from a space perspective is we didn't really want to integrate with our commercial partners because we didn't want to put a target on their back. We didn't want to make them a combatant. Well, what we're learning out of Ukraine is, first of all, the allies will be there. Commercial partners will be there. They will protect

and defend their own kit. But then Russia came out and said, everybody in space is a target. I don't care if you're commercial. I don't care if you're DOD, allied, or civil. You're all a target.

Well, if we're all operating in the same domain, we're all integrated and networked together, and we're all going to be shot at together, we'd better learn how to collaborate and cooperate together. So, we are able, from a space perspective, to leverage all that innovation coming out of industry today to field capabilities faster, more capable, and at a better price point than we have ever been able to do in history of space.

[Riki Ellison, Chairman and Founder of MDAA]
Can you talk about the UDL a little bit to everybody? Is that one of your –

[General Michael Guetlein, Vice Chief of Space Operations]
The Unified Data Library?

[Riki Ellison, Chairman and Founder of MDAA]
Yeah, that you're able to use.

[General Michael Guetlein, Vice Chief of Space Operations]
It is.

[Riki Ellison, Chairman and Founder of MDAA]
With foreign allies as well as us, right?

[General Michael Guetlein, Vice Chief of Space Operations]
It is. So, we built a –

[Riki Ellison, Chairman and Founder of MDAA]
What is that?

[General Michael Guetlein, Vice Chief of Space Operations]
It's a data lake where we bring all of our data together into one data lake and then expose that data lake to our industry partners, to our allied partners, to our academic partners, et cetera, so they can all take advantage of the data for their own applications.

[Riki Ellison, Chairman and Founder of MDAA]
So, it's not classified.

[General Michael Guetlein, Vice Chief of Space Operations]
the UDL is at all levels. We have an unclassified UDL all the way up to a top-secret UDL, and whatever the customer is for the data, whatever they're cleared out, they can get access to those different levels of data.

[Riki Ellison, Chairman and Founder of MDAA]
That's one way out. It's not a – it's a one-way in?

[General Michael Guetlein, Vice Chief of Space Operations]

One way out and one way in. It's both. It's bidirectional. So, if I give you the data and then you make the data better, all I ask is that you check the data back into the data lake and then the way you've modified it. So, I continue to build off the data. For our allied partners, we're doing the exact same thing. We're putting our sensor data into the data lake. They're able to tap into it to get situational awareness around the globe, but then they're also taking their sensor capabilities and data and putting it into our data lake as well.

[Riki Ellison, Chairman and Founder of MDAA]
And we're doing this today?

[General Michael Guetlein, Vice Chief of Space Operations]
Absolutely.

[Riki Ellison, Chairman and Founder of MDAA]
With a couple allies or a lot of allies? or different –

[General Michael Guetlein, Vice Chief of Space Operations]
Dozens. We're in the dozens of allies today that are collaborating in the data lake primarily for space domain awareness. We have what we call a JCO, a joint commercial office right now, that is operating in New Zealand, UK, and the U.S. We have 15-plus countries already sitting on all those ops floors, passing data in and out of the data lake and giving us exquisite space situational awareness.

[Riki Ellison, Chairman and Founder of MDAA]
And are you giving them the heat signatures yet or is that something –

[General Michael Guetlein, Vice Chief of Space Operations]
We're not doing that yet.

[Riki Ellison, Chairman and Founder of MDAA]
Not yet. So that's the next step in confidence?

[General Michael Guetlein, Vice Chief of Space Operations]
Correct. We are primarily today focused on space domain awareness, which is what's going on in space. We are sharing some of the missile warning data with some of the countries, not all of them. And then we are also looking at what we call tactical surveillance, reconnaissance, and tracking, which is the ability to look on down to the face of the earth, understand what's going on, and then fast-

[Riki Ellison, Chairman and Founder of MDAA]
But the vision is to have everybody on unclass.

[General Michael Guetlein, Vice Chief of Space Operations]
At whatever level they're cleared, expose the data.

[Riki Ellison, Chairman and Founder of MDAA]

Can you talk about the security of it a little bit? Because it seems like everything is going to the cloud. Does the cloud matter if it's in Europe or it's in someone else's hands? Or do we need everything in our own cloud?

[General Michael Guetlein, Vice Chief of Space Operations]
You do not need everything in your own cloud.

[Riki Ellison, Chairman and Founder of MDAA]
So you can have other people's clouds and all that? Correct.

