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Before the

COMMITTEE ON
ARMED SERVICES

UNITED STATES SENATE

HEARING TO RECEIVE TESTIMONY ON ACQUISITION REFORM: NEXT STEPS

Tuesday, December 1, 2015

Washington, D.C.

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The committee met, pursuant to notice, at 9:30 a.m. in Room SD-G50, Dirksen Senate Office Building, Hon. John McCain, chairman of the committee, presiding.

Committee Members Present: Senators McCain [presiding], Inhofe, Wicker, Ayotte, Fischer, Cotton, Rounds, Ernst, Tillis, Reed, Nelson, McCaskill, Manchin, Shaheen, Gillibrand, Donnelly, Hirono, King, and Heinrich.

OPENING STATEMENT OF HON. JOHN McCAIN, U.S. SENATOR FROM ARIZONA

Chairman McCain: Well, good morning. The Senate Armed Services Committee meets this morning to discuss the next steps for reforming the Pentagon's broken acquisition system.

Last week, the President signed the National Defense Authorization Act for Fiscal Year 2016 into law, and that legislation marked the beginning of a significant revamping of the defense acquisition system that has been broken for decades. Schedule delays and cost overruns are par for the course. Complex regulations and stifling bureaucracy impede innovation and restrict access to critical commercial technologies. Worse still, it seems no one in the defense acquisition system is ever held accountable for these repeated failures. That's why in this year's NDAA, Congress sought to improve access to nontraditional and commercial innovation by removing barriers to new entrants into the defense market, adopting commercial buying practices for the Defense Department, and ensuring these firms are not forced to cede intellectual property that's developed at their own expense. The NDAA also expanded flexible acquisition authorities in the development of alternative acquisition pathways to acquire critical national security capabilities.

And perhaps most importantly, the NDAA took important

steps to ensure accountability in the defense acquisition system. The NDAA gave greater authority to the military services to manage their own programs and enhance the role of the service chiefs in the acquisition process. Service chiefs, service secretaries, service acquisition executives and program managers will now sign up to binding management requirement and resource commitments. And if military services fail to manage a program effectively, they will lose authority and control over that program and be assessed an annual cost penalty on their cost overruns. This committee will be watching closely to ensure the Department implements these reforms in keeping with both the letter and spirit of the law. At the same time, we will continue to press forward to make lasting reform a reality.

It's been almost 30 years since the landmark Goldwater-Nichols Act and the Packard Commission. It's been 20 years since the Federal Acquisition Streamlining Act and the Clinger-Cohen Act. In recent years, the Pentagon has been given unprecedented authorities to bypass the existing acquisition system and access new technologies and innovative companies, yet today the defense acquisition system is more risk-averse, costly, inefficient, and less open to commercial solutions than it was 30 years ago.

This morning, we welcome a distinguished panel of witnesses to help us identify what else Congress can do to

change the current incentive structure and culture to achieve improved acquisition outcomes that meet the needs of our servicemembers and taxpayers:The Honorable Jacques Gansler, Chairman and CEO of The Gansler Group and Professor Emeritus at the University of Maryland. Mr. Gansler previously served as Under Secretary of Defense for Acquisition, Technology, and Logistics in the Clinton administration; Mr. Norman Augustine, founder of In-Q-Tel, former Chairman and CEO of Lockheed Martin, and Acting Secretary of the Army; Mr. Ben FitzGerald, Senior Fellow and Director of the Technology and National Security Program at the Center for a New American Security; and Retired Air Force General -- Lieutenant Colonel Dan Ward, a former Air Force acquisition officer who specialized in leading high-speed, low-cost technology development programs.

We simply cannot tolerate the vast management failure that is the defense acquisition system. All too often, programs are delayed, over budget, and underperforming. Worse still, the Pentagon has wasted billions on programs that produce no combat capability whatsoever: $20 billion spent on the Future Combat System, with little to show for it; over $1 billion spent on the Expeditionary Combat Support System; a failed attempt to implement a, quote, "commercial off-the-shelf logistics IT system" that resulted in no usable capability for the Air Force; $3 billion in 15

years spent on the expeditionary fighting vehicle; and $3.2 squandered on the presidential helicopter without ever fielding a single helicopter. And to think we used to be able to field zero helicopters for free.

Still, the management failures and the colossal waste of taxpayer dollars may not be the worst of our problems. As the bureaucracy fiddles and fails to modernize our forces, our adversaries are catching up with us in the development of critical defense technologies. At the same time, the Defense Department struggles to incorporate advanced commercial technologies into its operations as they become more widely available to our enemies. Our national security cannot rest on the assumption that our adversaries will be as inefficient and clueless as we are about buying defense capabilities.

We've reached a critical inflection point. We are confronting an emerging technology gap with the commercial market in electronics, information, security, robotics, communications, and data analytics. Combined with budget cuts that prevent us from modernizing our forces or deploying them in sufficient numbers around the world, such a gap will be disastrous, emboldening our adversaries and feeding instability. We must not allow any such technology and capability gap to grow. The United States has the greatest military in the world, but, make no mistake,

protecting our military technological superiority is the urgent work of today, not tomorrow. For acquisition reform to be successful, we must change the current culture of inefficiency, risk aversion, and complacency. There is only so much that legislation can do to accomplish this goal. It will require changing incentives and focused and continuous leadership from Congress, the Secretary of Defense, and industry. Every year we fail to do so, billions more in taxpayers' dollars will be wasted, and our military will be left less capable of performing its missions. That is dangerously unsustainable, and that's what we must prevent. And that's why we must continue to press the cause of acquisition reform.

And finally, I'd like to say that the President, as we all know, signed the defense authorization bill, a product of which all of us, Republican and Democrat, can be proud of the bipartisan effort. Our constituents are very unhappy about our lack of achieving results here in Washington. And I think all of -- every member who has been heavily engaged in this process can look with some satisfaction, the fact that, in a bipartisan fashion, we were able to craft legislation that is a beginning of reform and also continues our obligation to help train, equip, and defend the men and women who serve this Nation.

Senator Reed.

STATEMENT OF HON. JACK REED, U.S. SENATOR FROM RHODE ISLAND

Senator Reed: Well, thank you very much, Mr. Chairman. And let me also echo your comments about the defense authorization bill and make it clear that, without your leadership, it would not have been a bipartisan and innovative and important piece of legislation. So, thank you, Mr. Chairman.

And, gentlemen, thank you for joining us today. You have a wealth of experience in acquisition and management in the Department of Defense. You will help us sort of look forward to the next steps that we must take to follow on the -- what is included in this defense authorization bill to improve defense acquisition. Your experience, your insight, will be absolutely critical as we review additional steps that we will take, going forward.

The Pentagon's fundamental mission is the defense of our Nation, which requires that our military procure technologically advanced weapons platforms and invests in cutting-edge research and development. According to the Congressional Defense -- excuse me -- the Congressional Research Service, the Department of Defense obligated $285 billion in contracts in FY-2014, which was more than all other government agencies, combined. This amount included funding for high-end critical weapon systems, such as the

Joint Strike Fighter and the Ohio-class replacement submarine, as well as service support contracts, which have much less visibility. In fact, the Government Accountability Office has stated that, within the Federal Government, the Pentagon has the largest share of all service contracts, totaling $156 billion in FY-2014. And many times, we overlook these service contracts, where, in fact, that's a critical item, in terms of reforming and making more efficient the operation of the Department of Defense.

In an era of fiscal constraints, it's become more important to ensure that we spend every dollar wisely. While the Department has made progress in addressing cost overruns for some major acquisition programs, more work remains. For every dollar that is spent on the weapon systems that are underperforming, that is a dollar that we cannot spend on other important requirements of the military services, including other acquisition programs and important readiness activities, including flying hours for aircraft, steaming days for ships and submarines, and all training that supports the national military strategy.

The good news is that the acquisition procurement reforms undertaken by this committee, again under the leadership of the -- Chairman Mccain and, preceding that, under his leadership and that of Senator Carl Levin, such as

the Weapon Systems Acquisition Reform Act, have been, I think, combined with the better buying power reform led in the Department by Secretary Carter and Under Secretary Kendall, have begun to make an impact on our ability to control costs and schedules of acquisition, but we can't sit back on our laurels; we've got to do much more. Programs, I think, are being run with more realistic cost estimates, more rigorous systems engineering, and with lower technological risk. Programs that have been initiated under the rules of these later reforms have experienced less cost growth and fewer schedule slips than we've seen previously. Fewer programs are breaking large cost-growth thresholds -- in other words, Nunn-McCurdy breaches. We also seem to be making progress with halting the cost for increases for some major troubled acquisition initiated under the old rule.

Unfortunately, progress has been more elusive in other areas. The Department still struggles to develop and field large information technology systems and managed businesses processes, like personnel, pay, and accounting. DOD still does not have a good handle on how to control its spending on the lower visibility service contracts, as I mentioned before. DOD also finds it very difficult to compete with the private sector for world-class technical, engineering, and program management talent. We are rapidly losing important pieces of our defense industrial base through

merges and consolidations. And, perhaps most importantly, the Pentagon is in the unfamiliar role of chasing global and commercial innovation, rather than acting as the technological leader that it has been in the past. And I hope our witnesses can help us shed light on all these different topics.

Thank you again for your service to the Nation. And I look forward to your testimony.

Thank you, Mr. Chairman.

Chairman McCain: Dr. Gansler.

By the way, all of your complete statements will be made part of the record.

Dr. Gansler.

STATEMENT OF HON. JACQUES S. GANSLER, CHAIRMAN AND CEO, THE GANSLER GROUP AND PROFESSOR EMERITUS, UNIVERSITY OF MARYLAND

Dr. Gansler: Thank you.

Well, I don't have to tell this committee that this is a critical period in the future security of the United States. Our defense budget is being cut significantly to help pay for the Nation's debt, and a significant share of these cuts are coming out of R&D, which, of course, Senator Reed, your statements there are in conflict with that, taking cuts in R&D as we are now doing to help balance the budget. I think the way this strikes me is, we're preparing for 20th century warfare, but not 21st century needs. And I think that's not what we should be doing.

Well, clearly, the world is not at peace today. We have concerns about ISIS, Syria, the Crimea, the South China Sea, nuclear weapons and ICBM proliferations, terrorism, and cybersecurity. And, as we become more and more dependent on cyber, and as Senator McCain mentioned, things like robotics and other areas, we're becoming increasingly concerned about cyber -- use of cyber -- and therefore, this threat is becoming more and more real, the cybersecurity threat. And the recent OPM cyber attack certainly alerted all of us to that.

The overall security problem is compounded by the

rising costs of the current weapon systems and the high cost of their support. And I agree with Senator Reed's point about emphasizing the support, as well. And then, of course, the lengthening development times for the new systems -- for example, the F-22 took 22 and a half years; during that 22 and a half years, technology changes rapidly, geopolitics changed rapidly, and so we have to be able to adjust more rapidly.

Without a question in my mind, significant change is clearly required in the way the DOD goes about the acquisition of goods and services. And, to achieve this, the historical data is very clear -- in order to make change, to make significant change, two things are required: widespread recognition of the need for change, and leadership with a vision, a strategy, and a set of implementation actions.

On a positive note, the first of these is demonstrated by the current SASC and HASC proposals, under the leadership of Senator McCain or Representative Thornberry, for significant defense acquisition reform. Now we need agreement from the executive and legislative branches on the specific actions required to address this need for greater security with fewer dollars.

In the past, the U.S. defense and economic competitiveness strategies for the Nation have been based on

technological superiority. But, today, as shown in the first of my figures that I hope you all have copies of, it's very clear that, as was mentioned, the commercial world is now spending significantly more money on their R&D, and the global world is spending significantly more on R&D. And because there should be a correlation between R&D expenditures and results achieved, there are many critical national security areas in which the DOD is no longer leading.

For example, like when I got a briefing from the Army Night Vision Lab recently, the French are the leaders in night-vision devices. And also, when the DOD decided to armor the next-generation infantry fighting vehicles because roadside bombs were the number-one killer of U.S. soldiers and marines in Iraq and Afghanistan, so the DOD chose armor from Israel, and the foreign firm agreed to build the armor in the U.S. At least that's positive. Clearly, the congressional and DOD cutbacks and the share of the budgets going to R&D must be reversed in order for the DOD to achieve technological leadership in the 21st century.

