HEARING TO RECEIVE TESTIMONY ON THE ROLE OF THE DEPARTMENT OF DEFENSE SCIENCE AND TECHNOLOGY ENTERPRISE FOR INNOVATION AND AFFORDABILITY IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST FOR FISCAL YEAR 2014 AND THE FUTURE YEARS DEFENSE PROGRAM

THURSDAY, APRIL 18, 2013

U.S. SENATE,
SUBCOMMITTEE ON EMERGING
THREATS AND CAPABILITIES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:30 p.m. in room SR–232A, Russell Senate Office Building, Senator Kay R. Hagan (chairman of the subcommittee) presiding.

Committee members present: Senators Hagan and Fischer.

Majority staff members present: Richard W. Fieldhouse, professional staff member; and Robie I. Samanta Roy, professional staff member.

Minority staff members present: Thomas W. Goffus, professional staff member; and Anthony J. Lazarski, professional staff member.

Staff assistants present: Jennifer R. Knowles and Kathleen A. Kulenkampff.

Committee members' assistants present: Jeff Fatora, assistant to Senator Nelson; Christopher Cannon, assistant to Senator Hagan; and Peter Schirtzinger, assistant to Senator Fischer.

OPENING STATEMENT OF SENATOR KAY R. HAGAN, CHAIRMAN

Senator HAGAN. We will bring to order the Emerging Threats and Capabilities Subcommittee.

Good afternoon. And we meet today to receive testimony on the health and status of the Department of Defense science and technology enterprise and its contributions to developing innovative and affordable systems for the warfighter. This hearing will delve deeper into some of the important topics that we touched upon last year in our hearing on the health and status of the DOD laboratory enterprise.

Despite the significant budgetary pressures we are facing today, the Defense Department should be given credit for trying to preserve, as much as possible, the investments in science and tech-

nology. Nevertheless, these budgetary pressures, along with the pending drawdown of our forces in combat overseas and the associated decrease in rapid fielding requirements and the new defense strategic guidance, all are forcing the science and technology community to reevaluate the priorities.

Two key areas of significant concern to me are the Department's ability to recruit and retain the best and brightest for its science and technology workforce—and I know I have spoken to some of you about this—especially daunting when you look at the sequestration environment that we are in today, and the timeliness and affordability of the new weapons systems.

In order to address and understand some of these complex issues and the Department of Defense's approach to them, we are pleased to have five expert witnesses with us today. Dr. Alan Shaffer is the acting Assistant Secretary of Defense for Research and Engineering. And I understand that is the second time for an extended period of time over the last 10 years. So thank you.

Dr. Arati Prabhakar is the Director of Defense Advanced Research Projects Agency, better known as DARPA. I understand this too is your second time serving at DARPA, the first as a program manager and the founding director of DARPA's Microelectronics Technology Office. Welcome.

Ms. Mary Miller is the Deputy Assistant Secretary of the Army for Research and Technology, also in this position for the second time.

And Ms. Mary Lacey, the Deputy Assistant Secretary of the Navy for Research, Development, Test and Evaluation. As I said, welcome back. You are the only witness on this panel to date who was at the hearing that we had last year.

And Dr David Walker, the Deputy Assistant Secretary of the Air Force for Science, Technology, and Engineering.

I thank all of you today for your service in the cause for our National security. We look forward to your testimony. In order for us to have adequate time to discuss a broad range of topics—and especially with five witnesses also—I ask that you keep your opening remarks to, hopefully, 2 minutes. And we are going to include your full written statements in the hearing record.

Before we hear from our panel, I want to turn to my good colleague and ranking member, Senator Fischer, for any opening remarks Senator Fischer would care to make. Thank you.

STATEMENT OF SENATOR DEB FISCHER

Senator FISCHER. Thank you, Madam Chairman, and thank you all for being here today. I truly appreciate you taking the time to come and go through this briefing with us and have a conversation about the important issues before us.

I appreciate the innovative structures our military employs to conduct cutting-edge research. In my State, the University of Nebraska has partnered with the U.S. Strategic Command to advance its mission to protect the United States from an attack by weapons of mass destruction. And General Kehler has noted the clear value of this partnership.

As we prioritize our scarce defense resources, it is critical that we continue to invest in advanced research and potentially game-

changing technologies. The American military is the most advanced and effective fighting force in the world. We must sustain our investment in the next generation of technologies to maintain our technological superiority and stay ahead of these developing threats.

Of course, these investments must be made wisely. I am eager to hear from our witnesses on the steps they are taking to scrutinize their investments and, in particular, improve coordination and eliminate duplicative research.

The current fiscal environment also demands that defense funds be devoted toward warfighting missions and capabilities. Past years may have permitted the support of research that had only marginal benefit to the Department of Defense, but I believe it is critical that the Department's science and technology funding have a strong and clear benefit to its core mission: fighting and winning wars. The Department of Defense simply cannot afford to foot the bill for projects that are more relevant to other departments and agencies.

This subcommittee has its work cut out for it. Shedding non-warfighting research while protecting investments that could unlock the next generation of battlefield technology will be a complex and difficult task. We need the help of these witnesses to thread that needle.

So thank you so much for being here.

And thank you, Madam Chair.

Senator HAGAN. Thank you, Ranking Member Fischer.

What I would like to do is—I have had two charts handed out and I just want everybody to look. And my first question actually relates to these talks. Oh, I am sorry. I apologize. I am ready for these questions and I am already omitting your opening statements. [Laughter.]

So we will pull back on that. I know. I like my charts. [Laughter.]

So Dr. Shaffer, if you would start first please.

STATEMENT OF ALAN R. SHAFFER, ACTING ASSISTANT SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING

Mr. SHAFFER. Chairwoman Hagan, Ranking Member Fischer, I am pleased to represent the scientists and engineers of the Department of Defense, a group that conceives, develops, and matures systems early in the acquisition process. They work with multiple partners to provide the unmatched operational advantage employed by our services' men and women.

And by the way, we like the charts also.

As we wind down in Afghanistan, the national security and budget environments are changing. We are heading into uncertainty. The fiscal year 2014 President's budget request for science and technology is $12 billion, a nominal increase from 2013's $11.9 billion.

However, it is not possible to discuss the budget without addressing the impact of the sequester, which takes 9 percent from every single program in RDT&E. This reduction will delay or terminate some efforts. We will reduce awards. For instance, we will reduce university grants by roughly $200 million this year alone and po-

tentially reduce the number of new SMART scholarship for service program awardees this year to zero. Because of the way the sequester was implemented, we will be very limited in hiring new scientists this year and for the coming several years. Each of these actions will have a negative long-term impact to the Department and to national security.

The President and the Secretary of Defense depend upon us to make key contributions to the defense of our Nation. S&T should do three things for national security. First, we should mitigate the current and emerging threats facing our Armed Forces and Nation. Second, we should build affordability and affordably enable our current and future weapons systems to operate. And third, we should develop technology surprise to prevent potential adversaries from threatening us. My written testimony highlights specific programs in each of these areas.

In summary, the Department's research and engineering program is faced with the same challenges as the rest of the DOD and the Nation. But our people are performing.

We appreciate the support of Congress to let us continue to meet the National security needs of the Department and Nation. Thank you.

[The prepared statement of Mr. Shaffer follows:]

Senator HAGAN. Thank you.

Dr. Prabhakar.

STATEMENT OF DR. ARATI PRABHAKAR, DIRECTOR, DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

Dr. PRABHAKAR. Thank you, Madam Chairman and Senator Fischer. It is really a pleasure to be here with you today.

