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**READYING THE U.S. MILITARY FOR
FUTURE WARFARE**

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HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTEENTH CONGRESS

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READYING THE U.S. MILITARY FOR FUTURE WARFARE

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
Washington, DC, Tuesday, January 30, 2018.

The committee met, pursuant to call, at 10:02 a.m., in room 2118, Rayburn House Office Building, Hon. William M. “Mac” Thornberry (chairman of the committee) presiding.

OPENING STATEMENT OF HON. WILLIAM M. “MAC” THORNBERRY, A REPRESENTATIVE FROM TEXAS, CHAIRMAN, COMMITTEE ON ARMED SERVICES

The CHAIRMAN. The committee will come to order. The committee meets today to hear perspectives on the future nature of warfare. No one can predict the future with certainty. We will inevitably face surprises, but we have to try to peer into the fog looking for trends that point us towards where warfare is headed. History tells that even great powers can be overwhelmed by change that they do not recognize or to which they do not adapt. Neither our adversaries nor relentless change will wait for us to catch up.

Responding to these future indicators does not mean that we can necessarily walk away from more traditional capabilities. The challenge of our times and the challenge of our budgets is that we must be prepared for the full range of threats from having a strong credible nuclear deterrent to nonkinetic political influence operations and everything in between. Despite the controversy, there is a lot of truth in former Secretary of Defense Rumsfeld’s comment that “you go to war with the Army you have, not the Army you want or wish to have at a later time.” The military that the United States has depends on the decisions made by Congress as part of our constitutional responsibilities to raise and support, provide and maintain our military forces. Secretary Mattis has testified that the American advantage in every domain of warfare is eroding. That is the reality with which we must prepare for whatever the future brings.

We welcome three well-qualified witnesses to help us peer into the future today so that we can better meet our duties under the Constitution to our troops and to our Nation. But before turning to them, I would yield to the distinguish acting ranking member, Mrs. Davis, for any comments she would like to make.

[The prepared statement of Mr. Thornberry can be found in the Appendix on page 41.]

**STATEMENT OF HON. SUSAN DAVIS, A REPRESENTATIVE
FROM CALIFORNIA, COMMITTEE ON ARMED SERVICES**

Mrs. DAVIS. Thank you, Mr. Chairman. And I also welcome our witnesses today. Thank you very much for sharing your views with us.

On behalf of the chairman, I want to ask unanimous consent to submit his statement for the record. And if I could just highlight a few things that I know the chairman shares as well and the ranking chair, particularly highlighting the importance of a whole-of-government approach. And we know how really important that is in successfully implementing the National Defense Strategy. So I just support to expand our partnerships and strengthen our alliances.

Of course, fiscal certainty is also critically important, and we are all well aware of the challenges in that regard. And wanting to also speak again, we have to eliminate sequestration and lift the BCA [Budget Control Act] caps. That is going to be important to future efforts of the Defense Department and certainly in defense and in protection of our troops.

I hope that we can look at all of our investments and take actions that would yield savings or raise revenues. We certainly have a duty to manage our resources, and we appreciate your insights today.

Thank you very much.

The CHAIRMAN. Without objection, the full statement of the ranking member will be made part of the record.

[The prepared statement of Mr. Smith can be found in the Appendix on page 42.]

The CHAIRMAN. We are pleased to welcome today Dr. Tom Mahnken, president and chief executive officer of the Center for Strategic and Budgetary Assessments; Jim Thomas, principal and co-founder of the Telemus Group; and Paul Scharre, senior fellow and director, Technology and National Security Program at the Center for a New American Security. Thank you all for being with us.

Without objection, your full written statements will also be made part of the record. But I would yield to you at this point for any oral comments you would like to make.

Dr. Mahnken.

**STATEMENT OF DR. THOMAS G. MAHNKEN, PRESIDENT AND
CHIEF EXECUTIVE OFFICER, CENTER FOR STRATEGIC AND
BUDGETARY ASSESSMENTS**

Dr. MAHNKEN. Thank you, Chairman Thornberry, Acting Ranking Member Davis, distinguished members of the committee. Thank you for the invitation to appear before you today.

This really is a vitally important topic. In recent years, it has become apparent that we are living in a world characterized by peacetime competition between the United States, China, and Russia. And both the National Security Strategy and the National Defense Strategy have rightfully emphasized this. Of course, competition isn't the same thing as conflict nor does competition necessarily lead to conflict. But it must be admitted that the chances of great power conflict are increasing, maybe remote, but not incon-

ceivable and growing. What was once a hypothetical future contingency is now a real and present danger.

And in my prepared statement, which has been entered into the record, I—you know, I talk about a number of the challenges. But rather than reading from it, I would like you to join me in a thought experiment, a thought exercise exploring how a future war could unfold. And it touches on the themes that I lay out in my prepared statement.

So let's imagine a war between the United States and China over Taiwan. For our purposes today, it is unimportant to describe how the war would break out, merely to believe that such a war is possible, however unlikely.

Such a war could very well begin with massive attacks by precision-guided missiles not only against military facilities in Taiwan but also against U.S. bases in the region, potentially including those in Japan and on U.S. territory on Guam. How well prepared are the United States and its allies to meet such attacks?

This campaign, this massive conventional precision missile campaign, could inflict considerable damage on U.S. forces in the Pacific, including U.S. air and naval forces. Where would the United States find replacements for these lost forces?

Imagine further that Chinese submarines armed with land-attack cruise missiles are presumed, suspected, to be lurking in international waters off of American ports, American naval bases such as Norfolk and San Diego. How would the United States balance the need to act in the Western Pacific with the need to defend the U.S. homeland?

Now imagine also that China's mobile nuclear land-based ballistic missiles leave their garrisons and are largely unlocated and that China's nuclear ballistic missile submarines put to sea. How would the possibility, the threat, of Chinese nuclear coercion and retaliation, however explicit or implicit, affect our ability to act in the Western Pacific.

Accompanying this massive missile barrage that I described earlier would likely be attacks, perhaps overt, perhaps covert, on networks that support U.S. military operations to include logistics networks as well as on U.S. communication and imagery satellites. Again, as I say, some of that might be overt and apparent, some of it might be quite murky, difficult to attribute. Precision navigation and timing networks, such as the Global Positioning System [GPS], that support the military and a lot more might be disrupted. How prepared is the United States for a conflict in space and cyberspace?

Also accompanying this would likely be a Chinese political warfare campaign aimed at blaming the war on the Taiwanese Government, perhaps, and perhaps combined with messaging targeted on members of the U.S. business community with large investments in China warning of the dire consequences that they would face should the United States intervene in the conflict.

Imagine tailored messaging to U.S. allies and friends in the region viewing the United States or portraying the United States as the interloper, as the outsider. Imagine other messages warning that the Chinese Government could not guarantee the safety of the thousands and thousands of Americans in China should the United

States act. How prepared is the United States to defend against and respond to such political warfare campaigns?

Now let's imagine what many of us would see as a positive outcome, a happy outcome, a battlefield victory. Let's imagine that Taiwan, backed by the United States and perhaps others, is able to resist Chinese aggression, that this missile campaign, these other things, don't cause the Taiwanese Government to fold, they just steel Taiwan's will. But the result, of course, is not peace, but a protracted conflict with China gearing up for a long war. How prepared is the United States, and how prepared are we and our allies, for such a situation?

Mr. Chairman, as you noted in your introductory comments, military planners have to place bets against an uncertain future. And it is only when war comes, and, of course, we hope that war doesn't come, but it is only when war comes that we can figure out whether those bets have been good ones or not. This scenario and my written testimony point to some current shortfalls as well as the way forward to address them so that we can strengthen deterrence.

First we need to field Armed Forces that possess depth and resilience to be able to fight, accept damage, and recover. Today our forces lack readiness and are in dire need of modernization. Moreover, from the bottom to the top, our soldiers, sailors, airmen, and Marines have grown used to fighting terrorists and insurgents and are unfamiliar with the challenges of great power war.

Second, we need a defense industrial base and a national security innovation base more broadly that is capable of supporting protracted operations. For two decades, the watchword has been efficiency rather than effectiveness. Moreover, in a globalized interdependent world, we need to think carefully about foreign investment in strategic industries that bear on defense.

Third, we need a logistical system capable of operating in contested environments. Getting needed men and material from the United States to forward bases and staging areas to the battlefield will be an increasing challenge.

Fourth, we face a growing need to defend the United States, to include our networks and military bases as well as our space assets.

Fifth, we will need to develop ways to identify and counter foreign efforts to influence our society and those of our allies. Russia and China have been practicing political warfare on us for some time, and the magnitude of those efforts is only now becoming apparent. We need to develop countermeasures and responses to those efforts.

Here, as in other areas, past experience can certainly inform us. And as a historian, I believe in the power of history and its importance. But the past can also mislead us. There are clearly areas where we need to relearn lost skills, skills that we possessed during the Cold War, to include logistics and mobilization. But we shouldn't mindlessly ape past behavior. Great power competition in the 21st century will not be a replay of the Cold War. In the future, great power war, should one occur, will not be a rerun of World War II or the never-fought World War III between the United States and the Soviet Union.

Instead, we need to assess thoughtfully the similarities and the differences with the past and rebuild, and in some cases just build, intellectual capital and acquire the capabilities we need to deal with the era that we are in and likely to be in for the foreseeable future.

Thank you very much.

[The prepared statement of Dr. Mahnken can be found in the Appendix on page 44.]

The CHAIRMAN. Thank you.

Mr. Thomas.

**STATEMENT OF JIM THOMAS, PRINCIPAL AND CO-FOUNDER,
TELEMUS GROUP**

Mr. THOMAS. Thank you, Chairman Thornberry and Ranking Member Davis and members of the committee, for inviting me to testify today.

I would like to focus my remarks on America's ongoing strategic reorientation towards great power competitions and highlight the significant implications this reorientation will entail. Only a few years ago, senior defense leaders believed it was inconceivable that the United States would ever fight Russia or China. And while war with great powers is not inevitable and can certainly be prevented, it is no longer inconceivable.

The new defense strategy has called for treating competitions with China and Russia as the Department's top priorities for planning. This represents a potential sea change for readying the U.S. military for future war. To understand why such rebalancing will be necessary requires understanding the profound ramifications of this modern, multisided, great power competition and its impacts on U.S. defense planning.

First and foremost, a renewed emphasis on great power competition with Russia and China should lead to a comprehensive re-evaluation of the U.S. military's joint expeditionary warfare approach. Both the Russian and Chinese militaries are capable of achieving limited local military and paramilitary objectives before the bulk of U.S. forces could arrive in proximate theaters. And both have built up formidable A2/AD [anti-access/area denial] complexes that would hinder the U.S. military from gaining footholds nearby or operating with impunity.

To be clear, the erosion of the U.S. military's positions in Europe and the Far East is less a consequence of being outmanned than of being increasingly outgunned, outsticked, outpostured in tough away games. The fact that expeditionary warfare lacks the potency and credibility it once had requires the United States to identify and adopt new approaches to projecting power. The prioritization of great power competition in U.S. strategy also means that nuclear forces are once again coming to the forefront of planning efforts.

War games and other planning exercises must consider scenarios involving their use, in an effort to understand potential escalatory dynamics. The United States must also shore up its theater nuclear warfare capabilities by fielding theater-range, difficult-to-intercept nuclear cruise missiles. Such missiles could be air or submarine launched and should have a high probability of arrival at a target despite the presence of precision air defenses.

Beyond the nuclear dimension, great power competition will also require rebalancing U.S. conventional forces. In particular, it will place a premium on low signature forces with light logistics footprints capable of operating independently far forward in denied areas. Such forces include submarines and unmanned underwater vehicles, long-range penetrating surveillance and strike aircraft, special operations forces, ground-based missile forces, cyber and electronic attack capabilities, and space-based persistent surveillance systems.

All of this coupled with vastly greater quantities of precision standoff and direct attack munitions. These forces represent only a fraction of the current U.S. military but are likely to constitute the core element of a joint vanguard force in any future great power contingency.

Rebalancing our forces should be informed by the fact that war with Russia and/or China would involve target sets that are potentially vastly greater and more geographically distributed than those of regional opponents like North Korea. The United States may have to increase its stocks of preferred precision-guided munitions and delivery systems by more than an order of magnitude to ensure its conventional deterrent is credible.

Whatever dangers of collusion and opportunistic aggression there were with respect to region rogue states, they pale in comparison with the risks associated with Russia and China. Indeed, should war break out between the United States and one of these powers, it is difficult to imagine that one party would not coordinate its warfighting efforts with the other.

A strategy that emphasizes great power competition should take account of the likelihood that the other great powers will collude in opposing the United States both during peacetime competitions as well as in a state of armed conflict. This places a premium on globally fungible forces and capabilities that could be used to inflict unacceptable levels of punishment on multiple adversaries simultaneously.

In conclusion, Mr. Chairman, the competitions the United States faces with Russia and China are likely to last for decades. Winning will likely come from our staying power rather than victory in any decisive battle of annihilation. Thus it will be critical to maintain national solvency over time and to judiciously apply scarce resources—fiscal, human, natural, allied, and technological—in order to fulfill our duty to provide for the common defense not only for ourselves but for our posterity.

Thank you

[The prepared statement of Mr. Thomas can be found in the Appendix on page 48.]

The CHAIRMAN. Mr. Scharre.

STATEMENT OF PAUL SCHARRE, SENIOR FELLOW AND DIRECTOR, TECHNOLOGY AND NATIONAL SECURITY PROGRAM, CENTER FOR A NEW AMERICAN SECURITY

Mr. SCHARRE. Chairman Thornberry, Ranking Member Davis, and distinguished members, thank you for inviting me to testify today.

The title of today's hearing is "Readying the U.S. Military for Future War." I regret to say that the U.S. military is not ready for the threats we face today.

In a recent simulation of a war in the Western Pacific, colleagues of mine at the Center for a New American Security showed that a Chinese missile strike on U.S. bases in the region could destroy more than 200 aircraft on the ground, crater every runway at U.S. air bases in Japan, hit almost every major headquarters within minutes of a conflict beginning, destroy key logistical facilities, and hit almost every U.S. ship in port in Japan.

Similar analysis done by other defense experts have consistently shown that the United States ability to project power abroad has been steadily declining. China's arsenal of hundreds of cruise missiles and over 1,000 ballistic missiles poses a significant threat to U.S. bases in the region and aircraft carriers. The U.S. military faces similar problems in Europe where the United States has fallen behind Russian investments in long-range precision strike, integrated air defenses, and electronic warfare.

These problems did not spring up overnight. Broadly categorized under the label of anti-access capabilities, these threats to U.S. power projection are well understood. Defense analysts have been warning about the U.S. military's diminishing ability to project power into contested regions for the past two decades. And these threats have been recognized in every official DOD [Department of Defense] strategy document since the 2001 Quadrennial Defense Review.

Moreover, the steps necessary to counter these threats are clear. Increased investment in long-range strike, stealthy uninhabited aircraft to hunt mobile targets, advanced munitions, electronic warfare, and undersea strike. Yet the military has made only halting steps towards these investments. The Air Force is still heavily weighted towards short-range tactical fighter aircraft, and under current plans, will remain so for decades to come. The Navy's aircraft carriers similarly only carry short-range fighters limiting the carrier's usefulness in the early stages of a major conflict.

Despite strong pressure from Congress, the Navy has no plans to invest in a long-range strike aircraft to extend the carrier's reach. The Army has even more acute problems in power projection due to reduction in Army brigades forward based in Europe and the complete lack of any effective Army modernization for the past 15 years.

Why are we here? We spend more money than our adversaries. The United States is a global technology leader, and our warfighters are better educated, trained, and motivated than our adversaries. We have seen this problem coming for two decades yet we have failed to adequately respond. It is not for lack of money. With sufficient reforms, there is ample money within a \$600 billion defense budget.

Budgetary stability is needed. The current budgetary instability inflicted on the military due to a failure of the Nation's political leaders to reach a bipartisan deal on taxes and entitlements has severely hampered readiness and modernization.

We cannot fuel the first-class military through government shut-downs, continuing resolutions, and constant uncertainty about

long-term spending. But these problems predate the current budgetary crises.

Money alone will not cure what ails the Pentagon. Nor is it because DOD has been fixated on wars in the Middle East. A lot of taxpayer money went towards military modernization for future threats even while troops were fighting in Iraq and Afghanistan.

The reason we have failed to adapt is because our system lacks sufficient strategic agility. We have a ponderous and risk-averse acquisition system that develops weapons on decades-long time horizons. This is too slow to keep pace with the rapidly changing world.

