

Stenographic Transcript
Before the

Subcommittee on Airland

COMMITTEE ON
ARMED SERVICES

UNITED STATES SENATE

TO RECEIVE TESTIMONY ON ARMY
MODERNIZATION IN REVIEW OF
THE DEFENSE AUTHORIZATION
REQUEST FOR FISCAL YEAR 2022

Tuesday, June 15, 2021

Washington, D.C.

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WASHINGTON, D.C. 20005
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1 ARMY MODERNIZATION IN REVIEW OF THE DEFENSE AUTHORIZATION
2 REQUEST FOR FISCAL YEAR 2022

3
4 Tuesday, June 15, 2021

5
6 U.S. Senate
7 Subcommittee on Airland
8 Committee on Armed Services
9 Washington, D.C.

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11 The subcommittee met, pursuant to notice, at 2:30 p.m.
12 in Room SR-232A, Russell Senate Office Building, Hon. Tammy
13 Duckworth, chairwoman of the subcommittee, presiding.

14 Committee members present: Senators Duckworth
15 [presiding], King, Peters, Manchin, Rosen, Kelly, Cotton,
16 Wicker, Tillis, Sullivan, Scott, and Hawley.

1 OPENING STATEMENT OF HON. TAMMY DUCKWORTH, U.S.
2 SENATOR FROM ILLINOIS

3 Senator Duckworth: The Airland Subcommittee will come
4 to order.

5 Before we start, I would like to say how pleased I am
6 to chair this subcommittee and its oversight
7 responsibilities of our nation's primary land and air
8 forces. I look forward to working with Senator Cotton and
9 committee members as we continue the subcommittee's
10 collaborative approach during this critical time.

11 I think we can find broad agreement within the
12 subcommittee as we confront the issues facing our soldiers
13 and airmen and their families.

14 On to business. We meet today to receive testimony on
15 the United States Army's modernization efforts and its
16 fiscal year 2022 budget request.

17 Our witnesses this afternoon are Mr. Douglas Bush,
18 Acting Assistant Secretary of the Army for Acquisition,
19 Logistics, and Technology; General John Murray, Commanding
20 General, Army Futures Command; and Lieutenant General Erik
21 Peterson, Deputy Chief of Staff, Army G-8. I welcome each
22 of you and thank you for your service and willingness to
23 appear before us today.

24 The interim national security guidance states that the
25 United States will ensure our armed forces are equipped to

1 deter our adversaries, defend our people, interests, and
2 allies, and defeat threats that emerge. For the Army, that
3 means ensuring it is manned, trained, and equipped in a
4 manner that equals its vital role in a Joint Force and
5 remains ready for global employment.

6 Today, we are focusing on the equipping side. A few
7 years ago, the Army developed a clear picture of its future,
8 assessing requirements and identifying gaps. It then
9 focused on prioritizing future capabilities and modernizing
10 enduring systems while divesting legacy platforms. It has
11 done so by appropriately recognizing the importance of
12 focusing on its role in multidomain operations, while not
13 losing sight of its unique place as the preeminent land
14 force, and it has done so in the context of an assertive PRC
15 and a disruptive Russia while not losing sight of full
16 spectrum operations.

17 Today, we seek updates on the Army's six modernization
18 priorities: long-range precision fires, next-generation
19 combat vehicles, Future Vertical Lift, the Army Network Air
20 and Missile Defense, soldier lethality, and its rapid
21 capabilities development efforts in hypersonic, directed
22 energy, indirect fire protection, and mid-range capability.
23 We commend the Army's initiative in creating the concept of
24 a multidomain task force to address combatant commander
25 requirements, and we are interested in hearing about this

1 and other operational concepts, requirements, and
2 modernization plans underway, particularly, as they relate
3 to planned or potential fore-structure changes.

4 We hope that you articulate how the Army's fiscal year
5 2022 budget request balances modernization with advance
6 procurement. We are concerned about the risk the Army is
7 assuming by prioritizing future capability over enduring
8 force modernization efforts, specifically, in the areas of
9 aviation, wheeled- and tracked-combat vehicles, and IT, and
10 cybersecurity upgrades; furthermore, we must understand the
11 impact of these decisions on the modernization of the Army
12 National Guard and Army Reserves, critical components of the
13 total Army. Finally, the committee is keenly interested in
14 how the Army's budget requests manages risk to the
15 industrial base.

16 I would like to commend the Army for making bold steps
17 in its efforts to modernize soldier-centered practices, such
18 as soldier touchpoint in the prototyping phase and "try
19 before you buy" partnerships with industry, seem to be the
20 evolution the Army needed to reset its acquisition programs.
21 But hard decisions lie ahead. The establishment of Army
22 Futures Command placed sharp focus on requirements but
23 remains nascent.

24 The Army must ensure the modernization enterprise and
25 the civilian oversight function remains strong through

1 leadership transitions. I have great confidence in you all
2 and look forward to an open and cooperative effort in our
3 common endeavor to continue to fuel a world-class Army.

4 Senator Cotton?

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1 OPENING STATEMENT OF HON. TOM COTTON, U.S. SENATOR
2 FROM ARKANSAS

3 Senator Cotton: Thank you, Senator Duckworth.

4 First, let me say that, of course, none of us ever want
5 to turn the gavel over once you have held it, as I have
6 chaired this committee for the last 6 years, but is it a
7 great honor to turn it over to a fellow veteran and someone
8 who is served our nation with distinction in uniform and now
9 in the Senate in a sacrifice more than most of us could ever
10 imagine. So, congratulations on making the chair of our
11 committee.

12 I would say that I expect to have as good a
13 relationship with you as I did with Senator Manchin and then
14 with Senator King, but obviously, I expect to have a much
15 better relationship with you than those two guys.

16 Senator Duckworth: Yes.

17 Senator Cotton: Mr. Bush, General Murray, General
18 Peterson, thank you for being here today. Thank you for
19 taking the time to visit yesterday.

20 I also want to recognize here at the outset that
21 yesterday was the Army's birthday and to express my deep
22 thanks to our soldiers and their families and the Army's
23 civilian professionals for their selfless service to our
24 nation.

25 As you are all well aware, the National Defense

1 Strategy directs our nation's military to prepare for great
2 power competition. Some might say the return of great power
3 competition, but I would say it never left the scene to
4 begin with. This means the Army must be prepared to compete
5 with, deter, and if necessary, decisively defeat potential
6 adversaries like China and Russia.

7 Unfortunately, the President's budget request for
8 fiscal year 2022 does not provide the Army the resources
9 necessary to accomplish this objective. The Army top line
10 for fiscal year 2022 is nearly \$4 billion lower than this
11 year's enacted amount. The request for procurement is
12 nearly \$3 billion lower or 12 percent less than last year.
13 And funding for research, development, test, and evaluation
14 activities has been slashed by almost 10 percent.

15 Given these cuts, the Army was forced to make a
16 difficult choice between a holistic force modernization
17 effort or concentration diminished resources on the
18 development of future capabilities.

19 While I agree with the decision by the Army to focus on
20 its highest modernization priorities, I am concerned,
21 nonetheless, that delaying modernization of assets, like the
22 Abrams tank, without a replacement even on the drawing
23 board, leaves our nation less secure, our troops less
24 prepared, and our Army less ready for great power conflict.

25 The decision to dramatically slow the modernization of

1 the primary platforms used by today's soldiers is extremely
2 troubling.

3 I look forward to hearing from our witnesses about the
4 impacts and risks of these cuts to the Army's ability to
5 accomplish assigned tasks from the National Defense
6 Strategy. I also hope to hear our witnesses explain the
7 crucial role that Army forces would play in competition in
8 conflict with China.

9 I am hopeful this explanation will dispel a
10 misperception held by some that the Indo-Pacific is
11 primarily or even solely an air and maritime theater of
12 operation.

13 Finally, I look forward to hearing from our witnesses
14 about the progress being made on the highest priority
15 modernization efforts for strategic competition with China
16 and long-range precision fires, in particular.

17 Thank you, again.

18 Senator Duckworth: I thank the ranking member.

19 Our first witness is Mr. Bush. It is good to see you
20 again. We have when through many NDAAs together, well into
21 the early morning. I look forward to your testimony.