DARPA's objective is a new generation of technology for national security, and to realize this new set of military capabilities and systems is going to take a lot of organizations and people. But DARPA's role in that is to make the pivotal early investments that change what is possible, that really lets us take big steps forward in our capabilities for the future.

And so today, that means that we are investing in a host of areas. We are building a future where our warfighters can have cyber as a tactical tool that is fully integrated into the kinetic fight. And we are building a new generation of electronic warfare that leapfrogs what others around the world are able to do with widely, globally available semiconductor technology. It means we are investing in new technologies for position navigation and timing so that our people on our platforms are not critically reliant, as they are today, on GPS. We are investing in a new generation of space and robotics, advanced weapons systems, new platforms. And beneath all of that, we are building a new foundational infrastructure of emerging technologies in different areas of software and electronics and material science, but also today new technologies that are emerging from the biological sciences.

Now, with all of that together, if we are all successful, our aim is to create for our future commanders and leaders real options, powerful options for whatever threats our Nation faces in the years ahead. And that work is the driver behind all of our programs. It is the reason that the people at DARPA run to work every morning

with their hair on fire because they know that they are part of a mission that really does matter for our future security as a country.

I really want to thank this committee for the work that you have done to support us in many ways, including flexible hiring authorities as well as budget support. That has been essential in our ability to do our work.

And I look forward to taking your questions, along with my colleagues.

[The prepared statement of Dr. Prabhakar follows:]

Senator HAGAN. Ms. Miller?

STATEMENT OF MARY J. MILLER, DEPUTY ASSISTANT SECRETARY OF THE ARMY FOR RESEARCH AND TECHNOLOGY

Ms. MILLER. Chairman Hagan, Ranking Member Fischer, thank you for this opportunity to discuss the Army's science and technology program for fiscal year 2014.

Over the course of these past 12 years of war, the world has seen firsthand the value and impact that technology brings to the battlefield and how capabilities enabled by technology are critical to the soldiers and their success.

As a recent example, research done at the Night Vision and Electronics Systems Directorate in ground-penetrating radar resulted in the Husky Mounted Mine Detection System used widely in both Iraq and Afghanistan to detect IED's. This system is now becoming an Army program of record.

However, given the current budget environment, the Army has initiated a comprehensive strategic modernization strategy to better facilitate informed decisions based on long-term objectives. The role of the SMT enterprise is to research, develop, and demonstrate high payoff technology solutions for hard problems faced by the soldiers in ever-changing, complex environments, solutions that are both affordable and versatile.

As good stewards of the taxpayers? dollars, it is critical that we use finite Government resources to maximize development of technologies to meet Army-unique challenges and constraints. It is important that we complement what the private sector is already developing and that we leverage the work being done by our sister services, national labs, academia, and partner nations. Most importantly, our investments today must translate into capabilities that we successfully field to the Army of the future.

It goes without saying that the underpinning of all Army S&T efforts is a strong research program that builds an agile and adaptive workforce and technology base to be able to respond to future threats. Investments in S&T are a critical hedge to acquiring technological superiority with revolutionary and paradigm-shifting technologies. This includes the development of the next generation of Army scientists and engineers. Investing wisely in people with innovative ideas is our best hope for new discoveries to enable the Army of the future.

Thank you, and I look forward to your questions.

[The prepared statement of Ms. Miller follows:]

Senator HAGAN. Thank you.

Ms. Lacey?

STATEMENT OF MARY E. LACEY, DEPUTY ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Ms. LACEY. Good afternoon, Madam Chairman, Ranking member. It is an honor to appear here today before you to discuss the Navy's research and development enterprise.

In the year since I last appeared, we as a department have performed an extensive strategic review of our RDT&E resources, and the Secretary has established a corporate board to provide strategic oversight to our RDT&E investments and priorities and to further embed into our day-to-day business the urgency and flexibility we honed during a decade of a wartime posture.

Sequestration decreases our RDT&E accounts $1.5 billion in fiscal year 2013. This impacts all 282 program elements within the account. In S&T, we expect to place 300 less grants and cancel up to half of our new start functional naval capability projects. In development, we will delay most programs by about 3 months.

The Navy has historically made deliberate and measured investments to ensure stability and the right capacity within the organic technical workforce. Section 219 of the 2009 NDAA has proven invaluable to maintaining the health of our Navy labs, warfare, and systems centers. The Navy has used section 219 authority to refresh the technical capabilities of our workforce while enabling innovation. We are also placing greater emphasis on technical discipline on approaches that change the cost equation with things such as automated testing, open architecture, and corrosion prevention.

Investment in our workforce is critical, but it must be coupled with an appropriate investment in infrastructure. Based on the direction of this subcommittee, the Navy has expanded our ongoing test and evaluation infrastructure capabilities look to include our R&D enterprise. We are about halfway completed in our initial data gathering and we will use that in the future to make some strategic investment in our facilities.

In these exceptionally challenging technological and budgetary times, our goal continues to be to provide our sailors and marines with technically superior capabilities. We can ensure this through disciplined processes focused on affordability executed by a skilled workforce with technical capabilities second to none.

Thank you very much. I look forward to your questions.

[The prepared statement of Ms. Lacey follows:]

Senator HAGAN. Thank you.

Dr. Walker?

STATEMENT OF DR. DAVID E. WALKER, DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE FOR SCIENCE, TECHNOLOGY, AND ENGINEERING

Dr. WALKER. Chairman Hagan and Ranking Member Fischer, I am pleased to have the opportunity to provide testimony on the 2014 Air Force science and technology program.

As our Chief of Staff, General Welsh, recently stated in his vision for airmen, our service is fueled by innovation. The Air Force's single, fully integrated S&T program and our outstanding scientists and engineers are truly at the forefront of this innovative spirit.

The Air Force's fiscal year 2014 budget request for S&T is approximately $2.3 billion. These investments support a robust and balanced foundation of basic and applied research and advanced technology development that will provide demonstrated transition options and support future warfighting capabilities. This year's budget reflects a strong support of S&T from our leadership in this challenging fiscal environment and is balanced across the warfighters? need for rapid reaction solutions, midterm technology development, and revolutionary far-term capabilities.

Despite the strong support, the Air Force S&T program is not immune to the impacts of sequestration. So far, the Air Force research laboratory has notified over 40 universities and 20 contractors regarding grants and contracts that will be terminated, delayed, or rescoped.

We are also concerned about the negative impact of sequestration on our ability to attract and retain exceptional scientists and engineers.

The total impact of the Air Force research technology and development activities remains unclear, but it is safe to say that many of the new and promising technologies will be delayed in their transition to the warfighter.

While there are still uncertainties with sequestration, the budget does reflect a promise of the future warfighting capabilities, enabled by technologies developed in our laboratory.

Chairman Hagan, Ranking Member Fischer, I am pleased to present the Air Force program and look forward to your questions.

[The prepared statement of Dr. Walker follows:]

Senator HAGAN. I thank all of you very much.

And I know sequestration really has had a negative impact on all of these disciplines, and it is something, I am sure, we will be talking about more. It really does concern me greatly especially, Dr. Walker, your last comment too about the ability to retain the current scientists, engineers that are currently working throughout the disciplines of civilians in the DOD.

So let us look back to my handouts and the charts. These two were taken from a DARPA presentation on the defense aircraft industry last year. And the first one, the threats evolve faster than we develop systems, it depicts an example of how these threats evolve much faster than the time it takes for us to actually develop these systems, such as the F–22 fighter. During the time from the initial requirement of the advanced technical fighter in the early 1980s to the first F–22 delivered in 2003, this chart depicts how the world had significantly changed, both in terms of threat and in terms of technologies. And especially today when we are talking about the budget, the sequestration, I mean, the impact of the time alone certainly would impact the budgeting consequences and issues.

