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HEARING
ON
NATIONAL DEFENSE AUTHORIZATION ACT
FOR FISCAL YEAR 2021

AND
OVERSIGHT OF PREVIOUSLY AUTHORIZED
PROGRAMS

BEFORE THE
COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES
ONE HUNDRED SIXTEENTH CONGRESS
SECOND SESSION

SUBCOMMITTEE ON TACTICAL AIR
AND LAND FORCES HEARING

ON
**THE FISCAL YEAR 2021 ARMY AND
MARINE CORPS GROUND SYSTEMS
MODERNIZATION PROGRAMS**

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**THE FISCAL YEAR 2021 ARMY AND MARINE CORPS
GROUND SYSTEMS MODERNIZATION PROGRAMS**

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES,
Washington, DC, Thursday, March 5, 2020.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 2212, Rayburn House Office Building, Hon. Donald Norcross (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. DONALD NORCROSS, A REPRESENTATIVE FROM NEW JERSEY, CHAIRMAN, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Mr. NORCROSS. Good morning. We will come to order.

The Tactical Air and Land Forces Subcommittee meets today to review the Army and Marine Corps ground modernization programs and fiscal year 2021 budget request.

First off, I would like to thank our witnesses for being with us today. We certainly appreciate the work that went into this year's budget request to Congress.

Let me tell you up front, this committee is especially—we all are frustrated at the administration's disregard for congressional authority to make appropriations and the faithful execution of those laws. Attempts to reprogram funds as authorized by Congress for Army programs such as the National Guard and Reserve Equipment, Tactical Wheeled Vehicles, without prior approval and contrary to our disapproval undermines this relationship. I can't underscore that enough.

Our ability, together, to manage risk in the most realistic and timely manner, this should be—this should worry not only us but you as the witnesses that we continue this.

And as Chairman Smith said just the other day, the National Defense Strategy does not include the southern border wall.

As we highlighted earlier this week at the full committee Army posture hearing and also last week at the Navy and Marine Corps posture hearing, the committee is eager to hear further details from today's witnesses on how the services are evaluating trade-offs—acceptable risk between investment priorities, current needs, and the industrial base stability.

The Army made significant changes and tough choices in the fiscal year 2020 request to fund future capabilities without—without—an increase in their budget top line during the “night court” process. We understand the Marine Corps is also evaluating programs line by line in an effort to reallocate funds and modernize priorities.

We understand that the goal is achieving a modernized and lethal ground force that can match the strength of peer-to-peer and near-peer competitors by 2028. However, once we lose our ability to build and maintain weapons systems, it can be nearly impossible to get that back. We have a duty to examine with great scrutiny those choices we have made both for today and for the future to ensure we don't get it wrong.

Our subcommittee intends to examine the rationale behind these choices with the senior leadership here today.

I would like to welcome the distinguished panel of witnesses: first, Dr. Bruce Jette, Assistant Secretary of the Army for Acquisition, Logistics, and Technology—good to have you back; General John Murray, Commanding General, Army Futures Command—good to see you again; Lieutenant General James Pasquarette, Army Deputy Chief of Staff, G-8; Mr. James Geurts, the Assistant Secretary of the Navy for Research, Development, and Acquisition, who is on quite a roll this week; Lieutenant General Eric Smith, Commanding General, Marine Corps Combat Development Command and Deputy Commandant for Combat Development and Integration.

We look forward to your testimony and discussing the topics that we brought up earlier this morning and ones that you have been hearing about across the spectrum.

Before we begin, I would like to turn to my ranking member, Mrs. Hartzler, for any comments she would like to make.

[The prepared statement of Mr. Norcross can be found in the Appendix on page 43.]

STATEMENT OF HON. VICKY HARTZLER, A REPRESENTATIVE FROM MISSOURI, RANKING MEMBER, SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Mrs. HARTZLER. Yes. Thank you, Mr. Chairman. And I would like to echo your concerns with some of the reprogramming that we have seen taking place and hope that we can work that out to make sure that our men and women in uniform have what they need and Congress still has the ability to prioritize those assets.

But I want to thank each of our witnesses today. Thank you for your service and all that you do for our soldiers and our Marines.

And we have a lot to cover here in a relatively short amount of time. And this distinguished panel of witnesses, I look forward to having your expertise in this healthy discussion.

This budget request for ground system modernization is essentially flat when compared to last year's levels. General McConville, the Chief of Staff of the Army, stated that, quote, "the Army's budget request represents a downturn in real purchasing power from fiscal year 2020, and that progress is a risk," unquote.

The Army has realigned approximately \$2.4 billion in fiscal year 2021. These funds were taken from Army-identified lower-priority programs by eliminating or reducing approximately 80 programs across the Future Years Defense Program to better invest in the Army's "big six" modernization priorities.

Programs such as the Joint Light Tactical Vehicle, the Joint Assault Bridge, and munitions had quantities reduced, while pro-

grams such as the Advanced Precision Kill Weapon System were eliminated.

The Marine Corps is also in the process of a major redesign effort. And the Commandant, General Berger, has stated that, quote, “we will divest of legacy defense programs and force structure that support legacy capabilities,” end quote.

So I fully recognize the importance of prioritizing modernization efforts necessary for great power competition that aligns with the National Defense Strategy, especially when budgets are flat with no real growth. I appreciate the Army’s efforts in finding savings through reform and making these difficult choices and trades.

However, we need to better understand the near-term strategic and operational risks that may result. I look forward to working together to find that right balance between current readiness and future modernization.

So, given this focus on next-generation capabilities, I expect the witnesses to discuss how they are balancing investments in capabilities for the future fight while at the same time upgrading legacy platforms for current threats and improved tactical readiness.

Regarding Army modernization, the budget contains \$10.6 billion for 31 efforts being worked by the 8 cross-functional teams to address the Army’s top 6 modernization priorities. This is about a 26 percent increase over fiscal year 2020 levels.

I am sure our witnesses will touch on most of these programs today. And I am interested in hearing more about the status of the Optionally Manned Fighting Vehicle, Indirect Fire Protection Capability, the Next Generation Squad Weapon, and Long Range Precision Fires.

Regarding Marine Corps modernization, a full-rate production decision is planned for the Amphibious Combat Vehicle later this year, and I would like the witnesses to update us on this program and discuss any challenges that could be associated with a production ramp-up.

Finally, I want to stress the importance of jointness between the Army and the Marine Corps. I would like our witnesses to discuss how they are communicating and coordinating on critical modernization programs that could address similar operational requirements, such as body armor, Long Range Precision Fires, and next-generation small arms weapons.

So I thank the chairman for organizing this important hearing, and I yield back.

Mr. NORCROSS. Thank you.

I understand each of the Army witnesses will provide short opening remarks, starting with Dr. Jette, followed by General Murray and General Pasqualette.

Then, Mr. Geurts, you will do it for the Marine Corps.

With that, without objection, the full prepared statements will be in today’s hearing record.

Hearing none, so ordered.

Mr. Jette, welcome—or Dr. Jette. Forgive me.

STATEMENT OF HON. BRUCE JETTE, PH.D., ASSISTANT SECRETARY OF THE ARMY FOR ACQUISITION, LOGISTICS, AND TECHNOLOGY, DEPARTMENT OF THE ARMY

Secretary JETTE. Chairman Norcross, Ranking Member Hartzler, and distinguished members of the Subcommittee on Tactical Air and Land Forces, good morning. Thank you for your invitation to discuss the Army ground modernization program and the resources requested in the President's budget for fiscal year 2021.

I am pleased to be joined by my Army colleagues, General Murray and Lieutenant General Pasqualette, as well as our Navy and Marine Corps counterparts. We appreciate your making our written statement a part of today's record.

Mr. Chairman, the Army is nearly 2 years into the most transformational change in modernization in the last four decades. We recognize the need to rapidly and persistently modernize our forces to stay ahead of technological change and either reclaim or strengthen our advantage over adversaries. We are committed to getting the right equipment into the hands of the soldier at the right time.

There have been challenges, but I am happy to report to you that we confront those challenges as one team, together with unmatched collective experience, close collaboration, and synchronized unity of effort. Our soldiers deserve no less.

Because of this close collaboration, the Army modernization enterprise is gaining momentum: greater speed, efficiency, and effectiveness as we focus on delivering the capability outlined in the Army's modernization priorities.

We are making significant progress. There are many reasons why, Mr. Chairman, but chief among them is the unique relationship between the cross-functional teams of the Army Futures Command and our program executive offices. Together, they are bringing system concepts and designs to life. Together, they are aligning requirements development and acquisition expertise with representatives from testing, logistics, science and technology, and other important Army communities. Again, our soldiers deserve no less.

We are making significant progress in our reform efforts as well. The Army continues to implement the initiatives granted by Congress in order to streamline and gain those efficiencies in the acquisition process.

Let me highlight just a few.

Middle-tier acquisition [MTA] authority, section 804, allows us to rapidly prototype and accelerate select efforts within the Army's modernization priorities and enable soldier feedback for further refinement of those requirements. Currently, under MTA, the Army has 11 rapid prototyping efforts and 1 rapid fielding effort.

Other transaction authority allows the Army to attract small companies and nontraditional businesses, a known source of technological innovation. In fiscal year 2019, the Army awarded 830 agreements, valued at roughly \$5 billion.

Additionally, to streamline acquisition and deliver results, one of my first actions upon entering this office was to delegate milestone decision authority of acquisition category 2, 3, and 4 programs to our program executive officers and, when they felt appropriate,

level 3 and 4 below them. This alone has contributed greatly to efficiency and effectiveness within our acquisition community.

The Army ASA(ALT) [Assistant Secretary of the Army for Acquisition, Logistics and Technology], my office, in particular, has reviewed all of our policies to ensure that they support sound business planning and incentivize partnerships with industry.

Our approach to intellectual property [IP], for example, is designed to make us a savvier partner by stressing early planning for IP requirements, requiring tailored IP strategy, ensuring negotiations of customer licenses and vendors early in the process, and encouraging open communications with industry throughout.

We also have established a unified policy on advanced manufacturing to achieve a strategic investment by both Army and industry as well as the systemic adoption of additive manufacturing throughout the acquisition life cycle.

We are working closely with our Navy and Air Force partners on key and common technical interests, such as counter-UAS [unmanned aircraft systems], hypersonics, and directed energy.

Mr. Chairman, the bottom line in our mutual efforts is that the Army's modernization program takes time and money. We are working to achieve efficiency wherever possible, and we need sufficient, predictable, sustained, and timely funding to ensure a successful outcome.

Thank you again for this opportunity to discuss Army modernization and for your strong support of the Army programs. I look forward to your questions.

[The joint prepared statement of Secretary Jette, General Murray, and General Pasquarette can be found in the Appendix on page 44.]

**STATEMENT OF GEN JOHN M. MURRAY, USA, COMMANDING
GENERAL, ARMY FUTURES COMMAND**

General MURRAY. Chairman Norcross, Ranking Member Hartzler, and distinguished members of this subcommittee, thank you for the opportunity to testify on behalf of the men and women of Army Futures Command, the soldiers, engineers, scientists, and civilians, from privates to Ph.D.s, that are working every day to transform our Army.

And I appreciate the opportunity to join Dr. Bruce Jette and Lieutenant General Jim Pasquarette as we continue as one team to drive that transformation. I am also pleased we are able to have this conversation with our Navy and Marine Corps counterparts, Dr. Geurts and Lieutenant General Smith. No service is able to go it alone, and, as history has shown, joint teams win. And modernization is no exception.

And speaking of winning, our Chief, General McConville, is known for his phrase, "Winning matters." From the joint force to industry, to academia, to our allies, I say, "Winning matters, but winning together matters more."

Last year, we published a 2019 Army Modernization Strategy, and our written testimony echoes that framework.

First is how we fight. Our concept, Multi-Domain Operations, is the Army's contribution to the Joint Staff warfighting concept called Joint All-Domain Operations.

Second, what we fight with. These are the capabilities and force structures that we are designing and delivering.

And, third and finally, who we are. We are a team of teams, centered around the powerful intersection of requirements and acquisition. And as Dr. Jette mentioned, we at AFC [Army Futures Command] and ASA(ALT) will continue to leverage that close partnership all the way down to the cross-functional teams and their program executive officer counterparts.

In 2020, we are building on the momentum that we gained in 2019 and making it irreversible. And there are two key components to that momentum.

First is discovery. We are seeking out and finding the ideas and innovations that solve Army problems. From our own S&T [science and technology] efforts, partnerships with universities, to traditional and nontraditional industry, winning together involves innovation from every sector.

Second is delivery. We have already fielded an Enhanced Night-Vision Goggle-Binocular as well as the Command Post Computing Environment, a component of the Common Operating Environment. And, in both cases, statement of need to delivery of those capabilities was less than 18 months.

We also have successfully test-shot the Precision Strike Missile and Extended Range Cannon Artillery, greatly extending the range of two key long-range precision fire delivery systems.

Looking forward, we will continue to capitalize on the success we have had with the Integrated Visual Augmentation System, better known as IVAS.

In all of our efforts, we are leveraging a soldier-centered design approach to delivering capability, putting soldiers at the center of our production. Within this approach, we are committed to learning early and learning often. This means focusing on characteristics, working with industry and our soldiers, to make sure that when we do write requirements we get them right the first time.

The key to getting this all right is our people. And in the coming year, you will see initiatives that give us the flexibility we need to seek out the best talent and manage it as we develop the innovative workforce our Army needs.

And we will never be done modernizing. I call that persistent modernization. And we are pairing with our scientists and concept writers to look holistically at what could be. Our assessments will inform both future concepts and current S&T investments. This feedback loop allows us to maintain our lead in a rapidly advancing world.

There is much more to discuss, and I look forward to answering your questions here today. And it is truly a privilege to lead and represent here today the tremendously talented soldiers, civilians, and families of the United States Army Futures Command.

Thank you.

**STATEMENT OF LTG JAMES F. PASQUARETTE, USA, ARMY
DEPUTY CHIEF OF STAFF, G-8, DEPARTMENT OF THE ARMY**

General PASQUARETTE. Chairman Norcross, Ranking Member Hartzler, distinguished members of the subcommittee, thank you

for the opportunity to speak to you today about the fiscal year 2021 Army modernization budget request.

I appreciate the opportunity to be on this panel, given the close cooperation that exists between AFC, ASA(ALT), and G-8 in modernizing the United States Army. I also echo General Murray's thoughts about being here with our brothers from the United States Marine Corps.

The Army's fiscal year 2021 base budget request includes \$34 billion in research, development, and acquisition [RDA], 31 percent of which is aligned against the Army's six modernization priorities.

To put that percentage into perspective, 31 percent of the Army's RDA account is aligned against just under 6 percent of the programs and efforts in the Army's equipping portfolio—a testament to the Army's commitment to modernizing in accordance with the National Defense Strategy.

This investment commitment in support of the modernization priorities was not via an increase in RDA. In fact, the Army's RDA top line has remained relatively flat over the last 3 years—again, about \$34 billion.

However, inside this account, there has been a significant increase in RDT&E [research, development, test, and evaluation] for game-changing technological developmental efforts overseen by Army Futures Command, resourced through a corresponding decrease in procurement of legacy systems. This shift was realized through the deep-dive process that I can outline during our time together today.

From a FYDP [Future Years Defense Program] perception, the Army reprioritized internally \$7.4 billion in RDA, resulting in the elimination or reduction of 80 programs. These dollars, along with dollars previously identified in the PB20 [President's budget request for fiscal year 2020] deep dive, resulted in a \$9 billion increase in the PB21 FYDP for the six modernization priorities. In total, there is \$63 billion aligned against the six modernization priorities in the PB21 FYDP.

Beyond the Army's modernization priorities, this budget and associated FYDP also invested in other parts of our Army required to fight and win against the near-peer threat in the future. This includes investments in key enablers, those capabilities we must have that directly support the next-generation systems being developed by AFC.

Additionally, we began filling gaps in our ability to wage large-scale combat operations that were created 15 years ago when we optimized our formations and equipment for counterinsurgency operations in Iraq and Afghanistan.

All three investment areas—the modernization priorities, the key enablers, and large-scale combat operation gaps—are necessary for the Army to fight and win in the future, and it is reflected in the fiscal year 2021 budget submission.

I will close by quoting Secretary McCarthy. “This budget is about finishing what we started over the last 3 years to realize the Army we must have to fight and win in the future.”

I sincerely appreciate your time today, and I look forward to your questions.

Thank you.

STATEMENT OF HON. JAMES F. GEURTS, ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH, DEVELOPMENT, AND ACQUISITION, DEPARTMENT OF THE NAVY; ACCOMPANIED BY LTGEN ERIC M. SMITH, USMC, COMMANDING GENERAL, MARINE CORPS COMBAT DEVELOPMENT COMMAND, AND DEPUTY COMMANDANT FOR COMBAT DEVELOPMENT AND INTEGRATION, U.S. MARINE CORPS

Secretary GEURTS. Chairman Norcross, Ranking Member Hartzler, distinguished members of the subcommittee, thanks for the opportunity to appear before you today to address the Department of the Navy's fiscal year 2021 budget request on ground vehicles.

Joining me today is Lieutenant General Eric Smith, Deputy Commandant for Marine Corps Combat Development and Integration. With your permission, I will provide a few brief remarks for the both of us.

We thank the subcommittee and all of Congress for your leadership and steadfast support for the Department of the Navy.

Our 2021 budget submission delivers ground vehicle and weapon readiness while modernizing our force to deliver a more lethal force in support of the National Defense Strategy. It demonstrates our continued commitment to ensuring our Marines have the equipment they need to execute our national security.

The Marine Corps ground portfolio has shown significant progress over the last 5 years and is a top-performing portfolio in the Department of the Navy. Programs are consistently meeting or delivering ahead of schedule, putting capabilities into the hands of the Marines in the field today.

We are working closely with our Army partners here, most notably on the JLTV [Joint Light Tactical Vehicle] program, but across the joint force, including SOCOM [U.S. Special Operations Command], executing my favorite form of R&D [research and development], "rip off and deploy." If somebody else has it and we can get it in the hands of the Marines faster, that is the way we are going to do it, and that is working exceedingly well. And I look forward to having that discussion here today.

Last fiscal year, the Marine Corps, speaking of programs like that, fielded the JLTVs, reaching IOC [initial operational capability] in August, 10 months ahead of our program baseline. To date, the Marine Corps has fielded over 500 of these vehicles.

The Amphibious Combat Vehicle continues to execute on its baseline schedule, and it will enter operational tests this fiscal year, with the full-rate production decision this fall.

The G/ATOR [Ground/Air Task Oriented Radar] radar has currently fielded 10 low-rate initial production systems, successfully completing its operational test and achieving its full-rate production decision this year.

The Marine Corps highest ground modernization priority, the ground-based anti-ship missile, couples an unmanned JLTV-based launch platform with the Navy Strike Missile. By leveraging both of these proven capabilities, we are able to rapidly accelerate that capability at a very affordable cost. And that will allow us to attack our adversaries' sea lines of communication while defending our own.

These and the many other programs reflect a lot of hard work from the entire community and show the increased integration between the Navy and the Marine Corps acquisition requirements communities, the integration with our joint partners. And, in doing so, we are putting transformative capabilities into the hands of our Marines.

Continued budget predictability and stability will be necessary to maintain this success. Thank you for the strong support this subcommittee has always provided our Marines and our families.

We thank you for the opportunity to appear before you today, and we look forward to answering your questions.

[The joint prepared statement of Secretary Geurts and General Smith can be found in the Appendix on page 59.]

Mr. NORCROSS. Thank you for your opening statements.

We were just alerted that they are going to be moving votes up, so Mrs. Hartzler and I are going to defer our questions and go right to our committee.

Mrs. HARTZLER. Does General Smith have some remarks?

Mr. NORCROSS. Your remarks were combined, correct?

General SMITH. Yes, ma'am.

Mrs. HARTZLER. Okay.

Mr. NORCROSS. Thank you for that.

Ms. SHERRILL. Thank you, Mr. Chairman.

I echo the concerns that the chairman and the ranking member expressed over reprogramming.

Dr. Jette and General Murray, the Assistant Secretary for Acquisition, Army Futures Command, and Army Materiel Command, have apparently reached a transition to sustainment agreement on hundreds of Army weapons systems and platforms, including current ground systems.

