A Discussion On Missile Defense

[Riki Ellison, MDAA Chairman and Founder]
Good morning, ladies and gentlemen, to a great spring day here in Washington, D.C. We got the blossoms are peak, I think they're going to be blowing off in a few days, but it's gorgeous here. 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 and MDA has been around for over 20 years. We have the same mission, core mission, that we believe, no doubt, 100%, that missile defense makes our nation safer and the world safer. And we advocate for the deployment of it, the evolution of it, and the development of missile defenses, all systems that make our country safe.

This is our 72nd Congressional Roundtable. It's a discussion on missile defense with Tim McRae from the Missile Defense Agency. The last time I saw Tim was September, the past September 2024, at the end of September, and I was in a silo with you on Missile Field 4 at Fort Greeley at the bottom of the new NGI silos that you're doing. So, it's great to see you again, and back then, we talked about going big, making big, going fast on this, and just a historic memory of the 20th anniversary of putting, with a presidential directive, not an executive order, in under two years. Under two years, you were able to put in GBI's in Missile Field 1, you had an architecture with SBX, I think was out there, part of it, and you had a command-and-control system over the top of it. It's just a remarkable achievement 20 years ago.

So, we're honored to have you here, Tim. I'm going to read your bio, because it's an important one for everybody to understand who you are and what you represent. So, Tim is the Director for Strategy, Plans, and Resources for the Missile Defense Agency. He is responsible for overseeing all Missile Defense Agency strategic planning and resource management matters, encompassing financial management, cost estimating, human resources, congressional liaison, public affairs, and strategic communications. He provides leadership, vision, oversight, and strategic advice for all agency resources matters relating to the agency's 10-plus billion annual fiscal resource to develop, test, and sustain a layered missile defense system to protect the United States, its deployed forces, allies, and friends from missile attacks. It's impressive. He, prior to that, was the program manager for the marquee program of the Missile Defense Agency, the ground-based midcourse system. He's also had experience with Israel Cooperative. He's also had experience with THAAD on the program. So, he's quite qualified on everything.

So, I do want to start off with a win, Tim. Let's start off with a win. Last week, your Navy, Aegis, on their flight test 40, and USS Pinckney did an amazing thing with your development, and you're the only one in the country doing this for defensive hypersonic strike missiles. Can you just give us a little rundown of what happened last week?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Absolutely, Riki. So, you know, last week's test was exceptional. Another good, net-solved demonstration of integrated missile defense. So, missile defense, you know, we, about four years ago, set apart to come up with a sensing capability for hypersonic missiles. And so, we

developed it and got it onto orbit in less than 37 months, which is truly impressive to go from concept to on-orbit.

[Riki Ellison, MDAA Chairman and Founder]
That's HBTSS?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
That is the Hypersonic Ballistic Tracking Space Sensor. And so, it was part of this architecture for this test. And so, what we were able to demonstrate is a launch of a hypersonic threat vehicle built by the Missile Defense Agency coming in the vicinity of an Aegis cruiser. The Hypersonic Ballistic Tracking Space Sensor picked it up, tracked it, provided that information through our Command-and-Control Battle Management System, C2BMC, who then moved that data to the Aegis Weapon System to conduct that simulated engagement of a sea-based terminal capability. So, from space, to space comms, to C2BMC, to a fire control on a ship, to a weapon system, full end-to-end demonstration of that integrated missile defense architecture, which has become foundational to the operations in regional systems.

[Riki Ellison, MDAA Chairman and Founder]
And this is a mission that everybody in the world, right, it’s an impossible mission they say, to be able to defend against a hypersonic glide missile. And you've proven it with the terminal defense capability, correct? And this is moving that along that we have capabilities doing it.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Absolutely. It's taking things that have already been developed, stitching them together in an integrated fashion that gives capabilities that the systems were never necessarily intended to perform. And it's a foundational element to when we bring on our glide phase interceptor. Then we'll be able to attack that hypersonic threat in its glide phase and in its terminal phase with multiple weapon systems, both kinetic and non-kinetic.

[Riki Ellison, MDAA Chairman and Founder]
And just talk about the investment that MDA, what allotment of funding is for that mission? I don't think it's very much, right?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
It's not.

[Riki Ellison, MDAA Chairman and Founder]
Compared to a GMD system or why are we not at a much higher level?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
You know, I think the department is getting there. You know, when the hypersonic threat came about, we were also focused on hypersonic offensive. And I think you had Dr. Mike Griffin on, and they were talking about 78, 80% of the department's resources going to the offensive side, 20% coming to the defensive side. That is going to grow. Glide phase interceptor certainly will be a major investment for the department to get that mid-course, that glide phase aspect of that threat. Now that the hypersonic tracking space sensor has demonstrated its success, its algorithms are solid. Now that transitions to the Space Force,

and they will proliferate that. And so, as we're demonstrating these incremental capabilities, the deployment of it is where the resources will really start to come into the department and ensure that we have a constellation of HBTSS satellites. And we have glide phase interceptors and the sea-based terminal interceptors. Those investments just build on something that we're already doing.

[Riki Ellison, MDAA Chairman and Founder]
Is anybody else doing this inside our Pentagon, inside our services? Or are you the only one doing this?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
MDA is the only one that's tying it together from an integrated fashion, from space sensing to command and control to fire control to weapons engagement. MDA is the only one doing it, and we've been doing it for several years now.