Under Secretary Frank Kendall stated, in the -- in his Better Buying Power 3.0, the removal of the barriers to buying commercial is an area that has to change. And in the figures that I gave you, Figure 2 shows the comparison that came out of the Packard Commission that Bill Perry certainly

pushed hard when Bill was Secretary, for the difference between a commercial electronics item -- in this case, semiconductors, and a MIL-SPEC one -- in this case, as you can see from the data, the commercial is more than an order of magnitude cheaper, and more than an order of magnitude more reliable, and even more advanced in technology. And so, why wouldn't we use them? It seems to me sensible to consider doing that.

And, in fact, on Figure 3, you'll notice, this is the code of Federal regulations today, and it's now up to 180,000 pages. I'm sure every one of you have memorized every one of those requirements.

[Laughter.]

Dr. Gansler: And there's no question about -- that is a barrier to using commercial --

Chairman McCain: Say that again. How many pages?

Dr. Gansler: 180,000 pages.

Chairman McCain: Thank you.

Dr. Gansler: And not only that, Senator, but every year --

Chairman McCain: Yeah, I read them all the time.

[Laughter.]

Dr. Gansler: Every -- that's -- look at the slope of that curve. Every year, we're adding another 2,000 pages of requirements that are coming from a combination of

legislation and regulation. That's where they're coming from. And it has been independently estimated by OMB and the Small Business Administration that the cost of that compliance is $1.75 trillion in 2008, when they did their analysis. So, it's not a trivial point that is -- this is just one of the barriers that Frank Kendall was trying to identify. And clearly we have to address that.

And so, why, if you're a commercial firm, would you then want to go into the defense business? It's not expected to be a growth market. It's -- as we're seeing, it -- the dollars are shrinking. It's being used to pay for the Nation's debt. And we are legislating, in effect, a smaller profit than what the company would make in the commercial business. So, you know, if you don't have a growth market and you're guaranteed to get a lower profit, why is that a good business for you to go into? And this growth in the Federal regulations pages is killing the desire for any good commercial firm to get into this business.

So, in 2005, the test of desirability of using commercial parts to lower the costs of weapon systems, we tried, when I was Under Secretary, to apply this logic to the JDAM missile. The JDAM missile is converting dumb bombs into smart bombs. Precision-guided rather than simply gravity-dropped.

Chairman McCain: Doctor, could you summarize, since we have three other witnesses and so we could move forward with the questions, please?

Dr. Gansler: Sure.

Chairman McCain: Thank you.

Dr. Gansler: Okay.

Chairman McCain: Go ahead.

Dr. Gansler: Well, Senator Nunn once told me, "Jack, don't give me a lot of theory, give me some examples." So, this -- the JDAM is an example, where it was independently estimated that, if you use MIL-SPEC parts for the JDAM missile, it was going to cost $69,000 each. They now -- we allowed them to use commercial parts, and they're now building them for $18,000 each. So, there's a $50,000 difference there, times the 10- to 20,000 of dumb bombs that we had stored, that we wanted to now put into them, that we can now have precision delivery with. So, it makes a significant difference, not only in cost, but in reliability and performance, getting the combination of that out of it. So, we got the savings both ways, performance improvements and cost.

So, clearly, we should be using affordability now to drive our system. And the keys to affordability, it seems to me, are six items that -- one of which is increased -- let me summarize this -- increased competition. And I --

and in my paper, I've described some of those issues. For example, in a lot of these services that Senator Reed mentioned, we have a choice of doing public sector versus private sector. But, Congress has outlawed A76 competitions. And when we had over 3,000 of those competitions, the average savings was over 30 percent. Why wouldn't we continue them? I understand what the political considerations were.

Second thing that you need to do in order to address more efficiency and effectiveness is greater civil/military, industrial integration.

Third thing, more emphasis on innovation. Cutting the R&D budget is, for example, not an emphasis on innovation, and people don't just -- are resisting cultural change, or resist change. And that's one of the things that's happening.

And I think we also need to look at more innovative financing techniques. Other countries are now using leasing, for example. And I know we went through that once on a -- the tankers, but we had to stop it because of the illegal action, but not because of the leasing. And it's important.

Okay. And the fifth area was overcoming the resistance to change, both in industry and in the DOD. And we have to -- that takes leadership to do that.

And then the last item, that you did address, and they also addressed it in the House, which is the education and training of the DOD acquisition workforce. That's critical that we get these people with better education and training. And one of the things that at least I had noticed that was being cut out was graduate education funding for the DOD. And strikes me that that's going in the opposite direction.

So, let me thank you, Senator McCain, and you, Senator Reed, for this opportunity to present this information.

[The prepared statement of Dr. Gansler follows:]

Chairman McCain: Thank you, Doctor.

Mr. Augustine, welcome back.

STATEMENT OF NORMAN R. AUGUSTINE, COAUTHOR, THE DEFENSE REVOLUTION

Mr. Augustine: Thank you, Mr. Chairman -- it's good to be back -- Senator Reed, members of the committee. I appreciate the opportunity to share my thoughts on the defense acquisition process. And I have submitted a statement for the record, Mr. Chairman.

I need to emphasize that I'm appearing as a private citizen, and so the views I express are purely my own.

Chairman McCain: It's never constrained you in the past.

[Laughter.]

Mr. Augustine: That's true, and it may not today. But, I probably should give a little bit of my perspective. I must confess that I've spent nearly 60 years now in the defense acquisition process, either in it or around it, both in government and in industry. And I've also had the opportunity to work with a number of commercial firms sort of on the side.

In the United States, as you know, we've chosen to have the private enterprise system provide much of our military equipment, as opposed to having it provided in government-owned arsenals and government-operated arsenals. That's not true of much of the world. From everything I've seen, our system works far better than the other alternative. But,

the fact remains that there are many complications that go along with that decision that we've made. One of them is that the companies that provide most of our military equipment, not only compete with each other, they also have to compete for talent and for capital with all the other firms in the U.S., whether it's Google or IBM or Intel, or eBay, or whoever. Furthermore, our defense system is necessarily -- defense acquisition system is necessarily not true free enterprise, because it's a monopsony. And the sole buyer is a very powerful buyer. That places a huge fiduciary responsibility, not only on the buyer, but on the seller. The buyer, to assure that short-term actions don't harm the long-term sustainability of the industry. And it places a huge responsibility on those who run the industry, because this is not an industry that makes video games or sailboats. We're dealing with the Nation's defense. We're dealing with the lives of our servicemen and -women. A huge responsibility.

Having said all that, arguably -- and I think, strongly arguably -- the defense equipment that we've had in the past has been such that almost any other nation would have traded theirs for ours. But, the fact remains that the process of producing that equipment has been far less efficient than it could be or that it should be, and that very often that equipment was produced in spite of the system rather than

because of the system.

There's probably one fundamental problem that underlies most of this, and that is that we've tried to manage by regulation. Dr. Gansler mentions 180,000 pages. My experience is that the only way to manage is with talented, experienced, dedicated people, and to give those people the authority to make judgments. Yes, sometimes they will fail, indeed. But, the free market says, yes, that they fail far less often than does management by regulation.

In industry, we delegate responsibility. We place great emphasis on past accomplishments, past experience, placing people in positions of responsibility. And we fire people who fail to perform. None of these takes place in the government, to my experience. Furthermore, in the government, "risk" is considered to be a four-letter word.

How do you fix the acquisition process? Unfortunately, there's no silver bullet. There are a lot of very talented people who have tried in the past. You all know many of them. The -- but, there are certain things I think that we've learned, and number one is that we have to have talented people in positions to make judgments, give them the authority to make those judgments, and to hold them responsible. That is, to have consequences.

Furthermore, we should take greater advantage of the immense power in the free enterprise system that's served

this country so well in so many areas, whether it be industry or a higher education system or what have you. How do you do that? The fundamental basis of free enterprise is competition. And competition is not always possible, but it's usually possible to some degree. And to make it possible, one needs to have large buys, multiyear buys; one needs to rely, often, on competition at the subcontractor level if it can't be done at the prime level; one also can investigate such approaches as what was used at In-Q-Tel. Mr. Chairman, you mentioned my involvement in setting that up. And it addressed exactly the problem this committee is talking about. And I'm told that it's viewed by many as having been relatively successful.

We need to take advantage of the private sector, commercial sector, and the products that it produces, wherever we can, which would be to a far greater degree than we do. We need to be sure we use appropriate contracting methods. We need to provide funding stability. We need to shift authority from staff to line. That's extremely important, not only in the Defense Department, but in many other departments of the government. We need to totally revamp the requirements process. We need to provide contingency funding. We need to permit talented people, experienced people to move from government to industry, and back. And that could be done without creating conflicts of

interest, in my view, but it's rarely done anymore. And I believe we've paid a price for that. People like Dave Packard probably couldn't serve in the government today. We should avoid these conflicts of interest. And I say I think we can. We should emphasize prototyping to a greater extent. We need to fund basic research far more than we do.

And I just would conclude by saying that none of this is rocket science. This is Management 101. We just have to have the will to go do it.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Augustine follows:]

Chairman McCain: Thank you.

Mr. FitzGerald.

STATEMENT OF BEN FITZGERALD, SENIOR FELLOW AND DIRECTOR OF THE TECHNOLOGY AND NATIONAL SECURITY PROGRAM, CENTER FOR A NEW AMERICAN SECURITY

Mr. FitzGerald: Mr. Chairman, Ranking Member Reed, distinguished members of the committee, thank you for the opportunity to speak with you all today. It's a considerable honor. In fact, it's such an honor, I've taken the unusual step of putting on a tie, something I don't normally do.

I offer my remarks today from two perspectives, that of a researcher at a think tank, but also as the former managing director of a small business that worked predominantly for the Department of Defense.

It's a generally held article of faith today that the locus of technological innovation is now firmly rooted outside of the United States Department of Defense in the global private sector. My testimony seeks to unpack this bumper-sticker statement and explore the implications for necessary reforms to our R&D and acquisition systems.

The democratization of technology to a global user base is not new and has been underway since at least the early 1980s. The United States Government cannot arrest this trend. In fact, the Department's R&D budget is higher today, in constant dollars, than it was in the early 1970s. This trend is simply due to the growth of the global

economy. Our challenge today is that, despite the efforts of this committee and others across the defense establishment, our implicit strategy and organizational methods for developing military capability remain optimized for a bygone era, and we continue to cling to the methods of past success in ways that unnecessarily disadvantage us.

At a high level, it is helpful to think about this challenge in terms of the alignment between our strategic needs, the technological environments, and our underlying models of doing business. The canonical case for what "good" looks like comes from the increasingly popular second offset strategy.

During the '70s and '80s, the U.S. faced a clear and singular threat, in the form of the Soviet Union. Concomitant with the strategic imperative, the DOD possessed privileged access to critical technical components -- microprocessors, computer processing, networking, data compression, GPS, and software -- that, when integrated, would yield the precision munitions, ISR networks, and command-and-control systems that underpin our current military technical advantages. The positive alignment of U.S. strategy, technology, and business during the Cold War meant that the DOD could simultaneously establish a conventional deterrent to the Soviet Union, develop the most capable fighting force in human history, and lock in at the

privileged access to enabling technologies through a series of export controls. As if this was not enough, those investments helped establish U.S. businesses that came to dominate entire global industries. We would not have Intel, Cisco, or Apple or the following generation of Internet businesses, like Google and Facebook, without those early investments.

In contrast today, we face a range of rapidly evolving threats and competitors from near-peer powers to nonstate actors, with no one capability providing game-changing advantages across likely contingencies. We face many more technological options to which we might apply our finite resources -- AI and automation, big data, additive manufacturing, hypersonics, and directed energy weapons, to name a few. And the U.S. no longer holds a monopoly on emerging technologies with military relevance.

Most importantly, while the DOD budget is still significant and influential, it is no longer compelling. Apple Corporation currently has $203 billion cash on hand, enough to buy Lockheed Martin, General Dynamics, Raytheon, Northrop Grumman, and BAE Systems without having to get a loan. In this environment, it is hard to convince many businesses to build technologies specific to DOD requirements. Despite these many differences and the work of this committee and others, our acquisition system is

still optimized for that prior Cold War environment, creating a misalignment between our strategy, technology, and business.

So, what do we need to do to address this strategic misalignment? Accessing technology, people, and capital from commercial markets will be vital to providing our military with advanced capabilities today and in the future. I commend this committee for its work on the 2016 NDAA, which will make it much easier for the DOD to acquire commercial technology, should it choose to make use of those authorities. The DOD has also undertaken smart initiatives, such as better buying power and establishing a presence in Silicon Valley with the DIUX. However, commercial technology is available globally, to our allies and our adversaries, alike. Our challenge, therefore, is not simply how better to acquire commercially available technology, but, rather, how to generate and maintain unique military advantage in a global marketplace driven by demand for increasingly powerful commercial technologies.