We understand that transition to sustain generally provides a path to a system's disposal. What is the significance of this agreement, from your perspective? What objectives does this agreement seek to achieve? And how will you know if the objectives are achieved?

Secretary JETTE. Thank you, ma'am.

So we took quite a focused look at trying to determine how we could free up capital for, actually, our investment portfolio and realized that we tend not to transition things to sustainment, we keep moving them along—and we need to balance between those things that are modernized and about at the end of their useful life and going to be replaced by something else in the near future—and layered that into a collective group, Army Materiel Command, Army Futures Command.

So Futures is concerned about what we need and when we need it. Materiel Command is looking at can they accept it, how can they sustain it. And then the purpose of ASA(ALT) in this process is to determine whether we discontinue producing anything that is not needed and how we transition that to sustainment. I, in fact, sit on both the equipping peg and the sustainment peg, so I am sort of the linchpin between the two.

We established a committee, a methodology, and went through all of the programs, to include meetings with all the PEOs [program executive offices], to determine which things ought to be tran-

sitioned and could be. That led to this number in the vicinity of 100.

We are using that same model to develop a similar methodology to determine what things can be transitioned to divestiture. We haven't finished that, and that is part of the objective this year, is determine what we can get out of the force.

And we do know that we have a good number of systems that we sustain in small numbers. They tend to be associated with lower-priority issues, which means that they tend not to be looked at for replacement items along the road.

So we are making a significant effort in trying to figure out how to get the same type of effort going against divestiture as we had going against the transition.

General MURRAY. Ma'am, the only thing I would add is, we have an entire four-star command called Army Materiel Command that is responsible for sustainment.

And so, as we looked at what was being funded within the equipping peg, in the RDA accounts that all the investment futures systems came from, there were a number of things that it made sense to transition, under the leadership of General Gus Perna, to sustainment.

And you said sustainment to divestiture, and, as Dr. Jette pointed out, it is actually two entirely different processes. For the divestiture piece that Dr. Jette mentioned, a majority of that input is coming from U.S. Army Forces Command.

So we are asking units what equipment no longer leaves the motor pool, no longer leaves an arms room, no longer leaves a supply room just because soldiers don't use it anymore. And that is really the equipment we are focused on, is, with input from soldiers, is equipment they don't need to accomplish their mission.

Ms. SHERRILL. And so, if I understood you correctly, the equipment you were just speaking of is transitioned to divestiture, which you are saying is separate from transition to sustainment.

General MURRAY. It is two different things. The transition to sustainment, at this point, is to sustain for continued use. It is not to divest.

And then we have taken on a second effort, as Dr. Jette mentioned, to begin to look at things we can completely divest of. And that is the only way you really, truly free up resources, as opposed to just moving it around, who has responsibility for paying. And so the only way you ever truly free up resources for the Army is through divestiture.

Ms. SHERRILL. That is helpful. Because in my conversations with General Perna, there was some concern that, in transitioning, the transition to sustainment was moving things out of the capability of updating them and investing in them and reconfiguring them for more modern use.

Those are some of my fears. I wonder if you could address that.

General MURRAY. And that was part of it. And it was a long process that General Perna had, and, at the end, Dr. Jette and Gus Perna and I sat down and we decided what was going to transition to sustainment, what wasn't, and there was complete agreement amongst the three of us.

So transition to sustainment does not necessarily mean there won't be further investments. There are always going to have to be investments to maintain the capability, the maintenance that has to go into extending the life, et cetera, et cetera.

Fundamentally, and not necessarily in all cases, what transition to sustainment means is there will be no further upgrades, so go to a better weapons system, to put a new engine in something, but the sustainment dollars are still there.

Ms. SHERRILL. That sort of allays some of my concerns when we are talking about issues of updating them.

And I see my time is expiring, so thank you so much.

Mr. NORCROSS. Thank you.

We are going to back it down to 3 minutes so we can get some questions in. We have about 20 minutes before the members will have to leave for votes.

Mr. MITCHELL, you have been focused on the OMFV [Optionally Manned Fighting Vehicle]. Certainly, we have an opportunity to have that discussion here.

Mr. MITCHELL. Thanks, Mr. Chair. We will have that after I make a brief comment. And it is unfortunate that all of our hearings, or many of them, have started out talking about reprogramming. So, at this point in time, I think I need to make some comment on that.

I believe our border is part of our national security, in contrast to some that are here. Unfortunately, Congress has a duty in Article I, one they failed to undertake because compromise is a four-letter word. We can't compromise. We failed to address the border wall or border security adequately. We failed to compromise, internally or with the administration. So you are left with reprogramming money that should go to other things. I am sorry for you. It is no kind of way to make decisions.

We failed in our responsibility here, Mr. Chair. We failed here. We failed in working with the administration.

That is our responsibility, not yours. And, frankly, it is a shame.

Let me go to the Optionally Manned Fighting Vehicle. I will keep the same team I have had in the full hearing with the Army. I am concerned I have not gotten an adequate explanation of the abrupt cancellation of the procurement and what that does to the schedule, what delays that creates in the schedule.

You all identified, we agreed, that was a critical item. Now we are, in my opinion, pushed back. And no one has answered what the cost and delays will be in multiple inquiries. Frankly, I have gotten a whole lot of discussion around it, to be very honest with you.

So I am not going to ask you to address it here, but I am going to ask you all to address it for the record, of what happens from the original schedule to the new schedule on that Optionally Manned Fighting Vehicle and what the cost changes are. And we want an answer for the record. It is an issue that is a concern for many people here, because that was a pretty abrupt change.

[The information referred to can be found in the Appendix on page 78.]

Mr. MITCHELL. The other point I will make with you is that we are increasingly asking the private sector, venture capital, to invest

in innovation, technology, development of some of these things. People did that, to a fair extent, and we abruptly canceled it.

What impact do we believe that is going to have, Dr. Jette, in the future when we are telling people, please do that, and then all of a sudden we changed our mind? How do we fix that now at this point?

Secretary JETTE. Sir, I agree that if we were to abandon the effort on OMFV, it would be a wasted effort, it would be a wasted expenditure on the part of the company.

I was actually at their facility and talking to them just last week, and we have made it clear, OMFV is continuing. The objective that we were pursuing is unchanged. It is the methodology by which we are trying to get there. Their investments will continue to contribute to their next submission, and we expect them to participate.

Mr. MITCHELL. Let me make one quick point, which is the—I serve on the Future of Defense Task Force. And one thing that has become abundantly clear to the task force members is, in our procurement process, we outline a problem, then we tell folks frequently how to solve the problem, rather than asking the private sector, rather than asking contractors, what do you think is the best way to solve this problem, and see what innovation we get. And that is part of the problem I think happened in this procurement.

So I would desperately ask you folks to start with your acquisition folks to say, just tell the sector what your problems are, what you are trying to address, and let's see what ideas they have, rather than believe we can cook them all within the five walls of the Pentagon.

Thank you. And I have to yield back because we only have 3 minutes. Thank you, Mr. Chair.

Mr. NORCROSS. Thank you.

Mr. Vela.

Mr. VELA. General Murray, I think what I will do is I will defer the debate over the reprogramming for another day, but I would like to say that, after you and I spent one full day on the border, I want to personally thank you for a fulfilling experience with our Vietnam veteran pinning ceremony. I firsthand saw what you are doing with respect to academic research in the medical technology field and in the space field. And I just want to thank you for the time you spent with us down on the border.

General MURRAY. Sir, it was my pleasure, especially the opportunity to pin some pins on some very well-deserving and long-overdue Vietnam veterans. So thank you for that opportunity. And then, of course, the visit to the border and the university.

Mr. NORCROSS. Does the gentleman yield back?

Mr. VELA. Yes, Mr. Chairman.

Mr. NORCROSS. Mr. Turner.

Mr. TURNER. General Murray, I am a big fan of Futures Command and, of course, of your leadership, as you know.

I had the opportunity yesterday to hear your comments at the McAleese conference. You told a story about your work and the work that the Futures Command has done to take even the war-fighters' input into goggles. Would you please retell that story as to how that helps you formulate what you are doing?

And if you have another one from your comments yesterday that would also be insightful for this committee, if you would tell that, I would appreciate it.

General MURRAY. Yes, sir. And you are challenging me to remember what I said yesterday.

So, specifically—and I think the comment refers to, and I referred to in the opening remarks, soldier-centered design. And it dawned on me very early that one of the commercial industry's best practices is customer-centered design, and I realized that we did not do that with our soldiers. The first time soldiers saw a piece of equipment was when we delivered it for limited user tests, and it usually didn't fare well because we didn't have soldiers involved from the front.

So that has become a standard principle for everything, not only within the cross-functional teams but, thanks to Dr. Jette, throughout the acquisition community, that we get soldiers involved early and often in terms of the design.

A couple clear examples. And, ma'am, you mentioned Next Generation Squad Weapon. So we started off with five different vendors, and we have had soldiers—and when I say “soldiers,” it is not me and General Pasqualette; it is the privates, the sergeants, and the captains and lieutenants who will actually be using the equipment—provide input to us. And then, importantly, we listen to their input and make modifications.

IVAS is probably the clearest example that I could think of. We have had over 6,000 hours of soldier touchpoints. We are doing it inside of 3-week sprints. So, every 3 weeks, the engineers will put the equipment on soldiers, and soldiers will provide feedback to the engineers, and the engineers will make that change over the next 3 weeks, and we will just repeat that cycle consistently.

As an example, we were on path to deliver a set of goggles that could see 600 meters. We put them on a soldier, and the soldier said, why do you think I need to see 600 meters? Because when you go long, it is a very narrow field of view. You get no peripheral vision. And the insight was, they would much rather be able to see to the side for situational awareness [than] to be able to see 600 meters.

So if we had proceeded on normal path, we would have delivered a pair of goggles that soldiers would not have been happy with. And so we made that design modification, and they can now get what they want. Plus, the sight we are delivering that will be on the rifle is capable of seeing 600 meters, and they can see through their sight with their goggles. So we really got the best of both worlds.

Secretary JETTE. If I can quickly add—and it may relate back to the last question concerning OMFV. Our path forward is very similar for OMFV, although modified because we can't make a large number of replicants of vehicles, to pursue this methodology and a maturation process for OMFV, starting with industry, rough digital prototype, fine digital prototype, a physical prototype.

And we have had reform in acquisition. What General Murray has worked with us on is methodology by which we can reform requirements development. So, at every one of those interfaces, there is a revision of the requirements, informed by industry, informed

by the prototyping, informed by touchpoints by soldiers, at digital touchpoints by soldiers, modeling and simulation.

Mr. NORCROSS. We will continue with Mr. Brindisi.

Mr. BRINDISI. No questions, Mr. Chairman.

Mr. NORCROSS. Yield back.

Mr. Bacon.

Mr. BACON. Thank you, Mr. Chairman.

My first question is on the Joint All-Domain Command and Control, the JADC2, that the Air Force is working on. I know the goal is trying to make it integral through all of our services, and your future weapons systems will need to dovetail in.

How is that working? Are we getting good coordination with the Air Force in putting a joint JADC2 plan together?

General MURRAY. So JADC2, the concept of any sensor, any shooter, any C2 network in near real-time, is actually a joint concept.

Mr. BACON. Good.

General MURRAY. So it is a Joint Staff concept. The Air Force has an effort going on. We obviously have an effort going on. The Marine Corps and the Navy have an effort going on. And to answer your question directly, sir, yes, we are all integrated under the leadership of the Joint Staff, J6, right now.

The only question is how you deliver it and, you know, how you establish—the most important thing, because if you get down to what I just described, it all comes down to data and data architectures. So how you build that architecture that allows all the services to plug in—nobody is arguing with the concept of JADC2. It is just how we get for a joint force to enable that fight and that data architecture.

Mr. BACON. General Smith, anything else to add?

General SMITH. Sir, I concur with General Murray. We are involved. We went to a conference together out in Nellis. We are daily engaged and involved with JADC2.

But the concept of—which I don't think we do as good a job as we should of explaining what "any sensor, any shooter" really means. A Marine on the ground in place X should be able to pass data through the Joint All-Domain Command and Control to an Army unit that then fires a PrSM [Precision Strike Missile] missile, or to an Air Force F-35A, or that F-35B that is flying passes it to me, and I shoot a GBASM, a ground-based anti-ship missile.

The concept is simply passing data. And we are being very mindful that the systems, the form factors that we need, as ground forces, are able to feed into something without being forced into a specific methodology over which to pass data. And I think we are there, sir, and the cooperation, collaboration is quite good.

Mr. BACON. In my last 50 seconds, we walked away from EW [electronic warfare] back in the mid 1990s. I have heard a great briefing from the Joint Staff, I have heard one from the Air Force, where there is a high priority, we have a plan to right the ship.

How about your services? Do you feel like we are in the same boat? Are we pointed the right way, headed the right direction?

General MURRAY. Quickly, sir, for time, absolutely. So systems not only to, most importantly, understand the electromagnetic spectrum, which we don't have right now, and so first you have to un-

derstand before you can influence and impact and protect, and then actually standing up units within the multi-domain task forces that will have EW capability within them.

Mr. BACON. Okay.

General PASQUARETTE. Just from a fiscal perspective, we are committed \$600 million in 2021 and across the FYDP \$3.4 billion in an area that we know we need to catch up on. And so we are committed to the way ahead.

Mr. BACON. Thank you very much. I will yield.

Secretary GEURTS. Chair, we are good on Department of the Navy. We can give you a brief in detail.

Mr. BACON. Thank you.

Secretary GEURTS. Yep.

Mr. NORCROSS. Mr. Lamborn.

Mr. LAMBORN. Thank you, Mr. Chairman.

For both General Murray and General Smith, I know your respective services are working on countering unmanned aerial surveillance with the Common Aviation Command and Control System [CAC2S] for the Marines and Integrated Air Defense Battle Command System for the Army.

My concern is that these are going to be become stovepiped. They are separate initiatives, separate ventures. And two things are wrong with that, in my opinion. It is not as good as one joint effort, because two heads are better than one, right? And, secondly, they won't be able to communicate and interoperate in a multi-domain environment.

So are you aware of that, and are you working to work together on that vital issue?

General SMITH. So, sir, one, good to see you again, sir.

And as far as CAC2S, the command and control system, which for us incorporates all of Marine Air, fast movers and rotary wing, that is the overarching system underneath which we pass data, as far as counter-UAVs [unmanned aerial vehicles].

There is actually a joint task force, if you will, that has been stood up under the executive agency of the Army to make sure that our counter-UAS systems are, in fact, joint. Those specific systems—ours is called MADIS [Marine Air Defense Integrated System]; that is the Marine—it is our small, counter-UAS system that fits on a Joint Light Tactical Vehicle. That is a specific system, and those systems are being looked at to find out which is the best to be the joint force system.

The command and control architecture that is unique for a naval force versus a land force, those are in fact different, but they do have the ability to communicate and talk. So we are very comfortable with our CAC2S because of our unique necessity to bring in fast-moving aircraft and control airspace.

Mr. LAMBORN. Great. General Murray.

General MURRAY. Yes, sir. So IBCS, Integrated Battle Command System, is a system that is part of the JADC2 overarching architecture. And we are having great success—we will do a limited user test here pretty soon—on linking air defense sensors and air defense shooters, primarily from the Patriot standpoint right now. And we will continue to integrate more and more weapons systems and more and more sensors into it as we mature the system.

And as General Smith mentioned, under the Army's leadership, there has been an executive agency established for the Army to lead the counter-UAS effort for the Department of Defense. And so, inherently, that will be joint, because it is from all the services. We are just the executive agent managing the program.

And then, as you know, we have had a long history of fielding counter-small-UAS systems to both Iraq and Afghanistan over the past 5 or 6 years, and so there is some history to that.

Mr. LAMBORN. Along that line, does Army have plans to use Iron Dome that the Israelis have developed but we now co-produce?

General MURRAY. Can I go past time, sir? Am I good?

So Iron Dome—the 2019 NDAA [National Defense Authorization Act], there was—and there was a report submitted that we would purchase two batteries of Iron Dome with the intent of integrating them into our integrated air defense system. We do air defense in layers, and so the connections between high-altitude, mid-altitude, and low-altitude systems is very important to us.

It took us longer to acquire those two batteries than we would have liked, for a lot of different reasons. And we are in the process right now. We believe we cannot integrate them into our air defense system based upon some interoperability challenges, some cyber challenges, and some other challenges. So what we ended up having, really, is two standalone batteries that will be very capable, but they cannot be integrated into our air defense system.

And so we are working a path right now—the report came in last Friday—on our way forward. We anticipate a shoot-off open to U.S. industry, foreign industry, to go after whatever is the best solution to provide that capability.

Mr. LAMBORN. Okay. Thank you.

Mr. NORCROSS. Okay. That is our call to votes. We are going to push this up until the point we have to run. We can come back.

So thank you, Mr. Lamborn, for that line of questioning.

So I want to go back a little bit and try to, with Mrs. Hartzler, get into some of the meat of why we are here today.

So, Dr. Jette, Secretary Geurts, tens of billions of dollars have been shifted around based on night court, the National Defense Strategy. There is no question about that. But a clear return on investment. When we made those decisions, those tradeoffs, there was risk involved. We see that each and every day. And you have had to make those tough decisions.

According to the 2018 September GAO [Government Accountability Office] report, the Army hadn't finalized the method for these investments on how we evaluate them. Can you give us an update from when that report came out to where we are today, how you are looking at the shifts that we made, and how are we evaluating against what we originally thought?

So, Dr. Jette, would you like to start first?

Secretary JETTE. Yes, sir. I think that we end up, actually, having part of the answer from General Murray and part of the answer from the ASA(ALT) side.

We look at return on investment, and we have been relearning some things that we had practiced effectively during the Cold War, because now we are going back to large-scale operations, and how we can make measurements in effectiveness.

So the implementation of modeling and simulation to determine whether or not a particular capability that we are trying to put into a weapons system provides us some sort of an operational advantage. Because the purpose here is to get a product which does something for the soldier in the field, helps us win decisively. If we do that, then we generate, in its implementation, deterrence.

Mr. NORCROSS. But we made the choice to go over the six priorities. How are we evaluating whether those and their associated programs underneath them were the right move? How are we evaluating that now?

Secretary JETTE. I will turn that over.

General MURRAY. So one of the beauties of standing up AFC is I own probably 70 percent of the analysts, the ORSAs [operations research and systems analysts], in the Army. So we have, over the course of the—even before we named the six priorities, we did some sophisticated modeling and simulation where we injected potential capabilities of the things that we were developing and measured differences in outcomes of those scenarios. And the scenarios, I won't get into them here, but they were tied to specific places and specific locations in the world.

So we established a base case with current capabilities and current tactics and current doctrine. And then we modified the scenario and also updated our opponents' capabilities, where we project them to be, and then begin to measure the difference, capability by capability, platform by platform, developmental program by developmental program, on what those differences were and how much of a difference that investment would make.

Mr. NORCROSS. So where you are today, those decisions were made, those investments were made, and although just the beginning, you still feel across the spectrum of those decisions you are on target for what you originally planned?

General MURRAY. I do, sir. And as budgets flatten—and, as a matter of fact, you know, if you look across the FYDP, it is not 1 percent loss of buying power. We are about \$7 billion of lost buying power, if we remain flat, across the FYDP.

There are still some tough decisions to be made. And when we talked about night court, there were a lot of tough decisions. And those tough decisions could lead into within the “31+3” signature programs. We just don't know yet. Because there are some that, depending on where you are in the world, contribute more than others. And so we still have a lot of tough decisions to make in the future.

Mr. NORCROSS. We understand the dollars and cents, but the direction is the important one, that we are investing and we are now measuring that investment, that it was the right way.

Secretary Geurts.

Secretary GEURTS. Yes, sir. I think of your question in two aspects. One is, how do we measure the risk and performance of the trades we made on the battlefield? Ultimately, that is, you know, in the warfighters' eyes.

And the biggest risk is in that transition. You know, we are facing tough decisions—the F-18 lines, the P-8 line, a lot of places where getting the “when do you stop” and “when do you have enough confidence to start” is really challenging, and being very

thoughtful about where your outs are if you didn't get it quite right and where you are at the point of no return. So we spent a lot of time thinking that.