[General Michael Guetlein, Vice Chief of Space Operations]
You can take advantage of the data where the data resides. That's a much more efficient thing, what you're trying to do. That can be a much more efficient way of utilizing the data.

[Riki Ellison, Chairman and Founder of MDAA]
Can you compare this a little bit to what they've been doing in CENTCOM with Palantir and Anduril?

[General Michael Guetlein, Vice Chief of Space Operations]
It's a lot of the same kind of concepts. Palantir is actually the architect of our unified data library. It's a lot of the same kind of concepts.

[Riki Ellison, Chairman and Founder of MDAA]
And that's on the ground. You're up here. We're not mixed yet on sharing all that ultimate data? And is that – let's just go to the big picture, right, is to bring all the C2 and be able to filter it back, like the Joint Fires Network was looking to do.

[General Michael Guetlein, Vice Chief of Space Operations]
Right.

[Riki Ellison, Chairman and Founder of MDAA]
Are we – whose role? Because I think that's offense, defense, everything.

[General Michael Guetlein, Vice Chief of Space Operations]
So I think we're mixing networks with data. And what we are attempting to do in Space Force is build what we call the Space Data Network, which is a mesh network in space across all orbital regimes, meaning I can take data from any point on Earth, pass it through space to another point on the Earth seamlessly through just like you would have your Internet, but it's the Internet in space. With that mesh network, I can pass data any which direction, and it will be resilient. It will be optimized for your application based on timing and everything else that you need to do. We're in the process of building that today.

We have MILNET, we're building with SpaceX. We have partnerships with Kuiper. We're building out a network with Space Development Agency on their PWSA, proliferated warfighter space architecture. The key is now instead of just having PWSA, MILNET, and Kuiper all operating in a vacuum, I now need all that integrated together so the data is flowing from one system to the next. That's our space data.

[Riki Ellison, Chairman and Founder of MDAA]
And you don't have the transfer layer, but you've also got to get this thing down to the ground.

[General Michael Guetlein, Vice Chief of Space Operations]
Right. By having a mesh network in space, I no longer have to rely on so many ground entry points in some really hairy places on the Earth. I can actually take data from Europe and drop it into Colorado, into space and out of space, whereas in some cases, because of the size of the constellations, we're doing multiple. I take it out of Europe. I take it into space. I bring it back down to the East Coast. I send it back up to space and bring it back down into Colorado. We want to get rid of all those ground entry points and have that mesh network in space capable of carrying that traffic anywhere on the planet.

[Riki Ellison, Chairman and Founder of MDAA]
Last week, we had Dr. Griffin in here. And he wasn't a big fan of space-based, boost-phase defense aspect of it. And more the mid-course. Could you give us a vision of what mid-course missile defense in space is if it's not boost-phase defense? Is there seams before the stuff gets into space at the upper end and seams before it goes back down? And do you mesh the current mid-course interceptors that we have into this along with? As good as you want to explain it.

[General Michael Guetlein, Vice Chief of Space Operations]
So, obviously, we don't have a solution yet. We're still thinking about what's the best way to do this. You know, you have the three phases of flight, boost, mid-course, and terminal. And you can take out a threat in any one of those three phases, depending on the sensor coverage and based on the effectors. So, we are currently doing analysis to understand what does the effector have to look like in all three of those phases from space and from the ground? How do I integrate all that into a fire control solution? Your timelines can be very, very tight. Dr. Griffin talked quite a bit about the technical challenges of doing that early in flight versus doing it in mid-course during in terminal. Everything he said is absolutely true. It is a wicked hard physics-based problem.

But I do believe that the technology has matured today to a point where we can actually make that a reality. The question is, can we make it a cost-effective reality? That's going to be the challenge. So, we are going to need to really rely on an integration of academia with our industry partners, with some of our national lab experts to understand what's in the realm of the possible based on the technology that's available today.

[Riki Ellison, Chairman and Founder of MDAA]
What's the time, realistically, to have something up as a demonstration? You're going to need all this time to figure out what that architecture is.

[General Michael Guetlein, Vice Chief of Space Operations]
I don't think it's out of the realm to do rapid demonstrations on the matter of years.

[Riki Ellison, Chairman and Founder of MDAA]
Six months, 12 months?

[General Michael Guetlein, Vice Chief of Space Operations]
A couple years, you could have a demonstration, I believe. The hard challenging part, though, is the cost equation, how much proliferation of that capability do you want? Then also the organizational behavior challenge is not going to integrate all that data across multiple organizations and multiple agencies. What does that look like? But the technology, I believe the technology today has matured to a point where it is available. We just have to decide what we want to try to do.