[Riki Ellison, MDAA Chairman and Founder]
And when do you think it's possible to get a capable, deployable, operational hypersonic glide defense system in the way we're going? Or potentially, if we had resources adequately enough, and authorities adequately enough to get you that, what's that estimate?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
So, the current program is really not set up for success. It's been stretched out, delivering an initial capability in 2034, 2035, so a decade from now. That's not necessarily what the technology mandates. Technology is ready, near ready now. There's a couple of scientific things we got to close on, but they're not undoable. But it's a resourcing challenge. And so, resourcing has stretched it out for 10 years. If that program were resourced in a more appropriate manner, to get after the threat now, that's already on us, 2028, 2029, maybe 2030 are all doable. As not only just a glide phase interceptor, but an ability to demonstrate end-to-end of that capability.

[Riki Ellison, MDAA Chairman and Founder]
And this was kind of done without a new policy, right? You were policy restricted on hypersonic glide. There's different policies from where that is, whether it's the U.S. NORTHCOM versus U.S. INDOPACOM and other ones. And now it seems it's pretty clear that the president wants a hypersonic glide defense. I mean, I think that's very clear coming forward.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Yeah, I agree. I think policy has certainly shifted to address the peer and near-peer threats versus being constrained by policy to a limited rouge nation. But policy is one piece that has to change, and it has. The resourcing also has to change. Over the past two decades, after that great event in September of 2004, that limited defensive capability, the agency's budget controls have been flat.

And so we were about $10 billion in 2004. We're about $10 billion in 2026. But a lot of things have changed. So inflation changed, that's about a difference of a buying power of about $3.2 billion. As we have deployed more ships, more THAAD batteries, that comes with

an ONS tail. And so now our ability to do research and development is starting to diminish because we're doing more ONS.

[Riki Ellison, MDAA Chairman and Founder]
We're not going to ask, or the president of Congress is not going to ask you to do this inside that budget with NGI with that. You're going to have to have additional funding for this. There's no way you can do this. If you're going to do the timeframe you said you were going to do it for 2030, 2028. So, you're going to have to have more funding, correct, on this thing? And how much... I don't know if we can get into that, but...

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
The resourcing strategy has to change. To get after these threats for the homeland that the executive order calls for is going to require additional resources across all organizations. So not just MDA, Space Force is going to require it, the Army is going to require it, Navy, and then the Air Force. They're all going to require additional resources to get after these threats to develop those capabilities. MDA is going to need the resources to be increased so that we can integrate all those things. MDA doesn't need to build everything. MDA is extremely well-postured with technical folks to integrate complex systems. That's what we've been doing for the past two and a half decades. And I think that's really one of, we're at the center of the excellence for the department on that national level integration of space and terrestrial weapon systems.

[Riki Ellison, MDAA Chairman and Founder]
So just one more question on hypersonic. So, you've got a pretty good capability with the terminal capability of what the SM-6 most likely. Where's the wide area? That's the big challenge, I would assume. If you do the tracking, you can see it from space and you get fire control data. How do you do the wide area? What's that interceptor? Is it terrestrial-based? Is it space-based? That seems like a very typical problem.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
So, space-based interceptor is absolutely called out for us as a department to get after. It's a challenge. You've had Dr. Griffin on here. You've had General Guetlein on here. I think General Guetlein said it's a wicked hard technical challenge. But the nation's ready for it...

[Riki Ellison, MDAA Chairman and Founder]
But you’re the best wicked hard problem solvers, right?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
We are. We're problem solvers. So that's one aspect of this hypersonic threat is when it's in its boosting phase. But after it tips over, it's almost impossible to get that with a space-based interceptor because it's lower in the atmosphere. And so it's in the endo-atmosphere. So that requires a unique set of effectors. And so the department needs to get after it with non-kinetic effectors. Can you do an electronic attack? Can you do it with other disrupting technologies?

Then you need the hard kill effectors like the glide phase interceptor. Getting after that in that mid-course glide phase of that threat is critical to keeping that away from its objectives. What is it trying to hit? Whether that's an aircraft carrier or whether that's a city or a port. And so it doesn't necessarily need to be ground-based. It needs to be ground or sea-based.

It needs to be a weapon system that is agile enough. If we need that system to protect San Francisco, then we can put that thing on the ground in San Francisco and it can have an effective capability for the defense of that population center or on a ship.

[Riki Ellison, MDAA Chairman and Founder]
Would you say that that's a different weapon system than terminal? And would that be available by the end of 2030? Or does that need much more research and development?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency
Now, the glide phase interceptor, if resourced, the technology will be ready, the challenges can be overcome and we can deploy that capability in the late 2020s, probably 2029 or 2030. And that's a great program because that's a demonstration of that cooperative development with Japan. And so that missile is not just US, Japan's in the development cycle with us. And together, we're committed to delivering that capability earlier.

[Riki Ellison, MDAA Chairman and Founder]
That's great. Just because I think you're underestimated, or you're not thought as well as you are. You have like 550 engineers. How many engineers does MDA have? Or even maybe that's less in doing missile defense. Just give us the whole total, because I think there's other organizations out there that are trying to do this, and they're not even in close comparison to what your size is or the amount of people you put on. So go ahead.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
MDA is a kind of a unique organization. So, we're a multi-service organization. And so we have our MDA core civilians and contractors. We have civilians and contractors from the Navy working in our Aegis program office. We have partnerships with the Army, is embedded within our THAAD program office. And so it's not just a singular type organization, our labor categories are across civilians, contractors, the laboratories, the universities. We bring the best to bear whatever the technical problem is. Our manpower is probably somewhere right around 10,000 across all those labor categories. And out of that, about 70% is technical. And so when we get into a technical problem, a wicked hard physics problem, like General Guetlein said, we've got access to an existing workforce and access to the best and brightest across the FFRDCs and UARCs and industry, both traditional and non-traditional, to focus in on that problem, gang tackle it, and get it into the system in a way that it works. And then when we do that, we tackle that problem, but we do it as part of an integrated fashion. So when we build that effector like a glide phase interceptor to overcome those challenges of a hypersonic threat, we're also putting that system capability into the weapons system.

