TRANSSCRIPT

Event
“Homeland Cruise Missile Defense”
Panel 3 – Defense Industry Panel

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FEATURING

Doug Booth
Director, Radar and Integrated Air and Missile Defense, Lockheed Martin

Nick Bucci
Vice President, Defense Systems & Technologies, General Atomics

Jonathan Casey
Director, SMGBAD Mission Capability, Raytheon Missiles & Defense

Captain David M. McFarland (USN, ret.)
Senior Director, Missile Defense Programs, BAE Systems

Michael Noble
Senior Director, Advanced Missions, Anduril Industries

Marcus Weisgerber
Global Business Editor, Defense One

CSIS EXPERTS

Tom Karako
Senior Fellow, International Security Program and Director, Missile Defense Project, CSIS

Transcript By
Superior Transcriptions LLC
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All right, well, welcome back everybody. Again, I’m Tom Karako from CSIS. This is our last panel of the day. It’s going to be moderated by Marcus Weisgerber of Defense One. This is our defense industry panel. We told a bunch of defense companies, hey, we’re writing a report on cruise missile defense; would you like to send somebody over to help us think through how – from a defense industry perspective – we as a country might tackle this.

So, Marcus, over to you.

Testing. Hello? There we go.

Thank you, Tom. I appreciate it. I found the report by you and your colleagues incredibly interesting, and yes, I did read it. So for all of you, Tom and I have known each other about 10 years. We have the distinction of meeting each other by almost getting arrested together. I'll just leave that there – (laughter) – you can find out what that was about afterward perhaps. But it was at a defense conference. And there was no alcohol involved.

Anyway, so I got very interested in cruise missile defense probably around 2015. I was at the IDEX trade show in Abu Dhabi, and I went to a briefing by the Russians. And they, you know, talked about all these radars, and cruise missiles, and whatnot that they were developing, so naturally my inclination as a journalist was to go talk to the United States military and see what they were doing to counter it. And I was very surprised when I found out that not much was being done here in the United States aside from a little bit of a patchwork of systems around Washington, which Tom and his team point out in their report.

So, I then also have the distinction – as I told some of our guests yesterday – by writing about cruise missile defense, I got to become famous on television because, when the JLNS broke free, they threw me on with Brian Williams on NBC News for an hour to talk about it because I was one of the only reporters writing about cruise missiles and cruise missile defense.

Anyway, that brings us to today. I was struck this morning by Lieutenant General Roper’s comments. He referenced the capabilities of the United States for this type of defense being – I believe he used the term “outdated” capabilities to protect the homeland. So, we're going to kind of unpack some of the stuff in the report and talk about what companies are doing to address cruise missile defense in the United States.

So let me quickly introduce everybody. At the end, we have Doug Booth, director of Radar and Integrated Air and Missile Defense at Lockheed Martin – Doug, thanks for joining us; Nick Bucci, vice president of Defense Systems & Technologies at General Atomics; Jonathan Casey, director of Ground-Based Air and Missile Defense at Raytheon Missiles & Defense; Dave
McFarland, senior director of missile defense programs at BAE Systems; and Michael Noble, senior director of Advanced Missions at Anduril Industries. So, thank you everybody for joining us.

I’m going to pass it off to everybody; we’re going to go down the line starting with Doug, and everyone is going to give us some brief opening comments, and then we’re going to talk about the report. So, Doug, over to you.

Doug Booth

Yeah, thank you. Thank you so much. So Doug Booth, 25 years at Lockheed Martin. My background has primarily been working in the intel community, and the DOD, and some international work across, primarily, the space, electronic warfare, and the radar, and integrated air missile defense domain.

Right now, my portfolio is across – from a radar perspective and sensor perspective – across the space, air, maritime, and ground domain. I think you’ve heard a lot about some of the systems that are in my portfolio today that could be leveraged as part of the solution. You’ve heard about the over-the-horizon radar we currently manage and have people and personnel working over in Australia on that JORN capability. We’ve got airborne early warning with the APY-9 radar, that’s working in the Navy. Ground-based – we just started building the Air Force’s next generation, long-range radar called 3DELRR, and then the Sentinel program, which you’ve heard about. We’ve just delivered five radars to the – the first five radars for the Army for the Sentinel program. Those are the tower-mounted systems that you’ve been talking about.

Again, excited to be here. I think that, you know, I’m probably going to give some orthogonal thoughts later about the paper, but I do believe that it’s not a matter of if, but when that threat comes into the homeland. It’s happening around the world, as it was talked about – you know, the ARAMCO and with Russia – and when you are talking about something that – a threat that’s traveling that fast – 500-plus miles an hour, that’s subsonic – the ability to maneuver and evade our defenses, and we know that our adversaries are going to try and penetrate and do some reconnaissance where our radars are today or our sensors are today. The ability to maneuver is going to be very challenging for us to understand, and we have to make sure that we’re looking out for that. The ability to see a target that small, when you are talking about the cross-section, and flying at such a low altitude, going to be hard to tell the difference between the wave tops in the sea and the ocean and these cruise missiles flying real low.

So to me it’s a matter of, you know, what we need to get in there and a truly layered, in-depth approach.

Mr. Weisgerber

Great, thank you. Nick?
Thanks, Marcus. Thanks, Tom and CSIS for putting out this important report. Frankly, it’s a long time coming, as Doug just said.

I guess I’ve been in the business for about 25 years in missile defense at a previous company – the one that Doug works for – and now at General Atomics for the last eight years.

A very difficult problem, and I think the title of this report says a lot. You know, North America is a region, too – yeah, the answer is, yes, it is. It is a region, too, and so what that does is it enables us to take advantage of all of the work that we’ve been doing for the last 40 years on this missile defense problem, and all of the materiel solutions, and the integration challenges that we’ve gotten through, and kind of pull them together to tackle this problem.

And I’m going to violate the improv rule of saying, yes and, with but – yes but. In this case, it is a region, yes, but it’s a different region, right? It’s the homeland. And so, it requires a little bit more thought, you know, in terms of how do we do things with maybe a different set of criteria for resilience, and preparedness, and readiness, and redundancy, and things like that. How do we deal with things like consequence management, right – as I have to do environmental impact studies and all those things.

So the shopping-at-Costco comment this morning deals with yes, it is a region. The “it’s different” says every now and then I’ve got to go to the farmers market and, you know, I’ll kind of take-off from where Stan Stafira said – because we have all this heritage, if you want to call it that, to leverage, I look at it from the detect, control, engage, assess sequence, if you want to call it that, right? And so we have a lot of capabilities in all those areas. But we need to add some, right?

In detect, we have lots of RF sensors, we have lots of EO/IR sensors. But what we need to do is kind of look at how do I use them a little bit differently. The paper talks about utilizing passive sensors. Well, that’s a great opportunity with low environmental impact to get more data to solve this problem.

In the engage side, you know, we have lots of active defense. We have lots of kinetic defense. How are we going to integrate things like high-energy lasers or high-power microwave weapons? How are we going to integrate more passive defenses, too, to solve this problem?