[Riki Ellison, Chairman and Founder of MDAA]
And because it's in space and it's moving, you've got the whole world, right? You have the whole world.

[General Michael Guetlein, Vice Chief of Space Operations]
Right.

[Riki Ellison, Chairman and Founder of MDAA]
You have the whole world, It's not just L.A. or Alabama.

[General Michael Guetlein, Vice Chief of Space Operations]
The beauty of our space capabilities is, you know, other terrestrial or maritime and in our land capability or air capabilities are geographically bound, right? If I put something in CENTCOM, it's dedicated to CENTCOM. I put something into PACOM, it's dedicated into PACOM. Your satellites are screaming around the face of the earth 24-7. So I'm simultaneously supporting every combatant command on every rotation of a satellite around the earth. That's something different, a different way of looking at the problem from a space standpoint.

[Riki Ellison, Chairman and Founder of MDAA]
When they say that you have 80 percent of the kill chain for everybody, is that true or not? What space is that much?

[General Michael Guetlein, Vice Chief of Space Operations]
I don't think I could say we have 80 percent of the kill chains. I would say that we as a nation, space is the foundation for everything that we do. It's the foundation for our peaceful way of life with GPS, SATCOMs, et cetera, weather. It's also the foundation of the joint force. Part of the reason we stood up the Space Force in 2019 was to pivot away from the way we were looking at space. Prior to 2019, we were providing services from space. I provide the best weather from space, the best missile warning from space, the best set of communications from space. But I was not worried about protecting and defending those capabilities, nor was I worried about how I was providing those capabilities to the combatant commanders.

[Riki Ellison, Chairman and Founder of MDAA]
How did that shift?

[General Michael Guetlein, Vice Chief of Space Operations]
That started in 2019 with the stand up of the United States Space Force. At that point, we made a pivot from being a service provider to being a war fighter. And as General Saltzman

says, we made a pivot from being a merchant marine to being more like a Navy and actually having to protect and defend our domain.

[Riki Ellison, Chairman and Founder of MDAA]
The policies are still restricting you still?

[General Michael Guetlein, Vice Chief of Space Operations]
We do have restrictive policies on what we can and cannot do in space. What we want to do is make sure that everything we do is safe and professional. We don't want to leave a lot of debris up there and poison the environment for generations to come. So, we're trying to be very good stewards of the environment. So, there's a lot of policies up there that enable us to be professional and to be safe.

[Riki Ellison, Chairman and Founder of MDAA]
We've got a couple more minutes, but I just want one last part, because I think one of the great things that you did was the space universities and our relationship four years ago to go to a big school on the West Coast, U.S. facing China, right?

[General Michael Guetlein, Vice Chief of Space Operations]
Right.

[Riki Ellison, Chairman and Founder of MDAA]
And understanding four years ago that this and to be able to include academia in solving some of these problems and studying these problems with the SHIELD program. You led that, and I think you have 12 universities now, but our SHIELD program is phenomenal.

[General Michael Guetlein, Vice Chief of Space Operations]
It was.

[Riki Ellison, Chairman and Founder of MDAA]
It still is. It’s still going.

[General Michael Guetlein, Vice Chief of Space Operations]
I agree. You came along at a great time when you stood up SHIELD. It was right after we stood up with Space Force and we said, and with Tony we were saying, hey, partnerships is everything going forward. Space is too big for any of us to go it alone. We've got to start building these partnerships, partnerships with commercial, partnership with academia, partnerships with our allies, et cetera. And that means we need to start changing the way we looked at the problem.

So no longer do I want engineers just solving engineering problems. I want engineers solving operational problems. I want operational personnel solving engineering and acquisition problems. And then I want us to have a conversation about the business end of the equation, the ethics side of the equation, et cetera. So, by going to USC through the SHIELD program, we were able to bring all that together. You had a hodgepodge of operators and acquirers and developers all in one room, looking at the intersection of engineering and operations and ethics and how all that comes together. And what really has enabled us is we get better rounded leaders coming into the Space Force at the senior level, you know, six

and above now, five and above, that are thinking differently about the problem. Instead of just trying to solve their small piece of a puzzle, they're looking at the entire. Enterprise.

[Riki Ellison, Chairman and Founder of MDAA]
It's bigger than that, because you've got the universities and academia who are very anti-space,

[General Michael Guetlein, Vice Chief of Space Operations]
Right.