We're putting that requirement into the sensing capability, and we're bridging it together through command-and-control...

[Riki Ellison, MDAA Chairman and Founder]
So it’s a system or systems?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
A total system of systems.

[Riki Ellison, MDAA Chairman and Founder]
So let's just be clear on this. Does Army P&O Space, SMDC have that many? Does SDA have that many? Does JIAMDO? Does R&E? There's even close to you in terms of that. Let's be clear. I just don't think there's anybody that's even one-tenth of that.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency
I agree, Riki. I think Space Force is a larger organization. Air Force is, Army is, no doubt. But an organization that's focused on this singular problem set of integrated missile defense for regional and homeland, no one is organized or equipped like MDA is. We've got the talent in the workforce. We have the tools. We have the M&S structure. And it's building on a foundation that already exists today.

So this executive order is exceptional. It's going to put a defense in place for our nation that we've needed. And we've got the right folks to do that. And I agree, I don't think anybody else has that level of capability to go right now, inside the department, in a service, or inside the Pentagon. I don't think so.

[Riki Ellison, MDAA Chairman and Founder]
Well, let's talk about your culture. I just want to have a, because you're not just MDA. I know you were formed in 2002. That's when MDA, we were formed the same time you were. You go all the way back. And I think the SDIO, the Strategic Defense Initiative. And then you go to BMDO, Ballistic Missile Defense Organization. Because that depth, that depth of knowledge that goes all the way back to Clementine and the original tests of the ERIS program is all yours. And also, the first things we did with President Reagan was a memorandum of understanding with Japan, Israel, and UK. And we weren't allowed to do ground-based interceptors. We weren't allowed to do space-based interceptors. Everybody thought it was out there. That was just a research program. The SDIO was just a research program. But the real stuff happened with terminal defenses, stuff that you were able to do within the policy and the treaties to be able to do. So just give us the depth of MDA's roots all the way back to 19, I would assume 1983, with Abrahamson leading this organization.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Right. So the need for missile defense has been there since 1945. And so we're about 80 years in the making. But we're really focused with the Strategic Defense Initiative Organization, really looked at we need to have a space-based interceptor, we need to have space and terrestrial sensing, we need to have ground defectors like a ground-based interceptor, and we need to tie it together. And so...

[Riki Ellison, MDAA Chairman and Founder]
What's the difference between the executive order 40 years later than that?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency
It reads a whole lot like the initial phase one architecture.

[Riki Ellison, MDAA Chairman and Founder]
All the way back. But that was research. Now we're saying that we're going to deploy it.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Yeah, the technologies weren't there at that time to really bring it into reality. But a lot of engineering and studying of the problem started occurring. And that's been occurring now for 40 years. And so that depth of knowledge, that understanding of the environments, what does it take to have propulsion systems, seekers, communications, every aspect of what it's going to take to kill those threats has been going on. But that initial SDIO really focused on, I'll say, big strategic threats. And then came along the Ballistic Missile Defense Organization.

[Riki Ellison, MDAA Chairman and Founder]
That was downsized, right? I think we had two presidents to go forward that went on it. One president said, no, we're not going to spend money on it.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
That's right, kind of an ebb and flow.

[Riki Ellison, MDAA Chairman and Founder]
And then he got caught with the 1998 Missile Defense Act, which he said, boy, this assumes technology could be feasible. And that was because of North Korea flew over that.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Right that was when we made the transition to the Missile Defense Agency. Well, go from SDIO to Ballistic Missile Defense Organization. So SDIO, MDA was a direct report to the Secretary of Defense. And so that had access to the decision maker. And so when you think about the ability to go fast, that was really...

[Riki Ellison, MDAA Chairman and Founder]
All the way.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
That was all the way from the Director to...

[Riki Ellison, MDAA Chairman and Founder]
But you were just doing tests, right? You weren't doing deployment.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Doing development and tests. No deployment.

[Riki Ellison, MDAA Chairman and Founder]
And you had authorities to do that. Directly to the Sec Def.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Authorities to execute, access to decision makers, and resources. That's kind of a common theme that you'll hear. Really focused on the US.

[Riki Ellison, MDAA Chairman and Founder]
And what did you produce with those authorities?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency] So those are all foundational to the GBI we have on the ground today. You can go back to the root of that engineering was under the SDIO days. The root of our ground sensing applications. It's back there. The root of the tree is solid. And it started with SDIO. Fast forward 10 years, we make the change and the pivot to go to the Ballistic Missile Defense Organization. So that really then becomes more of a regional focus. And so the homeland focus is still going on. There's still engineering going on for ground-based interceptors. Command and control is still being matured. But now we're kind of focusing on regional systems. Patriot. Early, early, early Israel. Early THAAD. Early integration of missile defense capabilities on an Aegis destroyer. And so that went on for about 10 years. During that time frame, no longer reporting to the Secretary of Defense, down to the deputy Def Sec. Which is still an exceptional access to a decision maker and they had the authorities.

[Riki Ellison, MDAA Chairman and Founder]
So what was, was Aegis developed during that? I mean, I know it goes back to 70s with Wayne Meyer. But what were the products that MDA developed?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency Yeah, during that time, they started really looking at maturing the ballistic missile defense capabilities on the Aegis destroyer. Using the SM-3-1As. And so it was, again, it's foundational to where we are today.

And then fast forward to when we made the pivot to Missile Defense Agency. And given the mandate to deliver the homeland defense capability in two years. It built on those previous two decades of engineering. That engineering expertise and a lot of those folks actually are still around.

[Riki Ellison, MDAA Chairman and Founder]
But you got the new authorities or a new presidential directive.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency Presidential directive.