From a control perspective, the homeland is large, expansive, and we’ve got to operate in all domains. And so having things like very high-speed, assured optical communications in all domains is going to be an important piece of the command-and-control part, so I can get all the data from where it’s collected all the way through to where it needs to be used.
And then in the assess piece, it goes back to the detect in terms of looking and saying how to I now piece together what’s happened as this engagement has gone on. So I think it’s important that we kind of look and say where are some of the technologies that need to be moved in, right? Machine learning is huge. Autonomy is huge. How do we move those in – as the report talks about – into these phases? How can we move in these new technologies; i.e., going to the farmers markets and picking out that, you know, special cross-bred zucchini – (laughs) – that we want to put in this recipe for – I’ll call it – the special reason; that is the homeland.

Mr. Weisgerber

Great. Thank you.

Jonathan?

Jonathan Casey

Yeah, thank you. And thanks to Tom, thanks to CSIS for having us and for putting out this much-needed report.

You know, when we talk about the cruise missile defense problem for the homeland, there’s a famous quote that strikes me. You know, if we try to defend it all, we’ll defend nothing. And, you know, I think that really sums up the problem we have here. And I think that what Tom and the team did putting out, you know, the concept of defending the critical areas is really paramount to how we start to move forward here.

And I think if you take that even a step further – and what we’ve done in some of the rapid development programs that we’ve done over the past couple of years, we’ve learned to do stuff fast. And one of things that happens when we do stuff fast, we put something out there, you know, we build a little bit, and then we can learn a lot, and then we can build the rest. And I think that’s really what we need to do here to be successful – is to get something out there and to start.

You know, another point that Tom and the team made in the paper is the idea of leveraging everything that is out there in the country already: all the different data feeds we have, all the different radars that are out there. It’s a great idea. The backbone to that is going to be how do we successfully collect the data and how do we know what to do with that data. And that’s where I think the experimentation in the short term – you know, we can go out and we can pick a few of those FAA radars, we can take five or 10 of them, and we can, you know, set up a node and go test it, and go try to go do that. And that’s another thing that I think in the short term we can do to start taking that step forward and to start to learn so that we can then build even more beyond that.
And the third point I’ll make here is the architecture that we put forward has to be able to grow as the threat grows, right? And, you know, I think that we focus the discussion on the counter– I’m sorry – on the cruise missile threat, but we’ve got to build an architecture that can evolve for the hypersonic threat and whatever is next after that. And, you know, we talk about radars; that’s certainly one area where we need to make sure we’re building radars with enough power that they can see smaller threats and, you know, more stealthy threats. And so the key is going to be to think three steps ahead as we build this out.

Mr. Weisgerber  Great, thank you.

David M. McFarland  Yeah, good afternoon. Thanks, Tom, and thanks to CSIS for putting this together in this very important paper. And in my little pitch here I’m going to talk almost like a contrarian, but please, don’t get me wrong. I am totally behind this, and I think it’s a worthwhile effort.

Having said that, you know, there are some things that we need to look at. As Jonathan just talked about, the scalability, flexibility of an architecture, the ability to grow to address threats has to be there. There are some great technology that’s just over the horizon in tech demo right now; for example, high-altitude, long-endurance UAVs – that could add to it. Another technology that’s out there that I’ve been playing around with is hypervelocity gun weapon system – bring guns into the kill chain for terminal defense. You can do some great things there. You can increase your cost per kill, and we talked about costs, and that’s an important piece.

But I think – I think each of the panelists kind of identified a key – a key drawback to a bunch of the architecture that we’re talking about here, and that’s integration. Where’s Colonel Behrens? There he is. He said it best. This is something that gets hand-waved, and it’s something that quite frankly the government goes, over to you, industry. Figure it out, tell me how it works out. Well, it’s difficult. It is extremely difficult.

You know, my background, I’m an Aegis guy, spent 30 years in the Navy, you know, staffing ships, commanding ships, working in the Pentagon. When we talk about integration, it’s always out, off the cuff, and kind of the last thing we think about. And we’re going to give that to industry.

Well, I’ll tell you – where is Jen? She wrote a report in March that we just got Patriot to talk to THAAD and execute an engagement. That JUON rolled through the Pentagon in 2015 – Exhibit A. This is difficult.
So when we look at this architecture, the complexity of this architecture, the complexity of the Guam architecture, how are we in industry going to address this? The good news is there are some tools out there, there are some processes out there that industry has been refining, and it comes down to digital engineering. For example, you know, three things: mission engineering where you can do this with models. Model your mission, figure out what you want, link it back to requirements, you know, run it through the gamut of different perturbations. You can sort through a bunch of different architectures pretty quickly with all the existing models that each industry has. And as we look at this – these pieces, these capabilities are developed in stovepipes; you bring an EAS and a Wedgetail. You bring a LTAMDS radar. You bring something. But they’re all developed in their own little stovepipe. So when you put in a system of system – and I’ll poke at Tom a little bit – this is new. The systems aren’t new that were developed in stovepipes; the weapon system, the architecture is new. Who is going to do all of that integration work?

The second piece there – system of systems integration and engineering – because that’s a key part of this. Again, hard stuff. You know, we’ve got models. Let’s bring them into a digital environment, let’s run them through their traps, let’s trace them back to requirements, let’s validate them, let’s test them, let’s demonstrate them. We can do all these things. We know how to do that.

But again, going back to an organization piece, you’ve got to designate a program manager. Wow, we’re having a tough time doing that. Who is running Guam defense? Who is running homeland cruise missile defense? I don’t know; we’re having a policy discussion about it. So, before you can do all this Gucci stuff that we want to do, you know, we’re going to have to address those policy issues, and we’re going to have to come back to the integration pieces.

And then finally, what data are you looking at? What do you want to get out of all this integration, you know? And do we ask ourselves hard questions about that? For example, if an LTAMDS radar is part of the architecture, is that what’s going to be needed to close the kill train for SM-6? Is the data in the right format? Are we moving the data information transfer across this architecture, right – I likened it to GMD, which moves data across 12, 13 time zones to close a kill chain. You know, we’re talking about very, very difficult things here that, again – we’re hand-waving, and we shouldn’t hand-wave. We really need to do that next level of analysis and really chip in here. And again, I think that’s industries stated mission or implied mission.

Thanks.
Mr. Weisgerber  Thank you, David. And actually, that’s my first question that I’m going to have eventually after Michael speaks and gives his opening – it’s going to be right to – what you were just talking about with integration and stitching things together.

But Michael first. Over to you.

Michael Noble  Well, fantastic. So Marcus, and CSIS, and Tom, thanks so much for having me and Anduril here today. We’re a little bit different kind of company here. We’re a private company, been around for about five years. I’m three-and-a-half months with the company, still learning it, so bear with me as I go here.

I guess the thing I would offer, first and foremost – and I couldn’t agree more with my colleagues here. It’s all about the integration.

So my background: I was in the Air Force for 26 years as an acquisition officer and engineer, doing development, first article sort of stuff, right? And the comments about we develop stovepipes – we develop great kit, but it’s developed against a set of requirements for a specific set of tasks, and it’s an afterthought about how are we going to pull all these things together.

And it comes up in the report, it’s come up in the panels before this, and it’s coming up in this discussion, and I’m sure it will again. It’s all about the integration.

And so, frankly, the reason I’m at Anduril is Anduril takes kind of a different approach to things. We’re not necessarily a hardware builder first. We do build some hardware, but we focus on integration first. And I think we’ll talk a little bit more about that throughout the day.