22 Mr. Bush?

23 STATEMENT OF DOUGLAS BUSH, ACTING ASSISTANT SECRETARY
24 OF THE ARMY FOR ACQUISITION, LOGISTICS, AND TECHNOLOGY

25 Mr. Bush: Thank you, Madam Chair.

1 Madam Chair, Ranking Member Cotton, distinguished
2 members of the SAS Airland Subcommittee, good afternoon.
3 Thank you for the invitation to appear before you to discuss
4 the Army's modernization program and the resources requested
5 in the President's budget for fiscal year 2022.

6 I am pleased to be joined today by my teammates,
7 General Mike Murray, and Lieutenant General Erik Peterson.
8 We appreciate your making our written statement as part of
9 the records for today's hearing.

10 Madam Chair, our shared mission is to ensure that the
11 Army continues to achieve overmatch against all potential
12 adversaries, ensuring that our Army can fulfill its mission
13 to compete successfully, deter, and if necessary, fight and
14 win our nation's wars and part of the Joint Force.

15 We support the Army's transformation through
16 modernization in order to meet future challenges. Even
17 during a global pandemic, this past year has been one of
18 dramatic change, rapid innovation, shared challenges, and
19 significant progress, with an unprecedented unity of effort
20 across the Army modernization enterprise.

21 Next, I would like to take a moment to address the
22 subcommittee's specific request for views outlined in our
23 invitation. First, the committee has asked our views on the
24 current status of the Army's ongoing modernization efforts
25 across the Army's six modernization priorities, specifically

1 focused on 31+4 signature efforts. In this regard, I would
2 ask the committee members to review our joint witness
3 statement that summarizes these efforts, but I would note
4 that they are all fully supported by the fiscal year 2022
5 budget request.

6 Second, the committee asked our views on how the Army's
7 managing risk while prioritizing future capability over
8 enduring force modernization efforts, especially in the area
9 of aviation, wheeled- and tracked-combat vehicles, and IT
10 cybersecurity upgrades. While difficult choice were made to
11 make adjustments, I think this budget request reflects a
12 careful balance between appropriate levels of funding for
13 enduring efforts, such as these, in our future modernization
14 goals.

15 Finally, the committee asked for our views on how the
16 Army's fiscal year 2022 request manages risk in the
17 industrial base, as well as progress in reforming
18 modernization requirements, acquisition, and resourcing
19 processes. First, while no budget is without risk, I am
20 confident that the request before you represents what we
21 consider acceptable risks and manageable risks to the
22 industrial base, as well as the entire equipment portfolio;
23 further, the Army modernization community is committed to
24 reform. We are grateful to you and your colleagues on the
25 committee for form initiatives that have been instrumental

1 in our efforts to streamline and gain efficiencies in the
2 acquisition process and accelerate delivery of equipment to
3 soldiers.

4 This includes our use of middle-tier acquisition
5 authority for rapid prototyping, to accelerate select
6 efforts linked to our modernization priorities, including,
7 among others, the Extended Range Cannon Artillery,
8 Integrated Visual Augmentation System, and Next-Generation
9 Squad Weapon. We have also used other transaction authority
10 or, or OTAs, to help us streamline, selectively, the
11 acquisition research initiatives, prototype projects, and
12 follow-on production efforts.

13 In both of these areas, you have my commitment that the
14 Army will use these authorities conservatively and only
15 where needed to accomplish our modernization objectives.
16 You also have our commitment to ensure that appropriate
17 Army, internal Army oversight measures are in place to
18 monitor our use of these new authorities granted by
19 Congress. Overall, I think the fiscal year 2022 budget
20 request for Army modernization reflects continuity in the
21 Army's continued commitments to its highest priority
22 modernization programs.

23 While members will find that adjustments were made in
24 programs to achieve that goal, I believe that the fiscal
25 year 2022 budget request of \$34.1 billion for Army Research,

1 Development, and Acquisition reflects the Army's efforts at
2 making careful choices and supporting continued progress
3 across the Army's modernization priorities.

4 Let me close by saying that realization of our
5 modernization efforts is highly dependent on support of the
6 Army's fiscal year 2022 budget request. Investments in this
7 budget complement and reinforce the Army modernization
8 efforts you have already supported so strongly and thank you
9 for that support in the past. The key is predictable,
10 adequate, and timely sustained funding to ensure the United
11 States Army remains the best equipped land force in the
12 world.

13 I appreciate your time today and I look forward to your
14 questions. Thank you.

15 [The statement of Mr. Bush follows:]
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1 Senator Duckworth: Thank you.

2 General Murray, welcome, and I want to send a word of
3 gratitude to your wife, Jane, for being with you all these
4 years as you served our nation. Thank you.

5 General Murray: Some days that is in doubt, ma'am.

6 [Laughter.]

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1 STATEMENT OF GENERAL JOHN MURRAY, COMMANDING GENERAL,
2 ARMY FUTURES COMMAND

3 General Murray: Chair Duckworth, Ranking Member
4 Cotton, and distinguished members of the subcommittee, on
5 behalf of the soldiers and civilians of Army Futures
6 Command, thank you for this opportunity to testify about
7 Army modernization.

8 The dedicated and selfless men and women that I serve
9 with, work hard every day to ensure the modernization of our
10 Army. It is indeed an honor to join Mr. Doug Bush here
11 today. I would just note that the partnership, which is
12 absolutely critical, between AFC and ASALT was strong in the
13 past and remains strong under Mr. Bush's dedicated
14 leadership.

15 It is also an honor to join the newest member of the
16 Army staff and our teammate, Lieutenant General Erik
17 Peterson, the brand new Army G-8.

18 As you mentioned, the Army is in the midst of a
19 transformational change. This change is necessary to
20 maintain our global and competitive edge, to deter conflict,
21 and if called upon, to fight and win, as part of the Joint
22 Force. The Army is transforming how we fight, what we fight
23 with, how we organize, and how we do business, and,
24 importantly, who we are. Project Convergence, the Army's
25 campaign of learning and experimentation is informing all

1 aspects of transformation and I would like to take an
2 opportunity to say just a word about each of them.

3 First, we are transforming how we fight. The Army's
4 current concept is multidomain operations; our contribution
5 to the developing Joint Warfighting Concept. The Army's
6 Training and Doctrine Command is now in the process of
7 transitioning multidomain operations into Army doctrine.

8 At the same time, our Futures Studies Program is
9 bringing together concept writers, intelligence
10 professionals, and S&T experts with leading thinkers from
11 academia, industry, and other communities, to build our next
12 concept.

13 Second, we are transforming what we fight with. Our
14 material modernization includes the 31+4 signature efforts
15 based upon our six consistent modernization priorities. Our
16 fiscal year 2022 request includes \$11.3 billion to support
17 these signature efforts. Thirty-one of these efforts are
18 led by powerful teams comprised of our cross-functional
19 teams, program executive offices, and program managers. And
20 four of these efforts are led by the Army's Rapid
21 Capabilities and Critical Technologies Office. Twenty-two
22 of these capabilities with this budget are currently
23 projected to begin fielding over the next 4 years.

24 Third, we are transforming how we organize. The
25 multidomain task force will enable a convergence of the

1 integration of effects across all domains for Joint Force
2 commanders to create multiple dilemmas for our adversaries.
3 Security Force Assistance Brigades foster close partnerships
4 with host nation ground forces in critical locations. They
5 give us a strong foundation in competition and a head start
6 in crisis and conflict.

7 Fourth, we are transforming how we do business.
8 Soldier-centered design puts technology and prototypes into
9 the hands of soldiers from the operational force early so
10 that we can learn. Learning early changes how we generate
11 requirements and how we partner with both traditional and
12 non-traditional industry. Our Army Applications Lab is
13 spearheading effective ways to work with non-traditional
14 innovators, leveraging existing authorities to make it
15 easier to work with the Army.

16 Fifth, and maybe most importantly, we are transforming
17 who we are. We are exploring how best to find, train,
18 utilize, and importantly, retain the tech talent we know we
19 will need for a future fight. Our Artificial Intelligence
20 Integration Center works with Carnegie Mellon University to
21 offer data science courses, to grow software designers and
22 engineers, and to foster a more technologically savvy
23 workforce. Our software factory takes soldiers from any
24 career field with the right aptitude and grows them into
25 skilled coders.