And then the second chart, the clear time trend in defense new start aircraft developments, shows the time that it has taken the Defense Department to develop the aircraft from an historical perspective. The chart shows the time it took from the start of an aircraft program to the time it first flew in an operational capability over the years, once again from the 1940's until now. And note that

this time from program start to first operational flight has significantly increased.

The interesting thing, I think, too on this chart is it shows a comparison of development time for commercial aircraft and then the commercial automotive sector. And as you can see, they are diametrically opposed to what it is from the military.

Now, I know that we have got to heavily caveat these charts because these increasing delays over time are due to a host of issues, including budget pressures and I know the acquisition system inefficiencies, change orders, et cetera. So I am not implying that this is solely a science and technology issue.

But to me, these charts really do stress a key concern that is relevant to the panel today. With the rapid pace of global technological development, we no longer have the luxury of thinking about an idea, developing it, waiting a decade or more to field these weapons systems.

So I would like each of you just to address the following. What is the DOD S&T enterprise doing to ensure that the Department is able to take advantage of the latest technological developments and make sure that they are infused in a timely and affordable manner into current and future programs of record? Mr. Shaffer, if you would like to start, and we can just go down the panel.

Mr. SHAFFER. Certainly. I would like to highlight two things that the Department is doing in S&T.

The first is we are trying to put more developmental prototyping in our 6–3 program. The reason we are trying to do that is it is much cheaper to test out concepts and capabilities in S&T than it is in full-up acquisition. And in fact, if you look at your chart here, the period where we were flat with very short delivery—and there are certainly a number of factors—happens to coincide when the DOD and NASA were in full scale with their X-plane prototype period. We had the X–1, X–2 through the X–15. None of those were designed to be fully operational systems, but we actually prototyped parts of those systems very early. Mr. Kendall has asked myself and asked also DARPA to take a look at doing additional prototyping in these spaces to drive down the cost and time.

The second thing that we are doing—and this is really with DARPA and the services—is we are gathering up all of our folks in our laboratories who are working in the area of design, system design. And we have a program—they are terrible names—Engineering Resilient Systems, but where we are looking—and it is led by Dr. Jeff Holland, who is the technical director at the Corps of Engineering Lab in Vicksburg, a strange place for it, but he has a very big effort.

We are looking at how do we do more system design in computers so you can do a much broader range of trades in computers rather than bending metal and also design in things like open systems to the maximum extent possible. So as we have long developments, we can do very easy modular changes to the design and we can do that in a computer instead of on an assembly line.

I highlight those two areas. If those two pan out, we will dramatically reduce the cost of new systems, the time to develop, and also importantly, we will stock the cupboard for when the acquisi-

tion budget grows again so we will have capabilities to keep our forces safe.

Thank you.

Senator HAGAN. Dr. Prabhakar?

Dr. PRABHAKAR. Let me start by just putting my comments in the context that you started with, which is to recognize that there are so many factors behind any of these phenomena.

From the technology end, what we are really seeking are some technical approaches and demonstrations that might serve to poke that system and show that there are some different ways of doing business in the hope that that will help trigger a change in the overall process because that is really what it is going to take.

I want to break the question into two pieces. One is the platforms that we build, and the aircraft that these charts focus on are a great example of that, the major vehicle systems that we build. And then second, the capabilities that go on them, be it electronic warfare or communications or sensing whatever job we are trying to do. And I think that there are important innovations in both of those.

On the platform side, a key theme that I think many of us see is that as these acquisition processes stretch out, that just creates more time for requirements to continue to change and for more and more iterations which creates a situation where it is literally decades and the whole thing does not really close. So one of the key concepts that is behind several of our programs is are there approaches that will collapse that time so that we can much more quickly get to a capability and not have this long period of time during which we are continuing to move the requirements around. We are working towards that in some of our manufacturing programs.

As well, when we do X-plane or other X-platform projects, these are not acquisition programs, but at the R&D stage, we are really looking at innovative business models and have had some very good success in doing demonstrations that are much faster and for far fewer dollars than anyone thinks is possible simply by building the right incentive structures, by having very specific objectives that do not change, some of those kinds of practices. So that is platforms.

I think I am actually much more encouraged by what is going to be possible as we change the systems that go onto our platforms, and electronic warfare is a particularly good example. Today when we build a new electronic warfare system, we are building something that is monolithic and it is very complex. When our adversary changes what part of the electromagnetic spectrum, they are working and we have to start all over and redesign the whole thing. We are building a new architecture that will allow us to be extremely agile so that when the threat changes, we can adapt in real time without having to ditch that whole thing and go through this next laborious acquisition process.

So those are a couple of the ideas.

You know, the big point in my mind is that for so many years affordability has been the conversation you have after you do the innovation. And a challenge that we are really putting out to the leading edge technical community is to say where are the innova-

tions that will completely flip the cost equation, not just make incremental changes because I think that can be powerful, but it has not been historically the question that we have been asking.

Senator HAGAN. Thank you.

Ms. Miller?

Ms. MILLER. Thank you.

As Mr. Shaffer said, prototyping is a big activity that we are doing to try to better inform our requirements, requirements that often are reaching a little bit too far and take us a long time to achieve. And what we have been doing within the Army is working with our requirements community and our science and technology community to better inform those requirements. The prototypes help to set us up for good capacity in that regard because we can show what is technically achievable and we can drive down risk.

In addition, within the Army, I mentioned our strategic modernization strategy we are developing. This is a 35-year look out into the future. And what it does is it allows us to align the programs of record and their lifecycles against where they need technology insertion and where we need to have new platforms, perhaps, to replace them. That helps to, again, inform requirements and helps to baseline our science and technology investments so that we can do this insertion. It is actually aligning us so that our technology is there when it is needed, not too early, not too late, and we will, again, try to shorten up our——

Senator HAGAN. It seems 35 years is an awfully long time from a planning perspective—

Ms. MILLER. Yes, ma'am.

Senator HAGAN.—in today's highly technical architecture and field.

Ms. MILLER. I wish I could say that we did not have platforms that lasted that long, but ma'am, we do and we do need to have technical upgrades as we go along. That is why it is important to understand the lifecycle of the platforms and when we can have technical insertions.

I would also argue—and it has been mentioned—that we do not really know what threat will be there in 30 years or 35 years, but the fact is if you stretch something out that far, you certainly know the world is going to be different and it breaks people from saying I am just going to do what I am doing now for a little bit longer. They have to think differently. It has opened some new train of thought with people that pretty much have been kind of closed thinking.

Senator HAGAN. Well, that is why I like, Dr. Prabhakar, your comment about—you know, when the threat changes, that you can quickly adapt.

Ms. MILLER. Absolutely.

The other aspect that we are doing is looking to the international community and what technologies they can bring in. We talked about open architectures and systems engineering, and we are looking at the international community to see what they can bring in and augment the Army's capabilities. And I am certain that is true across all of the Services and DARPA because we are never going to say that we are the smartest people here. Everybody has got good ideas. We need to know how to use them.

Senator HAGAN. You know, I am already running close. We are going to be 10-minute sessions. So let us move on. Thank you, Ms. Miller.

Ms. Lacey?

Ms. LACEY. So I will agree with everyone, all the comments that have been made so far.