This problem is compounded by political pressures in the Pentagon, industry, and Congress that make it exceedingly difficult to cancel legacy programs that are less useful for future wars. If our military is to adapt to these threats, Congress must be a willing partner in terminating programs that are no longer needed.

And finally, cultural resistance within elements of the military to new paradigms for warfighting, particularly when it comes to using uninhabited and robotic systems. Congressional leadership is needed to help prod the military services towards new ways of fighting that may be uncomfortable but are necessary if the United States is to remain a global military power.

Thank you for the opportunity to testify here today, and I look forward to your questions.

[The prepared statement of Mr. Scharre can be found in the Appendix on page 57.]

The CHAIRMAN. Thank you. Thank you all.

Okay. We asked all three of you-all to help us peer into the future about the nature of warfare. And all three of you-all come back and say what we have to prepare for is peer competitors, Russia, China. Now, is that because the new defense strategy says that, or do you-all really believe that is the direction things are headed and that is the threat for which we have to be prepared?

Just run down the line right quick.

Dr. MAHNKEN. Sure. Well, I am on record, over the course of years, I hate to say it maybe more than a decade at this point, saying that great power competition, the prospective of great power war, is the most consequential threat that we will face and, therefore, it really should be the centerpiece of our planning. Not to say that there aren't other contingencies, but the most consequential, the most important contingency we face out there is the prospect of a great power war.

Mr. THOMAS. I think that is—Tom put it just right, which is it is the most consequential, even if perhaps it is not always going to be the most likely or the most frequent. And if we prepare adequately for conflict and competitions with great powers, that is our best chance at avoiding that very outcome.

Mr. SCHARRE. So, Chairman, the new NDS [National Defense Strategy] says that inter-state strategic competition, not terrorism, is the primary concern in U.S. national security. I don't agree with that assessment. Terrorists killed 3,000 people on 9/11, and terrorists remain a direct threat to the safety and security of American citizens. I think it is important to distinguish between threats to U.S. citizens and their lives and American interests abroad.

A lot of other places, Taiwan, the Spratly Islands, Ukraine, those are not U.S. territories. They matter to U.S. interests, right. And I think we do need to prepare for both. I don't agree with the ranking ordering of them.

From a financial standpoint, the challenge is that it costs a lot more to compete against countries like Russia or China or to defend against ballistic missile threats from North Korea than to fight terrorists.

So there are investments we need to make to do things to prepare for terrorism, things like a new OA-X airplane for the Air Force, sustaining, for example, the MQ-9 fleet. But they are not as costly as the things you need to do to prepare for inter-state strategic competition.

The CHAIRMAN. Okay. You just confused me. So you are saying that because we can do some things cheaper, we ought to do those and ignore other things—

Mr. SCHARRE. No.

The CHAIRMAN [continuing]. Because they are more expensive?

Mr. SCHARRE. We have to do all of them. We have to be able to do all of them.

I don't agree with the rank ordering that demotes terrorism as though that is not a concern. We have to be able to do all of those things.

The CHAIRMAN. Okay. Yeah. All right. That, I agree with.

But then Mr. Scharre was very explicit saying we are not ready for great power competition. Do you-all agree with that?

Dr. MAHNKEN. I do. We have taken essentially a quarter century hiatus from thinking about and preparing for these types of contingencies.

Mr. THOMAS. I would just add to that in agreement that we have honed our warfighting enterprise around fighting smaller regional contingencies. Our expeditionary warfare approach is tailor-made for going up against Saddam Hussein's Iraq. But it would require a tremendous amount of adaptation to face Russia or China.

The CHAIRMAN. Well, and I guess that is the last question I want to ask for now.

So on 9/11, we were woefully unprepared for the kind of conflict we were going to engage in for the next 17 years so far. How big a deal is this cultural mindset to shift from terrorism and regional sorts of situations that you describe, Mr. Thomas, to this return or emergence of multiple great power competitions?

I will start with you, Mr. Thomas, and then I will get everybody.

Mr. THOMAS. I think it is challenging but in a variable way across the force. And really what you are talking about, and I think Paul was getting to this, is it is really about rebalancing inside of each one of our services. In the Air Force between short range and long range. In the Navy between surface and subsurface. In the Army between maneuver force and fires. Within special operations between direct action and unconventional warfare.

So we have big changes to make across all of our services as we adapt. And it is not a question of jettisoning global counterterrorism operations, but it is a question of, essentially, adjusting the rheostat for the joint force.

The CHAIRMAN. Mr. Scharre, do you have any comments on that?

Mr. SCHARRE. Yes, sir. We do need to rebalance our forces, but it is not actually from terrorism to great power conflict. It is really this middle kind of space that Mr. Thomas described as expeditionary warfare that the military has been focused on. It hasn't really been terrorism. It has been basically refighting the Iraq war.

So if we need to go overseas and fight a smaller middle power where we could have ready access to a nearby land base, or we can bring our aircraft carriers up close, we are well positioned to do that. If we had to fight from a distance, what we don't have access as a great power, we don't have an ability to do that.

The CHAIRMAN. Okay. Dr. Mahnken.

Dr. MAHNKEN. I guess I see the cultural challenges as a significant one. You know, we spent the first decade after the end of the Cold War in a period of sort of unchallenged dominance. And then as you point out, since then we have really been focused on terrorism and counterinsurgency.

We have a whole generation, so 25 years, a professional lifetime in the military, professional lifetime functionally in the civil service, we have a whole group that really knows nothing other than that. And I will count myself as part of that, as an Iraq war veteran. We have people who have had very, very difficult, very personal experiences in a particular type of war that may provide experience, but also may mislead.

And it is often said, you know, with respect to, say, China, Well, China hasn't fought a war since, well depending on how you count it, 1953 against us in Korea, in 1979 against Vietnam. I always ask the U.S. armed services, when was the last time that we fought a peer adversary. For the U.S. Navy, I think that was 1944. I wouldn't even give credit for 1945, the last year of World War II. And so we need to re-acclurate to a very different type of situation than we faced in the last about 17 years.

The CHAIRMAN. Okay. Thank you all.

Mrs. Davis.

Mrs. DAVIS. Thank you, Mr. Chairman.

I wonder if you could talk about the role—more of the roles and—of alliances and partnerships in future wars. I think we would probably all agree that there is certainly an importance to that, and a defense strategy speaks to it. But being more nuanced about that, more detailed, what is it that—how would we want to encourage them in certain areas? And what are we expecting of them?

And then, finally, if we don't have that as a priority from the highest levels of government, how do we—how do we function with that?

Mr. THOMAS. You know, for most of the last 25 years, we spent a lot of time encouraging our allies to go out of area with us, to go to the Middle East to provide tanker refueling in the Indian Ocean and doing other things such as that. What we really need right now are allies on the front lines in Europe and in East Asia who are really focused on their own—on defense of their own sovereignty, of their sovereign air space, their land borders, and their maritime approaches to a far greater extent.

And so this is really—I think this is really hard for the United States because in the past we have asked our allies to be little

mini-me's; we wanted them to be a smaller version of the U.S. military.

What we are talking about now, I think, is radical differentiation where, in fact, we want our allies to look some ways a lot more like our adversaries. We want our allies to have their own anti-access and area denial capabilities so that they can fend off the power projection gambits of potential aggressors.

We also want them to provide some sanctuary for us so that we can either forward station forces in peacetime as part of a deterrent or, to a more limited extent, flow forces in to reinforce them in a crisis or conflict.

Dr. MAHNKEN. Yeah, if I could build off that.

So first I would say, you know, our alliances, our allies, really are a comparative advantage, and they offer the United States a lot of—a lot of benefits. But to agree with what Jim just said, I mean, I think we need to have, both here at home and also with our close allies, a very frank conversation about what sovereign capability we and our allies need to possess and what areas we can truly rely on each other for.

So as one example, we have a lot of information-sharing agreements with our close allies. We rely, on a day-to-day basis, on information not just produced here but produced there. We rely on that. I think that is a good basis. Are there other areas where we can do that? And to the extent that we can develop truly shared capabilities, it means that we—that they may not have to reproduce everything that we have, and we may not have to reproduce everything that they have.

I think the time is right because of the threat environment, because of the fiscal situation, for that type of frank discussion between ourselves and our allies.

Mrs. DAVIS. Mr. Scharre.

Mr. SCHARRE. Yeah. So I certainly would agree that our alliances are an asymmetric advantage. And we want to make sure that we take care of them and have them ready to use.

One of the challenges I think is that we have been viewing often alliances in this role of adding sort of political top cover when we go overseas and do—we add more people on, build a coalition of the willing. That is important, that is very valuable.

For many of these future conflicts against, say, a Russia or China, we actually would be looking for allies particularly for basing and access. Our ability to get into the region. And so not just sort of having more flags around the team but that they really would be vital members for us to be able to go in and operate.

Mrs. DAVIS. Is there more than a role only for the military in this as well? How would you characterize that? Because we know that in many cases our ambassadors, our State Department help negotiate some of those basing agreements. So how critical—are we actually even looking at that as a priority in that particular need?

Mr. SCHARRE. Absolutely it is critical. We certainly—diplomacy is the method by which you build those alliances and sustain them.

Mrs. DAVIS. All right.

Dr. MAHNKEN. Here I will invoke history. You know, during the last period of great power competition, during the Cold War, the whole U.S. national security community was involved in the effort.

You know, my godmother who was in the State Department, she was—she was part of our effort to counter Soviet communism, Soviet, you know, political “political” warfare. My first job in the Pentagon way back when was doing technology transfer controls. Again, that was part of dealing with Soviet technology theft. And today, similarly, we need a multidimensional effort.

Now, of course, there are certain things that only the U.S. military can do, and so that needs to be part of it. But certainly we do need a whole-of-government and multidimensional effort to deal with the challenges we face today.

Mrs. DAVIS. Thank you very much. I hope the National Defense Strategy leads us in a direction that we can actually analyze that in a productive manner.

Thank you.

The CHAIRMAN. Mr. Wilson.

Mr. WILSON. Thank you, Mr. Chairman. Thank each of you for being here today. And Dr. Mahnken in particular, being the president of the Center for Strategic and Budgetary Assessments, we need your input here in Congress on budgeting and look forward to that.

As we discussed emerging technology and maintaining a strategic edge over our adversaries, I am concerned about the fundamental question that directly impacts our military’s readiness for future warfare.

The current fiscal environment that we live in is lurching from one CR [continuing resolution] to another. According to Pew Research, the average time between the start of each fiscal year and the date that the year’s final spending bill becomes law has grown from 56 days in fiscal year 1998 to 216 days in fiscal year 2017.

Fortunately, with the leadership of Chairman Mac Thornberry and Speaker Paul Ryan, defense funding has passed the House twice last year. And then again today, the House will be voting on defense funding, but the Senate has not achieved votes for passage. I believe that the primary function of Congress is to fund common defense to protect American families, to do for us what we cannot do for ourselves.

Could you again, Dr. Mahnken, describe the impact of the inconsistent, flat, or restrictive funding, through the concurrent continuing resolutions, has had on the military’s ability to prepare for future wars.

Dr. MAHNKEN. Thank you, Congressman.

Yeah. Look, I would agree with you that the habit of budgeting through continuing resolutions has been a tremendously corrosive one. And I know, you know, in this committee, I am pretty much speaking to the choir. But I am concerned, as much as an American citizen and American taxpayer as anything else, that at the end of the day we—you know, that Congress will pass a continuing resolution, Members will pat themselves on the back that they have done well.

But, you know, it does have a corrosive effect. If we just take, let’s say, a program. It could be a bomber program, it could be a submarine program, whatever. A program that is ramping up, that is moving towards production as we need modernization, what does the continuing resolution do? Continuing resolution freezes the

funding at that of the previous year. Where more funding is needed, where we need to gear up a production line, where we need to hire people, where we need to get things going to move something into production, something to replace aging equipment, CR really hurts that, and it delays it. And CR after CR after CR just compounds that.

And so, again, I worry that too many people think that we are doing well because we are passing CRs. But particularly when it comes to modernization, not exclusively modernization, but particularly when it comes to modernization, it is truly corrosive over time.

Mr. WILSON. And equally, the effect on contracting with private businesses, can you explain how that is affected?

Dr. MAHNKEN. Yeah. Absolutely. They are—you know, they are putting resources—they are making bets towards future—towards future funding. And that amounts to hire—again, hiring people, hiring talented people to help with design, with production, and where the money is either not forthcoming or it is delayed, it is just more and more difficult to get those talented, skilled people on-board to produce the capabilities that we need to defend the Nation.

Mr. WILSON. Thank you.

And, Mr. Thomas, as a grateful dad of sons who—four who served in Iraq, Egypt, and Afghanistan, I was so pleased to know we had technology like unmanned aerial vehicles over their head, which I counted on to protect them.

And then recently I have had the opportunity to see advances of unmanned ground vehicles. It is just—the technology is just phenomenal to climb stairs, to go through hallways, to go into caves, forested areas. But I am really concerned.

What recommendations do you have to expedite these new technologies so that they are not multiyear delays?

Mr. THOMAS. Thank you, Congressman. And I really appreciate your remarks.

You know, the unmanned revolution is coming, and I think culturally this is often seen as a threat to our—to some of our service members in the sense that it is a robot versus a human. And I think you really put your finger on it, which this is about saving lives, and this is about augmenting and empowering humans so that they have greater span of control and they can do more things and overcome some of the physiological limitations of humans. So all of that is to the better.

In terms of accelerating the entry into the force, you know, I think we have a couple problems. One is we have a technology transition problem, that there is lots of stuff that is going on in the DARPA [Defense Advanced Research Projects Agency] world. But the programs then get caught in this valley of death, that the services are not integrating them into their program objective memoranda as quickly as we would like. And I think part of the problem is that collectively we tend to commit acquisition infanticide.

Once you are in the program of record, you are in pretty good shape, because there are lots of special interests and there are service proponents and there are lots of people who will keep you in the program of record. But it is very tough for some of these new

technologies and some of these new systems to just gain entry into the program of record. And this is something where—as Paul was saying earlier, this is a critical role that Congress can play in essentially stimulating the Department as it has done historically on a lot of critical capabilities like Tomahawk cruise missiles in the 1970s and 1980s, or Predator UAVs [unmanned aerial vehicles], where Congress really can play a catalytic role in driving this.

Mr. WILSON. Thank you very much.

The CHAIRMAN. Mr. Brown.

Mr. BROWN. Thank you, Mr. Chairman. I want to thank each of you for being here and for the big thinking that you put into the question of, you know, future warfare and our readiness. Thanks for your perspectives here today.

It seems that our services strive to be ready and well equipped to do everything. I think one of you testified that we need to do everything. And I think each of you agree that it is just a matter of balance and setting the priorities. And that is true whether our budget is in the \$500 billion range or, what we are looking at maybe for fiscal year 2018, in the \$600 billion range. The President, I believe, is going to be asking for something in the \$700 billion range for the next fiscal year. It is about balance and priorities. You take on all of these missions and tasks that the services have been asked to address.

A few months ago, a member of this committee asked senior military leaders to identify either acquisitions, or programs, or maybe even missions that they would rather not pursue, but for reasons beyond their control, namely Congress's will, they are forced to pursue or to procure or acquire and spend.

Does your view, your study of these issues, are you able to identify, perhaps today, give some examples of some acquisitions or programs that are way out of balance? And when I say out of balance, more on the side where we are doing too much of it today and we could actually scale back so that we could invest resources in those areas where the balance is working to the detriment of an important mission or program?

Dr. MAHNKEN. I will give one example. It is not a program, but it is in infrastructure. I mean, I do think that the U.S. military, Department of Defense, has more infrastructure, more bases than it does forces. And I think that infrastructure, that overhead, costs. And so not to bat things back in the court of Congress, but I think another round of base realignment and closures [is] at least something that should be on the table. I wouldn't prejudge the outcome of it, but that is—I think that is something that is—that should be part of it.

I think, unfortunately, all too often, because we have deferred modernization repeatedly, particularly for the types of contingencies we are talking about, it has—the programs that should have been cut were already cut, maybe even some of the programs that shouldn't have been cut have already been cut in past years. So I am at pains to find savings there. I would be looking—I would be looking elsewhere.