1 We are in the process of transforming almost every
2 aspect of our Army. There are, however, two key things that
3 we must hold onto; that would be our purpose and our most
4 precious resource: our people.

5 Our fiscal year 2022 budget request builds on the
6 consistent priorities and strong momentum of our 2021
7 request. Stable and consistent funding from Congress
8 supports our ability to serve our nation, take care of our
9 people, and continue the momentum of our modernization
10 efforts.

11 Thank you for your consistent support of our Army, your
12 consistent support of our soldiers and their families, and
13 thank you for having me here today.

14 It is an honor and a privilege to lead and represent
15 the soldiers, civilians, and families of Army's Futures
16 Command, and I look forward to your questions.

17 [The statement of General Murray follows:]
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1 Senator Duckworth: Thank you, General.

2 General Peterson, it is good to have a fellow aviator
3 here, but I am not giving you preferential treatment.

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1 STATEMENT OF LIEUTENANT GENERAL ERIK PETERSON, DEPUTY
2 CHIEF OF STAFF, ARMY G-8

3 General Peterson: Thank you, Chair Duckworth.

4 Ranking Member Cotton, distinguished members of this
5 Senate Armed Services Committee, Airland Subcommittee,
6 thanking for the opportunity to appear and testify regarding
7 the Army's fiscal year 2022 modernization efforts. And
8 thank you, as well, for your enduring support of our
9 soldiers, civilians, and families, as they play their vital
10 role in the defense of our nation; a role that they have
11 played for 246 years as of yesterday, our Army birthday.

12 Our requested investments in modernization in fiscal
13 year 2022 reflect our deliberate 3-going-on-4-year effort to
14 accelerate focused modernization and place transformational
15 capabilities in the hands of our soldiers. These
16 capabilities firmly support our National Defense Strategy
17 and our interim defense guidance and contribute directly to
18 the Joint Force's ability to deter, and when called upon,
19 fight, and win decisively.

20 They reduce risk imposed by increasingly aggressive
21 competitors and foes and will help us achieve the decisive
22 overmatch that we need. To that end, we remain committed to
23 our six modernization priorities and the 31+4 overarching
24 efforts aligned with those priorities and that commitment,
25 combined with several years of ruthless prioritization,

1 constant reassessment and re-evaluation, and your sustained
2 support, promises to bring over 20 new important
3 capabilities to bear in the next 4 years.

4 Through teamwork, engaged senior leadership, refinement
5 of process and authorities and resources you have granted
6 us, we continue to accelerate. From refined requirements
7 processes and the responsible employment of other
8 transactional authorities to experimentation, prototyping,
9 and soldier-centered design, the transformation you are
10 helping us with is being brought to bear.

11 The progress is not without risk. Several years of
12 ruthless prioritization, eliminating, reducing, and
13 deferring lower-priority and less-necessary efforts, as well
14 as divesting of legacy capabilities, has left little
15 flexibility in our top line.

16 We made the easy choices the first couple of years of
17 this effort. We are now well into the realm of hard
18 choices, really-hard choices, and downright excruciating
19 choices; as such, we ask for your continued, engaged support
20 and its predictable authorizations and resources on time to
21 help us maintain this transformation.

22 In closing, I would like to offer one additional brief
23 thanks and that is to your staffs, committee, and personal,
24 who professionally facilitate the engagement necessary to
25 advance our common commitment to the defense of our nation.

1 Thank you for the opportunity to appear and I look
2 forward to your questions.

3 [The statement of General Peterson follows:]

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1 Senator Duckworth: Thank you.

2 We will begin with our first round of questions. I
3 will begin first. General Murray, Secretary of Defense
4 Austin has made it clear that the PRC is the top priority,
5 that it is the pacing threat to our nation's defense, but
6 many suggest that the primary warfighting roles in the
7 Pacific belong to the Navy and the Air Force.

8 What role does the Army play in the Pacific and how
9 does Army modernization support the Army's ability to play
10 at that role?

11 General Murray: Madam Chair, thank you for that
12 question.

13 And, obviously, I have a pretty strong opinion on the
14 Army's role, not only in the Pacific, but anyplace the Joint
15 Force goes, and I would just start by saying, you know, your
16 military never fights as a single service; we always fight
17 as a Joint Force. The Army's role, I believe, in INDOPACOM,
18 specifically, spans the spectrum you talked about from
19 competition through crisis and into conflict, and I think we
20 have an especially important role to play in terms of
21 deterrence.

22 I mentioned the Security Force Assistance Brigades and
23 the partner, the ability to build partners, and partner
24 capacity up front. The partnerships with countries with
25 your United States Army with countries throughout INDOPACOM

1 is very strong and it gets stronger.

2 As the secretary mentioned this morning, the chiefs of
3 defense in many of those countries are land force commanders
4 and those partnerships and General McConville has been very
5 engaged and proactive in strengthening those partnerships
6 throughout INDOPACOM.

7 I would say from one aspect, in particular, is the
8 joint service and all joint services, in order to operate,
9 depend upon the Army for logistics support. So, that is a
10 strong role, no matter what phase of the operation you are
11 in, is the logistics support.

12 And then, specifically, as it relates to the
13 modernization priorities, obviously long-range precision
14 fires, when we started the concept called multidomain
15 operations, it was based upon the premise that the Army
16 could use long-range fires to begin to break down what we
17 call anti-access/area denial strategies and really enable
18 the Joint Force and really enable joint fires, operating as
19 a Joint Force.

20 And then, of course, the multidomain task force brings
21 together not only lethal capabilities, but also electronic
22 warfare, cyber intelligence capabilities that are useful in
23 competition, through crisis, and into conflict.

24 And then I would just lastly add that we are already
25 there. So, the last time I checked, South Korea and Japan

1 were part of the INDOPACOM AR and we have sizable
2 populations within those two locations.

3 Senator Duckworth: Thank you. I actually just
4 returned from South Korea where I met with General Abrams
5 and had a very, very productive visit.

6 I understand that the Joint Staff is working on a new
7 Joint Warfighting Concept. DOD just released a new joint,
8 all-domain command, and control strategy. You have already
9 referenced this. And as the Airland Subcommittee, we are
10 also paying careful attention to the Air Force's work on
11 their Advanced Battle Management System.

12 How do the Army's modernization efforts, including
13 Project Convergence, support these broader joint efforts?

14 General Murray: Yes, ma'am, and thank you, again, for
15 that question.

16 As I mentioned in my opening statement, we believe
17 multidomain operations, as we turn this into doctrine, is
18 not only our contribution to the joint warfighting concept,
19 but it actually will become part of it. We are hoping to
20 inform that exercise, and that is from a concept standpoint.

21 And then from a Project Convergence standpoint, last
22 year, we executed Project Convergence and it was an Army-
23 only, because we pulled it together pretty quickly. This
24 year, beginning in December, we formed a, at the three-star
25 level, a joint board of directors that includes not only all

1 four, and now five services, because the Space Force has now
2 joined us, but also the Joint Staff J-6, who is responsible
3 for the JADC2 concept at the Joint Staff level, and the
4 Joint Staff J-7, who is responsible for the Joint
5 Warfighting Concept.

6 Those two responsibilities, nobody is trying to take
7 that away from the Joint Staff or the Joint Requirements
8 Oversight Council. What we are trying to do is come
9 together as the services and begin to inform not only the
10 concept of JADC2, but the concept of joint warfighting from
11 the bottom up. And so, the services working together,
12 meeting someplace in the middle with the top-down work to
13 Joint Staff is doing, we believe, is the best way to come up
14 with a viable Joint Warfighting Concept and a viable concept
15 for Joint All-Domain Command and Control.

16 Senator Duckworth: General Peterson, the President's
17 defense budget requests for fiscal year 2022 puts some
18 pressure on the Army top line and Army leadership as
19 testified about the need to make tough choices. You were
20 saying you are into the excruciating-choices level at this
21 point.