The other transformation is not what we are buying but how we are buying it. And that, I don't think you have the same level of risk. As you heard in my hearings yesterday, we saved \$25 billion just by buying the equipment using modern, more thoughtful acquisition methods. So the risk in that calculation is not the same as the warfighting risk. We have to go on both of those directions but be thoughtful.

And then, last, we have to work on the absorption rate of the field to be able to absorb new technology. So, even if I can deliver it quickly, if we don't have the training and the education and the force design right, it won't matter how fast I can get it out there; I can't absorb it.

And so a lot of very thoughtful work in the Marine Corps particularly about how to train to absorb new systems. Because if you don't have that third element right, you can do the first two great and then it all backs up in the motor pool.

Mr. NORCROSS. So I want to pursue that, but I want to give my ranking member time before we go to votes.

Mrs. HARTZLER. Sure. Thank you very much.

Dr. Jette, I was very encouraged by General Murray's comments about development of the Next Generation Squad Weapon. And I just applaud what you are doing, having the soldier look at it and making those revisions. That makes so much sense.

And this new Next Generation Squad Weapon, of course, is going to require a new caliber to be using these weapons, a 6.8-millimeter round. I understand that ammunition is going to be produced at Lake City Ammunition Plant in Missouri, which we are very excited about. Many of my constituents work there and have worked there for years. I am very proud of what they do.

Could you update us on this effort? And do you require any additional funding in fiscal year 2021 for additional tooling or modernized equipment at Lake City?

Secretary JETTE. Thank you, ma'am.

So we have three candidates. Each of the three candidates have different configurations for the 6.8 round. One of them looks very much similar to a conventional bullet that we are all used to. The second one looks more like a lipstick case. And the third one looks somewhat similar to the conventional bullet but it is shaped like a—

Mrs. HARTZLER. I had a chance to see those.

Secretary JETTE. Ah.

Mrs. HARTZLER. Yeah, very interesting.

Secretary JETTE. The good part about that is that we think that the performance of the weapons are showing great promise. The tough thing that it leaves me with, just as you are alluding to, is: Now, how the heck do I make all of those? And I don't know which one, but when I do decide that I am going to make them, then we have to make a lot of them.

Lake City is where we intend to produce them. And what we are working preliminarily with the vendors is being able to take the technology that they are using—in the case of the brass casing, we

just have to redo dies and things, and we can use similar machines that we already have in place. In the case of the other two, we will have to develop some new equipment, but they have already developed that equipment as part of their development scheme.

Mrs. HARTZLER. Good.

Secretary JETTE. So we will probably be producing the initial tranche for a year or two as we reset Lake City and be able to put the equipment in place.

Mrs. HARTZLER. But as far as funding goes, do you think you are going to need any additional funding or are we spot-on for what you anticipate is new tooling, machining to make this?

Secretary JETTE. Yes, ma'am, right now I think that we are fine.

Mrs. HARTZLER. Okay.

And, General Smith, as far as the Marine Corps, can you discuss similar efforts in developing the next-generation small arms capability and how you are coordinating with the Army?

General SMITH. Yes, ma'am. So we coordinate on all of our small arms, to include the Next Generation Squad Weapon and IVAS. We have Marines involved in IVAS testing.

So what we are committed to is the best weapons system that the Marines can have. So what we will do is continue to coordinate with Army Futures Command in all the testing and the requirements development so that what we owe you is, where there are differences, where we find a difference, where we need, as a navally focused force, we have to explain that to you. We can't just say, well, we are different because we are different. We have to explain that to you.

But, right now, we are in step with and coordinating closely everything from the modular handgun all the way up to Next Generation Squad Weapon with the Army.

Mrs. HARTZLER. At this point, have you seen any differences that you are going to need as the Marines compared to the Army?

General SMITH. I don't think anything in the small arms category, ma'am.

Mrs. HARTZLER. Okay.

General SMITH. We are working joint sniper rifles, et cetera. So, frankly, in the small arms category, no, ma'am, and to include body armor.

Mrs. HARTZLER. Very good. Thank you.

Are we going to ask more questions now, or—

Mr. NORCROSS. We are up against votes, so we are going to suspend, barring our votes. We don't think it is going to be an hour, but it could be up to an hour. And we are going to come back because we just got our first top line in. It is not easy to get you all in one room at one time, so we will suspend subject to the call of the chair.

Thank you.

Mrs. HARTZLER. We have great coffee in the back. Thank you.

[Recess.]

Mr. NORCROSS. Again, thank you for bearing with us. Democracy takes time, and certainly we just went through some of that.

So I want to pick up where I dropped off with regards to measuring the reallocation and the requirement that we have: Are we

doing the right thing? Are we getting the right outcomes, at least in year two?

So, General Murray, you started to say the process by which you are measuring the ability to get things done in an appropriate amount of time and more touchpoints along the way, which we all agree with. In fact, we will talk about IVAS a little bit. Microsoft, I think, is a great case study on how to do it.

So that is the method by where we go. What I want to say and ask you, we reallocated based on new six priorities. Within those six, many programs, are we going in the right direction? Have we measured those decision points? Not how we are getting to it, but is it the right decision? Did we make the right move? Any indication on that, and how are you measuring that?

General MURRAY. So there is lots of elements to this, Mr. Chairman, and—

Mr. NORCROSS. There is, and this is why we want to have that discussion.

General MURRAY. Right. There is the industrial base risk, some of the things that were unfunded or reduced or eliminated. I mean, there is that risk.

There is the risk of going fast and making mistakes as you go along to get capability enhancements out to soldiers. There is risk in—that we are prioritizing the wrong things, which I think you are now focused on.

And that is where I would go back to what I tried to explain before, is the ultimate—you know, I guess the ultimate judge of whether we made the right decisions hopefully will never happen, that we never have to use these capabilities in an all-out conflict, and that is going to be the ultimate judge of whether we made the right decision or not.

Short of that, we do have ways of conducting modeling and simulation in some pretty realistic scenarios, and in those cases, we are substantially better off in multiple theaters than we were with the equipment that it is replacing.

Mr. NORCROSS. You are comfortable with that.

General MURRAY. Yes, sir.

General PASQUARETTE. May I have a point?

Mr. NORCROSS. Please.

General PASQUARETTE. When I first came in as the G-8, sir, about—I don't know—18 months ago, Secretary Esper, our SECARMY [Secretary of the Army] at the time, said: Listen, in deep dive one, I knew—I knew we took a lot of risk on this program to take the dollars that I thought we needed to place against the modernization priorities. So, when you do deep dive two, which is up here on the Hill right now that you are looking at, I want you to do analysis to see where there was any unacceptable risk, and so do the analysis as you build the current—this program we are discussing now.

And, in that process, we identified 12 programs that we put in almost \$600 million against based on that analysis. It went through Dr. Jette and General Murray, but it had to go actually all the way to Secretary Esper and General Milley, that they had to approve putting any dollars back in that were reduced or eliminated the time before.

Mr. NORCROSS. On the legacy programs?

General PASQUARETTE. Yes, sir. And so we have the details, and we can provide that to your staff as a part of our process.

Secretary GEURTS. Yes, sir. Kind of to build on that, I would say, you know, we talk about a hollow force. We also guard very closely in the Department of Navy, hollow acquisition programs. As you try and do a lot, you have got resources you can, if not careful, get optimistic or overly optimistic and close off paths. And so we spent a lot of time looking to make sure: Okay. We are going to make a pivot. We are going to transition. Where is all the transition risk, and are we going to transition to a program that is whole as opposed to transition to a hollow program?

Where I have seen issues in the past is where we have become too optimistic, hollowed out the program, and, you know, had to have a 350-yard drive, and then our best five iron and one putt in from 30 feet, as opposed to have the right programs to pivot into, with an ability to go back out if that pivot wasn't the right one.

Mr. NORCROSS. We all believe that we will be batting a thousand, but there are times that—

Secretary GEURTS. Sure.

Mr. NORCROSS [continuing]. Through technology or other reasons, that we are not getting to where we expected.

Secretary GEURTS. Yes, sir, but I would also counter the risk of playing it too safe or the risk of not looking at this of a pacing threat, and the risk of not doing something for fear that we don't have it a thousand percent right is also not the right way to go. And so we have got to balance. We have got to be ready tonight, but I don't want to, in 2030, be ready for a 2020 fight.

And that is where I think the leadership—and part of it is a really—the best way to get after it out of my SOCOM days was, the more closely you can link warfighter to acquisition to technologist, close that distance down, like you are seeing here between Futures Command and the Army acquisition to G-8, what you are seeing here with General Smith and I.

So that is—it is an iterative loop. What do you need? How can you get it to me? What do I need to get it to you? And that is a constant dialogue. The closer that link is with Congress as a clear partner in that, that is when we can get our institutional speed up.

That institutional speed is our best hedge against risk, both in terms of are we going to the right thing, or have we pivoted too fast and we need to have a fallback plan?

Mr. NORCROSS. So exactly where we wanted go. So you are comfortable with the decisions and the priorities. Now we are discussing the speed of which, which are actually dollars and technology that you are combining to those.

Where is your biggest challenge right now in terms of anticipated, where you would be at this point, and where you actually are? And is it a technology issue, or is it a dollar issue? So let's go right back.

General SMITH. Chairman, I will take that from our side. I would say it is both. How do we reference point? Are we where we should be? No, sir, we are not.

General Berger's focus has been on being prepared by 2030 for what he calls the decade of uncertainty. We know that the pacing

threat continues to move, and we cannot continue to hold at our current mission sets and our current requirements. We have to move toward the pacing threat.

Mr. NORCROSS. Well, I think what we will stipulate, we all know we aren't where we want to be.

General SMITH. So—

Mr. NORCROSS. But are we where we anticipated to be at this point since the change?

General SMITH. Sir, we are. General Berger has been pretty clear that the budget 2021 is the budget upon which we pivot to his future force, what he wants to do. So, for us, things like ground-based anti-ship missile, which is our number one ground program. We have to get that if we are going to be—the component that the Navy, the fleet commanders need our Fleet Marine Force to provide to the joint force. We are the littoral force as it is. The missile systems that we fire, the weapons we fire should clearly be able to strike a ship and actually do cost imposition.

And I will, very quickly, sir—for example, the Naval Strike Missile, which is already produced by the Navy; so it is a program we pick up off the shelves—it is about 1.7 million. When that begins to go after to significantly damage, or a couple of them, to sink a billion-plus dollar enemy warship, that is real cost imposition. That is what we are striving toward.

We are exactly now where I think we need to be. We will test fire that system, for example, this June. We test fired the sled upon which it will fire, Joint Light Tactical Vehicle, in December successfully. We will fire the missile this June, and then we will be in a position to take advantage of that and actually move forward with the capability that the joint force wants and must have to compete with a peer competitor.

Mr. NORCROSS. Okay. What we are going to do is I want to give Mrs. Hartzler a chance, and we will just pivot back and forth.

Mrs. HARTZLER. Yeah. Great. Thank you, Mr. Chairman.

I appreciate the strategy and what you are doing, and it is tough, looking at the risk and how fast to go. Supply chain is certainly a part of that. Industrial base, keeping that going for not only modernization but also to be able to continue to repair and to take care of what we already have into the future. So tough job, and I look forward—I appreciate this discussion with members here so that we can help in this transition.

I wanted to ask some questions about some more specific programs and as you make this transition, so I will start with Dr. Jette. I understand that the Long Range Precision Fires remains the Army's number one modernization priority, and the Precision Strike Missile is a critical program within that mission area.

So what is the Army doing to ensure continued competition in the Precision Strike Missile program, and are there lessons learned from the Optionally Manned Fighting Vehicle effort that could be applied here?

Secretary JETTE. First, ma'am, you are correct. A long-range precision fire is the number one priority. A bit to the chairman's question, one of the other things that we are contributing to to make sure we have got things scaled right is I know that General Murray and his team are working on a fires study to make sure that

we even have within that focus area the right priorities. And so we are very supportive of that.

Precision Strike Missile, we recently had a test firing. Of the missiles that we had two candidates, the two candidates, one missile was successful firing; the other missile had some technical problems. Not insurmountable. And where we are with that is we will have another test firing, I believe, later this month, or early next month. I can get you—I will get you the exact time we are going to do the testing.

So we definitely know one candidate is ready to go to that firing. The other candidate has some makeup to do. We are currently negotiating with them as to how to resolve that because we have to keep a level playing field between two competitors. I can't give someone else more money than I gave the other ones, and I am getting someplace with one competitor, and the other one has to make some adjustments. So we are trying to negotiate out a fair and equitable deal within our authorities to see if we can keep the second competitor involved.

Mrs. HARTZLER. Great. Where—I am interested in, General Murray, your test—your fire study that is underway. When is that going to be completed, and should we wait until this is done to inform the requirements for the missiles that you are developing?

General MURRAY. So it is due to be done the end of this month. I have got to see the Secretary and the Chief here probably shortly after it is done, and then, you know, once the Chief and the Secretary get a good look at it, I would be happy to come up and talk to you about it.

It was designed to look within the fires portfolio across the PrSM missile, across long-range cannon artillery to look—we had a number of programs inside Long Range Precision Fires, and what it was designed to do is go out to the two theaters, INDOPACOM [U.S. Indo-Pacific Command] and EUCOM [U.S. European Command], and specifically the target tiers, and look at their targeting work list, if you will, and then try to figure out the most important investments within the portfolio, so we can kind of rank order from one—look where there were similarities and where there was vast differences in how the theaters and the actual warfighters valued those capabilities.

So it wasn't specific to the two competitors for PrSM or a specific, you know, program itself. It was more of a rank ordering within that portfolio, what is most valued by the warfighter.

Mrs. HARTZLER. That is great. I love your approach of starting with the warfighter, what is the needs.

And, Dr. Jette, there will be time, then, to incorporate what your lessons learned and this other—very good.

I wanted to ask General Smith—and I loved General Murray's quote from earlier, your comments: A joint team wins. I love that, and then you said: Winning matters. Winning together matters most.

I might make a poster on that or something. It was good stuff. Good stuff.

And so I know you—the Marines is also looking at the precision fires development long range, so how are you coordinating with the

Army in this development process, and where are you in developing this new weapon?

General SMITH. So, ma'am, the Secretary of Defense, by January of 2020 asked us to deliver the—all of us, the joint force, to deliver the joint warfighting concept, and, underneath that, there is a precision fire—a Long Range Precision Fires piece, which the Navy leads. The Navy—each of the services has an element of logistics, et cetera.

So we are coordinating on the concept of Long Range Precision Fires, although what we are seeking now is a system with an active warhead that can go after—an active seeker, go after a ship. As the littoral combat force, things that we fire, we can—we are capable of firing an Army ATACMS [Army Tactical Missile System] off of our HIMARS, High Mobility Artillery Rocket System, now, but what we are not capable of doing is going after a ship that is moving. A land-based target, we can do.

We have to have a system that can go after this. So the Deputy Secretary of Defense just tasked us to take over the ground launch cruise missile way forward, and that will go after things like tactical Tomahawks, Navy strike missiles—Navy strike missiles and naval Tomahawk that has got an active seeker that gets you at ranges of 750 and beyond. That is what matters in the contested environment of the South China Sea or in the INDOPACOM area, and we are coordinating. I just talked to the Army PrSM PM [program manager] probably 2 months ago out at DARPA [Defense Advanced Research Projects Agency], and so we are coordinating, and I think much of what we will do in the ground launch cruise missile arena will be things we will actually pass for consideration to the Army, but we talk about that on a very regular basis. So we are not stovepiping or railroad tracking. We are integrating.

Mrs. HARTZLER. Thank you. Thank you for doing that. It makes sense to have some commonality, but then you may have some variations that is needed depending on the theater, so it makes sense—

General MURRAY. Ma'am, if I could add?

Mrs. HARTZLER. Yeah.

General MURRAY. So it is often overlooked. So we talk about the missile all the time, and General Smith mentioned the HIMARS, and so one of the design principles of the PrSM is it is the same launch that we have always had, so we are not having to buy new launchers, and one—two missiles now fit in one pod as opposed to one in one pod. So we have doubled the load out, and we are using existing launchers, which the Marine Corp also has.

Mrs. HARTZLER. Great. Great. I love your approach. Keep it up. Thanks. I yield back.

Mr. NORCROSS. So, the night court and what we went through, there is some things that appeared to have worked pretty well and things that might be a little bit challenged.

Let me start with IVAS. Microsoft—and we have been out there and been briefed—seems to be quite different. I don't know if it is Microsoft's approach to things, if it is new Futures Command, but it is different, and I think we are hearing that from both sides.

But, as we move down and the touchpoints which you have talked about, we are going to come to a decision whether or not,

in this year's budget, requesting close to a billion dollars for the actual purchase for 40,000.

Are we flying before we buy this? Are you going to be comfortable going right to 40,000?

And then, General Murray, what is the magic about 40,000? Where does that number come from instead of saying 5,000, get them out to the field, and get some more real-time feedback?

General MURRAY. To answer your first part, first question, Mr. Chairman, yes, I am very comfortable, and it is primarily based upon the number of soldier interactions we have had with IVAS. It is primarily based upon the feedback we have gotten from soldiers, which we never would have gotten before until we did the traditional way of taking it to a limited user test evaluation, and then we would go into some sort of EMD [engineering and manufacturing development]. We go into some sort of—and so the intent is—and the large spike in funding is we want to buy this out in 2 years and get the buy done.

It is a limited number. It is not designed for every soldier in the Army, and I am sure the Marine Corps is looking at this the same way, is we talked a couple years ago about what we called the close combat force, and so this is designed for those soldiers that will be in close combat.

We call it the close combat 100,000. It is probably going to end up being about 120,000 over the lifetime of the buy, but it is a very unique capability that will go to those soldiers that execute close combat at the—and we kind of define that by the platoon level and below. So it is more than just infantry. It would be some of the forward observers, some of the medics, et cetera.

But, to answer your question specifically, I just think, you know, we have basically done probably at least a dozen LUTs [limited user tests] in the development of this program, and so I am very comfortable with where we are.

Mr. NORCROSS. And, just to drill down a little bit on that, in the environments, the physical environments, we haven't been out, as I understand, in the jungle. We certainly haven't been up into the cold regions. How do you mitigate those factors into the operation of the units?

General MURRAY. So we will eventually get up to the Alaska test range, and we will eventually get down to the Panama and to the—but we do have, at each of our test centers, ways of recreating some of those environments. So you have the option of either going to Alaska. I was at Natick [U.S. Army Natick Soldier Systems Center], and it is not—they weren't testing IVAS, but I was at Natick the other day and talked to some soldiers that were testing cold-weather gear and walked in the chamber with them at 20 below zero. And so we have the opportunity and ways of recreating those environments on our current test facilities and in our current lab systems.

Mr. NORCROSS. So you are telling me we are going through that presently; we just physically haven't been to the different environments?

General MURRAY. We will get them through that level of testing, yes.

Mr. NORCROSS. Because, again—I think Mrs. Hartzler will agree—Microsoft appears to be very different. So far, the feedback going back and forth works very well. The step to a billion dollars is a very big step.

General MURRAY. Uh-huh.

Mr. NORCROSS. I like to refer to Reagan. We will trust, but we want to verify before we start doing this.

So are you looking—you said 2 years. Is that a 20,000 per year?

General MURRAY. No. The number will actually be much higher than 40,000, and so—and General Pasquarette can correct me if I'm wrong, but the original plan was to buy that capability out in 2 years, and the actual number of IVAS systems will be somewhere between probably 100,000 and 130,000.

Mr. NORCROSS. So the 40,000 would still—that is not full-rate production? We are not moving without any chance of—

General MURRAY. Correction?

Mr. NORCROSS [continuing]. Change or correction?

General MURRAY. We are always trying to learn and adjust as we go.

Mr. NORCROSS. Because, as you know, once they hit the field, there is varieties.

Okay. So let me switch to the other side of the coin where things have been a little bit more challenged and the—our fighting vehicle, the OMFV.

Going into this, it started long before Futures Command got into full swing, but the idea of asking our partners, giving them the requirements that I will call soft, general areas that we want to do, they made a tremendous investment by company, and yet here we are canceling the program. Could be for good reasons. We are not disputing that. We asked them to make an investment, and now we are switching.