I really appreciated the general’s comments about agile development. You know, what struck me – looking through the report and having done ops analysis in the past, it’s a great body of work. I commend CSIS for the work, in particular the attention on a really hard problem. It needs it, it deserves it. But as all of you know, right, what we see in the field five years from now will be informed by this body of work, but it will not be the same as this architecture, right? We’re going to learn as we go, and that’s been, you know, kind of a key ingredient for success in my experience in acquisition and development. Yeah, if you spend a year, two years on requirements development, and OAs, and analyses of alternatives, you know, you are just not going to keep pace with the threat. The threat is moving too fast. Our technology is moving too quickly. You’ve got to get out there and start, right, and realize that you are going to have an imperfect solution, and then continue to iterate. So, it requires industry, but it also requires partnership with the government. So the best programs are those where the government
works very closely with industry. Each has an important role to play – they are unique – but it absolutely is a team sport.

And you also need to include the warfighters early, right? So one of the challenges, you know, I found – I’m sure you guys have, as well – is, you know, CONOPs/CONEMP is typically an afterthought, right, and so getting the warfighters in meaningful experimentations – not stunts, but experiments that lead to, you know, discernable increments of capability is really, really critical. So, I guess I’ll leave it at that for now, and we’ll look forward to getting into the discussion.

Mr. Weisgerber  Great, thanks. And as I told our panelists when we – I think I told them this – when we chatted yesterday, I want this to be a conversation, so if somebody says something that you agree with, disagree with, want to add more to, feel free to interrupt.

Mr. Bucci  Then I’ll do so.

Mr. Weisgerber  Go for it!

Mr. Bucci  Just to kind of take off – I went up to Tom after the last panel, and I said, just like the old military saying, no plan survives first contact with the enemy. It’s great that CSIS put this report out, and he has already talked about having an eighth principle. So, I absolutely agree, right? (Laughter.) This is required because it gets the conversation started, so –

Mr. Booth  Yeah, and to continue before you get into the questioning, we talked a lot about budgets, right, and going to Walmart. And I wanted to just kind of launch on that for a little bit because when you hear Canada is putting aside a $40 billion budget for theirs, and ours is about 32 (billion dollars) right now, and we have a lot more – you know, larger land mass and population, I think that we need to look a little bit more in depth and get a little bit deeper in the layered approach in defense and depth.

I think that there are some things that we could potentially look at. I think it’s a great start by Tom and the team. It’s where we want to be.

But if you start with the National Capital Region’s IADS system as a place to start and look at the integration problems they’ve had just with that – I’m going to call it a simple system compared to what we are looking at now – and then building out from there, we’re talking about more expenses.

I think that there needs to be some more border surveillance. I think that the OTHR is probably not as reliable as we’re kind of hand-waving a little bit, and we’re going to need some space layer and probably some more airborne early warning. We could probably make use of the MQ-9s that we’ve done
such a great job inventing. So I do think that we need to talk about – more about the budget and start expanding that a little bit more to be some realistic – especially as we are giving a lot of funding to our overseas partners right now. I think that we should be looking at protecting ourselves.

Mr. Noble

I’m glad you brought up the NCR IADS. I was the program manager 15, 20 years ago. It’s unreal to think it was that long ago, but it’s a great example – to my way of thinking – of how this needs to be done, right?

So we took ASRs in the local area, integrated it with soldier radars, and then stitched that together with cameras in the NASAMS, right? And it was like a year from initial idea to initial capability. And it has evolved since then, right, but it was just getting that initial capability, and in this case getting the Army Guard involved, getting some experience and some reps with the system that really led to the traction for the capability that’s there today.

Mr. Casey

I think, you know, that kind of builds on the comment I was making about, you know, build a little, learn a lot, and then build the rest, right, and I think we can – we’ll debate the budgets all day. We’ll debate the budgets all century, right? So there’s obviously – you know, we need to do a good job at forecasting what we think it’s going to cost, and that informs some of the architecture, but I really – you know, you’ve got to get something out there, and that’s exactly what we did in the NCR, you know, 15, 20 years ago, right – is get something out there and figure out how it’s going to work.

Capt. McFarland

Yeah, that is a key point but, you know, you’ve got to operate it, too, and, you know, throw the NCR thing in there. I had a program that operated the NCR in Huntsville.

But we do have to approach this very thoughtfully because if we do do a budget graph – for example, what’s in the MDA’s budget right now? About 10 billion (dollars) a year – nine billion? You double that, there’s going to be a lot of questions without a lot of data. So again, architecture analysis. Let’s model this, let’s put it in a digital environment. Let’s find out what the architecture is going to be.

You know, we’re having a problem nailing down the architecture with Guam. I think the architecture was much more simple – well, it is – for NCR IADS. However, you know, there is a path that shows us – that could show us a way. But the more we get it into a model, the more we run analysis, the better our budgets will withstand rigor, and we’ll have the data to be able to present to those who mark those budgets.

Mr. Noble

I guess I would argue the two aren’t mutually exclusive. I worked with the red team throughout my whole Air Force career, and they’ve got a great process of doing really sophisticated modeling, ops analysis, and that
introduces questions that they then go take to the field and experiment to answer those questions, which then informs the ops analysis. So it’s – I think the two complement one another, and I think you need to run the two together.

Mr. Weisgerber

So to unpack what David was talking about earlier with integrating, I know Tom and I have talked for years about the need, and we’ve talked about this regionally in the Middle East, for partners over there to just share what they have, and the challenges of that. But as has been talked about here all day, you know, you have services that don’t talk to each other, you have systems made by each company probably up here that don’t talk to – or maybe not Anduril – (laughs) – but that don’t talk to one another.

So what, in each of your opinions, needs to be probably – first and foremost, needs to happen in order to stitch everything together? Is it – is it just – is it bureaucracy, is there something technically that needs to be done, or is it something else or a combination?

Capt. McFarland

Well, there is a combination. You know, first let’s identify what we’re talking about. We’re talking about data. We’re talking about proprietary data. Each stovepipe, each weapon system again, you know, its platform kind of rises up to the platform.

One of the business models we use in BAE Systems is: be an agnostic platform integrator and deal with the data, and – you know, because these weapon systems are creating data. We’ve talked about how we’re going to move data around all over the place to close kill chains. So, let’s approach it that way, you know. But that’s going to require the government to really own a technical baseline and to provide the leadership on where we’re going with that baseline. So yes, let’s execute the trades, let’s do the AoAs, all that kind of stuff. You can do it a little bit faster, better, cheaper with digital models; let’s go in there and look at that. Let’s snap the chalk line on an architecture that has growth, that’s flexible and scalable. You know, all of these things that you could put together you can model, and you can flesh out. But the government is going to have to really identify, you know, and, you know, kind of protect or, you know, address the data issues that each product provider or system of this system of system is going to add. I’ll stop.

Mr. Booth

I agree. I think it’s less technical and more on the policy and control of the data, especially when you start bringing in national assets that might be a higher classification than some of the other data that’s coming off.

I think the data itself, you know, can just be the zeros and ones from the threats and doesn’t have to be so much the IP part of the product itself. But I do think that it’s less technical, and we can probably get there faster if we
just kind of free up some of the policy and concerns between the different agencies and services.