22 What does that mean for the Army's ability to protect
23 its 31+4 signature modernization efforts?

24 General Peterson: Thank you, Chair Duckworth.

25 The 2022 budget request does, in fact, protect our

1 31+4. We have continued our deep-dive process, formerly
2 known as night court, to realign resources to ensure we
3 retain, and in some cases, accelerate momentum with the
4 31+4. But it is challenging. These are tough choices with
5 respect to the resourcing and funding of enduring and legacy
6 systems and we work very, very closely to assess that risk
7 and ensure that it is manageable.

8 During our process for fiscal year 2022, we gleaned a
9 realignment of \$1.6 billion through our very, very
10 excruciating, continued, rigorous realignment of funding in
11 order to continue to support those modernization priorities.

12 Senator Duckworth: Thank you.

13 Senator Cotton?

14 Senator Cotton: Thank you. Let's continue down the
15 track that Senator Duckworth started us on about the Army in
16 the Pacific, especially in conflict against China.

17 General Murray, could you elaborate a little bit on the
18 roles and the importance of land-based, long-range fires in
19 the Pacific and why it is so vital that we modernize and
20 procure those systems.

21 General Murray: Absolutely, Senator. And thank you
22 for the birthday wish, and happy birthday to the State of
23 Arkansas, 185 years today, I understand, if I am not
24 mistaken.

25 And it really goes back to the beginning of what I

1 described as multidomain operations. We understood the
2 significant modernization that China was undergoing, not
3 only in its ground forces, but really across all of its
4 services, and we understood, as we studied it, this concept
5 of anti-access/area denial. And I sat in this room with
6 H.R. McMaster, and you heard when you were chair, we were
7 outranged and outgunned.

8 The beginning of the breaking down that anti-
9 access/area denial layer to enable the Joint Force, we
10 believe, begins with long-range precision fires. And we
11 also believe that multidomain effects, better known for the
12 Army as mid-ranged capability, the ability to target from
13 land, either moving terrestrial or moving targets afloat, is
14 key to the ability to begin to break down that protective
15 bubble, that operational defense, if you will, and really
16 open up apertures or corridors for the rest of the Joint
17 Force to exploit.

18 Senator Cotton: And why is it so important that the
19 Army and the Marine Corps, once ashore, have that
20 capability? Why is the Navy and the Air Force not enough?

21 General Murray: Because I believe that multiple
22 dilemmas, any opponent, the more dilemmas you can present to
23 an opponent, they can focus on a single threat and it allows
24 them to focus on that single threat. So, the more dilemmas
25 you can present, the more angles you can come at on opponent

1 from. And the terrain does offer you an advantage in terms
2 of places to hide and places to maneuver that the sea and
3 the air don't necessarily give you.

4 Senator Cotton: And you can keep a lot more of the big
5 guns there, right?

6 General Murray: Yes, sir.

7 Senator Cotton: A lot easier to store those things on
8 a piece of ground than it is on a ship or an airplane.

9 General Murray: And a lot easier to resupply them.

10 Senator Cotton: Also, I noticed, not just the Army,
11 but the Marine Corps has been investing heavily in that kind
12 of long-range precision strike capability. There are some
13 skeptics.

14 Can you tell me what is the status of this question
15 between the services and the chairman and the Department's
16 civilian leadership.

17 General Murray: I hate to speak for the chairman and
18 the leadership at OSD level --

19 Senator Cotton: They told me you could.

20 General Murray: I doubt that.

21 [Laughter.]

22 General Murray: At the service level, you know, at
23 least when we are working through Project Convergence, there
24 is no disagreement on the necessity of presenting those
25 multiple dilemmas.

1 Senator Cotton: Thank you.

2 Mr. Bush, I want to turn now to the big question,
3 though, which is the top line budget. It was cut by \$4
4 billion last year. And as we heard in the testimony
5 already, the Army was in front of this subcommittee over the
6 last 2 years talking about how hard it was working through
7 the night court process to find some extra pennies and
8 nickels under underneath Uncle Sam's cushions.

9 So, obviously, cutting \$4 billion from the top line
10 this year, which includes a 10-percent cut from the
11 Research, Development, and Acquisition account is going to
12 put severe strain on Army's modernization efforts.

13 Could you just explain to us how it is going to be
14 possible to cut \$4 billion, 10 percent out of RD&A to
15 sustain the modernization equipping requirements after we
16 have heard for the last 2 years of how close we were already
17 blade-running on these efforts. I mean, it seems to me we
18 are well beyond fat and even muscle, and now moving deep
19 into the bone.

20 Mr. Bush: Of course, Senator.

21 For starting, the math is the math. It is a 173-
22 billion-dollar Army budget. R&D procurement is only \$34
23 billion of that, so 20 percent. So, from an affordability
24 standpoint, future leaders and Congress can, of course,
25 consider how that mixes within the Army. So, the choices we

1 had to make in the equipping area, as you pointed out, sir,
2 do show those reductions, primarily in R&D and procurement,
3 as the top line was reduced. So, sir, how did we do that?

4 We did accept risk in some areas of the budget in terms
5 of slowing down things, such as Abrams modernization and
6 other things, in an effort to protect the highest interests.
7 Sir, you have seen the budget. You have seen what we did
8 and how those choices were balanced and the Army and those
9 members will form their own views about those choices that
10 we made.

11 But there was an attempt to do that wisely, to not
12 damage the industrial base as part of that, and to not place
13 undue risk, while there is always some risk, on the
14 operational force, by slowing down modernization efforts
15 outside 31+4.

16 Senator Cotton: I worry that the most immediate impact
17 is going to be on those, what we call enduring capabilities,
18 things like the Abrams tank or the Paladin Howitzer, and I
19 know we use terms like accept risk there, but what that
20 means is that our soldiers are out there working those tanks
21 and those guns right now are going to have either older
22 equipment or equipment that is less well-maintained or less
23 training time on that equipment; is that right?

24 Mr. Bush: In some cases, sir, yes.

25 Parts of the Army have always had different equipment

1 than other parts. Even in the 1980s, Europe was the
2 priority. People back in the States had less-modern
3 equipment, but striking that balance is not an easy one,
4 sir. The Army has tried to maintain essential modernization
5 so that war plans and other things can be met with the right
6 equipment and the best equipment at the right time.

7 Senator Cotton: Okay. Thank you.

8 Senator Duckworth: Senator Hawley?

9 Senator Hawley: Thank you, Madam Chair.

10 Thank you all for being here. Thank you for your
11 service to our country.

12 I want to start, Mr. Bush, if I could, with the
13 Missouri question from my home state. Missouri is the proud
14 home of the Lake City Army Ammunition Plant.

15 So, let me ask you about the plant and the timeline to
16 establish a 6.8 millimeter ammunition manufacturing
17 capability at Lake City that would support the Next-
18 Generation Squad Weapon and, otherwise, help us build war
19 reserves.

20 Mr. Bush: Of course, Senator.

21 So, the first thing is, as you mentioned, the Next-
22 Generation Squad Weapon is an example of the Army doing
23 things differently and quickly. So, we are in rapid
24 prototyping, about to go under rapid fielding, hopefully,
25 which will include down-selected and ammunition type of that

1 caliber, 6.8 millimeter, which the Army does intend to
2 produce at Lake City eventually.

3 So, initially, we will be relying on contractor
4 production. The 2022 budget has projects in it that lay the
5 groundwork on-site for the future new facilities that will
6 produce the new ammunition in the future. So, sir, there is
7 going to be a transition over 3 to 5 years, I believe. That
8 timeline is partly dependent on which new specific type of
9 ammunition the Army chooses, because each of the three
10 vendors has a different type of round. So, we will know
11 more about that in the fall, sir, once we have got a
12 selection made.

13 Senator Hawley: Great. Very good. That is helpful.
14 Thank you.

15 Let me shift to some questions about the pacing
16 theater. Both Senator Duckworth and Senator Cotton were
17 asking you about this and about the Army's role in the
18 pacing theater in INDOPACOM and in the pacing scenario. I
19 want to ask about the pacing scenario.

20 General Murray, I want to start with you. Both
21 Secretary of Defense and Deputy Secretary Hicks have
22 testified about the pacing scenario being a Chinese fait
23 accompli against Taiwan and about the need for the United
24 States to maintain an ability to defeat that fait accompli
25 in order to maintain effective deterrence. That, of course,

1 puts a premium on the Army's ability to respond quickly to a
2 Chinese offensive, maybe even without any warning. So, can
3 I just ask how Army's Futures Command is incorporating this
4 scenario into the capabilities development process.

