THE BROOKINGS INSTITUTION

RESERVE OFFICERS ASSOCIATION

THE FUTURE OF THE NATIONAL SECURITY INDUSTRIAL BASE

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Introduction:

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Panel 1: Defense Budgets and Strategy:

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Keynote Address:

MICHAEL O'HANLON, Moderator
Senior Fellow and Director of Research, Foreign Policy
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THE HONORABLE MAC THORNBERRY (R-TX)
Vice Chairman, Armed Services Committee
U.S. House of Representatives

Panel 2: Innovation and the Industrial Base:

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DAVID MORRISON
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P R O C E E D I N G S

LTC FEIDLER: Good morning and welcome to today's program on The Future of the National Security Industrial Base. My name is Bob Feidler. I'm with the Reserve Officers Association and I head up our Defense Education Forum. And we're very privileged today to be doing this program with The Brookings Institution, which has done so much work on this, particularly led by Michael O'Hanlon and Peter Singer.

I will just say briefly, again, we're in the home of the Reserve Officers Association, our Minuteman Building. We've been around for almost 100 years. We represent the reserve officers of the United States' uniformed services and it's a real pleasure to have all of you with us today.

Please be sure to turn off all your phones. If anybody needs any further assistance, our staff is on the fourth floor, they'd be more than happy to help you at any time during the program.

And with that, I'm going to turn it over to Michael O'Hanlon, senior fellow of The Brookings Institution. Michael?

MR. O'HANLON: Thank you, Bob, and we're certainly grateful to have all of you here, grateful to the Reserve Officers Association and to all our participants in a Brookings working group that's been discussing issues of the defense industrial base as well as the broader subject of changing American defense strategy and budget for the

last year -- really for the last two years. And you'll see a certain representation of that working today on our two panels. As you know, we're also honored to have Congressman Mac Thornberry coming in between the two panels to give the keynote address.

I'm going to give a brief introduction here to our panel, to the concept of the day, and then we'll get on with remarks because, as you know, this is an action-packed day with a fair amount of boom, boom, boom, because we only have about 50 minutes for each panel and we want to involve you in the discussion as well.

So what we'll do here is that after I briefly say a word of welcome and introduction for each of our panelists and a couple other words to frame the discussion, we'll then proceed and then have about 20 minutes or so for discussion before we have Congressman Thornberry. We won't have any actual breaks and so please feel invited at any time, thanks to the generosity of the ROA, to get up, replenish your coffee. If you need a bathroom break, feel free to do that because we're not going to give you any other breaks officially or as a group between now and noon, we have so much to do.

I would like to introduce a panel that I think can be described as young and vigorous. And this is true regardless of whether they are relatively, you know, early in their career or even those who have been

around awhile, with the freshness and vigor of their analysis that continues to this day. We have Mackenzie Eaglen of the American Enterprise Institute, who is seated, obviously, two to my right.

We have Robert Haffa, who's now running his own consulting firm, but a longstanding analyst at the Northrop Grumman Corporation and their analysis center. Also a professor at a number of universities, including the Air Force Academy and Georgetown, after a distinguished 24-year career in the Air Force.

To my immediate right, Peter Singer, who runs our 21st Defense Initiative at Brookings and is an expert on a number of new trends and technologies in warfare, including drones, a subject about which he has recently written. I should also give Mackenzie a shout out for her *Wall Street Journal* op-ed of yesterday, which was very provocative and I think helps frame our discussion.

One more broad word about our purpose today. We are trying to focus on the national security industrial base, the technology, science, research and development, infrastructure, and capability -- human and physical -- in this country that's so crucial to our technological excellence and supremacy, which is a core element of the American way of war and what gives our relatively small military an ability to play such an important role around the world. This has been, in general, in American

defense policy sort of an afterthought. The assumption being, well, we've always had great science. We've always had great industry. And we've always been able to assume that once we adjust our fore structure, once we adjust our budgets, industry will sort of take care of itself, settle down, do whatever mergers and acquisitions it might need to, and continue to be there almost for the asking, without the strength of the industrial base or the science base having to be an explicit concern of policymakers. I think that day has changed. And that is a premise behind our entire working group as well as our working group's whitepaper, which we invite you to find down below where you walked in, but we'll also have some extra copies brought up here and it's going to be on the Brookings.edu website today as well.

We don't have a lot of prescriptions as a group about which areas of technology, which areas of the industrial base require more support, require more attention, preferential, you know, help. And we certainly don't advocate subsidies in general, but just in terms of a matter of policy, which areas of the defense industry, defense science are the most important. We don't take positions on these questions as a group, but we do share the common belief that the national security industrial base needs to be as vivid and as intense a subject of discussion as anything like a two war strategy or a swing to Asia or a given nuclear

posture or all the other subjects that we're used to debating in this town when we talk about and think about defense strategy.

So that's the broad motivation. This first panel will focus a bit on the linkages between broad strategy and budget questions, on the one hand, with acquisition, modernization, industrial base strategies on the other.

The second panel will get a bit more focused on the specifics of the national security industrial base. But we invite both panels -- and all of you -- as you raise questions and concerns and comments, to feel free to blur the lines a little bit because the general subject here obviously is going to have to be, you know, in a back-and-forth fashion. The defense budget is in such flux that it would make little sense to just assume we know where it's headed and build our national security industrial base strategy or discussion around that set of assumptions. Everything's in flux and so we're going to have to proceed accordingly.

Let me just say one brief word now about my own thinking on this subject, then I'm going to turn things over to Robert and we'll just work down the panel with roughly 8- to 10-minute presentations by each panelist, again, saving about 15 or 20 minutes for your questions before the congressman arrives. And I would just like to really frame things in very simple terms as I think about them.

I've been working very hard in the last year on a book project, where what I've tried to do is to shake up my own assumptions and break out of my own comfort zone about what kind of U.S. strategy adjustments I think are possible in an era when we have to downsize. We have to save money, really as a matter of national security policy, not just as a matter of the politics of the moment, but because our deficits have become so enormous and are contributing to an erosion of our long-term economic strength, which is itself necessary for national security. I think we have to view defense and the defense budget partly in these terms and view deficit reduction as a core element of defense policy.

Now, we'll have different views on the panel about how far that logic should go, but that for me is a starting premise. And so I wound up coming up with a few different ideas and I'm just going to tick about three of them off and then hand things off.

I wound up arguing that, in fact, we do not need a two simultaneous land war capability anymore. That something like a one war capability plus two smaller missions -- probably multinational, but potentially long -- is now an adequate basis for sizing the ground forces. And the ground forces perhaps can go down to their Clinton era levels or even a little below. And indeed, it appears that's where we are headed now with what we're hearing out of the Pentagon by way of early

indications of where the President's budget and new strategy will head.

I've also suggested the Navy do something that it has resisted in most of its combatant fleet for decades, which is called Sea Swap, the idea of actually having a ship stay overseas a year or two and having the crews share the ship and replace each other after six-month deployments by being flown out to the theater rather than having the one crew always stay with the one ship. This allows for a more efficient use of the fleet and, therefore, allows for a somewhat smaller fleet rather than a larger fleet, perhaps consistent for our need to stay strong in the Western Pacific and the Persian Gulf.

And also, just one more point on national security industrial base policy, I argue for a fairly major revamping and, frankly, scaling back of some big programs, including the F-35, and the Littoral Combat Ship. I'm not going to bore you with the details of my thinking there now, but I'm actually a little surprised that the Pentagon, by early indications, seems to just want to delay many of these programs and actually keep more of them intact than I would have thought prudent or possible at this moment.

But the moral of this story and the point on which I'll finish is this: Even if you do all of these things or things like them, it's pretty hard to save more than $500 billion in the 10-year defense plan. Now, I'm not saying that has to be the right number. For some people that's already

too much and we may hear from one of them in a minute. For some people that's not enough and perhaps we could save more than that amount relative to previous plans. But what I'm saying is even doing this is hard and when you actually do the arithmetic, you're going to have to make tough choices in my judgment about cutting muscle, not just trimming fat.

And so that's the spirit in which we launch this discussion today. And without further ado, I will now turn things over to Robert. And, again, we'll go Robert, Mackenzie, Peter, and then your questions. Sir?

MR. HAFFA: Thank you, Michael. Ladies and gentlemen, a pleasure for me to be here. Thank you to the Brookings team for the invitation.

I expect many of you recall the quote that's often attributed to Winston Churchill, "Gentlemen, we are out of money. Now we have to think." The U.S. Department of Defense, as the Brookings "Arsenal of Democracy" paper makes clear, is not out of money, but the defense budget we are learning just a little bit more about seems like each day the FY '13 budget, 535 billion, was it? We're hearing more about personnel cuts today in the Pentagon. And, of course, we all know that there's this targeted amount of somewhere around $500 billion that will be reduced from the defense budget over the next decade. And then there's this

lurking sequestration of another perhaps $600 billion that could hit defense at January this time next year. So, thinking smarter about defense, as my colleagues at another think tank in town, the Center for Strategic and Budgetary Assessments, like to say, certainly seems in order.

So the paper that we present to you here today provides plenty to think about with this particular focus, as Michael said, on the role in the future of the defense industrial base. And it sets out questions for the presidential candidates and their party platforms that provide a good outline for the prioritization of defense needs as plans and budgets once again try to avoid that perennial mismatch.

In my brief remarks this morning I'd like to focus on that first question that's outlined in the paper. That is, how the sectors and the technologies should be prioritized to meet U.S. security needs in the future. This, you know, is just the sort of guidance that industry wants and longs for and often doesn't get in the so-called strategy documents, the QDR, the National Security Strategy, that are issued. There's always lots of worthy objectives, but rarely is there the kind of guidance that the industry can take to direct their own investments, to do their own strategic planning, to plan on their workforce and their facilities and, perhaps most importantly, provides them the stability that they want to see and their

investors want to see as well.

So, let me start with just a brief background, move to the strategic guidance as we understand its evolving that Michael alluded to. To give you my own views of what I think, the paper kind of stopped there. Let me suggest to you some priorities, some sectors, some systems that I think need to be supported in the future as we face these budget cuts, while noting the concerns of the industrial base as I go along.

First, I hope you noticed the recommended reading list at the end of the paper or that you will turn to that. A few of us up here are part-time academics, so we always like to add to the syllabus of reading material. One of those is a paper my CSBA colleagues Barry Watts and Todd Harrison wrote. They authored it on the U.S. industrial base. Their work characterizes the defense industrial base as a highly regulated industry, but with some irony they note the reluctance of the U.S. Government in the past to pursue a coherent, long-term strategy for maintaining a healthy defense industrial base.

As Jack Gansler has noted, the United States might be the only industrialized country in the world that does not treat its defense industrial base as a valuable national asset. Watts and Harrison in that paper called for a change to this policy, arguing that an industrial base strategy at the very least should ensure the preservation and the

advancement of those few sectors that are critical to the future security of the United States.

So that begs the question which of these sectors are critical and worthy of specific government intervention, investment, motivation to the industry to assure that those capabilities are available when they're needed? If you want to search for answers to those questions, what sectors are most important, we certainly can be helped by what guidance has been issued by the U.S. Government. And two documents that have hit the street lately I think are helpful in this regard. The first of those was the document from DOD called "Priorities for 21st Century Defense," and the second one, which you may not have seen, was a Joint Chiefs of Staff document called "The Joint Operational Access Concept."

Both of those documents make a very strong case for U.S. forces in the future to be able to operate in what we've known to become as A2AD -- Anti-Access/Area Denial -- environments under the contention that the way U.S. forces have operated over the last decade have been in relatively permissive environments. But as we look to future contingencies and adversaries that condition will probably not hold. So we need to think about a force that has to penetrate, loiter, accomplish its missions in arenas that are far more contested in environments that are far less friendly.

If you want to read between the lines a little bit in those somewhat politically correct documents or also look at some of the other work that's been done here in town on what the principal security threats that the Unites States does face in the future, it usually comes down to about three.

The first remains terrorism and I think we are seeing a switch from a counterinsurgency to a counterterrorism strategy. That's the nexus of radical Islam and transnational terrorism with the potential for state failure across the Islamic world.

Secondly is China. That's the rise of a major strategic competitor in the Western Pacific that threatens U.S. and allied interests there.

And third, what we used to call rogue states. I don't know what the current term of art is, but that implies the armed aggression of a rogue state -- that's North Korea and Iran -- that may have nuclear weapons to back up their own power projection in very strategic regions, again, for the United States and along with the possibility of nuclear proliferation from those states.

Well, if you look at those contingencies in the future, then the force planners' perspective becomes one to develop the force structure and the capabilities that will be sufficient, and force planners always err on

the side of conservatism. We always want more perhaps than the budgeteers allow us, but you want to have the capabilities to prevail, to meet the mission in each one of those contingencies as you design them.

Budgeteers, on the other hand, might see the same problem, but they'll look for savings across those three. They'll look for commonalities. What are the kinds of systems that we can use to swing among those contingencies, so we can invest and know that whatever that future might be, we'll have those kind of capabilities at hand?

So let's look, as I've done -- we won't do that in detail -- at the hypothetical contingencies that we face: containing China, deterring and defending against rogue nuclear-armed states, and countering terrorism. What are the common capabilities, systems, platforms that we need to have, regardless of how that future might unfold, but with an eye very distinctly focused on what those adversaries might attempt to do over the next decade? As you do that kind of analysis, several capabilities come to the fore. The first of those is long-range, non-nuclear precision-strike systems and platforms that can penetrate Anti-Access/Area Denial environments.

Dominate the enemy defenses across the domains. That JCS paper talks about cross-domain synergy. In space, in air, on land, and at sea you want to be able to defeat the enemy defenses. C4ISR and

robust battle networks, you've got to be connected. You've got to have the intelligence and reconnaissance in order to have a picture situational awareness of that battlefield, whatever it is.