How do we keep saying to our industrial base, okay, that was a screw-up, your investment is not lost, we are going here? I mean, for any company to make those sort of investments—it is a risk. We understand. They knew it was going in. But it doesn't help our case that this is the new way that we are going to do things and bringing our industry along. So I would like to hear each of your opinions on how our partners are going to react to this.

Dr. Jette, if you—

Secretary JETTE. Sir, in the first—first of all, what I want to say is the fundamental of OMFV hasn't changed. We aren't canceling the OMFV. Much like in prior systems, I know people reflect back to FCS [Future Combat Systems] and say, oh, you canceled that vehicle program, you canceled another vehicle program, here you go doing it again. That is not intending—that is not our intent. Our intent is to continue with OMFV.

When we used the MTA authorities, we knew that the objective was to try and move forward as quickly as possible and make our assessments of how we were doing rather than, let's say, some of our prior efforts. Comanche, you know, we had problems, and we just kept going along, see if we could fix them, fix them, fix them, and a few billion dollars a year later, we ended up canceling.

So our view of this was to start out with a program that was MTA, go fast because that is what we understood—and I think that

the way that the Secretary has described it: an unprecedented interaction with industry. The Secretary and the Chief both spent an entire day, just them, with CEOs [chief executive officers] of the corporations to get them involved.

So we gained a great deal of their input, and I think that, when we finally came to the conclusion that we needed to reset, it wasn't that we didn't have input from industry. They told us what they said they could do. When we put it all together in a package and put it out there and said, "Okay, now, put this all together in one piece," we ended up where we were.

Mr. NORCROSS. But what was the mechanism that didn't work to stop this further back before they went all the way through the submission phase? It didn't come up at the last moment, obviously, but why weren't we able to intercept that based on the way that you are looking at this, at an earlier point, before one dropped out, the other one couldn't make it across the finish line, and we end up with one?

Secretary JETTE. So I think that was part of our assessment and how we are trying to move forward. If you—I have sort of described the new method, which is we have an interaction with industry phase right now. In fact, it is ongoing. Subsequent to this, they will submit white papers, and we will have five OEMs [original equipment manufacturers] that we will select, down-select to.

We are not going to bending metal at that point because that was one of the things that I think was part of the issue with the first one. In trying to go so fast, we asked for vehicle deliveries of prototypes at the very beginning. Instead, what we need to do is we need to keep—we need to lower the bar. That itself pushed people out of competition.

Mr. NORCROSS. Lower the bar for investment?

Secretary JETTE. Yes, sir.

Mr. NORCROSS. Okay.

Secretary JETTE. So more people could enter the competition and participate, get things past their boards.

So, in this case, going to a digital design requires them to be professional in their engineering capabilities but doesn't require them necessarily to bend metal. It also gives us an ability to take the money that we have in the program and apply it to multiple vendors to keep the competition in place longer.

The digital design phase isn't a stagnant design; they don't just give it to us, and then that is it. Each one of these vendors are going to continue to have an interactive discussion. So, as General Murray has said on the soldier touchpoints that we have gone through on IVAS, we are going to be doing virtual soldier touchpoints as well.

In some cases, we will do mockups of certain aspects of the equipment to see if it is really going to work the way that we think it is going to work or not. So we are not spending a great deal of money on bending metal and soldering pieces together or welding pieces together, but, in fact, getting the knowledge that we need.

At the end of that phase, instead of a requirement, which is what we have done—this is, in my view, one of the most innovative things that we have come out of this effort. Another change was

that we originally said: Here is the requirement document. Here are the things you have to deliver. Show up.

Mr. NORCROSS. Right.

Secretary JETTE. But there is a requirement document. Requirement documents are pretty stiff.

Those are appropriate, and we spent quite a bit of time together, General Murray and I, just going over that one aspect of this. We have the—we don't have a really good lexicon for how to do this smarter. So we ended up building one. Requirements, in our view, at this point, are for things we are going to build where we are pretty specific. That is production.

If we are doing a prototyping phase in MTA, we want to evolve the requirements as we learn through the phases of your prototyping. So he starts off with an operational—that is what is out there today, an operational characteristics. It is a requirement, but it is—we use the different term because it is not this rigid thing at the end.

As we go through each of those phases, we will revise the operational and technical characteristics for each of them based upon what we learned. When we get into a phase, we will interact with the vendors that are involved and get them to do just what you have asked us to do: Tell us what they think that we haven't asked for. Let us make assessments. Let us do modeling and simulation concurrently. Let's do studies and analysis. Let's get soldier touch-points involved here. And then come back at the end of that next phase for them to compete for the next down-select with a revised set of characteristics.

Mr. NORCROSS. So, without beating this subject up, industry made a sizeable investment. They now hear and see what you are talking about now.

Are they going to continue this and be partners, or do you think, instead of three, we are going to open up to six, taking into play some maybe original manufacturing equipment, things that can make it much less costly than starting from scratch? Where is industry with us because I know what we have heard, and it hasn't been pretty because of their investment.

You know, they have felt as if, if we were going to be here, we could have done this many millions of dollars sooner. And I am homing in on this because it is a fundamental change of industry coming with us, not just we are telling them what to do. And I think it is indicative of what we are going to do. We just chock this one off, and do they understand that we now—as you would say, irreversible? We are not going to use that old model; this is our new model?

Secretary JETTE. Sir, last week, I met with our big—this kind of—big vehicle manufacturers, and I was taking a look at mobile protective firepower, MPF, and we—I had this discussion with them. I understand it. It is a sting. I also understand that some of the things that they have done are still viable and useful in the next phase.

So we are trying to do as—be as supportive as possible in the process. So far, my estimate is that—that at least what I would consider the standard competitors are still intending to participate,

and there are a number of others who have talked to the PEO already. I think he said 11 so far have talked—

Mr. NORCROSS. Good.

Secretary JETTE [continuing]. To him about this. And the PEO—one of the other things that I think that we have really tried to do within my time as ASA(ALT), has been make sure, all the way down to the PEOs and PMs, our doors are open. If industry wants to come in, they just have to get a meeting with us, and we will do that.

Mr. NORCROSS. Okay.

General MURRAY. And, sir, if I could real quick, so—and I think the root of this is trust. I mean the trust going forward.

Mr. NORCROSS. Yeah.

General MURRAY. And I agree with you 100 percent. And I just want to make sure you understand this was not a quick or easy decision when we decided to restart the program.

So we went through probably 2, 3, 4 weeks of discussion Dr. Jette and I were part of along with the Army senior leadership. And there was a lot of debate. The issues you are talking about were brought up and discussed, and ultimately the decision was made to restart the program. But it was not an easy decision.

Mr. NORCROSS. We have learned by it. We will get back to some more of my questions.

Mrs. Hartzler.

Mrs. HARTZLER. Thank you. Yeah. Good discussion here, and I had a couple of fairly short questions still dealing with this program, and then another one for—give it back to the chairman for a few minutes.

But how does restructuring of the Optionally Manned Fighting Vehicle program affect plans for future upgrades and fielding of modernized Bradley infantry fighting vehicles, and how important is competition—well, we have kind of covered that. So fielding the ones that we have now, how is the restructuring of this program going to affect their further upgrades?

General MURRAY. So the M2 Bradley, there is money and plans to upgrade to the A4 version for—I believe it is now down to four brigades worth of vehicles?

General PASQUARETTE. Between four and five, sir.

General MURRAY. Between four and five.

So the plans before that we had, it has not impacted that at all. And that would be the last upgrade to the Bradley fighting vehicle.

And you have heard me say this before. You have probably heard the Chief say it before, is the Bradley has been a phenomenal vehicle. Development of the Bradley started in 1963 and delivered in 1981 was the first Bradleys we delivered. And we have run out of room to upgrade the Bradley.

One of the major issues with the Bradley is power. It is an underpowered vehicle right now. The A4 fixes some of that, but we have got—and that is why we remain committed to the OMFV program. We have got to replace the Bradley. We have just run out of room to continue to upgrade it. But the plans that were there are still in the program.

Mrs. HARTZLER. Okay. That is good.

And it is my understanding the Army is planning to use a digital engineering approach as part of the restructured Optionally Manned Fighting Vehicle effort.

The Air Force, through Dr. Roper, is also using digital engineering and digital manufacturing for many of their advanced weapons systems. I am a big fan of this. I think this is tremendous, the way we should go. It is the way the commercial industry is going.

So I have—I am just curious. Have you reached out to Dr. Roper and the Air Force to gain any insights that they may have in respect to this approach?

Secretary JETTE. So one of the fortuitous things is that the three acquisition executives knew each other well before we ended up in the same—in these seats, and so have a pretty good relationship.

I have reached out to Dr. Roper on this and a number of other issues, and we are trying to share as best as possible across our programs. I will tell you that we are sharing even into the black world. Any of our classified programs, we have given full open access to, and the idea there is I don't need to invent anything he has already done.

Mrs. HARTZLER. Exactly. Exactly.

Secretary JETTE. So we are trying to maximize our leverage of each other's development work.

Mrs. HARTZLER. That is great. Very encouraging.

And, on another topic, Dr. Jette—and this is from an earlier question as well. We talked about Lake City Ammunition. It says the Army's budget request for 5.56-millimeter ammunition is \$68.5 million. This is a slight increase from fiscal year 2020. However, it appears from what we have learned in the last week or two that this request did not take into consideration the change in contractor management at Lake City, plus the increase in costs to produce enhanced-performance 5.56-millimeter rounds. Based on initial estimates that I have seen from the contractor, the 5.56-millimeter line would need an increase of \$37.6 million just to maintain current capacity and produce 310 million rounds of ammunition.

So did the Army consider these cost increases when it prepared the fiscal year 2021 budget request, and what actions are you taking to mitigate any shortfalls in 5.56-millimeter ammunition production?

Secretary JETTE. Do you want to take the program piece, and then I will—

General PASQUARETTE. I will just start on the ammunition in general and specifically on 5.56. We go line by line every year on our requirements for ammunition, ma'am, because each year we have a—we check what our training plan is, our training strategy, combat and command requirements, and actually how we fight—we plan on fighting in the future, and that drives the number.

And then we want—we must fund everything we must have, and we can't afford to buy more ammunition than that amount. So I will—we are—I don't have the details exactly on the 5.56. I owe you that back.

Mrs. HARTZLER. Yeah. This is just something we heard about recently. It is my understanding, you know, the requirement hasn't changed, but the cost has, is what is needed—

General PASQUARETTE. Yeah.

Mrs. HARTZLER [continuing]. To create that same amount of ammunition. So—

General PASQUARETTE. So we will have to work that—

Mrs. HARTZLER [continuing]. The former contractor lost a significant amount of money, and the new one basically can't afford to make the amount at the same price and needs more money if it is to be able to fulfill that anyway. So—

General PASQUARETTE. Yeah.

Mrs. HARTZLER [continuing]. If you could look at that and get back with us—

General PASQUARETTE. Yes, ma'am.

Mrs. HARTZLER [continuing]. That sounds good. Thank you.

Secretary JETTE. Ma'am, can I just add?

Mrs. HARTZLER. Sure.

Secretary JETTE. We are taking—so I have restructured how we are approaching the organic industrial base within ASA(ALT). I have a centrally selected program manager, colonel, who is now basically the mayor and governor of these facilities. He has full control over the contracts, and we are looking at all the contracting methodologies.

If I was to do a very top view of how we have approached these, it was all very close-in battles. "I need a new doorknob for something." There was no prediction of where we needed to go, what we needed to do. Do I need more ammo capacity for this caliber? Do I need less? How about the machines? How easy are the refit, et cetera, et cetera.

So we are taking a stem-to-stern, if I can borrow that from the Navy, look at just exactly how do we run these facilities to optimize them and not end up with a mountain of the wrong caliber ammo.

Mrs. HARTZLER. Very good. Thanks.

Mr. NORCROSS. General Smith, understanding that the still-pending force structure modernization priorities we spoke about earlier, yet we are in the middle of a budget season, explain to us what "lightened the force" means, and where is that taking you not only in this budget cycle, but beyond?

General SMITH. Sure. I truly do appreciate that question.

"Lighten the force" means exactly that, and I will get to the very important why.

Logistics is and can be an Achilles' heel of any operation. As we talk about pacing threat and we talk about operating in the Indo-Pacific, our ability to sustain ourselves inside the weapons engagement zone as the, quote, "stand-in forces" depends on our being able to resupply and sustain those forces that are, for example, within the first island chain, or, frankly, anywhere globally.

Every pound that we take off, whether it is the polymer ammunition that we are working with the Army—we are doing .50 caliber, the Army is doing 7.62, and the Brits are doing 5.56—to lighten the load by 20 or so percent, to some of the battery packs that we are working out with Johns Hopkins that will lighten our battery ability, our ability to generate our own power, to water purification, to physically going from ceramic plates down to plastic plates, which we are working now on personnel protective equipment, to the ROGUE Fires Vehicle, which is a Joint Light Tactical Vehicle

stripped of most of its armor, and that starts lightening things by thousands of pounds.

Every short ton that I take off is a short ton that my counterpart in the Navy, Vice Admiral Jim Kilby, does not have to transport and move. That matters to the operational commander. That gets me to the fight faster. It means my resupply mechanisms are less—need to be less robust. It means I can sustain myself inside that weapons engagement zone.

For me, that is pretty important because I personally have a second lieutenant son who is inside that weapons engagement zone now. He is forward deployed in Japan. And he is a logistics officer. So we talk about this. That is my back channel to how we are doing, if we are actually doing what we are supposed to be doing. I get an earful every time I talk to him.

That is what “lightening” means. Everything from helmets to body armor to ammunition, to vehicles, to form factors of radios, batteries, power, all of that combined, sir, because every pound adds toward a short ton.

Mr. NORCROSS. Is it also with sheer numbers?

General SMITH. I am sorry, sir?

Mr. NORCROSS. Also with sheer numbers?

General SMITH. Oh, absolutely, sure. Absolutely.

When we just—when we did some of the studies we have been doing with the Navy for how we will sustain ourselves, we actually calculated how big is an expeditionary advanced base, which is really a platoon-sized unit, reinforced. We can’t say it depends or it is about this big. How many exact Marines? How many radios? How many corpsmen? What are they carrying.

I have to calculate that poundage out that turns into short tons so I know what requirement to levy on or to request of the Navy so that they can transport me, and that goes to military sealift, which is not part of this committee, I know, but that is vitally important for logistics sustainment.

We have not gotten lighter in the last 20 years. We have slowed the rate of weight increase, which is unacceptable. So our goal is I am not adding a pound to the fleet reinforce. We have to really reduce the weight, and we are starting to do that. I mean, we are actually having real results in lightening the individual load on the Marine and ultimately on the unit.

Mr. NORCROSS. So when do you think you will reach the final number or goal of where you are, because—

General SMITH. Sir—

Mr. NORCROSS [continuing]. We are in between budgets.

General SMITH. Sure. So, sir, we will never cease trying to lighten the load. I mean, every time a new polymer comes out that will provide similar protection, we will take it, and we will drop weight. We are never going to cease trying to cut weight. So I—

Mr. NORCROSS. But the force structure itself?

General SMITH. Oh, I am sorry, sir. Force structure, the Commandant will start moving that. I won’t get ahead of my Commandant, but I believe he will start to show that very soon after we get the 2021 budget explained, and then his full pivot is toward the 2022 budget. That will lay out force design, which are the

changes in training, manning, and equipping. That will show which units might be morphing or changing missions.

He will start to roll that out, I believe, this spring. So I am comfortable saying this spring for him.

Mr. NORCROSS. So this budget includes those interim numbers—

General SMITH. Uh-huh.

Mr. NORCROSS [continuing]. As you are going to the new—

General SMITH. Sir, it does, and the Commandant made some modifications to 2021—a lot of it was in training and education—so that, when we take a full step out in 2022, and then 2023 and 2024 and beyond, that, when we gain things like Naval Strike Missile—we call it GBASM, ground-based anti-ship missile. When we get that, there is a unit who is ready to fire it, those long-range precision fire units, artillery, are ready to fire that system, so that our command and control units, when these new technologies emerge, are actually organized to accept that equipment, and we don't have to then organize for a new technology.

I use Moore's law a lot, sir. Moore's law: If we continue to accelerate the pace of change, the unit has to be able to absorb and utilize that equipment immediately. I can't—the pacing threat won't wait; I can't wait.

So the Commandant's focus has been on training and educating the forces to use it. Again, I think I have a very smart son, but he is not trained to fire a 750-nautical-mile anti-ship missile. He would say he is. I would say he is not. You know, his mom would probably say he is, but he needs more training to do that.

We have already begun that training to move from an industrial age to an information age training base because I am fortunate that I own the training and education process for the Marine Corps, and we started that already under General Berger's leadership.

Mr. NORCROSS. Thank you.

Ms. Hartzler.

Mrs. HARTZLER. Great. And I applaud your efforts to lighten the load, and I think the new generation—Next Generation Squad Weapon and the new ammunition very much will be part of that, and so that is really exciting.

Dr. Jette, and I have to leave at 12:30 to catch my plane, so I am trying to talk fast. If you could help me, that would be good too. I have a couple more questions, and then I will leave one for the record.

So, during Tuesday's Army posture hearing, Secretary McCarthy testified that the Army is coordinating its hypersonic development efforts with the Air Force and the Navy, and so could you elaborate further on these joint service coordination efforts specifically in regard to the Army's long-range hypersonic weapon? This is something I am definitely focused on, and I know that all the services are. It is critical we get this capability as soon as possible.

So, once again, to the theme of working together, all team, how are you coordinating with the others? And are we reinventing the wheel, or are we working together and saving money and saving time?

Secretary JETTE. Yes, ma'am. Okay. So the Department of Defense has designated the Army as the executive agent. We have a joint program going—that is not a joint program. We have a cooperative program between the Navy and the Army, and with some aspects with the Air Force specifically.

This program is put into my senior PEO. I have one three-star PEO, and—Lieutenant General Neil Thurgood, who has—he was the deputy director of MDA [Missile Defense Agency]. He was a PEO of missiles in space. He has been PEO aviation. So he has got a great deal of background in this area, and he is now in charge of the material solution for hypersonics within the Army.

The Navy and the Army are fully connected at the programmatic. They are working with the Air Force. They had some different issues with firing from an aircraft versus firing from the ground and the sea. But they are continuing to work through those issues.

We are responsible for the commercial production of the hypersonic reentry vehicle. The Navy is responsible for production of the launch vehicle, 34-inch—34.5-inch launch body, and we will—we are doing joint testing so that we are not testing our piece and their piece; we are testing things together.

The Navy is leading the first test. We follow by leading the second test, et cetera. So we are—it is truly a very well-integrated program.

Secretary GEURTS. It can't be any more—the Navy is building all the rockets for the program, the Army is building all the glide bodies, and we are doing all the joint testing together. So it could not be a more closely linked program.

Mrs. HARTZLER. Great. I saw the prototype—well, the picture at the Army Caucus breakfast the other day, and that was really interesting, so I am glad to hear that.

So, Dr. Jette and General Murray, in section 240 of the NDAA fiscal year 2020, it requires Secretary of Defense to identify the military services or agencies that will be responsible for the conduct of air and missile defense in support of joint campaigns as it applies to defense against current and emerging missile threats, including against each class of cruise missile.

Do you know whether the Secretary of Defense has made this certification, and can you provide any information on how this certification was coordinated with the Army?

General MURRAY. Ma'am, I am unaware if the Secretary has made that decision yet or not.

Mrs. HARTZLER. Okay. Well, okay. Very good.

I had a couple of questions on active protection systems that I will submit for the record unless we have time before 12:30, but go ahead.

Mr. NORCROSS. Thank you. We are going to try to wrap up by 12:30, so—

Mrs. HARTZLER. Okay.

Mr. NORCROSS [continuing]. Obviously you can make—General Murray, Chief of Staff of the Army's unfunded priorities list includes \$151 million for creation of what you are calling the Multi-Domain Operations Task Force. What is the documentary requirement from DOD or the Joint Staff for the Army to provide this capability under its title 10 responsibility?