To achieve this objective will require a more nuanced and varied approach than we have in our current system, which operates on similar principles, regardless of whether you were developing an aircraft carrier or a microdrone. We cannot expect the same market conditions, product life cycles, export controls, or business models to create

optimal outcomes for the full range of capabilities we require in our arsenal. We will need to create a business environment that incentivizes the best companies and individuals to help solve our hardest problems. This naturally conjures images of Silicon Valley, an important innovation hub, but we must also include other hubs around the country and the world.

Importantly, reforms to our acquisition system must also incentivize traditional defense industry to innovate and collaborate with nontraditional businesses. Traditional defense industry will be an important conduit to deploy new technology and ideas inside the DOD at scale. This committee can provide the legal basis and strong incentives for the DOD to adapt appropriately. Updated approaches to intellectual property, export control, our requirements regime, and contracting methods would help lay the foundation for a more competitive, innovative, and sustainable set of industries from which the DOD can generate unique military advantages.

Acquisition reform will never have the same urgency as the frequent international crises we face, or garner the same interests as decisions on new weapon systems. And yet, our ability to respond effectively to the crises of today and tomorrow, to generate unique military advantage, and to support healthy industries for the DOD require us to improve

our acquisition system. While DOD's recent history does not provide much hope for our ability to change, I believe we have a small window within which we might make significant progress. The leaders of this committee, your colleagues on the HASC, and the current DOD senior leaders are uniquely qualified and willing to take action.

So, in closing, I thank the committee for its work, and I encourage you to continue on your current path of investigation and reform.

Thank you again for the opportunity to speak with you all today.

[The prepared statement of Mr. FitzGerald follows:]

Chairman McCain: Thank you, Mr. FitzGerald. It's a nice-looking tie.

Mr. FitzGerald: Thank you. I bought it specially.

Chairman McCain: Thank you.

[Laughter.]

Chairman McCain: Thought maybe you had borrowed it. Thank you.

[Laughter.]

Chairman McCain: Colonel Ward.

STATEMENT OF LIEUTENANT COLONEL DAN WARD, USAF (RET.), CONSULTANT AND AUTHOR OF F.I.R.E.: HOW FAST, INEXPENSIVE, RESTRAINED, AND ELEGANT METHODS IGNITE INNOVATION

Colonel Ward: Good morning, everybody.

Mr. Chairman, Ranking Member Reed, and distinguished committee members, thank you for the opportunity to be here this morning and to share some thoughts.

My perspective on acquisition reform can be summed up in two words: constraints work. That perspective is based on my 20 years of service as an Air Force acquisition officer and my research over the past decade. I've observed that small teams who embrace constraints tend to outperform large teams who adopt an expansive mentality of "take your time and spare no expense." It may seem counterintuitive, but, beyond a certain point, there is an inverse relationship between how much we spend on a project and the value of what it produces. I contend that if we want the acquisition community to deliver world-class, affordable systems at the speed of need, we need to establish small teams with short schedules, tight budgets, and a deep commitment to simplicity. We should resist the urge to launch big, slow, expensive programs which inevitably cost more, take longer, and do less than promised.

As I explained in an article about technology lessons from Star Wars, we need to build droids, not death stars.

Droids work, death stars keep getting blown up. And this doesn't just happen in the movies, it happens in real life, too. The opening story in my first book, F.I.R.E.," is about a supercomputer developed by the Air Force Research Lab in 2010. At the time, it was the fastest supercomputer in the entire Department of Defense. Remarkably, it cost less than a tenth of what a typical supercomputer would cost. How did AFRL produce a best-in-class technology on a shoestring budget? They built it out of 1,760 Play Station IIIs, which makes it an interesting story and a funny story, but also an important story.

If the scientists and engineers at the Air Force Research Lab had a large budget for that particular project, what would they have done? They would have bought a standard, typical supercomputer, which would have cost more and performed more slowly than the system they actually developed. Their small budget forced them to pursue a different path, which not only saved money, it also -- and I can't emphasize this enough -- outperformed every other supercomputer in the Pentagon's inventory. And that is a key point. A constrained approach can help save money, yes, but that's a secondary objective. The primary objective is to ensure we deliver best-in-class capabilities so that our men and women in uniform continue to enjoy unsurpassed technological advantages. As a person who has strapped on

body armor and carried a loaded weapon into a combat zone, I take this very seriously. And the data is overwhelmingly consistent. We get better acquisition outcomes, programmatically and operationally, when we take a constrained approach. That's what I mean when I say "constraints work."

So, the question is, How do we build a culture that incentivizes constraint? And the first is to recognize that constraint is not a foreign concept. The Armed Forces are full of people who embrace constraints, who take pride in doing the most when they have the least. And I had the privilege of leading one such team during my final year on Active Duty. There were six of us in uniform, along with a handful of civilian partners. Our $84 million project was one of the smallest in our division, so constraints are relative. $84 million is a lot of money. But, outside experts said this project should take 7 years. My predecessor wisely decided to do it in 2. I took over for the last year. Our first test flight was a month ahead of schedule. We flew twice as many test flights as originally planned. And, when the program ended, I was able to go into my commander's office and report that we were $8 million under budget.

Now, this is not a typical outcome, but it's more common than you might think. And if we want more projects

to look like this -- world-class technologies, ahead of schedule, and under budget -- my suggestion for -- is for leaders to seek, support, and celebrate such teams. Take steps to find these high-performing innovators, and support them, and tell their stories. If prominent leaders tell the world, "This is what right looks like. This is us at our best," that will help provide incentives for others to move in that direction, as well.

Look, the U.S. military is fantastic at achieving its goals. Give us an objective, and we will do whatever it takes to satisfy that objective. Military innovators have proven we can deliver world-class capabilities ahead of schedule and under budget when that's the goal. But, acquisition programs run into problems when that's not the goal, when concepts like speed and thrift are dismissed, when they're viewed skeptically or written off as impossible. Acquisition programs run into problems when big budgets are treated as signs of prestige, when long timelines are treated as signs of strategic genius, and when high degrees of complexity are treated as signs of sophistication. We need to set better goals and incentivize the right things.

If we're going to reform the acquisition system, we must take steps to measure and incentivize three things: speed, thrift, and simplicity. And we need leaders who will

seek, support, and celebrate the teams who pursue these goals. And we need to do these things for a very, very simple reason: constraints work.

Thank you.

[The prepared statement of Colonel Ward follows:]

Chairman McCain: Thank you.

Silicon Valley seems to be a place where innovation and quick turnaround and quick progress on their products is the order of the day. And we continue to see new products, new advances in information technologies, new ways of communicating. And therefore, many of us, including the Secretary of Defense, have tried to involve and engage Silicon Valley more in the issue of acquisition. And also, the attempts, at least, have been made to help us with this challenge of cyber. And that part, we seem to be at somewhat odds, but -- so, we formed up In-Q-Tel. That was a CIA operation, and seemed to be very successful. It provided funds for startups, which have -- many of which have been successful. And I think it's quite a -- really remarkable progress in the area that we are looking for and engaging Silicon Valley, who I think we all know are not particularly interested, because of the constraints which the witnesses just described. But, then we had DIUx, and that seems to be a tour guide for government officials that visit Silicon Valley and matchmaking -- and vastly different from what IN-Q-Tel has done.

So, I guess my overall question to you is, How do we engage Silicon Valley? How do we really adopt some of the practices, which obviously have astounded and led the world, and employ some of those, at least in our reform -- our

efforts to reform the acquisition process?

I guess we'd begin with you, Dr. Gansler.

Dr. Gansler: Well, the --

Chairman McCain: And what role does Silicon Valley play in that effort?

Dr. Gansler: I think what Secretary Carter started there was the right thing to be considering, is to try to come up with some innovative, nontraditional approaches, you know, because clearly we've had some great success with the Small Business Innovative Research Program. And that probably, right now, is being emulated around the world. Other countries are trying to copy us, because we've had such success with the SBIR program. And the same concept is behind the move toward Silicon Valley. And what we're trying there to do is to, again, think about, How do we get disruptive things done? I mean, you mentioned, earlier, unmanned systems. And that's an example of where there's enormous cultural resistance to introducing some of these new ideas. And we have to continue to fight that.

I mean -- I'll give you an example again. I like to use examples wherever we can. The Global Hawk is an example of that, where, if you remember, for 2 years in a row, while I was Under Secretary, the Air Force refused to fund the Global Hawk, because it was an unmanned airplane, and that was countercultural to the Air Force culture of pilots. And

so, the -- we -- I actually had Bill Cohen send a note to the Air Force saying, "Fund the Global Hawk." And they did fund it, but then they got back at me by saying the person sitting at a desk in Las Vegas flying an airplane over Afghanistan must be a rated pilot. So, what we had to do was to spend a million dollars to get that person to be trained as a pilot, each -- you know, for each person. And then, when you realize it, those people didn't want to sit at a desk anymore, they wanted to fly airplanes, so we had trouble trying to get them to stay as the remote piloting systems.

Chairman McCain: Could --

Dr. Gansler: And there's an example, it strikes me, that what we need is something like the innovation that comes out of the Small Business Innovative Research Program.

Chairman McCain: Thank you.

Dr. Gansler: It's a self-sustaining program. It -- by the way, it often has this -- the people from the universities involved in that. They're, in many areas, ahead of the technology.

Chairman McCain: Thank you.

Mr. Augustine.

Mr. Augustine: Yes, I think there are two characteristics of Silicon Valley that are particularly important. One is the willingness to take risk, and the

other is that young people getting out of college today, where do they want to work? They want to work in Silicon Valley; whereas, when I first got out of engineering school, where you wanted to work was in the Defense Department, because the latter was where the state-of-the-art was, the excitement was.

You mentioned In-Q-Tel. I -- my experience with that was in 1998. George Tenet was head of the CIA, and George called me. I had just retired from my other job. The -- George said that they were having a terrible problem at the CIA because they were totally dependent on the information industry, that it was their -- their lifeblood, obviously, is information. But, the state-of-the-art had moved from defense contractors to Silicon Valley. And the Silicon Valley wanted absolutely nothing to do with the government, particularly the CIA -- and asked what we might do. And, anyway, a group of us got together, and we decided maybe what we should do is form In-Q-Tel. And I was the first chairman of that. And the model is extremely simple. What --

Chairman McCain: But, DIUx has not followed that model.

Mr. Augustine: I'm sorry?

Chairman McCain: But, the Department of Defense, DIUx, has not followed in the In-Q-Tel model.

Mr. Augustine: No, it's totally different approach. And the In-Q-Tel model was simply to deal with Silicon Valley as other commercial firms --

Chairman McCain: Right.

Mr. Augustine: -- deal with each other not as the Defense deals with you -- Department -- deals with you. And so, through great courage of the people at the CIA, we created an outside organization in the private sector, not for profit, and we were given the authority to grant contracts, to give grants, to take equity positions, and to make decisions overnight without competition, whatever we thought was the best interest of the government. And we did it. And I might add, sir, we spent the first 2 years being investigated by every IG in the world, but --

Chairman McCain: Could --

Mr. Augustine: -- once they became convinced that we were sincere in our belief, In-Q-Tel, I think, has been an enormous success. And I would think, just maybe there's some prototype of In-Q-Tel that could be adopted by the DOD. I wouldn't suggest you could develop aircraft carriers with In-Q-Tel, but I think there are a lot of things you can. And I would encourage thinking about a prototype version of it.

Chairman McCain: Thank you.

Mr. FitzGerald.

Mr. FitzGerald: Senator, I think that the way to engage Silicon Valley is by solving hard problems with mutual benefit. If we're able to align our interests and Silicon Valley interests, help them kick off new work on new ideas and hard problems, let them innovate rapidly, and then if we have the ability to purchase those solutions commercially later and allow them to pursue a global commercial market, things will line up neatly.

I agree -- I almost always agree, unfortunately, with Mr. Augustine, we're not going to see a Google aircraft carrier or the Apple iBomber. The Department of Defense shouldn't try to become Google. It's not -- that would not work, and it would be a bad idea. But, if we align --

Chairman McCain: But, in the area of cyber, which is a major challenge, it's seems to me that we could have some alliance there.

Mr. FitzGerald: Absolutely, we can, although I note that Silicon Valley thinks about information security and information risk in very --

Chairman McCain: I know.

Mr. FitzGerald: -- different ways. So --

Chairman McCain: I'm very aware.