Unmanned vehicles still seem to work in almost every occasion. We've seen them in low-intensity conflicts. They will remain important, as Peter Singer has written about, in high-intensity conflicts as well.

Missile defense becomes important. Electronic attack, an edge that the United States military has held for a long time and must continue to do so. We all know about cyber deterrents and defense. Hard to talk about, but the United States is under attack every day in cyberspace. And then ultimately or finally, capacity building. We used to call it burden sharing, getting our allies, whether it's at the high end or the low end of conflict, to aid us in these missions.

Have we ever tried such an approach before, outlining the kinds of things that we needed and said this is where our investment priority should lie? Yes. And, in fact, in the Watts/Harrison paper they recollect a time back in early 2001 in which a very similar kind of proposal was offered in the Department of Defense, but, as you can imagine, fell victim to bureaucratic politics. It also fell victim to a policy of plenty. As 2001 events unfolded and the United States launched on overseas wars,

the defense budget, as we all know, expanded; doubled since then. So hard choices did not need to be made. That's not the case today as threats, as we wind down our budgets, seem to be waxing rather than waning.

As we think about taking down the defense budget and prioritizing among it, we want to keep in mind -- the next panel perhaps will focus more precisely on that, on the health of the defense industry. And after all, that's why we gathered to produce this paper. So even if you can prioritize and lend guidance and give stability to the industry to provide these capabilities, it's still incumbent on the government, as part of its industrial base strategy, to consider some mitigating measures to ameliorate the impact of defense cuts on the ability of these individual companies to provide the capabilities when they are needed.

There's a list of these measures in a very good paper that was produced and in a letter that was sent to Secretary Panetta, led by the Aerospace Industries Association. I would add that one to your reading list as well, but it includes a long list of continuing industry requests of the government, such as risk sharing, reducing compliance burdens, approving multiyear acquisition for key programs, and implementing export control reform, which goes into that capacity-building category. I recommend that paper to you as well.

In closing, thanks to the Brookings team for inviting me to participate, both in the larger study effort and in the presentation of the paper today. One last reading recommendation, Michael already alluded to his book on *The Wounded Giant,* which he subtitles *America's Armed Forces in an Age of Austerity*. I told him industry really didn't like that word "austerity," but he used it anyway.

But there's a thing about austerity that we need to keep in mind. Austerity is not scarcity. The defense budget is not scarce. It has ample resources, but we are being asked -- the government is -- and industry is listening to prioritize those resources. Austerity implies a choice. So I think when it comes down to, well, what questions should presidential candidates be addressing in terms of the nation's security, and particularly the nation's industrial base, is how much should the Defense Department be paying to bring down the deficit? That's a choice in terms of austerity. And when it comes time to make those choices, I hope they will consider the future challenges that face the United States and the prioritization of those key capabilities that will allow the United States to meet those security challenges in the future.

MR. O'HANLON: Robert, thank you very much. Before we go to Mackenzie, one quick clarifying question. And I just -- and, again, a nuanced point, but I think just for the sake of putting the conversation right

to a clear focal point.

Implicitly, it sounded to me that you were saying that there were a number of areas of technology that are perhaps not unimportant, but can be viewed as somewhat less important than the ones you mentioned and then maybe perhaps we've even sometimes assumed in the past. And if I was going to do a quick list it would include things such as nuclear forces, short-range tactical combat aircraft, certain Army ground systems for traditional ground combat. Is that a fair way to begin to delineate not what you would say were low priorities, by any means, but priorities that may be just a notch down from the top tier?

MR. HAFFA: I think they could be put a notch down. If you look at what the future requires, it appears from those strategic documents the requirements aren't as great for those systems that you talked about.

MR. O'HANLON: And over to you Mackenzie to respond any way you wish.

MS. EAGLEN: Okay. Thank you. Well, good morning everyone. There's plenty of seats up here for those who want a chair, just so you know. Feel free to sit in the reserved and we'll find space elsewhere.

It was the perfect panel that Mike put together, like usual. And thanks for having us because Bob is focusing on question number 1

in our paper and I'm going to jump right to the last one, which is number 10, where the working group posed a question to policymakers, which includes those running for President on the Republican side, the candidates seeking to win the primary nomination, but also those who currently serve in policy positions in government because DOD is not immune in the need to answer these questions either, and those who lead the country now.

But basically, the key question Michael asked in my mind is what's needed to ensure U.S. military technological supremacy in the years and decades ahead? And it's the key question, and actually Bob laid the terrific foundation for a lot of these answers in terms of particularly his capabilities set and identifying and prioritizing that. I agree with Bob, industry has -- continues to have little to no guidance from the department.

This is not exclusive to this administration. Most of the comments I say actually go back across party lines here in the last 15 years, even the last actually 20, 25 years as well. And to have these -- to put it out there in stark terms, in black and white, this is more important than that, are the kind of true sort of "hard choices" DOD likes to talk about, but which we often don't really see when it comes to what I consider prioritization. It's hard. It's hard for Congress to agree on prioritization because it means winners and losers, and in this town we

don't like to do that. It's just like your kids' softball team. I mean, Washington is very similar in terms of, you know, everybody's a winner and that's actually not the case. In terms of how quickly and steeply budgets are coming down, the sky is not falling, but it's certainly a sea change ahead.

And it's not -- this is not a build-down like others. And, in fact, Michael's written on this in the past. I've borrowed some of his research from foreign policy examining historical defense build-downs, not just in the U.S., but in other nations as well. We're pretty good at the build-downs. We're pretty predictable in doing them. We've -- for a loose term here, we've disarmed after every conflict in the last century and we're set to do that again. Disarm is, again, a loose term. I don't think we'll fully do that this time around.

But the unique part about the current build-down in our defense budgets is that, you know, we do still have 70,000 U.S. forces in Afghanistan. It's not clear that we won't have to continue to work with Iraq in a military capacity even though we're not there at the moment. The country's not doing so hot without U.S. forces there. We all know Iran is continuing to pose problems. And all of the other, you know, things around the world that the U.S. military's doing aren't going away. The dramatic increase in counterterror missions in Somalia and Yemen and

Latin America, for example, all of these things are going to continue, the building partner capacity to prevent conflict in the future and help our allies and friends sustain the capability so we don't have to intervene.

There's a backlog of demand in DOD and yet the budgets are coming down as if there isn't. And so this is a unique period in history in the build-down.

We have a sense of what DOD's coming and their answer to question number 10, you know, the securing supremacy for the future, and they've picked up a lot of the right terms and buzzwords from people like us up here who care about these issues and follow these issues. So, for example, you see it on everything from their decision to lay off 100,000 active duty ground forces under the banner of reversibility, right. If we get this wrong, don't worry, everybody, we'll figure it out and we'll rebuild. And it's called just yank it back from the reserve component and put them back in the active and it's not a problem, so don't worry, nothing to see here, which I actually don't think that's the most viable solution. It's budget-driven from what I understand.

But then on the DOD procurement and R&D side of the budget, the accounts we're talking about primarily up here, the solution in buzzword capacity has been innovation. And Peter is the expert on this panel to talk about how that is happening in terms of robotics and other

specific areas of the defense budget. But on the high end, on the whole cloth, what I'm telling you is that's not there. And, you know, there's no -- the emperor has no clothes. When you pull back the terms and then you put the line items and match and rack and stack the numbers and see what we're actually buying in terms of that term of art, there isn't much there there. Again, partly just do to budget-driven decisions, but not entirely.

I know, for example, we can talk about the Air Force, next generation bombers, one of the few things that's going to survive these budget announcements coming later today. But this is a really small pot of money right now. I mean, we're talking a couple hundred million dollars. I mean, it's in an embryonic stage as a program right now. And what we're seeing and where the Air Force and where the department writ large -- because the Air Force does take a lot of its orders from on high -- where the Air Force goes with this program is indicative of this larger challenge of innovating for the future and truly modernizing with a new capability. And when I say "modernizing," this is a term defense nerds care about, but it actually means something in light of what we're talking about in sustaining the human capital: the research infrastructure, the training of scientists and engineers and designers and machinists and welders, all of these types of people, the infrastructure, et cetera. All of things that go into

making something that we're talking about leads to this industrial base, obviously, benefit. So the term "modernization" is important to draw this distinction.

You hear a lot of the times the services say we need to reset or recapitalize after 10 years of war, particularly the ground forces. And a lot of times what they mean is to take the vehicle we have, set the engine back to zero miles; put more nifty things that are brand new, commercial, off-the-shelf into the cockpit, or in the vehicle's case in the driver dash, et cetera; and give everybody neat stuff. But you're still basically driving around in the same frame.

If you look at, for example, fifth generation fighters or even our very experimental next-generation destroyer, both of these are systems that not only the internal guts have a lot of neat, brand-new things -- not in all cases, but have a lot of neat and interesting things -- on the inside, but also what you find is in these types of hulls and frames for the aircraft, or the ship in this case, is that the modernized system is truly built from the ground up. So, for example, the Stealth and the fifth generation fighter, as I've been told many times going to Fort Worth, is built into the frame. So while you can do amazing things with Lockheed and Boeing's older fourth gen aircraft, it's still never going to be the same as a fifth gen because there are certain things that you cannot do structurally to an

airframe to change it.

Same thing with the DDG-1000. You may like it, you may not. It's not the point. But when we're talking about comparing an Arleigh Burke-class destroyer, even a Flight 3A, you know, brand-new, modernized, open system, Aegis Open Architecture, et cetera, all of the things that we're changing on the internal components of that, the DDG-1000 still has the radar cross-section of a rowboat. And the 51 will never have that, again, because we're building it from the ground up. It's a whole new, brand-new thing.

So this is the term "modernization" and this is where DOD has absolutely no answer for the future, not on the low end, not on drones necessarily, and not on robotics, not even on some particular capabilities like nanotechnologies, solid-state lasers, et cetera. These all need bolstering as well, but I'm talking, again, on the high-end major systems. We're still pretty much living off the Reagan military here in the case of this type of modernization.

So maintaining our supremacy for the next, I would say, 20 years since that's, you know, that's a good timeframe for DOD to think in terms of, although I know that's also hard to do, the first thing we have to do is look at what DOD buys and the tool sets, as Michael laid out in question number 3, to evaluate whether or not they are capable of doing

this. Do they have the tools to evaluate this stuff and access to those industries that can help them do this in the future? Even if they're not doing it today, can they do it tomorrow?

If you walk around town or if you read legislation like the McCain-Levin bill or the Weapons Acquisitions Reform Act that passed a couple years ago, and even the House Armed Services Committee put together an Acquisition Panel, I mean, everybody in town has a solution to acquisition reform, which is needed, but the challenge is this is something that's plagued every secretary of defense in every administration since, well, the end of World War II or since I can remember in modern history. It seems to have only gotten worse, and we really have only piled on the solution set as opposed to go and take things out and put more things in.

But what the real challenge here is legislation like McCain-Levin, for example -- and I will pick on them in particular -- it tends to focus on what DOD buys on its hardware side. It's something we've talked about in this group. DOD buys a lot of stuff, more than probably anybody else in the world in a given annual year. Let's use the 2010 Defense Budget as the metrics: close to 700 billion when you include the war spending. About 400 billion of that bought stuff -- it's a lot of money -- not, you know, paid people or anything like that or paid for training, et cetera. It just bought stuff. Well, more than half of all the stuff DOD buys are

services, IT, and commodities. And all of our solution sets which tend to be wrong are focused on the minority funding pot of goods: hardware, kick the tires, tangible things you can touch and feel. And we continue to pile on not just the red tape and the bureaucracy, including the acquisition, the overwhelming acquisition DOD workforce, but all of the solutions that tend to come into that pot of money that makes the system actually more risk-adverse. In many cases it's focused exclusively on things that we buy that you can touch. And we're not talking about this other pot of money, which, frankly, is ripe for solutions and is ripe for actually being a bill-payer for things that we need to be buy. Because right now there's a great need to buy hardware and, I would argue, if I was adding an annex to Michael's book, there's probably less of a need or at least an ability to give up a little bit on that services, IT, and commodities, particularly since so much of the commodities was related to war-spending, things that you actually needed to prosecute operations overseas.

So we are losing our edge now. This is not a problem for two years from now. We're actually losing our technological margins of superiority across the services and across the domains on the high end today. And the fact that we're not even acknowledging that there is a problem means that it's getting worse more quickly. Congress doesn't -- if no one's telling Congress that this is a problem, then they don't have any

solutions and they're not going to think about it and they're certainly not going to direct money towards it if no one's saying this is actually a problem.

I would echo Bob's sentiments, affirm CSBA. We've had no coherent long-term defense industrial base strategy, and I would agree with that. But more specifically, what DOD lacks for the services -- intraservice and interservice -- are long-term R&D and S&T plans specifically, and then a fit of the budgets towards that year after year. And I mean something much more granular than a 30-year ship-building or aviation plan. All right? Something that's much more linked to these line items in the budget and capability sets that we say that are needed to buy.

So where -- why are we losing our edge now? It's not just a function of a lot of the problems that I've talked about already, but it's also because, you know, our missed decade of modernization. You know, defense budgets -- back to the *Wall Street Journal*, defense budgets have grown pretty significantly in the past decade. Nobody disputes that. But the grew for a reason and a lot of that reason is because they were cut so deeply the decade before, and a lot of that money went straight into wars or things related to them. So what you saw was a procurement budget and an R&D budget for things that, you know, help build and buy what we need. Those were pretty big pots of money, but they were going to very

specific current-day problems and not to the future. But we mortgaged the future in the last decade, so now we're going on 21 years -- 22, depending on the budget timeline we're talking about -- of continuing to pay today at the expense of the future on the high end.