I will cite two specific examples. One is a rapid prototyping that you probably heard a lot about in the last couple weeks, our high-energy laser demo on an operational platform in the Gulf. So that should give us some context, some learning, some understanding so we can make sure that as we move into the development phase, that we have provided a capability that the warfighter can actually use.

Senator HAGAN. What does this laser do?

Ms. LACEY. It is a high-energy laser and it will shoot down air targets or FIAC targets close in on the surface type targets. So we are going to be dong a demonstration of that coming up in 2014. I am very excited about it.

The comment I would like to make about open architecture—we too are moving in that direction. And it is not so much driven by science and technology, but it is certainly enabled by it. But the real key is to open up what you already have. As Ms. Miller pointed out, we are going to have systems for 35. In our case, we have aircraft carriers for 50 years. And if we do not open those systems up now, we are not going to be able to take advantage of these science and technology breakthroughs as they happen. So we in the Navy are spending a lot of time doing that as we move forward.

Senator HAGAN. Thank you.

Dr. Walker?

Dr. WALKER. The Air Force is in lockstep with the other services and ASD as well.

A couple of things I did want to address, though, is I really like your slide because I am doing a study right now that our chief scientist, Dr. Mark Maybury, is running on the global horizon, which is really looking at the future of S&T and how we take that to improve the Air Force of the future. And I am leading a team that is doing mission support which is really how do we improve the acquisition system so that we can bring in new technology faster. And this slide is my number one trend slide that I am using.

And it was interesting. When I started looking into this, we really have driven ourselves into a long acquisition process. We are not following the trends of other agencies, and we want to take advantage of that. And we started asking questions. The automobile industry, which is actually coming down—they actually are using four times the number of lines of code in a modern automobile than we use in the F–35. Yet, they are able to do it faster. One of the reasons is because they learned to use loosely coupled software, use loosely coupled systems as opposed to our approach which has been highly integrated systems.

So when you start looking at how do we have an evolvable system, which is really addressing that issue of requirements—requirements change over time. From the time you define what you want to have to the time you actually have it fielded and, much worse, 60 years later when you are still using it like we are using

some of our aircraft, you have to be able to evolve and you need to design the system so it can evolve along the way. And having loosely coupled, where possible, allows you to do that and is much more flexible.

Taking advantage of the digital design and building a digital thread, taking advantage of advanced manufacturing capabilities—these are all ideas of how we can improve our ability to get from technology ideas into warfighting systems.

Senator HAGAN. Thank you.

Senator Fischer?

Senator FISCHER. Thank you, Madam Chair.

I would just like to follow up with you on the line of discussion that the chairwoman was discussing. When we talk about collapsing time and looking at the changes that are occurring and looking out 35 years and adapting and evolving, is that happening now? Is that happening now or is that your plan and goal for the future? Is that the direction you want to head or are you headed in that direction now? And if you are headed there now, have you had any successes that you could share with us where you have been more able to adapt in a quicker manner?

Dr. PRABHAKAR. I will kick off.

Let me just shift to a different realm than aircraft. But an example I really love of adaptability—your big question was are we doing this yet. And I would say we have been trying for a while and it is slow progress, but there are some examples where we are making progress.

And one that I really like has to do with the situation our soldiers on the ground were facing in Afghanistan. The intelligence that is collected from the battlefield all gets pulled up, but the soldiers on patrol from one day to the next do not really have the kind of immediate, fresh information from their colleagues as they go every day when they go out on patrol. So one of the projects that we did—and you know, we would hear sometimes from these young soldiers that they had left a civilian world where they could walk around with maps on their iPhones and know where they are and post text notes to their friends. And now they are in Afghanistan and all of that is gone when they really could have used it.

Well, it turns out those things are much harder to provide in a battlefield environment. Security is a real concern. The connectivity does not really exist. You need secure and physically hardened devices. So there were a whole host of challenges.

But in some work that we did where we did get real devices in the hands of soldiers, we were able to give them handhelds where they would have these kinds of apps that looked like the apps that they used in the civilian world, and they used these apps in just very practical ways. So soldiers would go out—they are. They are going out on patrol. They are recording the local observations of what is this farmer doing in this field or what is the scuttlebutt that they are picking up as they are talking to people. And that is immediately fed to their colleagues and to the guy that is going out on patrol the next day.

Senator FISCHER. So it is not just going up. It is really—

Dr. PRABHAKAR. It is laterally. Exactly.

And the thing that I think is really great about this, because I love what we are doing for the soldiers today, but really the exciting thing to me is we are introducing this element of adaptability because the apps that they use one day tell them what the apps are that they need the next day. And the development team that we have sitting next to them then will spin up that app, and a few days later, they are able to have a new capability that matches the particular thing that they are trying to track or a particular way that our adversary might have adapted on the other side.

So it is just one little example, but when you see the power of that kind of ability to react, I think it does tell you where we could go.

Senator FISCHER. Good. That is good to hear.

I would like to talk about sequestration and the effect that that is going to have on the groups that you are representing. Sequestration could reduce the Federal R&D spending by $57.5 billion, or 8.4 percent, through 2017. And spending on defense R&D could be cut by $33.5 billion, or 9.1 percent. And that is going to bring the spending levels for defense down to the 2002 level.

Do you have any specific S&T sequestration funding numbers for fiscal year 2013 and a breakdown of how it is going to impact your programs?

Mr. SHAFFER. Yes, ma'am, and we can provide that to you. I mean, I do not have it in my pocket.

But basic rule of thumb, 9 percent to every program element and project across the department in RDT&E. So you can take whatever was appropriated in fiscal year 2013, subtract 9 percent from that. That will cause terminations in some cases. It will cause certainly slowdowns to all of our programs.

The place that it will hurt, I think, the worst is the reduction in the number of grants and new awards. We heard Ms. Lacey say that the future naval capability new starts are cut in half. I will start no new technology demos for fiscal year 2013. We will reduce our overall number of grants going out to universities by somewhere between 500 and 1,000. That does not sound like much, but when we in the United States are struggling to have enough scientists and engineers to work on national security problems, I do not know which of those 500 or 1,000 grants might give me a very good scientist or engineer to come work in my laboratory. But if we reduce the pool, we reduce the future. And those are the impacts of sequestration.

We are all in the business of an uncertain future. We were talking before this hearing started. We have some members in uniform who say, well, you know, just fund the basic research projects that are going to pan out. We wish were that good. You have to fund a number of things and then some of them will bubble. By reducing the pool, we are going to reduce the future.

And I want to point out one thing that we are talking about within the building. In previous periods, the last two big budget contractions for the Department of Defense, Secretary Perry was involved in both of those. He made a strategic choice to maintain investment in research and development because we are cheaper and we provide options. We are working through that argument. I do not know if that is going to hold for this time or not. But in the

past, there has been a strategic choice in our Government to maintain the future.

Senator FISCHER. Would it be more helpful if you had flexibility to decide where you were going to make those cuts and make them more targeted?

Mr. SHAFFER. Yes, absolutely.

Senator FISCHER. Would it be less harmful to the programs that you deal with?

Mr. SHAFFER. Absolutely.

Senator FISCHER. So you could make wiser decisions if we would give you the flexibility to let you make those decisions within your department.

Mr. SHAFFER. Absolutely.

Senator FISCHER. Did anyone wish to add anything on that point?

I happen to believe that we need to make sure that the funding and the programs need to be focused on our warfighters. So while sequestration may impact each of your organizations, the impact I am concerned with are what is going to happen with regard to those warfighters and the warfighting capabilities. So what specific aspects and impacts will those cuts due to sequestration have on our warfighters and those specific capabilities?