Mr. FitzGerald: But, we can -- but, I think that we can line that up. I think a good model for what "good" looks like here is if we think about SpaceX. So, SpaceX, in

the aerospace industry -- and I have some writing about this in my written statement -- they're supporting NASA through commercial spaceflight. They're not interested in going after ULA's satellite launch business. They want to do commercial spaceflight. But, in the interim, NASA can benefit from commercial practices, and the United States will develop -- will redevelop a healthy space industry. If we don't allow organizations like SpaceX and BlueOrigin to get into this environment, we're not going to have a sufficiently healthy space industry to build our own rocket engines, and we're going to have to keep buying them from the Russians. So, we can't -- despite the fact that I agree with -- that we need constraints, we can't constrain Silicon Valley to a purely DOD market. We need to find common interests and leverage those, and then let them go do their thing outside of that.

Chairman McCain: Thank you.

Colonel Ward, briefly. I'm way over time.

Colonel Ward: Yes, sir. When I was on Active Duty, I actually had a very successful engagement with a nontraditional company from Silicon Valley. The reason they were interested in working with us is that we had a -- an interesting series of small, quick, rapidly developed and rapidly delivered new capacities. Look, Silicon Valley looks at the big traditional acquisition programs, and they

get uninterested because the pace is so slow and the bureaucracy so heavy. They want to deliver something quickly, not just because they are interested in speed, but because they know speed works and they know that long timelines increase the risk of delivering something that's operationally irrelevant, technologically obsolete, or both. And that's the type of risk that we don't want to pursue. So, by keeping the timelines short, we can make ourselves more interesting and more engaging to the Silicon Valley folks.

Chairman McCain: Thank you.

Senator Reed.

Senator Reed: Well, thank you very much, Mr. Chairman.

Let me start with Colonel Ward and go down. And the general topic are the service contracts. You know, usually when there's a front page story, it's about overrun on a system -- a land-based system, an aircraft, or something. But, there's so much money being devoted to service contracts -- and Mr. Gansler referred to one of the constraints already -- but your insights about how we can get our handle on these service contracts to be more efficient, more effective, and hopefully free up dollars for other higher priorities. And, Colonel Ward, you start, and we'll go right down.

Colonel Ward: Yes, sir. So, a couple of years ago,

the Air Force announced that they were spending more money on service projects than they were on, you know, traditional R&D and technology-type things. So, it is a huge amount of money. I think one of the first steps is to not treat service contracts that same as we treat contracts to build an aircraft, for example. However, I think a lot of the similar constraints can apply. Rather than assembling a cast of thousands, I think we're better off with smaller teams. And I think if we sort of modularize these service contracts -- again, this idea of centralized -- centralizing everything in one big service contract to rule them all -- the economies of scale that were promised never seem to emerge, the efficiencies that are supposed to come along with those never quite happen, because the bureaucracy just gets so heavy when we're managing that. Large numbers of small teams have their own challenges, and none of this is easy. But, large numbers of small teams, I think gets you better results than a small number of really large teams.

Senator Reed: Thank you.

Mr. FitzGerald, please.

Mr. FitzGerald: Senator, I don't have much more to add on top of Colonel Ward's excellent points. The only thing that I would add is: shorter duration allows for continued competition; and we need to ensure that there are strong incentives for these companies to continue to compete for

that business. They can't view them as an annuity business which just allows them to generate revenue in perpetuity.

Senator Reed: Very good.

And Mr. Augustine.

Mr. Augustine: Senator, everything I have seen with regard to service contracts or hardware contracts is that the successful ones always have somebody at the leadership position who has authority, who has the willingness to put their career on the line, who has experience at what they've been asked to do. And I think it comes down to leadership, with people.

Senator Reed: And that leadership would be in the company or in the Department of Defense, or both? I agree with you.

Mr. Augustine: I -- it's obviously both, but the real issue, I think, is in the Department of Defense. The way we've filled many of the leadership positions really discourages people from joining the Department of Defense today.

Senator Reed: There's another aspect of this, too, I think, in terms of -- sometimes you have to plug the gap at the middle and lower level with contractors, because of the reason you point out. You cannot attract, as you did 30 or 40 years ago, you know, the very best to go in for a career in the Department of Defense. Is that another problem we

have in -- we have to deal with?

Mr. Augustine: I think it is absolutely a problem. And in my mid-career, when you -- it was during the Cold War -- when you were asked to take a position in the government, even if it meant a huge pay cut, you took it. Today, I know of jobs that a dozen people have turned down, senior positions in the government. And I think we pay a great price for that, sir.

Senator Reed: Thank you.

Dr. Gansler, please.

Dr. Gansler: Well, the most obvious place where I think this would be applicable to your point about services is in the information technology area. I mean, the example that I think would be appropriate here is a comparison between FedEx, UPS, and Department of Defense logistics systems, where FedEx and UPS have total asset visibility, but the DOD doesn't have that. That's inexcusable. It seems to me that we should be learning how to take advantage -- I mean, right now, our IT systems tend to follow the same rules as building a tank. And that's not sensible. I mean -- and that's one of the main areas I think we have to address, is the information system technology acquisition, and how to take full advantage of what commercial technology is doing in the IT area today; for example, that logistics case I just gave you.

Senator Reed: Just one follow -- a quick point -- is that, you know, we've come to realize that information technology is a double-edged sword. It moves things around very quickly, but if you can get into that system, you can stop everything in a moment. So, part of what we're -- we want to do is emulate what they do, but also make sure it's invulnerable to penetration, I would presume. Is that fair?

Dr. Gansler: Correct. No, that's -- right now, we're becoming increasingly vulnerable, and that's the danger in the system. And it's been demonstrated with that OPM attack recently. And it's very clear that -- when people were talking, a few minutes ago, about supercomputing, that the number-one supercomputer in the world today is actually the National University of Defense Technology in China. And it's obvious that they are focusing on the software aspects of that. And, by the way, when I toured that facility, those were all American parts in there. There's a globalization of parts. And -- but, it's clear that their focus is on the software side of that. And so, other countries are going to be -- not just countries, but people -- are going to increasingly be attacking our systems. And it makes them more vulnerable as we become more dependent on cyber.

Senator Reed: Thank you.

Thank you, gentlemen, very much.

Thank you.

Chairman McCain: Senator Inhofe.

Senator Inhofe: Thank you, Mr. Chairman.

I've been waiting for the right panel to come along for several years now. So, I'm going to only ask one question, and I'm going to carry you through. And it's something that's very personal to me, because I was elected to the Senate in 1994. My first year was 1995. In 1995, they came up with the idea that we've had the old Paladin system for many years. It's old World War II technology. And we needed to have something that would really be substantial, really protect our kids out there. And they came out with the Crusader. That was 1995.

In fact, let me get the timeline down here so I'm accurate on it. In 1995, it's when they approved the -- to commence the program. And the first prototype -- this is the Howitzer -- was -- and you're all familiar with this, of course -- was in the year 2000.

Then, in 2002, after some $2 billion had been spent, it was terminated. Now, I'm a Republican, I'm conservative, but I can't blame the Democrats on this, because this was done with Rumsfeld in the Bush administration. In fact, it was so seriously considered that one of -- you remember the Congressman, J.C. Watts, he actually retired from the House of Representatives because he was so upset with spending 7

years on a program and then dropping the thing. And at that time, $2 billion seemed like a lot.

Well, then we go through with this thing, and carry it through. And they say, "All right, we need to have something that's lighter." The Crusader started out at 65 tons, ended up at 40 tons. They went into bringing it down to 18 tons. They said, "No, that's not heavy enough to offer the protection that's necessary, so let's" -- we dropped that program, started the NLOS Cannon, none-line-of-sight cannon. That was one that was -- they brought down to 18 tons because they wanted to make sure they could transport it on a C-130. And so, we went through this -- all of this program. And finally, at the end of a period of time, they went into -- that was part of the FCS program, then they dropped that one. As the Chairman mentioned in his opening remarks, that was a $20 billion program that we had already spent on that.

Now, the interesting thing is, they brought the weight down. We're now going back to a part of an improved Paladin, the PIM system. And what's the weight of that? It's right back up to where the Crusader was. It's 40 tons.

Now, what I'd like to ask you -- and I know you can't do it in here -- I'd like to have your opinions on the record, later on, getting around to it, as to how we went through that chronology, that transition.

[The information referred to follows:]

Senator Inhofe: Because you start a program, the requirements really didn't change that much, because the requirements were, "It's got to be transferable, it's got to be mobile, and it's got to offer the protection." And other than the fact that we had different systems down there, we're going right back to one that offered essentially the same protection that -- in the final years of the Crusader. Do you have any comments now about just that one combat vehicle that we've gone through in that period of time? In your -- and in your opinion. Is it because requirements changed and then didn't we end up where we started?

Dr. Gansler: Well, I think one of the things we should start to think about is making affordability a requirement. Because it's very clear, if you think about Lanchester's Law, that -- you know, of total force effectiveness is proportional to individual weapon effectiveness times numbers squared.

Senator Inhofe: Yeah.

Dr. Gansler: And so, the question is, Are -- is it affordable to get the numbers we need? And therefore, that's the unit cost. Why isn't that a requirement?

Senator Inhofe: Yeah. Well, let me do this. Because I'm out of time anyway. If you all wouldn't mind tracing that through, that little history through for me. And I'd like to be -- very much to have your comments on how we

ended up in that situation.

[The information referred to follows:]

Senator Inhofe: Thank you, Mr. Chairman.

Chairman McCain: Senator Heinrich.

Senator Heinrich: Thank you, Mr. Chairman.

I want to return, if I could, to something that both Mr. FitzGerald and Mr. Augustine have brought up a couple of times now, and it's just how much things have changed since even I got my engineering degree, back in the early to mid-'90s, where people really tracked to working in DOD, working in our National Labs, because of the attractiveness particularly of the problems. It was seen as the place to be. And I saw that change very quickly as I left and went to work as -- for a contractor at Air Force Research Labs, how quickly Silicon Valley and other innovative tech clusters around the country became the place to be for the talent coming out of our engineering schools, in particular.

Some of that is based on the problems that are being put forth. People want to work on the things that really make them excited, that are difficult, where they feel like innovative solutions are going to emerge. Some of that's also cultural. And you see this anytime you -- you know, if you go and tour some of the innovators at Silicon Valley, and the culture of workplace is so dramatically different than, you know, what I experienced at Air Force Research Labs. And that is something that has an enormous draw for engineering and STEM talent coming out of our universities

today.

What can we learn, in terms of inserting some of those cultural elements into what is obviously a slow-to-change and rigid and, in many cases, for a reason, culture of DOD?

And, Mr. FitzGerald and Mr. Augustine, in particular, I'd like to get your thoughts.

Mr. Augustine: Well, it's a great question. And I think there are examples within DOD that do exactly what you describe. DARPA, ARPA-E, In-Q-Tel could attract the very best people coming out of college today. Whereas, many of the more established, rigid organizations can't. And I think the difference is the culture or the freedom to do things. And I'll cite the example of my son, who is an engineer. Went to work for a company -- not the one I was involved with -- and was working on a defense contract. And he and these young engineers were told how very important this was. They worked through the Thanksgiving holidays. He went to work on Christmas Day. Early in January, the customer decided they really didn't need this after all and canceled the program. Well, those kids all got out of the defense business and headed to Silicon Valley. And so, it's a cultural issue. And this issue of the lack of stability is something that costs us a great deal.

Mr. FitzGerald: I agree, this is a great question.

I'd come back to how we frame the problem. Part of the

challenge is that we frame problems in really boring or esoteric ways. So, if I give a short example. The Secretary of Defense, when he was in Silicon Valley, talked a lot about GPS, and rightly so. If I described the problem to you in military technical speak, I would say, "We face an ongoing challenge of, How do we maintain persistent precision timing in navigation in A2AD environments against a near-peer threat specifically in the South China Sea?" -- at which point most people under the age of 30 are in a microsleep. If we say, "I'm talking about the future of GPS that does not require expensive satellite technology, that would revolutionize how every mobile handset on the planet operates, and then all the opportunities that come from the apps that you'll build on top of that," that's a compelling and interesting problem to go after. So, we need to frame it, and then we need to let people go directly to the problem.

Most of the folks I speak to in Silicon Valley would love to work on an actual military problem. If they get to hang out with marines in a quonset hut in the desert, that's a good time. What they don't want to do is sit in an office park somewhere in Northern Virginia and do a capabilities-based assessment for 3 months. So, if we can keep things -- if we can operate on short timeframes, I think we can make it more interesting. Overall, I think that this is one of

those sort of addition by subtraction. Remove constraints, in terms of unnecessary bureaucracy, let people go at the problems, and they'll want to do it.