Mr. Bucci

I think, step one, we heard the general say we’re going to hear about the executive agent coming out soon. That’s absolutely step one. Who is going to be responsible? What are they going to do to take on this mission, and how will they execute it?

I think the – one of the things we have to our advantage is we all are used to working with one another. And over the years – especially the last 15 or so, digital engineering and integrating models, and those models being able to work in real time and communicate via Internet Protocol have helped us tackle some of the build-a-little, test-a-little, learn-a-lot things that Jonathan talked about, right? If I don’t know exactly how I’m going to talk to somebody, the best way to do it is to talk to them and find out where we’re not communicating, and then fix it, so you kind of get through that cycle. And so those digital models are huge. Everyone is creating digital twins for everything. Getting those models to integrate starting with, I’ll say, very low-fidelity models all the way up to the highest fidelity models and then hardware in the loop. Those are the kinds of things we have to get to, but job one is get who is responsible.

Mr. Casey

You know, I think there’s – you know, there’s a number of C2 systems out there that are in development. You know, there’s a few of them. We all know what they are and, you know, the goal is to kind of, I’ll say, achieve a nirvana. But it’s going to take a while to get there. You know, they’re largely not ready yet.

But there are things out there that we’ve used to do this type of thing before, right? The Navy has used the CEC system. The Air Force – we had BC3. And so in my mind, we’ve got to start. So, I go back to the comment I made earlier. Let’s pick 10 radars out there in the U.S. somewhere, and let’s go make them all talk together, and let’s – you know, let’s pass that data to the NCR and see if we can the systems to look at it.

Mr. Weisgerber

How difficult is it to do that, because – you know, I was trying to think about that as I was reading the report last night and, you know, just driving down the highway you run into weather radars, or if you are on Andrews you run into stuff over there, too. If you’re in populated areas, it’s like New York City. They’re around the airports.

How difficult is it to actually, like, you know –

Mr. Casey

I think it’s going to be on a case-by-case basis. I think some of the things you’ll run into is some of these systems are not set up currently to look at low-altitude threats. They’re going to throw those away. And some of them
may be not looking at, you know, small threats. Maybe they’re only looking for big aircraft.

So there is some work that we have to do to go, you know, make an update to these systems, and that’s why I say let’s start small. Let’s pick a few of them and go see – and go figure that out. I mean, it’s going to be very much case by case but, you know, to me, if you – if you take the integration problem in the whole, we’ll never – we’ll never get there. We have to – you know, we have to localize it, and we have to use the systems that we have out there today to start and to experiment against it. We can’t wait for those C2 systems that are trying to achieve nirvana – and that hopefully will, but just not there yet today.

Mr. Noble

So, I would offer the digital engineering stuff is really interesting, although I confess – I’m from Missouri as far as that goes. We’ll see if it solves the integration problem.

And frankly, the government just isn’t that good at integration, and I don’t want to be pejorative and knock the acquisition professionals I’ve had the good fortune to work with. It’s just not a natural skill of the government. It’s, frankly, better left to industry, and the incentives are all wrong for the most part, right?

I mean, you guys build fantastic equipment, but the primary requirement – despite the KPI – by which you are evaluated is not how well it integrates with other stuff that’s in the field or stuff that’s in development.

See, you kind of have to leave it to industry to get this done, and you’ve got to incentivize and partner with someone to do the integration. I think that’s the only thing that we’ve seen work, and it hasn’t worked that often. But that’s the most promising thing I’ve seen.

Mr. Booth

Yeah, I think that, you know, the integration of the systems – most of them are built on the same common platform, you know, like and Asterix system, but now you are talking about so much data, you know, into one system. If you just look at the volume of data from a simple, you know, Sentinel-based type radar, you’re talking about, you know, limited range and volume. If you start adding in an OTHR system and the volume there that goes from sea to atmosphere, out thousands of miles, I mean, it’s just so complex. You need some really, you know, high-end tools, data processing, social-media-type things that we see out on the Internet today. I think that’s where General VanHerck is saying he’s going to unleash this on industry to help figure out – I think the data processing and signal processing side is going to be one of the biggest areas where we’re going to need some help with on this.
Capt. McFarland  Yeah, I – you know, going back to that piece – because that’s important, you know – we call that information content analysis, you know. So what are you doing with all this data, you know? Is it in the right format? Are you moving it to the places you need to have it?

You know, we – again, we hand-wave a lot of that stuff. We just assume it’s going to be there – like OTHR data. That’s going to aid in closing a kill chain and, you know, creating a combined track. That’s easy to say, but it’s very difficult to do.

Now – you know, again, I guess I’m going to have to prove it you – we have digital tools that can do that. We can model that information flow. We can analyze that data. We can ask those questions: Is it in the right format? Is it going to the right place? So, you know, we’ve just got to get in there and just start doing it.

Mr. Weisgerber  One of the biggest challenges I think, when we heard it brought up earlier today, is combat identification – you know, how do you tell a flock of birds from a cruise missile, or a Cessna, or who knows what – jetliner.

I guess what needs to be done, again, technically to actually improve this? And is there anything any of your companies are working on that could actually, you know, improve that? And I think back to the gyrocopter man who flew right onto the National Mall. And I don’t remember the particulars of whether radar saw it or not or thought it was a bird or not, but what can be done to prevent something like that from happening?

Capt. McFarland  So I was showing Ken Harmon, you know, a glimpse – and you can go on the Internet and just Google, you know, air traffic across the United States today, and you can see the clusters of, you know, commercial airlines that are tracked – they’re squawking a mode in code, you know – we know what those are. But they exist somewhere else. They exist in the FAA system. They exist in commercial sources. Again, we’re talking data. We’re talking big data analytics. We’re talking algorithms that we can use to help us deconflict that air space.

But, you know, if – a little about me. So I played around with Tomahawks in my career – fired a couple of them. When I think about defense of the National Capital Region, boy, I can make a Tomahawk kind of fly like a commercial airliner. I could probably get it to squawk a mode in code that looks like a commercial airliner. Oh, by the way, there is this nice mountain range called, you know, the – right outside of D.C. that I can mask my approach and come in that way, squawking a mode in code and looking all great. I can get away with it one time at least, right? But that one time matters, and again, if we’re not looking at that data, if we’re not developing the TTP to deconflict air space, to bring in FAA data, sort it out, you know,
some AIML to present our operators with methods to really see through all of this stuff because there is a lot of stuff out there, then, you know, we’re not doing a – we’re not really addressing employment of the weapon systems we’re talking about.

Mr. Booth

I agree and, you know, from just a basic system perspective, it’s easy to identify a bird, you know, versus a cruise missile, versus a type of a jet. I mean, that’s done today. But if you think it’s about a near peer threat to us, they’re not going to just fly it that way; they’re going to try to spoof our systems, and that’s the concern.

That’s also kind of where OTHR is helpful. It’s different than other radars. Most radars just look up at the target, so it only sees like the front end of the target come at you or the front end of the plane, where OTHR signal comes down so you can see the whole side of the target, so there are some algorithms that could be done there and modeling, you know, that can be done there to help identify – using OTHR as one of those.