[Riki Ellison, MDAA Chairman and Founder]
Presidential directive 23. So, what was different about this than BMDO? So then SDI.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency] So I think the big difference on this was one, technology was ready. Two, it was a presidential directive that focused the entire government organization on delivering this capability because there was a real threat. Access to the DepSecDef. So, you had access to the decision maker. All the authorities were given to the Missile Defense Agency. I can recall.

[Riki Ellison, MDAA Chairman and Founder]
And resources.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency] And resources. I can remember John Hawley sharing a story where there was a flight test challenge. And he was on the phone with General Obering and the Secretary of Defense and

they were working through this. And so that responsiveness to overcome challenges within a program is critical to going fast. If you don't have that and you have to take it back through committees. You're just going to slow programs down. You're going to slow capability for the nation down. And it's really going to be hard to go fast. It's going to be more expensive when you do that because you're not solving the problem. You're waiting on a coalition of personnel to get to a decision and so that just burns resources. And so that was really how MDA got after the homeland capability and delivered it within two years.

[Riki Ellison, MDAA Chairman and Founder]
Let's just go back in time. Because North Korea had created an ICBM, the homeland was threatened. So this was a real threat. And it wasn't a terminal defense, it was an area for the entire U.S. continent. I mean, in Canada, everybody, that you were able in two years to create. What did you just, it's impressive, what did you create to defend the entire [homeland]. I mean, that's the first dome of domes. I mean, that's right there. So what did you create architecture wise 20 years ago to do this mission?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Okay. So first, I think it's important to note the foundational work had been going on for well over a decade. And so in that timeframe with the three conditions we talked about resources, authorities and access. We constructed the missile defense field at Fort Greeley. Constructed all the facilities to support that missile defense field, which is fairly significant. Constructed systems to communicate to interceptors in flight. Developed and designed and deployed a fire control system that allows the NORTHCOM operators at Fort Greely and in Colorado Springs to operate in unison, in parallel, executing that fight. I-2 sensors owned by the Air Force upgraded by the Missile Defense Agency, now they're owned by Space Force across all these terrestrial sensors. We were integrating satellites all the way back in 2002, integrating satellite sensing capability to feed into the command-and-control system, into the fire control system to launch interceptors, to communicate to interceptors in flight, and they have a hard kinetic shield in mid-course.

[Riki Ellison, MDAA Chairman and Founder]
What other joint thing we've done in the history of this country has done this? Joint-wise, like you just explained.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
I'd be challenged to come up with one that did it on such a scale, under such a, I don't want to say constraint, but it was focused just on that threat set. And so that constrained it. If we had been designing for a peer or near peer, we probably would have been designing it a little bit different, taking advantage of some of the capabilities and options.

[Riki Ellison, MDAA Chairman and Founder]
That's what you're doing now.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
That's what we want to do now. The executive order says, you know, take off those constraints, focus on the near peer and peer threats and deliver a weapon system that defends the United States.

[Riki Ellison, MDAA Chairman and Founder]
You've done it 20 years ago.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
And so all these new capabilities and technologies should tie into that system.

[Riki Ellison, MDAA Chairman and Founder]
So, let's just keep going down this path a little bit, because again, this is the mid or the early 2000s, very politically charged issue here because of arms control and technologies that they doubted on top of that. So unlike Corona, unlike Schriever, we had, you know, they had a lot more failures than you ever had, but you had some missions that didn't go all the way right. So, you struggled with that. Can you just talk through that timeframe? Because I think that's starting to where people driving to take those authorities away from you, maybe. I don't know what the answer to that is, but I do want to ask you, how were those authorities taken from MDA? Since you delivered but I think it was through some of the test failures. So go ahead.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
So, in the run up to the limited defensive capability in 2004, the agency executed three flight tests, three intercept tests, ground-based interceptor, launching them out of Kodiak, correction, out of Kwajalein against targets coming out of Kodiak. And we had one that did not go well. And within, I'd say, three weeks, they knew exactly what the cause of the failure was. And the authorities in the trust of the DepSecDef at that time allowed the program to continue. Now, it went back to test within five months and then had two successes and deployed the capability.

Let's compare that to the mid-2016s, 2015 timeframe. We have a target failure of a target coming out of a C-17. Within five minutes, we know what the problem is. We spent 18 months going back through all the analysis to get back to a flight test.

[Riki Ellison, MDAA Chairman and Founder]
Because you didn't have authorities? Or what slowed you down?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
I think the risk posture, when you're already at, you believe you already have a capability to address the threat in what you've already deployed up to that 2015, 2016 timeframe, the risk posture shifts. And you don't want to take risks. And when you don't do that, programs start to slow down. And when programs start to slow down, people start asking questions, as they should. Things start costing more. And so, I think that risk posture contributed to some of the authorities being pulled back.

[Riki Ellison, MDAA Chairman and Founder]
And that's also affecting your culture as well. Everybody's going to be risking.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
They begin to not step out. So, if that engineer on that aircraft didn't do that analysis and knew what the failure mode was right away, that would have been bad. But he did. And we could have gone right back into test. But now, that environment starts to say, well, let me study this a little bit more. Then maybe I don't know all the problems that I had with that.

And that starts to stretch out the development cycle. And when you stretch that out, people lose confidence in your ability to deliver on pace.

[Riki Ellison, MDAA Chairman and Founder]
So, what happened in 2019 when they took authorities from you?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency
They did. It was a continuation of, I'll say, going back to what we had in 2002. Over time, it just started to get eroded. In 2019, it really was the point where most of the authorities that allowed MDA to go fast were taken and were brought up to a higher level within the Pentagon.