5 General Murray: Thank you for the question, Senator.

6 You know, the Army and none of the services can build,
7 in my case, an Army for a specific scenario in a specific
8 theater. We do have global responsibilities and that
9 explains, you know, some of the other things that we are
10 doing in the budget.

11 Specific to the fait accompli, and it is a scenario
12 that we started off with, to be honest with you, when we
13 started to look at this, there are two sponsor to a fait
14 accompli. You can either prevent it through deterrence or,
15 we believe, through long-range fires positioned in the
16 theater, because the quickest way to get from Point A to
17 Point B is already be at Point B, or then, you know, if that
18 fait accompli is completed, then you are facing a
19 potentially long, protracted effort to reverse their effort.

20 And so, our preference is either through deterrence or
21 being present in theater with the assets, primarily long-
22 range fires, to help convince the Chinese, number one, that
23 today is not the day to try this, and number two is if they
24 do try it, to help the rest of the Joint Force prevent that.
25 That would be my response.

1 Senator Hawley: Yeah, very good.

2 And can I just ask you if you agree with the Secretary,
3 Secretary Austin, that is, and the Deputy Secretary, that
4 our forces have to be able to defeat a Chinese fait accompli
5 scenario.

6 General Murray: Of course they do.

7 Senator Hawley: Yeah, I thought that might be your
8 answer. But let me ask you how you envision PrSM being used
9 in the Pacific.

10 Do you envision it being deployed forward on a regular
11 basis or surged into theater, as needed, in the event of a
12 crisis or conflict?

13 General Murray: That is primarily up to the INDOPACOM
14 commander, the employment of forces. With my experience, I
15 could see both. And as you know, for the precision strike
16 missile, we have already flown it 400 kilometers, which is a
17 record for one of our systems. Later this fall, we will
18 shoot it from Vandenburg and we will see how far it will
19 actually go and spiral to. We will incorporate a seeker to
20 allow it to target both, land-based and sea-based emitters.

21 And then we have begun, in this budget, to invest in
22 extended-range, which our hope is to get it out over a
23 thousand kilometers.

24 Senator Hawley: Very good.

25 When do you plan to field PrSM with an anti-ship

1 warhead?

2 General Murray: I believe that is in 2026 or 2027.

3 Senator Hawley: Got it.

4 And do you see this becoming primarily a sea-denial
5 asset or doing both, sea-denial and land-attack?

6 General Murray: Both. Depending on which theaters you
7 are talking about and the role, and once again, the desires
8 of the combatant commander.

9 Senator Hawley: Very good.

10 Let me ask you here in my last few seconds, either for
11 you, General Murray or you, General Peterson, how you
12 envision the Long-Range Hypersonic Weapon helping the United
13 States respond effectively to any Chinese fait accompli
14 against Taiwan and any contingency. And I am particularly
15 curious in how you envision that capability allowing us to
16 hit time-sensitive targets, the mobile command centers, for
17 instance, that Chinese forces would rely on to mount any
18 effective invasion.

19 General Murray: At least the first iteration, and I
20 think this is true of most, if not all of the services,
21 time-sensitive targets become problematic just by based on
22 the time of flight. But if you are talking hypersonic
23 flight, it is a very quick launch to target, so it does help
24 you, to a degree, cover those distances in a time-effective
25 manner.

1 And the primary advantage of the hypersonic weapons
2 that we are developing is the range that it provides us.
3 And we have had one test shot. We have another test shot
4 coming up in the not-too-distant future. So far,
5 successful. We stood up the unit at Joint Base Lewis-
6 McChord in Washington state and we are starting to deliver
7 training equipment to them. So, we are on track to deliver,
8 in 2023, the first hypersonic battery.

9 Senator Duckworth: Thank you.

10 With the ranking member's agreement, we will begin a
11 second round of questions. Thank you.

12 General Peterson, I am going to follow-up with the line
13 of questioning that the ranking member began, which has to
14 do with prioritizing future capabilities at the expense of
15 ongoing modernization efforts.

16 The Army submitted a \$5.5 billion in unfunded
17 requirements. Within that, there was this decision that had
18 to be made to prioritize future capabilities at the expense
19 of ongoing modernization efforts of enduring capabilities,
20 which left just under 2 billion, 1.9 billion for
21 modernization and equipping and unfunded requirements.

22 I have three questions that I would like you to answer
23 and I am going to give them all to you right now. What are
24 the top modernization projects included in this list? How
25 are you ensuring that enduring capabilities receive

1 sufficient priority through support deterrence, or if
2 necessary, emergent requirements?

3 I am worried, also, about the increasing costs of
4 maintenance costs of aging equipment.

5 And then, finally, how do these decisions impact the
6 modernization efforts and timeliness of the Army National
7 Guard and Army Reserves, the timelines, sorry, of the Army
8 National Guard and Army Reserves' modernization?

9 Thank you.

10 General Peterson: Chair Duckworth, in reverse order,
11 if I may. First, the Army National Guard and Army Reserve,
12 in some cases, we do slow modernization across the entire,
13 total Army force, be that with aviation efforts or our
14 ABCTs, based on these tough choices that we have alluded to.

15 Each and every one of our forces will pay some of those
16 bills across the board. As you may be aware, in the
17 aviation portfolio, we will retain the older versions of the
18 Apaches in the active force, actually longer than we will in
19 the National Guard, and we will divest of the older
20 Blackhawks in the National Guard earlier than we will in the
21 active force. So, there is not a disproportionate burden
22 being borne by our multicombo teammates and partners here;
23 these are informed decisions across the board as we spread
24 the pain, if you will.

25 With respect to our enduring investments, there are

1 multiple cuts in the reflected, for restorals if the
2 resources are available in the Chief's UFR list. We have
3 several of the enduring systems involving our ABCTs that we
4 reflect. Those are our prime, heavy-fighting forces that
5 are at rate there, that we do ask for your consideration.
6 And those would be the primary ones in the enduring forces.
7 We will have our ABCTs, our heavy forces and the elements of
8 those, and our striker forces for an extended period of
9 time.

10 With respect to the modernization priorities that are
11 here, there are many opportunities for acceleration; again,
12 we funded them appropriately to meet the needs and keep them
13 on plan. The requests in the Chief's UFR list are for
14 opportunities for acceleration.

15 Senator Duckworth: Thank you.

16 Mr. Bush, maturing technologies to an appropriate level
17 is critical to ensuring that the systems delivered to
18 soldiers function as expected and provide the capabilities
19 required.

20 How is the Army ensuring technologies are demonstrated
21 in an operational environment before they are transitioned
22 to a program of record, and please describe how the Army
23 decision-process has sufficient dexterity to ensure
24 iterative technology development is included, even after
25 transition to that program of record status. Thank you.

1 Mr. Bush: Yes, Senator.

2 So, in the first part, I think the Army, as you have
3 seen, the Army is taking a new approach over the last few
4 years with, rather than the traditional process, going to
5 more of a prototyping first, then determining requirements,
6 then going into production, with soldiers involved in that
7 prototyping phase to ensure that the requirements reflect
8 what the needs of the service are.

9 That transition from prototyping at different levels of
10 fidelity to actual production is the difficult part of this
11 new approach. So, the key thing we are doing is working
12 collaboratively with General Murray's team and my team, is
13 to make sure that those handovers between prototyping and
14 actual production are planned well in advance.

15 The teams work together to make sure it is not being
16 thrown over the fence, but rather, worked together through
17 the process to make sure we go from a prototype to a
18 production system in a way that is responsible and is
19 properly tested.

20 So, one of my personal commitments to you is to ensure
21 that the testing, especially operational and safety testing,
22 no corners are cut in that regard, even those we are trying
23 to go quickly.

24 Ma'am, if I could on the requirements part, I would
25 defer to General Murray for a little more color there.

1 General Murray: And, ma'am, just a very quick example.
2 So, two systems are handheld radios and the new Manpack
3 radio. You talk about an operational environment, we
4 deployed them with the unit to the Joint Readiness Training
5 Center and we had testers and evaluators with the unit at
6 the Joint Readiness Training Center to get after exactly
7 what you talked about. This is an example.