Mr. THOMAS. I would add two categories to that broadly. I think one is, given this issue of great power competitions, it is about range. That we have to rebalance across our entire joint force be-

tween short range and longer range forces. And there I would say we are probably overinvesting in short-range systems, whether those be aircraft or those be ground-based artillery systems and the like. We are going to need just much greater—to operate at much greater distances than we have in the recent past. And in this way, this is kind of reminiscent of the Cold War where we had to think about long-range, ground-based missile systems. And we had a much larger bomber force and the like.

The other area, as was mentioned earlier, is in terms of balancing between manned and unmanned systems. We know that the biggest driver on DOD cost growth has come from personnel. Personnel compensation, benefits, et cetera. As we look ahead, unmanned systems not only may be more operationally effective for many of the missions we ask them to perform, but they also can help us in terms of lowering the cost of things like training and life-cycle sustainment and the like. How do we essentially position ourselves to reap some of the downstream cost benefits from these systems I think will be important.

Mr. SCHARRE. Just to add on to what Jim said, I see within both the Navy and the Air Force, some fundamental cultural realignments will have to change over the coming decades. For the Air Force, it is principally about range. And it is important. It is not just about hardware, it is about people inside the Air Force, because what you are talking about doing is changing the organizational structure inside the Air Force, who has power.

Moving from what has been a fighter-centric organization over the past several decades towards one that now has greater emphasis on long-range strike, long-range bombers, and reduced emphasis on fighters. And that is going to change the sort of balance of power inside the services between these communities. And that is where congressional leadership is very important. I see a similar need in the Navy to emphasize undersea.

Mr. BROWN. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Lamborn.

Mr. LAMBORN. Thank you, Mr. Chairman. And thank you all for being here.

We have vulnerabilities as a Nation, whether it comes from legacy or whether it comes from a strong reliance on exquisite satellites in space that are very expensive, very capable, but also potentially very vulnerable. But I want to turn this around. You know, we have our vulnerabilities. What vulnerabilities—you know, God forbid there is ever a conflict. But what vulnerabilities do China and Russia have in particular that it might be wise to pay attention to? For all three of you.

Mr. THOMAS. Well, if I could maybe begin.

I think the greatest source of vulnerability for both China and Russia is their lack of political legitimacy long term. That is fundamental. And both of them face enormous internal security risks, how they meet the demands of their people. But, you know, if you are Russia, you have got to govern and you have got to maintain security across 11 time zones.

If you think we have problems with thinking about concurrency and can we fight two nearly simultaneous wars, what does that look like from Russia's perspective? Or China's, for that matter? Do

they have the command and control to do it? Do they have the logistics to do it? Can they split their forces like that?

They also have a number of historical competitions on their borders. They don't have great neighbors like we do with Mexico and Canada. And so that is something that they always have to be on guard about.

So I would just leave those as a couple major vulnerabilities that these countries have.

Dr. MAHNKEN. Yeah, I would agree with that. And I would say, really, the political warfare campaigns that we see China and Russia waging against us are, in fact, efforts to weaken us, to weaken our morale, to divide us, because what they actually fear is, you know, that the vibrancy of our democracy. It is a reflection in a way of the weakness of the authoritarian political model.

They see us as trying to overthrow them. Whether we are actually doing it or not, our culture, our society is—offers such an example that others within their borders, without any backing by the U.S. Government, seek to emulate it.

So I think the authoritarian political system is a deep critical vulnerability for those—

Mr. LAMBORN. Okay. I hear what you are saying. I agree a thousand percent, but you are really getting more into soft power. And I agree that that is vital and is our ace up the sleeve, you might say. But I want to talk about hard power.

What are military vulnerabilities that these two near peers have?

Mr. SCHARRE. Sure. So if I may, I think certainly in electronic warfare and cyberspace, they have similar vulnerabilities that come from any kind of digitally enabled or network system that we have. Those are places where we ought to be able to exploit those. We are a high-technology country. We should be able to be dominant in those spaces. It is going to be contested, but we should be able to use that space to exploit their vulnerabilities and disable their systems, or degrade them at least.

I also think on the command and control side, because of the nature of being authoritarian regimes, even inside their military structure they are likely to have more vulnerabilities to their command and control being more brittle because their people are—they are likely less to trust their people and they are less likely to be able to take the initiative the way that U.S. personnel are going to be able to do. And so that is something we ought to think about how to exploit that in a wartime environment.

Mr. THOMAS. Let me just take a shot at judo throwing the problem that we face from an American perspective, which is we see that power projection is getting tougher for us and our ability—you know, that our position is eroding across all domains of warfare. This affects us the most because we are the country that has most branded itself as being in the power projection business. But it is going to affect all countries, and it is going to affect Russia and China when it comes to local power projection. And this is something we can exploit. They are going to be very vulnerable as they try to project power beyond their borders, that they are going to have a lot of problems we do but at a smaller scale.

And this is something we can exploit by, you know, arming our allies with anti-access and area denial capabilities, by denying them effective use of the electromagnetic spectrum, by pinning them in geographically into certain areas and not letting them break out. These are things that we can—that we could do very effectively.

But, again, it requires a radically different approach to warfare than the one we have had for the last 25 years.

Mr. LAMBORN. Thank you very much.

The CHAIRMAN. Mr. Panetta.

Mr. PANETTA. Thank you, Mr. Chairman. Gentlemen, thank you for being here. Good morning.

I come from the central coast of California. On the central coast, I am sure you have heard of the military institutions that we have there. Educational institutions such as Navy Postgraduate School [NPS] as well as DLI, Defense Language Institute. And so—just to kind of give you a foundation of what my questions are going to be focused on.

You know, obviously you have talked a lot about operational, what we can do in the future for operations. But you also mentioned a couple words like cultural resistance, I think you used, and multidimensional efforts as well. Narrowing it down in regards to our educational investments, would that be a part of these multidimensional efforts? Would it be a part of helping the cultural change? And if so, what types of investments should we have in our military educational systems?

Dr. MAHNKEN. So as somebody who spent a good chunk of his career in the professional military education system, it won't surprise you to hear—look, I think professional military education is crucial to this. And I was heartened by the language on that in the summary of the National Defense Strategy that was released the other week.

Look, I think both at sort of at the strategic level and understanding the character and conduct of war, understanding strategy, understanding foreign cultures, and becoming true military professionals, education is crucial. I think that, you know, part of the cultural change that needs to come about can come about through professional military education.

When it comes to—and you mentioned DLI. I mean, I think the Defense Department does about as good a job as can be done. Educating adults in foreign languages, I think we need to—we need to do that. We also need to look for ways to bring in folks, heritage speakers of foreign language, to kind of get them along that—along that path. I think we should explore things like bonuses or—either requirements or bonuses for ROTC [Reserve Officer Training Corps] scholarship recipients, cadets, midshipmen to take on hard foreign languages, because the earlier you learn a foreign language, the better off you are.

So I think education clearly is key to our strategic effectiveness.

Mr. PANETTA. Thank you.

Mr. SCHARRE. Thank you. You know, I think that these institutions can be really vital in helping to encourage service members to experiment, think outside the box about new ways of war-fighting. And I will give two examples. At NPS in particular, there

is a really incredible experimentation going on on swarming warfare tactics. People that—things that no one has really thought about before now that you have robotic swarms, and we have demonstrated them over 100 small drones flying together as part of a swarm, how do you fight with that?

How do you command and control that entity? How do you counter someone else's swarm? What is the right tactics for that? NPS is doing both physical and then modeling in simulation computer experiments trying to figure that out.

But, you know, more broadly I frequently get service members reaching out to me from these institutions when they are there working in courses. Give them a role, I think like asking questions about, hey, I am writing a paper on some new concept for warfare, whether it is robotics or something else.

And, you know, hey, are there things I should look into? Are there things I should be reading about? Can you give me some thoughts on this? So it gives service members an opportunity to then take a step back in their careers, think about history, think about broad patterns of innovation, and then start to apply that kind of thinking to the future of warfare and their roles going forward, which is great.

Mr. THOMAS. Yeah, I would just—I think cross-pollination is really critical. And, you know, I think back to a previous revolution in warfare in the 19th century, and there were leaders like Bismarck and Prussia who happened to also be in the railroad business, and they were able to take lessons they were learning from the commercial sector and bring them in and transform warfare. That is a role that professional military educational institutions like Naval Postgraduate School can play today. And it really is a national gem.

I would say the other thing that is really important is IMET, but it is our International Military Educational and Training programs, and bringing ally and partner military leaders to the United States where they are going to interact on a daily basis with rising U.S. military officers and NCOs [noncommissioned officers].

But they are building personal connections that will last a lifetime. But it is also the cross-pollination that—you know, the United States doesn't have a monopoly on all the great military ideas, and there is a lot we can learn from some of these students coming through our programs.

Mr. PANETTA. Great. Thank you.

I yield back. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Wittman.

Mr. WITTMAN. Thank you, Mr. Chairman. Gentlemen, thanks so much for joining us.

I want to begin, Mr. Thomas, with you and go specifically to Secretary Mattis' National Defense Strategy where he notes that rapid technological advancements and the changing character of war are going to force the U.S. to change and modernize more quickly than our adversaries, which is sort of the beginning of where things are going.

He did mention specifically directed energy and hypersonics as some of those areas where we really have to make those advancements. And in my district in Virginia, the Dahlgren Naval Support

Facility is doing a lot of work within those particular areas. Let me get your perspective on what we face as far as emerging capabilities with our adversaries, things like unmanned systems. Give me your perspective on what we are seeing now where we are going to have actually the employment of a more modern laser onboard the USS *Portland*, LPD-27, in an upcoming deployment.

Give me your perspective there in countering what Mr. Scharre had emphasized or talked about, and that is drone swarming. Are those weapon systems, like a laser, able to do that? And how quickly do you think we can get a weapon system like the railgun deployed so it can actually be there to counter what we see as emerging technologies from our adversaries?

Mr. THOMAS. Thank you, Congressman.

A great question on all of these technologies. And if I could, just broadening directed energy out from just thinking about lasers, as you rightly do in your remarks. It is, in fact, also about hypervelocity projectiles using railgun or powder gun technologies. These are coming along at a much faster pace than anyone would have anticipated certainly a decade ago. And they are seen as technologically feasible.

There are some technical challenges in terms of improving the two performance for a greater number of shots, as you know. But I think these are things that will be worked out within a very few years.

These have the potential to radically transform the offense-defense equation, to make defense much more cost-effective against incoming salvos, attacks on our naval forces, on our ground forces, on air bases, and the like. So that is a really big deal, especially as we think about how we buy back some of the value of our overseas bases or how we are able to push our naval forces further into contested environments in the future.

With respect to hypersonics, this is one where we obviously are making big investments, but so are our competitors. And, again, we have a much more level playing field in terms of basic science and technology research, especially vis-a-vis China, than we did in the Cold War. So we are going to have to adopt, I think, a very different competitive technological strategy than we have had in the past.

Thank you.

Mr. WITTMAN. Thank you. I think that is a great point, especially on the acquisition side. You know, they start with a blank sheet of paper, no limitations. Our piece of paper is full of noes. No, you can't do this; no, you can't do that. We have find a porthole through there to find a way to get to yes. So I think those are great points.

Dr. Mahnken, can we go to you? I want to talk a little bit about Chinese Navy capability. We see today they are retiring their legacy combatants. They are now building very capable multi-mission ships that can—that can compete in an anti-ship environment with great self-defense systems, anti-submarine, anti-air systems there. And now as you see their deployments are not just there in their near territorial waters.

They are projecting power into the Indian Ocean, the Atlantic Ocean, the Baltics. And they are sustaining those operations there, something that is extraordinarily significant, I think, as far as

what we are looking at. Obviously we are trying to also match with modernized naval capability.

Give me your perspective on where we are as the United States Navy versus the capability in the Chinese Navy and remembering that it is not just quantity there, they have many more ships than we have, but they are also now putting in that quality perspective which we used to have the advantage. And give me your perspective on where we are in countering China looking at our naval forces today.

Dr. MAHNKEN. Thank you, Congressman. It is an excellent question.

I would say, look, actually, China conceptually is building three navies. So there is this sea-denial, anti-access "navy," and I use the quotes because it goes beyond the People's Liberation Army Navy to include their anti-ship ballistic missile systems and other capabilities that reside outside the navy.

There is a sort of a softer soft-power navy that is a humanitarian assistance, disaster relief, friendly navy.

And then, as you point out, there is increasingly a power projection navy. And that is increasingly equipped with modern surface combatants with some pretty impressive capabilities.

You know, the U.S. Navy has been the world's dominant navy for decades. I think in a number of areas, we have rested on our laurels a little bit, and particularly in anti-ship capabilities, anti-ship cruise missiles and so forth. So I think we find ourselves a little bit of a step behind.

Mr. WITTMAN. Thank you, Mr. Chairman. I yield back.

The CHAIRMAN. Mr. Khanna.

Mr. KHANNA. Thank you, Mr. Chairman.

Mr. Scharre, I really appreciated your testimony. You say that one of the reasons we aren't ready is, quote, "It is not for a lack of money," and you point out correctly that we spend more money than all of our adversaries. As you well know, we spend more than the next eight countries combined. And you say what we really need is sufficient strategic agility.

And my question is, in the part of the country where I come from, in Silicon Valley, if you have a company that is getting money and is getting three times more than its competitor and isn't executing, the last thing you want to do is give them more money. That would be the last thing you would want to do to get reform.

What is your view on giving more money? And do you think that the principles in the private sector should apply to the military?

Mr. SCHARRE. Yeah, I mean, there is some degree of—I would say that more important than the quantity of money is budgetary stability, right? If we can get budgetary stability for the Department, then we can live with a budget probably in the mid-600s, provided that there is sufficient reform on cutting programs you no longer need and orienting that money towards future threats. But I am most concerned about things to speed our acquisitions process so that we can bring things to market faster.

I do think, you know, to your questions about whether or not the same principles should apply, there are obviously very fundamental differences. The Pentagon has a large board of directors, in the form of Congress, right, who all have veto power over what the

Pentagon spends on, and, you know, defense industry has a big influence, as well, that is different.

But I am more concerned about how do we get these decisions done faster, because if we keep building things on these decades-long time horizons, we are always going to be building things too late.

Mr. KHANNA. I agree with you on stability, and I know Chairman Thornberry has been an eloquent voice on stability. And I don't think there is anyone in Congress who disagrees that we should not be funding the Pentagon on continuing resolutions.

But I would be curious from our other witnesses, as well. You know, I mean, obviously, we have the best military in the world. I don't think anyone would say that our troops aren't more resilient, aren't more creative and competent than the Russian or Chinese troops. We have the best military leaders in the world.

So I guess what I am struggling to understand is: We are outspending folks three to one. We clearly have better character and resilience in our troops. What is going wrong? I mean, why are we not three times more effective?

Dr. MAHNKEN. First off, Congressman, and with all due respect, I don't know whether we have the world's best military when it comes to the types of contingencies that I described. What basis would we have to judge that? Because the scenario that I laid out was literally unprecedented. I don't know. And so I think we shouldn't reassure ourselves falsely that, "Oh, yes, we have the world's best military," when the truth is we don't know.

When it comes to comparisons between the military and private industry, I think those are useful. Let's think about personnel. In private industry, you can hire and fire more or less at will. When it comes to the military, you can't just get, you know, a skilled aviator off the street; it takes time to train that person up. And then, because of the retirement system, because of all sorts of benefits, you are paying for that person throughout his or her life. And that is about 50 percent of the budget right there.

When it comes to acquisition, when I used to work with then-Deputy Secretary Gordon England, he used to say, what is a defense contractor? And he said, a defense contractor is anybody who is willing to put up with the mountain of paperwork that was the Federal Acquisition Regulations [FAR]. That is a defense contractor. Our competitors get to deal with everybody else.

So, in private industry, if you are not dealing with the Federal Government, you have a lot more flexibility. You don't have to adhere to the FAR.

Mr. KHANNA. I just want to give Mr. Thomas—

Dr. MAHNKEN. Yeah.

Mr. KHANNA [continuing]. 30 seconds.

Dr. MAHNKEN. But just a couple differences.

Mr. KHANNA. Thanks.

Mr. THOMAS. You know, I think here is the fundamental issue, is that we almost have to take a back-to-basics approach for the Department of Defense, that since the creation of the Department in 1947 we have grown the bureaucracy and we have grown the enterprise, but if we are fundamentally in the business of projecting power—that is, visiting violence on those who would do us harm

as a deterrent or in conflict—the number of arrowheads in our system has just shrunk massively over time. We have fewer and fewer weapons; we have fewer and fewer delivery systems.