Senator Heinrich: Thank you both.

I want to, with the remainder of my time -- and this is for anyone on the panel -- How much of these challenges just result from sort of an inherent bias towards sort of exquisite one-off solutions at the cost of off-the-shelf solutions as a result of the sort of regulatory process that we've created?

Mr. Augustine: Well, your question, really, I think, points to the requirements process, which, in my view, is a fundamental part of the problem that we face. The requirements process is very sterile, very formalized, lacks feedback, lacks financial input. And I think that -- I won't take a lot of time, because we don't have it, but I -- the first thing I would start doing would be to change the way we do requirements.

Senator Heinrich: That's very helpful.

Thank you very much, Mr. Chair --

Dr. Gansler: My comment on the --

Senator Heinrich: Oh. Hello.

Dr. Gansler: -- GPS -- I didn't realize I was going to turn the lights off, but -- I mean, it's -- but, your example of GPS is an interesting one, in the sense that one

of the things we might look for is dual-use capability in some of these innovative ideas.

Senator Heinrich: Right.

Dr. Gansler: I mean, it's very clear. At the time when GPS was started, I was responsible for electronics R&D. And what was interesting about that is, both the Navy and the Air Force separately came to me and wanted their own satellite navigation system. I suggested to them they're using the same earth. You know, it doesn't seem to me it makes much sense, because it was so expensive. And why do you need a separate one? You know. And -- but, it -- obviously, it had lots of commercial application. So, if you were thinking about what career you want to go into, you would want to go into something that had both dual-use. And a lot of the things we've talked about today are dual-use kinds of things. And so, you might think about it in that model rather than simply saying something that's unique for defense. In the past, where defense was always ahead, it's no longer the case.

Chairman McCain: Senator Rounds.

Senator Rounds: Thank you, Mr. Chairman.

Gentlemen, I'd just -- what I would like to do is a little bit of an exercise. Based on a series of premises, I'd like you to rate and suggest to us, as policymakers, better ways to provide specific guidance.

Let me just lay this out. I'd -- the old comic strip story of, "We have met the enemy, and the enemy is us." It sounds as though, in this particular case, when you have laid out for us the challenges that you've seen, it comes back down to the policy that has been established. And let me just work my way through this for just a second.

Dr. Gansler, in your testimony, you've noted the incredible number of regulations for doing government business. You've indicated 2,000 more pages are being added of regulations, 180,000 already in place. I think currently the total cost for regulatory compliance to the United States is up to about $1.9 trillion today, and climbing.

Mr. Augustine, you talk about the fact that, in the private sector, when particularly bad judgments have been made, people lose their jobs. In government, when bad judgments were made, nothing happens. You've also identified, earlier in our conversations today, the fact that there was a time, when someone asked someone to go to work in a government agency to help, people said yes. Today, we have those positions open, and we're having a tough time filling them. There's a reason for it.

When we talk -- Colonel Ward, in your testimony, you comment that, time and again, military program offices, working under tight constraints, reliably hit their budget and schedule targets while the technologies they produce

contribute significantly to achieving operational objectives in the field. And then you lay out the fact that constraints work.

It looks to me, though, that when we sit back and we look at the actual products that have been established, whether you talk about an F-22, where you talk about the total number of dollars invested in the development of the program, and then, midstream, we end up with less than 200 aircraft operational when we're all done. Look at the F-35, where the challenge of developing it is one thing, and yet we're going to debate how many we actually build. We have an LRSB, which is under development today, and yet the cost of it will go up unless we commit to the number of aircraft that we're actually going to build.

At some stage of the game, when we look at all of these different issues, they all point back to policy, which is either being changed in midstream or there is not accountability demanded, or it appears as though, when we do see something wrong, the first thing we do is, is we jump back into this thing to say there ought to be a law to stop it from happening again, none of which seems to be working very well.

So, if I could, would you each just, in -- briefly as you can -- lay out for us one or two items that you think would be critical as we move forward that we could do, as

policymakers, specifically to help the Department of Defense to actually be able to comply and to become more efficient, things that we could either stop doing or things that we should be doing as policymakers.

Colonel Ward: So, a program with a long timeline presents a larger target to the forces of change, whether it's legislative change, changes in the threat environment, changes in the technology environment, changes in the economics or the politics of the thing. So, anything we can do to incentivize and reward shorter timelines will help provide that stability, in terms of requirements, legislative requirements, all these things. So, we start sort of by measuring it. And if we're really legislatively, you know, saying, "We must measure not just how much time we're -- we spend, but how much time we plan to spend" -- because a lot of times, when we plan to spend a long time, we end up spending even more; when we plan to spend a short amount of time, we end up spending even less.

One of my favorite examples is the Virginia-class submarine. My friends in the Navy have done a fantastic job with the Virginia-class subs. I have some numbers here. The -- in 2008, the U.S.S. New Hampshire delivered 8 months early, 54 million under budget. In 2011, the U.S.S. Mississippi was a year ahead of schedule, 60 million under budget. So, on the order of a year ahead of schedule, on

the order of tens of millions of dollars under budget for something as large and expensive and complicated as a nuclear-powered sub. The reason they did that, they set a goal: two for two in two. Two subs, $2 billion every 2 years. And then they said, "Not a day more, not a dollar more. In fact, we expect you to beat these timelines." And $2 billion is a lot of money, but compare that to the Sea Wolf submarine, which was $4.4 billion -- that was the one that came before and was canceled -- it's less than half the price of the Sea Wolf. It can be done, even on something as big and complicated as that, by setting these tight constraints. Things like two for two in two, which is a nice, handy bumper-sticker, but there was deep engineering beneath it, as well.

Senator Rounds: Got it.

Mr. FitzGerald: I'll pick two things. The first would be export controls. I think that we should blow the current system up and start again. It made sense in an era when we had access to unique technology that we needed to protect. But other people have this technology already. The great example is our desire to sell drones to Jordan, an ally of ours. We sell them F-16s. Thanks to MTCR, we can't sell them drones. In the past, that would have meant they didn't have any. Now they're buying, or they have the opportunity to buy, Chinese drones that look suspiciously like our

drones, and we have fewer means by which we control -- we can influence the way that the Jordanians use them. And, at the same time, our businesses are not as competitive globally because they're not able to sell drones as frequently. I think that's a huge -- one way we can just start again.

I would also -- while it's not legislative, I would encourage the committee to establish incentives whereby we can start many more programs, each of which is smaller and shorter. That will mean that we have less risk in each program and we can shoot things earlier, and they won't be trying to move requirements onto one big megaprogram, as we've seen with all of the failures that we've been talking about today.

Senator Rounds: Thank you.

Mr. Augustine: Two things that I think the Congress could do to address the issue you raise. One would be to provide the Defense Department with a 10-year planning budget that you update every year, and require that all new starts fit within that budget. One of the problems is that we start out approving programs one by one, in isolation, and we don't fit together the total cost. And so, we start out to build a -- I've forgotten how many B-2s, but we wound up building 21 of them and then wondered why they cost so much. So, if the Congress provided a planning budget, kept

it up to date, that would, I think, be very helpful.

The second is to make it very much harder to start new programs and very much harder to change them once they're started. When I worked in the Pentagon, I was an aerospace engineer, they put me to work in the Army because they thought that was where the biggest problem was, I guess, or that's what I was told. And, at that time, there had been five -- the Army "big five" had just started. And whether I agreed with them or not, I said, "By golly, we're going to stick with them to avoid the Crusader problem. We're going to stick with them, and we're going to make them happen." Well, those five programs today were the Apache, the Black Hawk, the Patriot, and Abrams tank, and the combat vehicle. Those are the systems we're fighting with today, and that was in 1973. And so, if we just stick with these things and make it -- don't start them. Let's keep track of how many we finish, not how many we start.

Senator Rounds: Thank you.

Chairman McCain: Got to move on to --

Senator Rounds: Thank you, Mr. Chairman.

Chairman McCain: Yeah.

Senator Manchin.

Senator Manchin: Thank you, Mr. Chairman.

Thank all of you all for being here today and your service to our country.

Mr. Ward -- Colonel Ward, I was -- I checked your bio and everything. I was very impressed. And you went over the numbers again, 8 -- was it 8 billion under budget?

Colonel Ward: Million with an "m."

Senator Manchin: Eight million, oh, okay. I was giving you a little bit more credit. Anyway, time constraints. You know, we hear an awful -- I want to hear all of your -- the sequestering and budget caps. You're talking about time constraints. It seems like Congress has to -- you want us to micromanage, since the Department of Defense can't put time constraints on themselves? Where should it come from? This committee? From Congress, telling how quick these programs should be -- come to fruition? If not, then you move on. But, how did you get to where you all -- the "two for two for two" you just mentioned, how did that come about?

Colonel Ward: I think that was Navy leadership who made that decision. And, again, I wouldn't recommend -- I'm a big fan of decentralized decisionmaking and pushing --

Senator Manchin: Yeah.

Colonel Ward: -- decisions down to the lowest possible level and as close --

Senator Manchin: Okay.

Colonel Ward: -- to the action as possible. The challenge is, though, that what gets rewarded and

incentivized is managing a program that -- you know, if you want to get promoted, work on a long, big, expensive, complicated program.

Senator Manchin: There's schools of thoughts here, because some people think that we throw so much money, and it's just wasted, and there's no time, and there's no accountability and responsibility. And then others say that we basically have strangled with budget caps and sequestration. Give me all -- give me your all thoughts on those real quick.

Colonel Ward: Sure. I think that there's a widespread belief that spending more money and spending more time is a good problem-solving technique and a good way to get us better outcomes. And the data just doesn't support that. In fact, we tend to get better results with short timelines and --

Senator Manchin: What's your thoughts on sequestration?

Colonel Ward: I think there's a way to do budget constraints that's intelligent and thoughtful, and then sequestration tends to be more of a broad --

Senator Manchin: Hammer down?

Colonel Ward: Yeah, more of a hammer than the scalpel.

Senator Manchin: Gotcha.

Colonel Ward: So, we can do it well, we can do it, you

know, more of a brute force.

Senator Manchin: Do you think there's enough money in the system right now to defend our country?

Colonel Ward: I do. I do.

Senator Manchin: Just not using it wisely, right?

Colonel Ward: Right. Right. And the idea is not that we spend less money overall, but that we spend it on smaller individual projects. And we could have a portfolio of programs which distributes the risk, distributes the learning, and increases accountability.

Senator Manchin: Mr. Augustine, I'd like to hear your thoughts on that real quick.

Mr. Augustine: Yes. I think that not only is the amount of money important, but the stability of the amount of money is extremely important. And with regard to sequestration, everything I've seen, looking from the bottom up, is that it's been very damaging.

Senator Manchin: Mr. Gansler?

Dr. Gansler: I think the one thing we've got to do is gain better confidence in the stability of the budget. And if -- for planning purposes, that's going to be absolutely critical, in terms of how much you can afford for each individual system and how many of those you can buy.

Senator Manchin: Mr. Augustine, real quick, do you think there's enough money in the system right now, as far

as our budget in -- if we chose to spend it differently or, basically, appropriate it differently?

Mr. Augustine: I suspect I'm not in a position to really answer whether it's an adequate amount, but I do think that we could get a great deal more for what we have.

Senator Manchin: Efficiency.

Mr. Augustine: Through efficiency. And I'm talking about probably 25 percent or something like that, a big number.

Senator Manchin: Oh, boy.

Mr. FitzGerald.

Dr. Gansler: But, it also depends upon how many more new regulations and legislation you write, because if those are driving the costs up and the -- and stretching --

Senator Manchin: Well, you all have been very clear in your testimonies about, basically, the regulations. Almost -- more than a trillion dollars of cost has been added because of regulations that have been sent from us, from Congress, or is it developed within the Department of Defense?

Dr. Gansler: Some of each.

Senator Manchin: Some of each.

Mr. FitzGerald: Senator, when I was running a small business, the majority of government input was about my reporting and my accounting and the audits that I had to go

through to get paid, rather than, "Did I do good work? Were my ideas strong? Did they impact the Department of Defense in a positive way?" So, we're putting -- we're strangling on the wrong things, not strangling on the right things.

I strongly agree with the point Mr. Augustine made, in terms of sequestration and budget clarity. I almost went out of business twice because of continuing resolutions. I had Department of Defense customers who wanted to purchase my services for things that mattered, but there were new starts during a CR, and we couldn't do it. That meant that I had to keep significant cash on hand just to keep the business going. I couldn't invest that in new ideas. It was a very inefficient way of running a business.