I'm most worried about the R&D investments, the research and development investments, and planning for defense budgets right now in this build-down. Now, I don't necessarily want to see a return to, you know, the 1940, '50s, '60s, '70s, and '80s, where DOD -- basically the Defense Department's research and development led the entire U.S. Government and, frankly, the commercial sector economy's R&D efforts. But there is something to be said for the incredible synergy and the spinoff effects for all of us even in this room that we don't think about every day that, due to DOD's research and development efforts that it helped the military and helped the wider U.S. economy as a result.

So we know the obvious things. We all have access to the Internet today because of the military. You have GPS in your car because of the military. You have a microwave in your kitchen because of the military R&D. Those are pretty straightforward ones, but there's a whole lot more, many, many more other things, like, for example, the airplane that you might fly to go home for Christmas and see your family, the Boeing 707, for example, is a derivative of an originally designed military

aircraft. Digital photo, you probably have a camera or it's in your phone, your digital photography thanks to the U.S. military. Radar, again, your pilots use to fly you home for the holidays, but not just on aircraft; lots of capabilities.

My son's baby video monitor has night vision. That's thanks to the U.S. military. Then finally, anybody who's lucky enough to have an iPhone 4, if you have Siri, that's thanks to the U.S. military. That's artificial intelligence. It came from DARPA, which was a result of R&D investment in the defense budget.

So these are just some examples of things that are needed. I don't advocate spending money in DOD that we don't need, that's for sure. But all of these things, these innovative programs of the future, again, the purpose of them was to develop the human capital, the research infrastructure, the manufacturing industrial base behind that, and that also leads to things like foreign sales, which helps our U.S. economy and do things like, again, training the personnel: scientists, machinists, engineers, designers, et cetera. All of these benefits then lead to technology transfers among companies within -- working for a military customer, among companies working across the U.S. Government; obviously within the commercial sector itself.

What we're not seeing right now is the Defense Department

look up and talk about the capability sets that aren't needed as we see precision-guided munitions proliferate, as we see Stealth becoming increasingly less effective against enemy air defenses and other types of capabilities as they develop their own. We don't have these long-term R&D S&T plans. We don't have answers for how we're going to build a next generation surface campaign, how we're going to build, for lack of a better term, a sixth generation fighter. Are we going to invest in laser, nano, and fiber technologies and all the things that I think Peter will talk about?

And so I guess the answer to the question, in conclusion, is are the policy interventions necessary to sustain or preeminence? Yes. But it's like a good, old classic 12-step program. Until DOD and Congress actually understand that the answer to number 10 right now is we're losing it, we're losing that preeminence, and there's actually a problem to be fixed, I fear any prescriptions Bob and I come up with are hopeless at this point, not to be too dire or draconian. But we have to admit that there is a problem first.

MR. O'HANLON: Thank you, Mackenzie. And Peter, over to you.

MR. SINGER: Thank you. One of the things that I think is so special and, frankly, so neat about this project and the working paper is

that you have folks from very different perspectives, very different backgrounds, very different organizations, very different political stripes coming together in that paper, identifying -- what we've been able to do is jointly identify what we all collectively think are the key issues and identify the key questions that we think any and every candidate who aspires to national security leadership and/or current official in that space needs to be able to answer. We may disagree about the answers to those questions, we agree that they all need to face those questions. And so that's really what the goal of the effort is, is to try and push these important issues into the discussion. As Mike said, too often they're left as an afterthought. The goal of this project is to force them into the discussion because all of us collectively, from right to left, agree that they're important.

It's interesting, I was going to make four points, but I want to quickly make a fifth that builds off everybody sort of jumping on which question they think is the most important one out of this. Mackenzie talked about all the different benefits that R&D on the military side has added to our nation. You left out my favorite example, which is actually the fluoride in your toothpaste came from Office of Naval Research because good dental health is the key to naval superiority. (Laughter)

But I actually think question number 8 really is the answer to

much of this because, frankly, whether you're talking about the manufacture of that jet aircraft that's a passenger jet to Siri, it's not whether we spend on R&D for it that benefits our nation and our national security complex in the long term, it's whether we capture the long-term benefit of it to our workforce, to our economy. Siri's great, but I would point you to the wonderful in-depth report that the *New York Times* had this weekend about how we haven't been able to capture the benefit for our economy from Apple. We paid for Siri. We ain't getting the benefit from Siri.

But four more focused defense points. The first is the halcyon days of defense spending at a big level are gone. Figures show a cold, hard reality that we often want to ignore. And so as the token liberal intellect at this panel I have to quote Aristotle: Numbers are intellectual witnesses, as he said. And today, the numbers that make up America's fiscal house are screaming.

You all know those numbers. Our debt stands at roughly 15 trillion, roughly 100 percent debt-to-GDP ratio. If we don't take action within a couple of decades, we get to over 300 percent GDP ratio. The numbers make modern-day Greece rather than ancient Greece look like a haven of financial stability compared to where we're headed. We face a national security crisis when it comes to our economic security situation,

bottom line. That's a reality. There's no ignoring it.

Now, the sensible and I would argue patriotic response of the political parties would have been to disdain each of their extremist wings whose intransigence got the nation into this position and focus on coming to the common ground with the still-needed reforms in both tax and entitlements that are actually driving this economic situation. Unsurprising to most anyone who's watched these parties at play over the last decade, that's not what happened. The various players were unable to come to agreement and we now face the proposition of not just cutting a little over 400 billion now, but potentially another 500 billion coming.

That's not my point, though. My point is this: the numbers don't lie. Even a trillion-dollar cut in the defense budget would only cut a small percentage off of that growing mountain, and the parties and the players are still the same. So we often want to talk about this defense cuts as a one-time-only thing. We'll make it through sequestration and -- or don't let sequestration happen, but just it's -- that's it. The reality is that we're going to have to get used to wrestling with how to face debt more than once. It's not just a 2012 issue. And exploring cutting the defense budget is going to be on the table more than once again beyond that first wave that we're experiencing right now.

Now, again, as someone who supports a strong defense, I

wish this wasn't the reality. I'm not advocating it to the be reality. I'm just pointing out the fact the numbers are there. We need to prepare for that.

Point number two, a lot of people talk about strategy, but one of the things that strategy truly is, is about making hard choices. We've had a great quote from Churchill and I see some of our friends here from the British Embassy. Strategy at the start of World War II was not saying we're going to put all our resources into fighting both the Germans and the Japanese in the Pacific and the Indo-Burmese Theatre. The strategy that they laid out at the start of the war that was true strategy, that won the war, was, guess what, Germany first, then Japan, and Indo-Burmese Theatre last.

It's not about wishful thinking. So when you're setting priorities, you also -- and you might try to push this -- have to identify what you're not going to do. And that's very hard for those of us collectively in this town.

It's also about having a sense of where you are now and where you want to go to next. And so all the attention that will come out today with the release of the budget is about which aircraft, which tank, which ship to cut. But what's more important to me is figuring out if we have any principles behind those cuts because, again, it's not a one-time-only deal. The principles, the underlying manner that we think about going

about the cuts is more important to me than what specifically is in cutting.

So I wanted to lay out in my final two points two principles that I think we need to have into the discussion and I think will help us in developing that strategy. The first is Sutton's Law. The bank robber Willie Sutton was asked why he robbed banks and he famously replied, "Because that's where the money is." And Mackenzie hit this point really well, that too often in discussions of defense budgets, national security industrial base, cuts, et cetera, we focus on acquisitions in terms of specific items, specific programs, basically widgets. That's the equivalent of planning to rob a drugstore when the bank is next door.

We need to focus on, for example, the fact that for every 30 percent the military spends on buying weapons, we spend 70 cents on maintaining those same weapons; or the balance between good and services, where, by my numbers, for every 45 cents that the Pentagon spends on buying goods, the Pentagon spends 55 cents on contracting out billable hours of services from defense firms. And yet, our acquisition system is not set up for that. In fact, our response to some of the worst losses, the worst contract abuses was to load up on acquisitions officers back in D.C., where most of the losses were actually happening out in the field in contingency operations.

Similarly, we spend about $80 billion a year on installation

expenses -- the problem of owning, running, powering, cleaning the world's largest portfolio of real estate. We clearly can come about that a lot better.

But one that is rarely talked about and, as far as I understand, will not be dealt with in the upcoming budget is personnel and benefits, which is basically doing to the defense budget what is happening to our larger national budget as a whole. It's growth is basically squeezing everything out. The cost of providing health care has roughly tripled in the last decade while the overall amount of spending on personnel is about a third of the Pentagon's budget. And if this growth doesn't stop, at a certain point a couple decades from now we get to a position where the Pentagon budget actually doesn't buy any weapons. It just pays for personnel and benefits. And yet, we treat it like a political third rail. We just don't want to touch it. It's simply not mentioned and not being dealt with right now.

Brookings is going to be issuing a report on this in a couple of days actually written by Karl Gingrich, who's our Army Federal Executive fellow, and it points out how we can find savings in personnel and benefits of a scale of at least $100 billion, importantly without breaking the commitments that we've made to folks. I know I'm in dangerous ground right now in here talking about this, in this room in particular, but

the point is we can't keep treating this like a political third rail. We have to maintain our commitments, but we also have to own up to the problem set.

The last point that I wanted to make is the idea of posing hard questions, which I think all of us have talked about here. The hard questions that I think we really need to deal with is our underlying philosophies of war and war fighting. We need to establish what in our system stands up to intellectual rigor and what's living on due to the more often powerful explanation of parochialism and inertia. Because we've always done it that way is no longer a good excuse.

Now, in some areas, and we use -- the metaphor was used of the emperor and new clothes earlier, sometimes we need to not only admit where the emperor has no clothes, but that the Pentagon spending on wardrobe has gone awry. For example, the U.S. has spent more money on national ballistic missile defense than it did on the entire *Apollo* space program that took man to the moon. Now, even if the ultimate goal -- and I'm not even going to go into how it's not yet achieved and may never be achieved, but even if we did achieve the ultimate goal with this system, we would still get an incredibly low payoff. That is, even if it ever worked, I believe that money is better spent on more flexible, better payoff options, like, for example, the Aegis system that we can double-task.

Another example of this is we need to be willing to ask why

do new doctrines mean for existing planned program. That is, we've got lots of interest in energy around something like AirSea Battle doctrine, and yet it's fascinating how everything that existed and was planned for before AirSea Battle doctrine wonderfully seems to fit into it. What doesn't fit into it and what needs to be trimmed? It's sort of the inverse of what Bob was talking about of the key priorities. There are certain systems, there are certain programs that don't fit, but instead we visualized the AirSea Battle doctrine, this new thing, as a great way to keep on doing the old.

In other cases we're going to have to question how we organize ourselves. Instead of framing every choice around which programs overall to eliminate or not, we might want to do what's called budget wargaming. Ask if there's other alternative force mixes that give commanders a more effective toolkit in a wider set of contingencies.

So, for example, when it comes to discussions of American airpower, the question to me is not simply whether to buy the F-35 or not and what year, but rather what are the mixes that it would be most optimal in? And those mixes apply to both war-fighting contingencies, but, of course, the budget equation. So what might a theater commander, say, out in Pacific Command do with a squadron of 13 F-35s versus 8 F-35s, 2 F-18E Growler electronic warfare strike craft, 1 Global Hawk, and 4 MQ-9 Reaper systems. And let me clear, "system" doesn't mean single plane. It

means multiple planes, the ability to have four on station 24 hours/7. And, oh, by the way, the extra $182 million that we would save. What's the difference between these two packages? Which one's more attractive, not just from a budget standpoint, but from an operational standpoint?

Next issue, we need to be willing to look outside the boxes, particularly how we think about jointness, not only in the services, but with our foreign partners. We talk about programs like the Joint Strike Fighter as being joint, but they're not truly joint. Similarly, we talk about exploring joint bases, but we're clearly not there yet. We need to push this forward to a finer level of detail on everything from joint training to joint postings to actual pooling of resources.

If Britain and France can figure out how to do this, I think America and our close allies -- like Britain, like Australia, et cetera -- can figure out how to do this. It doesn't mean dropping the capability completely, but recognizing that there are certain areas where nations can jointly gain while facing their own budget crises. Pooling resources are areas particularly to explore in things like anti-submarine warfare, air defense, electronic warfare, search and rescue, countermine warfare, et cetera.

Another set of these tough questions we need to pose is challenging cherished assumptions that might no longer stand up. So

we're presently engaged in a fairly draining counterinsurgency. And the Army, while it's facing personnel cuts, still is resetting itself for a future that mixes counterinsurgency with more traditional missions of combined arms maneuver. And yet, the Army maintains 5,795 main battle tanks. The Marines have another 447. To put that number into context, it's roughly three times the number of tanks that were used in the Iraq war, the 1991 Iraq war. Three times the size. Even the most ardent fans of tanks -- and I'm one of them -- don't contemplate any major ground invasion being conducted in the same was as we did it back in 1991, let alone three times the size. And, oh, by the way, we don't have the logistics to get them there even if we wanted to.

But finally, I think the biggest old assumption that we need to challenge is the way that we're unwilling to look at spending on nuclear weapons through any other lens than arms control and negotiations with the loser of the Cold War. We spend $25 billion annually on maintaining some 5,500 nuclear warheads, spread out across the nuclear triad that too many in this town -- on both right and left -- treat like the Holy Trinity, unwilling to question it. Whether it's shaving off 275 or 550 more warheads from this and the accompanying roughly 1.25- to 2.5 billion a year you would save just by those shavings, the result, I would argue, would be no great strategic loss to the United States, but rather a strategic

gain by the other parts of the defense budget and the research and development that we might be more effectively spending on.

Again, I'm not talking about the traditional left wing narrative of get rid of all the nukes, let's go down to zero. I love nukes. I just don't think we need 5,000 of them in any conceivable scenario, including alien attack. (Laughter) Rather, we have to be willing to think differently, to ask what additional security does that 5,226 nuclear weapons buy me that I couldn't spend on something more effective on our military, on our national security?