But we have more and more of a support structure for all of that, which costs a lot of money. And, at the same time, where have we seen the biggest cost growth over the last 15 years? It has been in personnel costs. And when we talk about increasing the size of the force or anything else, it means that our downstream costs are going to be that much more in terms of compensation and benefits.

So that is something where we want to try to arrest that cost growth and, again, buy back some of our weapons and delivery system capabilities, at the pointy end of the spear.

Mr. KHANNA. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Scott.

Mr. SCOTT. Thank you, Mr. Chairman.

As we discuss this, I just kind of globally go back to the fact that there are over 7 billion people in the world, 300 million Americans—325 million Americans. Less than 1 percent serve in the Armed Forces. And I think that not just U.S. security but the whole world's security is contingent upon those men and women and the partnerships that we have with other countries in the world.

Certainly, if a country partners with China or with Russia, they have to worry about China and Russia taking them over, but they don't have to worry about that with the United States. And so a focus on those partnerships with our allies and alliances and friends is key to that security.

One of the things I am concerned about, as I look at the fight with Russia and China and the expansion of the battlefields into, specifically, space with China and Russia—cyber is something that smaller countries can compete in, which makes it, I think, even more difficult than space—but it is the cost of space and the dependence on space and our Department of Defense's desire to move more and more to dependence on space, the cost of space and the technology. And if we become too dependent on it, if China and Russia find a way to break or to defeat us in space, what vulnerabilities does that leave us with if we no longer maintain our existing system?

So could each of you quickly discuss the risk on our DOD becoming too dependent on space and what alternative approaches could operate in conjunction or in addition to space?

Mr. SCHARRE. I think you are right, sir. We are already too dependent on space. And right now the Department's answer has been to basically double down on that, on what is right now our asymmetric advantage in space but also our Achilles' heel.

The real solution? There are steps we can take in space to make our space architecture more resilient, but we also need to be building capabilities outside of space that give us additional redundancy and resiliency.

The Department has for several years been looking at a Joint Aerial Layer Network that provides similar communications, position, navigation, and timing, passive GPS signals, through an aerial architecture. You are never going to get the same sort of peacetime-level cost-effectiveness that you might get with satellites, but

you might get better wartime resiliency because you can move aircraft around in a way that satellites move through predictable orbits and are easy to target.

And so, you know, one of challenges has been, from an organizational standpoint inside DOD, you have offices inside the policy shop, inside the acquisition shop, in OSD [Office of the Secretary of Defense], and then in the services that are in charge of space. You don't have people in charge of, sort of, global C4ISR [command, control, communications, computers, intelligence, surveillance, and reconnaissance] the same way, which is what you really need, is sort of building a global architecture in multiple domains.

Mr. SCOTT. Mr. Thomas, could you speak briefly to that?

And, Mr. Mahnken, I am going to change the question for you.

Mr. THOMAS. I think Paul put his finger on it, in terms of how we organize is a major part of the problem, in terms of thinking more about portfolios and about how you balance risk to provide the same enterprise service, whether it is surveillance or communications or position, navigation, and timing. The——

Mr. SCOTT. Okay. Thank you. I am sorry.

Dr. Mahnken, the 2017 Center for Strategic and Budgetary Assessments' report, there is a statement in there—"Force Planning for the Era of Great Power Competition." There is a call for the development of low-probability-of-intercept/low-probability-of-detection communications and secure data links to create ISR [intelligence, surveillance, and reconnaissance], strike, electronic warfare, and airborne battle management, command, control, communications, and intelligence systems.

It goes on to say, "Networks should support communications between fifth- and fourth-generation aircraft and direct coordination with sea-based assets and ground fires units. The ability to be integrated into a network of sensors and shooters should be a baseline requirement for all future combat aircraft."

Do you share your colleagues' recommendations in regard to the need to develop airborne battle management systems with network communications to support strikes in contested areas?

Dr. MAHNKEN. Yes, absolutely.

Mr. SCOTT. Do you see current systems designed from the start with open mission systems architecture, such as JSTARS [Joint Surveillance Target Attack Radar System] recap [recapitalization], as a vehicle for rapid application of these concepts?

Dr. MAHNKEN. I do. And we need to have the incentives for an open architecture and incentives for interoperability kind of built in from the beginning and not added or sprinkled on at the end.

Mr. SCOTT. Gentlemen, thank you. I am down to about 15 seconds. Mr. Thomas, sorry you got cut a little short. But thank you for your service to the country.

And, with that, I yield the remainder of my time.

The CHAIRMAN. Mr. Larsen.

Mr. LARSEN. Thank you, Mr. Chairman.

It seems to me that this hearing is mis-titled. It should be "Readying the U.S. Military for Present Warfare," that we are already past this discussion. We are not talking about the future of warfare; we are talking about—you all have testified about what

we ought to be doing right now, not what we ought to be doing in 10 years. And we are a little, I guess, behind the eight ball.

And I am just wondering—and I have gone through your testimony, but—how we stumbled into great power competition. Ten years ago, it was near peer. Even 5 years ago, it was near peer. It seems like there is this progression of titles we are moving towards, talking about the other folks in the world, from nonexistent or folks who were on the downhill slide, to near peer, and now they are even with us.

Would you argue that, say, China and Russia are even in terms of power with us? Are they great? Are we one of the great powers in the great power competition? Are we talking about others in this? Or are we all at the same level?

One at a time.

Mr. THOMAS. Well, I guess the place to start is by talking about some of the asymmetries between the great powers and that the biggest is that, when we talk about China and Russia, we are normally talking about local theater competitions. We are not talking about a global competition—

Mr. LARSEN. Right.

Mr. THOMAS [continuing]. As we were in the Cold War. This isn't the Soviet Union.

But what we see is that they have favorable time/distance asymmetries in terms of local power projection. Their ability to go and grab something before we can dispatch forces to react and counter them is far greater than it was dealing with countries like Iraq or even North Korea on the Korean Peninsula.

And so I think that is a big difference. I mean, the United States has the burden of providing global security, that we have to be in multiple theaters of the world policing at once and, at the same time, policing the global commons and protecting the homeland. For these countries, they are able to really focus their attentions.

We also assume that, in most cases, they have the initiative, that it is not the United States that is starting some war in Europe or in Asia, but we potentially are going to have to react and come to the aid of an ally.

Mr. LARSEN. Can I, before I—I need to move on to a different point related to that point. Would you argue that is one of the reasons why we spend X times what Russia or China spends and yet we can call them a great power, even though we are outspending countries by, you know, the last previous eight countries' defense budgets?

Dr. MAHNKEN. Yeah, I think the comparison oftentimes is a false one. Again, we have global interests. Competitors have regional interests, by and large, although sometimes getting larger. You know, we pay. We pay professionals. They don't always have to. Too often, when we get to these gross comparisons of defense spending, I just think it is apples and oranges.

Mr. LARSEN. All right. Do we buy apples and oranges for our Defense Department?

Paul, if you could address—and just even getting down to the R&D [research and development] issue and the focus on R&D. You testified in front of us a few weeks back on some of this. We are

trying to do everything, but do we do R&D well? Are we investing in the right things?

If you looked at the appropriations we are voting on today, when you look at the President saying he wants \$716 billion, is all that for more steel and, you know, more platforms that Members of Congress can take credit for, or is it actually in bits and bytes and electrons and things that we don't see and can't take credit for but is more necessary?

Mr. SCHARRE. Yeah, I mean, I think we could do better in a couple ways.

I think we could have more strategic plan, as a department, about how we invest our R&D dollars. Right now, a lot of it is bottom-up from within the services. There is value in both approaches, but having a more coherent strategy would, I think, benefit the Department.

But, more importantly, there is so much innovation happening outside of the traditional defense sector that we need to do a better job of drawing that in. There are lots of U.S. companies spending a lot of money investing in better computer chips, better artificial intelligence [AI], better networking. We don't need to try to replicate that. What we need to be able to do is to spin that technology in easily.

And that is really the barrier right now, was we built up these walls to innovation, to bringing that kind of technology in. So we want to sort of tear down those walls and find ways to allow those companies to then work with DOD better.

Mr. LARSEN. All right. That is fine.

Thank you. I yield back.

The CHAIRMAN. Mr. Byrne.

Mr. BYRNE. Thank you, Mr. Chairman.

Gentlemen, there is a common concern in your written testimonies that the current structure of the U.S. industrial base is ill-suited to produce the assets necessary for the U.S. to initiate and sustain a great power war.

You are talking about something I know a little bit about, and that is shipbuilding. The Navy shipbuilding industry is a good example of our declining industrial base. At the end of the Second World War, the United States had 8 public shipyards, along with 64 private shipyards. Since the 1940s, there has been a nearly 90 percent decline in shipyards. We now only have seven private shipyards building our fleet.

Additionally, the latest census indicated that only 0.3 percent of high school students pursue vocational or technical education, which you need to know to make ships. This lack of supply can hardly keep up with the demand of skilled-labor jobs in the civilian labor force, especially in the shipbuilding industry.

Since we have reached a period where we have lost the institutional knowledge on great power wars and apparent lack of priority for the U.S. industrial base, what would be your advice to the Department of Defense on how to protect and catalyze our defense industrial base to prepare it for a future conflict?

Dr. MAHNKEN. Congressman, that is an excellent question.

So, you know, I think for too long we have been focused in the defense industrial base on efficiency, not in really determining

what it would take to yield the capabilities that we will need in war, including the types of war we are talking about here. And that may not be the most efficient route. I think that type of assessment needs to go on.

I think also, as an extension of what I was saying earlier with that deep conversation that needs to go on with our allies, we need to have that conversation as well. You know, are there ways that we can deeply collaborate when it comes to our industrial bases, or do we have to have all that capability resident in a particular sector, resident in the United States? It really is time—it is overdue—to have that type of a conversation.

Mr. BYRNE. Well, let me ask you in maybe a little bit different way. Should it be a priority of the Department of Defense to maintain and rebuild our industrial base for the various assets that we need?

Dr. MAHNKEN. Congressman, I think it is time, but I also think we need to look beyond that, meaning there is—the defense industrial base of 2018 is not the defense industrial base of 1945. And the defense industrial base of 2030 is, I would venture to say, not the defense industrial base of 2018.

So we need to be looking not only at the traditional sectors, I think which will endure, shipbuilding being clearly one of them, but we also need to look to adjacent sectors, that if we were having this hearing in 2030 people would be talking about the defense industrial base, but we don't consider part of that base today.

And where I have concerns there are foreign acquisitions of some key companies in some of these cutting-edge areas—

Mr. BYRNE. Right.

Dr. MAHNKEN [continuing]. That may be undermining our lead in some of those areas that are just adjacent to today's defense industrial base.

Mr. BYRNE. Well, let me make this suggestion. In a prior life, I was the chancellor of the 2-year college system in Alabama and the chair of the Workforce Planning Council. And I was charged at one point with building up the labor force for a shipyard that was building from the ground up.

Getting people with those skills is extraordinarily difficult. First of all, you have to find the people that are willing to take the training and do the work, and it is hard work. And, secondly, you have to get them not just sort of the book-learning but the actual experience of doing it to where they get to be proficient at it.

And so this is not something you push a button and say, "Hey, we need to hire a thousand shipyard workers," and the next day you have them. It takes years for those people to build up to the point where they are performing at the level that we are going to need them to.

And I think about World War II. In my hometown, they were capable of turning out one ship a week. Now, these were Liberty ships. You know what those were. But we don't build Liberty ships anymore. We build extremely sophisticated ships. And so the level of expertise we need and the ability to turn them out, there is no way we could go back and do what we did in World War II. We don't have the workforce, we don't have the shipyards, particularly given the sophistication we are talking about.

So it seems to me we ought to have a national discussion about how we have an industrial base, period, but, secondly, how we have an industrial base that can meet the needs of the new assets that we are going to have for the future warfare.

Dr. MAHNKEN. I agree.

Mr. BYRNE. Thank you, Mr. Chairman. I yield back.

The CHAIRMAN. Ms. Stefanik.

Ms. STEFANIK. Thank you, Mr. Chairman.

This is a follow-up to Mr. Byrne's questions.

And, Dr. Mahnken, you mentioned what we are going to be talking about 30 years from now will be very different than today.

We just held an Emerging Threats and Capabilities Subcommittee hearing looking at China's use of emerging technologies. And one of the themes that resonated was the need to increase and sustain our own science and technology innovation and investments. As an example, high performance in quantum computing was highlighted as an area where the Chinese are proving to be more reliable investment partners than the U.S. for research, which could significantly degrade our ability to compete.

So I have two questions related to that.

The first is, for each of you, what critical technologies should we be investing in, and are we investing enough in these areas? Some that come to mind are quantum, artificial intelligence and machine learning, nanotechnology, robotics, even gene editing and synthetic biology. That is question one.

Question two is: Any strategic areas of concern where you would recommend a rapid acceleration of development so that we are better postured for that 10-, 20-, 30-year outlook that you noted, Dr. Mahnken?

So I will start with you.

Dr. MAHNKEN. I think, actually, your list is a good one, and I think that is the right list. And I think the nature of R&D is, in general, within limits, the more resources, the better, because you don't know what is going to pay off, when it is going to pay off.

To take the example of directed energy that was raised earlier, directed energy has reliably been sort of 5 or 10 years out for my adult professional career, except I think now we are actually at a stage where we are getting there. So forecasting breakthroughs can be difficult. So I think more resources are needed for those areas.

I think in terms of areas where we may be falling behind, many of the same areas. I would put hypersonics in there as well—I think that is an area of concern—AI, most certainly; and quantum, most certainly, as well.

Ms. STEFANIK. Mr. Thomas.

Mr. THOMAS. Yeah, I think that is a great list that you have got. A couple things. One is that, during the Cold War, the United States was able to sustain technological leads across the board. We just ran up everything. I don't know if we are going to have the fiscal luxury of doing that on the competitions that are coming, so we are going to have to be far more selective. I think your list is an excellent one in terms of how we think about perhaps narrowing scope.

I think the other is really think about what are the applications, practically, in two ways. One, how are they going to change the

sources of national wealth in the future? How do you get rich as you look out 30 years from some of these technologies? And what is the impact of that on our broader society and economy? But then there is the more limited question of what are the military applications going to be, and how is this potentially going to change the way wars are fought?

And in a number of these technologies—quantum, for instance—it really happens across the board. It changes our ability to sense, it is going to change communications, it is going to change computation and in ways that could overthrow, kind of, the existing warfare regime that we have today, with supersensitive sensors that can detect magnetic anomalies and things like that that are really beyond our scope today.

Ms. STEFANIK. Mr. Scharre.

Mr. SCHARRE. Yes, ma'am. So you heard some of my views on this in the last hearing. I think that if I had to choose to prioritize, I would focus things in information-based technologies. Those are things where we are seeing most rapid advances, and there is a lot of intersection and synergy among them—relationships between, for example, artificial intelligence being able to then process large amounts of data and having effects on, for example, synthetic biology.

That is not to say that other areas like directed energy, hypersonics, they are not important. They are important. DOD needs to invest there because we are not seeing commercial investments in those places. Right? Google is not going to go build a hypersonic weapon; we have to do that. But I think we are more likely to see the payoff in information-based technologies. They are more likely to mature fastest and change warfare most significantly.

Ms. STEFANIK. I have 30 seconds left.

You know, as we consider making sure that we are maintaining an edge in 21st-century technologies, I am concerned about our ability to enact national-level whole-of-society plans. Obviously, China has a distinct advantage just in their top-down, whole-of-government approach.

What can we do to improve our national-level coordination plans when it comes to this technological development?

I am almost out of time. You can follow up with the record on that.

The CHAIRMAN. Important question that we need to talk more about, because we see what others are doing.

Mr. Hice.

Mr. HICE. Thank you very much, Mr. Chairman.

And as the newest member of this committee, I want to thank each of you for your expertise and what you bring to the table today. It has been extremely insightful and helpful to me personally.

The Trump administration's National Defense Strategy actually states that the current bureaucratic approach, centered on exacting thoroughness and minimizing risk above all else, is proving to be increasingly unresponsive.

Interesting to me how they have raised concern over a culture of minimizing risk above all else. Would you share that same concern? Each of you.

Dr. MAHNKEN. Yes.

Mr. THOMAS. Yes.

Mr. SCHARRE. Yeah, absolutely.