General MURRAY. So it is fundamentally the same demand that we get for just about any other capability. So it came directly from the combatant commanders, specifically Admiral Davidson in the Pacific and from General Walters in U.S. Army Europe. The 151.4 is really an acceleration of MDTFs, Multi-Domain Task Forces 2 and 3, 2 in Europe and number 3 for the Pacific. So that would give two in the Pacific is specifically what Admiral Davidson has asked us to produce.

Some of that is facilities and sustainment. Some of it is fleshing out an organization we call I2CEWS [Intelligence, Information, Cyber, Electronic Warfare and Space]. So it is really the heart of the Multi-Domain Task Force. It is intelligence. It is cyber. It is electronic warfare, and it is space capabilities that really enable this—the Multi-Domain Task Force.

Mr. NORCROSS. Very good. I want you to get your questions in—

Mrs. HARTZLER. Okay. Very good.

Mr. NORCROSS [continuing]. And we are going to wrap things up.

Mrs. HARTZLER. Okay. I wanted to follow up first, just quickly, on something the chairman said and you shared in the testimony, I think General Pasquarette, about there is—as far as risk, you went back and discovered 12 programs that, before—and you re-funded those at \$600 million. You said you could give us a list, and so I would just say, could you give us a list, yes?

General PASQUARETTE. Yes, ma'am. I think it is up here with the staffers, but we will follow up and make sure it gets to your office.

Mrs. HARTZLER. Okay. The two APS [active protection systems] questions. So what is the Army doing to maintain momentum in fielding non-developmental active protection systems for the Abrams, Bradley, and Stryker, as we believe soldier protection is our number one priority and this capability needs to be rapidly fielded? So I guess that is the first question: What are you doing to maintain the momentum?

And can the committee provide additional resources to assist in the fielding the remaining Army brigade combat teams as continued testing on the Stryker and the Bradley platforms, so—

Secretary JETTE. Do you want to take the piece—

General PASQUARETTE. Well, we are—our leadership has given us direction that we must head down these paths for our three major systems that we are concerned about: Abrams, Bradley, and Stryker. And, with Abrams, thanks to the support of Congress, we have committed to four sets of that kit. We are actually mounting the A kits now. And one of those, we are going to mount—a company, I believe during Defender Europe, is going to mount one of the B kits as a part of that operation to validate the means to do that.

Stryker, on the other end of the spectrum, it is a tough science project. The ability to defeat a round with an active protective system to the degree that doesn't allow penetration with the secondary effects of what is left of the round coming at it, we are still working with industry and the S&T world on how to do that.

In the middle of that is Bradley, where we have—looking at a similar program similar to Trophy on the Abrams. We are testing that right now. I defer to Dr. Jette about how that has gone. But

we want to move forward with—it is called Iron Fist Decoupled is the system, and we are working to see if that is something that will work with the Bradley or not. Sir.

Secretary JETTE. So the light system is continuing to be tested to determine whether or not it actually performs the manner we want it to perform for the Bradley.

We have not stopped and said, “Well, this is the solution.” In fact, we are looking for additional APS systems and approaches to systems.

Mrs. HARTZLER. Is that been put out there for industry asking for—

Secretary JETTE. Yes. And in a different forum, I can show you some of the successes we have had, and they are significant. They, I think, will lead us to some different views of how we execute APS.

I believe that we have absolutely a need to find an alternative way to protect these vehicles from the type of fires that they can have to deal with. I have already got an 80-ton tank. I can’t make it any heavier, and I can’t make light armored vehicles weigh 80 tons. So we are going to have to come up with a better method, and we have several technologies which we are incorporating into our OMFV method as part of sprints—sprints are short demonstrating technology cycles—which lead to the development of them over a period of time.

Mrs. HARTZLER. That might be a good classified briefing maybe to learn about some of the new systems. Maybe it would be. Okay.

Does the Army have sufficient APS capability to protect all armored brigade combat teams in multiple theaters? So I believe you have purchased four?

General MURRAY. Yeah. Not currently, ma’am.

Mrs. HARTZLER. Okay. And, finally, what risk is the Army incurring if it doesn’t pursue other proven non-developmental APS technologies for current ground platforms like Bradley and Stryker? Well, it sounds like you are pursuing it.

Secretary JETTE. We are.

Mrs. HARTZLER. Yeah.

Secretary JETTE. And so one of the—my perspective on this is that we pursued things to try and get them done quickly, and we looked at NDI, non-developmental items. APS is a unique category of a non-developmental item.

If you put a number of different companies in, they come out with their products, they bring it there, and they are going to try and sell it to you, and you don’t choose one of them because you are going to choose one; maybe later a second. If you don’t win the competition, you have no place to go with the product. So they are all governmentally funded. And we didn’t have—we haven’t had a governmentally funded program for APS since FCS.

So I believed that one of the things we needed to do was start opening the aperture and look for those things which we could invest in the nascent stages of these APS systems, or all we are going to ever get are the ones that are already developed by foreign governments or already exist in place. And that is one reason why there is not really a lot of NDI options laying on the table, and we

just need to test them. We are going to have to do some work in development to get where we need to go.

Mrs. HARTZLER. Do you need more money to do that from us?

Secretary JETTE. I don't think we need it this year. I am going to look at 2022 when we start submitting it next year.

Mrs. HARTZLER. All right. I look forward to continuing the discussion on this.

Thank you very much. This has been a great hearing.

Mr. NORCROSS. Thank you.

Let me just wrap this up, sort of beginning or ending where we began. We talked about the shift to modernization, National Defense Strategy, and in any of the selections that were made, either to cancel a legacy or enter into one of our six priorities, you are measuring against the threat as defined in National Defense Strategy.

This year, there are 12 items that the Army had previously canceled or reduced that we are now going to continue. So that gets to the heart of my first question: Is that evaluation—obviously took place here. Not each of the 12 items. Can you give us a little synopsis or a story what made you reflect back and make that change to continue it? Was it the industrial base? Has the threat changed? What exactly caused this to change in the Army?

General PASQUARETTE. I can give an example of one system called UCS, Unified Command System. There was guidance to try and be more efficient with that. It is something every State is supposed to have in the National Guard in case of an emergency to stand up quickly, to react to that crisis.

And we were looking—the direction from the leadership was see if we can't consolidate it. Why do we need 54 of these? Can we have 16 regionally, and you go get it when you need it?

Upon reflection, because of the demand, the requirements out there in the National Guard to react immediately, the analysis was done. You can't go from Texas to Oklahoma to go get your piece of kit to come back to Texas for the emergency.

So it was guidance to look at this. We took the dollars initially thinking it would work out. Upon analysis, we showed the leadership that you have to have it there to meet the requirement, and so there was an agreement by the—decision by the Secretary and the Chief that, yes, let's put money back in it. That is one example.

Mr. NORCROSS. Can you give me a hardware example, something where a hardware piece of equipment might have been changed?

General PASQUARETTE. Not off the top of my head, Mr. Chairman. There is—I can't—maybe—

Mr. NORCROSS. Either industrial base collapses or—just trying to get a feel for—

Secretary JETTE. Let me make sure I am giving you the right answer here. Fuel trucks is one of them. We did an assessment based upon our initial assumptions in particular theaters of what our operational needs would be. That went with the set of assumptions we had in the analysis that generated the decrement in the budget.

Over the next year, we went back and reviewed all of the decisions we had made and found that one of the assumptions was false, and what that did was it drove us to coming back and saying: This assumption can't be accomplished. We need to go back and

relook our fuel truck requirements, and then we decided to put the fuel trucks back in.

General PASQUARETTE. I would say another one was crypto modification. We realized we took money out of it, and then, when we looked at it, we were not going to be in compliance with the NSA [National Security Agency] guidance for our systems to operate, and so, again, that was a decision made. Upon reflection and analysis, feedback, in order to be compliant, we had to put those dollars back in.

That is just another example, sir.

Mr. NORCROSS. So is there a formal process to reevaluate all the programs, or is it brewing up, I would say, from those that are in those programs saying, "Wait, you didn't take this into consideration," be it an industrial base or a threat?

General MURRAY. It is both. And so we get a significant amount of input, because the things we are looking at as we go through the program review, which we are going through right now, really starts at the low levels and then works its way through colonels and one-star generals and two-star generals and three-star generals, and eventually ends up with Dr. Jette and I. So it gets looked at at multiple points.

And there are objections raised just about every one of them in terms of—you know, eventually, it becomes a risk decision. And another thing I would say that has added to some of the changes is people often focus on the "31+3," and that is the only thing that the Army's investing in. It is really more holistic than that.

So we look at the enablers for those 31+3s, and fuel trucks are a great example. I mean, I can build the best tactical vehicle in the world, and if I can't get fuel to it, it is not going to good for much more than about a half a day. So, as you look at enablers, they are not part of the 31+3, but they are the critical enablers that go along with the 31+3.

Mr. NORCROSS. You can imagine, with any budget that comes out, my colleagues look down the list and say, oh, that is mine.

We want to make sure that, when we address their questions that they are based on reliable set of figures that is consistent across the program and not just you happen to be in the right state at the right time for the right thing. And that is the overarching theme because we will be with you. But when we question you on—drill down on some of these subjects, it is so I can answer them and look them in the eye and say: We are going to support their decision because, A, they have done this, they have reviewed it, and it is the right thing to do.

So, when we get these questions to you, it is so 9 times out of 10 we can address questions.

With that, seeing I am the only one left, I want to thank you for your time, particularly working with us during the votes.

And we are adjourned.

[Whereupon, at 12:33 p.m., the subcommittee was adjourned.]

A P P E N D I X

MARCH 5, 2020

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

MARCH 5, 2020

**Statement of the Honorable Donald Norcross
Chairman, Subcommittee on Tactical Air and Land Forces
FY 2021 Army and Marine Corps Ground Systems Modernization Programs
Hearing
March 5, 2020**

The hearing will come to order.

The Tactical Air and Land Forces subcommittee meets today to review the Army and Marine Corps Ground Modernization programs in the fiscal year 2021 budget request. First off, I'd like to thank our witnesses for being with us today and for the work done to put together this year's budget requests to Congress.

As we highlighted earlier this week at the full Committee Army Posture hearing, and also last week at the Navy and Marine Corps Posture hearing, the committee is eager to hear further details from today's witnesses on how the services are evaluating tradeoffs of "acceptable risk" between investment priorities, current needs, and industrial base stability. The Army made significant changes and tough choices in the FY20 request to fund future capabilities without asking for an increase to their budget topline during their "night court" process. We understand the Marine Corps is also evaluating programs line-by-line in an effort to reallocate funds for modernization priorities.

We understand the goal of achieving a modernized and lethal ground force that can match the strength of peer and near-peer competitors by 2028. However, once we lose our ability to build and maintain weapon systems, it can be nearly impossible to get it back. We have a duty to examine with great scrutiny those choices made for both today and the future to ensure we don't get it wrong.

Our Subcommittee intends to examine the rationale behind these choices with the senior leaders here today.

I would like to welcome our distinguished panel of witnesses:

- Dr. Bruce Jette, Assistant Secretary of the Army for Acquisition, Logistics and Technology
- General John Murray, Commanding General, Army Futures Command
- Lieutenant General James Pasquarette, Army Deputy Chief of Staff, G-8
- Mr. James F. Geurts, Assistant Secretary of the Navy for Research, Development and Acquisition
- Lieutenant General Eric M. Smith, Commanding General, Marine Corps Combat Development Command, and the Deputy Commandant for Combat Development and Integration

I look forward to your testimony and discussing these topics. Before we begin, I would like to turn to my Ranking Member from Missouri, Mrs. Hartzler, for any comments she may want to make.

RECORD VERSION

STATEMENT BY

**THE HONORABLE BRUCE D. JETTE, PhD
ASSISTANT SECRETARY OF THE ARMY
FOR ACQUISITION, LOGISTICS AND TECHNOLOGY
AND ARMY ACQUISITION EXECUTIVE**

AND

**GENERAL JOHN M. MURRAY
COMMANDING GENERAL, ARMY FUTURES COMMAND**

AND

**LIEUTENANT GENERAL JAMES F. PASQUARETTE
DEPUTY CHIEF OF STAFF OF THE ARMY, G-8**

BEFORE THE

**SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
COMMITTEE ON ARMED SERVICES
UNITED STATES HOUSE OF REPRESENTATIVES**

ON FISCAL YEAR 2021 ARMY GROUND MODERNIZATION PROGRAM

SECOND SESSION, 116TH CONGRESS

MARCH 5, 2020

**NOT FOR PUBLICATION UNTIL RELEASED BY THE
COMMITTEE ON ARMED SERVICES**

INTRODUCTION

Chairman Norcross, Ranking Member Hartzler, distinguished Members of the House Armed Services Subcommittee on Tactical Air and Land Forces, thank you for your continued support and enduring commitment to our Soldiers, our Civilians, and their Families. On behalf of the Secretary of the Army, the Honorable Ryan McCarthy, and the Army Chief of Staff, General James McConville, we thank you for the invitation to appear before you today, and we look forward to a productive discussion.

Our shared mission is to make sure that our Army continues to enjoy overmatch against all potential adversaries, ensuring that we can fulfill our mandate to deter and, if necessary, to fight and win as part of the Joint Force.

This past year has been one of rapid innovation, shared challenges, and incredible progress with an unprecedented unity of effort across the Army modernization enterprise. The Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) and Army Futures Command (AFC) share the same objectives, and play distinct, but complementary roles throughout the process. Our focus is on delivering critical capabilities to our Soldiers at the speed of relevance. There will always be challenges, but we confront them as one team – together with unmatched collective experience, close collaboration, and synchronized unity of effort.

One major achievement over the past year is our growing emphasis to ‘learn early’ and applying that learning. We are learning through frequent engagements with industry, design competitions with traditional and non-traditional partners, and most importantly, from frequent touch points with our Soldiers. In turn, the close collaboration between ASA(ALT) and AFC – supporting and supported relationships all the way through the process – are easing the transition through the proverbial “valley of death” into the traditional acquisition cycle.

The Cross Functional Teams (CFTs) established under AFC have created a dynamic within the Army that allows for true iterative design and development that emphasizes learning as a critical component to refining and improving requirements. This concept is commonplace among civilian developers and innovators across both traditional and non-traditional industry. This approach has enabled our teams to work together to exploit emerging technology, develop new concepts, and refine these ideas before investing heavily. This process results in better defined and understood requirements before the Army commits to a costly Program of Record (PoR). Ultimately, our partnership enables capabilities that will achieve decisive advantage on any battlefield.

The Army modernization enterprise is gaining momentum; greater speed, efficiency, and effectiveness throughout the Army's six modernization priorities. This includes improving the way we do business across our organizations. We are seeing the benefits of our efforts – enduring priorities; decreased bureaucracy; sufficient investments; and greater access to innovation – to make us better stewards for the warfighter and the taxpayer.

THE STRATEGIC ENVIRONMENT

Geostrategic competition with our near-peer competitors, China and Russia, is only deepening. We fully expect both states to leverage every opportunity to challenge our role on the world stage, and the international norms that we and our Allies and partners have carefully built over many decades. Military modernization is one of the many forms that competition takes. As we prioritized rapid modernization our competitors – Russia and China – have not slowed down.

Both China and Russia are committed to developing hypersonic capability and advanced cruise missiles. While the United States has been the world leader in hypersonic system research for many decades, we did not choose to weaponize this capability. Our adversaries have chosen differently. Their decision to weaponize

hypersonics created a warfighting asymmetry that we must address. Additionally, China continues to grow its inventory of intermediate range ballistic missiles – capable of conducting both conventional and nuclear precision strike.

Both Russia and China have also committed to an increased pace and scope of military exercises, honing their joint warfighting capability, while China went through a large scale restructure and change of leadership to reinforce and enhance their modernization goals.

HOW WE WILL FIGHT

In October, the Army published the 2019 Army Modernization Strategy. It describes three core components of our modernization effort: how we will fight, what we will fight with, and who we are.

Our Multi Domain Operations (MDO) concept describes how we fight – by continuously converging effects across all domains, at the speed of relevance. Military strategist John Boyd had it right with his concept of the observe, orient, decide, act (OODA) decision making loop – whoever has the faster and more accurate decision cycles wins. Getting the MDO fight right depends on getting the right secure data to the right users at the right time, at scale.

Convergence is the integration of effects across the five warfighting domains, in near real time. In partnership with our sister Services, we will ensure we can maximize the use of all our capabilities more rapidly than our adversaries. This requires Joint, cloud-based, interoperable architectures that are tailorable to each Service's unique requirements and capabilities. The ability to leverage all sensors, to direct the most effective asset, and communicate that demand to the right command – in near real time – will create multiple dilemmas for our adversaries. While we continue to deliver capability to the force, convergence is key and it is a top priority for the Army.

MODERNIZING THE FORCE – WHAT WE WILL FIGHT WITH

We continue to focus on the Army's modernization priorities: delivering capability to Soldiers faster and more effectively. We are grateful to Congress for the consistent funding that has supported our modernization efforts to date. The Fiscal Year 2021 (FY21) President's Budget Request continues to fund these priorities. The FY21 budget requests \$10.7 billion to support the Army's modernization priorities, a \$2.2 billion increase over the FY20 enacted level. We continue to prioritize deliberate investments in modernization that will transform our Army and put the best equipment in the world in the hands of our Soldiers. We must aggressively pursue these priorities and associated timelines to maintain our competitive advantage.

The FY21 budget builds on the progress we have made across all priorities. Within each priority we have highlighted recent progress and outlined our way forward with continued stable funding.

- Long Range Precision Fires (LRPF) – approximately \$1.7 billion:
 - Our Extended Range Cannon Artillery (ERCA) can now shoot in the 70 kilometer range with accuracy. We are on track to field the first ERCA battalion in FY23.
 - We had a successful and accurate flight test of our Precision Strike Missile (PrSM) in 1QFY20. We will begin fielding PrSM in FY23.
 - The Army's hypersonics program is managed by the Rapid Capabilities and Critical Technologies Office (RCCTO), which works closely with the LRPF CFT. As the Army component of the Joint Service Conventional Prompt Strike program, RCCTO is on track to deliver a road mobile hypersonic prototype battery by FY23.

- Next Generation Combat Vehicle (NGCV) – approximately \$1.5 billion:
 - The decision to revisit the characteristics, acquisition strategy, and schedule of the Optionally Manned Fighting Vehicle (OMFV) – very

early in its cycle – is the type of decisive action that working as an integrated team can enable. We remain committed to the OMFV program as it is our second-highest modernization priority, and the need for this ground combat vehicle capability is real. It is imperative we get it right for our Soldiers.

- We demonstrated the first robotic breach of a complex obstacle last year. Although still in its very early stages, this work will reduce the number of Soldiers we place at risk in some of the most dangerous positions on the battlefield. Next month, at Fort Carson, we will have another Soldier touch point demonstrating the incorporation of unmanned vehicles into ground combat operations.
 - In 4QFY25, we will see the first fielding of Mobile Protected Firepower (MPF) to give our light infantry much needed firepower.
- Future Vertical Lift (FVL) – approximately \$1.1 billion:
 - Following the successful firing of a Spike – Non Line of Sight (NLOS) missile from an AH-64E Apache in 4QFY19, we will achieve initial operating capability in FY23 with three Combat Aviation Brigades. This capability extends range by four times over our current Hellfire missiles.
 - We had successful demonstrations from industry for our Future Long Range Assault Aircraft, and will down-select to two vendors this month.
 - We've also successfully demonstrated a Modular Open System Architecture that allows for the insertion of upgraded or new capabilities within the aircraft as they become available, instead of being limited to major overhaul upgrades.
 - Army Network – approximately \$2.2 billion:
 - This past year we began fielding the Command Post Computing Environment that incorporates continuous developmental operations through Soldier feedback. We've also started incorporating tools that

aid our Soldiers in detecting cyber intrusions into the tactical network. This will also be incorporated by USAEUR in Defender Europe 20.