8 Senator Duckworth: Thank you.

9 Senator Manchin?

10 Senator Manchin: Thank you, Madam Chairwoman.

11 General Murray, the Army has used the Reserves and
12 National Guard forces extensively for over 20 years to
13 support the global war on terror, however, I am concerned
14 that they have not adapted to supporting them with the same
15 training and assets as if they were an active component. I
16 will give you an example.

17 There are eight Army National Guard Combat Aviation
18 Brigades with four battalions of AH-64 Apache helicopters,
19 each only manned by 18 aircraft, instead of the 24 typical
20 of an active-duty battalion. The number used to be higher
21 with eight battalions of Apaches, all manned with 24 at one
22 time.

23 The reduction, itself, was a blow to readiness for the
24 National Guard, but we have heard that the Army now plans to
25 phase out its own supply of D-model Apaches, without

1 offering conversions of those aircraft to National Guard,
2 which would bring the brigades back to full strength.

3 So, is there any reason why they can't be transferred
4 to the National Guard, those aircraft?

5 General Murray: You know, I am going to ask General
6 Peterson, an aviator --

7 Senator Manchin: Sure.

8 General Murray: -- to chime in here, Senator.

9 And the one thing I will say before I turn it over to
10 him is, at least from our perspective, when you look at
11 things like rearm, which I know came up in this morning's
12 hearings, as well --

13 Senator Manchin: Uh-huh.

14 General Murray: -- the Army views that as compo-
15 agnostic. So, regardless of compo, the unit that is going
16 first, give it a war plan, give it a contingency, gets the
17 most modern equipment the Army can possibly provide.

18 A lot of the Echo model that you are talking about,
19 which is replacing the Delta, is a conversion, so my guess
20 is units across the Army are short as we send Delta models
21 back to the factory to be refurbished as Echoes.

22 Senator Manchin: Go ahead.

23 General Peterson: Senator, I apologize if somehow a
24 disinformation campaign struck there.

25 The bottom line is, we are absolutely committed to

1 staying on track to completely fielding our National
2 Guard --

3 Senator Manchin: Back to 24?

4 General Peterson: Absolutely. We are committed and we
5 are resourced to do so.

6 Currently, the plan is to field the, to buy out the AH-
7 64E by 2025 with fielding in the next couple of years. The
8 active component will retain two D-model equipped units.
9 But the Guard will be fully resourced with their full
10 battalions and the most modern capability.

11 Senator Manchin: That is good news.

12 General Peterson: And we are not diverting from that.
13 That is not a new plan. We are rigidly sticking to it and
14 our --

15 Senator Manchin: I have no idea how the absolutely
16 erroneous information got out, but we will try to track it
17 back, to help get the culprit.

18 Let me ask this question, if I can, General Peterson,
19 this is probably for you, too, the Army's future fighting
20 force method has been to strengthen existing alliances,
21 develop new partnerships, increase readiness, and build a
22 more lethal force.

23 Every day I am reminded how vulnerable we are from the
24 cyber, and I am on the Cyber Committee and chair that
25 subcommittee, and I am deeply concerned with the

1 cybersecurity capacity and capabilities to operate
2 seamlessly with our civilian partners. And I view the
3 capabilities of the National Guard in the cyber domain as
4 critical enablers to support the local authorities and to
5 influence national security both, abroad and domestically.

6 So, my question would be, as part of the future 2028
7 Army concept, how do you see the National Guard being used
8 to influence cybersecurity?

9 General Peterson: Senator, thank you for that
10 question.

11 With respect to our overarching cyber approach and
12 strategy, there are multiple components of that. First, is
13 the people component, which involves force structure and
14 training and recruiting and, certainly, retention of the
15 very talented professionals associated with those unique
16 skill sets, which also have an exceptionally high demand and
17 competitive salaries in the civilian world. And I know that
18 our Army is taking that under our talent-management
19 strategies very, very seriously.

20 We have stood up cross-components, new structures and
21 new organizations that optimize the cyber teams at various
22 locations. I do not recall the specific number that are in
23 the National Guard, but I know that they have been resourced
24 and continue to flush out those teams.

25 With respect to the specific implementation of the

1 equipping or the modernization side, I would ask if we could
2 speak in another forum or session to talk about the
3 determined investments that we continue to make in that
4 realm that bring us capabilities that keep us relevant and
5 at pace with the specific threats.

6 Senator Manchin: And Mr. Bush, my time is running out
7 really quick. Referring from stagnation and research and
8 development and doctrine is critical deficiencies to
9 viability of any organization, as we know. My question
10 would be, what participation from the other services is
11 there with Project Convergence on ensuring acquisition is
12 conducted with joint interoperability in mind? We have such
13 a difficult situation there and challenge, it seems like.

14 Mr. Bush: Yes, Senator, if I could, I will start
15 briefly and then turn that to General Murray if that is
16 okay --

17 Senator Manchin: Sure.

18 Mr. Bush: -- as the person in charge of Project
19 Convergence.

20 We are constantly working with the other services
21 across R&D efforts. I cannot say that we are perfectly
22 synchronized, but we do meet often and have tried to
23 leverage each other's efforts where we are doing that,
24 especially in the realm of command and control, which I
25 think General Murray can talk to you with regard to JADC2

1 and Project Convergence.

2 General Murray: And, Senator, Project Convergence
3 deals primarily with early S&T, R&D efforts, and so very low
4 technology-readiness levels. I think the place where the
5 services get the most benefit of working together is a place
6 at Aberdeen Proving Ground, we call the Joint Systems
7 Integration Lab, where we have the opportunity to come
8 together and understand at the very beginning of what is
9 going to work together well and what is not going to work.

10 And so, instead of stove-pipe developmental systems
11 that we have to tie together once we have produced it, we
12 have figured out how to tie things together at the very
13 beginning. There is a tremendous amount of learning in a
14 lot of areas to include what is being pursued from a
15 research, development, test, and evaluation perspective by
16 the services and there is open sharing of good ideas and
17 ways to proceed.

18 Senator Manchin: Thank you, all. I appreciate it.

19 Senator Duckworth: Senator Tillis?

20 Senator Tillis: Thank you, Madam Chair.

21 Thank you, gentlemen, for being here.

22 I was watching the hearing in my office and my
23 colleagues touched on a lot of the questions that I was
24 going to ask, but I did have a few things that I wanted to
25 go back to. One is the Next-Generation Squad Weapon.

1 Mr. Bush, I think you mentioned that the Lake City
2 Ammunition Plant, or you may have in prior testimony, I
3 don't know if you did it in this hearing, 3 to 4 years
4 before they can fully ramp-up for producing the munitions.
5 And I think in response to Senator Hawley's question, you
6 said you may rely on contractors to field munitions sooner
7 than that.

8 The 3-to-4 year, I go back a lot of times, if you have
9 ever seen me do any kind of hearings on acquisition, I go
10 back to the 680-page next-generation handgun, 10 years to
11 select, 10 years to deploy. About the time we will need
12 another one.

13 And so, the time frame for the Next-Generation Squad
14 Weapon, relatively speaking, is probably going to beat that
15 mark, but what can we do to speed this up and to what extent
16 should we be looking at other ways to produce in the future?

17 When we are talking about Next-Generation Squad
18 Weapons, should we also be talking about next-generation
19 ammunition manufacturing and distribution?

20 With all due respect, my colleague from Lake City, when
21 you see some of the technologies, I have gone out and
22 visited True Velocity, polymer-based casing, lighter, more
23 accurate. To what extent do those moderate ways of
24 manufacturing munitions actually enter into the equation?

25 Mr. Bush: Senator, first, on Next-Generation Squad

1 Weapon, and I think it is the polar opposite of what
2 happened with the handgun. So, you may really use those as
3 two extremes. And it is using every rapid method we have to
4 test weapons that are being tested now. We picked three
5 vendors and their weapons are in the hands of soldiers going
6 through testing.

7 There will be challenges with that, but we are hoping
8 to narrow that down. And the first quarter of fiscal year
9 2022 is the selection down to the final one. So, in terms
10 of acquisition process, sir, I don't think there is another
11 authority that Congress can give us to go any faster than we
12 are in this case.