[Riki Ellison, MDAA Chairman and Founder]
And so, now, from 2019, you don't have the authorities, but you're expected to do what you did in 2020. And that's why you may have a reputation that's out there. So, just address the reality of what this is.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
I kind of live in a glass house, so I don't like to throw stones. MDA has made some mistakes, but we've learned from the mistakes. And so, whether it's a technology issue that we had that we kept the program going longer than we should have, like RKV, we took those lessons, and those lessons are not just learned, they're applied.

And so, we have changed our approach to how we manage programs. We have changed the organization that manages those programs. And so, now, what we have in MDA are program executives leading major pieces of the integrated architecture, homeland, theater-based, age-based, decision dominance. They have the authorities now. They're not organized for process or organized for execution. And so, I think that has set a condition for us to go fast.

We've set up a transformation task force. So, how do we transform how we do business? So, not only from a technology, a model-based system engineering approach, how do we change our acquisition approach? How do we go faster and get leverage from these non-traditionals to increase the cadence of change and capability? And so, we have made, I'll say, a pretty deliberate effort at this. Within four days of the executive order, we had an RFI on the street. The RFI was, a request for information, was constructed to draw in those non-traditionals and not exclude them. We've just released a multiple acquisition authority instrument, which allows us to have a contract vehicle that gets right to those non-traditionals. It doesn't mean the traditionals are out. There is a role for traditionals, but there's absolutely a role for the non-traditionals. As we start talking about layers of integration, I think at the gaps between systems that still might remain, they've got a huge capability. They've got more capability in the artificial intelligence, machine learning, how to improve the speed of decisions. That's an area where I think non-traditionals really excel.

[Riki Ellison, MDAA Chairman and Founder]
But to be clear, to do the best of your whole workforce, your 10,000, your 40 years of culture, you have to have the authorities back to get to where you need to go. Correct. So, resources are coming. I'm pretty sure the resources are coming, but the authorities is a

question that needs to be broken or approached. But that seems to be restricting your ability to go forward.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency] It does. I think the agency is now postured the way we have changed for the MDA we need to get up to this threat and get up to the pace we need to do it. I think we've got the right workforce, but you're right. To run this, you've got to have access to the decision maker. You have to have the authorities, not only at the architectural level, you have to have the authorities to execute trades against those architectures. You know, again, we talk, it's not just MDA doing the building, it's the services and other agencies. You've got to be able to do trades against there. So, you've got to have those authorities to do that. And then you've got to have the resources to execute it.

I think with those three things in the foundation that MDA has from a workforce in what we've already done, frankly, you know, we're seeing it, you know, over in Israel, you know, integrated missile defense systems work. We talked about, you know, I don't know the reason the president chose Iron Dome for his executive order, but I know what Iron Dome does. And it's just the Iron Dome system, but it's two other systems executing layered missile defense that we are part of the cooperative development of, but it wasn't just the Israeli three systems. It was the Aegis system, the THAAD weapon system, forward-based TYP-2s, command and control, overhead sensing, all the way through that integrated architecture is why Israel in April and October was able to successfully defend their country. And that's what we've got to have here.

[Riki Ellison, MDAA Chairman and Founder]
Yeah, let's just go back to that because that Israeli Iron Dome quote, everybody thinks it's the shooter, which is the mortar shooter and the rocket shooter. It wasn't. It was a layered, the complete layered approach. The integration of their C-2 with our C-2, the Navy. I mean, you couldn't have done it better with Army, Navy, and MDA there, but you have invested in Israel back in the 90s and you have spent billions, billions, and...

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency] We.

[Riki Ellison, MDAA Chairman and Founder]
We. All of us, all of us, I'm sorry, the American tax dollars, we have for the right reasons and have developed a unbelievable layered defense system that can defend, you know, a small country, right? And that's something I think that MDA should take credit for. I think there was no one else. I mean, you were the ones that funded that with Israeli organization.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency Yeah, I agree, Riki. It is a layered system approach, system of systems, and they got after it really fast. You know, they started at-

[Riki Ellison, MDAA Chairman and Founder]
They had authorities, didn't they?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]

Yep, that’s where was I going to go. The Israeli Missile Defense Organization, has the authorities to work with whoever the contractor is that's going to deliver a capability and to make decisions. They had access to the decision maker, IMDO, to the leader who's making decisions, and they had resources both internal to Israel and that the U.S. offered. So again, good recipe for success. And they demonstrated it. Then we integrated that into the integrated missile defense system that MDA is responsible for, and it's saving lives, and it's working. That's what we need in the United States.

[Riki Ellison, MDAA Chairman and Founder]
So can you just talk to us today on what the architecture is for the U.S. homeland? Just the general understanding of the system of systems, what does that involve and what have you done to protect today on that? I want you to- Yeah. Let's just go with that because I want you to go terminal and mid-course with what you got.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
How about I start at the very top? Okay. Come down. So space sensing. So we have space sensors out there today.

[Riki Ellison, MDAA Chairman and Founder]
Like Mike said, you're not DSP. That's the Space Forces, right?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Yeah. When I say we, I say about the Coalition of Missile Defense. So it is Space Force, Air Force, Army, Navy, MDA. None of us are doing it alone. None of us can do it without each other. So yes, Space Force now, they have a sensing capability already up there. It's not everything we need, and I think the executive order really calls out for additional investments so that we can track a threat object from when it launches all the way to where it's going. We want to have track custody. So we have the space sensing layer.