So to me, the bottom line of all of this, where we are right now, goes back to that Churchill quote. We've got to think differently. We've got to now really get to asking the hard questions.

Thank you.

MR. O'HANLON: Thank you, Peter. And of strategies about making tough choices, I'm going to make one, which is, unfortunately, no Q&A for this panel. You'll have to save your questions for the congressman and for the second panel because, again, not only are we out of money, we're out of time. (Laughter) And so we're going to have to proceed.

Please remember to stay where you are as we make the transition to Congressman Thornberry. But please also join me in

thanking this distinguished panel. (Applause)

Well, thank you, everyone, for remaining attentive, and I know there's good reason because we have a great speaker now to keynote our panel discussion, our forum today. It's a great honor and a great good fortune when the person whom everyone in our working group who was consulted agreed would be our single best choice to keynote this address or keynote this forum today agreed to do so. We're thrilled to have Congressman Mac Thornberry from Texas here today.

As you know, the congressman has been one of the leading voices on national security policy for a long time, but also on the issue of defense innovation and transformation. He was very important in the revolution of military affairs debate of the late 1990s. He was quite prescient in thinking about homeland threats, calling for new measures to address them a decade or more ago. He's been involved more recently on a special task force in Congress on the cyber threat. He's a fifth generation Texan. And not only does he think about ground operations as well as high technology here in Washington, he's a rancher back home, so he covers the full range from traditional missions to future tasks of the nation and of warfare. And we just could not be more thrilled to have him here today.

As you know, the basic ground rules, the congressman will

speak for whatever amount of time suits him, probably 15 to 25 minutes. And then he'll have about a half-hour for your questions.

And so without further ado, please join me in welcoming Congressman Mac Thornberry of Texas. (Applause)

CONGRESSMAN THORNBERRY: Well, thank you, Dr. O'Hanlon. I appreciate the kind introduction and I appreciate the work that the task force and Brookings has done on our defense capabilities and especially including the defense industrial base.

I also appreciated the chance to read your new book. Lots of good and interesting ideas in there, a couple of very flawed judgments, but I'll try not to talk about that at the moment. (Laughter) But it's very helpful.

But I think when you think about the defense industrial base the kind of place to start is that if the United States cannot build something that is crucial for our national security here at home, if we can't build it here at home, then that ought to be a major concern for us all. And if we only have one supplier of something that is very important for our security -- weapons, equipment, or whatever -- then that ought to concern us, too, if we believe at all in free markets and the benefits of competition and innovation. And yet, one of the challenges that we face moving ahead with tighter and tighter budgets is we're shrinking the number of people

who can build things.

And to me, what we really need is that culture of innovation. And so I'm going to zoom out just a little bit from the defense industrial base. Actually it's similar to a lot of the things that you just heard, I think, from the last panel. But I'll start with two propositions that are blatantly obvious to everybody here, but, nonetheless, I think shape the environment that we all operate in.

One is that the world is changing fast and is very uncertain. And those changes are not making it simpler, they're not making it cheaper. They are just adding complexity to the national security challenges we face.

One of the things I do is try to follow some of the business literature about how companies succeed and fail. And I think it's interesting that there's been a fair amount of writing about how companies can survive in a rapidly changing, uncertain time. And Friedman wrote in *The World is Flat* that looking at those experiences should be a warning to all businesses, institutions, and nation states that are facing these challenges, but lack the leadership, flexibility, and imagination to adapt. You think leadership, flexibility, and imagination, well -- and you compare it to the Pentagon, leadership's probably there. Flexibility and imagination, eh, maybe not so much.

And then I'm also reminded from studies that show that the record of our ability to predict the nature of the next war, not to mention its causes, location, time, adversary, and allies, has been uniformly dismal. So we've got a lot of change going on, a bad record of predicting what's going to be ahead, and yet the change happens anyway.

The second proposition that's blatantly obvious is that budgets are going to be tight regardless of who wins the next elections. There's not going to be a whole lot of money to spend at defense. We're not going to be able to throw money at the problem. Now, I do believe that Congress will find a way to turn off the sequestration that is scheduled to take effect in January 2013 and substitute other savings for that mindless across-the-board sort of cuts that would take place otherwise. I can't tell you exactly how it's going to happen, I can't tell exactly when it's going to happen, but I do think there is agreement on both sides of the aisle not only for defense, but the domestic programs, that that's the dumbest way to make cuts. So finding other savings to substitute turning off the sequestration, I think, will happen. But still, in the bigger picture, we're going to have very tight budgets.

So we've got rapid change, not a lot of money to spend, what's the answer to that? It can only be innovation and flexibility. Of course, Secretary Panetta's going to release some details of the defense

budget today, but I'd just like to make the point that leaner and smaller does not automatically equal more agile. And you see those phrases grouped together a lot, leaner and more agile. It's not the same thing. One does not automatically follow from the other, although certainly more agile, I would argue, is one of the key goals. But just because you shrink the defense budget does not adequately make the Department of Defense or the military more agile.

What we really have to look at -- and this is one of the reasons I don't think you can just look at the stuff we buy -- I think we have to look at everything from people, and that's everything from pay and benefits to training, to who we promote and why we promote them, to organizations, to the technologies we pursue, to ideas we pursue. Colonel John Boyd of OODA Loop fame says it's people, ideas, and hardware, in that order. And I tend to agree with that.

And at the same time, change is hard. Those who have studied it have found that major attempts to change within organizations fail about 70 percent of the time, so we shouldn't think it's ever easier. One of my favorite quotes is from Dr. Edward Teller in his autobiography where he said, "The substance with the greatest inertia known to man is the human brain and the only substance more inert is the collection of human brains found in large organizations, such as a military service or a

faculty of a university," which he ought to know. But it strikes me as part of our challenge.

A few years ago, I was on a commission called Looking at Smart Power, which basically meant the combination of hard and soft power so that you have a full range of capabilities that can be employed in a way that is needed and will be most effective and most efficient at the time that you need them. I mean, that was kind of the basic underlying, and that looked at how we could develop that full range of capabilities. I'm kind of thinking what we need in defense is something one might call smart defense: a full range of capabilities that could be employed in the right combination -- and you just heard some of that in the last panel -- for the circumstances that we need.

Now, I don't have all the answers. I haven't presumed -- I'm not smart enough to write a book on what those answers should be, but let me just offer some at least elements that would be included in smart defense.

Number one is I think it ought to be based on knowledge and understanding. Now, that's different from being based on information. We collect loads of information, but sifting through that information and making sense of it so that you really have knowledge or, even better yet, understanding is another step. Some of that comes from the intelligence

community through secret collection and through open source collection and in analysis of that information, but I'd suggest a lot of it comes from understanding the religion, the cultures, the history of places. And that gets to some of the criticisms, for example, that General Flynn made of our early years in Afghanistan, where we really didn't understand and spent money needlessly, probably spent lives that did not need to be spent because we did not have that deep understanding of where we were.

If we're going to choose what sort of tool to use for a particular outcome, we have to have that sort of understanding. And that doesn't mean all the money we spend on intelligence is automatically sacrosanct. But I do think one of the dumber places to cut would be to cut intelligence capability, which would reduce our ability to develop the kind of understanding that we need from a strategic level down to the tactical level. You can't invent it when a crisis develops. It has to be embedded ahead of time so that you can draw on those resources and that expertise when you need it.

And that presents all sorts of challenges, you know, for example, with our growing dependence on ISR. Everybody wants it, everybody wants their own, and everybody wants a lot of it. Now, part of what I've tried to ask is who's looking at the bigger picture about how all of

these platforms fit together? And maybe what we -- with the need and desire for persistent surveillance and full-motion video, and so forth, multiple roles on one platform, who manages those platforms with multiple roles? And they could benefit other services. I think that's organizational, that's cultural, that gets into some of the personnel issues.

Another example, a tempting place to cut in the defense budget is professional military education. Again, I don't think that every dollar we spend there is sacrosanct, but I think one of the dumbest places you cut is the educational system that helps prepare your military to deal with the challenges in the future.

Ben-Gurion wrote that, "The most dangerous enemy to Israel's security was the intellectual inertia of those who are responsible for its security." Now, if that was true of Israel in its early dangerous days I would suggest it's also true for us.

Another pillar, I think, of Smart Defense would be drawing upon that knowledge and understanding, mature our capability to work by, with, and through others. Now, that's kind of the traditional Special Forces mission. We all know some things only the United States can do. Most things, probably, the United States does better than anybody else, but we're going to have to have the ability to help others get some things done good enough and not necessarily do it all ourselves.

Much of that will inevitably involve irregular warfare. I'm a little concerned that there is a temptation now that will accelerate to get "back to normal." But we had a hearing in my subcommittee late last year where it turns out that normal, at least 83 percent of the time since 1815, has been irregular warfare. And other research has shown that in the first two-thirds of the 20th century, there were 48 small wars, which taken together involved as many people as the World Wars and involved as many casualties as each of them. And just think about where we've been the last 20 years, you know, Bosnia, Somalia, all through the list.

So I think we need to be alert to the danger of putting what we have learned at a very high price over the past decade back on the bookshelf. And so I will -- in my subcommittee that oversees special operations, we're going to continue to have hearings looking at personnel, training, those things involved in irregular warfare to make sure that that does not happen.

But if you're working by, with, and through others, that involves other things. It involves great interagency effectiveness, and we've been talking a lot about it. There have probably been some advances, at least since the early days of Iraq and Afghanistan, but clearly we're nowhere near where we ought to be. And the expeditionary nature of other government agencies. Let me just mention one example that

maybe we ought to all watch for.

The Coast Guard has among its missions maritime law enforcement, customs, border patrol, drug interdiction, and they do some international training, but it's not integrated into our national security planning, it's not prioritized as far as overall national security objectives go. A lot of folks think it's not sustainable. And yet, what a lot of these countries need are the very things that the Coast Guard offers. We have to improve the ability to use the expertise in one part of the government for national security purposes.

I have heard anecdotes of a complete mess at the Afghan-Pakistan border, when the military was trying to control the border access until they bring some border patrol agents who kind of say you go here, you go here, and gets things kind of straightened out and smoothed it along very nicely. Those are just kind of some simple examples of where we've got to make sure other government -- we can draw upon other government agencies to help in national security purposes as we work by, with, and through others because we can't do everything, we can't be everywhere, and we don't have to have everything done perfectly. Now, you know, that gets messy. You're dealing with partnerships and coalitions and that sort of stuff. But yet, it seems to me it's an essential part of a smart defense.

I think smart defense also has got to include some countercultural issues. Dr. O'Hanlon mentioned one at least in his book where he talks about changing the crew of a ship while it's out on its mission, not bringing it back and forth. I've often thought that longer terms of service in a lot of key positions makes a lot of sense, and I've just seen it in my own district. I have one Air Force base in my district that is a training base and the one-star general who runs it wrote two years doesn't even get around before he's out the door and the next guy's coming in. There's been some very fine people who do that, but by the time they learn who's in the community and what training goes on there and what goes on, they're off to the next thing. That cannot make sense. And you take that into lots of other positions, I think we hurt ourselves.

And also, if you look back historically, some of the great innovators have been in their jobs a long time. You know, they couldn't blast Rick Ober out. He was there 30 years and yet tremendous capability came from his tenure there.

I think there are other countercultural changes that we need to explore. In 2005, Tom Barnett wrote that the Iraq war will not make a lasting impact on the U.S. military, but the Iraqi peace will redefine it. "The defense-industrial complex will be forced into wrenching change: from producing the few and the absurdly expensive to cranking out the many

and the cheap." I kind of thought he was right when he wrote that and yet it has not happened yet. And I guess the question for us to think about is if that is desirable, to go from the few and the expensive to be able to do the many and the cheap, are we even able to do that? Is the culture, the organization, and structure, able to carry that off?

I also think more accountability and -- responsibility and accountability for decisions is essentially. Partly that goes with longer tenure in certain positions, but it's hard to find sometimes, especially in these acquisition programs who's responsible for decisions and for programs that don't perform as we want.

Briefly, I'd just say I think a smart defense means that we have to be prepared for new domains of warfare. We've been talking about space for a while. I think one could even argue information may be a domain of warfare, not necessarily an enabler. But cyber is the one that just jumps out as challenging so many of our approaches and assumptions, from what constitutes a use of force to how do you have command and control or even oversight when something is happening at the speed of light; to personnel issues, how do you get -- how do you attract and keep the kind of people that are the most effective in the cyber world that may not meet the other criteria we often think of for military service; to just a host of issues.

But I would say with Moore's Law I can't imagine a place where acquisition reform is more necessary than in the whole field of IT and cyber. And again, that requires the kind of cultural change.

Let me just finish with turning the mirror back on Congress because it shares some of the responsibility not only for the problems we face, but also for the solutions. Again, I -- this is not a comprehensive list, but some thoughts about what Congress needs to do to support a culture of innovation and a smart defense.

Number one, to be blatantly obvious, you don't get a lot of innovation with continuing resolutions, particularly with those that go on for a couple months at a time. And in these -- in a larger sense, in times of budgetary uncertainty companies are rational and they become more cautious. Now, we may have some disagreements about where the overall economy is, but I have talked to hundreds of businesses in my district and around Texas, and I guarantee they are worried about what's going to happen with taxes, they're worried about the regulations that are coming, they're worried about the debt ceiling, you know, how that's going to -- what that did or could have done to credit. Those who are government contractors are worried about whether they're going to get their money or not. And they are not going to take a risk and they're certainly not going to stick their neck out to put R&D money into

something that may or may not pay off. And I think that's what you're seeing across the economy, which is why the recovery has been so anemic. But the point is Congress, working with the President, has got to put some greater certainty into these key issues of taxes or regulation and appropriation.