[Riki Ellison, Chairman and Founder of MDAA]
Very anti and not understanding, not educated about it. And this also is that whole movement on top of that. So I just I want to thank you for that.

[General Michael Guetlein, Vice Chief of Space Operations]
I agree, because, you know, I went and did my master's degree at George Washington. And it was interesting when you got the academics and the military in the same room and they started understanding that, hey, the military doesn't want to go to war. Military wants peace. We need to figure out how to solve peace. And that intersection between the military and academics really becomes where that happens at. And then also exposing the academics to my problems. You know, we started talking to USC about quantum artificial intelligence and how to bring that to bear. It really has been a great, great relationship.

[Riki Ellison, Chairman and Founder of MDAA]
And then the next deterrent. I mean, that's a great evolution of it. But we're running out of time. I do want to open it up. It was a great conversation, I think, for taking the time. But I think if you're OK, we could ask, have J.D. ask a couple of questions coming from the public from that. J.D.?

[JD Gainey, MDAA Board of Directors]
Hey, sir. Aloha from Hawaii. General, it's good to see you again, sir. Fantastic.

[General Michael Guetlein, Vice Chief of Space Operations]
You too.

[JD Gainey, MDAA Board of Directors]
Yeah. Every time I get a chance to engage with you, I learn multiple things. So a few questions that you have not touched on already coming from come from the populace. One is an open source. China is putting up a ton of assets in VLEO. And the question was, do you see that altitude in that area become any contested environment? And if so, is it a concern of yours?

[General Michael Guetlein, Vice Chief of Space Operations]
It is a concern of ours. Anywhere that the threat is, is obviously going to be a concern. And anywhere the threat is going to be a contested domain. So, I think what you're seeing today is the war fighting domains, unfortunately, extend from the seabed surface all the way to beyond the moon. And what we really need to do is make sure in all those domains that we are operating in a safe and professional manner, trying to protect the environment, trying to

protect the public. But we, as a United States military, have an obligation to protect and defend the nation no matter where that threat is in that threat base.

[JD Gainey, MDAA Board of Directors]
Yes, sir. Thank you. Kind of shifting gears to to to the kill chain. There's a saying I grew up with in the Navy, detect, track, control, engage without system synthesis is no capability. But could you, kind of describe some of the functions you need or the DoD enterprise needs to work on the system synthesis piece of it to start bringing a more homogenous kill chain effort from space?

[General Michael Guetlein, Vice Chief of Space Operations]
I think the biggest thing that we're probably not good at is systems engineering and more importantly, systems of systems engineering. How do I bring these capabilities that were built for different purposes and different domains together in an integrated and network fashion? That's really the secret sauce that we've got to get after. We used to go into the fight individually, meaning the Army went in. The Army had the ability to go in alone. Navy could go alone. Air Force could go along. That's no longer the case anymore in the in the fights that we see in the future.

We've all got to be integrated and network together and in order to do that we've got to start solving the wicked hard systems of systems engineering problems, which also gets into a lot of organizational behavior challenges.

[JD Gainey, MDAA Board of Directors]
Yes, sir. And a follow up to that one is, do you see the Space Force adopting some type of weapon system logic, weapon systems control function that you find in other systems like Aegis weapon system, THAAD command and control, et cetera?

[General Michael Guetlein, Vice Chief of Space Operations]
Absolutely. So, I kind of talked about the pivot in 2019 of going away from services to being a joint warfighter. Part of joint warfighter is really protect and defend your domain. In order to protect and defend your domain we have to adopt those proven processes going forward.

[JD Gainey, MDAA Board of Directors]
Yes, sir. Two more. One more question. One more comment. As POM and the fight upstart being are being built out right now. Is there something right around the cut line that you're eyeballing? Is we as a advocacy alliance maybe help out with or is there something that we want to bring more exposure to an effort or program that that probably needs to go above the cut line?

[General Michael Guetlein, Vice Chief of Space Operations]
So, for us, what we are advocating from a Space Force perspective, first and foremost, is the counter space kit, the ability to put the capabilities that allow us to protect and defend our existing space capabilities or on orbit or on board, protect and defend capabilities. That's first and foremost. The second one is that space domain awareness and space data network. How do I interconnect all these capabilities across commercial allied and DOD? And then the last area that we're investing in is cyber defense. So, I would say the things that we have

down the cut line that are in jeopardy right now are the systems that were that are being designed to go against one threat and in a very special day or is very special manner and not really integrating into the broader enterprise. Those are the ones that we have down towards the bottom of the cut line.