If I could just give one example. If you go look, for example, at the number of people working on the Joint Strike Fighter program, okay, giant program. You got people doing it—you got engineers, you got people building the thing, you got people down on the floor constructing it. But then you have people sort of checking everyone, right? Just managing the program, supervising things. What is their role? It is to keep costs down. But they are adding to cost, right?

And so this gets to this risk aversion that we have in the Department that ends up slowing things down, adding cost, and adding red tape.

Mr. HICE. Okay. Well, you bring up a good point then. What other risks are, in itself, embedded within a culture of avoiding risk above all else?

Mr. THOMAS. Well, so one of the things that I think Paul is getting to is that the testing regime for systems is one of the things that really slows us down.

Industry is amazing. I mean, we can prototype advanced technological systems in a question of months. But going from 0.9 version of a system to the 1.0 version that has a user's manual with it and has been fully tested and all the kinks have been worked out, that takes years. And that is one of the things that is really slowing us down.

Having more of a prototyping mindset and actually pushing more prototypes out into the field faster, systems that we can experiment with. And, you know, the Navy developed the X-47B as an experimental prototype. It now is being retired. That is a system that actually still has lots of life in it. We have made a tremendous investment. And that is one where we could be out there experimenting or we could use it for the MQ-25 program, to begin training aircrews now so that they will be ready to accept the MQ-25 when it comes on line, as an example.

Mr. HICE. Okay.

Dr. MAHNKEN. And I would agree with that example. I mean, there is a case where the American taxpayer has already invested significant money in a capability, and not only is it being retired but may even be dismantled. It makes no sense.

I think the biggest risk in a risk-averse culture is the risk of not having the capability we need when we need it.

My father was involved in the Atlas ballistic missile program. You know, they were given a target, to get a capability in the field to defend the United States. All else was secondary to that. And they went—herculean efforts, a lot of failures along the way, and it produced the first intercontinental ballistic missile to defend the United States.

We can still do that, but so many of the incentives that we face today are 180 degrees out from back when we were truly serious about these things, when we faced an existential threat and needed to respond to it.

Mr. SCHARRE. If I could just—so I think, you know, one of the things that is really essential is that Congress looks at putting the right incentives in place, sir.

So, if you go to, like, a venture capital firm, you know, they understand that a lot of their investments are going to fail, and that is what they are betting on, is they are going to take risk, right? And they are looking for the one that is going to pay off big.

We have the opposite structure. So, if you look at this example that my two colleagues mentioned about an X-47, if the Navy were to go ahead and do this, they would likely get a lot of heat from Congress, right? Because you would be saying, “Well, you got this one program over here. You got this other program over here. It looks redundant. What are you doing?”

The smart thing, I agree, would be to continue to keep this investment we have made in these demonstration aircraft, use them for the Navy or the Air Force, get some mileage out of this, and be able to do interesting things, be able to take risks. Do a demonstration, and maybe it does not work, and that is okay, because we are learning from that process. But it requires kind of the political top cover to say, “Go forth and do.”

Mr. HICE. Okay. I appreciate those answers.

Let me transition real quickly. You mentioned earlier one of the vulnerabilities is space. I would guess, probably, with the emphasis we place now on cyber, that is also an area we have to focus on.

So, with that in mind, what capabilities should we really be investing in in these areas?

Dr. MAHNKEN. As a country, we are undergoing a commercial revolution in space. So we are actually, in some ways, better positioned than anybody to take advantage of it. DOD needs to take advantage of that.

And, conversely, you know, as we are dependent in space, as China is increasing its space capability, China is becoming more dependent on space as well.

So I think we actually have real opportunities to turn the tables when it comes to vulnerability in space.

Mr. HICE. Thank you, Mr. Chairman.

The CHAIRMAN. Mrs. Hartzler.

Mrs. HARTZLER. Thank you, Mr. Chairman.

Mr. Scharre, in your written testimony, you state that one of the priority investment areas for airpower is to maximize the rate of production for the B-21 bomber once it goes into production.

And we have heard testimony from the Air Force that it needs a minimum of 100 B-21 bombers. So is this number sufficient to meet the wide array of current and future threats?

Mr. SCHARRE. I can't imagine that it possibly is or that it is based on any kind of serious analysis. It seems like a round number that they just kind of made up, I mean, frankly.

You know, any reasonable analysis that I have seen from outside experts comes up with numbers that are significantly larger than that. I don't have a specific number, but it is certainly going to be bigger than 100.

Mrs. HARTZLER. Okay. I would agree. So, interesting.

It was recently reported that Russia purchased 10 supersonic bombers. Unfortunately, while the United States was cutting the

defense budget, Russia was aggressively investing in its military capabilities.

So the B-21 program remains largely classified, but how would you recommend we invest in our bomber fleet to ensure that our capabilities are not outmatched by Russia and the fleet remains a credible and reliable deterrent?

Do you want to start?

Mr. SCHARRE. Yeah, I think there are a couple things.

The first and most important thing is we have this aircraft, the B-21, in development. Once it goes into production, as I said, maximize the rate of production so that we are buying as most of them as we can over time to start to execute this shift towards more longer-range aircraft.

We want to look at things that can augment the B-21, particularly long-endurance unmanned aircraft that are stealthy, that can persist forward into contested areas, that can provide surveillance and targeting and some limited strike capability for the B-21; as well as then we want to look at munitions and other air-delivered vehicles that are onboard both of those kinds of assets—things like small air-launched swarms, drones that might be used for surveillance, battle damage assessment, jamming, electronic warfare, decoys, all of these things that then go into the aircraft that make them more effective and survivable.

Mrs. HARTZLER. I saw in your testimony that you were also suggesting that we build more bombers that are able to take off of the aircraft carriers and in that realm as well.

Mr. SCHARRE. Absolutely. We need a long-range strike aircraft off the aircraft carrier if it is going to remain relevant.

Mrs. HARTZLER. Uh-huh. Very good.

I wanted to ask Mr. Thomas, you earlier talked about, when I came in, the record of issue—I mean, program of record issue—yeah—and that Congress can help push that for the small contractors. I have heard that back home, as well, many times, that that is an issue.

Can you expound on that a little bit? Because you said Congress can help with this. What are some incentives we can do to help the small companies, the small innovators, and get that first program of record?

Mr. THOMAS. Well, I think Congress historically has just been an early adapter or an early proponent of some of the technologies that end up being embraced by the military later but are opposed when they are first being proposed.

And the Predator UAV is an example of one that ran into enormous resistance, and Congress was able to overcome that, to a point where people, over the last 10 years, really couldn't get enough of them. When you look at the Tomahawk cruise missile, it was, again, one which was pushed by Congress.

More recently, Paul was mentioning the X-47, or the idea of a long-range strike system from aircraft carriers, where there was a lot of congressional support despite resistance on the part of the Navy.

If I could, just going back on the B-21 and talking about next-generation strike in general, when I was in the Pentagon we were authoring the Quadrennial Defense Review in 2006. The 2006

Quadrennial Defense Review called for fielding the next-generation bomber this year, 2018. We have lost close to a decade.

And so we are behind the gun when it comes to the numbers. This was a well-anticipated requirement that was going to be needed, and we failed to meet that deadline.

The other was that, when we talk about numbers, not just for the bomber but across the board, switching the topic and focusing on Russia and China, you are talking about a sea change in how we think about the stockpiles of our munitions and the delivery systems that are going to be needed. Most of the figures that were used to develop requirements are really driven by old scenarios looking at wars in the Middle East and the like. All that needs to be updated.

Mrs. HARTZLER. Go ahead.

Dr. MAHNKEN. I would agree with everything that has been said. I would just add a couple things.

One is, back to the continuing resolutions, I mean, I think B-21 is a poster child for how continuing resolutions can just corrode a vitally important program.

And when it comes to numbers, yeah, I think we are already, I think, underprojecting the bomber requirements, and so we are going to need to look for force multipliers, we are going to look for adjuncts, and I think ultimately we are going to need to look to a much larger production run than currently anticipated.

Mrs. HARTZLER. Agreed. Thank you.

I yield back.

The CHAIRMAN. Mrs. Davis.

Mrs. DAVIS. Thank you, Mr. Chairman.

I have a few follow-up questions for you—and really appreciate your testimony here today—the first really relating to Ms. Stefanik's questions about how confident or what is your level of confidence that we have a national strategy that is looking out multiple years.

Dr. MAHNKEN. I think about strategy a couple different ways. I mean, one is a formal written strategy, the result of, you know, deliberation. And then the other is maybe a little bit more informal, really driven by the press of events.

And I think what I have seen over past administrations, Democrat and Republican, is the growing urgency of dealing with great power challenges. And I think past administrations have come to that realization at different times in their time in office.

What I would say for the current administration is they appear to be dealing with that up front, and I think that is commendable. I think the concern there is—or the possible downside is that we get sidetracked.

As was previously alluded to, the 2001 Quadrennial Defense Review really did, you know, preview, foreshadow many of the challenges that we face today and actually contained a very good set of operational challenges. It is worth looking back with 17 years of hindsight and asking where we are in relationship to the challenges posited in 2001. I think in each case our situation has eroded. And so I think that the situation is much more urgent today than it was in the past.

Mr. SCHARRE. You know, I think, ma'am, when it comes to these challenges and sort of a national strategy in investing in the science/technology base, unfortunately not only do we not have a strategy, the implicit strategy that I see out of this administration is running counter to what I think is one of the most important issues, which is human capital.

And the broad sort of anti-immigration sentiment, I think, is actually quite harmful towards bringing in some of the best and brightest from other parts of the world and incentivizing our entrepreneurial base here.

Mrs. DAVIS. Thank you. I appreciate that.

I guess a follow-up question to that really is whether or not we have—that we are looking at this strategy and, again, where it falls short or does not, with the resources that we would want to have versus the resources that we have, and whether we are providing the opportunities to address those areas when, clearly, we have to deal with a whole host of issues, political as well as others, that impinge on our ability to have those resources. That is a tough one.

Mr. THOMAS. You know, I think the strategy gets high marks in terms of placing emphasis on great power competition. We have known for quite some time that China was a rising power, and this has been a focus. Russia has been more of a surprise, quite frankly, in its behavior over the last 5 to 8 years. But we can be fairly certain that China is going to be around for a long time—not absolutely certain, but we have a good idea that China's growth economically will continue to fuel its military developments.

So I think this is an appropriate focus for the strategy. The real question, I think, for this committee and Congress as a whole is really about the implementation of the strategy. And what I see is, as Paul and Tom have already alluded to, is that there has been the disconnect for so long between an appreciation of the threats that we face, the security challenges that we face, on the one hand and where we are with our program of record on the other. And we have to find a way of closing this gap.

Mrs. DAVIS. How much time do we have?

Mr. THOMAS. We are out of time. I mean, we are over time. These are things that should have been done yesterday and they should have been done a decade ago.

Mrs. DAVIS. Yeah. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. You all have mentioned it, but I have been surprised there has not been more discussion of political warfare, of—somebody calls it psycho-cultural warfare.

We can prepare for great power, near peer adversaries, but it is not a lesser included case to deal with some of these campaigns the Russians, the Chinese, the Iranians, even the North Koreans have undertaken that undermine our ability to defend ourselves or divide our alliances and so forth.

Would each of you make whatever comments you think are most relevant to that aspect of warfare?

Dr. MAHNKEN. Yeah. Thank you, Mr. Chairman. I think it is an excellent topic, and it is actually a topic personally that I am

spending some time working on and hopefully will have something to show for it soon in terms of a publication.

But I think it is useful to realize that, say, for both Russia and China, they see political warfare, whatever we want to call it, as an integral dimension both of peacetime competition and of war. We kind of hive it off, we see it as something separate, to the extent that we even pay attention to it. They really see it as integral. And if war is ultimately about affecting your adversary's decision-making calculus and affecting your adversary's leadership, it is integral. And, you know, so they are going about a particularly, if you will, authoritarian approach to political warfare.

Now, there is an alternative tradition, and that is, if you will, democratic political warfare. In the old days, we used to do it passably well. We still do it, I think, subconsciously, meaning our society does it even when government doesn't pay attention to it. But it clearly is an area that deserves more attention.

I think it is also an area where we can learn from our allies. I think some of our allies in Europe, Australia, in some ways they are farther along than we are in having this national conversation about foreign influence, foreign attempts to manipulate them than we are. And I think, again, that is an area where we could deeply collaborate with allies and with friends.

Mr. THOMAS. I agree with all that.

Political warfare is not new. It was an integral component of the Cold War. And so, in some ways, this is more of a reawakening of a classic form of warfare.

Tom is exactly right, which is our adversaries have a much more holistic concept of warfare, which includes both political as well as economic and information warfare, in addition to kinetic activities and the like.

The other thing that I think is really important, especially when it comes to Russia and, maybe to a lesser extent, China, is a Russian conceptual rejection of a binary choice between war and peace, that it is seen that you are much more on a spectrum and it is a much more fluid concept.

And I think that this is actually closer to the reality of what a great power competition is going to be than the American conception. I think this is one where we really need to rethink how we compete and how we essentially can frequency hop in our activities, as well, to match them move for move.

And I think the last is, really, this is going to require an integrated, concerted defense effort on the part of the United States. And we are going to have to do a much better job of protecting our national hardware, critical infrastructure protection against things like cyber attacks and the like. But we also, I think, have neglected or we have allowed to atrophy, some of our civil defenses for what I call the national software, things like our societal cohesion and governance. And these are going to have to be improved in the coming years.

Mr. SCHARRE. Yeah, I think Tom and Jim both hit on this, the central problem that the things that others are doing, if you look, for example, at Russia's efforts in disinformation and propaganda and hacking, they fall within this gray zone between war and

peace, from our standpoint. They see it as warfare, it doesn't fit our kind of paradigm, and we are caught flatfooted.

And so, when you look at these Russian disinformation efforts, well, whose job is it in the U.S. Government to counter that? Is it the Defense Department's? They would say, "No, it is not war," and, frankly, I am not sure that they are the best entity to do that. Is it the State Department's? Well, not the State Department as it exists today. The intelligence community has a role but probably not a public-facing one. Is it DHS's [Department of Homeland Security's] role?

No one has a job for countering that, right? We don't have an agency for countering that. So I do think there are some fundamental questions we need to ask ourselves sort of in terms of how we are going to approach that, whose job is it, what are the tools we need.

I also think that—so, right now, we are basically leaving it up to people outside of government to even out these Russian entities and say, you know, Russian bots are spreading this information. So how does the government think about structuring itself to do that?

There is also probably a role for legislation and regulation with the private sector. Just like we have legislation about material support to terrorism, probably a need for some legislation that actually drives private-sector incentives to cooperate with the government to out these actors and actually blunt their attacks.

The CHAIRMAN. Challenging questions, and yet, as I said at the beginning, our adversaries aren't waiting. Change isn't waiting on us to get our act together and answer those questions. And I am concerned about where that leads us.

All very interesting. Thank you all for being here.

The hearing stands adjourned.

[Whereupon, at 11:50 a.m., the committee was adjourned.]

A P P E N D I X

JANUARY 30, 2018

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

JANUARY 30, 2018

House Armed Services Committee Chairman William M. “Mac” Thornberry
Opening Statement - Prepared
Full Committee Hearing on
Readying the U.S. Military for Future Warfare
January 30, 2018

The committee meets today to hear perspectives on the future nature of warfare.

No one can predict the future with certainty. We will inevitably face surprises. But we have to try to peer into the fog, looking for trends that point us toward where warfare is headed. History tells us that even great powers can be overwhelmed by change that they do not recognize and to which they do not adapt. Neither our adversaries nor relentless change will wait for us to catch up.

Responding to these future indicators does not mean that we can necessarily walk away from more traditional capabilities. The challenge of our times—and the challenge of our budgets—is that we must be prepared for the full range of—from a strong, credible nuclear deterrent to non-kinetic influence operations—in the constantly evolving art and science of warfare.

Despite the controversy, there is a lot of truth in former Secretary of Defense Rumsfeld’s comment that “You go to war with the Army you have, not the Army you might want or wish to have at a later time.” The military that the United States has depends on the decisions made by Congress as part of our constitutional responsibility to “raise and support,” “provide and maintain” our military forces. Secretary Mattis has testified that the American advantage in every domain of warfare is eroding. That is the reality with which we must prepare for whatever the future brings.

We welcome three well-qualified witnesses to help us peer into the future so we can better meet our duties under the Constitution to our troops and to the nation.