We're going to vote -- in the House we're going to vote next week on the beginnings of some budget reforms. There are about 10 of them that the Budget Committee is looking at. One of them that we're not voting on next week, but they're considering, is a two-year budget cycle. I think that would be a good thing to provide some of that stability and predictability that managers need, whether you're in the military or whether you're a contractor.

In the meantime, I think it's really important for the federal government to keep up its R&D because as budgets shrink, companies are going to put less of their money -- rationally -- into R&D. We've still got to research and be prepared for the future. That means the government cannot slack in its R&D efforts for funding.

Congress cannot overreact when there's a problem. And I think a lot of the barnacles that have been added to our defense have come from Congress trying to be responsive, but basically overreacting. You know, you have a media report about a $600 toilet seat and all of a

sudden you've got three commissions and six toilet inspectors, you know, that have got to look at it all. I mean, that's the sort of phenomena, I think, that has just built up over time. And that gets back to the real need for accountability -- for people -- managers being able to make decisions and then being able to hold them accountable for those decisions without all the second-guessing and without all the mother-may-I's that have developed in our system.

I think it's also important for Congress to understand the consequences of various proposals. Apparently today the secretary's going to recommend a reduction in the size of the Army and they will make a -- they will emphasize the fact that we're not only going to not shrink special operations, we're going to grow in the future. Well, the truth is special operations depends on the conventional Army for much of what it does. So part of our job, I think, is to look at what the consequences of those conventional cuts could be on special operations and make sure that really we're not cutting off our nose to spite our face.

Obviously committee jurisdictions need to be sorted out. There's been a ream of studies since 9-11 that have made recommendations for Congress, a lot of them have been ignored. I worry a little bit that there is a, to borrow a phrase, soft bigotry of low expectations when it comes to Congress and its ability to get its act

together on national security. But -- and don't be guilty of that. Please help us to lift up to a higher standard.

So I think the summary is there is much ahead of us that is unknowable and beyond our control, but as in life in general I may not be able to control what is coming at me, what I can control is how prepared I am for it and how I react to it. Our goal ought to be the kind of agility to react and the kind of preparation that means we are able to effectively react in a time of rapid change and uncertainty.

Eliot Cohen wrote, I think, a great book about the war leadership at the heights, where he looked at Churchill and Lincoln and a variety of folks. The bottom line was it was in his ability to adapt and not in the capacity for a grand design that the war statesman finds his largest test. I think that's true with us, too. It's in our ability to adapt, not in our ability to sort it all out ahead of time, that we will find our greatest task.

Thanks for having me. (Applause)

MR. O'HANLON: Please prepare your questions. I'm going to open up, if I could, Congressman, with just one my own.

CONGRESSMAN THORNBERRY: Yeah.

MR. O'HANLON: And you mentioned that you're hopeful that Congress will find a way to soften sequestration or to replace it with something else. And I realize you were wary of predicting the character of

that new bill, but can you at least sketch out for us the possibilities? Because to me it looks pretty hard in an election year where if you're looking to find $500 billion in 10 years' savings somewhere else or increase revenue, well, the increased revenue seems like a non-starter, frankly, for both parties this year. Entitlement reform seems too hard to do quickly and domestic discretionary accounts have already taken an equal brunt as did defense in the Budget Control Act's implications so far. So what are even the range of possibilities that you would foresee where this could be possible?

CONGRESSMAN THORNBERRY: Two things. One is I think the budget that will -- at least the Republicans will vote on in the House will substitute other savings. Now, the budget's not going to get enacted, but at least it will lay out the game plan to do that. But remember, you don't have to find $500 billion savings. What you have to find is about 40 or 50 for the first year. And so, you know, again, kind of shrink the expectations a little bit if we need to find substitute savings for the first year. And if you look at the variety of things that the supercommittee looked at, there's some fairly easy, low-hanging fruit that could be used for that.

Now, the harder question is what's the legislative vehicle? And as you point out, what is the politics of the moment? What does it get

attached to? And that's why I think it's really hard to predict. But to find the savings to turn off -- and the 40 to 50 is, I think, for across the board, I think that's not that hard.

MR. O'HANLON: Please. And Harlan, why don't you start? Please introduce yourselves after waiting for a microphone.

MR. ULLMAN: Congressman, I'm Harlan Ullman. Good to see you again. Thank you for your comments.

My broader question is what is your biggest and boldest idea to get this fixed? But let me put it in the following context. It seems to me the title of this conference, "The Future of the National Security Industrial Base," smacks of the 19th century and the 20th century for a couple of reasons. National security is too often taken to mean defense when it has to be much broader. And as we've learned and you pointed out, military force may or may not be necessary, but it sure as hell wasn't sufficient in Afghanistan and Iraq. And you were talking about knowledge and understanding, we should be looking not so much at an industrial base, but an intellectual base that goes across all of government.

So with that as context, what do you think would be a bold, big idea that may be able to move us fully into the 21st century when your notion of knowledge and understanding, it seems to me, has got to be the centerpiece of our future national security?

CONGRESSMAN THORNBERRY: I don't think there's a magic -- I don't know of a magic answer, silver bullet that accomplishes what I would like to accomplish. I do think -- and forgive me, I may be somewhat parochial here because, as Mike pointed out, I've spent a lot of time on cyber the past year or so -- I do think cyber is going to challenge so many things that it is an opportunity for us to advance on a broader front, whether it is acquisition or personnel or the intellectual needs.

And so, for example, I'm going to have some hearings in this budget cycle in my subcommittee about cyber and the very hard problems that it presents in a military context. What is war? What do we expect the federal government to do to defend commercial enterprises, and so forth?

So I think things that get to the cultural reforms that that is really at the heart of this. And I really agree with you that the intellectual capacity, not just of the Department of Defense, but across the broader national security-related agencies, is really central to this.

MR. NICHOLSON: Sir, good morning. George Nicholson from StratCorp. First, I want to thank you for everything that you've done and your predecessor, Adam Smith, and Jim Saxton on your committee.

The question I've got, you talk about the industrial base, we look at programs like the replacement for the OH-58 helicopter. The first one was the Lockheed Cheyenne: built, flown, cancelled. The next

replacement was the Sikorsky/Boeing Comanche: built, flown, cancelled. And then in your own district the Bell AH/ARH: built, flown, cancelled. What have we learned from that and what are the impacts going to be on the industrial base?

CONGRESSMAN THORNBERRY: I can't remember the number, but somebody has put together the number of how much money we've spent over the last 10 years developing weapons systems that get cancelled, and maybe there's some technology that can harvested from them, but it's an incredible number of billions and billions of dollars that we just pulled the plug out and basically don't have anything to show for a huge investment. And so, you know, certainly in a time of tight budgets we all have to find a way to deal with it. And there's been, you know, a number of recommendations from tightening up the requirements process at the beginning to not letting those requirements continue to shift as it's underway, to different sorts of contracting methods that have all kind of gotten at some of this stuff.

I think we've had some sort of acquisition reform basically every other -- or something that was called acquisition reform basically every other year since I've been around here. I'm kind of to the point where I think of it kind of like the tax code. We just need to stop, just wipe it all out and start over. And I'm somewhat cavalier in saying that, but still,

I think that we're going to have to -- we cannot continue to do the kinds of things that you have just mentioned.

And I think there are a number of studies that provide some helpful recommendations, but, again, part of it is there's going to -- whatever system you set up there's going to be some abuse or some mistake. And the question is how self-correcting we are without adding all of these barnacles and stuff, which really have developed, I think, over the past several decades. It's part of our -- probably our biggest challenge in an age of restricted resources.

MR. O'HANLON: Here in the front row.

MR. DAVIS: Mark Davis, White House Writers Group. Earlier it was suggested that we might eliminate or scrap one leg of the nuclear triad deterrent that we have. Is that a good place to go for savings, budgetary savings? Is that a reasonable or safe thing to do?

CONGRESSMAN THORNBERRY: I don't think so. Now, maybe I'm old-fashioned, but I think that there is wisdom in a triad of systems so that we are not overly dependent upon either one and I think that there is a danger in going too low in the nuclear field just because it makes it more attractive for others to jump up and reach you. And so, you know, I don't know and I don't think anybody knows where that magic level is -- we can cut this far, but no further -- before we start encouraging other

nations to add to their nuclear capability in order to equalize. But, you know, I'm -- particularly with the nuclear deterrent, I am probably more cautious than many, but I don't think we better cut too low and I think we better keep a triad of delivery systems to have the sort of survivability that that brings.

MR. O'HANLON: Clara in the front row.

MS. O'DONNELL: Thank you. Clara O'Donnell, visiting fellow at The Brookings Institution.

I was wondering to what extent are you concerned by the ongoing defense spending cuts taking place in Europe? And to what extent do you expect it might hinder a future transatlantic defense corporation?

CONGRESSMAN THORNBERRY: Well, I think it is a significant concern. Ideally, as I mentioned, we work with others and that means others have to have a capability that complements ours. And if others can have a capability that complements ours, we don't have to do it as much and everybody can be, you know, more efficient. If the others don't have a capability, then that stretches us thinner. And so, you know, just kind of at a basic level I think that's worrisome.

I don't know to what extent further significant cuts in a country's defense budget affects the attitude of the people in that nation

towards national security, whether it undermines their responsibility to provide for their own security, or is it the kind of thing that, oh, we don't need to spend money on that, the Americans will take care of it? And so we -- you know, so I think that worries me some and that's more kind of a cultural psychological thing. But, you know, we're all under enormous stress in our budgets and it's understandable that there would be a desire to cut further in defense, but it seems to me that it would be a dangerous road to go. And as I tell people in my town hall meetings you can wipe out the defense budget and all of foreign aid and all the rest of discretionary spending and we still would have had a deficit last year, so that's not where the problem is at home.

MR. O'HANLON: Arnaud in the back row.

MR. DE BORCHGRAVE: Arnold de Borchgrave, CSIS. As you look at the future and look for savings, how large a role does robotic warfare figure in your thinking?

CONGRESSMAN THORNBERRY: I think it is inevitably going to be a larger and larger role in our future. And as Dr. Singer has written about, I think it also presents some legal policy and ethical challenges for us as we move further in that direction in a similar way that cyber does. So it's not just a newer, better version of what we've been doing all along. It adds some new dimensions that is incumbent upon

policymakers, not just scientists, to work our way through. But obviously, with the premium we put on human life, the desirability to have airplanes and submarines that can not have human pilots is going to be the strongest current, and not to mention longevity, you know, in the air or underwater; not to mention various capabilities where the human provides some restraint or constraints on us.

So I think it's inevitable, but I kind of turn the mirror back our direction. We need to help the country work our way through some of those ethical and policy issues as we continue to move in that direction.

CONGRESSMAN THORNBERRY: Yes, sir.

MR. KREISHER: Good morning, Congressman. Otto Kreisher with *Seapower* and AOL Defense.

Two issues. One, the industrial base has been particularly -- AIA and others have been pleading for reform on the export controls. You know, if they can sell overseas more, it helps them, you know, with reductions here. The administration has made some steps. Part of the problem's going to be getting Congress to approve the single list, you know, and those sort of things. What's your view on that policy?

And the other one is, you know, you get into tough times like this, the tendency is not to cancel programs, but to stretch them out. Doesn't that inevitably add to the cost of everything you buy?

CONGRESSMAN THORNBERRY: Yes, absolutely. And, you know, so reportedly the secretary's going to recommend stretching out F-35 buys today and that will make them more expensive. And we have a history of stretching things out, making them more expensive, and then deciding, oh, it's too expensive for us to buy, we better cancel it. That is that cycle we get ourselves into again, which comes back to, I think, a lot of our basic acquisition approach and the difficulty in planning ahead.

On the export controls, I think it's a good idea to have a single list. Dutch Ruppersberger and I have pursued this, especially when it comes to some of the satellite manufacturers. And back to the topic of industrial base, if we put too much restraint on our companies' ability to sell their goods overseas, it makes it harder for them to survive. And that is what's happened, to some extent, for example, with satellite makers. And so, you know, you don't want to remove all constraints and you understand how good some people in the world are at copying technology and so forth, but, at the same time, overreacting the other way causes our industrial base, I think, to shrink and shrink. And so it has not kept up -- our laws have not kept up with the way the world has changed in this and a whole host of areas, and so I do think we should.

MR. O'HANLON: Over here, ma'am, third row.

MS. HOLM: Yes, my name is Gro Holm and I'm representing Norwegian Broadcasting Corporation, some of one of the allies. But my question is more political.

To what extent has your committee been discussing lessons learned from the war in Iraq, from the soon-to-finish -- we hope -- war in Afghanistan? In two and a half years' time the forces will be out. Have you discussed the lessons learned and eventually the consequences those might have for thinking about future industry and thinking about future priorities?

There was a surge, 30,000 U.S. troops a few years ago, 10,000 other troops from Europe. Have they been effective? Have the lessons learned there told you something about how the American defense should look like in the future?

CONGRESSMAN THORNBERRY: I think the answer is we have not spent nearly enough time trying to understand the lessons learned of the past decade. And it is one of the ways, I think, Congress has not fully fulfilled its role in our system of government. I guess that sort of concern is part of the reason that I have had and will have more hearings on irregular warfare because part of what I want to try to do is kind of look at what we've learned and make sure that it doesn't just go back on the bookshelf, that we really do learn and apply the lessons that

have come, whether it's in our organizational structure or whether it's in the stuff we buy or whatever. So, you know, I do think that.

I also worry, and, again, this may be slightly parochial, but a number of years ago, Senators Lieberman, Coats, and I had bills to create the Joint Forces Command. And part of the purpose of that command was experimentation so that you could look at things in the future, but also this having kind of an independent organization that was responsible for joint lessons learned. And they did some studies on lessons learned that I think were generally helpful. You know, that command has been abolished now. So where is it in our system that you've got folks that are focused on kind of the broader lessons so that we can learn them, apply them, and move ahead? And I'm not sure where that is now. I'm not sure it was a mistake to just abolish that command, by the way, because it never really lived up to what we had hoped it would do. But the point is the need for that sort of thing -- experimentation, among others -- I think still is there.