Where we are trying to get people more comfortable in investing is in commercial capabilities. That kind of goes against our DNA. I told you we kind of classically want to own and operate our own kit. We want to be in charge of our own destiny. Now I want to go buy more commercial capabilities. How do I guarantee that commercial partner is going to be there? How do they guarantee that they're going to protect and defend their capabilities? We're wanting to go buy more of that. But that's a culture challenge that we can always use more advocacy. How to better integrate commercial and industry.

[JD Gainey, MDAA Board of Directors]
Yes, sir. And that that leads into the final comment. I was lucky enough to support Admiral Davison and Aquilino with their regain the advantage and seize the initiative efforts. We found that each service were building their own individual kill chains. The comment is what Space Force has done by bringing in nontraditional vendors, the commercial world allies into a single usable environment, accessible environment is game changing. So what you're doing with the nonprofits like the Catalyst Campus, CyberWorx at the Air Force Academy, as well as academia to use those as vehicles to bring in the things in tech that we don't traditionally do is setting the pace of the other services to follow. But to your point that you mentioned earlier, the hardest part is each service, each acquisition entity has its own way of doing things. And there's really no governance structure in place to bring it all together under one efficiency. So that's all I got, sir. Thank you very much.

[General Michael Guetlein, Vice Chief of Space Operations]
Thanks JD.

[Riki Ellison, Chairman and Founder of MDAA]
And Mike, I'm going to ask you one last question. Well, what keeps you awake at night and what's your biggest challenge?

[General Michael Guetlein, Vice Chief of Space Operations]
It's easy. The threat keeps me awake at night. We are seeing the threat mature every single day like we've never seen before. We're seeing nesting dolls in space. We are seeing satellites collaborating together. If you heard me talk about dogfighting in space, we see five satellites operating together in synchronicity, orbiting around each other in ways we hadn't seen before. We are seeing robots capable of towing other robots into space.

But the thing that really keeps me awake is there used to be a gentleman's agreement in space. We did not mess with each other's space systems. We just didn't do that today. That is no longer the case. The new norms of behavior are jamming, spoofing, blazing, cyber hacking. We are under attack every single day in very unsafe and unprofessional manners. And we have got to counter those new norms of behavior or we're going to find ourselves in conflict. That's really what keeps me awake at night. And then the ability of the Space Force

to rapidly be able to adapt technology, rapidly adapt capabilities and rapidly adapt our culture to get after that emergency.

[Riki Ellison, Chairman and Founder of MDAA]
So, this is beyond deterrence now?

[General Michael Guetlein, Vice Chief of Space Operations]
Well, it's only deterrence if there's consequences for your behavior, right?

[Riki Ellison, Chairman and Founder of MDAA]
There's no consequences for their behavior.

[General Michael Guetlein, Vice Chief of Space Operations]
And if norms are we're going to continue to muck with you and there's no consequences, then there is no deterrence. So, we've got to restore deterrence to start countering this bad behavior.

[Riki Ellison, Chairman and Founder of MDAA]
In space.

[General Michael Guetlein, Vice Chief of Space Operations]
In space, in cyber and in every other domain.

[Riki Ellison, Chairman and Founder of MDAA]
OK, well, thanks. This has been a great conversation. Do you have any closing remarks?

[General Michael Guetlein, Vice Chief of Space Operations]
No, I don't. I really appreciate you inviting me over here today. It's always good seeing you.

[Riki Ellison, Chairman and Founder of MDAA]
It's great. It's a good feel of what and, you know, we rounded the issues at stake.

[General Michael Guetlein, Vice Chief of Space Operations]
Yes Sir.

[Riki Ellison, Chairman and Founder of MDAA]
And I just, you know, I hope or not hope, I believe our commander in chief is going to put the best people in the job to be able to deal with what you just said with missile defense for our country, for the world on top of that.

[General Michael Guetlein, Vice Chief of Space Operations]
If you look at our competitive advantage, I'll leave you with one thing, our competitive advantage as a nation, we have three of them. First and foremost, it's our people. Second, it's our allies. And third, it's our industry. Our industry and our allies have always been there side by side with us. And we need to figure out how to continue to leverage those three core competencies, three competitive advantages to continue to defeat the threat. And like you said, fight's on.

[Riki Ellison, Chairman and Founder of MDAA]
Thank you. It's great. Great conversation. Winners associate with winners to win. We're going to win this, man. This is a good fight. This is a great fight. It's inspiring everybody to get together to help and to win this. So, thank you, ladies and gentlemen.