Ms. MILLER. I guess I will start.

Senator FISCHER. If it remains like it is now and you do not have the options to make decisions yourself.

Ms. MILLER. As you have already heard, sequestration is not only impacting our programs. In some cases, we will terminate some of our science and technology efforts, efforts that may well have produced capability for the warfighter. We are also certainly going to constitute a delay in what we can deliver. It will be an impact to getting things through the acquisition system and improving what we have.

Certainly in the Army, we have a lot of systems that are becoming back out of the warfare, becoming programs of record, become part of our main time set of equipment, and it would be up to the science and technology community to make sure that those pieces of equipment then are operational and can be upgraded and perform much more capably and affordably. And so we will look to try to invest our resources, what we have of them, to make sure that we have platforms that are affordable and that do not cost as much money and perhaps not make as many new designs based on the limitation in the funding, certainly tied to what the warfighter wants.

Senator FISCHER. And the budget that you were looking at, the five of you, was the budget introduced by the President. Is that correct?

Ms. MILLER. Yes, ma'am.

Senator FISCHER. So that did not account for sequestration. So if we are going to account for sequestration, have you dug into that even deeper to find out what will need to be done? Have you looked at that at all?

Mr. SHAFFER. Are you asking have we gone through a prioritization to begin to understand how we would deal with it in 2014 if sequestration actually hits? Yes, ma'am, we are doing it.

Senator FISCHER. Well it has hit.

Mr. SHAFFER. It has hit.

Senator FISCHER. It has hit, but the budget that was introduced did not have that accounted for in it.

Mr. SHAFFER. That is absolutely correct.

Of course, we are looking at how we would prioritize. Yes, ma'am.

Senator FISCHER. The rest of you, would you answer please?

Ms. MILLER. Absolutely.

Senator FISCHER. Thank you.

Ms. MILLER. You know, just for context, in our work, which is projects driven, we do not have standing laboratories for the work that we do at DARPA. We are in a constant process of prioritizing in the normal course of business. And so when something like sequestration hit in fiscal year 2013, of course, we started with our lowest priority programs that were struggling already or, for whatever reason, there was a problem. But when the cut is as substantial as it was in fiscal year 2013, it does cut into the things that we very much would have wanted to do. So the consequences there included delays to important programs. Plan X, which is our cyber offense program that is just beginning is an example. Delays on transition.

One of the very interesting things we are seeing is the secondary effects because we do so much of our work with our partners in the services, be it contracting or when things are more mature when we are going to field tests or going to test ranges. We are finding that all of those schedules now are delayed and pushed out.

So the net effect from a 1-year hit in fiscal year 2013 tends to be a series of delays. I mean, it is not the end of the world for our mission in the long term. It is just very corrosive and extremely demoralizing to our program managers that we worked very hard to get in the door.

One time, you know, you can sort of absorb that. My concern, about if this continues, is then it does start getting at our fundamental ability to create, in our case, these big leap-ahead technologies. So if some of our programs are—instead of just a few months of delay, if we end up starting to have to cut into the actual work and drop things on the ground, that is where I think the bigger impacts loom, which would be much more dangerous.

Senator FISCHER. Just maybe a quick answer from the other three. I am way over my time.

Ms. MILLER. Yes, ma'am. We are looking at prioritization and what we will no longer be doing and aligning it with our programs of record and what the warfighter needs.

Ms. LACEY. We are doing that as well in the Navy and the Marine Corps.

Dr. WALKER. We are also in the Air Force. And the alignment to a given PE and the hits on certain programs will cause us to have to either realign programs within the Air Force or to delay in some of the key programs, particularly the bigger demonstrations that are closer to warfighter needs.

Senator FISCHER. Thank you. I am glad to hear that you are all being very realistic about the current law that we are under and the budget situation that we face. Thank you.

Senator HAGAN. Thank you.

Dr. Prabhakar, you just mentioned the Plan X, and I wanted to address that. The President and the leadership of DOD from the Secretary on down have emphasized the importance of cyber to our Nation's security and prosperity and continue to increase investment in this area despite the declining overall budgets.

DOD has turned to DARPA for substantial investment in this leap-ahead technology. DARPA's role is especially critical as a highly credible source of alternative approaches to operating in cyberspace from those developed by the NSA and the cryptologic services of the Army and the Navy and the Air Force. It is very concerning to see that DARPA has levied a 43 percent cut on this flagship cyber program called Plan X in allocating sequester reductions in the portfolio.

Why is this flagship cyber program being cut so significantly, and what are the broader implications because of this 43 percent cut?

Dr. PRABHAKAR. That is a great example of the unfortunate impact of sequestration because when we are done making the cuts that we can live with, then we get to the things that we are not very happy about having to live with.

The Plan X program that you cited is one component in an overall set of activities that we are doing in cyber. So I do not want you to take away a notion that it is a 43 percent cut to our entire cyber portfolio. The Plan X program is just ramping up, and that was one of the reasons that we felt that was the right place to take that portion of the cut within that program element relative to the other hundreds of contracts that were underway in that program element. We had to choose among our children there.

But just to paint a little bit broader picture, you are absolutely right. Cyber is something about which there is enormous concern in terms of cybersecurity. DARPA's role very much as in other fields is not operational. There are many other parts of the Department and the intelligence community as well that are focused on the operational mission, and I think they are putting enormous effort into keeping up with this growing threat.

What we are trying to do is come up with the technology ideas that change the trajectory because right now the threat keeps growing and all we really have as solutions is to hire people, of which there are not enough because they need special training, and every time there is an attack, we patch and then we hope. I mean, that is essentially all we can do.

We have two themes and Plan X is one of them. But the other piece is about cyberdefense, first of all, which is trying to build—and I think we actually have some phenomenal programs that will build—the technical ability to create a more fundamental defense, ways to assess legacy systems and assure that they are secure and also then to build new systems, for example, embedded systems that might go into our advanced military platforms, build them in a way that is much more inherently secure. So I think with those technologies, we can get to a place where we get beyond just throwing people at it and get to a much more automated future for security.

And then for cyberoffense, back to the Plan X story, the dream here is right now our warfighters are engaged in—they know how

to fight a kinetic fight. Electronic warfare is a fully integrated part of that. But cyber sort of sits off on the side. It is not a tool that someone engaged in that kinetic activity can really bring to bear in an active situation. It is because cyberoffense tools are things that are exquisite pieces of software that you write. You really do not know for sure what they are going to take out when you launch them. Once you launch them, you do not really know what other collateral damage they have. They really are not weapons in the conventional warfighting sense. Building those capabilities is what the research program in Plan X will do, and that is, obviously, why we are very excited about pushing it forward as aggressively as we can.

Senator HAGAN. So do you feel comfortable or somewhat comfortable with the funding for the defensive part of cybersecurity issues?

Dr. PRABHAKAR. I think we have been able to size that at a place where we are making the investments that have the greatest promise for big impacts. So, yes, I am comfortable with that.

Senator HAGAN. We certainly need to go back and look at Plan X too, in my estimation, going forward, for sure.

Mr. Shaffer, last month Mr. Frank Kendall, the Under Secretary of Defense for Acquisition and Technology and Logistics, was quoted at a conference saying that he is considering a strategy of funding research and development projects despite the ongoing budget pressures. His objective is to fund R&D projects to keep the leading edge of the industrial base working on advanced technologies when budget pressures are significantly impacting major acquisition programs.

Two thoughts. Two questions. What are you doing to implement this strategy?