MR. O'HANLON: And we'll make this the last question. Right here in the second row.

MS. DiMASCIO: Hi. I'm Jen DiMascio with *Aviation Week*.

I wanted to drill down about the F-35. You know, you mentioned that the secretary's going to recommend, you know, slowing

down the buy or stretching it out and you said, you know, that's likely to increase the cost. Is that a move that you're likely to oppose in Congress this year? How do you balance the need to cut the budget this year and in the future with the potential for making weapons systems like the F-35 more expensive in the long run? And does the F-35 fit into your vision for smart defense?

CONGRESSMAN THORNBERRY: Well, first, remember this year the top line on defense is decided. That was part of the budget agreement last year, so it is not an option for 2013 to increase the amount of money basically that we spend on the base budget of defense. Now, the overseas contingency account is not part of that, but basically the number is decided and so that puts certain constraints on all of us. But I think we do have to be aware that it is so tempting and easy to stretch things out. Oh, we don't need to buy, you know, this number we'll buy this year. We can buy fewer and we'll buy them the next year and the next year, and then we do more of it, you know, more of the stretching out again and again. And the inevitable result of that is incredibly -- is costs that continue to go up.

Now, you know, one would look at where the F-35 is and the process of its development. Obviously the B version has had problems and so you can delay things for technical reasons, but I'm talking about

purely for budgetary reasons.

You know, I think the country needs to have top-rate fighters and certainly the idea that there would be a fighter that would be shared by the services and by allies is a very attractive concept that I think we should not walk away from. On the other hand, speaking of lessons learned, let's study this program, from its inception to its development and acquisition, and see what acquisition lessons we can learn from that. I think that might be the most helpful way to proceed because clearly it has not performed well from an acquisitions standpoint.

MR. O'HANLON: Well, Congressman, that was fantastic. Everyone please join me in thanking him. (Applause)

And as the congressman departs, he's been so concise and compelling and cogent, and so have you, and crisp in your answers that you've earned a coffee break. We are not going to take a long one because we do want to start by 11:00, recognizing that we're finishing by 12:00.

But before I invite you to look for some refills let me just make brief not that as an added incentive to get back here by 11:00, we can inquire from Peter Singer, who's going to moderate the next panel, just how he sizes nuclear forces for alien attack. (Laughter) This is something I've had in the back of my mind ever since he mentioned it an

hour ago. And we also have two great representatives from industry: David Morrison from a traditional player, Boeing, which, of course, remains very innovative, but is traditional; and David Worn from a new player, a relatively new player, and also very innovative, Palantir.

So we're resume right at 11:00. Thanks.

(Recess)

MR. SINGER: So we've had a great discussion today on issues of strategy and budget. Now with this panel we want to focus in on a particular part of the impact on the national security industrial base. One of the things that you might have noticed that's been a little bit different about this discussion and how that term "industrial base" is thrown around is that too often when you use "industrial base" it becomes a bumper sticker for actually talking about protecting a single program or a single company. You can't do this because of what it will do to the industrial base. Or we talk about a single congressional district. A single budget year cycle.

And we've tried to avoid that and I think this panel in particular will help reframe it at a larger level because what we want to look at is three questions. Whether budget cuts actually have to hurt innovation or not. If so, how? And then finally, the most important steps that need to be taken on the policy side and on the business side to

ensure strong long-term innovation in the defense sector in the future. These are very immediate issues, very tough questions but fortunately we've got two great minds to help us with this. And interestingly enough, from two firms that represent the wide spectrum of efforts within the defense economy.

We've got David Morrison, who is corporate vice president for government operations at Boeing. Prior to serving at Boeing he served 22 years in the federal government in roles that extended from budget analyst with OMB's National Security Division to staff director and clerk of the House Defense Subcommittee on Appropriations. And then we've got David Worn, who is head of the Washington office of Palantir Technologies. As opposed to Boeing, which is just a couple years from its hundredth anniversary, Palantir was formed in 2004 by a handful of PayPal alumni and Stanford computer scientists focused on how information is analyzed and shared. And David's responsible for their activity in the defense intelligence and commercial domains and has helped grow their office in D.C. from the first employee, which was him, to a hundred-person operation.

So we're going to start with David Morrison and then David Worn.

MR. MORRISON: Okay. Thanks a lot. Thanks for

everybody taking the time to be here. I'm pleased to be here. It's a capricious day to have this since it disobeys some of the folks in the industrial base later on today maybe wanting to rethink their defense industrial base participation in the wake of Secretary Panetta's announcement.

But let me start with just a few remarks and then turn it over to David. In the wake of the last major drawdown that we went through, post-Cold War drawdown, the Senate Appropriations Committee in its infinite wisdom came up with the idea to create what was known as the Defense Conversion Commission to look at precisely the issues that Pete raises. How will the defense industrial base transition during the time of drawdown? How will it maintain innovation and so on and so forth? That was an idea that I proposed and Senator Inouye agreed to it. The Congress agreed to it. We set up the Commission. It was chaired by a fellow named David Berteau. You guys know David. Had a fair number of other folks on it. I note that on the wall outside this room Senator Inouye won the Minute Man of the Year Award in 1993. It was not because he came up with the idea of the Defense Conversion Commission. That's a joke. (Laughter)

But interestingly enough here's what the commission found in all of their field hearings and discussions and deliberations both in

Washington and around the country, and it will come as a shock to you. The companies will invest, and particularly the first and second tier companies, they will invest primarily on where they see the market going. Positively or negatively. And they primarily will use their own money to do so or venture capital money. So the government incentives to spur transition or innovation were more to them like economic rent, if you know what I mean by that term. Interesting. That was not true with the third and fourth and the lower tier companies by the way. And we'll talk about that in a second.

So the lessons from the Defense Conversion Commission lo these 20 years ago I think are probably somewhat appropriate for how we think about this issue today as we draw down some. First of all, what companies are looking for are clarity in the marketplace to the extent that that can be achieved. They tend to look at where the future goes and ultimately they tend to look at the stability in the programs that they have now for the future. Program stability.

Second, companies are looking for a reasonable opportunity to get a return on their investment. Reasonable opportunity. I worked on Capitol Hill in OMB for many years. The good government analysis, first and foremost that was required by our chairman and our director and president, was to make sure the American taxpayer dollars were

protected. That's why I use the term "reasonable opportunity." That means keeping programs on cost and on schedule and that's everybody's responsibility by the way, both the government and industry. Contractual structures have to sort of match that and allow for it. There's a lot of chaff and turbulence in the system going on about this issue. We can talk more about it but it's fundamental to the ability for companies to invest in innovation that Pete talked about.

Finally, financial health. Financial health above all factors is what attracts investment. It's also what attracts talent and it's also what spurs innovation. To the extent that there is a perception created that the defense industry is struggling, that's not a good thing for those folks up in New York City and around the country who want to invest. So perception we need to be very careful about as we move forward in these next couple years.

A couple of other conclusions from the Defense Conversion Commission that I think are useful. The major fears are the large companies at that time. And virtually, the second and third tiers were a loss of talent. And it happened, by the way. There was a flight of aerospace engineers and other engineers from the defense industry mostly to the dotcoms. Economics drove that more than anything else. But it was a major issue.

Second, they were worried about the supply chain because supply chain, believe it or not, in the third, fourth, fifth, and sixth tier companies is where a significant amount of innovation occurs. Now, it's true Boeing prides itself on being a technology company and there are a few things that we create every now and then but it's companies like David's that are coming up with the whiz-bang ideas. They build pretend dollars and they ultimately change the course of history.

So what does that mean for today? Some prescriptions, Pete, you talked about. I would say there are a couple things. First of all, everybody needs to commit to stability in a program, even in a downward trend. So that's things like multi years, clarity on what the future is going to look like for some of the new start programs that the Pentagon has and so on and so forth.

Second, there are some low cost, high impact things that we can do as a defense establish that would have a significant payoff without costing the Department of Defense too much money. First, we need to think about how we support defense companies selling items overseas. Export controls for military sales. It's a relatively big deal. I will tell you this -- this is not a secret -- Boeing's defense side of the House, major growth they anticipate in the services side and international sales. That's what will sustain legacy programs in the long run.

We need to figure out ways to partner with our allies in making our resources go as far as we can, in particular ASEAN countries. We're looking at Asia-Pacific. We might as well begin to figure out how we partner with them better. Public-private partnerships in the sustainment world are critically important. We've been dealing with these issues on Capitol Hill and in the Pentagon for years. How is it that we balance the organic workload in the Pentagon with what the private sector brings? It's a huge thing. And again, services. The service industry is one of the ways that these companies, in particular the big companies, see growth occurring in the future. Right?

Finally is education. This addresses the workforce issue. Boeing, like a lot of the other major defense contractors, will see in its engineering and technical workforce a block obsolescence. That's beginning to occur now and will occur over the next 10 to 15 years. What I mean by that is if you take a look at the average age of engineers that we have in the Boeing company it's about as old as I am. That's a frightening thought. And they look better than I do, too.

So Boeing, just to provide a few examples, we just partnered with Senator -- Governor Gregoire out in Washington State to provide $25 million along with Microsoft in grants for education for math and science education in K-12. We are serious about the need to generate interest in

and support for science, math, and technology programs all throughout the education spectrum. The Department of Defense needs to be serious about it, too. And so, you know, they should take a good look at their education programs, figure out how they can partner with industry on this to create interest in and provide resources for educating folks in this field. Otherwise, the ability to innovate will be nipped in the bud as they say because there won't be anybody left to do it.

So those are just a couple of thoughts I'll leave you with. We can talk more about it. David, the innovation king on here, over to you.

MR. WORN: Thanks, David. You know, I appreciate the innovative props. I've got to tell you riding on a 787 is number six on my current bucket list. So I don't want to hear that you guys can't do that anymore.

MR. MORRISON: Yeah, we're going to make it happen.

MR. WORN: Was that too close to the bone?

MR. MORRISON: Unh-unh. It's good to go.

MR. WORN: Just to lead in I was also, you know, hoping to hear some good thoughts from other entrepreneurs today. Didn't think I would hear those thoughts from Representative Thornberry but I thought he really nailed it today. It's kind of fun to hear that. Not something that I expected from the Hill.

Peter, Mike, great to be here today. I'm almost embarrassed to say that I just learned this really awesome D.C. expression a few weeks ago, "Where you stand depends on where you sit." I use it all the time now. But it's probably important for you to understand where it is that I actually sit. Although I run our office here in D.C., I sit very much, very firmly in Silicon Valley. So I've been asked to come here today, I believe, to share some of the Valley's perspective on some of these issues in budget cuts and innovation. It's been our experience over the past couple of weeks and months as we've been involved with Peter and Mike's program here that talk of austerity and budget cuts tends to conjure up a pretty dark cloud inside the beltway. And we view this perhaps with a bit more of a silver lining.

So I think we're probably invited here to be a bit of a contrarian foil today. So I want to give a few thoughts on how we pound here with the Valley actually view some positives potentially in the future, but also share with you some structural concerns that we have about innovation in this space that scare us a heck of a lot more than any cuts to the budget.

So let me start with the more happier piece. And I hope you'll forgive my notes. I'm much more used to sitting on panels with Googlers and Facebookers and people who work for companies that you

can append E-R to to describe them. That doesn't work very well for Boeingers, I guess.

But it's probably not news to anybody here but what Silicon Valley does better than anybody else in the world -- all due apologies to Silicon Ally, to Bangalore, to any other city that claims to be the next Silicon Valley -- is apply patient capital to winners where winners are very simply defined as companies that today or in the very near future are going to provide positive mission outcomes to their customers. It's that easy. And what they also do quite effectively is give nothing, zero, to losers, people who fail to do that.

This creates systemic impulse towards innovation that you see nowhere else really in the environment. It's a perfect capitalistic system. It's what this country quite frankly does better than anybody else in the world. I wake up every morning listening for those footsteps and that's what keeps us innovating internally every day.

Now, when does this system break down? We've all certainly seen Silicon Valley have its share of fits and starts over the last couple decades. It breaks down under a number of different conditions but I think the failure state shares a common theme and that's any event that compromises this competitive impulse. Most frequently this is an overabundance of capital. When there are these asset bubbles you see

things like Pets.com. Arguably, some may say you see things like $20 billion valuations for companies that are selling coupons over the internet. When it works well you get Amazon.com and Facebook and Netflix and Google and Yahoo and some of the most innovative companies in the history of the world.

Fiscal discipline then is the driver for innovation in the Valley. When fiscal discipline breaks down the system breaks down. Again, where fiscal discipline and smart investment is simply defined as giving resources to those who are delivering effective outcomes to the customer or to the mission and losers are those people who are not.

Smaller budgets then, from our perspective, can be both good for companies. I'll talk a little bit about our personal experience with this over the last couple of years. But more importantly I would argue that if you get the systemic element of this right budget cuts can also force a flight to quality in outcomes that could be better for the mission and ultimately I think that's what we all really care about. I don't want to be heard as sitting up here saying this is a rising tide that will raise all boats in the national security industrial space. Certainly, if your business is predicated on the slice of the pie that you take home in any given year, the pie is going to get smaller. There's no question about that. If your business is predicated on your ability to outcompete everybody else in

delivering the best solution to a problem, then opportunities open to you as competitors that haven't been there before in this space.

And I want to use that as the segue then for what really scares us as a company and me as a citizen of the country. We are definitely bullish again on the future of our business and the future of solutions advocacy for the mission. But the defense strategy pulls no punches when it talks about in a world of smaller fore-structure we will hitch our wagon to -- and I'm quoting here -- "exploding our technological joint and network advantage. We are hitching our trailer to innovation in a way that arguably we haven't done before. And from our seat it's increasingly difficult to understand how the systemic impediments to innovation that we all see and understand, particularly in the acquisition world today, are going to do anything but dampen the community's ability to provide those type of innovative solutions that we need.