House Armed Services Committee Ranking Member Adam Smith
Opening Statement - Prepared
Full Committee Hearing on
Readying the U.S. Military for Future Warfare
January 30, 2018

Thank you, Mr. Chairman. I would like to welcome our witnesses today and to thank them for sharing their views. Their testimony will be beneficial as we continue to evaluate the recently released National Defense Strategy and the future conflicts our military could confront.

In the future, our country will continue to face a range of national security challenges. The international rules-based order is threatened in a variety of ways by Russia, China, North Korea, Iran, and violent extremist organizations, such as ISIL and al Qaeda.

The threats posed by Russia are especially concerning. Russia is seeking to weaken liberal democratic institutions in order to promote authoritarianism. Russia has meddled in electoral processes, has adopted a revanchist posture in Europe, used influence operations for malign intent, and systematically pursued efforts to undermine alliances and partnerships of which we are a part. Deterring Russia will require working in close cooperation with our partners and allies in Europe. We cannot face these threats alone. Cooperation with allies and partners will be essential to deter future conflict and successfully implement the National Defense Strategy as envisioned.

The United States must concentrate its efforts on countering this threat. As the National Defense Strategy accurately asserts, long-term strategic competition and our national security involves much more than defense. We must adopt whole-of-government approaches to strengthening our defenses and meeting future challenges. Just as addressing violent extremism requires more than military force, future challenges will almost certainly continue to require addressing the political, economic, and social conditions that fuel them.

Such a whole-of-government approach is essential to successfully implementing the National Defense Strategy's line of effort to expand partnerships and strengthen alliances. That said, the Administration must now demonstrate that alliances and partnerships are a priority at the highest levels through cooperative efforts, support for diplomacy and development, and by ensuring that State Department and USAID programs receive adequate funding.

Further, fiscal certainty is required to successfully implement the National Defense Strategy and build the force to meet the challenges that the spectrum of capabilities future warfare may present. Long-term planning requires a reliably funded, comprehensive, long-term national budget. We have not yet seen the President's request for the Department of Defense for fiscal year 2019 but, if press

speculation is accurate, it could once again exceed the budgetary caps imposed by the Budget Control Act of 2011 (the BCA).

I continue to believe that Congress should eliminate sequestration and lift the BCA caps. I also believe that defense dollars should not come at the expense of the non-defense accounts. As I've said before, investments in diplomatic efforts, foreign assistance programs, and emergency preparedness are just as important to our national security as traditional defense spending. We also need to invest in infrastructure, research and innovation, energy solutions, education, health care, and many other facets of enduring national strength.

If we truly care about making sure that our troops have enough money, we need to make tough budget choices. If the national defense strategy exceeds the amount of money we have, the ones left holding the bag are our troops. They are the ones who are asked to train and execute missions that they are not adequately resourced and equipped to perform. As but one example, the \$1.2 trillion nuclear weapons enterprise expansion is devoid of any budget realism or realistic planning. When you look at the national defense strategy along with all of the government programs that the public wants funded, they are beyond the amount of money that we have.

As we look to the future, we need review our investments and take actions that will yield savings or raise revenues. We have a duty to manage our country's resources responsibly in fielding an effective military. We must invest wisely when it comes to national security and take a hard look at spending. Our overall strategic approach must coherently match our national security goals with the resources necessary to support them.

Thank you, Mr. Chairman. I look forward to the testimony of our witnesses.

TESTIMONY

**STATEMENT BEFORE THE HOUSE
ARMED SERVICES COMMITTEE ON READYING THE U.S.
MILITARY FOR FUTURE WAR****January 30, 2018****Statement by Thomas G. Mahnken
President and CEO, Center for Strategic and Budgetary Assessments**

Chairman Thornberry, Ranking Member Smith, and distinguished members of the Committee: thank you for your invitation to appear before you today to discuss the need to prepare the U.S. military for the challenges of future war.

This is a vitally important topic. In recent years it has become apparent that we are living in a world characterized by peacetime competition between the United States, China, and Russia. Both the *National Security Strategy* and the *National Defense Strategy* have rightfully emphasized this.

Of course, competition is not the same thing as conflict. Nor does competition necessarily lead to conflict. It must be admitted, however, that in addition to the reality of great-power competition, we face an increasing possibility of great-power war. The possibility is remote, but not inconceivable, and it is growing. What was once a hypothetical future contingency is now a real, and present, danger.

This is significant for three reasons. *First*, and most obviously, the consequences of a war between the United States and China or Russia would be enormous. It would be one of the most consequential events of the 21st century, with implications for world order. *Second*, great power conflict is largely outside the professional experience of senior civilian policy makers and military leaders. It has been a quarter century since we have thought seriously about great-power war: a professional lifetime in the military and civil service. Much of the expertise that we once possessed – in government, the policy community, and academia – is gone.

Third, the armed forces that the United States and its allies possess today were developed for very different circumstances than we face today and will face in the future. While the United States was focused on defeating insurgents in Iraq and Afghanistan, Russia and China were focused on acquiring capabilities to defeat us. As a result, we find ourselves a step behind in a number of key warfighting areas.

Thus for the first time in decades, we face the need to think seriously about great-power war. Indeed, *I believe that that the requirements of great-power war should be the most important test of the adequacy of our force structure and posture.*

A war between the United States and China or Russia would literally be without precedent. It would feature adversaries armed with nuclear weapons and precision strike systems and would likely include operations not only on land, in the air, and on and under the seas, but also in space and cyberspace. Such a war would likely look much different than recent wars.

- It might be short, particularly if an adversary were able to achieve a *fait accompli*, but might just as well be protracted, particularly if the United States and its allies achieve initial success.
- It would likely feature high expenditure of weapon systems and munitions and could result in high attrition, and consequently the need for social and industrial mobilization to support the war.
- Nor would the U.S. homeland necessarily be a sanctuary. It would likely feature non-kinetic and likely kinetic attacks on the United States as well as enemy forces deployed off our coasts and potentially near our borders.
- It would likely include efforts to undermine our willingness and ability to fight by sowing discord and exploiting cleavages in our society.
- It would also likely feature military operations in space against U.S. and allied satellites.
- And it could ultimately lead to the disruption of the global economic system.

What are the sorts of things that we need to do to prepare for such a war, if only to convince a potential aggressor of that it would be fruitless to take on the United States and its allies and thus enhance deterrence?

First, we need to field armed forces that possess depth and resilience to be able to fight, accept damage, and recover. Today, our forces lack readiness and are in dire need of modernization. Moreover, from the bottom to the top, our soldiers, sailors, airmen, and Marines have grown used to fighting terrorists and insurgents and are unfamiliar with the challenges of great-power war.

Second, we need a defense industrial base, and a national security innovation base, that is capable of supporting protracted operations. For two decades, the watchword has been “efficiency” rather than “effectiveness.” Moreover, in a globalized, interdependent world, we need to think carefully about foreign investment in strategic industries that bear on defense.

Third, we need a logistical system capable of operating in contested environments. Getting needed men and materiel from the United States and U.S. forward bases and staging areas to the battlefield will be an increasing challenge.

Fourth, we will face a growing need to defend the United States, to include our networks and military bases, as well as our space assets.

Fifth, we will need to develop ways to identify and counter foreign efforts to influence our society, and that of our allies. Russia and China have been practicing political warfare on us for some time, and the magnitude of those efforts is only now becoming apparent. We need to develop countermeasures and responses to those efforts.

Here and in other areas, past experience can both inform and mislead us. There are clearly areas where we need to re-learn lost skills, to include logistics and mobilization. But we should not mindlessly ape past behavior. Great-power competition in the 21st century will not be a replay of the Cold War, and a future great-power war will not be a rerun of World War II, or the never-fought World War III between the United States and the Soviet Union. Instead, we need to assess thoughtfully the similarities to and differences with the past and rebuild (and in some cases just build) intellectual capital and capabilities to deal with the era that we are in, and are likely to be in for the foreseeable future.

Thomas G. Mahnken
President
Center for Strategic and Budgetary Assessments

Dr. Thomas G. Mahnken is President and Chief Executive Officer of the Center for Strategic and Budgetary Assessments.

He is a Senior Research Professor at the Philip Merrill Center for Strategic Studies at The Johns Hopkins University's Paul H. Nitze School of Advanced International Studies (SAIS) and has served for over 20 years as an officer in the U.S. Navy Reserve, to include tours in Iraq and Kosovo.

He currently serves as a member of the Congressionally-mandated National Defense Strategy Commission and as a member of the Board of Visitors of Marine Corps University. His previous government career includes service as Deputy Assistant Secretary of Defense for Policy Planning from 2006–2009, where he helped craft the 2006 Quadrennial Defense Review and 2008 National Defense Strategy. He served on the staff of the 2014 National Defense Panel, 2010 Quadrennial Defense Review Independent Panel, and the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction. He served in the Defense Department's Office of Net Assessment and as a member of the Gulf War Air Power Survey. In 2009 he was awarded the Secretary of Defense Medal for Outstanding Public Service and in 2016 the Department of the Navy Superior Civilian Service Medal.

Dr. Mahnken is the author of *Strategy in Asia: The Past, Present and Future of Regional Security* (Stanford University Press, 2014), *Competitive Strategies for the 21st Century: Theory, History, and Practice* (Stanford University Press, 2012), *Technology and the American Way of War Since 1945* (Columbia University Press, 2008), and *Uncovering Ways of War: U.S. Intelligence and Foreign Military Innovation, 1918–1941* (Cornell University Press, 2002), among other works.

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TESTIMONY
BY JIM THOMAS
BEFORE THE HOUSE ARMED SERVICES COMMITTEE
January 30, 2018

Chairman Thornberry, Ranking Member Smith, and Members of the Committee, thank you for your invitation to testify on the issue of readying the U.S. military for future warfare. While North Korea is the most acute foreign threat facing the United States and its allies at the moment, it is Russia and China that present the most vexing military challenges to the United States' global position and they will likely continue to do so over the next decade and beyond. I do not believe that war with Russia or China is in any way inevitable, but prudence dictates taking actions to arrest the erosion of our military positions in Europe and the Far East, lest weakness encourage hegemonic appetites for further probing and expansion. In my testimony today, I will focus on America's ongoing strategic reorientation toward great power competitions with Russia and China and highlight the significant implications this reorientation will entail.

Over the last twenty-five years, "future warfare" connoted for many a science fiction-like competition with a near-peer rival that might emerge one day in the far-off future to challenge the United States, but such a competition was not viewed as a pressing or particularly serious matter. Lacking a sense of urgency, there was little impetus for the U.S. military to orient itself to such a challenge. Even as it fought extended wars in Iraq and Afghanistan and conducted global counterterrorism operations, the U.S. military has with a few notable exceptions (e.g., expansion of Special Operations Forces and creation of armed-reconnaissance UAV squadrons) retained the post-Cold War shape and size outlined in the 1993 Bottom-Up Review for fighting wars against mid-sized regional states like Iraq and North Korea.

Over the past decade, though, the future has rapidly converged with the present. In place of a faceless near-peer competitor, China and Russia have arisen as determined rivals attempting to redefine the world order. The challenge Russia and China each pose is markedly different from the other and each will demand a tailored and differentiated approach to counter. Russia's military challenges stem from the Kremlin's sense of self-decline and its attempt to reclaim some of its former sphere of subjugation in its near-abroad while it still can. By contrast, China's military challenge is driven largely by the wealth it has generated as an economic powerhouse and used to acquire formidable full-spectrum military capabilities for righting what it perceives as a century of foreign humiliation. Both of these powers are challenging the United States and its allies at multiple levels:

- Below the threshold of armed conflict in the so-called gray zone with non-military and paramilitary forces, covert activities, and influence operations aimed at gradually shifting territorial and geopolitical realities as well as undermining foreign societal cohesion and governance in the twilight between peace and war;
- At the theater warfare level with advanced conventional capabilities, including sophisticated sensor networks, arsenals of precision-guided munitions (PGMs), cyber

and electronic warfare systems, world-class air defenses, fifth generation fighters, quiet submarines, large numbers of sea-mines, and sizable arsenals of ground-based rocket artillery and coastal defense missiles; and

- At the strategic level with modernized, survivable nuclear forces capable of attacking the U.S. homeland, and novel forms of strategic attack such as cyber and counterspace warfare capabilities to hold at risk critical infrastructure or threaten U.S. nuclear command and control.

Both Russia and China assess that they have sufficiently survivable nuclear arsenals to preclude the possibility of disarming strikes by the United States, and that allows them to take varying degrees of risk regionally below the strategic nuclear threshold (Russia tending to be more open to risk-taking, China being more cautious). Their conventional anti-access and area denial (A2/AD) capabilities, in turn, are perceived as able to prevent the U.S. military from coming to the aid of allies and partners while also providing overwatch for sub-conventional gray zone activities. Neither state intentionally seeks a war with the United States and its allies, but they see backdoor vulnerabilities in the American expeditionary style of warfare that confer time and space advantages for them to achieve their strategic goals without fighting. Consequently, Russia and China are waging new “struggles for mastery” that will decide the fates of countries in Eastern Europe and maritime Asia, as well as determine what America’s power position will be entering the second half of the century.

The new National Defense Strategy has recognized that great power contests are likely to be the defining national security challenge for the foreseeable future. It therefore calls for treating the competitions with China and Russia as the Department’s top priorities for force and operational planning. This prioritization of great power competitions represents a potential sea-change for readying the U.S. military for future war (*if we take seriously its implementation*) and should lead to an aggressive rebalancing of effort and reallocation of resources. To understand why such rebalancing will be necessary requires understanding the profound ramifications of this modern multisided great power competition for U.S. defense planning:

1. Devaluation of Expeditionary Warfare

First and foremost, a renewed emphasis on great power competition with Russia and China should lead to a comprehensive reevaluation of the U.S. military’s joint expeditionary warfare approach to power projection. Expeditionary warfare has been the defining characteristic of the U.S. military for the last quarter-century. Since the end of the Cold War, the U.S. military has drawn down forward-stationed forces in Europe and the Far East while favoring months-long rotational deployments of forces from the continental United States to maintain a forward military presence in these regions, as well as in the Middle East. If conflict broke out in any of these theaters, U.S. forces envisage surging from the continental United States over several weeks, inserting into theater sea- and airports, and then conducting counter-offensives to defeat hostile forces. In the past, this planning assumed the U.S. military enjoyed gross qualitative and quantitative advantages over potential regional aggressors such as Iraq and North Korea, as well as escalation dominance given its nuclear deterrent. It assumed unfettered logistical lines of communication to distant theaters; ports and airfields for receiving U.S. forces that would be largely safe from attack; and the ability

to gain local air, sea, and land control quickly. But these assumptions collapse when confronting the Russian or Chinese militaries.

Both the Russian and Chinese militaries are capable of achieving limited local military or paramilitary objectives before the bulk of U.S. forces could enter proximate theaters. And both have built up formidable A2/AD complexes that would hinder the U.S. military from gaining footholds nearby or operating with impunity. Russia enjoys favorable time-distance factors for quick land grabs, while China benefits from U.S. forces relying on a very small number of airbases and ports in the Western Pacific and the vast distances at which U.S. forces would have to operate if they were deprived of those forward bases.

The fact that expeditionary warfare lacks the potency and credibility it once had requires United States to undertake a broad reevaluation of the U.S. military's posture, capabilities, organization, concepts, and plans for force generation in crafting a fundamentally new approach to projecting power. Perhaps it will require permanently forward stationing certain types of ground forces in Europe. These forces might include heavy armor for blocking the advance of mechanized ground forces; short-range air defenses for denying an enemy forces' air cover; rocket artillery for suppressing enemy air defenses and deep strike; special electronic warfare units to gain advantage in the electro-magnetic spectrum; and Special Forces and Joint Terminal Attack Controller-qualified personnel for bolstering local resistance forces and ensuring air-ground integration. Together, these forces would allow the U.S. military to create unconventional defensive barriers against conventional aggression (in other words, friendly A2/AD complexes). Such an approach would benefit from the construction of deep underground facilities and tunnel complexes for command and control and pre-positioned weapons storage, as well as the clandestine laying of fiber optic cables for protected local communications. This ground posture might need to be coupled with air and naval assets that could operate from 1,000-plus mile ranges to penetrate into contested air and maritime areas and circumvent or overcome enemy coastal and air defenses to engage hostile forces.

It is also necessary to reconsider the force management / force generation model the Department uses, placing less emphasis on rotational deployments of forces and more on some combination of permanent forward stationing in overseas theaters, differentiated units of force depending on the theater to which they are assigned, and the conduct of sustained high-tempo naval and air strike operations from ports and airfields outside the reach of most of an adversary's A2/AD forces.