And then also, in the President's budget, you have more than doubled the funding for the emerging capabilities technology budget line from $25 million to $62 million and have also created a new applied research for the advancement of S&T priorities with $45 million. Can you describe what this funding is for and how will it address the key issues of increasing responsiveness to develop and to deploy new technologies and affordability?

Mr. SHAFFER. Yes, ma'am. So there are actually two threads in there. So let me start with the first one.

We have touched on this a little bit already. So Mr. Kendall is asking us to take a look at prototyping, late development prototyping demonstration for a couple of reasons. One is to develop new capabilities. A second is to keep design teams employed when we are going through periods where we are not buying them out of equipment. I mean, so when you look at advanced technology, the real secret sauce are those really smart design team engineers who will go ahead and create the new trades and possibilities. So we will do some prototyping in some of those areas, I believe, to make sure that we keep the National intellectual capital viable for when we need the next set of systems.

So that is kind of where Mr. Kendall is looking. He is looking, through DARPA, at something called an air dominance initiative to really look at what are the pieces for the next generation fighter or network set of fighters that we need to keep in place so that

when we actually go to the next generation aircraft—hopefully it will not take 30 years to develop—that we will have the right smart people in place.

The second question you asked—and by the way, and I have in my own lines in OSD increased the funding for prototyping in the emerging capabilities technology demonstration program. They will be doing prototyping in things like very advanced electronic warfare systems and things like some cyber capabilities. It is where we have to address new and emerging capabilities.

The $45 million for the applied technology program actually is not a new start, new set of money. I took five or six of my old programs and collapsed those into a single program element to be able to fund good ideas competitively across the Department in the cross-cutting areas that everybody has S&T programs in: communications, cyber, electronic warfare, materiels, those types of things that all of my partners here are funding at some level. We want to have a program to put connective tissue to make their programs better. All of that $45 million will be executed through the services. So it is a new way of thinking about how are we going to get more bang for the buck by funding internally competitively proposed projects in those certain cross-cutting areas.

Senator HAGAN. Thank you.

Ms. Miller and Ms. Lacey and Dr. Walker, in the fiscal year 2014 budget request, the DOD has more or less preserved its top line funding for S&T. In part, this is due to increases in basic and applied research at the expense of advanced technology development. While increased basic research is important, there are concerns over decreases in more applied research funding and for activities that can help transition technologies across what has classically been labeled ?the valley of death,? the gap between the labs and then the military users.

Do you feel the balance between basic research, applied research, and advanced technology development is right, and what is your assessment of our funding for technology development across "the valley of death"? Ms. Miller?

Ms. MILLER. I will start, ma'am.

I think that the balance needs to be looked at. I think that we have done a good job in pushing resources down into basic research and now applied research, but it has caused an even earlier valley of death.

Senator HAGAN. If you have got any examples, I love examples.

Ms. MILLER. Well, I would tell you in this budget development, we ended up decreasing our budget activity 3, advanced tech development resources, on the order of $140 million pushed into other 6–2 areas, and we took our tech maturity—so I should start with the Army established a 6–4 line for their S&T activities to help do prototyping and to cross the valley of death. And those resources have also been reprogrammed into the 6–1 and 6–2 at this time to make sure that we could meet compliance and have those next generation capabilities.

But at this point, we need to start being cognizant of the ability to take those good ideas that are developed in earlier research veins and be able to transition them through. So we will be looking to try to get a better balance from here on out.

Ms. LACEY. I too agree that the balance needs to be relooked. We have seen that valley of death or the interpretation of it being a valley of death widen over the years. In reality, what we have done is we have moved things that historically had been in procurement accounts back into the R&D accounts. And so we have a lot of pressure on our 6–4 accounts that we currently have today, which is the traditional transition zone, and 94 percent of our money in what is BA–4 through BA–7 in the Navy is tied to program of record. So we have very little that is focused on that transition area, and that is something we need to look at very, very carefully DOD-wide. By preserving the 6–1 and 6–2, a very noble thing to do, at the expense of the 6–3 and 6–4, we are actually widening that valley.

Dr. WALKER. In the 2014 budget submission, we were actually able to increase our 6–3 at a greater rate than our 6–1 and 6–2 trying to reverse a trend that we have had over the last few years. 6–1 and 6–2 tended to dominate the S&T budget. But we have the same problem as the Navy. Our 6–4 program, our BA–4 is primarily tied to programs of record, and we miss that opportunity to move beyond the laboratory and into a demonstration and development program getting ready prior to a program of record being in place. That is an area that we think we need to improve as well.

Senator HAGAN. Thank you.

Senator Fischer?

Senator FISCHER. Thank you, Madam Chair.

I would like to talk about furloughs for civilian personnel that you may have. We know that it causes loss of productivity. I think it will harm our military readiness at a time when we are facing, I think, more serious threats than many other times in history for this country. Furloughs will have a significant impact on employees' families and also on our States' economies.

While DOD has decided to reduce the number of furlough days, I remain deeply concerned about the impact of those furloughs on the things that I mentioned. Your scientists, your engineers, your program managers play a critical role in maintaining our superiority on the battlefield because of the research that you are doing. I have heard that the Navy and the Marine Corps have funds available to avoid furloughs, but DOD, the Army, and Air Force will have furloughs for their civilian employees.

So I have three questions for you. What is the current status of furloughs in each of your organizations? What would be the impact if you had to furlough some or all of your civilian employees? And would any of your civilian employees be exempt?

Mr. SHAFFER. Ma'am, the actual implementation of furloughs is still an ongoing process, but right now it looks like across the board in DOD, the policy will be 14 days for civilian personnel taken over the last 14 weeks of the year.

The reason that this step is being taken is because of the inability to move money between accounts from one to the other. And we, the Department, are in what I consider to be a very terrible place. We either fund the ongoing war efforts for our deployed forces or we furlough. So there are other ways at the margin to get there, but at the end of the day, we are so underfunded in our operations and maintenance accounts right now in the Department that we

have to take the drastic steps. None of us particularly like furloughs. I have talked to Arati and she actually has a different problem. She hires people for 4 years and they want to come in and do things. It is going to be very upsetting that they are not going to be allowed to do things.

I also want to point out that while we have a furlough of 14 days, it is not just the 14 days that is going to impact us. And one of our services—in fact, all of our services are dramatically under-represented in contracting officers. In addition to furloughs, people who are currently being paid overtime will no longer be paid overtime. They will not be allowed to work overtime. So it is not going to be just the cut of 14 days, it is going to be a reduction in many cases of people who are putting in 50- to 60-hour weeks and getting paid for it being cut to 32 hours. So that will impact getting money out the door and on contract.

There is a whole host of second-order impacts due to sequestration, but those are all going to hurt everybody on this panel and it is going to hurt our young people. We are breaking faith with our young people, many of whom, at least in this area, are living very close to the margin and have mortgages to make and that type of thing.

So this is a very serious step. None of us like it. We understand why the Department is taking it. It is kind of where we are, ma'am.

Dr. PRABHAKAR. I think Al said it all.

I will just add you asked about exemptions. In my organization, the furlough applies to civilian Government employees and we will be taking that across the board, including myself and my deputy. We have one civilian Government employee who is in Afghanistan for some of the field test work that we are doing, and we are sorting out that situation. But that would be the only exemption if there is one.

Ms. MILLER. Pretty much what Mr. Shaffer said applies to all the rest of us.

Ms. LACEY. In terms of exemptions, we are looking at health and safety issues as potentials at the moment.

Dr. WALKER. For us in the science and technology workforce, it will be no exemptions, just for the health and safety issues, but right now, we do not have any of those.