- We fielded – and sent forward – components of our Integrated Tactical Network that allow our commanders greater connectivity options and increases interoperability with allies and partners. Feedback will inform capability set 21 – which we will field to four Infantry Brigade Combat Teams in FY21.
 - We also fielded the first generation of Mounted Assured Positioning System to units in Europe.
- Air and Missile Defense (AMD) – approximately \$2.0 billion:
 - We went from a directed requirement for Maneuver Short Range Air Defense (M-SHORAD) in February of 2018 to prototype delivery last December – shortening the projected timeline by almost four years. We'll be going through testing this year with initial fielding in FY21 and four battalions equipped by FY23.
 - We took directed energy (DE) out of the realm of research and demonstration and into delivering capability to Soldiers. We accelerated the competitive prototyping of the Army's first combat-capable high energy laser weapon system, which will provide a 50 kilowatt-class laser on a Stryker platform supporting the M-SHORAD mission. This effort will lead to the fielding of four DE-M-SHORAD prototype combat vehicles in FY22.
 - Soldier Lethality – approximately \$1.4 billion:
 - The Integrated Visual Augmentation System (IVAS) is – for now – our best example of a departure from the traditional requirements process. We're working with Microsoft Corporation in three week sprints – and we're going directly to Soldiers in each one of the sprints to refine the product to make sure we get it right. This approach led to a significant

reduction in estimated delivery to our Soldiers – on track for delivery in 4QFY21.

- We're also well into developing a new rifle, round, and sight, the Next Gen Squad Weapon (NGSW). The sight already integrates into the recently fielded Enhanced Night Vision Goggle – binoculars – where Soldiers don't actually have to look down their sights to aim. It's projected right into the goggles. The sight will be fielded in FY22 and integrated into IVAS as well.
- Additionally, our Synthetic Training Environment CFT has already put prototypes of One World Terrain (OWT) in the hands of units. More than just imagery, it provides a 3D representation of the entire earth that we can integrate into simulation. When paired with IVAS, it will allow our Soldiers to simulate any location on the planet right from their combat goggles. OWT has also shown how it can be used operationally to help forward deployed units identify locations to harden their security posture and improve the protection of their Soldiers.

Our funding requests also includes support for research in the nine priority areas of science and technology highlighted in the Army Modernization Strategy: Our investments in S&T helped solve problems in each of the CFT's areas of interest, and identify future opportunities.

Under AFC, there are eight CFTs aligned to the Army's six modernization priorities, focused on 31 signature systems. The CFTs and their partnered PEOs are resourced and empowered to rapidly generate cost-efficient capabilities that ensure overmatch against near-peer adversaries, and can be rapidly fielded to warfighters.

In addition to the 31 CFT-led priorities, Hypersonics, DE, and Space are also high-priority efforts for the Army. Collectively, these three are referred to as the "plus 3" to our 31 signature efforts. These efforts form the nucleus of the Army's Modernization Strategy. Hypersonics and DE are managed by the Army Rapid Capabilities and

Critical Technologies Office (RCCTO), which is a uniquely chartered organization that develops rapid prototypes, delivers residual combat capability to Soldiers, and provides a foundation for key new programs of record.

Looking ahead, the Army is increasingly focused on integrating efforts across our CFTs. Integrating these systems and programs across the Army and other Services ensures the Joint Force can fight and win. To support this effort, we established Project Convergence. Currently in the planning phase, it will leverage existing experimentation to integrate capabilities, identify data gaps, and allow us to develop data standards that enable the full realization of MDO. Project Convergence is the Army's overarching contribution to Joint All-Domain Command and Control.

THE ENTERPRISE – WHO WE ARE

The Army modernization is based on strong unity of effort – multiple organizations working in distinct but complementary ways toward the same objective, the multi-domain force of the future. As the 2019 Army Modernization Strategy describes, we are transforming the Army into a multi-domain force, not just incrementally improving it.

AFC and ASA(ALT) are key stakeholders in the Army modernization enterprise, along with other organizations across the entire Army, including HQDA staff and other Army commands. AFC, under the strategic direction of HQDA, develops and delivers future concepts, requirements, and organizational designs based on its assessment of the future operating environment. AFC plays an essential role in developing system characteristics, informed by experimentation and technical demonstrations, and refining these characteristics into requirements. ASA(ALT) develops, acquires and fields materiel solutions that meet the operational requirements defined by AFC and others, and acts as the acquisition decision authority throughout the acquisition lifecycle.

Information transparency forges data-driven decisions between our organizations and reinforces the unity of effort across the Army modernization enterprise at the speed of relevance. AFC and ASA(ALT) work together to develop the most lethal, technologically advanced fighting force the world has ever known. This kind of collaboration is at the heart of the enterprise and is critical to our success.

The partnership between AFC and ASA(ALT) also provides a unique opportunity for collaboration between the CFTs and ASA(ALT)'s Program Executive Offices (PEOs) to bring system concepts and designs to life. The CFTs and PEOs work together to align requirements developers and acquisition experts with representatives from the testing, logistics, science and technology, and other functional communities. Each CFT has an associated primary PEO who is responsible for the CFT portfolio area. The responsible PEOs assign and oversee the program managers for all "31 +3" signature systems. This close working relationship between the CFTs and the PEOs is extremely valuable: the acquisition community contributes to AFC's operational requirements development process and the CFTs participate in deliberation over acquisition strategies, while each organization retains its own responsibilities.

The foundation of the Army modernization enterprise is the tremendous Soldiers and civilians who work hard, each and every day to make sure we deliver capability that provides the Army with a warfighting advantage at an accelerated pace.

REFORM

The Army continues to implement the reform initiatives granted by Congress designed to streamline and gain efficiencies in the acquisition process. These initiatives, which have reduced bureaucracy and helped the Army accelerate the delivery of capability to the field, include the granting of Middle Tier Acquisition Authority (MTA) which allows for both rapid prototyping and rapid fielding efforts, and the expanded use of Other Transactional Authority (OTA), which now can be extended to include production. The Army is using MTA for rapid prototyping to accelerate select

efforts linked to the Army's modernization priorities, including ERCA, IVAS, Lower Tier Air and Missile Defense Sensor, PrSM, NGSW, and MPF, each of which is designed to leave a residual capability with the warfighter that can enable constructive feedback and refinement of requirements. The Army effectively utilizes OTA to streamline the acquisition of basic through advanced research activities, prototype projects, and follow-on production efforts. OTAs are simplified contract mechanisms that lend themselves to working with small companies and non-traditional contractors, a known source of technological innovation. In FY19, the Army awarded more than 830 agreements valued at \$4.9 billion.

In addition, the Army has issued two new policies – one on Intellectual Property (IP) and the other on Advanced Manufacturing (AM) – to further enable modernization and readiness objectives. The first stresses identifying and planning for IP needs early in the lifecycle of any system. It includes IP requirements, strategy, licensing considerations and open communication with industry. The second establishes a unified Army strategy that aims to achieve a strategic investment in AM by both the Army and industry and the systemic adoption of AM throughout the acquisition lifecycle, where prudent. The policy advocates for the deliberate and thoughtful use of AM.

Finally, we will continue to align resources against our priorities through targeted reductions in spending for areas that do not directly contribute to the National Defense Strategy. This includes forgoing additional incremental upgrades to some legacy systems, reassessing acquisition objectives, or divesting of fielded programs to free up resources for Modernization Priorities.

CONCLUSION

The Army is 18 months into the biggest transformational change since the 1970s to modernize and build a multi-domain-capable force, and we are making tremendous progress. The 2019 Army Modernization Strategy lays the foundation for a modernized Army capable of conducting MDO as part of an integrated Joint Force by 2028, and

ready to conduct MDO across an array of scenarios by 2035. Today's Army Modernization efforts are linked directly to challenges outlined in the National Defense Strategy, and are focused on the enduring Army Modernization Priorities.

To be clear, the Army will never be 'done' modernizing. The years 2028 and 2035 are important way stations, and good markers to use to make sure we deliver timely results. We're laying the foundations now to make sure the Army continues to modernize for the future after 2035, and the one after that.

Army senior leader emphasis is on enabling the AME. By working together, the Army modernization enterprise can simplify the Army's complex processes and procedures. We are leveraging authorities derived from Congress to streamline and improve the way we do business – optimizing our resources to make the Total Army and Joint Force more lethal, capable, and efficient.

The Army is moving quickly to modernize – and we are seeing tremendous results. With continued support from Congress, including sufficient, predictable, sustained, and timely funding, the Army will build and maintain a modern, lethal force capable of defending the Nation today and in the future fight.

Thank you again for this opportunity to discuss Army Modernization and for your strong support of our Soldiers, Army Civilians, and their Families. We look forward to your questions.

The Honorable Dr. Bruce D. Jette
Assistant Secretary of the Army (Acquisition, Logistics and Technology) and
Army Acquisition Executive

Dr. Bruce D. Jette was confirmed by the United States Senate as the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) on December 20, 2017, and sworn into office on January 2, 2018. In this position, he serves as the Army Acquisition Executive, the Senior Procurement Executive, the Science Advisor to the Secretary of the Army, and the Army's Senior Research and Development official. He also has principal responsibility for all Department of the Army matters related to logistics.

Dr. Jette leads the execution of the Army's acquisition function and the acquisition management system. His responsibilities include providing oversight for the life cycle management and sustainment of Army weapon systems and equipment from research and development through test and evaluation, acquisition, logistics, fielding, and disposition. He is also responsible for appointing, managing, and evaluating program executive officers and managing the Army Acquisition Corps and Army Acquisition Workforce. In addition, he oversees the Elimination of Chemical Weapons program.

Prior to his confirmation, Dr. Jette served as President and Chief Executive Officer of Synovision Solutions, LLC, an innovative company he founded to provide management and technical consulting, engineering services, and project management in support of military and governmental agencies, as well as commercial industry.

A decorated veteran of 28 years of active duty, Dr. Jette retired as a Colonel following a career that included several armor and cavalry company commands, two overseas tours, various staff assignments at the battalion and brigade level, and over two years of operational deployments to Afghanistan, Iraq and Kuwait. Highlights of his previous acquisition service include founding the U.S. Army Rapid Equipping Force; serving as Program Manager for Soldier Systems which led to the establishment of Program Executive Office Soldier; and being honored as U.S. Army PM of the Year for his success as Product Manager for all Army airborne electronic warfare systems.

Dr. Jette is a graduate of the United States Military Academy with a Bachelor of Science degree in Nuclear Engineering and Chemistry. He also holds both a Master of Science degree and a Doctorate in Electronic Materials from the Massachusetts Institute of Technology. He was an Adjunct Professor at the Edmund A. Walsh School of Foreign Service Security Studies Program at Georgetown University.

His numerous military awards and commendations include the Distinguished Service Medal, Legion of Merit (3), Bronze Star Medal, Meritorious Service Medal (3), Army Commendation Medal, Army Achievement Medal (2), National Defense Medal (2), Operation Iraqi Freedom Campaign Ribbon, Operation Enduring Freedom Ribbon, Army Service Ribbon, Army Overseas Ribbon (2), Parachutist Badge, Army General Staff Award, and Order of Saint Maurice (Legionnaire).

General John M. Murray
Commanding General, Army Futures Command

General Murray was commissioned as an Infantry officer in the U.S. Army upon graduation from the Ohio State University in 1982. Throughout his career, General Murray has served in leadership positions and commanded from Company through Division, with various staff assignments at the highest levels of the Army.

General Murray has held numerous command positions. His command assignments include: Commanding General Joint Task Force-3; Deputy Commanding General – Support for U.S. Forces Afghanistan; Commander Bagram Airfield; Commanding General 3rd Infantry Division at Fort Stewart, Georgia; Commander, 3rd Brigade, 1st Cavalry Division, at Fort Hood, Texas while serving in Operation IRAQI FREEDOM; Commander, 1st Battalion, 18th Infantry, 1st Infantry Division, United States Army Europe and Seventh Army, Germany; Commander, C Company, 1-12th Infantry Battalion, 4th Infantry Division (Mechanized), Fort Carson, Colorado.

Previously, he was the Deputy Chief of Staff, G-8, in the Pentagon; Director, Force Management, the Pentagon; Assistant Deputy Director for Joint Training, J-7, Joint Staff, Suffolk, Virginia; Director, Joint Center for Operational Analysis, United States Joint Forces Command, Suffolk, Virginia; Deputy Commanding General (Maneuver), 1st Cavalry Division, Fort Hood, Texas; Deputy Commanding General (Maneuver), Multi-National Division-Baghdad OPERATION IRAQI FREEDOM, Iraq; G-3 (Operations), III Corps, Fort Hood, Texas; Chief of Staff, III Corps and Fort Hood, Fort Hood, Texas; C-3, Multi-National Corps-Iraq, OPERATION IRAQI FREEDOM, Iraq; G-3 (Operations), 1st Infantry Division, United States Army Europe and Seventh Army, Germany; Chief, Space Control Protection Section, J-33, United States Space Command, Peterson Air Force Base, Colorado; S-3(Operations), later Executive Officer, 1st Battalion, 5th Cavalry, 1st Cavalry Division, Fort Hood, Texas; Chief, Plans, G-1, III Corps and Fort Hood, Fort Hood, Texas.

General Murray's awards and decorations include: the Distinguished Service Medal w/ Oak Leaf Cluster, the Defense Superior Service Medal with Oak Leaf Cluster, the Legion of Merit with two Oak Leaf Clusters, the Bronze Star Medal with three Oak Leaf Clusters, the Defense Meritorious Service Medal, the Meritorious Service Medal with two Oak Leaf Clusters, the Army Commendation Medal with Oak Leaf Cluster, the Joint Service Achievement Medal, the Army Achievement Medal with Oak Leaf Cluster, the Ranger Tab, the Combat Infantryman Badge, the Expert Infantryman Badge, the Parachutist Badge, the Air Assault Badge, the Joint Chiefs of Staff Identification Badge and the Army Staff Identification Badge.

General Murray hails from Kenton, Ohio. He and his wife, Jane, have three lovely daughters and seven grandchildren.

James F. Pasquarette
Army Deputy Chief of Staff, G-8, United States

Lieutenant General Pasquarette was commissioned as a second lieutenant armor officer in the U.S. Army upon his graduation from Furman University in 1983. His first duty assignment was 1st Battalion, 13th Armor in Illesheim, West Germany. As a captain, LTG Pasquarette served in 1st Cavalry Division in G-3 Operations, as the 1st Brigade logistics officer, and as a tank company commander in 2nd Battalion, 8th Cavalry Regiment. His company subsequently deployed as a Cohesion Operational Readiness Training (COHORT) unit to the Republic of Korea and became part of 1st Battalion, 72nd Armor Regiment, 2nd Infantry Division.

Upon completion of company command, LTG Pasquarette spent two years as a staff officer in the Strategy, Plans and Policy Directorate, Office of the Deputy Chief of Staff, G-3, on the Army Staff in Washington, DC. He subsequently spent three years at Fort Stewart, Georgia, as Chief of Plans, 3rd Infantry Division and operations officer for 3rd Battalion, 69th Armor Regiment and 1st Brigade, 3rd Infantry Division. He then served at Fort McPherson, Georgia, as a plans officer in 3rd Army and as aide-de-camp to the U.S. Army Forces Command Commander.

LTG Pasquarette commanded the 2nd Battalion, 12th Cavalry Regiment, 1st Cavalry Division, from 2001-2003. Upon completion of battalion command, he served on the Joint Staff in Washington, DC. From 2005-2007, LTG Pasquarette commanded 1st Brigade, 4th Infantry Division at Fort Hood, Texas, and in Iraq. Following his attendance at the Army War College, he served as executive officer to the Chief of Staff of the Army followed by an assignment as Deputy Commanding General (Support) for 4th Infantry Division (Mechanized) at both Fort Carson, Colorado, and Iraq. Upon his return from Iraq, LTG Pasquarette served as Director, Comprehensive Soldier Fitness, prior to becoming the Deputy Director, Program Analysis and Evaluation Directorate, Headquarters, Department of the Army, G-8. His most recent assignments were as Chief of Staff, United States Army Pacific, from July 2013 to August 2014; Deputy Commanding General of U.S. Army Pacific Command at Fort Shafter, Hawaii; and as Commander, U.S. Army Japan from July 2015 to July 2018. He assumed his present duties in August 2018.

His awards and decorations include the Distinguished Service Medal, Legion of Merit, Bronze Star, Defense Meritorious Service Medal and Meritorious Service Medal. He has earned Master's degrees from Harvard University, U.S. Army Command and General Staff College, and the Army War College.

LTG Pasquarette hails from Florida. He and his wife, Liz, have three sons, two of whom serve in the Army and the other is a sophomore at in high school.

NOT FOR PUBLICATION UNTIL RELEASED
BY THE HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND
FORCES

STATEMENT OF

THE HONORABLE JAMES F. GEURTS
ASSISTANT SECRETARY OF THE NAVY FOR
RESEARCH, DEVELOPMENT AND ACQUISITION

AND

LIEUTENANT GENERAL ERIC M. SMITH
DEPUTY COMMANDANT
COMBAT DEVELOPMENT AND INTEGRATION &
COMMANDING GENERAL, MARINE CORPS COMBAT DEVELOPMENT COMMAND

BEFORE THE

SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

OF THE

HOUSE ARMED SERVICES COMMITTEE

ON

MARINE CORPS GROUND PROGRAMS

MARCH 5, 2020

NOT FOR PUBLICATION UNTIL RELEASED BY THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES

Introduction

Great power competition has fundamentally altered the manner in which the U.S. military must operate in the maritime domain. Our competitors have carefully studied U.S. forces for the past two decades and built a force specifically designed to counter American maritime power and influence. Consequently, they have rapidly expanded their capabilities to deny U.S. forces freedom of access within critical maritime terrain and are increasingly motivated by pursuits of political, economic, and military hegemony in key regions.

The *National Defense Strategy* acknowledges this increasingly complex global security environment, and the Department of Defense has focused on strategic competition. Joint Doctrine Note 1-19, *Competition Continuum*, posits that, rather than a world either at peace or at war, there is “a world of enduring competition conducted through a mixture of cooperation, competition below armed conflict, and armed conflict.” The Navy and Marine Corps, therefore, are revising our organizations, training, and equipment to best support long-term strategic competition across the competition continuum. Integrated American Naval Power remains focused on deterring and, if necessary, defeating peer adversaries in a contested environment through persistent forward presence and action in an all-domain battlespace.

Our first priority remains deterrence, as the cost of competition will always be less than the cost — in both blood and treasure — of armed conflict. When called upon, however, the Navy and Marine Corps will fight forward together for sea control and sea denial, forcing potential adversaries to react to our naval efforts.

Over the past 18 months, multiple wargames have concluded that the best way for the Marine Corps to support the naval and joint force is to persist as “stand-in forces” inside the range of adversary fires, to maintain contact with our allies and partners overseas, and to compete below the level of armed conflict. Combined, these actions complicate an adversary’s decision calculus. Should deterrence fail, these forces will be postured to blunt the enemy’s actions and impose costly and disruptive dilemmas on him. To do so, the Marine Corps seeks to arm its Fleet Marine Forces with long range precision weapons which can strike enemy ships at extended ranges to assist the Navy in sea denial. Additionally, the Marine Corps will pursue command and control systems that allow our weapons to fire based on information obtained from joint U.S. assets across the battlespace. These systems will also ensure that information obtained

by the Marine Corps' "stand-in forces" can be passed to any U.S. strike asset across the joint force. This capability is called "any sensor, any shooter" and supports the entire joint force.

In order to create this new warfighting construct, the Marine Corps must realign our efforts and resources to pursue capabilities that provide the best counter to peer adversaries. With the assistance of the United States Congress, the fiscal year 2021 budget request will invest in the modernization for a more lethal force in support of the *National Defense Strategy* and the *Commandant's Planning Guidance*. Key investments include ground-based long-range precision fires; command and control systems for a degraded environment; air and missile defense; unmanned systems; ground mobility modernization; and emerging capabilities.

Ground-Based Long-Range Precision Fires

The *National Defense Strategy*, as well as emerging naval concepts, identifies the need for naval forces capable of conducting lethal strikes at range, in depth, and with precision in support of sea control and sea denial missions. To support this requirement, the Marine Corps is committed to fielding ground-based weapons with sufficient range and precision to provide operationally effective surface-to-surface fires in the land and maritime domains.

The Marine Corps' highest ground modernization priority, a Ground-Based Anti-Ship Missile (GBASM) capability, will provide these anti-ship fires from land as part of an integrated Naval Anti-Surface Warfare campaign. This forward-deployed and survivable capability will enhance the lethality of our naval forces and will help to deny our adversaries the use of key maritime terrain.