2. Re-Emphasis of Nuclear Weapons and Strategic Warfare

For the last quarter-century, the United States has sought to de-emphasize the role of nuclear weapons in national security while Russia and China have modernized and placed increased emphasis on their own nuclear forces. In the case of Russia, it has leaned more heavily on theater-range nuclear forces as an insurance policy against the failure of its conventional forces in a regional conflict involving NATO. The prioritization of great power competition in U.S. strategy means that nuclear forces should once again come to the forefront of planning efforts. Wargames and other planning exercises must consider scenarios involving their use in an effort to understand potential escalatory dynamics. Beyond investments in strategic nuclear forces like new penetrating bombers, land-based intercontinental ballistic missiles, nuclear ballistic missile submarines, and nuclear command

and control and communications systems, the United States must also shore up its theater nuclear warfare capabilities to deter symmetrically the use of enemy theater nuclear weapons and thereby, seemingly paradoxically, reduce the possibility that strategic forces would have to be generated in a theater war with another major nuclear power. This will likely require the development and rapid fielding of a theater-range, difficult-to-intercept nuclear cruise missile. Such a missile could be air- or submarine-launched, and should have a high probability of arrival at a target despite the presence of precision air defenses.

In addition to countering classic nuclear weapons threats, the U.S. military will also have to identify or develop defenses, resiliency measures, counter-attack capabilities, and declaratory policies against novel forms of strategic attack, including attacks on:

- Critical infrastructure or the financial system;
- Agriculture and livestock;
- Transoceanic fiber optic cables; and
- Constellation of satellites for intelligence warning, communications, and position, navigation and timing.

3. Prioritization of Capabilities and Forces Optimized for Contested Environments

Great power competition will also require significant rebalancing of U.S. conventional military forces. In particular, it will place a premium on low-signature forces with light logistics footprints capable of operating independently far forward in denied areas. Such forces include submarines and unmanned underwater vehicles, long-range penetrating surveillance and strike aircraft, special operations forces, ground-based missile forces, cyber and electronic attack capabilities, and space-based persistent surveillance systems coupled with vastly greater quantities of precision standoff and direct attack munitions. These forces represent only a small fraction of the current U.S. military but are likely to constitute the core element of a joint vanguard force in any future great power contingency and would play the most demanding roles deterring opportunistic aggression by a second party. Over time, a greater proportion of resources should be allocated to such forces at the expense of those forces and capabilities less suited for operations in contested environments.

4. Intensified Military Activities in Space, Cyber/Electromagnetic and the Undersea Domains

Modern “great games” in the form of constant probing and dueling are already being played out in the space, cyberspace and undersea domains. As during the Cold War, when a silent war was fought undersea between dueling U.S. and Soviet submarines, great powers may engage in covert activities prior to conflict to map each other’s networks, place destructive or corruptive implants on those networks—including submarine telecommunications cables and seabed energy extraction infrastructure—and interfere or prepare to interfere with one another’s satellite constellations using lasers, radio-frequency jamming, or kinetic vehicles. Inadvertent detection or contact in one or more of these domains could be a trigger for rapid escalation to overt, general war.

The expansion of military activity in these domains should lead to the emergence of new military missions, particularly for suppressing sensor networks and achieving domain superiority. Just as the suppression of enemy air defenses (SEAD) has historically been the

primary precursor mission for achieving air superiority and permitting strike operations, in the future, similar missions may be necessary to suppress enemy anti-satellite systems, disable hostile network security systems, and deafen undersea sensor networks using swarms of small underwater vehicles. A common characteristic of such new missions is that they will likely be conducted using robotic, automated, and increasingly autonomous systems.

5. Refocused R&D Efforts

Since the defeat of Nazi Germany, the United States has been unrivalled in basic technological research. The nuclear, precision strike, and information revolutions in technology all stemmed from U.S. government-led efforts. Today, however, the U.S. government enjoys less commanding leads in the pursuit of quantum computing and communications, artificial intelligence, massive data set analytics, gene editing, directed energy, hypersonics and advanced materials science relative to its great power rivals. A large portion of U.S. spending on research and development, moreover, comes from private companies focused on commercialization, not national security. In the fields of quantum, directed energy and hypersonics, the Chinese government has made sizable investments that have been driven by a perception of national security as well as industrial opportunities. While China will be a tougher R&D competitor across-the-board, Russia, too, has protected select industrial R&D efforts in niche military areas including nuclear weapons design, submarines and torpedoes, ballistic missiles, hypersonic systems, and cyber and electronic warfare.

Given the stiffer technological competition posed by China and Russia, the United States will need to update its R&D approach. It will need to improve dramatically its intelligence efforts aimed at monitoring the research efforts of competitors to avoid technological surprise. It will have to focus its limited government resources on national security “big bets” that the commercial sector has little incentive to make in order to roll out new technological surprises to influence the decision calculations of great power rivals. And it will have to become a much more effective second mover technologically by quickly comprehending the significance of foreign technological developments to adopt them itself and operationalize them faster than its competition.

6. Warfare at Scale: Stockpiling, Industrial Production, and Mobilization

Preparing for the possibility of war with Russia and/or China with the aim of deterring such an event is radically different from planning for the possibility of wars with smaller regional opponents and presents an enormous problem of scale. Potential target sets are orders of magnitude greater and more geographically distributed than those for regional opponents like North Korea. As a reference, in 2003 the U.S. military delivered on average 750 PGMs per day during the opening combat phase of Operation Iraqi Freedom against a country that is one twenty-second the size of the United States with less than one tenth the population and at the time possessed relatively antiquated air defenses. Operations against great powers would likely require many times more sorties per day, and preferred PGMs could be depleted within days. Shallow magazines of standoff and direct attack precision munitions, as well as insufficient numbers of launchers and survivable delivery systems represent critical gaps between the ambition of the defense strategy and the means to execute it that will need to be addressed quickly.

Beyond scale is the issue of protraction. War is difficult to imagine between great powers, but it is even harder to imagine a swift, decisive outcome if it breaks out. Protracted or frozen conflict may be more likely, creating enormous societal burdens that are more comparable our grandparents' experience in the world wars of the early twentieth century than to any conflicts we have engaged in over the last fifty years. Such a protracted war would require large-scale mobilization of civilian resources and could massively disrupt the global economy. Large-scale strategic physical and cyber attacks on the U.S. homeland should be treated as a likely condition of future war against a great power.

The ability to sustain war efforts despite economic dislocations and to surge production of war-related items could be critical to winning such a war. Our defense industrial base, however, is ill-suited for such a conflict. While the United States and its close allies have in the aggregate excess capacity for shipbuilding and aircraft manufacturing, they have grossly inadequate industrial capacity for precision munitions, trusted foundries for microelectronics, and advanced sensor production to support a large-scale and likely protracted war against one or more great powers. In the armaments industry there will always be inefficiencies, but could excess capacity be driven down over time in areas where it is less useful and increased in areas that would confer advantage and strengthen deterrence in long-term competitions?

7. Increasing Important of Concurrency

During the post-Cold War period, U.S. force planning constructs dictated that the U.S. military should be shaped and sized to wage two nearly simultaneous regional wars more or less unilaterally. This two-war principle was seen as critical for deterrence, because it discouraged collusion between potential aggressors as well as opportunistic aggression by a second belligerent if U.S. forces were already engaged in one war. Whatever dangers of collusion or opportunistic aggression there were with respect to regional rogue states, though, they pale in comparison to the risks associated with Russia and China. Indeed, should war break out between the United States and one of these powers, it is difficult to imagine that one party would not coordinate its warfighting effort with the other. A strategy that emphasizes great power competitions should take account of the likelihood that other great powers will collude in opposing the United States both during peacetime competitions as well as in a state of armed conflict, placing a premium on concurrency.

One possible way to maintain the strategic imperative of concurrency while avoiding the cost of a large force build would be to refine the unit of concurrency—how war is defined—while emphasizing globally fungible forces and capabilities that could be used to inflict unacceptable levels of punishment on multiple adversaries simultaneously. Long-range surveillance and strike aircraft, non-kinetic cyber capabilities, globally-available space-based capabilities and deep magazines of PGM stocks could all play a role in maintaining concurrency as a force planning principle.

8. Re-Thinking Arms Control

A resumption of great power competitions also should entail a reevaluation of arms control arrangements, both to jettison constraints that no longer make strategic sense for the United States in this new era as well as to identify new arrangements that should be pursued to manage the competitions and increase strategic stability in areas of mutual interest.

Thus far, Russian violations of the 1987 Intermediate-Range Nuclear Forces (INF) Treaty and China's build-up of a sizable arsenal of ground-launched intermediate-range ballistic missiles, have gone unanswered by the United States. It has done little to redress the disadvantages under which it is operating in the area of intermediate-range ground-launched strike systems. The U.S. Congress might consider a commission to reevaluate the INF Treaty and its costs and benefits in the years ahead, and to make recommendations for a path forward. In the meantime, it may be prudent to postpone major investments in new treaty-compliant, ground-based precision fires pending the outcome of such a review to avoid squandering resources should the United States ultimately withdraw from or amend the treaty. We should not lock in the U.S. military's future investment plans based on treaty constraints from a previous era.

On the other hand, the United States should explore the possibility that verifiable arms control measures could be developed in other areas. For example, all of the great powers would have an interest in mutual non-targeting of dedicated (exclusive use) nuclear command and control systems. Although the technical verification challenges appear daunting, such a regime would be beneficial to all great powers through its enhancement of strategic stability. Similarly, prohibitions on biological weapons might need to be updated to account for the growing potential of gene editing. And new arms control measures should be considered to address the expansion of military-related activities in space, cyberspace and undersea perhaps by prohibiting certain types of countervalue, or non-military, targeting.

9. Full-Spectrum Civil Defense

It has been many decades since the United States has put serious effort into civil defense and integrated it into a broader defense strategy. A re-emphasis on great power competition will necessitate such efforts. Greater thinking about civil defense is needed to confront an array of nuclear and non-nuclear forms of strategic attacks, including electro-magnetic pulse, biological warfare, and catastrophic cyber attacks. Part and parcel to this will be enhancing the resiliency of our critical infrastructure, our "national hardware." But the United States must also be concerned with protecting its "national software": its societal cohesion and governance, which can be undermined through influence operations and information campaigns. These efforts must be integrated with more classical military preparations.

10. Fiscal / Economic Competition

The competitions the United States faces with Russia and China are likely to last for decades. "Winning" is likely to be much more a matter of staying power than victory in any decisive battle of annihilation. For this reason, maintaining national solvency over time and the judicious application of scarce resources—fiscal, human, natural, allied and technological—will be critical to successful competitive strategies. We have a duty to provide for the common defense not only for ourselves but also for our posterity. The continued postponement of hard choices and major shifts in the U.S. military's program of record both extends gross inefficiencies and costs into the future and retards the development of credible deterrent forces that are already required to arrest the erosion of our regional military positions and strengthen deterrence.

While there may be a need for increased defense spending, there are risks in applying new funds toward near-term capacity needs (increasing end-strength and force structure) at the

expense of improvements in capabilities. The erosion of the U.S. military's positions in Europe and the Far East is less a consequence of being out-manned than of being increasingly out-gunned, out-sticked, and out-postured in tough away games. A strategy that prioritizes great power competitions should, in turn, ensure that the reshaping of the U.S. military in terms of its capability mix takes precedence over resizing. It should be wary of increases in personnel during what is likely to be only a fleeting period of defense budgetary growth. The longer term fiscal picture suggests an almost inevitable and persistent downturn in defense spending in the years ahead given the crowding out effects from interest payments on publicly held debt and growth in entitlement spending. When such a downturn occurs, personnel increases will cause cutbacks to be all the more painful.

Conclusion

Only a few years ago, senior defense leaders believed it was inconceivable that the United States would ever fight Russia or China. Such thinking has vanished almost overnight. While the probability of war against one or both of these revisionist powers remains thankfully low, war is far from inconceivable any longer. It is commendable that the new defense strategy prioritizes great power competitions as the central force planning and deterrence challenge for the U.S. military, but the implications of great power competitions must be fully absorbed to ensure the strategy's effective implementation.

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Jim Thomas is an experienced analyst and practitioner of strategy development, scenario planning, operational planning, force design, and conventional and nuclear deterrence. He served for thirteen years in a variety of policy, planning, and resource analysis posts in the Department of Defense, culminating in his dual appointment as Deputy Assistant Secretary of Defense for Resources and Plans, and Acting Deputy Assistant Secretary of Defense for Strategy.

During his tenure in the Pentagon, he was responsible for the development of U.S. defense strategy, guidance for conventional force planning, resource assessment, and the oversight of war plans. Mr. Thomas spearheaded the 2005-2006 Quadrennial Defense Review (QDR) and was the principal author of the 2006 QDR Report to Congress.

Mr. Thomas currently serves on the Board of Advisors of the Center for a New American Security (CNAS), as an Adjunct with the RAND Corporation, and as a Consultant to National Defense University's Center for the Study of Weapons of Mass Destruction. He frequently testifies before Congress and has published numerous analytic studies with the Center for Strategic and Budgetary Assessments (CSBA), the International Institute for Strategic Studies (IISS) and CNAS. His articles have appeared in Foreign Affairs, The American Interest, The National Interest, and the Wall Street Journal.

Prior to co-founding the Telemus Group, Mr. Thomas was Vice President and Director of Studies at CSBA. Earlier in his career, Mr. Thomas was Vice President of Applied Minds, Inc., a private research and development company specializing in rapid, interdisciplinary technology prototyping. He has previously served on the National Security Agency Advisory Board External Affairs Panel and participated in several Defense Science Board Summer Studies on Constrained Operations (2016), Capability Surprise (2008), and Future Warfare (2007).

A former US Naval Reserve officer, Mr. Thomas served as an analyst in the Office of Naval Intelligence and watch officer in the National Military Joint Intelligence Center. He was awarded the Department of Defense Medal for Distinguished Public Service in 2006. Mr. Thomas is a member of the Council on Foreign Relations. He holds an MA in Strategic Studies and International Economics from the Johns Hopkins University School of Advanced International Studies, an MA in Foreign Affairs from the University of Virginia, and a BA degree with high honors in International Relations from the College of William and Mary.

January 30, 2018

Testimony before the House Armed Services Committee

Readying the U.S. Military for Future Warfare

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Chairman Thornberry, Ranking Member Smith, and distinguished members, thank you for inviting me to testify today.

The title of today's hearing is readying the U.S. military for future war. I regret to say that the U.S. military is not ready for the threats we face today.

In a recent simulation of a war in the Western Pacific, colleagues of mine at the Center for a New American Security showed that a Chinese missile strike on U.S. bases in the region could destroy more than 200 aircraft on the ground, crater every runway at U.S. airbases in Japan, hit almost every major headquarters within minutes of a conflict starting, destroy key logistical facilities, and hit almost every U.S. ship in port in Japan.¹

This is not a new problem. Similar analyses done by other defense experts have consistently shown that the United States' ability to project power into the Western Pacific has been steadily declining. China's arsenal of hundreds of cruise missiles and over 1,000 ballistic missiles poses a significant threat to U.S. bases in the region and aircraft carriers. The U.S. military faces similar problems in Europe, where the United States has fallen behind Russian investments in long-range precision strike, integrated air defenses, and electronic warfare.

These problems did not spring up overnight. Broadly categorized under the label of anti-access capabilities, these threats to U.S. power projection are well understood. Defense analysts have been warning about the U.S. military's waning ability to project power into contested regions for the past two decades. And these threats have been recognized in every official DOD strategy document since the 2001 Quadrennial Defense Review. Moreover, the steps necessary to counter these threats are clear – increased investment in: long-range strike, stealthy uninhabited aircraft to hunt for mobile targets, advanced munitions, electronic warfare, and undersea strike.

Yet the military has made only halting steps towards these investments. The Air Force is still heavily weighted towards short-range tactical fighter aircraft and, under current plans, will remain so for decades to come. The Navy's aircraft carriers similarly only carry short-range fighters, limiting the carrier's usefulness in the early stages of a major conflict. Despite strong pressure from Congress, the Navy has no plans to invest in a long-range strike aircraft to extend the carrier's reach. The Army has even more acute problems in power projection due to the reduction in Army brigades forward based in Europe and the complete lack of any effective Army modernization for the past fifteen years.

Why are we here? We spend more money than our adversaries. The United States is a global technology leader. And our warfighters are better educated, trained, and motivated than our adversaries. We have seen this problem coming for two decades, yet we have failed to adequately respond.