Senator Manchin: Makes all the sense in the world.

Thank you.

Chairman McCain: Some feel that a MEDAX approach, which is sequestration, is the wrong approach. And I don't know of many experts who disagree with that. I am proud of this committee's reductions in excess spending, fact I can name it in the billions. But, to have a MEDAX approach, it takes -- throws the baby out with the bath water. And every military -- uniformed military leader who has testified before this committee has said that sequestration is harming their ability to defend the Nation. And if the attack on Paris doesn't wake us up, then nothing will. And so, to

somehow allege that we're spending enough money right now in the right way is, in my view, sheer fallacy and ignorance of the threats that we face. Total ignorance.

Senator Ernst.

Senator Ernst: Thank you, Mr. Chair.

Gentlemen, thank you for being here today.

Colonel Ward, just thank you. You shared some great examples there of servicemen and -women that have really taken that extra step and exhibited some great ingenuity. So, thank you for doing that for us today.

Gentlemen, we do have a substantive budget allocation that's directly dependent on our program management, our program project management being done right. I mean, it must be done right. However, we don't have a fully standardized workforce leading those programs with a baseline of people and processes and the culture, which we've talked about today, how we need a culture that works a little differently than it has in the past, that culture that's necessary for predictable outcomes -- on time, on target, on budget.

And the Defense Acquisition Workforce Improvement Act was a great first step in this process. However, it only deals with weapon systems, it doesn't deal with the service contract side that we've discussed about earlier.

So, just very briefly, if each of you could comment on

your assessment of DAWIA. And is it providing the necessary program management across the whole of our acquisition process? And just some brief thoughts on that.

Colonel Ward, if we could start with you, please.

Colonel Ward: Yes, ma'am. So, I think there's a lot of good things that happened with DAWIA, in terms of the emphasis on education. I think there's certainly more room for improvement. One thing that I've done recently is, I kind of -- I went through and I read the FAR, or as much of it as I could, and I collected a series of the phrases, the clauses, the sections of the FAR that I could really hang my hat on, that moved us in the direction of speed, thrift, and simplicity, flexibility, agility, and these types of things. So, I mean, granted, the FAR is too long and too complicated and difficult to comply with, but there's a lot in there that does tell us to do the right things and do good things. And so, if we can kind of include that type of analysis. And I wrote a little booklet on it, and it'll be coming out in the new year, that says, "Here are the simplifications, the opportunities, and the agilities that the FAR not just allows us to do, but encourages us to do." A greater awareness of those types of things, I think, would go a long way to improve the quality of decisionmaking at the practitioner level, which is sort of my area.

Senator Ernst: Certainly. Thank you.

Mr. FitzGerald.

Mr. FitzGerald: I agree with you. I think that the legislation is a good first step, that that needs to be followed up with strong management and getting the incentives right at the individual level. So, celebrating success, when required, and, without being indelicate, punishing failure. It's -- all of this legislation will be immaterial to the practitioner if they can't see the implications for themselves. So, I would encourage this committee to engage in that sort of management, and also to encourage the Department of Defense to do that, as well.

Senator Ernst: Very good, thank you.

Mr. Augustine.

Mr. Augustine: Yes. My experience has been that, where you really develop managers for very, very complex undertakings, whether it's software or hardware or services or what have you, is really in industry, not in the government. And I think the reasons for that are that, in industry, you're given authority, and you're held accountable. And one of the things that's changed during the period of my career is that it used to be quite common for people to -- in industry who have been trained to manage big projects, they serve in government for a period of time and manage those projects, and then can go back and have a career in industry. They have to disqualify themselves for

many things to avoid conflicts of interest. And that's important. But, today it's so hard to go back and forth. And many would say it -- you shouldn't go back and forth. But, I truly believe that if we don't have some of the industrial experience managing major projects in our government, we're losing an opportunity.

Senator Ernst: Very good, thank you.

Dr. Gansler.

Dr. Gansler: I agree with Norman, it's highly desirable to have both experiences to understand -- but, the incentives in industry, from the government side -- that that's absolutely critical. And to the extent that maybe you can get that in business school, or something like that, it would be highly desirable to have that understanding. I also think that we should have a promotion system within the government, based upon success, achievements, you know, meeting schedules, meeting cost, meeting performance, things like that, that we need to evaluate the incentive systems, both ways. And, of course, it wouldn't hurt to have some salary compensation, either. I mean, twice I've gone into the government -- first time, I took an 80-percent cut, and the second time, a 90-percent cut. That's not bad.

Senator Ernst: Right.

Well, I thank you all very much for your testimony today.

Thank you, Mr. Chair.

Chairman McCain: Senator Hirono.

Senator Hirono: Thank you, Mr. Chairman.

Our acquisition process is highly complicated, and yet we are stuck in a bygone era, from not just the testimony from today's hearing, but from other hearings that the Chairman has called.

I was very intrigued, therefore, by Colonel Ward's focus on "constraints work," where speed, thrift, and simplicity are the areas that we ought to be looking at. And I'm interested to know from the other three panelists whether you think that this approach, the attitude, "constraints work," whether that would be applicable to the acquisition process in -- for example, in our space systems, in the building of aircraft carriers, to our cybersecurity area. Would this be a good approach for us to move toward: "constraints work"?

Mr. Augustine: Well, I'll comment. And the Colonel makes a very important point. I think there's a real semantics hazard here. And the 180,000 pages that Jacques mentions are constraints. And I'm sure those are not what the Colonel is referring to. And so, I would probably use the word "freedom" instead of "constraints." But, I understand his point, and I think his point is correct.

Dr. Gansler: Yeah, I would think that the -- I agree

with Norman -- the concept of removing the constraints would be highly desirable, in the sense of the regulatory aspects of them. You know, the -- right now, with the -- one of the problems, I think, that we have is in the training of our acquisition officials in the Department of Defense. They learn all the constraints, but they don't learn to think about whether those constraints are good or bad, and how they could be modified.

So, I think what we probably do need is something like another Packard Commission, in effect, that -- I mean, we didn't take advantage of what came out of the Packard Commission, in terms of how to use commercial stuff. That was one of the main things that Bill Perry was trying to do in the chart that I showed of the comparison of mill standard parts with commercial parts, is an example of where we could be more flexible in our judgment of how we apply commercial things. We talked information systems, for example, in the support functions.

Senator Hirono: So, I think that if we define "constraints" as, really, speed, thrift, simplicity, I think that's what we're getting at, not, "Let's add another 100,000 pages of requirements." So, if we use those kinds of words to define what we mean, and then I think that's when you get a decision such as "two for two in two." And I think that that's perhaps where we need to go.

There's one more person who I'd like to hear from.

Mr. FitzGerald: Yeah. So, I'm slightly biased. I'm a Dan Ward fan. I actually reviewed his first book. So, I agree. But, this is about putting constraints in the right areas, not through regulation, but through management. I'd also say that we can't have one system to build everything. So, building aircraft carriers requires a different system to building -- to integrating ISR systems and to acquiring commercial technologies. Building an aircraft carrier, you can still create constraints. It's a series of small projects, not one 50-year project.

We can also benefit ourselves by not building stuff. This version of the NDAA encourages or, I think, mandates that the Department of Defense look more at the persistent close air support project, which I think is an excellent project by DARPA and the Marine Corps. They build new software that they put on top of an Android tablet. We didn't have to build the Android operating system. We didn't have to build the tablet. That's a great way of constraining your project. Just don't build that. Focus on the hard stuff that you need the military unique advantage. I think it's a great approach.

Senator Hirono: Some of you have talked about the competition that exists between, for example, the engineers wanting to go and work at -- in Silicon Valley, as opposed

to the DOD. And as we look at the need of our country for STEM -- people with STEM backgrounds, are we -- how do you see us, vis-a-vis the rest of the world, in terms of our ability to have people with STEM educations? How are we doing? And what do we need to do? Very briefly. I'm running out of time.

Mr. Augustine: Well, I'm so glad you asked that question, because, I think, in the long term, that may be the biggest hazard we face in defense. And today -- there was a recent study of 93 countries, as where they looked at what percentage of the baccalaureate degrees were awarded, were awarded in science of engineering. The United States ranked 79th out of the 93. The country we were closest to was Madagascar. If you look into the scores on standardized tests of 15-year-olds in this country, of the OECD nations, 34 nations, the United States ranks 21st --

Senator Hirono: So, we're not doing well. What -- do you have any thoughts on what we can do to improve this situation?

Mr. Augustine: The first thing to do is to fix the K-through-12 system, and second is, don't have the States starve our great research universities.

Senator Hirono: Anyone else?

Dr. Gansler: Also --

Senator Hirono: Yes, Colonel Ward.

Dr. Gansler: -- funding advanced research would certainly be one of the ways of doing it.

Senator Hirono: Colonel Ward.

Colonel Ward: So, I was at a technology conference out in Silicon Valley, and Todd Park, from D.C., went out there and spoke to a big room of people, and basically said, "Your government needs you." We have important challenges to help serve our veterans -- VA healthcare and -- and he laid out a number of interesting challenges. And he said, "I'm going to be in that room over there. If you want to come talk to me about coming to D.C. and working, you know, give me your card." He was mobbed. The line was out the door. I couldn't even get -- and I was still in uniform at the time, so I was already there. But, people want meaningful challenges. And I was listening to people talk, and it's like, "This is a chance to go -- I'm doing -- designing video games, which is fun, but I could be helping to save lives. That's what I want to go do." And the just simple outreach of, "Hey, I'm here. Here are some of the problems. Come talk to me" -- seemed to have a huge impact.

Senator Hirono: Thank you.

Chairman McCain: Senator Ayotte.

Senator Ayotte: Thank you, Chairman.

I want to thank the witnesses.

In Secretary Gates' books, he discusses the

extraordinary measures he had to take to get the MRAPs fielded to our troops to save lives. And I think that's one of -- that's not the only story we have of where we've needed to really go around the entire system to get to our men and women in uniform, lifesaving equipment and the best, so that we could make sure that they're protected and we're able to address what we needed to do to fight the enemy on the ground. So, what do you all take from the MRAP experience? And how do we -- especially as we think about our engagement in conflicts, and we're still, obviously, engaged in Afghanistan, we're fighting this war against ISIS. And we've been notably bad at predicting what our next conflict will be. How do we avoid this? What lessons do we take from that, from what he described he had to do for -- to get the MRAPs to the troops?

Colonel Ward: Sure. I have sort of two observations on the MRAP. The first is that the defense acquisition system and all the requirements and things are super important for us to all comply with them, unless we have an important and urgent need in where it really matters to deliver it, and then we sort of throw that out the window and we come up with a new rapid approach. And so, this idea that, you know, we can only be fast when we have to be, is sort of a weird perverse incentive that goes on.

With the MRAP, the leadership made it very clear, "This

needs to be quickly and spend as much money as you need to." So, what happened? It was done quickly, and we spent a lot of money. I wonder what would have happened if they had said, "Needs to be done quickly, and it needs to thrifty, and we need to plan for future upgrades." But, again, those goals weren't as clearly emphasized as --

Senator Ayotte: Do you think that that's what distinguishes the Virginia-class success? Where we had a measurable, "It has to be done in this period, this amount of money, and this is how much we have produce"?

Colonel Ward: I do. I do. And I think that the tendency -- again, to hit the goals that we set is very strong. We've got a great track record of doing that. And again, with the MRAP, they said, "Hey, speed matters. Cost doesn't matter so much." So, we got it fast, and it was expensive. But, the idea of "faster, better, cheaper, pick two," that's the one conclusion that the data absolutely doesn't support. It's possible to simultaneously improve all three dimensions -- the speed, the quality, and the performance, and the cost. We can only pick two. And if we do only pick two, it becomes a self-fulfilling prophecy, but it's possible to pick all three. And the Virginia, I think, is a great example of when we've done that.

Mr. FitzGerald: Senator, I think that the MRAP example shows that our system is geared for crisis. The thing that

really concerns me is that we're getting to a point where the size of the crisis required to drive change is greater than the crisis we're trying to respond to in the world, at which point we've lost. We didn't just lose that conflict, we've lost all conflicts. So, it also shows that the only way to succeed in crisis is to go around the system. We saw that with the MRAP, we saw that even in the 1970s and '80s, with the second offset strategy. That was Bill Perry managing around the system. It's a call for the action that you guys are already taking. So, I get incredibly frustrated. The answer is always, "Change the system." And the one thing that we don't seem to be able to do is change the system. We can't afford to -- in the current environment, we can't assume that we're going to be able to jam through one or two capabilities --

Senator Ayotte: Right.