That layer is tied into terrestrial and space communications, and we get that information into our command-and-control battle management system. So that is the, I'll say the crown jewel. That is the hub of information coming into no matter what the threat is and where it's going. And so from there, it distributes the information to the fire control systems. And so we really have three fire control systems today. Two when you bring in the IBCS system from the Army, which is going to be a great capability contribution. It goes into the GMD fire control system first, which is having the ability to affect it at the mid-course level. So up in the exo-atmosphere. If it's a size of a threat, I'll say in quantity, that might allow something to come through, that's when the terminal pieces come in. And so it just doesn't go from mid-course to terminal. You affect it throughout its flight. And so you look at what an Aegis weapon system can do. We can put an Aegis system off of the east and west coast. It's tied into that same architecture. So it's not, it's not just GMD, it's an integrated architecture. And so you can start using standard missiles to start trying to negate and negating those enemy objects coming in. And then you have the THAAD weapon system, which again is tied into C2BMC and tied into IBCS. And so it's starting to have an effect, again, still not in terminal yet, still in the upper atmosphere, all the way down to the terminal aspect.

And so from a ballistic missile, you're attacking it all the way, pretty much through its entire phase of flight. If you add in a space-based interceptor, now you're attacking it even earlier.

When you start bringing in all these disruptive technologies, you're starting to attack it sometimes even before launch. And so I think that's the key to this executive order is you're tying all these effectors in so you are not allowing the enemy to have any free space in how he operates. That's the key. You attack it in depth.

[Riki Ellison, MDAA Chairman and Founder]
And I want to just, because you hit that point, the population doesn't want debris falling off. You want to hit this as far as possible in that space or pre-boost or pre-track, but there's nobody else that's been out there that's worked in space intercepting. I mean, your EKVs, your GMDs, your THAADs, your SM-3 block 2As, you're the only one that's doing this, that's actually got experience in discrimination of all the decoys and stuff. And I think you're developing another sensor to be able to see that better, to be able to play in that space. And I think the executive order is more about space than it is about terminal. We're going to have some terminal, but it's going to be a space problem.

And going back to you, just in the past, we've had one guy run, one guy, one woman, Schriever, Meyer, Rickover. What do you think on that way of solving this big problem? Or do you think you've already, MDA has already solved a lot of it. Do you need someone like that to come at a four or three-star level and say, let's go?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Well, that's a challenging question, Riki. So first, I believe, you know I worked for the Missile Defense Agency, I've spent 20 years with them after retiring from the Army, there's not another talented workforce out there that can tackle this problem. They've got the expertise and they've got the motivation to do it. You know, if you look at what we do, we protect our families. You know, it's different than an offensive system. You know when you leave home, the reason you can take your daughter to ballet is because we've got an effective Homeland Defense shield. It needs to be more effective against a new threat, the peer and near peer.

So I think MDA is the right place for this activity to be integrated, to be architected, and to be delivered. Again, with our coalition partners, the services and the other agencies. I think with the right access to decision makers, I think MDA has leadership that can execute this. We're structured for this mission. You know, I think those are all great leaders in history. But, you know, I'll say MDA has had some great leaders as well. If you look at back when we did the LDO, you know, you had General Kadish, then you had General Obering, you had General Holly, mission focused. And so I don't know that it's a challenge. Like, I think it was Dr. Griffin said, you know, you got to go find that right leader. I think our services are filled with those leaders. They got to be given the opportunity to lead effectively. Authority, access, and resources.

And I think with that, MDA can execute phenomenal work and deliver this iron, this shield for the homeland.

[Riki Ellison, MDAA Chairman and Founder]
And we're close. It's that authority piece that is the key here, right? And access. I mean, those two are the key things right here. Good. Well, I'm going to bring out some questions.

You good? Anything else you'd like to talk about? We covered a lot here, but we can go back over.

Hey, Mark. Mark's here. Mark Montgomery, who's on our board. Mark, are you available to ask a couple questions from the public?

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]
Yeah, I've got two. Before I do it, I just want to say a couple of things. First, I really appreciate it. That was a great discussion, Tim. And I agree completely that MDA is the right architect for this. How the Secretary of Defense organizes his final leader is something that's inherently up to him, what rank he wants and that sort of thing.

But if MDA isn't the lead service at the AutoCAD or whatever engineering program you're using to make this, then we've made a real mistake. And I love that you called yourself the center of excellence for the Department on the integration of space and terrestrial missile defense. That's exactly what you are. And it would be good to know the exact number of engineers at MDA. Because I think every once in a while, we need to wield that talking point. Because I think there's a gross misunderstanding of the relative delta between MDA and everybody else in doing this. And by MDA, I do mean, you're right, the extensions into some of the services where they specifically service you.

And I also want to double down on your thoughts that the Navy did it. Wayne Meyer and Aegis are fantastic. Obviously, we have to acknowledge his brilliance to set that up. But if MDA had not rolled in with the money, the ballistic missile defense aspects of Aegis would not have developed at anywhere near the pace and success that they achieved. And to me, that's one of the great examples of a service cooperating with a departmental defense agency in executing a mission. And you'll find very few of that higher quality as the development of maritime-based ballistic missile defense by MDA and the Navy. And it's a big hat tip.

One thing I do want to point out, just because you guys had a great discussion of hypersonic defense, I will say in the glide phase, in fairness to Riki's question, Tim, I think it's fair to say that with the current decision-making on down-select, MDA will not make the timelines you're discussing. However, should they get more money to go back in time seven months and reverse what many of us call a bad decision, but you might call a cost-informed decision, we could have hypersonic defense in the glide phase intercept of hypersonic weapons, and that's going to be critical to this success story. So I don't want people to think that, MDA is going to need to take some action, I think, to get us there.

Is that a fair statement?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency
Yeah, that's a good correction. Today's program, as it's set up, won't deliver until the mid-2030s. And with changes, resources, and a change in decisions, that capability can come back into earlier than 2030.