Let me be slightly more specific. Today -- and I can speak to this with some degree of insight because I've been trying to do it for the last seven years -- bringing innovation into this community from outside the beltway is darn near impossible. I challenge you with a bit of a thought experiment to imagine in your mind a program that has gone from commercial tech insertion. Maybe this is an In-Q-Tel program. Maybe this is some other similar analog that has gone from tech insertion to

enterprise scale program of record. It's possible that some of you are coming up with some things. Maybe you're thinking of keyhole. Peter, I'm sure you're thinking of General Atomics and the Predator. I ask you though did those programs succeed because of the support they got from the system or did they succeed in spite of the support they got from the system. I don't think that's a question that we all need to think very hard about.

The reality is that the law on this is actually pretty clear. This is what gives me some hope for the future. The FAR is clearly written to support competition, to support commercial preference. But just ask Ford how easy it was to be included for consideration in the next-gen Humvee. Ask our friend Elon Musk at SpaceX how easy it is to be included in conversations about space launch. Ask our friends at Skybox Imaging how easy it's been to be included in conversations about national technical means. It is very hard to actually come in from the outside and bring innovation into these spaces in nontraditional ways.

I'll wrap then with just a cautionary story that speaks to this, again, from my seat as a Valley guy. It may not speak to you guys at all so I apologize for that if it doesn't. But in the Valley, when a company is successful, when they close around a funding, when they go public, within days you'll see three, four, five, six, 10 companies doing exactly the same

thing. You've all seen this. Go in the app store. You'll see this every day. This is a great thing. It certainly is the sincerest form of flattery and it's what keeps that innovative engine going.

Palantir, it's been well documented in the financial and popular press. It's been very successful. We're the fastest growing enterprise software company ever. We're the largest commercial tenant in downtown Palo Alto. Everybody knows who we are and what we do. Today there are exactly zero companies in Silicon Valley attempting to do what we've done. Zero. And the reason for this is quite simple. There's no mystery today, and Dave, I think you alluded to some of this as well. When these people are walking into venture capitalists' offices, they're making the same pitch that we made seven years ago. And it's something like this. "It's going to take us multiple years to be profitable because that's how long it takes to sell into this space. It's unclear actually how or whom we even approach to try to sell our product. And oh, by the way, it's going to take us several years to do this because these are really hard problems. We're not building Farmville here. We're solving some of the most difficult technological problems ever and they will be and they are, like we were seven years ago, laughed out of those venture capitalists' offices.

Now, we were lucky enough to be funded by some fairly

wealthy individuals so we could do this ourselves. But that's rare. And although nothing makes me happier than making venture capitalists rue the day that they laughed at me, this should be taken as a hugely negative indicator by those of us who care about the ability of the commercial marketplace to insert innovation into this domain. I certainly care greatly about this. This is one of the reasons that we formed this company in the first place.

So to wrap up then, austerity can clearly, we feel, be a driver for explosive growth in innovation if we focus on competition, if we focus on mission outcomes. The rest will inevitably follow if we don't do that, and I think Representative Thornberry, you know, talked about the inertia here, which is to actually pull back on investment in times of austerity. If that's the direction we go, we're in a dangerous place. Thank you.

MR. SINGER: Thank you. Two really great presentations. I think you can see why we invited them. To speak to you. So, and I have the pleasure of having wonderful panelists that left us time for Q&A, unlike those terrible panelists that Mike had to moderate. So let's hear from you. Questions? Comments? Let's get the discussion going. Right here. But please wait for the microphone, stand up, and introduce yourself.

MR. KOUKIAS: Hi. I'm Constantine Koukias with the New America Foundation.

I just wanted to ask you, for David from Palantir, to reconcile something you said at the beginning of your talk with something at the end. In the beginning you sort of said Silicon Valley is fantastic at allocating capital. At the end you said you had a great idea and you were laughed out of all the venture capitalists' offices. So I was wondering how you square that circle. Thanks.

MR. WORN: That's a great question. We had a crazy, ridiculous idea. The idea was to take what we had done at PayPal, which worked, and somehow apply it to the national security domain, which seemed really interesting and meaningful to us. In no stretch of the imagination is that a compelling business pitch to anybody so I want to certainly draw those distinctions. We've been successful. No one actually in the Valley understands why or how we've been successful. I would struggle to sit up here and actually articulate to you how we've managed to navigate these things because, believe me, every day feels like we're the first company to ever try to do what it is that we're doing which seems somewhat insane to me. But certainly I wouldn't hold myself out as this paradigm of a great idea that should have gotten funded. We were a crazy idea. That's kind of the idea, I think.

MR. HUGHES: Philip Hughes from the White House Writers Group.

Two things. Again, to you, David, first, could you perhaps reconcile if you heard Mackenzie Eaglen's presentation from the first panel two things. You emphasized that from your point of view we're going to have to leverage technology in order to make up for, if you would, the scarcity of funds and thin procurement budgets going forward. But Mackenzie has just told us that we precisely lack plans to do that and are sort of starving ourselves for real innovation and defense fear. How do those two ideas fit together or how can they be made to fit together?

Second quick thing, everything that -- much that we've been saying is predicated on the idea that wars are behind us so perhaps you'll have a bit of a respite now admittedly within budgets during which to recover and sort of reposition ourselves industrially and technologically. But there are at least two circumstances I can think of connected specifically with Iran. One could be out of our control because of some other country's action; one could be out of our control because of Iran's action that could call upon us to be involved in conflict imminently. Does that mean that budget realities are going to make us shy away from or abjure involvement if conflict breaks out in that region? Or might we have to put off another decade of innovation to fight another war?

MR. WORN: I'll just ask for both of us that you specify something more than "this is for David." But I assume that was at least

starting with me.

MR. HUGHES: Why don't you both answer it then?

MR. WORN: Yeah. I would love to actually hear David's perspective on the second piece, you know, because I will say I'm sitting up here positioning myself on the standard continuum of engineer dysfunction in answering pretty much any question outside of our narrow domain of expertise.

But when it comes to what Mackenzie said I actually --

SPEAKER: In D.C. that's called a pundit. (Laughter)

SPEAKER: Very good

MR. WORN: I learned something else today.

I actually spent a lot of time thinking about what Mackenzie was saying when she was talking about the role of DoD in fostering and supporting innovation. It was difficult for me to listen to her make some sort of connection between Siri and the iPhone4 being about SRI and DARPA. From where I sit the iPhone4 is about Steve, not about DARPA. And I think that drives a lot of our thinking about these things. And if the Valley has learned anything and if computer scientists in particular have learned anything over the last two or three decades it's that anybody who has the heurist to think that they can predict even a year out to think, okay, I know what I need to do, I know what those requirements are going to be,

I know what I should fund, I know what I should put down in this giant requirements document, is doomed to fail.

So my concern with that approach is that if you're actually placing your bets through the defense industrial base, vice seeking to create this environment as specified in the National Security Strategy, we actually want to see the community to support these multiple possible futures and let them do the innovation. That to me seems like a much more realistic approach. I realize that is completely at odds with the way it has been done in the past. But there was no one who was doing what we're doing, for example, which seems odd. We took that on and learned what we use in the commercial space and brought that to bear against this range of problems and that was the success.

So does innovation need to come from the DoD? I don't know. I do know we can't predict the future and we need to remain that capability to be agile which to me implies enabling the community to bring innovation as opposed to thinking that we can see those correct avenues.

As far as the second question goes, you know, maybe here's where I can defer to the other David about, you know, what the impact of another war or another military operation might have on spending.

MR. MORRISON: I actually, if I heard you right, Philip, I'll challenge a bit of your assertion. I actually think that during wartime it

spurred innovation in the Pentagon. And for three reasons really. First, the imperative was there. And so you had lots of different officials in the Department of Defense trying to find ways to create pockets of funding to advance technology quickly in order to provide for the war fighter, much to the chagrin of folks on Capitol Hill by the way, not for the purpose but for the fact but for the fact that there was money all over the place.

Second, what happened during this war and what's happened in previous times is much of what David was talking about in terms of the timeline it takes to get something incubated, researched, developed, and then fielded gets shrunk in the Pentagon during wartime because it circumvents the FAR basically. And so there's some goodness to that and maybe some not so goodness.

And then the third thing is support for these types of ideas tends to be guaranteed because folks both in the Pentagon and on Capitol Hill are as interested and they can't find any way financially to support the war fighter and that includes innovation and technology. So I'm not -- I think going down into a down period in the Department of Defense actually would be counterproductive to what you were thinking possibly could occur during wartime.

Just to pick up on your point a little bit on the first question, I think what conjoins the issues for us, Philip, is if there is some sense in

what the future holds and what the Pentagon is going to be willing to provide resources for in terms of areas of inquiry, then companies are going to invest in it and innovate. If there's a sense that the Pentagon is going to be all for finding, you know, supporting the growth of unmanned systems in the Pentagon you can bet your bottom dollar that most of the primes and even companies like General Atomics which you referenced are going to invest in doing so. But if they think those funds are going to dry up they'll look somewhere else like cyber or something like that.

So I think so long as there is some clarity in what the future marketplace looks like you're going to find companies both large and small willing to invest in it regardless of whether the Department of Defense sets aside the dollars to do so. They will to some degree but it's more about the stability and the interest as opposed to actually setting the dollars aside.

MR. WORN: I'll just say one more thing on that that you just led me to think about, again, perhaps a bit contrarian. Specifically, when the government has specified things as spending priority, cyber is probably a good example, we as arguably a younger, more immature competitor, have actually oftentimes found ourselves blocked out of participation and a lot of that spent. It's easier for us to sell into the cyberspace at our coalition partners than it is to U.S. agencies that are

mandated with that mission space because all of that money is already going to other places. So again, just a thought there.

MR. SINGER: I want to follow up actually on this idea of the impact of a potential war and you brought in discussion of DARPA and other traditional locales of R&D or at least innovation within the defense space. The question I want to pose is the impact of ongoing operations on those and the potential warping effect that is DARPA and other agencies have been -- you talked about how it spurs innovation but yet it spurred innovation towards ID detection rather -- and quick deliverables rather than the Internet. The big think ideas. And there's different forms of how you might spur innovation. There's the traditional form of funding folks but then there's other models that you may be -- you are familiar with in terms of, for example, the In-Q-Tel model and the impact that's had. Or the Grand Challenge model of open sourcing. Where do you see this headed? And what do you think is the most effective? That is, if you're advising -- if Secretary Panetta sits you both down and says, "Okay, how do we help these agencies? How do we help this innovation?" What do you respond? What do you say? Do we do more of the In-Q-Tel side? Do we do more of the Grand Challenges? Or is it a matter of the kind of economy-pushing that we saw during the last 10 years, David Morrison?

MR. MORRISON: I'd say you've got to do -- well, I think

pretty much the obvious answer is you've got to do a little bit of both really. You have to -- perception really matters. We really do need to think about that. People came -- I think folk were interested -- engineers and innovators were interested in doing things in the short-term to support the war effort. Do you know what I mean? I mean, I think attracting folks to do work in the defense industry is not an easy thing but there are folks who came because they felt some patriotic impulse to do so.

But you got those folks to come. And so now you need to figure out ways to keep them. And so, you know, working with agencies like DARPA and developing models to make sure that both the large and the small firms are looking at -- have an opportunity to do some whiz-bang stuff in the future is what's going to keep these folks attracted.

The other thing is, Pete, and I'll say it again, is I think the best thing that the secretary of defense can do is to talk to the defense industry and say, look, we want to provide you guys the opportunity to go out and innovate. And so we're going to make sure that we provide you with reasonable contractual structures to do so and reasonable return on your investment and work with you in that regard. I think that's what I would advise the secretary of defense. And, you know, you're much smarter about the models than I am about which ones should apply in this instance but I think it's just what the defense industry -- the captains of

industry, the generals are interested in hearing that the Pentagon is not going to walk -- is not going to try and walk away from some of the things that they have done to support industry in the past by pointing fingers at industry and saying that you guys are the bad guys out there.

MR. WORN: Yeah. I have just two things to add to that. I thought that was great, Dave.

One, about DARPA specifically. My uncle -- and I can say this is an unclassified program there -- worked with them to train cockroaches to fly down the barrels of tanks and leave slime on targeting mirrors. This is a great DARPA program. (Laughter) DARPA currently probably has 15 initiatives attempting to build what I sell, what we built seven years ago. That is a terrible DARPA initiative and is insanely anti-competitive and a terrible use of money. When it comes to In-Q-Tel, we're an In-Q-Tel company. We love In-Q-Tel. They were tremendously helpful in getting us into labs at several places. As I referenced, there is absolutely no path from the lab to program of record. Having somebody to help us along that path would have probably sped us up by five years. Having to figure that out ourselves was really hard and there are a lot of people who failed in that due to lack of resourcing. We were able to fund ourselves for those first three, four years. That shouldn't be expected of people trying to help the cause.

So in general, continuing to actually support the commercial preference as currently written into law would be tremendously helpful to us. Beyond that, you know, I'm somewhat wary of any additional efforts to help that I'm going to get from the government.

MR. SINGER: Right over here.

MR. HERIOT: Judd Heriot, documentary filmmaker.

Would any of the panelists be comfortable talking about the foreign competition? We've heard about possible loss of edge in all of this but what's going on with our principal competitors and/or adversaries?

MR. MORRISON: They're trying to do the same thing that we are. The major -- for Boeing, there are significant competitions around the world and major companies to sell airplanes, in particular fighter aircraft. As it turns out, some of the competitors get a sort of -- get some advantages in the marketplace with support -- pressing support in particular from their governments. That's going to occur in the commercial world as well on the aircraft side with competitors like Brazil and China and Canada.