The Marine Corps' GBASM solution is the Navy Marine Expeditionary Ship Interdiction System (NMESIS), consisting of an unmanned Joint Light Tactical Vehicle-based mobile launch platform, called the Remotely Operated Ground Unit for Expeditionary Fires (ROGUE-Fires), and Naval Strike Missiles (NSM). The NSM is identical to the Navy's Over the Horizon Weapon System deployed on the Littoral Combat Ship and will provide the Marine Corps with a missile capable of sea-skimming, high-g maneuverability, and the ability to engage targets from the side, rather than top-down. This maximizes lethality and missile survivability. The first live-

fire test of NMESIS took place in December 2019 and a second live-fire demonstration with a guided NSM is planned for June 2020.

To increase lethality, the Marine Corps' ground-based long-range precision fires will consist of a variety of capabilities that complicate the adversary's decision-making processes and ability to defend themselves. In line with this concept, in fiscal year 2019, the DoD's Strategic Capabilities Office (SCO) initiated development of a Ground-Launched Cruise Missile (GLCM) capability that will provide increased range to complement NMESIS. The Marine Corps will work with SCO to continue design and development of a mobile launch platform in order to prototype and field a Marine Corps ground-based, long-range, land attack cruise missile capability for employment by its rocket artillery units. Prototype launchers will undergo firing and endurance testing through fiscal year 2022, with the aim of fielding a battery of launchers to an operational unit in fiscal year 2023. This capability will add additional firing capacity to the Integrated Naval Force in support of both maritime and land operations in any theater.

The Marine Corps is also expanding the operational capacity of the High Mobility Artillery Rocket System (HIMARS); a battalion will stand up within 2d Marine Division during fiscal years 2021 and 2022 which will bring HIMARS capacity to two Active battalions and one Reserve battalion. HIMARS provides the capability to employ the lethal Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM), which was developed and is also employed by U.S. Army HIMARS and MLRS equipped units. The MFOM includes GPS-guided precision munitions and will include the Precision Strike Missile (PrSM) now in development. The PrSM will enable rocket artillery units to accurately engage land and maritime, stationary and mobile, targets at ranges significantly greater than currently fielded munitions.

The combination of the above weapons fielded to the Fleet Marine Forces will provide the naval force with precise, lethal, offensive, surface-to-surface fires that enable sea control, sea denial, and the prosecution of landward objectives.

Command and Control for a Degraded Environment

Fleet Marine Forces require a sustainable, defendable, and resilient Command and Control (C2) network. This network is part of the Naval Tactical Grid and supports Joint All Domain Command and Control (JADC2), providing timely, secure, and persistent information exchange while enhancing battlespace awareness to dispersed tactical units. Critical to that effort is the ability to coordinate and synchronize distributed fires and sensor systems to inform decision makers so that they can take decisive and timely action at the speed of relevance. Assured C2 capabilities enable and enhance combat effectiveness as well as protect forces operating from remote, globally deployed locations.

Command and control in a degraded environment requires a layered approach with the ability to adapt to changing electromagnetic environments beyond the line of sight. This layered network approach, coupled with a command philosophy that allows commanders at all echelons the freedom to make decisions while operating within their higher commander's intent, provides a resilient, dynamic C2 structure that harnesses new and emerging technology to support decision superiority.

Tactical Communications Modernization (TCM) provides crypto-modernized radio systems to meet National Security Agency mandates. High Frequency (HF) radios have been prioritized for modernization in order to support naval concepts in a spectrum contested environment. These new radios, coupled with advanced waveforms in development, provide a more robust, resilient, and secure radio frequency networks that support dispersed forces operating inside the range of adversary fires.

Networking On the Move (NOTM) provides Fleet Marine Forces with a robust, over-the-horizon and beyond line-of-sight, digital C2 capability while on-the-move and at-the-halt. NOTM provides maneuvering forces with the ability to seamlessly conduct digital C2 through access, collaboration, and exchange of tactical voice, video, and data while using a full suite of Combat Operations Center tactical software applications and services to support decision-making, fires, and increased multi-domain situational awareness from anywhere in the battlespace. NOTM provides access to three external network enclaves (NIPR, SIPR, and Mission Specific) via wideband satellite (Ku, Ka- currently developing X-band) communications services, and it bridges aerial Link 16 networks to ground forces to increase lethality of dispersed forces. Mounted and dismounted users are connected to these network enclaves via Type 1

encrypted wireless local area networks. NOTM is purpose built to support our naval and joint concepts that require our forces to fight distributed while allowing commanders the ability to effectively command and control forces in a contested all-domain environment.

Terrestrial Wideband Transmission System (TWTS) provides high capacity, beyond the line of sight and line of sight communications via tropo-scatter capabilities in a space-denied, terrestrial-only environment. This family of systems provides more flexible, scalable, and maneuverable terrestrial capabilities that also allows landing forces terrestrial ship-to-shore communications, retransmissions, and relays. Furthermore, the line of sight system will be augmented by free space optics communications which has line of sight low probability of intercept, low probability of detection, and anti-jam characteristics.

Marine Corps Wideband Satellite Communications Family of Systems (MC-WSATCOM FoS) is a comprehensive, integrated, and sustainable solution designed to address current and future warfighting capability needs using military and commercial SATCOM systems in an electro-magnetic spectrum contested environment. The MC-WSATCOM systems will be fully interoperable with joint and naval wideband SATCOM systems, and will provide the capabilities enabling C2 in Expeditionary Amphibious Base Operations.

Combat Data Network (CDN) provides firewalls, servers, and data infrastructure components that allow tactical and deployed forces to connect to the Defense Information Systems Network, Theater, and Marine Corps Enterprise Networks. Critical applications and services, as well as artificial intelligence and machine learning algorithms, will be hosted on the CDN to operate in a disconnected and degraded environment until connectivity is restored to enable replication and high data rate information sharing.

G/ATOR is a state-of-the-art, ground-based, short-to-medium range, expeditionary radar system designed as a single materiel solution to satisfy air surveillance, air defense, ground counter-fire and counter-battery, and potentially air traffic control mission requirements. Block I achieved Initial Operational Capability in February 2018 and Block II did so in March 2019. Full Operational Capability will be achieved in fiscal year 2025. G/ATOR detects the most formidable air threats to our forces and will out-pace our adversaries for years to come.

CAC2S provides the tactical situational display, information management, sensor and data link interface, and operational facilities for planning and execution of Marine manned and unmanned aviation missions in support of the fleet. CAC2S eliminates the current dissimilar legacy systems and adds capability for aviation combat direction and air defense functions. It provides a single networked system that integrates Marine manned and unmanned aviation operations with joint aviation C2 agencies. The Marine Corps intends to fully field CAC2S by fiscal year 2021.

Air and Missile Defense

In great power competition, forward bases and legacy infrastructure will likely be vulnerable to an enemy strike; therefore, the Marine Corps must ensure our forces possess the capabilities required to mitigate those threats for themselves, the fleet, and the joint force. Additionally, naval forces around the world face risks posed by adversaries with ready access to low-cost asymmetric capabilities – whether traditional rockets or unmanned systems – that can strike our forces. With the increasing lethality of these low-cost systems as well as long-range precision fires, air and missile defenses provide critical capabilities for the Marine Corps to protect personnel, equipment, and installations and to persist as the Nation’s “stand-in” naval expeditionary force.

The Marine Air Defense Integrated System (MADIS) family of systems is the Marine Corps’ primary program for providing short-range surface-to-air fires and electronic attack capability. The MADIS is being developed in three versions: a JLTV-integrated version, a light version, and an installation version. In July 2019, the light MADIS successfully defeated a hostile Iranian unmanned aerial vehicle in the Strait of Hormuz.

The Marine Corps also continues to pursue the Medium Range Intercept Capability to provide a defense against cruise missiles. A demonstration in August 2019 at White Sands Missile Range successfully evaluated the integration of the Israeli Tamir missile and Battle Management Control system with the Marine Corps’ CAC2S and G/ATOR.

Unmanned Systems

Given our adversaries' abilities to strike with increasing range, precision, and lethality, we must reduce exposure of our Marines wherever possible and correspondingly increase our reliance on unmanned systems. These platforms and payloads will be pivotal on the future battlefield. The ability to flood an adversary's decision-making and targeting processes with an array of low signature, affordable, and risk-worthy platforms in the air, on the ground, and on the surface will greatly expand the survivability and capabilities of Marines operating within the adversary's weapon engagement zones.

For two decades, the Marine Corps has relied on unmanned aerial systems to provide reconnaissance for our ground forces, and the Marine Corps will continue this investment in the future. On the ground, the aforementioned ROGUE-Fires system is an example of employing an unmanned system to increase Marine Corps ground forces' lethality.

Another program that will support Marine Corps operations in the future is the Long Range Unmanned Surface Vessel. This surface vessel will provide an autonomous platform for precision fires against sea and land targets as well as the launch and recovery of smaller unmanned aircraft, unmanned surface craft, and unmanned underwater vehicles for reconnaissance, surveillance, hydrographic survey, and mine detection. In 2019, the Long Range Unmanned Surface Vessel completed the Advanced Naval Technology Exercise-East Super Swarm Exercise and demonstrated the ability to launch autonomous systems, keep station, and conduct autonomous navigation while avoiding hazards on a route from Norfolk, Virginia to Cherry Point, North Carolina. With our budget submission for 2021, the Marine Corps will seek to procure three vessels to conduct further evaluation and demonstration.

These unmanned systems will not replace manned platforms but will team with them to maximize and expand our ability to sense and shoot across the domains. The further integration of aerial, ground, and surface unmanned systems across Fleet Marine Forces will provide the warfighter enhanced capability to operate sensors, deliver fires, and shorten the naval and joint force kill-chains.

Ground Mobility Modernization

The distribution and maneuver of Fleet Marine Forces ashore will be a key enabler of operations to sense, engage, and defeat adversary forces occupying the maritime domain on land, in the littorals, and in blue water. Capabilities for the warfighter must include vehicles that can operate in complex urban terrain as well as in austere environments. To this end, our ground mobility modernization programs remain healthy and critical to providing protected mobility, enhanced maneuver, and flexibility to support the full range of future operations capabilities.

In 2019, the Amphibious Combat Vehicle (ACV) program progressed into a Family of Vehicles approach. The fiscal year 2021 budget request will further the success of the program by continuing to fund the procurement of the personnel variant and the development of the mission role variants (MRV) for command and control and medium caliber cannon. Procurement of the MRVs is planned for subsequent years. As a power projection enabler and key source of dual domain protected mobility, the ACV aligns with the *National Defense Strategy* and the *Commandant's Planning Guidance*.

Paralleling our efforts with the ACV, the Marine Corps achieved initial operational capability with the Joint Light Tactical Vehicle (JLTV) program in August 2019 with the fielding of vehicles to 3d Battalion, 8th Marines and select elements in the training base. The program is currently planned to fully replace the High Mobility Multipurpose Wheeled Vehicle (HMMWV) by 2030. The fiscal year 2021 budget request prioritizes the fielding of vehicles to all active infantry battalions and designated supporting units, which will occur by fiscal year 2022. The vehicle's design includes the capacity to power, host, and integrate current and future capabilities, such as GBASM and MADIS. Additionally, the Ultra-Light Tactical Vehicle (ULTV) will be fielded during this period. This vehicle lends tactical units a lower cost, flexible platform across a broad array of terrain sets and mission sets to include logistics, command and control and maneuver.

Emerging Capabilities

Key warfighting investments along with the increased readiness of our force lay the foundation for the Marine Corps' fulfillment of its requirements in the *National Defense Strategy*. Continued and critical investments in science, technology, research, and development will further enhance the ability of the Fleet Marine Forces and the naval team to impose costly and complex dilemmas on adversaries and will enable those forces to deploy in new and more lethal formations.

Capitalizing on the transformation which began in fiscal year 2020, the Marine Corps continues to reallocate resources from legacy capabilities that do not meet our future requirements to modernized capabilities aligned specifically with the *National Defense Strategy* and *Defense Planning Guidance*. In concert with the Office of Naval Research, the Defense Advanced Research Programs Agency, and the Strategic Capabilities Office, the Marine Corps is aggressively pursuing the development of disruptive capabilities in the areas of signature management, artificial intelligence, autonomy and robotics, expeditionary logistics, and long range precision fires in order to increase the survivability and sustainability of our expeditionary advanced bases within an adversary's weapon engagement zones.

Conclusion

Your United States Marine Corps remains a key component of the Nation's naval expeditionary force-in-readiness. As we undertake an era of new challenges, a new force design coupled with emerging capabilities will be critical to creating the competitive overmatch desired by the *National Defense Strategy* and to supplying the joint force with an "any sensor, any shooter" capability that persists within an adversary's threat rings. The Marine Corps is not embarking on this mission alone. Through the Integrated Naval Force Structure Assessment, collaboration on naval warfighting concepts and doctrine, and joint wargaming and experimentation, we will build a naval force design that integrates capabilities across the warfighting domains, defines how we operate, and results in solutions that are creative, relevant, and resilient.

Your Marines, alongside our Navy shipmates, remain ready to defend our Nation, and with advances in our training and education establishment, they will continue to evolve and to build the critical skills necessary to maximize our capabilities on the battlefield. Your continued support for the warfighter with full and on-time funding, your assistance in realigning our efforts and our resources for great power competition and peer conflict, and your thoughtful oversight will ensure your Integrated American Naval Power remains ready, relevant, and prepared to deter and defeat current and future threats.

James F. Geurts
Assistant Secretary of the Navy
(Research, Development and Acquisition)
12/5/2017 - Present

On Dec. 5, 2017, Mr. James F. Geurts was sworn in as Assistant Secretary of the Navy for Research, Development & Acquisition (ASN (RD&A)), following his confirmation by the Senate November 2017. As the Navy's acquisition executive, Mr. Geurts has oversight of an annual budget in excess of \$60 billion and is responsible for equipping and supporting the finest Sailors and Marines in the world with the best platforms, systems and technology as they operate around the globe in defense of the Nation.

Mr. Geurts previously served as the Acquisition Executive, U.S.. Special Operations Command (USSOCOM), at MacDill Air Force Base (AFB), Florida, where he was responsible for all special operations forces acquisition, technology and logistics. In this position his innovative leadership and technological ingenuity provided rapid and affordable acquisition that positively impacted the USSOCOM acquisition work force and the special operations forces capability on the battlefield. These contributions were recognized by both private and public institutions during his tenure to include earning the Presidential Rank Award, USSOCOM Medal, William Perry Award and Federal Times Vanguard Award for Executive of the Year.

Prior to Senior Executive Service, Mr. Geurts began his career as an Air Force officer where he served as an acquisition program manager with engineering and program management leadership positions in numerous weapon systems including intercontinental ballistic missiles, surveillance platforms, tactical fighter aircraft, advanced avionics systems, stealth cruise missiles, training systems and manned and unmanned special operations aircraft.

He has over 30 years of extensive joint acquisition experience and served in all levels of acquisition leadership positions including Acquisition Executive, Program Executive Officer and Program Manager of Major Defense Acquisition Programs.

Mr. Geurts is a distinguished 1987 ROTC graduate from Lehigh University where he received a Bachelor of Science in Electrical Engineering. He holds a Master of Science in Electrical Engineering from Air Force Institute of Technology, Wright-Patterson AFB and in National Security Resourcing from Industrial College of the Armed Forces, National Defense University, Washington, D.C. Mr. Geurts also attended executive leadership and international studies programs at Harvard Kennedy School and George Washington Elliot School.

Lieutenant General Eric M. Smith
CG, MCCDC & DC, CD&I

Lieutenant General Smith is from Plano, Texas and entered the Marine Corps in 1987 through the NROTC program at Texas A&M University. After completing The Basic School and Infantry Officer's Course, he was assigned to 2nd Battalion, 3rd Marines; participating in Operations Desert Shield / Desert Storm. Following a tour as an Officer Selection Officer, he attended the Amphibious Warfare School and then reported to 2nd Battalion, 2nd Marines for duty as Commanding Officer of Weapons and Echo Companies. During this tour he participated in Operation Assured Response in Monrovia, Liberia.

After a tour as a Marine Officer Instructor at Texas A&M University, he attended the United States Army Command and General Staff Course. His next assignment was as the Naval Section Chief at the U.S. Military Group in Caracas, Venezuela from 2001-2003.

From 2003 until 2006, he served in the 1st Marine Division as the Division Current Operations Officer; Executive Officer of Regimental Combat Team 1; Commanding Officer of 1st Battalion, 5th Marines; and Assistant Chief of Staff G3. During this period he completed two deployments to Iraq in support of Operation Iraqi Freedom. Subsequent assignments were as a student at the Marine Corps War College, Senior Aide to the Commandant of the Marine Corps, and Director of the Fires and Maneuver Integration Division at the Marine Corps Combat Development Command.

From 2009 until 2012 he served in the 2nd Marine Division as the Assistant Chief of Staff G3 and Commanding Officer of 8th Marine Regiment; completing a one-year deployment to Afghanistan in support of Operation Enduring Freedom.

In June of 2012 he reported for duty as the Director of Capability Development Directorate, and in May of 2013 he was assigned as the Senior Military Assistant to the Deputy Secretary of Defense.

From July through November of 2015 he commanded Marine Corps Forces Southern Command in Miami, Florida, and was then transferred to the Pentagon to serve as the Senior Military Assistant to the Secretary of Defense.

From February 2017 until June 2017, he served as the Assistant Deputy Commandant for Plans, Policies and Operations. From June 2017 until July 2018, he served as the Commanding General, 1st Marine Division. From August 2018 until June 2019, Lieutenant General Smith served as the Commanding General, III Marine Expeditionary Force.

On 13 June 2019, Lieutenant General Smith assumed responsibility as the Commanding General, Marine Corps Combat Development Command, and the Deputy Commandant for Combat Development and Integration, Headquarters, U.S. Marine Corps.

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

MARCH 5, 2020

QUESTIONS SUBMITTED BY MRS. HARTZLER

Mrs. HARTZLER. The Army's budget request for 5.56mm ammunition is \$68.5 million. This is a slight increase from FY20; however, it appears that this request did not take into consideration the change in contractor management at Lake City, plus the increase in cost to produce enhanced performance 5.56mm rounds. Based on initial estimates that I have seen from the contractor, the 5.56mm line would need an increase of \$37.6 million just to maintain current capacity and produce 310 million rounds of ammunition. Did the Army consider these cost increases when it prepared the FY21 budget request and what actions are you taking to mitigate any shortfalls in 5.56mm ammunition production?

Secretary JETTE. The Army did anticipate and account for estimated unit price increases pending the change in contractor management at Lake City, starting with FY20 Unit Costs (UC) when the new contract became active. Unit price increases specifically for enhanced performance 5.56mm rounds incorporated normal expected inflation. Although quantities would be reduced as a result of a higher UC increase than expected prior to the selection of new contract management, the Army has sufficient stockpiles of 5.56mm to address the seeming shortfall. The Army's 5.56mm requirements are complemented by other Service procurements as well as substantial yearly Foreign Military Sales (FMS) cases. The Army is confident that with the combination of all 5.56mm FY21 requirements, the current inventory posture, and the fact that the contract has firm fixed pricing as low as 150M/year, that Lake City will maintain its current capacity.

QUESTIONS SUBMITTED BY MR. LAMBORN

Mr. LAMBORN. Dr. Jette can you please provide a detailed report of the Army's RDT&E spending related to IFPC over the past 5 years, including planned spend for FY20? We would like to understand why there is no plan to test Iron Dome with U.S. systems this year.

Secretary JETTE and General MURRAY. At your request, the table at the bottom depicts the Army Research, Development, Test and Evaluation (RDT&E) expenditures for Indirect Fire Protection Capability (IFPC) from Fiscal Year 2016 (FY16) to FY20. We will gladly provide you additional details under separate cover.

The IFPC program has changed a great deal during the past 5 years as a result of testing and changing of operational requirements. Over FY16-19, the Army was developing the original IFPC capability to address cruise missile, short range air defense and Counter Rocket, Artillery, and Mortar defense missions. These efforts included work to integrate the AIM-9X missile with the Multi-Mission Launcher (MML), as well as exploration of other, lower cost, interceptors through the Expanded Mission Area Missile (EMAM) program.