Senator FISCHER. Once again, I would ask you with regard to flexibility, if we would be able to give you flexibility to make decisions within your own programs, would that help with the furlough situation?

Mr. SHAFFER. Ma'am, I think that this is all tied into flexibility with operations and maintenance accounts and because of the way we have to spend money, funding the war efforts forward. We are rapidly running out of time because O&M or OM&A for the Navy are 1-year money. So even if we start to get flexibility late in the summer, it is going to be very hard to move money from one account to O&M and then get that spent. So we have kind of a double whammy going on. It is the color of money but it is also the time of the year and whether or not we would actually be able to expend it.

And Mr. Hale, a wonderful guy—you know, I am surprised he has any hair left because every time I go by him, he is pulling more of it out. It is a very difficult management problem.

Senator FISCHER. So are you saying with regard to the furloughs, the flexibility really would not help at this point at all?

Mr. SHAFFER. It is beyond our ability to deal with. This is really a larger issue coming from Dr. Carter, the comptroller, and Secretary Hagel and how they would be able to manage the war effort. And that is what is driving everything. Internally, I do not think that it would help much.

Senator FISCHER. Thank you.

I would like to move on to infrastructure, if I could, with modernization and duplication. The lab enterprise includes 62 organizations spread across 22 States, with a total workforce of about 60,000 employees, more than half of whom are degreed scientists and engineers. That infrastructure supports this enterprise like the rest of DOD and continues to age with no MILCON funding in sight to modernize your facilities.

The fiscal year 2013 NDAA Senate report required DOD, the Air Force, and the Navy to conduct a survey of its laboratory infrastructure, brief the congressional defense committees on the results of their surveys no later than March 1, 2013. I believe the Army has provided their survey, but we are waiting to receive some surveys from DOD and the Navy.

What is the overall status of your facilities and how does that status and the state of your infrastructure affect your mission?

Ms. LACEY. Ma'am, where we are in the Navy, we have actually baselined the buildings that we have, and we can quote a number. But that is not very informative when it comes to understanding what can you do with that building. You have to couple it with the equipment that is in it and the people so that we can understand the real capability. That is where we are right now is trying to make sure we understand that.

Senator FISCHER. Are you completing your survey now? Will be receiving a briefing on that?

Ms. LACEY. We can give you a briefing, but I want to be careful here. We have completed our survey on the facilities themselves, the building piece. What we really are interested in is the capability piece, and we are only about halfway through that. So we expect that it will be sometime early next fiscal year before we have our first look at that.

But do we have old buildings? Yes. The fact of the matter is that our scientists and engineers are very dedicated folks that do amazing work despite the buildings that some of them have to operate in. Would I like it to be better? Absolutely. But we are trying to determine right now what we really need to invest in. Making every building very, very nice may not be the right answer for the Navy for the long term.

Senator FISCHER. Dr. Walker?

Dr. WALKER. I believe we have turned in our survey. And the Air Force survey of the building facilities is like Ms. Lacey was saying. About 90 percent of our buildings are actually in fairly good shape. We put a lot of effort into this both in good support from Air Force

MILCON, MILCON inserts that we have gotten over the time, and the recent BRAC allowed us to modernize a number of our areas.

We have also taken advantage of 219 to really work the lab piece of it and start to modernize the interior of the buildings because a lot of our buildings were built in the 1960s–1970s and they do not need to be replaced. They just need to be modernized in place. We have also modernized older buildings with the recent MILCON at Wright-Patterson where we took a shell of a building and completely rebuilt the interior of it to make a world-class, modern power lab for the Aerospace Systems Directorate. So we have taken advantage of this. The Air Force has been very good to us.

We realize in this day and age of where we are in the fiscal environment, we are probably not going to get MILCON's for a time in the Air Force, but we have actually taken advantage and using 219 are able to keep the labs to the par that we would like to have them on.

Senator FISCHER. Have you looked at what it would cost if you truly were going to modernize for not your wants but your needs for your mission?

Dr. WALKER. We have taken the surveys of that. I do not have that number off the top of my head, but it is not a small number.

Senator FISCHER. Thank you.

Senator HAGAN. Just so the panel knows, we are going to stop the meeting right before 4:00.

I have got a question on the Rapid Innovation Program. 3 years ago, Congress established the Rapid Innovation Program to help fund the rapid transition of innovative technologies largely from the small business community to the warfighter. This was an environment where rapid fielding of technologies was driving a significant level of the effort on the S&T community. And as we draw down our combat operations overseas, the demand for rapid fielding may diminish.

What are your views on the Rapid Innovation Program? And from my understanding, this program is not included in the fiscal year 2014 budget request. Is this program not useful now to the Department in the current environment? Mr. Shaffer?

Mr. SHAFFER. Yes, ma'am. So the reason it is not in the 2014 budget request is that we have just gone through and we have done the first year's worth of awards. We are waiting to see how this program pans out and the types of products that come out of it before we put in a budget request. And it is not clear that we would get new money.

So there would be other ways we could do this. As you mentioned, most of the Rapid Innovation Program comes through the small business community. We could include this as part of the Small Business Innovative Research Program in the future, and that is one of the things we are considering. But before we jump off the cliff, we really would like to have a year's worth of evaluation of the programs to see if we actually got value for money.

Senator HAGAN. And how much money did you put out?

Mr. SHAFFER. We got everything out that was appropriated. I am trying to remember. In the first year, it was $200 million? $500 million, somewhere in there, yes.

Senator HAGAN. $400 million.

Mr. SHAFFER. $400 million.

Senator HAGAN. Thanks.

Mr. SHAFFER. Yes, ma'am.

Ms. Lacey, Ms. Miller, anybody?

Ms. LACEY. We have not completed the first round, but we do have one early completion expected next month, but the vast majority are not going to finish up for another 12 to 18 months.

Dr. WALKER. We put $105 million out to 44 different small businesses working across the rapid response for the warfighter, cyber, sustainment. And so far things are looking good and showing promise, and we will see as the program goes on. And we are looking forward again to our next round somewhere around 18 to 20 awards coming out this year out of the 2012 money.

The other thing that that we are getting out of this is that there is huge interest in the program because we have had over 700 white papers both years that we put out the announcement. So there are a lot of people out there with good ideas that we are able to take a look at and screen through the program.

Senator HAGAN. Ms. Miller?

Ms. MILLER. And the Army was the same as well. We have no early indicators yet. We know that we got a lot of interested parties, and it certainly gets connectivity to small business.

Senator HAGAN. Thank you.

Over the years, there also has been much discussion over the pros and cons of various management models of the Department of Defense labs that are Government-owned and Government-operated versus the Department of Energy labs that are Government-owned and contractor-operated.

So, Ms. Miller, Ms. Lacey, and Dr. Walker, if you were going to start a new basic and/or applied research laboratory, what type of business model would you use for the management and operation of that laboratory? Dr. Walker, why do we not start with you and go back?

Dr. WALKER. I have run two directorates in the Air Force research laboratory and we have pretty operated under the Government-owned with the contractor collaboration with a strong in-house contractor representation. It gives us some flexibility in being able to turn over workforce, identify and bring in new workforce into both the Government and the contractor side and have flexibility as we change the thrust of the research that we are doing at any given time. This has been a very successful model for the Air Force. We studied the GOCO model back in the mid-1990s and we decided to go with the collaborator-assisted model instead, and it has been very successful. And I think I would follow that model into the future.