Mr. Bucci

And again, from a machine learning thing, there are characteristics of a Tomahawk flying like an airplane, that it can’t – it can’t possibly replicate an airplane because of its radar cross section, let’s say, right, so again, bringing all that information together before you make a decision so that you can make the right decision.

You know, to your point, Jonathan, about how can we understand how these radars can talk, well, the NRO is buying commercial data – SAR data – off of satellites. They’re going to take that raw data and go process and come up with their own products.

Well, some of the things that we don’t get out of those air traffic radars, and those weather radars are things like they don’t see targets below a certain amount probably because they’re not allowed to, or whatever the answer is. If I get the raw data, now I can go process it in a different way and start pulling together that information to go do this. So the data can be there; it’s just a matter of how do I pull it all together, do it smartly, and get the information that I want.

Mr. Weisgerber

There is a question that I want to hit from the audience because it ties into this and combat identification, and it talks about the number of – that the Pentagon has talked about UAPs a lot of late, and there’s been a lot of attention paid to that on Capitol Hill.

But it says, what tech can be brought to – tech can be brought to bear to better understand the issues that – the issues and capabilities being used in cruise missile defense help with identification and that aspect.
Mr. Bucci

Well, I think one of the things I tried to mention earlier – having multi-spectral sensors helps a lot because now I can – maybe something that is designed to spoof one particular sensor can’t spoof another. And so, if I can ensure detection from, say, and EO/IR sensor or an RF sensor, now I can start pulling that picture together better, and getting better characteristics because I’ve looked at it different ways.

Using passive sensors is another great way to get different information. Hey, why don’t we talk about acoustic sensors? I know the big thing that looked like binoculars that was in the report – there are a lot of really good acoustic sensors out there, which we happen to make one that has been used for cruise missile defense, counter UAS. Those are important sensors to now bring into this architecture so that you can get that, I’ll say, broader picture of the characteristics of a particular threat or object so you can tell whether it's a threat to be sure you're going after the right thing.

Mr. Bucci

And that’s when your costs start to go up, that we talked about before. Since it’s multi-spectral and it’s multi-static, the ability to use a ground radar with an airborne radar is going to help with that identification, as well, so I think there’s multiple things that could be done there to help with the – solve the problem.

Mr. Noble

Yeah – oh, go ahead.

Mr. Casey

So, I was just going to say it’s always going to be a difficult problem that we’re going to have. You know, one of the things that I – I think I read it in the report – was the idea of, you know, a – I’ll say, a, you know, different states of alert. So, when there is a very, very high level of alert, do you reduce the level of confirmation you need in terms of combat ID and, you know, I think that’s a difficult decision – and I really just wanted to pose it for the – you know, to see what everybody else thinks of that. It would have been a good question, probably, for the government panelists – (laughs) – but I didn’t think of it – think of asking it at that time.

But, you know, I think you’re never – with these methods we’re talking about, other than getting eyes on the target, it's never going to be a hundred percent. I mean, that's the hundred-percent way to do it, and – you know, but the technology – I mean, it’s really that data analytics, it’s the things that the social media companies are using to find bots, and it's looking for the abnormalities in the data set that tells you it’s something that’s different than the rest.

But I am interested in what everybody thinks of the idea of having different alert states and changing the requirement on combat ID.
Capt. McFarland: Well, you know, that does – that does happen and, you know, that’s part of TTP for some of the area defense stuff that the services are doing now, you know. And you are – you are going to see some precursors to, you know, a potential strike. Are you going to see them all? No.

But, you know, this goes to what Colonel Behrens was talking about, playing away games that we’re really good at, big-data analytics from NRO to look and see – count submarines like we used to do in the old days – how many Oscars are in port? Hmm, there’s one missing; I wonder where it is. Well, let’s get some ASW aircraft out there to find it, right? Before it becomes an air defense problem, make it a ASW problem.

So we got to start thinking big. We got to start thinking about the battle space differently. It’s now the homeland, which means everything else – we have to be out there with our forward-deployed forces with the mindset that we are defending the homeland out there. So COCOMs have to talk to each other; we have to enable that. Staffs have to talk to each other; we have to enable that. Their machines have to talk to each other; we have to enable that, we have to flow information. Oh, boy, it all comes back down to data.

Mr. Noble: Yeah, I couldn’t agree more. I mean, we have so much good ISR. We have fantastic radar. We have fantastic EO, awesome SIGINT, et cetera, and we’ll continue to improve it, and we need more sensors, absolutely.

But I think a key thing to realize here is this is not something we solve, right? The enemy has a boat here, too. The way we do combat ID is going vary from one target to another, and they are going to adjust, right, and we’re going to take advantage of new technologies.

And one of the things I thought was really good in the report is recognition that this architecture is going to have to evolve, right? Hopefully in a few years we’ll have overheads like HBTSS and Tracking Layer and so forth; that will be part of that architecture. And you’re going to have to have a framework – and again, it’s the integration piece, right? And it’s the process that’s able to adapt to the changes from the threat and the changes in our technology.

Mr. Bucci: And I think – you know, you talk about HBTSS and the Tracking Layer from SDA, very important capabilities. We’ll get there eventually.

And kind of to your point, Jonathan, what do we do in the meantime as we start to see indications and warning? Well, persistence is what we need, right? You don’t have persistence until you get that fully populated constellation of satellites that gives you 24/7, 365 heads-up data.
In the meantime, you have surge capabilities. You put out medium-altitude, high-altitude, long-endurance UAVs with the right sensor suites on them to be able to surge to where indications and warning have given you some level of information that says, you know what? I now have a rogue submarine off the coast of the – off the East Coast. I’m going to set up a picket for the next 30 days, 60 days, and that becomes part your architecture to get that surge capability as you move into the various stages – as indications and warning kind of take you to those stages.

Mr. Booth
Yeah, Tom, that was a note to the team as well because I didn’t see anything under sea. From a sense of respect, that probably needs to be looked at as well, so.

Mr. Weisgerber
Michael, I believe – Anduril has, I believe, you guys have been testing radars on towers. So, can you talk to us a little bit about what you learned?

And I have a question for Tom because I don’t see Wes in the room anymore. Did you guys look at how much it would cost in your report to actually rent the tower space to put radars on?

Over to you, Michael.

Mr. Noble
Yeah, sure. So, the radars and towers are a great example of, kind of, the iterative development process. So, our counter intrusion system is probably one of our marquee systems. Our big contract – if you Google Anduril we’re the systems integration partner for SOCOM – and frankly, I think that’s a good template to follow for this type of stuff, where, you know, SOCOM had a number of events with industry involved, with problems that were presented, and it was a matter of, OK, how do you integrate existing systems or systems that you’re developing or you’re partnering with to address that problem.

And through the course of multiple events, they determine, hey, here’s an industry partner that we want to work with. They’re going to work with other industry partners for elements of that architecture, which is going to be continually evolving, and the radars on towers is just one piece of that.

And the way we arrived at that was, you know, just based on the need for, you know, tracking, in this case human beings at the border, the cameras were insufficient. So, to get additional range you needed the radars. To get the combat ID, you needed to stitch the radars with the cameras, and the then the real power of the system isn’t any of the given radars because they’re just commercial, likewise the cameras, it’s the stitching together of the network, and that’s – it’s that I-word that keeps coming up over and over again.
And yeah.