13 With regard to the ammunition, I believe all three of
14 these selected vendors have a different ammunition approach,
15 with polymer, cased telescoped, and perhaps one that is a
16 little bit more conventional. So, I believe the Army is
17 aware of the innovation in that space.

18 This weapon will not equip the entire Army, initially,
19 so you could probably look at it as possibly a first step,
20 and I believe as advances in ammunition come through,
21 General Murray's team working on requirements for possibly
22 new types of capabilities we will need against enemy
23 defensive equipment, for example, would be in the lead for
24 that.

25 Senator Tillis: And maybe, General Murray, you can add

1 to that, but I am also curious about the future of
2 designing. Right now, we design next-generation weapons
3 around the kind of known for the ammunition, but are we
4 reaching a point where we design guns around new ammunition-
5 delivery systems, you know what I mean. I mean, we are
6 using, basically, the same kind of technology that we have
7 been using for about 100 years; the casings, build a gun
8 around it.

9 But tell me a little bit about what we are doing for
10 future generations for any of kind of small arms.

11 General Murray: So, Senator, thank you, and to add on
12 to Mr. Bush's answer, because of the way we are doing this,
13 we do have three entirely different designs for the bullet.
14 So, to credit for the acquisition community in Lake City, we
15 don't know what the manufacturing requirement is going to
16 be, because we don't know what we are going to have yet, and
17 so the ammunition is, by necessity, trailing the development
18 of the weapon.

19 In the case of this weapon, we started with, not a
20 bullet, but just the effector, the lethal end, the lethal
21 mechanism of the cartridge, which was government-developed,
22 and went to industry and said, build us not only one weapon,
23 but two weapons, an automatic rifle and an automatic weapon,
24 a rapid-fire weapon around this effector, and that is why we
25 ended up with the three different types of cases and three

1 entirely different designs for weapons.

2 One is what they call a bull-pup, and the other two are
3 more conventional. And we had tremendous interest from
4 industry, and I think we are going to end up with a very
5 viable solution with that approach. It was a completely
6 different approach, as Mr. Bush said, than the handgun.

7 Senator Tillis: Okay. Thank you, gentlemen.

8 Senator Duckworth: Senator Kelly?

9 Senator Kelly: Thank you, Madam Chairwoman.

10 General Murray, this question is for you about Project
11 Convergence, the centerpiece for transformational change for
12 the Army. So, last August and September, Project
13 Convergence 2020 conducted its capstone event at Yuma
14 Proving Ground, an ideal location to host an event like
15 this, not only because Marine Corps Air Station Yuma is next
16 door and was able to provide an F-35, but it is a great
17 environment to operate in; good weather, but also a
18 challenging environment, desert environment.

19 And that is important, to make sure that we know our
20 technology is going to work when we need it the most. An
21 important part of this concept of modernization is trying
22 out innovative ideas and technologies, sometimes even before
23 they are fully matured. You mentioned very low TRLs for
24 some of these items, finding out early on, which ones work,
25 which ones don't. I want to really applaud that mindset,

1 because I believe this is exactly what we need to innovate
2 and to respond to emerging threats.

3 So, General, what are some of the lessons learned from
4 last year's demonstration, maybe something that didn't go
5 quite as planned, but also, was there any relatively low TRL
6 item that performed well and surprised you and you think
7 could be in the Army's future?

8 General Murray: So, Senator, thank you.

9 And we are actually coming out to Yuma, again, later
10 this year as you probably know, a little bit later;
11 hopefully, it is not 120 degrees again when we are out
12 there.

13 Senator Kelly: I think it is today.

14 General Murray: Project Convergence taught us a lot.
15 And as you mentioned, it was Army S&T coming out of Army
16 labs. And the key thing there is, you know, as we begin to
17 work with these technologies, it is Government-owned
18 intellectual property, and so we were free to work on those
19 technologies at Yuma in the dirt with soldiers and coders
20 and engineers working side-by-side. That is the first
21 lesson, is the power of marrying up soldiers and engineers,
22 that soldiers can say, if only it could do this, and then an
23 engineer or a coder or a scientist can say, it can do that,
24 give me 6 hours it recode some of this and we will see what
25 it can do. That was the first powerful lesson.

1 The second powerful lesson is, and we didn't have all
2 of the cross-functional teams out there, is the realization
3 as you look across the Army modernization, the systems
4 integration and the systems engineering of what we are
5 doing, the whole has to be greater than the sum of its
6 parts. As you start to pair these things together, you can
7 accomplish some pretty amazing things.

8 Last year was focused on sensor to shooter. We got a
9 process that was in tens of minutes, down to tens of seconds
10 using, to include space-based sensors at extended ranges.

11 The third thing we learned was that we have got to have
12 coders in the Army because we were literally rewriting code
13 each and every day to make things work, which was the
14 genesis of the thing we called the software factory, which I
15 mentioned in my opening comment, the ability to reach out
16 and really capitalize on the talent, not recruit the talent,
17 but capitalize on the talent that is currently in the Army
18 and then give them those skills so we have those front line
19 coders on that future battlefield.

20 The power of the, and we had not planned for the Marine
21 Corps F-35. Out of the generosity and willingness to
22 participate, they came in. We were able to link the F-35 to
23 ground and pass traffic, targeting data both up and down,
24 which was a first for us to be able to do that.

25 Project Convergence 2021, which you will see this year,

1 and you are welcome to attend, you will see all four
2 services out there doing basically the same thing; working
3 to solve joint problems from the ground up.

4 There was an algorithm that we used to pair, and there
5 are lots of things that I was impressed with, but to pair
6 the best shooter that we had available in deconfliction of
7 airspace and range, ammunition on hand, and it did it
8 through an automated algorithm.

9 There was a technology we had at Joint Base Lewis-
10 McChord that basically took the feed from the sensor, did
11 the target mensuration down to 10 digits, cleared the fires,
12 put it in a standard message format, passed it back down to
13 Yuma Proving Ground in your state, and then it went through
14 this algorithm to match it up with the best shooter.

15 So, we had lots of things. Nothing worked perfectly at
16 the demonstration last year. There were very few things
17 that worked perfectly, but I think that is the beauty of it.
18 This is not a canned exercise. We are actually trying to
19 make these technologies work together in ways, in some
20 cases, they were never designed to do.

21 Senator Kelly: General, would you say that that
22 algorithm was at the level of using artificial intelligence
23 on the battlefield?

24 General Murray: I would say machine learning at this
25 point and we are continuing to mature it.

1 Senator Kelly: All right. So, we are going to need to
2 continue to have these partnerships with institutions across
3 the country, universities like the one we have in Arizona or
4 the three major universities, to make sure that you have
5 those coders available to incorporate and continue to
6 develop these technologies.

7 General Murray: Absolutely, Senator.

8 Senator Kelly: Thank you, General.

9 Senator Duckworth: Senator Cotton?

10 Senator Cotton: Mr. Bush, last fall, the Army reported
11 to Congress that the Iron Dome Missile Defense System would
12 meet the Army's need for an interim capability to protect
13 troops from short-range mortars, artillery, and rockets.

14 What is the current status of that program, including
15 its acquisition, training, air defense integration, and
16 fielding?

17 Mr. Bush: Yes, Senator.

18 So, the first tasking from Congress was two batteries
19 in operation, and the Army will have two operational
20 batteries of the original Israeli Iron Dome system by the
21 end of the year, capable of being deployed. And they will
22 be part of the Army's air defense force.

23 So, what follows is what the Army is working on now,
24 which is a system that will provide additional capability
25 working with some different vendors that we are hoping to

1 get a decision on in the near future to down-select and then
2 move into production to provide protection that is even
3 better than what Iron Dome provides, in regards to, for
4 example, cruise missiles and some unmanned vehicles.

5 Senator Cotton: And when you say ready to deploy later
6 this year, that means with a maneuver unit, capable of
7 deploying around the world, in conflict?

8 Mr. Bush: Yes, sir, that is the plan.

9 Senator Cotton: What is the biggest hurdle to
10 integrating Iron Dome into our maneuver units and our air
11 defense systems?