It is not for a lack of money. With sufficient reforms, there is ample money within a \$600 billion defense budget. Budgetary stability is necessary. The current budgetary instability inflicted on the military due to a failure of the nation's political leaders to reach a bipartisan deal on taxes and entitlements has severely hampered readiness and modernization. We cannot field a first-class military through government shut downs, continuing resolutions, and constant uncertainty about long-term spending.² But these problems predate the current budgetary crises. Money alone will not cure what ails the Pentagon.

Nor is it because the Pentagon has been fixated on wars in the Middle East. From 2001 to 2008, the base budgets of the Navy and Air Force grew 22% and 27%, respectively, in real dollars. At the same time, the number of combat ships declined by 10% and combat aircraft by 20% over that same period.³ The Army squandered over \$18 billion on its Future Combat Systems program, with little to show for it. On top of that, the Pentagon wasted an additional \$25 billion on other failed modernization initiatives in the early 2000s.⁴ Taxpayer money – a lot of it – went towards military modernization for future threats, even while troops were fighting in Iraq and Afghanistan.

The reason we have failed to adapt is because our system lacks sufficient strategic agility. We have seen these threats coming a long ways off. We have spent money. Yet we have a force that is not appropriately designed for the threats we face because we have not adapted quickly enough.

There are three main obstacles to more rapid adaptation: a ponderous and risk-averse acquisition system; stickiness in our programs that makes it difficult to cancel legacy systems less suited to future needs; and cultural resistance within elements of the military to new paradigms of warfighting.

The need for acquisition reform is well-understood in defense circles. Reform can mean many different things, however, and some goals for reform may be at odds with others. For example, reforms aimed at reducing wasteful spending – a valuable goal – could end up adding red tape and slowing down an already sluggish process. If the U.S. military is to be more adaptable, then the primary goal of acquisition reform should be speed. The DOD must accelerate the pace of requirements and acquisitions.

DOD has some experience with rapid fielding. During the wars in Iraq and Afghanistan, DOD accelerated the acquisition of vital capabilities – body armor, counter-improvised explosive device (IED) technology, mine-resistant ambush protected (MRAP) vehicles, and intelligence, surveillance and reconnaissance (ISR) assets. Unfortunately, to do so senior defense leaders were forced to go around the standard requirements and acquisition processes, rather than work within it. To field combat capabilities in a relevant timeframe, senior leaders had to create standalone ad hoc organizations: the Rapid Equipping Force (REF), Joint IED Defeat Organization (JIEDDO), Joint Rapid Acquisition Cell (JRAC), MRAP Task Force, and ISR Task Force, among others.

These organizational initiatives are often held up as examples of successful innovation, and while individually they are success stories, it is worth putting their creation in context. During two of America's longest wars, the DOD's standard methods for fielding new equipment were too slow to be useful. Even worse, senior leaders were not effective in creating a generalized rapid process, despite efforts to do so. Rather, for each new capability, senior leaders had to create purpose-built organizations that reported directly to senior leaders so that they would not be stymied by other parts of the bureaucracy. This is not the hallmark of an agile system.

Even when innovation occurred, it often came late to need. Urgent requests from combat units in Iraq for MRAPs languished in the halls of the Pentagon for two years before Secretary of Defense Robert Gates became personally involved and directed MRAP procurement. And this was in spite of intense pressure from Congress, including this committee, to urgently field MRAPs. The cost to this delay was hundreds and possibly thousands of servicemembers' lives.⁵ In a major war, the cost could be even greater. For perspective, the three years it took the Pentagon to field MRAPs corresponds to nearly all of U.S. involvement in World War II. If the request had been submitted on the day after Pearl Harbor, units would not have arrived in significant numbers until the final six months of the war.

In a major power war, we will be required to innovate on timelines of months, not years. And we must have these processes of innovation in place today. DOD has taken steps to institutionalize some of the rapid innovation processes used in Iraq and Afghanistan and has created new organizations, such as the Strategic Capabilities Office (SCO). These organizations are valuable, but we must also make speed-to-market a goal in our standard acquisition process as well. At present, it can take decades to bring a new major weapon system to fruition. This process is too slow, and often the security environment evolves in the intervening years to make systems less valuable. In short, reality is operating inside our bureaucratic OODA loop.¹

The DOD needs to acquire major weapons systems on shorter timelines. Perhaps counter-intuitively, this means that the best strategy for preparing for future wars is to eschew ambitious "leap ahead" transformational programs and instead orient modernization initiatives to what is achievable in the near-term with existing technology. DOD should invest in emerging technologies, but prototyping and experimentation should be separate from acquisition. DOD should not embark down the path of procuring a new major weapon system until the technology is mature.

¹ The "OODA loop" comes from a paradigm for combat in which the winning competitor is the one who completes a cognitive process – observe, orient, decide, act (OODA) – faster than his or her adversary.

The slowness of our acquisition system is unfortunately compounded by political and bureaucratic structures in the Pentagon, defense industry, and Congress that make it exceedingly difficult to cancel or curtail programs that are less useful. Defense secretaries who seek to reorient the DOD to future threats face an uphill battle against their own subordinates, industry, and too often members of Congress who seek to defend existing programs. Existing programs are “sticky” – they have advocates throughout the defense enterprise. There are fewer institutional advocates for new programs: no program office in the Pentagon to defend their goals, no money to defense contractors, and no jobs in members’ districts. This asymmetric incentive structure is baked into our process and there is no easy fix other than strong leadership. If DOD is to be adaptable, Congress must be a willing partner in cancelling or curtailing programs that are no longer best suited for future wars.

Finally, in some cases, cultural resistance to new paradigms for warfighting can be a hindrance to some kinds of innovation. Many forms of innovation fall within existing paradigms for warfighting and are easily embraced by military communities – for example, longer-range missiles or more maneuverable fighters. Some kinds of military innovations, however, require major paradigm shifts in combat, such as the transition from horses to tanks. These shifts are often met by resistance from military communities, in spite of the fact that these innovations would lead to combat advantage. Unfortunately, this is the case for some kinds of innovation today.

The Air Force and Navy aviation community have both been extremely reluctant to adopt uninhabited combat aircraft. The Air Force has embraced uninhabited aircraft for reconnaissance missions, but not combat missions. The Navy is investing in an uninhabited carrier-based aircraft for tanking, but not strike missions. This is consistent with a pattern across the military services of using uninhabited and robotic systems in support roles, but not combat roles, even when they have clear advantages. In the case of airpower, uninhabited aircraft are essential for power projection into contested areas because of their greater endurance than human-inhabited aircraft. With refueling, uninhabited aircraft could stay aloft for 10 to 20 hours or more, far longer than what is possible with a human in a single-seat aircraft. These advantages were first recognized over a decade ago in the 2006 Quadrennial Defense Review, which directed the Navy to: “develop an unmanned longer-range carrier-based aircraft capable of being air-refueled to provide greater standoff capability, to expand payload and launch options, and to increase naval reach and persistence.”⁶ Despite intense pressure from Congress and impressive technological progress in the form of the X-47B demonstration aircraft, these goals remain unfulfilled. The Navy’s current carrier-based uninhabited aircraft program the MQ-25, is oriented towards aerial refueling,⁷ and the Navy has no program underway to develop a penetrating strike aircraft. This gap means that aircraft carriers, a visible symbol of American power and a significant financial investment, will be of reduced value in the early stages of a conflict against major competitors, when they are most needed.

More generally, rebalancing the military to project power in the face of anti-access threats requires a fundamental re-look at the balance of investments within the Navy and Air Force. The vast bulk of the Air Force’s combat fleet consists of short-range tactical fighters. Unfortunately, these will also be of little utility in the early stages of a high-end conflict, when adversary ballistic missiles will hammer U.S. air bases. The Air Force needs to extend its reach. The B-21 bomber is a key capability for doing so, and Congress should work with the DOD to ensure that once the bomber enters production, it is procured at the maximum rate of production. The B-21 must also be augmented

with stealthy uninhabited aircraft to provide persistent surveillance and strike capability against mobile and relocatable targets such as missile launchers and radars. Congressional leadership is needed to help ensure DOD is maximizing its opportunities in this area as well. Over time, the Air Force needs to shift its investment profile away from short-range fighters to longer-range aircraft, or else DOD will face a long-term horizon of waning airpower and combat effectiveness.

For the Navy, acquisition of a stealthy uninhabited penetrating strike aircraft is essential to keeping the aircraft carrier relevant in the face of longer-range ballistic and cruise missiles. Even with this capability, though, the proliferation of precision-strike suggests a fundamental re-examination of the balance of investments across the three components of American sea power: surface ships, carriers, and submarines. Today, the United States has an unparalleled advantage in undersea warfare capabilities. The United States is able to use the undersea environment as a sanctuary and operate deep within adversary anti-access regions and strike enemy targets from undersea. The Navy should capitalize on this opportunity, expanding Virginia-class submarine production. The Navy should also invest in uninhabited undersea vehicles (UUVs) and undersea payload modules to expand sensor and strike capacity.

The Army and Marine Corps are culturally in a better place, as the transition away from long-duration counterinsurgency wars towards more traditional threats is more within their comfort zone. Nevertheless, they face challenges as well. The Army has similarly been slow to embrace ground robotic vehicles, particularly armed systems, in spite of significant Russian investment in armed ground robots.⁸ The Army also must overcome a strong anti-technology strain of thinking, a product partly of the failure of technological advantage to yield meaningful strategic outcomes in Iraq and Afghanistan.⁹ For the Marine Corps, anti-access threats pose serious challenges to current amphibious warfare tactics, and the Marine Corps must evolve new technologies and concepts for amphibious assault and forcible entry.

The United States military is capable of adapting to these future challenges. U.S. warfighters can generate creative solutions to operational problems, and the U.S. industrial base is capable of fielding unparalleled military capabilities. The most difficult challenge is focusing defense institutions on the right problems and holding the military services accountable for developing solutions. Power projection in the face of anti-access threats is a major problem for the U.S. military today, and Congressional leadership will be essential in ensuring that the military reorients its forces to develop effective solutions.

Priority Investment Areas

Listed below are priority investment areas for modernizing the U.S. military to meet future threats.

Air power

- **Long-range penetrating strike aircraft** – Maximize the rate of procurement for the B-21 bomber once it goes into production.
- **Persistent surveillance and strike aircraft** – Develop a stealthy uninhabited combat air vehicle (UCAV) to persist inside enemy territory to hunt mobile and relocatable targets.

- **Robust, secure networks** – Build an aerial layer network for resilient communications and position, navigation, and timing (PNT) in the event of disruption of space assets.
- **Next-generation weapons** – Increase quantities of the Joint Air-to-Surface Standoff Missile–Extended Range (JASSM-ER) and Long-Range Anti-Ship Missile (LRASM), and develop a new longer-range air-to-air missile.
- **Air-launched swarming drones** – Field small air-launched swarming air vehicles for jamming, decoys, reconnaissance, battle damage assessment, and strike.
- **Low-cost delivery systems** – Maximize the use of existing aircraft (e.g., B-1, B-52, F-15, F-16, and MQ-9) and consider new, low-cost air vehicles to act as delivery systems for standoff weapons, decoys, and air-launched swarms.
- **Light attack aircraft** – Field a low-cost, light attack aircraft for counter-terrorism, close air support, and other missions in permissive air environments.
- **Artificial intelligence** – Leverage artificial intelligence and data analytics to help process large volumes of data and cue items of interest to human analysts.
- **Emerging technologies** – Invest in and mature key emerging technologies such as artificial intelligence, autonomy, and directed energy weapons.

Sea power

- **Carrier aviation** – Develop a stealthy, uninhabited combat air vehicle (UCAV) to extend the reach of aircraft carriers in contested environments.
- **Submarines** – Increase the rate of Virginia-class submarine production to capitalize on the United States’ undersea advantages.
- **Undersea** – Procure large-diameter uninhabited undersea vehicles (UUVs), both submarine-delivered and ship-delivered, to augment undersea capabilities. Experiment with undersea payload modules as low-cost means of augmenting undersea payload capacity.
- **Lower-cost expeditionary ships** – Invest in commercial-derivative (“black hull”) expeditionary sea bases for more cost-effective expeditionary operations.
- **Robotics** – Field low-cost uninhabited surface vessels for anti-submarine warfare and to act as additional missile batteries to augment destroyers.
- **Missile defense** – Invest in hyper velocity projectiles and mature electromagnetic rail gun technology to improve ship defenses against ballistic and cruise missiles.
- **Protection** – Invest in armed uninhabited surface vessels (USVs) to act as escort and interdiction ships for high-value assets against potential threats in high-threat areas, such as during strait transit. Equip surface ships’ small boats with robotic applique kits to allow them to operate “optionally manned” for use as uninhabited interdiction boats against potential threats.

Land power

- **Armor** – Increase the number of active duty armored brigade combat teams (BCTs).
- **Survivability** – Upgrade ground vehicles with active protection systems (APS) to intercept precision-guided anti-armor weapons.
- **Fires** – Increase the range, capacity, and lethality of long-range precision fires.
- **Communications and electronic warfare** – Invest in protected communications, electronic warfare, and electromagnetic decoys to ensure forces are survivable and can communicate in contested electromagnetic environments.
- **Air defenses** – Invest in short-range air defenses to protect ground forces from air attack.
- **Missile defense** – Upgrade Paladin 155mm howitzers with hyper velocity projectiles (HVPs) and targeting capabilities for ballistic and cruise missile defense.¹⁰
- **Robotics** – Experiment with new operational concepts leveraging air and ground robotic teammates.
- **Lethality** – Mature and field advanced precision-guided weapons for dismounted troops, such as counter defilade weapons and smart rifles.
- **Mobility** – Mature exoskeleton and exosuit technologies to improve individual mobility and protection.
- **Protection** – Increase troop protection against blast-induced brain injury through improved helmet design.
- **Human performance** – Research the benefits and risks of human enhancement technologies, such as transcranial direct current stimulation (tDCS)¹¹ and pharmaceutical enhancements to improve alertness and cognitive performance, such as modafinil.¹² Establish a DOD-wide process for integrating these technologies and techniques into the force in a safe and ethical manner.

Recommendations for Further Reading

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Consistent with Rule 11, clause 2(g)(5), of the Rules of the U.S. House of Representatives for the 115th Congress, a detailed list of CNAS federal contracts or grants (including subcontracts and subgrants), or contracts or payments originating with a foreign government, received during the current and two previous calendar years has been provided to this committee as an attachment.

Notes

¹ Thomas Shugart and Javier Gonzalez, "First Strike: China's Missile Threat to U.S. Bases in Asia," Center for a New American Security, June 2017, <https://www.cnas.org/publications/reports/first-strike-chinas-missile-threat-to-u-s-bases-to-asia>.

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From 2008-2013, Mr. Scharre worked in the Office of the Secretary of Defense (OSD) where he played a leading role in establishing policies on unmanned and autonomous systems and emerging weapons technologies. Mr. Scharre led the DoD working group that drafted DoD Directive 3000.09, establishing the Department's policies on autonomy in weapon systems. Mr. Scharre also led DoD efforts to establish policies on intelligence, surveillance, and reconnaissance (ISR) programs and directed energy technologies. Mr. Scharre was involved in the drafting of policy guidance in the 2012 Defense Strategic Guidance, 2010 Quadrennial Defense Review, and Secretary-level planning guidance. His most recent position was Special Assistant to the Under Secretary of Defense for Policy.

Prior to joining OSD, Mr. Scharre served as a special operations reconnaissance team leader in the Army's 3rd Ranger Battalion and completed multiple tours to Iraq and Afghanistan. He is a graduate of the Army's Airborne, Ranger, and Sniper Schools and Honor Graduate of the 75th Ranger Regiment's Ranger Indoctrination Program.

Mr. Scharre has published articles in *The New York Times*, *Foreign Policy*, *Politico*, *Proceedings*, *Armed Forces Journal*, *Joint Force Quarterly*, *Military Review*, and in academic technical journals. He has presented at the United Nations, NATO Defence College, Chatham House, National Defense University and numerous other defense-related conferences on robotics and autonomous systems, defense institution building, ISR, hybrid warfare, and the Iraq war. He has appeared as a commentator on CNN, MSNBC, NPR, the BBC, and Swiss and Canadian television. Mr. Scharre is a term member of the Council on Foreign Relations. He holds an M.A. in Political Economy and Public Policy and a B.S. in Physics, cum laude, both from Washington University in St. Louis.