Mr. Weisgerber  David, you talked earlier about hypervelocity guns. I don’t believe that was in the report either, but can you talk about how something like that would be employed as a – would these be, like, coastline defenses or?

Capt. McFarland  Well, yeah. Take Guam. The Air Force is looking at this, and they’re making a significant for air base defense. Right at the north tip of Guam is this little placed called Andersen Air Force Base. You know, kind of an important place.

You’d probably want to put in a close-in weapons system to, you know, enhance your layers, right? We’re talking about layering both sensors and effectors, missiles, you know. Boy, if you want to clean up leakers, use a gun. We’ve proven what CIWS can do, and that’s small caliber, right, 20 mm, versus 155. But we’ve tested this. BA systems have been working this. It’s kind of an offshoot of when railgun was cancelled. You know those hypervelocity projectiles are there and in fact they’re even developed even further.

Right now, we’ve been conducting tests on firing these pretty rapidly and put them in a battery – and somebody said Nike Hercules earlier, and I was thinking about coastal artillery. And if you integrate that, you can pick up a lot of leakers cheaply with a gun.

And you know, but to Tom’s point, you can’t put them everywhere, right? They’re terminal defense systems. But you can put them where you need them to count, and you can’t afford to have leakers, so.

You know, it’s some good work our engineers have been working on is that hypervelocity-guided weapon. It’s a guided round, oh, by the way.

Mr. Bucci  Yeah, that – I was going to add that if you didn’t, David. I mean, the big difference between CIWS and what you’re talking about is precision-guided munition to be able to take out reasonably sophisticated threats that can maneuver because –

Capt. McFarland  Yeah, that’s what it is.

Mr. Bucci  So, that’s an important piece is that precision-guided munition piece because that’s what gets you the kill advantage to take them out, and frankly, it gets you the cost advantage because they’re a hell of a lot cheaper than missiles are – both the inbound and outbound defensive missiles.

Capt. McFarland  Yeah, if you did a cost-for-kill analysis and compared it to an MSC versus, you know, we employed – we shot two rounds at a cruise missile, knocked it
down. That's an order of magnitude difference. That was about 300k. MSC's are going to cost you a cost-per-kill, you're in the millions easy. So, it's pretty compelling.

Mr. Weisgerber

Nick, I wanted to go to you. I have another platform-specific question. The Reaper was alluded to earlier. We've – you know, it's been used a ton over the last two decades – Predators and Reapers. We now are at a point where we see the Air Force wanting to unload a hundred of them to another part of the government.

Have you guys looked at how a Reaper could be used in the, you know, cruise missile specifically kill chain?

Mr. Bucci

We have. We've looked at it from a couple of different perspectives – protecting the platform itself as well as protecting critical assets.

And so, you know, armed with the right sensors, armed with the right interceptors, the right missiles, it certainly can provide that level of capability. The key with those is, you know, unmanned, long endurance. You know, depending on the loadout, somewhere between 36 and greater than 48 hours, you can have a single aircraft up doing surveillance and doing protection.

So, that's really the key is getting that long surveillance, and frankly, being able to stay up that long, no manned aircraft can do that because pilots can't take it – at least not easily. They've got to get refueled much more often and things like that.

So, the real key to utilizing things like unmanned aircraft is the ability to be there on station when required, surge as needed, taking – you know, one of the things in the report was don't throw away anything. The reference was, don't throw away the data from the ARSRs and the ASR radars, but I also looked at it as don't get rid of assets that still have intrinsic value, right?

And some will say you have to do this, and you have to do that. Well, I worked on a system that was designed to do air defense, and all of a sudden after, you know, three years we had ballistic missile defense capability. And someone asked, well, how the heck did you get that done, and so, we created a briefing called "Blood from a Stone." Sometimes you can get more out of a system that was built to do something to do something completely else because you thought about it a little differently.

I mean, SCO has doing that for a while now – you know, added capabilities to SM-6, added capabilities to other programs. So, we can't necessarily say we shouldn't use this particular asset because it can't do. Well, it might be able to do if you put a little bit of thought into it and tried, so.
Mr. Booth: Yeah, and I think some of the payloads that we've been looking at putting on the MQ-9 is going to help get eyes on the target as well. So, if you can do airborne early warning pods, you know, with the imagery capability that already exists on the MQ-9, I think that's what the decision-makers really need before they figure out what they're going to – what they want to do. So, I think that's what's real key is some lightweight payloads that allow them to really fly that 24 to 36 hours. That's really going to extend the range of your surveillance network.

Mr. Bucci: Sensing as well as, I'll call it, other types of weapons, not just kinetic weapons, but high-energy lasers, high-power microwave, et cetera.

Capt. McFarland: You know, just over the horizon – or in the HALE, the High-Altitude Long-Endurance UAV kind of market, are, you know, solar-powered HALEs. We've been testing one. Airbus is flying one right now. It's been flying for a couple of weeks.

You know, it's part of OSD's initiative to operation lines of stratosphere. You know, we talked about balloons carrying big heavy payloads. We talk about UAVs up there that can carry very light payloads, almost, you know, LEO-type payloads into the stratosphere with solar-powered aircraft.

So, those things are there, and they're, you know, in development. They can help us out with a lot of this. We don't want to foreclose any, you know, avenue that's going to improve the kill chain.

Mr. Bucci: One of the things I mentioned to Tom a month or so ago was, I look at our UAV platforms as suborbital geostationary satellites because they stay over a particular place and provide you the kind of data that you get from a satellite a little more up close and personal, not quite as far, and broad, but they essentially act like a geostationary satellite at lower altitude.

Mr. Weisgerber: So – go ahead.

Mr. Noble: I was just going to offer, there's lots of great sensor and platform technology that exists today and that's on the horizon. And I think one of the challenges – and I don't recall if it comes up directly in the report or is implied – is cost imposition, right?

So, part of this is – I mean, obviously we need to protect the homeland, but how do you not only deter, but create an environment where it's not just fiscally sound, if you will, for an adversary to try to threaten us with cruise missiles or other types of weapons?
And so, I think throughout all this, when you’re thinking of architecture – and it’s going to be dynamic – you have to think about the cost piece. And that’s hard, right? It’s hard to set requirements up front for here’s what the architecture is and what the cost bogey ought to be.

And we all know, right, you know, budgets next year is somewhat real and everything beyond that is kind of make believe, and it’s going to change, et cetera, right? So, it’s a really difficult problem.

So, one way to approach that is, you know, challenge industry. Hey, you guys put skin in the game. You guys solve this, present us something that works, do it as cost effectively as possible because it’s in your best interests – just like commercial works, right – to present a solution that satisfies the need – not necessarily the requirements, but the mission need – you know, at the most cost effective price point as possible because that’s revenue that, you know, if it’s more expensive, it’s revenue you’re going to lose and it’s profit you’re going to lose. And that’s kind of the way we operate.

Mr. Casey

Just two things that come to mind. You know, the first is obviously when we talk about being able to get that early warning and do it in a way that has – you know, I’ll say a lower life cycle cost. We have to look at not just the acquisition cost, but the lifecycle cost, and I’m thinking about the operations. And I’m thinking about the power consumption and these lightweight, you know, airborne vehicles that, you know, we can fly from somewhere else or are really good at that.