So that's sort of the reality that we face in the marketplace. And we're going to have to try and figure out how to deal with that. That's why I referenced earlier on that we need to take a look at the export control regime that we have here which right now is sort of a hold over a

legacy of the Cold War, number one. And number two, we need to sort of think through fairly robustly how we support American companies overseas to compete in those markets.

Now, this is a two-edge sword also because one of the issues that a company like Boeing faces is the supply chain is a global supply chain. And so while we compete with some folk with platforms overseas, we also share the same supply chain. Everybody's familiar with the tanker program. The tanker program is interesting from a variety of different perspectives. You know, we made a lot of hullabaloo about the subsidies and WTO solutions but there was only so far that Boeing could go in creating a lot of anxiety and getting our suppliers engaged in this because EADS was going to use the same supply chain for a lot of the things. Smart.

So we need to be careful. We, Boeing, and I suspect it's true for a lot of the other primes and second tiers, you need to -- it's a two-edge sword for us. We want a fair playing field and I think that that's what everybody will argue for. We'd like support from the federal government to try and achieve that. But at the same time we are interested also in partnering with some of our competitors in other markets. And so we need to be careful about that. So it's interesting.

MR. WORN: I can tell you with great assurance at least

from the computer engineering domain that we continue to have the best engineers in the world, the United States. We build the best products. We're the most innovative. Why this is I couldn't tell you. I think it has a lot to do with how we learn, how we think about ourselves. But we continue to out innovate in that domain.

Unfortunately, as Dave referenced earlier as well, there are fewer and fewer of us every year. If we don't figure out a way to deal with that, a way to deal with the fact that I'm 50 percent understaffed right now because I can't find these people, we're going to be in a bad place. But we still have the best, most innovative people and ultimately that's what heartens me about our ability to continue to out innovate. But we're losing that edge.

MR. COWEN: Sure. Byron Cowen, Capital Alpha Partners.

David at Boeing, I want to talk a bit about this concept of reversibility in the defense industrial base. When you think about the supply chain that Boeing deals with, what parts are the most fragile? You talked about third and fourth tier but are there specific skill sets that are really at risk here as you think about defense?

And then David at Palantir, can you talk about, you know, Peter raised this but is there -- if you had a meeting tomorrow with the sec def, what three most important things could he do this year to make this

innovation dream come true?

MR. WORN: You want time to think? I thought I was going to get time to think. (Laughter)

This is actually an easy one for me. I don't have three things. I have one. And we have spent some time trying to figure out how you actually navigate this place over here. It's been an interesting learning experience for us and one where we've had our share of fits and starts. But we've come across what we've been told is sort of this very strange no-ask ask which is all we need is an opportunity to compete and demonstrate that we can actually do better for cheaper what it is that you want done. I can't do that today. It's impossible. Let me do that and we'll all win and we'll all be happy. I don't know how to specify our way to that outcome. All those laws are on the books but if we could find a way to do that, find a way to allow us to compete fairly, then I would be a very, very happy man.

MR. MORRISON: Byron, what we worry about are the specialty parts makers for the most part. That's the area where they rely almost solely on Boeing contracts to supply things that have military specs. For those folks -- the other side of the coin is for those folk that have a fairly decent opportunity to transition to an intercommercial marketplace or have a commercial base right now, they're going to be

okay. But it's the specialty parts makers for the most part. You know, using alloys and all that sort -- I've forgotten the term but you know what I'm talking about. Metal alloys and those types of things. Those go away fairly quickly and they are very hard to replace. So that's kind of the deal. And that's the problem with the regime, the export control regime and all that sort of good stuff. It's also hard to find global support for it as well because of the sensitivity.

MR. SINGER: Right there.

MR. ARZANPOULI: Hi. Mazi Arzanpouli with the Monitor Group.

You guys have talked about bringing commercial innovations into the DoD. Can you guys talk a bit about taking DoD innovations in the commercial marketplace?

MR. MORRISON: Yes. It's harder to do because not many people want to buy tanks. But I think, look, a lot of the innovations that have come, you know, that DARPA and some of the other R&D outfits that the Pentagon has supported over the years has been transitioned to commercial activities. But that's not -- the Pentagon's whole acquisition regime doesn't think that way. It's really 180 degrees. And so I'm not sure whenever the Pentagon contracts, in fact I'm fairly positive about this, there is no -- there are few opportunities during the actual acquisition

regime for people to be thinking about how they're going to be able to use military systems in a commercial marketplace. I'll give an example.

There is interest out there to use Boeing and other company cargo airplanes to haul freight, military cargo airplanes. It will require a significant amount of cooperation and collaboration between three agencies in the federal government -- the Pentagon, the FAA, and the State Department. And the reason the State Department is the long pole in the tent is because the stuff that goes on in these airplanes, not just Boeing airplanes, are on the munitions list. Right? You know what I mean by the munitions list, right? So while this may be a whiz-bang idea to find, you know, to take all the research development and production that's occurred on the military side to use for what's obviously a market that's going to grow in the future, the likelihood of that occurring is severely limited by, among other things, the certification that has to be gotten from the FAA and getting the damn thing off the munitions list.

So I think it's an interesting question but I'm not sure that the regime thinks that way. It's going to require a whole paradigm shift in how we do stuff like that and anything beyond the most basic innovations that come out of the Pentagon.

MR. WORN: I would weigh in on one other, at least within a part of the industry that I know well. With unmanned systems we heard in

the prior two panels how they're very much part of the Defense Department's vision for the future and likely defense industry's vision for where military aviation is headed. But they're also where civil aviation is headed. And we're seeing spillover into law enforcement use. There's a huge industry waiting to happen on the agricultural side actually using the same small tactical UAVs that our military uses in Afghanistan for things like crop dusting at the micro level to crop inspection across the board. The smart companies will be the ones that envision and seek to go after that market. The dumb companies will be the ones that continue to try and fight it on behalf of legacy programs. And I think we're seeing a shift within the industry of attitudes towards this new technology. And then that interfaces back to how they deal with DoD and the acquisitions and the Congress of what they support and lobby for and what they don't. And I say this not to kind of chide companies but use the parallel of Silicon Valley and Silicon Alley or Wadi and the like. If this is the future of military aviation and civil aviation I want it to be located in the U.S.

And to the prior question about other nations when it comes to military robotics there's 45 other nations out there producing and some of them are states like China and Japan and I don't want to see them eat our lunch in this new area of both the defense and civil aviation economy.

MR. SINGER: We have a question way back there.

MR. TRYBULA: I'm Dave Trybula, Army War College fellow.

The latest defense strategy guidance talked about one of the major risk mitigation strategies being reversibility. I'd like your insights as to what that means to your companies and the industrial base.

MR. WORN: I thought a lot about this when I read that primarily because this is something that speaks directly to my background in computer science. It's been well known in that field that the farther you get from design phase the more expensive it is to fix these mistakes that you've made. And so it concerns me to specify something like that without mentioning how you think you're actually going to accomplish it.

We certainly have a wealth of experience in understanding how we do that, and we do that, again, by not thinking that we can specify in advance what those future vectors are against which we're going to need to pivot and making sure that systemically we're designing infrastructure and designing systems that can pivot. Now, that may be easier to do for software where you can actually build openness into the system. I would argue that it's probably something you can architect into any sort of system if you're being thoughtful about it. So I do worry because it's certainly not something that I've seen in any of the systems that I've interacted with with the government, nor do I see it built into any sort of acquisition programs.

SPEAKER: May I ask you a question, Peter? We talked about what is commonly known as the valley of death in R&D programs, particularly when it comes out of DARPA and then the services don't pick them up for a variety of different reasons. How do we address that problem?

MR. SINGER: I don't know.

SPEAKER: I'm turning to someone with 22 years of experience. I did the bio.

MR. SINGER: Well, let's ask the audience. What do people think about on that one? Well, actually, let's do it. Who wants to weigh in on the valley of death problem? I'm looking across this room and we've got a lot of talent and experience. How do we deal with that? Way in the back there.

SPEAKER: You know, I'm not convinced that the valley of death is ultimately a problem because what happens is that on one side of the valley of death what you do is you seed innovation. That may not directly transition but if you've done it correctly, and DARPA usually spreads that wealth across several different companies, those companies will reinvent themselves in some particular form. So you have sort of an evolutionary manner. And if the need is present later on it will come back and find its way into acquisition at some later point in time. I

don't think it's necessary, and in fact, I think it's counterproductive to imagine that you can know the answer in advance, innovate specifically to that solution, and then put it directly into fielded forces. Sometimes that model works but particularly where you're trying to seed the edge sometimes the opposite model is actually more efficient where you have lots of potential past innovation and they rapidly get killed off.

MR. SINGER: Anyone else want to weigh in? Yes.

MR. HUGHES: Philip Hughes from the White House Writers Group.

I'm not a procurement expert but David, aren't there kind of two valleys of death here? There's the valley of death of programs that are incubated by entities like DARPA that don't have a service sponsor and where there may be resistance from people invested in school solutions or existing programs of record. But then there's the program alluded to earlier that we've experienced over the last several decades it seems in increasing frequency of major procurement programs, including unhappily the future combat system for Boeing, that get considerably down the track of development to the point of flying or prototyping or a production decision and then get canceled and we have nothing to show for it. I don't have a solution to the first valley of death problem but it seems to me that a key to solving the second valley of death problem is

getting some kind of greater hold or greater discipline over the requirements process at the beginning because it's generally speaking gaps between hugely ambitious requirements or hugely ambitious technology development goals and budgetary realities that cause the kind of program cancelations that have cost us so heavily in the last two decades.

MR. MORRISON: I absolutely agree with you and I think that's why the idea about stability and honesty between the industry and the Pentagon and the Congress is absolutely critical. Look, the Army is suffering big time as a result of this. Crusader, Comanche, BCTM FCS, they're going the way of all flesh and they have spent billions of dollars for nothing really to show for it and frankly, they're going to lose a couple more today from Secretary Panetta. So that's something that we just can't afford now.

And the other thing that it does is it sort of creates an impression in industry, certainly with investors of a level of uncertainty, that we can't sustain in the future because the capital will fly in other places. And so that's a fundamental problem. I'm hoping that frankly with respect to the BCTM FCS program economic Darwinism has taken over and I hope that sort of happens to a variety of other programs and we at least can come to some sort of stable threshold even if it's a downward

trend over the next couple years. That's what I would hope.

MR. WORN: Dave, you posed the question to me and so I'm going to slightly disagree with you. Part of the problem as well is committing to a vision before we've tested it out or competed it. So whether it's FCS, one of the few things to come out of FCS, one of the few things to make it across that valley of death was the small UGV, which was not originally an FCS because it came from, at the time, a small company. It wasn't originally part of it. And, in fact, it was the one part of it that when they got it in the hands of the soldiers they actually wanted.

I similarly think of our commitment on F-35 and I compare that experience to the fly-off between what's now the F-16 and the F-18 back in the day where I think maybe to blend your points with what you were saying is that we do need to involve more competition and open up the aperture in these program sets. That's one of the lessons that I learned from our successes as well as our failures.

MR. SINGER: So we are getting to --

MR. MORRISON: One --

MR. SINGER: No, please fire back.

MR. MORRISON: The UGV, this is the iRobot, Dealio. Actually, you're referencing the PackBot. That was the original thing that was sent overseas. Do you know how that program actually got started?

An earmark. (Laughter)

MR. SINGER: Exactly.

MR. MORRISON: That's true actually.

MR. SINGER: And they got the prototype in the hands of an Army unit in Afghanistan and they knew they had met with success when they wouldn't give it back. Compare that to all of our meta programs where we've already committed to their vision and not actually gotten them in the hands of troops to test them and decide whether they like them or need them.

Okay. That actually gets us to the witching hour so I want to first thank our panelists here for a fantastic discussion.

(Applause)

And then invite up Major General Drew Davis, who has been kindly hosting us at this event.

MAJOR GENERAL DAVIS: Well, thank you. I know that I'm the only thing between you and lunch now.

I just finished a very good biography of Dwight Eisenhower and his White House years written by a guy named Jim Newton. And obviously the White House years ended with his farewell address where the common interpretation is that he warned of the military industrial complex. In reality what he was doing was he was warning against a

decline -- an allowed decline and allowed deterioration of our industrial capability to support the nation's defense. And that's been sort of lost to the revisionists of history. So I think this morning's several hours of consideration of these issues has been not only stimulating but important for all of us, particularly as we sit on the eve of the coming budget cuts.

A good example are our panelists here. I'm just a dumb Marine infantry officer but I actually know more about vortex ring state and the V-22 and worked with the Boeing folks to try and rescue that program after the second crash. And I've been a fan and observer of Palantir's real innovations in intelligence and the capabilities of intelligence analysis. So these are the sorts of things that we as a nation need to protect and nurture in our military industrial complex.

It's also been a terrific experience being partnered with Brookings. Obviously, Brookings is arguably the leading think tank in defense issues and its scholars, two of them you've heard this morning, are widely regarded as leaders in their fields. So I particularly want to thank Michael O'Hanlon and Peter Singer for their role in this. They'll be joining us next week at our annual National Security Symposium at the Wardman Park Marriot. You can go on ROA.org if the spirit moves you to come and join us for any of the session. There is a fee. But I think it's going to be an exciting symposium for us.

And I want to close with another unashamed plug. We're right now putting the finishing touches on a voyage in August from Boston to Halifax where we'll spend three days at sea on a palatial cruise ship studying national security issues. And so again, watch the ROA.org website for more information and you definitely are invited to that. It's going to be fairly low cost and a great way to get away from Washington in August.

So with that, thank you all for coming. Come to our next session and watch for more on our National Security Symposiums. Thanks.

(Applause)

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