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]

And you also did a great job talking about, you know, Riki, you and I started to get confused about boost phase when we were talking with Dr. Griffin, because some outsiders have called us to complain that we weren't getting it right. And I think what's happened is I now understand. I'm going to write this out. And Tom Drugan helped me get smart. Admiral, retired Tom Drugan, a smart missile defense and Navy veteran. I think what Dr. Griffin's talking about, the boost phase, he says, he's only talking about the first stage booster going to end, which is about 30 seconds, and he's not talking about the ascent phase. And then I think when outside, when people who talked to us, some former MDA officials said they're really talking about the second and third final rocket stopping, which might be considered the boost and ascent phase. And that when Dr. Griffin says there's no opportunity in the boost phase, he means that 20 to 30 seconds is the boost rocket. When other people are saying, no, no, no, there's a chance of the boost phase, they're probably talking about that extension that gets you to the ascent phase.

Tim, is that how you guys kind of think about it, that there's an opportunity in that ascent phase?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency
Yeah, we view the boosting phase as when it is under propulsion. And so agnostic to the first, second, or however many stages, two stages, that to us, that's the boost phase. And after it's done boosting, then it's still continuing in its ascent phase until it hits its apogee.

And so that's where we think the opportunity is, upper boost into that ascent. When it's a hypersonic, that ascent is going to be curtailed so they can save that energy and tip over, and then come into the hypersonic threat regime, which brings it back down into the atmosphere. And if it's a ballistic, there is a period of time in that ascent phase before the payload start, before they start making it more complex. How about that?

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]
I like that.

[Riki Ellison, MDAA Chairman and Founder]
Mark?

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]
Yeah, go ahead.

[Riki Ellison, MDAA Chairman and Founder]
I just want to just, before we get off this conversation, I do want to have you address cruise missile defense, because we didn't talk about it. It's not, you know, is that you passed on it when a couple years ago, when you were asked to do it, or Air Force came in and did it.

I don't know how that happened, but is that part of your portfolio, or is that not?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency
So cruise missile defense is critical. The NORTHCOM commander, all the way back to General O'Shaughnessy, they asked the department to solve the homeland cruise missile defense problem. And so the Missile Defense Agency, we did. We did analysis of

alternatives, concept development. There was a decision made in the department that the executive agent for homeland cruise missile defense would be the U.S. Air Force. And so as part of this executive order, that's another piece of the layer now that has to be integrated, is the Army's aspects of cruise missile defense, the Air Force's cruise missile defense authorities, their architectural plans, and bringing that into a singular integrated air missile defense architecture.

[Riki Ellison, MDAA Chairman and Founder]
But you're not going to actually create?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency
We won't be creating, we will be integrating.

[Riki Ellison, MDAA Chairman and Founder]
Okay I just wanted that to be clear. Okay back to you Mark.

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]
I think that's important because, look, giving it to the Air Force was a real, and I think the Air Force is very good at command and control of the airspace, but they're a command and control organization in missile defense. To be brutal, they have no weapons. That's not fair. They have weapons. They have the planes, but that works in the defense of Israel, which is a point source, which is smaller than the state of New Jersey, right? When you're trying to defend the whole United States, I don't think anyone's going to argue for F-35s on combat patrol defending the whole area, right? There's not enough F-35s built worldwide for that.

The Army is going to have a really big role in this. The Navy, against all their wishes, is going to have a role in this. And the Air Force will have a big role as the command and control integrator and then MDA as the systems integrator.

I do think, I'd like to get Tim's opinion on the value in near space or dirigibles or aerostats and getting the picture right for cruise missile defense and potentially hypersonic missile defense.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Yeah, I agree fully. The architecture needs that sensing capability. These are going to be really challenging from space. So you're going to have to have alternative means. Terrestrial, like you said, the dirigibles, towers, there are a lot of thoughts out there. I think this is an area where some of those non-traditional companies probably have a leg up because they think differently than we have in the past.

And so they're seeing what's happening over in Israel, over in the Ukraine. And they're looking at those applications. They're looking at what they've done for border security.

All those capabilities and technologies are transferable and they're low cost. And so I think you're right. Getting that sensing capability for cruise missile and hypersonics far enough where we can have an effect on them is critical.

[Riki Ellison, MDAA Chairman and Founder]

Hey, Mark, just to have fun with you. I just came from Seymour Air Force Base where they got the Distinguished Flying Cross for shooting down all those drones. So, the Air Force and the F-15E has a hell of a role in doing some of this stuff that's there.

I know it doesn't have the quantity. I just got to give a little love to them.

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]
Again, if you're telling me you're defending Guam, I'd be thrilled. If you're telling me you're trying to defend the counter-value, counter-targeting target set, the Defended Asset List of the United States, I'd say all the air forces in the world couldn't do that. I mean, there is a delta here. Look, they're going to be a part of it, though, especially early on when you're looking to defend a smaller Defended Asset List. I think they can be part of it. I think they'll regret getting assigned that mission, much like the Navy would regret being assigned an Aegis patrol somewhere off the West Coast and East Coast of the United States. There'll be a lot of regrets early on. Hopefully, over time, technology will subsume that, and you'll get systems like a dirigible.

I got to give MDA a shout out. That Israeli dirigible is not—I mean, that has a lot of MDA, as I recall, a lot of MDA fingerprints on it. Isn't that correct, Tim?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
It was co-developed. You're right.

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]
Yeah, so we already know how to do it, not just JLENS, which also worked perfectly fine over the United States, I mean, over the national capital region. But there and I believe Poland is now looking at a dirigible system as part of their integrated defense. So hopefully, we'll get to that. And the beauty with us is we have great—the Army has great firing quality track radars that they can put up in these and really make—cruise missile defense gets a lot easier, whether you're in an F-35, an Aegis, or a Patriot. It gets a lot easier if someone's at 25,000 or 30,000 feet calling balls and strikes for you.