12 Mr. Bush: Full integration of software.

13 Senator Cotton: Is there a way to achieve that --

14 Mr. Bush: Sir --

15 Senator Cotton: -- or is that why you are looking at
16 alternative systems that will address some of those other
17 threats, as well?

18 Mr. Bush: That is part of the answer, sir, yes.

19 Senator Cotton: The short answer is, they don't want
20 to give up all the code, right. Okay. Got it.

21 Active protection systems, General Murray, there is a
22 sixteen-million-dollar unfunded request for Bradley- and
23 Stryker-centric active protection systems to defeat incoming
24 RPGs and recoilless rifle rounds. Can you explain the
25 importance of getting that request funded and how delaying

1 that fielding, the fielding of that system, or how delayed
2 the fielding of that system will be if it remains unfunded.

3 General Murray: It would be a guess to tell you how
4 long because it is going to depend on future budgets,
5 Senator, whether we can fit it into the base budget.

6 The money you mentioned is really to work on
7 characterization of a system called Iron Fist Light
8 Decoupled, and that is a long acronym. We have been working
9 with Iron Fist for a while.

10 The issue with the Bradley fighting vehicle is the size
11 of the top of the turret; it is hard to get an active
12 protective system on there. The problem with the Stryker
13 vehicle is it is not as heavy as armor as an Abrams, so you
14 get residual penetration of the vehicle without an
15 appropriate system; plus, the systems have to be lighter,
16 than, for instance, the trophy that is on the Abrams.

17 So, that money is designed to characterize Iron Fist
18 Light Decoupled, plus, do some work with some other
19 developing systems and then work that into, eventually, a
20 capability that we will field on both, the Bradley and
21 Stryker.

22 Senator Cotton: Okay. Thank you.

23 General Peterson: Senator?

24 Senator Duckworth: Go ahead. I'm sorry.

25 General Peterson: Pardon me, Senator.

1 If I may add, that is one piece, and, again, it
2 reflects acceleration of a specific capability in that UFR
3 list. Overall, vehicle protective systems, or suites, which
4 is a comprehensive, layered approach to protection of our
5 combat vehicles, has over \$200 million invested in it in the
6 2022 budget, fully funded and reflected.

7 Again, we are seeking opportunities to invest in other
8 capabilities and to accelerate specific capabilities. In
9 another forum, we would be honored to talk to you about that
10 comprehensive, layered approach.

11 Senator Cotton: Thank you.

12 General Murray, it is our understanding that some of
13 our more expeditionary units, like the 82nd Airborne, are
14 experimenting with a light tank that could be airdropped to
15 provide a little extra firepower on the drop zone.

16 What is the current status of that program and to what
17 extent have any testing succeeded?

18 General Murray: And we are in the middle of soldier
19 touchpoints for two vendors with what we call mobile
20 protective firepower, which is in better terms, a light
21 tank.

22 The one correction, sir, is airdrop is not one of the
23 requirements that we are currently pursuing. One of the
24 vendors is significantly lighter than the other. I mean,
25 there could be a potential there, but that is not an Army

1 requirement, to airdrop it.

2 So, the first vendor, and we are in competition right
3 now, so that is why I said vendors, instead of specific
4 industry-partner names, has completed a live-fire soldier
5 touchpoint testing and is getting ready for a limited-user
6 test. The second vendor is now in the process of delivering
7 vehicles to Fort Bragg, North Carolina. The 82nd Airborne
8 will go through the same process with soldier touchpoints, a
9 live-fire, and then we will do the LUT concurrently, so we
10 have similar weather, similar conditions, similar everything
11 before we select which vendor.

12 Senator Cotton: Okay. If it is not air-dropped, how
13 are you going to get it onto the battlefield? Is it follow-
14 on airlift after airfield seizure?

15 General Murray: Airland, yes, sir.

16 Senator Cotton: Is the Marine Corps showing any
17 interest in this kind of capability since they just got rid
18 of all of their Abrams?

19 General Murray: No, sir.

20 Senator Cotton: Thank you.

21 Senator Duckworth: Senator Kelly?

22 Senator Kelly: Thank you, Madam Chairwoman.

23 So, General Peterson, and also for Mr. Bush, so, supply
24 chain security is an issue that is a top priority for me
25 when it comes to our national defense and that includes all

1 the parts and components that make our weapons systems work.
2 That is why in recent weeks, I worked to secure \$2 billion
3 in dedicated funding for programs like the microelectronics
4 R&D network, as authorized by Section 9903 of the fiscal
5 year 2021 NDAA.

6 And I am pleased that this was included in the U.S.
7 Competitiveness and Innovation Act that passed the Senate
8 just last week. And once implemented, this effort will
9 close gaps in domestic, semiconductor, laboratory, and
10 manufacturing capacity as quickly as possible by leveraging
11 the research capabilities of universities across the nation.

12 So, General Peterson, as the person responsible for
13 matching resources to the defense strategy and the Army's
14 plan, how are you thinking about the Army's microelectronics
15 needs to support the services' modernization goals?

16 General Peterson: Senator, thank you very much for
17 that question, and as well as the recognition of the gap in
18 the risk to our National Security Strategy with respect to
19 the supply chain vulnerabilities.

20 Very specifically, in 2022, we recognized the challenge
21 with the offshore vulnerabilities of microelectronic sources
22 and with limited capabilities, fleeting capabilities
23 currently here in the United States, we participated in
24 both, a joint OSD buy with over \$200 million in 2022 of
25 required, trusted microelectronics, as well as a unilateral

1 investment of over \$60 million, as we continue to ensure
2 that we have the supply chain for essential modernization,
3 as well as new efforts and our enduring systems to mitigate
4 the vulnerability to that.

5 For a longer term, the entire Joint Force and OSD are
6 working collaboratively with you and other supporters to
7 ensure that we have enduring onshore capabilities, and we
8 appreciate your continued emphasis there.

9 Senator Kelly: Thank you.

10 And Mr. Bush, you know, part of, it is not only
11 sourcing the microelectronics, the semiconductors, here in
12 the United States, instead of overseas, one critical aspect
13 of this is also the "fab to lab" testing component. Right
14 now, we, as a nation, semiconductors are often tested, ours
15 are tested in China and some European countries. This poses
16 a national security issue for us.

17 Do you agree that it would be in the best interests of
18 our nation and our national security to do that fabrication
19 to lab, or "lab to fab" testing onshore, rather than in
20 near-peer adversary countries?

21 Mr. Bush: Senator, without having deep expertise, I
22 would say, yes, of course, we would prefer do that kind of
23 thing here.

24 If I could add some context to the overall efforts we
25 are looking at with regard to supply chain risk, about 50

1 years or more of globalization has produced deep,
2 interconnected, international supply chains for all our
3 companies that the Department of Defense works for, and in
4 particular, we find those with non-traditional companies
5 that maybe haven't worked with the Defense before, but are
6 private companies or commercial companies, have
7 international supply chains.

8 The first thing we are trying to do, our guidance for
9 now, the first thing we have to do is see ourselves. So,
10 the Army is trying to develop in-house capability to analyze
11 and understand supply chains on our own, rather than only
12 relying on industry to do that.

13 The second thing, sir, will be to evaluate risk. A
14 different risk calculus, perhaps, between something in
15 Canada and something in China, as you pointed out.

16 And the third thing will be mitigation and that is
17 where the challenges will really come and the choices will
18 have to be made between critical things like semiconductors
19 and microelectronics, like you are describing, sir, and
20 choices that we will have to make on other things that might
21 be made overseas, but might be acceptable to be made
22 overseas and that will be a "cost to risk" trade-off because
23 we also are trying to maintain our current production lines
24 at the paces that they are going, while balancing the risks
25 of international supply chains. It will be a long, ongoing

1 effort, sir.

2 Senator Kelly: Well, thank you, Mr. Bush, and thank
3 you, General Peterson.

4 I yield back.

5 Senator Duckworth: Thank you.

6 I want to thank all three witnesses for your testimony
7 today and your responses, and I thank you again. I look
8 forward to working with you all into the future. Good first
9 hearing, and, again, I just want to thank everybody.

10 With that, the hearing is adjourned.

11 [Whereupon, at 3:42 p.m., the hearing was adjourned.]

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