Mr. FitzGerald: -- to get us out of a jam in the future, given the range of threats that we face.

Senator Ayotte: I want to -- before my time goes up, Dr. Gansler, I want to ask you about something that you -- which I think is related to this, as well -- in your written statement, you emphasize the importance of utilizing best value. And one provision that I've -- got included in the defense authorization this year is to really focus on -- in particular, on the personal protective equipment that are

critical to life or death for our troops, of making sure that it's not -- that it's best value. I mean, obviously, best value, in terms of best equipment and best cost, looking -- doing it both. So, I wanted to get your thoughts on that since you included that in your --

Dr. Gansler: Yeah, I've been very shocked by the fact that we've been drifting towards low pricing settings to be acceptable as a source selection criteria. I mean, you and I don't buy that way. You know, that's cheap.

Senator Ayotte: Well, especially when it means bullets are coming at us and we --

Dr. Gansler: Exactly.

Senator Ayotte: -- want to make sure that we're protected.

Dr. Gansler: Yeah. I mean, it's -- it just doesn't make any sense.

Senator Ayotte: It's like when you're going cold-weather hiking. You know, do you get the cheapest thing you can find, or you get the thing that keeps you warm and so that you don't get frostbitten?

Dr. Gansler: Exactly. I mean, well, I -- we don't use best choice -- combination of performance and cost. That's the way I think the DOD should be buying today.

Senator Ayotte: So, my time is running up. So, I've got 10 seconds here, Mr. Augustine. You talked about In-Q-

Tel. I've been very impressed with their success. What can we learn from that experience, from In-Q-Tel and that?

Mr. Augustine: I think that it -- put very shortly is, it -- it's going to take a long time to fix the system. And, in the meantime, for those things that are really important, take them out of the system, treat them separately.

Senator Ayotte: Yeah. The irony, of course, the fact that we have to, like, essentially, go around the system to get something so important to our men and women on the ground, and to our warfighters, is that it's supposed to be set up to be warfighting and defend the Nation.

Mr. FitzGerald: And then, once that contingency is over, we shut down the system that we created to go around --

Senator Ayotte: It's unbelievable, because there's always going to be another contingency, and that's what we need to be dynamic enough to address.

Colonel Ward: My proposal is, sort of, shift the default. We have the rapid method that we only use in emergencies, and we have the big, expensive, complicated one. How about the rapid be the default approach, and you only do the big, expensive, complicated one when you have to?

Senator Ayotte: Sounds great.

Thank you.

Dr. Gansler: You might also think about the distinction that Clay Christensen points out between disruptive technology and traditional incremental technology. And we're having trouble funding the disruptive technologies, the new innovation stuff. And that's the direction that we should be moving, because the world is changing rapidly. Technology is changing, geopolitics are changing rapidly. But, tradition constrains us to thinking that what we've been doing for the past, you know, 30 years is the right thing to continue doing.

Chairman McCain: Senator King.

Senator King: Thank you, Mr. Chairman.

Mr. Ward -- Colonel Ward, I'm fascinated by the concept of constraints. Reminds me of when Edward Bennett Williams fired the general manager of what I refer to as "the team which plays its home games in Washington." He said, "I gave him an unlimited budget, and he overspent it. I gave him infinite patience, and he exhausted it." And it's common sense what you say, and yet, it's so rarely thought about that -- of course we can't put a cap on this, because we don't know what it's going to cost, and "Take all the time you need," and, by definition, the work expands to fill the time available. I would love to see further thoughts from you. You said you have a book coming out. As -- I hope it

touches on this point.

Colonel Ward: I -- my first book came out in May of 2014, and it goes into this in a good amount of detail.

A great example, though, is NASA's "faster, better, cheaper" missions during the 1990s. For the total cost -- they launched 16 missions under this "faster, better, cheaper" initiative, and the idea was low cost, high-speed access to space. The amount of money that they spent on all 16 missions was less than what we've spent on Cassini. Now, Cassini is a huge success. I love Cassini. We're getting great science and great arc out of Cassini. But, for that amount of money, we got 16 other missions. Only 10 of them succeeded, so we only got a 10-for-1 return on that investment. But, it was things like the Pathfinder mission to Mars, which was one-fifteenth the cost of the Viking mission to Mars from 20 years earlier. Viking was a huge success, but it was so expensive, so complicated, NASA said, "Let's never do that again." It was 20 years before they tried to go back. Later on, for about half the time, a third of the team, one-fifteenth the cost, it was designed to last a week, they hoped it would last a month, it drove around for 83 days on the surface of the planet. And they said, "That was great. That was awesome. Let's do it again." They went back three more times: Spirit, Curiosity, Opportunity.

Senator King: Well, I think that's a very important concept, and ought to be part of our thinking.

By the way, Mr. Chairman, I commend to you a book that Mr. Augustine sent me a couple of years ago called "The Free Enterprise Patriot." It's a humorous account of a blacksmith trying to make cannons for the continental army under today's procurement process. The cannons never got built until, you know, 1785 or so. It's a fabulous story.

Mr. Augustine, you've been -- you've mentioned several times the importance of good people. It seems to me we've built a system -- I was just talking to another Senator about this, this morning -- where good people don't want to put up with what they have to put up with in order to go to work for the government -- financial disclosure, FBI checks, then you do everything else and your nomination can sit here for a year or more -- not in this committee, but in the Senate. Talk to me about the problems -- the mount -- I've considered it a mounting problem of a disincentive of anybody that is -- has, you know, consciousness of -- why would they want to put themselves through this?

Mr. Augustine: Well, the Colonel mentioned going to Silicon Valley and that there were all kinds of people who were very excited about taking on some of these big challenges. The problem is, when they walk in the door to work on the big challenges, they're handed Jacques' 180,000-

page set of rules, and they don't want to deal with that. And --

Senator King: But, I'm talking about the top-level people to come in and manage. I mean, that's where a lot of the important decisions have to be made.

Mr. Augustine: I think that the mission is so important that that's very attractive, but it is so hard to go from industry to government. I'll just tell a story, if I might, briefly. I was asked --

Senator King: Briefly, because the Chairman watches this little clock that --

Mr. Augustine: I'm looking at it, here, too. But, I was asked to take a position in the government. And -- a few years ago -- and they -- I get a call from the White House, and they said they see I own stock in Lockheed Martin. And I said, "Yes, I own one share." And they said, "How much do you make on that?" And I said, "73 cents every 3 months." And they said, "Boy, that's a big problem. We probably can't deal with that. Will you sell it?" And I said, "No." And they said, "Why won't you sell it?" And I said, "It's share number one of Lockheed Martin. I -- it's my signature approving the sale of it. I bought it." And I said, "I won't sell it." And they said, "Well, that's a big problem." And the conversation went downhill from there.

[Laughter.]

Mr. Augustine: I didn't take the job.

Senator King: Well, that -- I think that's the point.

This is a question for the record. Many of you have mentioned the problem of regulations and how it impedes our ability to go -- I would like some specific examples of regulations and how they impede our ability to contract effectively and efficiently. You know, Rule 14(a), 302(b), which says you have to file all your applications in triplicate, or whatever it is. I think it would be helpful to understand exactly what we're talking about.

[The information referred to follows:]

Senator King: And then, finally, Mr. FitzGerald -- and again, perhaps for the record -- modularity, it seems to me, is an important concept. When we're building 40-year platforms, that we not try to cram all the technology into the new Ohio-class, but that we build it in such a way that it can be upgraded. I'd like your thoughts on that.

[The information referred to follows:]

Mr. FitzGerald: Sir, I completely agree. There are multiple ways that we can address this. Modularity in the design of systems, but also pairing the payloads with the platforms, as former CNO Greenert talked about. So, the B-52 was flown for a long time. It's not an especially smart platform, but if you put a smart munition in it, it becomes a very effective way of thinking about things. So, I think modularity there is important. I think there are also significant opportunities that are soon to be available to us technologically, in terms of advanced manufacturing, where we can use 3D printing and robotic assembly to assemble different components in very compelling ways. I'm happy to share with you a paper that I wrote on this a couple of years ago that explains how that might work.

So, if we take that approach, that allows us to get positive constraints, it allows us to compete out different parts and mitigate risks in very compelling ways. The challenge becomes, How do we take that approach and put it into our current acquisition system? Again, this is where things fall down.

Senator King: Thank you.

Thank you, Mr. Chairman.

Chairman McCain: You know, I agree, Mr. FitzGerald, but I also can cite you an example, the Littoral Combat Ship. Modularity has not succeeded. In fact, it's been

disastrous, as far as the mine countermeasures modularity. So, I guess the moral of the story is, these are -- there's not real simple answers. But, maybe you could begin by sending Senator King the 1,800 pages of regulations that need to be changed. And I'm sure he will enjoy reading them. It's very cold up in Maine this time of year.

Senator Shaheen.

Senator Shaheen: Thank you, Mr. Chairman.

And thank you all very much for being here.

And, as Senator King and Mr. Augustine, you note, talk about that book on the revolution of the continental army, it had to abide by the rules of the British Army. We never would have won the war. So, it's an important lesson in the importance of innovation.

Mr. Augustine: We would be speaking with a British accent here.

[Laughter.]

Senator Shaheen: Yes. Yes, we would.

Mr. FitzGerald: I don't know what you're talking about. I'm Australian.

[Laughter.]

Senator Shaheen: You know, I don't really have a question, but I want to agree with the point that everybody has made about how we attract good people into work for the government. And it seems to me that some of the actions

that Congress has taken have contributed significantly to that, whether it's sequestration or our ability to reach budget agreement so there's some certainty. You know, the Portsmouth Naval Shipyard is between New Hampshire and Maine. Senator King and I fight about that on a regular basis. But, it's one of our premier public shipyards. And they have very -- a very good skilled workforce who is -- that is now aging. And the challenge of trying to replace that workforce in an environment where people are uncertain about the budget prospects and what sequestration is going to mean has been very challenging. And so, I think it's a good admonition to all of us that we need to try and address those concerns to keep good people here.

I want to, Dr. Gansler, ask you about the SBIR program, because that's a program that was started by Warren Rudman, from New Hampshire, so we feel a lot of personal commitment to that program. And I serve on the Small Business Committee as the Ranking Member, and I know how long it took us to get it reauthorized in the last go-round. It's up for renewal again in 2017. I think we need to start right now in order to get that done.

But, can you comment on how important you think it would be to make that program permanent so that we don't have to do this and, again, provide the uncertainty every go-round on the SBIR program?

Dr. Gansler: Yes. I feel strongly that we should make it a permanent thing. What you'll notice is, a lot of country around the world are starting to copy us now with the SBIR program. I put into my presentation, my talk, for -- specifically, that one figure, that last figure in there -- that shows that, where we used to get most of our good ideas from industry, that industry is reluctant to make changes if they think it'll be disruptive to their business. Where the same thing is true about universities. Many cases now, the people in universities who have the good ideas are starting to set up their own small business. And I think increasingly that's going to become an opportunity for them. And I think, in many cases, we're getting many of our ideas -- and that's what that chart shows -- from now -- if you just list the --

Senator Shaheen: Let -- I don't want to interrupt you, but the clock is running, and so I just want to get --

Dr. Gansler: Yeah.

Senator Shaheen: Is there anybody who disagrees that that program should be made permanent?

[No response.]

Senator Shaheen: Okay, thank you.

Mr. Augustine: I would just comment very briefly. I do think it should be made permanent, but there -- as you know, there have been abuses. We need --

Senator Shaheen: Right.

Mr. Augustine: -- we need to fix those. And I come from a world where our goal was not to become a small business, but it's a truth that I think could be shown that most of the new, creative disruptive ideas do come from small businesses.

Senator Shaheen: I agree.

And, Mr. FitzGerald, I know you wanted to respond to that, but let me ask you, as part of that -- you talked about the problems with the export control system, which I totally agree with. I think we've got to do more to address that. And there have been efforts to reform it over the last couple of years. Do you think those have been helpful, or should we -- do we need to scrap those and start all over?

Mr. FitzGerald: So, just briefly, on the small business thing, I think that the SBIR program is excellent. The challenge is not that program. We have many ways of getting new ideas funded in the Department of Defense, from In-Q-Tel, from other places. The challenge is what happens after that initial funding. How do we integrate that into the --

Senator Shaheen: Right.

Mr. FitzGerald: -- mainstream Department of Defense? Otherwise, we are funding stuff that we never get a benefit

on or it becomes commercial and, therefore, our adversaries and other people can buy it, and we can't. Very frustrating.