Ms. LACEY. In the Navy, we have a Government-owned, Government-operated philosophy which is a little different than the Air Force. However, we do use a significant amount of contractor personnel, perhaps not as fully embedded as you might see in the Air Force. We are very comfortable with our model. We are continuously overseeing how they are doing and ensuring that they are focused on the things that we need them to do and not out there freelancing and creating duplicate capability in their various areas.

But as I say, it is something the Navy has become very comfortable with and very good at operating. So it works for us.

Ms. MILLER. And the Army model is very much like the Navy model. We are very happy with how we are performing our work.

Senator HAGAN. Thank you.

Go ahead. Ask another question.

Senator FISCHER. Thank you, Madam Chair.

In my last question, I asked about the infrastructure and the modernization. We did not get to the duplication part.

What kind of process do you have set up that would address if there is unneeded facilities out there?

And, Doctor, you and I talked the other day, yesterday I believe, about programs and how do you keep track of all the programs and the research that you are running to make sure that what the Navy is doing, the Army is further along it, and you really do not need to be doing it. How do you prioritize it? How do you work together? How do you make sure that your efforts are being utilized wisely?

Mr. SHAFFER. So I always hate to sound like a Washington bureaucrat and talk process.

Senator FISCHER. But you will.

Mr. SHAFFER. I will. [Laughter.]

And so what we have done and we have reinstituted and strengthened something we call Reliance 21. We are taking a portfolio approach in about 18 of these big areas that all of us have investment in. Now, I cannot track every one of the 10,000 programs. But we have SES-level members, Senior Executive Service members, in each one of the services that have a spend who we charge to get the best that they can out of their program. So we have created a portfolio review with the SES's having to come back to report back to us and tell us what they are doing.

DARPA plays in a slightly different way in this process because we do not want DARPA on any service's critical path. We want DARPA to disrupt that critical path. So how DARPA plays is they will come in and brief these portfolio managers—and each one is chaired by someone from the Service—brief the portfolio managers on what they are doing so the portfolio managers have that awareness.

But if we cannot trust our SES's to get rid of duplication between themselves, because they are all charged with delivering capability—if we cannot trust our flag-level civilians to drive down duplication, it is very hard for us to do it from the top of the mountaintop.

So this is strengthened. We are in our second to third year of this process. This year we are having the first six of these portfolio managers come back in roughly two half-day sessions brief out their programs to myself, Ms. Miller, Admiral Klunder, and Mary Lacey and Dr. Walker, and we are going to see how well we are able to drive out duplication. You know, sometimes you want to have intended duplication, but it has to be a conscious choice. But fundamentally, we have to push that process down to our senior executives to come back and report to us.

Senator FISCHER. Have you ended any programs if you found that there was duplication taking place?

Mr. SHAFFER. I know that programs have ended. Typically when our SESs find out that there is a little bit of duplication, we do not have to end the program. They figure out who is in the lead, who is going to take that piece on so someone else does another portion of the work. These portfolio folks have come back and told us where they have modified their portfolio to get more bang for the buck.

Senator FISCHER. And are you in touch with universities or private industry that is doing research as well and trying to monitor what they are doing and work together or else let one of the other of you move ahead on that project?

Mr. SHAFFER. The answer is yes, and I think Arati has the best answer.

Dr. PRABHAKAR. I hope I do since I volunteered to try to answer that. [Laughter.]

Senator FISCHER. She had a good one in my office.

Dr. PRABHAKAR. Just following on what Al was describing as a formal process, a thing I really look to is our core program managers at DARPA to make sure that they know what is going on across the Services but very much, as you said, in the broader technical community. The first way we do that is we recruit program managers who come out of the best parts of the technical community. And I think only about 10 percent of my program managers come from other parts of Government. Most of them come from universities or have worked in companies. So they are already from that broader community. And then their day job is to be out engaged with that community. That is how they build their programs. It is where they get their inspiration for the next generation. And they are so personally driven to make an impact with their programs that the last thing they want to do is waste a nickel on something that someone else is already going to do. So that is the bottoms-up part that I think augments what we do as a management team.

Dr. WALKER. From an industry perspective, when we are building road maps, we want industry involved with our road-mapping process so they understand what it is that we are trying to do and what contributions they can make, as well as how they can align their IRAD to what is important to the Government. So it is really a collaborative effort across academia, industry, and the Government to ensure that we have the right technology development moving forward to where we want to be in the future.

Senator FISCHER. Thank you.

Ms. Lacey, I was going to ask you about the laser on the ship. This is just for my own personal interest because I read an article on it and it just sounded fabulous. But how is that working out? Can you tell us? And what do you think the future holds for lasers?

Ms. LACEY. Ma'am, we would be happy to come in and brief you on this, and if you are ever in Bahrain, we can take you on the Ponce and show it to you.

We have been working on laser programs collaboratively with our sister services for decades, and what we are doing is installing this on a ship that is available in theater to do a demonstration against realistic targets again and to understand the operational domain.

But what we are fundamentally trying to do here is prove to ourselves that we have the capability and we can develop the tactics, techniques, and procedures to change the cost equation. We are talking about taking a shot for a dollar as opposed to—yes, whatever it takes to generate the electricity on board that ship to defeat that threat. That is a huge game changer when it comes to the cost equation. As opposed to using a $3 million missile to take out a $50,000 target, we are talking about dollars. It is a big deal. So we have reached the point where we are comfortable that we can put it in an operational theater to learn even more lessons about it.

But we would be happy to come show you what we are doing, ma'am.

Senator FISCHER. I may take you up on that. Thank you very much. Thank you all very much. I appreciate it.

Madam Chair?

Senator HAGAN. I know I have got a couple more questions, and I am running out of time. So I might submit some for the record for your reply and certainly Senator Fischer too.

Mr. Shaffer, I know that DARPA has just completed its strategic framework. And I was just wondering about another strategic framework for your division. I know last year the Defense Science Board conducted a study of DOD's basic research portfolio, and one key finding was that DOD needed a technology strategy that would not only be invaluable in alignment of research and engineering but an alignment of systems, missions, and national security affairs more broadly. And then they listed a vision, an assessment of emerging areas of S&T, particularly areas of rapid change and substantial promise, realistic objectives, an approach to achieve the vision, and detailed plans on how to achieve the objectives.

Are you developing a more comprehensive strategy with the elements just outlined?

Mr. SHAFFER. So, Senator Hagan, a couple of things.

The short answer is yes, but not at the detail listed in the DSB report. And I commented that I do not like a lot of bureaucracy.

One of the other things I will note in Washington is more is written than is ever read.

Senator HAGAN. I agree with that.

Mr. SHAFFER. So this strategy that is outlined by the Defense Science Board is really an implementation plan. We have developed a strategy and we are waiting to see what happens with the political process. But the strategy that I have written is very much like DARPA's framework. It is a very short document that outlines where we want to go and the tools that will be available to the people.

Following from that, the rest of these things that are in the Defense Science Board report is really an implementation plan, and that should be pushed down to the people who actually are going to execute the program to come back up and tell us. So these things that are in this plan are in those portfolio managers? responsibilities that I just mentioned.

We are on the path. We are not there yet. I have a strategy drafted. I have shown it to Mr. Kendall, the Under Secretary, and now we are just waiting to see what happens with all the political process.

Senator HAGAN. Thank you.

Mr. SHAFFER. Yes, ma'am.

Senator HAGAN. And to all of our witnesses, I really do appreciate your time, the service that you give to our country, and in particular, the detail, the approaches for the long term using the technology that you are developing right now. I think it is very, very important to our country, to the warfighter, and to the national security. Thank you for being here.

And this meeting is adjourned.

[Whereupon, at 3:54 p.m., the committee adjourned.]