The place that they’re going to lack, though, and we’re – is that they’re – you know, we’re not – we don’t have enough power there to be able to provide the level of a track that we need to engage the targets. So, you know, I think the early warning gives us decision time, and it lets us know sooner. It also helps us with a response, which is that – obviously key to the deterrence piece of it, but we’re still going to need that engagement quality data that’s going to really only come from that – those local sensors that we’re going to need. It’s going to be very hard to ever get away from that.

Mr. Weisgerber

So, earlier today General Murray talked about the government kind of wanting to take a software-like approach to developing capabilities. So, I want to turn that question around back to you guys, and we’ve talked a lot about cultural – bureaucratic issues.

I wanted to talk about cultural changes within industry. We talked about systems not being able to talk to one another. What have been your observations from within your own companies about, you know, the – turning over data to the government and the government owning the baseline? How’s that being received? Is it – you know, I know there’s historically been a stiff opposition to this. Is that changing?
Capt. McFarland: I think it is. In our company, that’s our business model. The government bought it. It’s theirs. We just have to enable them. That’s why our focus is on the tools to help enable them – the model-based systems engineer and the digital engineering tools, the integration tools – that type of approach.

Because more and more, as that culture changes, where the government becomes the lead system integrator, they become, you know – they have to get smarter on what they’re doing in their own technical baselines. If you’re going to sustain them, to Jonathan’s point, which is a key point, and spiral them and modernize them and all that type of stuff, they really do have to own their baselines. If you’re going to prevent vendor lock, if you will, it’s – they have to step up to the plate to do that.

So, their culture changes. One, they’re going to have to own it. Two, they’re going to have to train their workforce to understand what they’re looking at, and three, demand that industry, you know, knock down some of those data rights – that sharing that’s preventing a bunch of this true integration.

Because you know, as everyone’s talked about it up here, even the industry panel, integration comes from cooperation from human beings. We have to be able to do that. We have to be able to trust each other that radar data that’s coming from a Lockheed Martin, you know, OTH Radar that’s going into one of Jonathan’s radars – or we’re bringing that together in a system composite track – that everybody’s interests are protected.

We have digital tools that can do that. So, you know, that’s kind of where we’re pointing industry is down that direction.

Mr. Casey: I think it’s an interesting – I’ll say there’s a conundrum right now because on one side all the new development programs that we’ve seen come out over the last few years, the mantra has been we want your skin in the game, we want to demonstrate, we want you to invest and bring what you have.

And you know, we saw this on – LTAMDS is a great example of it, which Raytheon won, right, and you know, that goes in the face of give me your baseline if I’m investing all this money.

So, you know, I think we’ve come a little ways. You know, things like royalties and things like that the government’s, you know, starting to accept – because we need to find a way to make back the ROI if we’re going to make that investment, right? I mean, that’s just the bottom line.

So, I think with going faster and with bringing capability before – bringing capability to the competition needs to come that evolution in how we incentivize and provide that return on investment.
Mr. Bucci: I think sometimes it’s not the data that you’re sharing amongst the sensors that has the proprietary, if you want to call it that, information, and it’s how I got to that data. And so, sharing information is easy, you know? Sharing how you get to some of that data is where sometimes, you know – that’s where the really smart folks that work at all of our companies, that’s where they put their livelihoods into it.

And frankly, you know, I think it was – David said, the government paid for it, so in general, when the government pays for it, the government owns it, and they can use it as they see fit.

When it’s developed on discretionary funds, that becomes where, you know, we start to have those tough discussions, and they’re always hard discussions, but we always get through them because we always figure out a way – how to, you know, protect each other’s equities, if you want to call it that, so that the warfighter still gets what they need and the company still has made a contribution to the warfighter going forward.

Mr. Noble: Yeah, I agree with you. I think – you know, our business model is – you know, it’s commercial, right? So, we invest our own money to develop a product and bring it back and sell it to the government as a proven product, right?

And we’ve had those discussions about, you know, owning the baseline, and the government needs to own what they bought. But you know, when they develop stuff on like a traditional development contract, you know, there’s only so much they can do with it, right?

So, I think the government needs to think about, what do we really want out of owning this? So, the commercial model is nice in that, you know, they get what they want. They get what they need to train a warfighter, to operate a system and field a system, but, you know, they’re not trying to take the place that is naturally is best occupied by industry.

Mr. Bucci: I almost hate to say these two words, but open architecture helps in some of that, right? Because if we have the right interfaces defined and the right capabilities defined for all of those things that have to come together, they can come together without having those battles all of the time. And it helps, you know, because now everybody can bring their unique capabilities to the table and bring it together. And you don’t have to have those battles in a lot of ways.

Mr. Noble: Boy, we could have a whole long conversion about that.

Mr. Bucci: Yeah, we could. That’s why I said I almost hated to bring it up.
Mr. Noble – and the company-specific versions of the common extraction layer that are fielded, et cetera, and things like stitches that are intended to bridge all those disparate cows.

So, the challenge there is that – I mean, it sounds great in principle. It’s really hard in practice – or at least it has been hard in practice. I think, you know, things like stitches are encouraging, but incentivizing an integrator who doesn’t necessarily have skin in the game for any of the hardware elements per se, but is responsible for developing a system that works, there’s some precedent for that, you know, actually, working in practice.

Capt. McFarland Well, there is, and there’s a movement towards that. Take missile defense and GMD futures for Ground-based Midcourse Defense. The missile defense agencies made a decision to go away from a prime provider. They broke up the contract when before they just had one belly button, hey, make this change to the weapons system, make this change to the interceptor. They just went to the prime to do that.

Now, they have to go through several contractors to do that with a one capstone kind of contractor being a technical agent for that. So, it’s a culture change. It’s something that we’re going to do differently.

But really, when you look at it, yes, it does create seams, but it also puts the stovepipe product providers – and I don’t say that in a derogatory way. You know, they’re focusing on delivering a product, an interceptor, you know, and phased-array, IDT, you know, that type of stuff – and that type of component in the weapons system; well, they can focus on doing that. Somebody else can focus on the integration, an independent integrator that supports the government.

So, you know, that’s kind of what I’m seeing emerging from a lot of this stuff.

Mr. Weisgerber So, something that I’ve been writing about a lot – and this is more broadly to the industry, but it affects everything that you guys do, is kind of the workforce issues right now and the supply chain issues right now.

And I was wondering, is there anything – I understand for missile defense it’s different than building a ship, where I know there’s been a lot of issues with trades workers and stuff – but are there any unique areas right now where you’re experiencing, you know, heartburn, if you will, due to both workforce and supply chain?

Capt. McFarland Yes. I live in a town named Huntsville, Alabama, where we’re in space programs. We’re in missile defense. We’re even in Ground-Based Strategic Deterrence. We’re even in Trident D5 integration. If you’re an engineer, you’re going to be a wealthy person.
They’re in high demand, and they’re hard to come by. And they’re always working for somebody, and this is something where, you know – we struggle with this. We go to different parts of the country to recruit, to bring them to Huntsville. We do some innovative things, and I still feel in some of the programs I’ve overseen that I’m losing traction.