The Army's Acquisition Strategy shifted during 2018 and 2019 due to both critical design issues and Congressional direction to field an interim Cruise Missile Defense (CMD) capability. The MML and interceptor experienced engineering limitations in handling payloads and reloading procedures which proved untenable. The Army took lessons learned from this experience and in FY19, implemented a revised strategy for the enduring IFPC solution, which is expected to alleviate these issues. We are taking a competitive approach with industry to first demonstrate candidate launcher-interceptor solutions through modeling and simulation, system integration lab testing, and then a live fire shoot-off at White Sands Missile Range with Cruise Missile and Unmanned Aircraft Systems targets. As the Army executes this strategy, we will field an interim CMD capability, Iron Dome Defense System-Army (IDDS-A), in FY21.

In answer to your question about testing, the Army does plan to test Iron Dome in FY20 with U.S. specified system software and hardware adaptations. In June 2020, a System Integration Lab is scheduled to test the U.S. software by executing scenarios to assess system performance. In August 2020, mobility testing of the Iron Dome prime movers adapted to U.S. vehicles (HEMTTs) is planned to be conducted in Israel prior to delivery of the first Battery to verify safety and performance requirements. Then in September 2020, live fire testing is expected to occur in Israel

on the adapted Iron Dome system using U.S. provided cruise missile surrogate targets. Finally, in FY21 the Army plans to execute interoperability and performance testing at White Sands Missile Range, New Mexico, using the first Iron Dome Battery with U.S. Army Soldiers.

FY	Allot \$K	Obs \$K	%Allot OBLIG	Disb \$K	%Allot DISB
2016	\$ 149,218,384.09	\$ 149,143,575.13	99.95%	\$ 147,762,292.66	99.02%
2017	\$ 80,781,000.00	\$ 80,105,741.80	99.16%	\$ 79,226,904.97	98.08%
2018	\$ 161,880,640.63	\$ 161,822,528.18	99.96%	\$ 126,469,754.62	78.13%
2019	\$ 102,998,180.97	\$ 70,947,449.07	68.88%	\$ 7,931,685.76	7.70%
2020	\$ 186,369,000.00	\$ 6,823,724.53	3.66%	\$ 708,457.19	0.38%
Grand Total	\$ 681,247,205.69	\$ 468,843,018.71	68.82%	\$ 362,099,095.20	53.15%

Mr. LAMBORN. General Murray, you raised concerns about the ability to integrate Iron Dome in the U.S. air defense systems. It is my understanding the U.S. Marines were able to do so with CAC2 and the G/ATOR radar. Can you please:

a) Explain why the Marines were able to do so and the Army was not, including in the form of using these as an interim capability?

b) Provide a list and details on all contracts signed with Israel, Raytheon and/or Rafael to attempt to integrate Iron Dome with: Sentinel A3; Sentinel A4, IBCS, and/or Link 16.

c) List and describe all other non-contractual efforts to integrate with Sentinel A3; Sentinel A4, IBCS, and/or Link 16, including whether they use outside vendors or analysts.

General MURRAY. The Army observed the USMC successfully demonstrate initial "interoperability", but not "integration," of an Iron Dome launcher and TAMIR interceptor with the USMC system Ground/Air Task Oriented Rader (G/ATOR). Interoperability links systems together and allows systems to exchange data via a common data network. This provides situational awareness and allows engagement coordination and de-confliction. Interoperability does not optimize performance across disparate systems. Like interoperability, integration links multiple systems together. However, with integration the connection is much more robust and allows the use of data to go beyond coordination and de-confliction and allow optimization of components (e.g., Sensors and shooters) to maximize effectiveness and/or efficiency. Integration is the requirement for IFPC Inc 2 components, as it is for all future Army Air Defense capabilities, to become part of the tiered and layered air defense.

The USMC demonstrated the ability to pass G/ATOR tracking data to the Iron Dome system using the USMC mission command node (Common Aviation Command and Control System, or CAC2S), through a cross-domain solution (security filter), then to a surrogate Iron Dome mission command node (a surrogate Battle Management and Weapon Control (BMC) system) for the engagement calculations before sending the mission to the launcher and interceptor. Additionally, the USMC employed the Sensor in a sectored, non-rotating mode, which does not meet the Army's 360 degree requirement for cruise missile defense. The USMC demonstration has informed Army contracting activities planned for Fiscal Year 2020 (FY20), in which the Army will assess the path forward for Iron Dome's BMC "interoperability" with Integrated Battle Command System (IBCS) for the interim systems.

This approach will require a supplier to mitigate cybersecurity risk, and IBCS will be limited to providing Fire Direction, not Fire Control, to the Iron Dome system. This assessment activity achieves interoperability with Iron Dome, however, this type of interoperability does not meet the enduring IFPC requirement. The Army needs to be able to execute fire control from IBCS, without using additional Command and Control systems that the Army has to sustain over time.

b) Provide a list and details on all contracts signed with Israel, Raytheon and/or Rafael to attempt to integrate Iron Dome with: Sentinel A3; Sentinel A4, IBCS, and/or Link 16.

The Army awarded two contracts related to Iron Dome components and their integration with Sentinel and the Integrated Air and Missile Defense Battle Command System (IBCS). The first was part of the Enhanced Mission Area Missile (EMAM) program that was developing additional missiles for use in the IFPC system, which included the Sentinel A3, IBCS, and the Multi Mission Launcher (MML). The second was for the adaptation and procurement of Iron Dome Defense Systems for the U.S. Army (IDDS-A), which will undergo performance testing and interoperability testing with IBCS.

The Army awarded contract W15QKN-14-9-1001 to Raytheon Company (teaming with Rafael) to integrate a SkyHunter interceptor (U.S. variant of TAMIR) with a

U.S. surrogate launcher and IBCS on June 4, 2018. The contract value was \$2,597,398. Raytheon/Rafael was unable to provide necessary source code and high fidelity models and simulations to continue with the effort in April 2019. Funding for EMAM ended in FY19.

The Army awarded contract W31P4Q-19-D-0024 to the Israeli Ministry of Defense (IMOD) for IDDS-A on August 1, 2019. To date, the Army awarded \$287,510,625 to adapt the Iron Dome System to the IDDS-A configuration and to procure two IDDS-A batteries plus an additional 48 TAMIR interceptors. The IMOD will deliver the first IDDS-A battery by 30 September 2020 for shipment to the U.S. no later than December 2020. The IMOD will deliver the second IDDS-A battery and additional interceptors by December 31, 2020 for shipment to the U.S. There are additional contract options the Army could execute if required for further adaptation work and logistics support. In FY21, the Army will execute interoperability and performance testing at White Sands Missile Range, New Mexico, using the first Iron Dome Battery with U.S. Army Soldiers

c) List and describe all other non-contractual efforts to integrate with Sentinel A3; Sentinel A4, IBCS, and/or Link 16, including whether they use outside vendors or analysts.

The February 25, 2020, "Enduring Indirect Fire Protection Capability Increment 2 (IFPC Inc 2) Report to Congress" describes in detail the interaction and assessments the Army executed in coordination with the Israeli Missile Defense Organization (IMDO) concerning Iron Dome.

In FY19, the Army generated a number of design reference missions for analysis through high fidelity modeling and simulation to determine if the potential missile systems have acceptable performance against the threats. Modeling tools included the Army Integrated Air and Missile Defense (AIAMD) simulation and Sentinel Digital Simulation (SDS) for Sentinel A3, as well as SDS runs with updated Sentinel A4 specifications. In keeping with prioritized threats, the design reference missions included simulated engagements of 1) maneuvering and non-maneuvering subsonic CM and UAS, and 2) Rocket, Artillery and Mortar, or "RAM."

To support this assessment the Army executed several Technical Interchange Meetings (TIM) culminating in two major exchanges. From 23-25 September 2019 the U.S. Government hosted representatives from the IMDO and Rafael Advanced Defense Systems at Redstone Arsenal. An objective of the meeting was to understand and agree to requirements for data to support integration into U.S. AMD architecture, as well as potential componentization of the systems launcher and TAMIR interceptor for Enduring IFPC requirements. A joint memorandum between the Army and IMDO agree upon the transmission of Iron Dome engineering technical data no later than October 31, 2019.

IMDO transmitted Iron Dome System data on October 31, 2019. The data included engineering information (e.g., architectural documentation, sequence diagrams, and system models); however, it did not include mission command and interceptor component level source code, algorithms, or mathematical models necessary to successfully dis-integrate Iron Dome components and then integrate the Iron Dome launcher and missile into the U.S. Army's IBCS.

During the second major data exchange, the Army and representatives from IMDO and Rafael Advanced Defense systems met at Redstone Arsenal, Alabama from November 12-14, 2019. During this TIM, Army subject matter experts (SMEs) reviewed technical data and assessed the feasibility of integrating Iron Dome components in the Army's AMD architecture. Army SMEs assessed a high risk of integration with Iron Dome System into the AIAMD architecture due to performance dependencies between the BMC, Multi-Mission Radar (MMR), and TAMIR interceptor.

The Army's analysis concluded the Iron Dome launcher and TAMIR interceptor's performance is highly reliant on the BMC and the MMR. For Iron Dome's launcher and TAMIR interceptors to be a viable option for Enduring IFPC Inc 2, the BMC and MMR functions require transferring into the Army's IBCS. Additionally, Technical Interchange Meetings concluded the IMDO does not currently possess component-level models (e.g., missile seeker model, missile guidance and control model, missile-fusing model, Six-Degrees of Freedom (6-DoF) IFS) needed to verify launcher and missile performance within the AIAMD architecture. The tightly coupled nature of Iron Dome components within the Iron Dome architecture and a lack of sufficient technical data requires further development, prototyping, and integration to provide a potential Enduring IFPC Inc 2 capability.

The Army's FY19 analysis concluded further performance evidence is required from U.S. Industry and IMDO. The Army's Enduring IFPC Inc 2 competitive approach strategy moving forward requires industry to demonstrate integration through a successful kill-chain live fire demonstration, which reduces program risk

and provides required performance data for analysis, and eventual contract award to one vendor.

QUESTIONS SUBMITTED BY MR. GALLEGO

Mr. GALLEGO. I understand that there have been some problems with the Amphibious Combat Vehicle identified during operational testing. Can you outline what the problems are and how they are being mitigated?

Will these problems affect planned full-rate production for ACV in the coming months?

Secretary GEURTS. Director Operational Test and Evaluation (DOT&E) identified four primary issues in their Operational Assessment report: Issue 1: Investigate options for preventing damage to steering/suspension when encountering battlefield debris, such concertina wire. Mitigation: The ACV operator vision aid system has been improved to provide ACV unit enhanced situational awareness with respect to tactical land and water movements in both day and night environments, which will significantly improve the ability of the vehicle crew to navigate around or otherwise avoid battlefield debris. Issue 2: Improve ACV reliability by implementing corrective actions on Low Rate Initial Production (LRIP) vehicles to reduce the failure rate and maintenance demand. Mitigation: 43 design modifications have been implemented into the LRIP design to improve system reliability. Effectivity of these modifications will be assessed during planned Reliability Qualification Testing and Initial Operational Test & Evaluation. Issue 3: Resolve vision block and Remote Weapon System (RWS) sight freezing and fogging issues in extreme cold weather environments. Mitigation: LRIP test articles are equipped with improved vision blocks. Additional testing will be conducted to assess improvement in the area of extreme cold environments. Proper preventive maintenance procedures were developed to combat RWS sight freezing issues noted during previous testing. Issue 4: Investigate the development of a cold weather special mission kit to keep Marine crews warm when operating with hatches open in extreme cold. Mitigation: The Program Office will investigate options for development of a cold weather special mission kit while other engineering changes are completed. The Department does not anticipate any of the issues identified in the DOT&E report to have an adverse impact on the Full Rate Production decision.

Mr. GALLEGO. As I understand it, the 1st Marine Division at Camp Pendleton will be the first to receive ACV. When is that delivery scheduled?

Secretary GEURTS. Company D, 3rd Assault Amphibian Battalion, 1st Marine Division, Marine Corps Air-Ground Combat Center, 29 Palms, CA will be the first to receive ACV. Initial delivery to one platoon is scheduled for the fourth quarter of FY 2020. The fielding, provisioning, and training of this platoon will achieve Initial Operational Capability for the ACV Family of Vehicles.

Mr. GALLEGO. What is the wider delivery plan for ACV for the fleet? Which units will receive ACV, and when?

Secretary GEURTS. The ACV delivery plan is prioritized to both the Supporting Establishment and the 1st Marine Division during the initial fielding of vehicles. This will ensure a robust training curriculum is established early for operators and maintainers while simultaneously delivering capability to the fleet. Subsequent fielding to 2d Marine Division, Camp Lejeune, 4th Marine Regiment, Okinawa, and 3d Marine Regiment, Hawaii, will follow, as priorities for the USMC are continuously evaluated. The 4th Marine Division, Marine Forces Reserve and the Maritime Prepositioning Force are scheduled to complete ACV fielding last. The ACV delivery plan will however, require re-evaluation, following the completion of USMC Force Design to Force Development planning.

QUESTIONS SUBMITTED BY MR. MITCHELL

Mr. MITCHELL. Dr. Jette and General Murray, what the specific impacts to the schedule and costs for delivering the Optionally Manned Vehicle caused by the decision to cancel the original solicitation for prototypes? What are the changes being made to the overall requirements and capabilities of the vehicle?

Secretary JETTE and General MURRAY. Specific impacts to the schedule and cost of the Optionally Manned Fighting Vehicle (OMFV) program are evolving as we revisit requirements and the acquisition strategy. On January 16, 2020, the Army decided to cancel the OMFV solicitation because we determined we were asking for a great deal of capability on a very aggressive schedule. The solicitation included a request for early physical bid samples from industry and a First Unit Equipped (FUE) date of Fiscal Year 2026. The Army is still determining the new FUE date.

The new schedule will reduce risk by providing more time for preliminary and detailed design phases prior to entering into a build and test phase with physical prototypes. Additionally, the Army expects these efforts will increase competition.

Going forward, the Army has begun with a broad set of characteristics for the OMFV, and will refine them into requirements through a cooperative and iterative process with industry. In late February 2020, the Army released nine broad characteristics for industry feedback: survivability, mobility, growth, lethality, weight, logistics, transportability, manning, and training. The Army will conduct extensive engagement with industry to determine their ability to meet the desired characteristics and what trades may be necessary, and will use industry feedback and performance trades analysis to gradually refine the desired characteristics. This refinement will occur in conjunction with a phased acquisition plan that seeks to maintain competition. Digital designs, modeling and simulation, and Soldier Touchpoints will inform and sharpen the characteristics for prototyping and testing.

Mr. MITCHELL. Dr. Jette and General Murray, what is the plan for testing, developing, and/or procuring active protection systems on the Stryker and Bradley platforms moving forward? What is the current status of testing?

Secretary JETTE and General MURRAY. Both the Stryker and Bradley platforms participated in an expedited effort to identify mature, non-developmental hard kill active protection systems (APS) for platform integration and characterization activities.

For the Stryker, the Army tested and determined the Iron Curtain system was not immediately suitable for the platform. The Army then conducted a follow-on demonstration with two systems: the Rafael Trophy-Medium Variant system, and the Rheinmetall Active Defeat System. While both systems demonstrated the ability to intercept threats, neither system is suitable for the Stryker platform. However the Army believes there is value in collecting additional data from these systems to inform future application of APS for Stryker and other ground combat platforms. The Army plans on conducting follow-on testing to collect ballistic data, to include residual penetration data through a vehicle agnostic effort beginning in 1st Quarter, Fiscal Year 2021.

For the Bradley, the Army selected Elbit's (formerly Israeli Military Industries) Iron Fist-Light Decoupled (IF-LD) system for an urgent materiel release based on the initial characterization results. Funding adjustments to the Bradley program has now resulted in the Army prioritizing available funding for the A4 modernization effort over procurement of IF-LD systems. Pending additional funding to support urgent fielding, the expedited effort is delayed.

Additional protection capabilities being considered for the Stryker platform, and other ground combat platforms include: laser warning receiver integrated with the Modular APS Controller and Framework; soft kill APS and passive signature management that impacts the infrared signature of the vehicle.

Mr. MITCHELL. Dr. Jette, I have a question about the Army's plans for its developmental, opposed-piston Advanced Combat Engine (ACE). In December of last year, the Army successfully conducted a proof of concept test of the ACE engine, an engine that has been in development since 2012, as an internal alternative to the non-developmental combat vehicle engines available in the national defense industrial base. Yet, experts predict the continued development of the engine could cost an additional \$100 million over several years to have an engine ready for Low Rate Initial Production. I understand there are domestically manufactured diesel engines designed for use in combat vehicles that are fully developed to military specifications. These engines, available in the national defense industrial base, have been selected for use in a range of Army priorities, including the Optionally Manned Fighting Vehicle, Mobile Protected Firepower, and the Armored Multi-Purpose Vehicle.

Will you please explain why the Army is pursuing the development its own diesel engine while fielded and proven engines are available from private industry?

What gap is the Army hoping to fill with the Advanced Combat Engine?

What applications does the Army believe the ACE can have in the future? Could it include any of the vehicles under development by the NGCV CFT?

Does the Army see a risk of weakening the defense industrial base should it develop, productionize, and compete its engine for future land defense platforms?

How does the Army reconcile the development of its engine with its obligations under 10 USC 2377 to forego its development of a new item when a comparable item can be readily purchased in the marketplace?

Secretary JETTE. The Army is pursuing an Advanced Combat Powertrain, which includes the Advanced Combat Engine (ACE), due to the need for combat vehicle platforms with protection from near-peer threat environments to maintain pace with the force. The driving need for this development is for a 45-60 ton (T) combat platform to maintain pace with the force and provide electrical power to support protec-

tion, lethality and communications systems as well as provide propulsion and thermal management to protect the signature under armor in the volume of current combat vehicle powertrains. A market survey and analysis showed available combat powertrains are not sufficient to meet these requirements, and engines developed for commercial applications were not sufficient for military operating conditions without further development. The Army used a competitive acquisition strategy to develop a new powertrain to meet these requirements in 2015, which resulted in a new combat vehicle engine design that was demonstrated in December, 2019. The Advanced Combat Powertrain, including the ACE, started development in 2015 with the objectives to improve the power density by 1.5 to 2.0x, increase fuel efficiency by 25 percent, increase electrical power available by 10x, increase mobility (range by an additional 100 miles, speed on grades by 50 percent and accelerate 30 percent faster), and improved thermal management, with the Bradley powertrain as the baseline.

What gap is the Army hoping to fill with the Advanced Combat Engine? The Advanced Combat Powertrain, including the ACE, addresses a gap for mobility of combat vehicles that weigh more than 45 tons.

What applications does the Army believe the ACE can have in the future? We are assessing its continued value and industrial viability. The ACE may have application to new platforms or upgrades to existing combat systems that result in system weights of 45T–60T. The engine architecture is scalable, allowing growth to cover systems up to 80T. The current application being explored is the Optionally Manned Fighting Vehicle. The OMFV is expected to be equal to or larger than the current Bradley Family of Vehicles, and the Army desires room for future growth which would require a larger (~1000 horsepower) engine with much greater electrical power generation but in as small a package as possible.

Could it include any of the vehicles under development by the NGCV CFT? The Advanced Combat Engine, may have application to the Optionally Manned Fighting Vehicle and the Optionally Manned Tank.

Does the Army see a risk of weakening the defense industrial base should it develop, productionize, and compete its engine for future land defense platforms? There is no anticipated impact to the defense industrial base as a result of the engine development program. The ACE was developed in partnership with Cummins, who currently manufactures combat vehicle engines. If the Advanced Combat Engine goes into production, it must be produced by an industrial base partner. The Army does not plan to manufacture the engine.

How does the Army reconcile the development of its engine with its obligations under 10 USC 2377 to forego its development of a new item when a comparable item can be readily purchased in the marketplace? The Army performed a market survey and analysis showing available combat powertrains were not sufficient to meet the required mobility for combat vehicles greater than 45 tons, and engines developed for commercial applications were not sufficient for military operating conditions without further development. The Army used a competitive contracting strategy in 2015 to develop a new powertrain with a target of 1000 horsepower in the volume of the current Bradley's powertrain to meet these requirements, which resulted in a new combat vehicle engine design that was demonstrated in December 2019.