I did get a good question. This is a tough one, Tim, but I think you've answered it. I got it from Jason Sherman. Can you comment? I think Dr. Griffin and Ms. Porter were a little bit critical of MDA and said that we're not sure MDA is ready for this new and more comprehensive enterprise and that saying a legacy enterprise like MDA can up its game to be in charge of the architecture and acquisition and technical thinking that's required, I think is probably wrong. What do you think about that?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Well, first, I disagree with it. Being part of the MDA organization, we talked about some of the things that we have been challenged with that have contributed, I think, to a perspective that MDA is slow, MDA doesn't have the agility, MDA is tied to the traditional big defense primes. You know, going back mid-2016, 2020, that was true. But since 2020, 2021, it's been a systematic change in the organization on how we operate. We are now doing model-based engineering. We now have an agile DevSecOps environment.

So we have embraced the tools of technology to go fast. And so we've made those investments. Not only in the equipment, we've made the investments in workforce training to pivot them into these new technologies and how to use them and leverage them to develop at pace. And so I think that's critical on what we've been doing for the past four and a half years to get ready for this mission. If this mission didn't come, we were still going to make these changes because we think the nation needs it. They don't need an agency that is slow and takes decades. They need an agency that's delivering capability at the speed of relevance for NORTHCOM and for the combatant commanders in the geographic regions. And so that's what we have been doing, changing our structure, changing our tools, changing our people now to get after this mission set. So Dr. Griffin, when he was there as R&D, he probably saw the historical side of MDA. He had been on our red team for a couple of years. But I think he'd appreciate the changes we've made to get after this mission set.

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]
I agree with your answer, and I agree that MDA really has evolved. I'd say in fairness to Dr. Griffin, I think some of the press kind of cribbed what he said about there's a difference between developing the architecture, I think you've shown the agility is developing, and forcing services to do your bidding, which I think even today MDA would say it's hard. Services are, next to congressmen, the hardest people in the world to whip into shape and do the right thing. And so I think really what he might be talking about more is, how do we organizationally take your architecture and force services to alter programs of record, to change their prioritization to match the president and secretary of defenses? They don't often do it when being directed by the secretary of defense, so being directed by MDA will be even harder. So having that kind of leader, what he might mean is MDA has to have either an elevated leadership, four stars a leader, or be aligned with someone who executes for them. Maybe it's the deputy secretary, something like that.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Yeah, I agree, Mark, to both of your comments. I think there's another knob on this, and it's control of the resources. When you control the resources, your ability to apply leverage to ensure the capabilities are developed at pace and are integrable is another level of successful leadership to make this executive order a reality.

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]
That's great. Here's the final question we got. Riki, I think we've got enough time. We've got three minutes. Just a quick answer, because this might be an easy one, complex but easy.

Should we assume the executive order is not talking about establishing the ability to shoot down an inbound comprehensive nuclear strike from a peer adversary like Russia or China?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Yeah, the scenarios that the Department of Defense has under consideration, I don't know that – I'm not sure I could answer that 100 percent, but certainly when we look at architectures that we have considered, taking on a mass raid from a peer, numerically that is extremely challenging and might even be cost prohibitive.

[Rear Admiral (Ret.) Mark Montgomery Board of Directors, MDAA]

Yeah, I think that's fair. I don't think we say it out loud enough. I mean, that nuclear strike, a first strike from Russia or China, our defense from that is mutual assured destruction, and that still remains a relevant effort. And by the way, I think we're spending somewhere north of $350 billion to modernize three different legs of the triad to do that. So I mean, the trough is full there already, and I think that it might be a fair statement to say that's handled by this, because otherwise I think the cost of your – of a Golden Dome, Iron Dome, any kind of dome for a comprehensive missile defense against an inbound ICBM strike might be fairly high for the foreseeable future.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
Right, but being able to effectively negate, I'll say, coercive-type launches, I think that's critical. And it's not going to be free. It buys decision time for the National Command Authority.

But when you look at what we protect from a population center perspective, Hurricane Katrina cost a nation somewhere around $32 billion to recover from. And so when I start adding up all the cities, big population centers from a nuclear-type strike, the GMD, the Missile Defense Agency, the underlayer capabilities, the space-sensing capabilities, I think that's an insurance policy that is well-warranted and certainly not going to come at a price like the offensive side of the equation.

[Riki Ellison, MDAA Chairman and Founder]
Thanks, Mark. Let's just wrap up, Tim. Thank you for being here. But any final comments on this discussion?

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
I appreciate the time to come and talk, Riki. And my hope out of this whole discussion is I represented the Missile Defense Agency professional workforce well. They are a national treasure. And I'm kind of blessed to work with them every day. So thank you.

[Riki Ellison, MDAA Chairman and Founder]
Thank you. People matter. They do. And winners associate with winners to win. And you have a bulk of winners there. I just, from this discussion, getting your authorities back, that is absolutely critical for you not having those authorities, It's ridiculous. You did this. You did this at a presidential directive 20 years ago and under two years.

So that's got to be put out there and addressed on that. So, thank you for enlightening everybody and just history. It's a fact. This is what happened. There's 40 years of depth. There's nobody out there that can match. There's nobody.

[Mr. Timothy R. McRae Director for Strategy, Plans and Resources, Missile Defense Agency]
I agree.

[Riki Ellison, MDAA Chairman and Founder]
And that's the fact. So, you have to be our prime player. You have to be the MVP. You have to be the GOAT. And that's where this is right now. People questioning that, it's, yeah, you got to do it. So thank you. I appreciate the time. Great, great discussion. Thank you.