Because guess what? My friends are doing the same thing for the same kind of talent, and it’s very difficult to specific disciplines, you know, systems engineers, particularly model-based systems engineers. You know, bringing that together and using models instead of, like I did – you know, I’m a nuclear engineer, graduated in 1989. Have I done engineering since? No. Right? Do I even know what a model-based systems engineer looks like? No. Right?

There’s that challenge that we’re trying to find and recruit that kind of talent. So, it’s difficult, and it’s real.

Mr. Booth

Yeah. I think, you know, the combination of the Top Gun movie and Tom’s report, hopefully we’ll get some excitement around the world – (laughter) – and we need some more engineers to come in and help us with the problem. Completely agree.

The others on the supply chain side, if we can develop some microelectronics inside of the U.S. and take some of the pressure off the – what we’re trying to get internationally, I think that’s a major problem that we have right now.

Mr. Bucci

I think it was a double whammy. You know, everybody heard about the great resignation, right, over the last two years.

There was also the great retirement. There were a lot of people who said, I’m out and have retired, and that comes with a double whammy. Because not only do they take and you lose that person, but you lose all the knowledge that they had as well, which now says all of the new folks that you have to bring in because the other folks resigned or retired, you don’t have anybody to bring them up to speed on your problems.

So, it really has been a very difficult time for, I think, every industry. I mean, I don’t know if anybody’s flown in the last two months, but it’s pretty brutal out there, you know? Half the time you’re lucky if you get to your destination period, let alone on time, so.

Mr. Noble

Yeah, so I guess a couple thoughts. So, supply chain, absolutely. It’s a big deal. Couldn’t agree more. We need a U.S. foundry. We need a U.S. supply of semiconductors. It’s a strategic issue. We’ve got to fix that.
From a workforce standpoint, so we’re a little unique. We’re a software first company. Seventy percent of our workforce are engineers, and the lion share of them are software engineers. And I’m sure you guys are suffering the same thing. They’re really, really hard to come by, right?

So, there’s an undersupply in general. A lot of them want to go work for the Amazons and the Googles, et cetera. That said, we’ve found that this generation is very patriotic. If given the opportunity to do cool software work in support of national security, we’re seeing a lot of folks who are attracted to it.

One of the big challenges, I guess, I would turn on the government folks is we just don’t have a good process for acquiring and valuing software, right? So, the integration approach that we’ve talked about throughout this is one way to do that, right? Put a mission system integrator that’s a, you know, software centric company to pull everything together because integration data work is fundamentally software driven, but that can’t be the only approach, right?

Others are bringing software to the field through hardware by necessity, right? But we’ve had, you know, multiple customers who have said, hey, I’d like to put your software on your competitor’s hardware and vice versa, and I think we’re all for it. We just can’t find a business model that closes to make that make sense.

So, you know, that’s a shared problem. The impact on our ability to recruit engineers is probably secondary, but it’s probably worth noting.

Mr. Weisgerber

So, we have about five minutes left. Last question for – we’ll give everyone this last one.

If there was one thing – what’s one thing that wasn’t in Tom’s report – Tom and his team’s report – that, if you were writing the report, that you would put in? I’ll give you a minute to think about it.

(Pause.)

I see a smirk, Nick. I see a smirk.

Capt. McFarland

I’ll jump on that first.

Mr. Weisgerber

All right. (Laughter.)

Capt. McFarland

The systems-to-systems approach –

Mr. Bucci

(Off mic.)
Capt. McFarland – (laughs) – the systems-to-systems approach, we cannot – we cannot, you know – we did talk about the architecture, but we talked about it, you know, at a very high level.

The system-to-system approach, the system-to-system analysis that has to be done to look at the different, you know, combinations of weapons systems within the system is really a difficult thing, and it goes back to the I-word that we’ve been discussing. And we all recognize it’s difficult.

We can’t undersell that, and you know, integration deals with the .mil and MFP stuff that we’ve talked about. You have to organize around it. You need somebody that’s going to do this, a lead agency, which we talked about.

We talked about different acquisition processes that we could use to bring to bear from this – agile, you know, DevSecOps now – and we’ve talked about policy. But you know, we have to work the whole system to include the people, to include the processes, and then of course, the technology and our model-based tools that could really help us and bring this to bear.

Mr. Bucci I think I kind of addressed it at the very beginning, but you know, Wes talked a lot about going to Costco. If there was one thing I wished they would have talked more about was going to the farmer’s market for some of those technologies that maybe aren’t there right now.

They’re not on the shelves at Costco, but they are at the farmer’s market. And maybe going digging a little bit deeper to figure out how to get them, how to acquire them, and how to get them integrated – I think that would be the one add.

Mr. Casey You know, I think the report was pretty thorough. The one thing that comes to mind for me is more on the operations side. How do we actually go execute this? What does that look like? Where do we put the ops centers? How do we put redundancy in place, and how do we connect everything in a – you know, in that way?

And you know, we talked a little about the C-2. We talked about the nirvana systems that are out there. What can we do in the next two years, the next three years, the next five years before those nirvana systems are out there and how does that all play together with the operations piece is, I think, what – as we move forward here and as we select that – you know, that – select that lead agency or lead department, you know, I think that’s one of the key things that’s going to come out when they start talking to the warfighter.

Mr. Booth Yeah, I think, you know, on top of some of the other, you know, tactical sensors we thought would make it a little bit more defense in depth. I think a day in the life of what would change for the Army and Air National Guard
that are running the NCRs, and you’re talking about, you know, eight to 10 priority sites, you know. So, you’re talking about eight to 10 of those units, and Major General Rice is pretty busy, you know, today. So, I think that understanding that is really going to be helpful to inform the services.

Mr. Noble

So, I drug my feet to go last. So, I’ll confess I haven’t had an opportunity to read the report. It’s on my nightstand, and I’ll get to it tonight. But I wanted to leverage your guys’ answers.

Yeah, I think you hit on a lot of great points, and the thing that resonated with me is the whole agile development. I think General Murray brought that up. That’s just going to be so critical through this, right.

I mean – and the recognition that regardless what architecture you lay out, it’s going to be different because technology keeps moving and because the threat keeps moving.

Mr. Weisgerber

All right. Well, I think we are out of time, so I want to thank everybody for joining us, and thank you to CSIS and back over to Tom.

Dr. Karako

Thank you, Marcus. Thanks for everybody that came out today.

First of all, I just love that you guys are throwing darts at it. That’s fantastic. That tells me that the thinking is happening and that you know we wouldn’t have so many big brains, we wouldn’t have so many officials out here today, if this wasn’t a pressing concern. So, thanks for that.

I also want to call out two people. First of all, Tony Behrens and also kind of Nick Bucci because they referred to kind of historical things. Colonel Behrens talked about Nike Hercules, which was a very distributed architecture. That holds some lessons here.

And Nick, you called out our passive acoustic sensors in the report. We have an unwritten rule of always having an old historical throw-back kind of pictures here.

So, there’s lots of lessons to be learned from the past, and this is fundamentally an air defense problem. It’s an air defense problem that’s come home to roost here.

So, thanks everybody. I also want to thank Shaan Shaikh for putting this together. It was a lot of work. Please give him a hand, and – (applause) – and please, stay tuned. We’ll have some more things coming out in the next couple months. Appreciate it, guys.

(END)