From an export-control perspective, I think that the current -- the recent work has been excellent. We've removed a number of things from the lists. I think, ultimately, the challenge is the lists, themselves. I think of it kind of like the DHS alert system. No political leader is going to say, "We're moving from status red to status orange." You need to blow up the system and say, "It's going to be alpha-numeric now, and we're going to come up with a letter, instead, that will be a lower level of threat." Otherwise, we're going to have, sort of, the high priests of ITAR continue to come out and tell us how the world's going to explode if we take something off the list. It's not going to -- we can't reform that way.

Senator Shaheen: I totally agree.

And I'm out of time, but can I ask just one more question, Mr. Chairman, of Colonel Ward?

I was in Kuwait when they were bringing back a lot of the equipment from Iraq. And one of the things they showed me with great pride was the MRAP with the little contraption on its nose that could -- had a heat source that detected IEDs, and how successful that had been. And they said that that had been designed by men and women in the field who had

this idea about how to help. How do we get those kinds of ideas into our innovation research into the acquisition process so we can actually respond to what works in the field?

Colonel Ward: Sure. So, field mods are an important source of innovative ideas. Oftentimes, after they're successfully used and demonstrated, "Hey, this works great," the official response is, "Take that off. It's not authorized." So, there are some mechanisms and channels to provide those ideas and provide those inputs. I think those tend to be, again, sort of held at arm's length, much like the -- but, again, the Army OIF report said that field mods are the primary channel of feedback to developers. As an engineer, I often didn't hear those, and -- because they got filter out -- filtered through -- over-filtered.

So, the idea is that we need to encourage and -- again, seek, support, and celebrate. Tell those stories, say, "Hey, this was a great example. We should do more of this." Because, for every situation and every story we hear, there's ten more that we didn't hear about -- again, that got over-filtered. So, we need to create some channels to let those ideas filter through.

Senator Shaheen: Thank you all very much.

Chairman McCain: Senator Cotton.

Senator Cotton: Thank you all very much for your

thought-provoking testimony on this important topic.

Mr. Augustine, you had mentioned in your written testimony that you were present at the creation, so to speak, of In-Q-Tel, back in the 1990s. I'm familiar with the organization from my work on the Intelligence Committee. Could you give us your take on the lessons learned from the creation of In-Q-Tel and the way it's worked, and how it would apply to the Department of Defense, given their differences in mission and scale and so forth?

Mr. Augustine: Yes. I don't believe that In-Q-Tel can solve the broad problems of the Department of Defense, but I think a Department of Defense version of In-Q-Tel to deal with very high priority specific challenges could be very valuable. And the secret to In-Q-Tel is fairly straightforward, and that is that it has the capability to deal with firms just as they would deal with each other, as opposed to the way they have to deal with the government. And In-Q-Tel had a lot of latitude, it had a lot of flexibility. Is there room for abuse? Yes. But, thus far, there has not been a problem.

Senator Cotton: All right.

Mr. FitzGerald, the interaction between the Department of Defense and the private sector, especially given that technological development is now largely located outside of our defense industry, is something about which you wrote.

You said there needed to be policy, legal, cultural changes, in your written testimony. Do you care to comment on the In-Q-Tel approach? You just -- you had some comments earlier, but also what Mr. Augustine just said?

Mr. FitzGerald: I think that the In-Q-Tel model is an excellent one. A number of the advantages that it takes -- that it is based on are particular to the intelligence community. Partially, that's about size, and it's also about their ability to link the people who own the problem with the people who fund the solution very quickly. And it's difficult for us to do that in the Department of Defense. So, I think that it helps us address a number of challenges.

The challenge with -- for the Department of Defense is, How do you do that at scale? So, that's how we can build prototypes, that's how we can get new entrants into the marketplace. But, it -- I don't -- we don't have a good model yet to take us from that new idea into a large program of record, which isn't the failing of In-Q-Tel or those models, it's a failure of our program-of-record system.

Senator Cotton: Okay.

When you say that the Department of Defense needs -- is going to need legal and policy and cultural changes, which one of those do you think are most important?

Mr. FitzGerald: Ultimately, it's the cultural change,

but that's probably going to be driven, in the first instance, by the law and policy. And I think the other factor, something that we've talked about significantly today, is about leadership and human capital. So, ultimately, I think -- and I think this has been shown in our testimony and the understanding of the committee today -- we know what most of the challenges are, and we have a pretty good sense, idea of what needs to be done. It's a -- just a question of, How do we move the large institutions to implement on what we know needs to be done?

Senator Cotton: And, Colonel Ward, the human capital and leadership development is something about which you spoke in your written testimony; specifically, the ability of constraint-driven teams to innovate rapidly at lower cost. What's your perspective on this about the cultural or mindset shift that may need to occur?

Colonel Ward: Absolutely. So, the culture shift, I agree, is absolutely the right piece of the puzzle that's going to be the -- have the biggest impact on improving acquisition outcomes. And when I say "acquisition outcomes," I mean programmatically as well as operationally. So, the ability to get the mission done on time, on budget.

The culture shift, I think -- right now, we have a culture that tends to look at complexity as a sign of sophistication, budgets as a sign of prestige, and long

timelines as a sign of strategic intelligence and strategic genius, when, in fact, I think we get better results when we have a culture that values speed, thrift, and simplicity.

I think the other piece of it, too, though, is -- and we talked a lot of about regulations. I've found that ignorance of the FAR is a greater barrier to innovation than the regulations themselves. The prevailing perception in the culture is, "The FAR won't let you do that, the FAR won't let you be fast, the FAR won't let you simplify." In fact, when we go through and read the FAR -- and you -- there's plenty of clauses, plenty of pieces of the FAR that do, not only allow, but encourage speed, thrift, and simplicity. So, a greater awareness of what the FAR actually says, what it allows, what it encourages, I think can go a long way towards that.

Senator Cotton: What --

Colonel Ward: And it's just a matter of --

Senator Cotton: What's behind that lack of awareness among people who, by and large, make a living using the FAR?

Colonel Ward: Right. It's so big and so expensive -- or the FAR, itself, is to complex that it's intimidating. I've found that people who can quote the FAR, chapter and verse, tend to be more convincing than people who can't. And the people who can quote the FAR, chapter and verse, are very, very few in number. It's easier to just say, "The

FAR," which none of us have read, "doesn't let you do that." And so, it's the safer -- it's the more risk-averse-type approach to just say, "Well, I'm sure we can't do that, because we didn't do it last time."

Senator Cotton: The military, by and large, has an up-or-out personnel management system. Do you think that's an appropriate system for our -- the people who are involved in our acquisitions process?

Colonel Ward: That is a -- challenging and problematic. I'm not sure I have a better solution for it. But, in my case, for example, I decided to retire from the military because I was not interested in getting promoted again, I wasn't interested in moving again, my kids were heading into high school, and we wanted them to start and finish in one place. And the Air Force's perspective was, "Either move or get out." There was no third option to sort of stay and keep doing this kind of work.

Senator Cotton: Okay.

Thank you. My time is expired.

Senator Reed [presiding]: Thank you.

On behalf of the Chairman, Senator McCaskill.

Senator McCaskill: There's a lot of argument, I think, that can be made that "up and out" has really, in many ways, cannibalized our acquisitions processes, because it -- longevity and having as much knowledge as the people who are

trying to do business with the Federal Government -- knowledge is power. And when there's a new person, then you've got opportunities. And I think that there -- that there's something to be said for that.

You know, when you talk about incentives -- I've spent an awful lot of time -- and some of you know -- on contracting and the problems there. It seems to me that the incentive in the private sector is so elegant and simple, speaking of simple -- it's that speed and thrift pays more money. You make more money if you are efficient. And in the private sector, the bottom line matters. You can't have a new deputy deputy dog if you're not making money. In the Pentagon, you could have the Under Secretary to the Under Secretary to the Assistant Secretary to the Under Secretary, and there is no bottom-line pressure.

So, why is it that we can't change the incentives in a more simplified way? The incentives are there to get the bid, to be cost-effective in the bid. But, then the incentives kind of get murky. And that's when the regs come in, right? That's when the regs march with a resoluteness towards, "You must do this, you must do that." Because the system is trying to desperately -- by fingernails sometimes -- hold on to the concept that, "We're going to constrain your costs, we are going to constrain your costs. We will add a nother requirement to constrain your costs."

Why can't we incentivize more profit if you constrain the cost? I mean, I can think of so many systems -- I mean, whether it's DCGS or whether it's the helicopter, or whatever. If you actually, during the lifetime of the development, said, "If you can do this, we will pay you more," as opposed to, "We're going to layer another regulation on you to make sure you don't up the cost when there's not a good reason for it," which, by the way, ups the cost without a good reason for it.

So, tell me, historically, have there been attempts that have not been successful to incentivize profit for constraining cost?

Colonel Ward: I think part of the challenge is, on a 10- or 20-year project, the incentives that we try to establish for the people who are in the early part of the program, we won't know how the program is going to end for another 10 or 20 years, so we don't see the end of other story, so it's hard to incentivize those outcomes for people who won't be around in 10 or 20 years. But, I --

Senator McCaskill: But, the company is going to be around, whether it makes money or not. I mean, we're down to -- you know, I can count on my fingers and toes how many companies there are that are getting these bids. They certainly are way more sophisticated than the man or woman of the hour at acquisition, right?

Colonel Ward: Yes, absolutely. Absolutely. But, I think on the military side, on the practitioner side, you know, we want to incentivize good decisionmaking for the engineers, the program managers, and the contracting officers. On a 3-year assignment, which just ends up being a year and a half on this project and a year and a half on some other project, but each of them are 10-year projects, so the longer timelines really create barriers to smart incentives.

Senator McCaskill: Yeah. Well, they certainly do on the military side. I guess I'm --

Colonel Ward: Right.

Senator McCaskill: -- trying to think more from on the side of the people who are actually getting paid by the government to develop these systems.

Mr. FitzGerald: So, in my experience, Senator, the challenge was a misapplication of well-intended regulations. So, when I was running a small business, I was running a strategy firm. We weren't building products, it was fairly low-risk stuff. Despite that, many of the contracts that I suffered under were "cost plus fixed fee." I was -- I had to do "cost plus fixed fee" contracts because the worker I had done had never been done before, and they were concerned that there would be too much risk. So, I was, like, "Let me understand this. You're going to tell me up front what my

profit is going to be, and you're going to drive that down over time, but the amount that I spend can increase almost as much as I would like it to."

Senator McCaskill: That's how we got monogrammed hand towels in Iraq.

Mr. FitzGerald: Well, the -- well, this was a thing. When I was speaking to my board, who were not familiar with the defense -- with the U.S. defense world, I'm saying, "So, why don't you just go out and buy, like, really nice furniture and all of these other things for the office?" And I was, like, "Because that would make us an unhealthy and sick business if we try to do anything other than live off this contract." So, ultimately we didn't, but only for -- out of self-interest. If all we had done -- for the -- in terms of the culture and health of our organization. If we had followed the incentives as they were laid out, we would --

Senator McCaskill: Right.

Mr. FitzGerald: -- have become big and bloated, because I was only going to get 7 percent profit, so I might as well have nice perks in the office so that I could hire people --

Senator McCaskill: Exactly.

Mr. FitzGerald: It was crazy.

Senator McCaskill: I mean, the cost-plus is, like,

ridiculous.

Mr. FitzGerald: So --

Senator McCaskill: I mean, if we are going to be a risk-free organization, I think defense is the wrong area to be in.

Mr. FitzGerald: I completely agree.

Senator McCaskill: Right? I mean, it's kind of inherently risky, isn't it? It seems to me embracing risk ought to be part of the equation.

Well, my time is out. I've got a awful lot of other questions. I would like -- and will have some for the record for you, because you all represent an awful lot of expertise. IT drives me crazy, the inability of the various branches to talk to one another, the absolute aversion to off-the-shelf that is beyond the pale of ridiculous. Speaking of complexity, that -- and these are people buying stuff that don't know what they're buying, so it is needlessly complex and needlessly expensive, and there is an aversion to off-the-shelf IT products that I think needs to come to a screeching halt at the Pentagon.

So, thank you, Mr. Chairman.

Senator Reed: Thank you, Senator McCaskill.

And, gentlemen, thank you for your extraordinary testimony and also for your great service to the Nation in so many different ways.

And on behalf of Chairman McCain, I will declare the hearing adjourned.

[Whereupon, at 11:36 a.m., the hearing was adjourned.]