



# Regaining the Strategic Advantage in an Age of Great Power Competition: A Conversation with Michael Griffin

Speakers: Michael D. Griffin, Under Secretary of Defense for Research and Engineering

Moderator: Rebecca Heinrichs, Senior Fellow, Hudson Institute

## TRANSCRIPT

*Please note: This transcript is based off a recording and mistranslations may appear in text. A video of the event is available here: <https://www.hudson.org/events/1540-regaining-the-strategic-advantage-in-an-age-of-great-power-competition-a-conversation-with-michael-griffin42018>*

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**KENNETH WEINSTEIN:** Good morning and welcome to the Stern Policy Center here at Hudson Institute. I'm Ken Weinstein, President and CEO of Hudson Institute. I'd like to welcome our audience here at Hudson as well as the C-SPAN viewing audience.

Hudson Institute is dedicated to American leadership and global engagement for a secure, free and prosperous future. And key to American leadership is continued American technological preeminence. And given that that's the case, I'm delighted to be able to welcome and introduce Undersecretary of Defense for Research and Engineering Michael Griffin, here at the Hudson Institute.

Undersecretary Griffin will be speaking today in conversation with Senior Fellow Rebecca Heinrichs on precisely this question of American technology preeminence and how to preempt our great power competitors and rogue actors from exploiting these technologies against us or against U.S. interest.

Undersecretary Griffin, in effect, serves as chief technology officer for the Secretary of Defense, which means that he looks at the current defense capabilities, looks at how to improve them technologically, looks at defense technology transformation, how to hedge against uncertainty.

He's an aeronautical engineer by training, most recently taught at the University of Alabama at Huntsville before returning to the Department of Defense. He, of course, served as administrator of NASA from 2005 to 2009. Prior to his service at NASA, he was head of the space department at the Johns Hopkins University Applied Physics Laboratory and he also, of course, served as president and chief operating officer of In-Q-Tel, private, non-profit enterprise funded by the Central Intelligence Agency to identify and invest in cutting edge technologies that serve national security interests.

As I mentioned, Undersecretary Griffin will be engaged in conversation this morning with Hudson Senior Fellow Rebecca «Heinrichs». Rebecca is well-known in defense circles as both for her work on missile defense and on other policy issues. She's frequently called to brief on Capitol Hill, at the White House, at the Pentagon. She's a former Congressional staffer who helped launched the Missile Defense Caucus, writes regularly for The Hill, is a frequent guest on Fox News as well. So without any further ado, it's my pleasure to turn it over to Rebecca. Thank you.

**REBECCA HEINRICHS:** Thank you so much, Ken.

Thank you all for being here. So what I'd like to do this morning is have -- Dr. Griffin has asked that I call him Mike so I'm going to call him Mike, but my upbringing is telling me that I should not do that.

I've known Mike for several years. I am thrilled as many of you are that he is where he is at this time in history, because I think he is the man for the job, so thrilled that you're there, thrilled that you're here, sir. And I'm going to go ahead and turn the floor over to him and let him talk for a while about his priorities, where he sees the current landscape and how he's going to prioritize over the next coming months and years. And then he and I will engage in conversation and then if you have questions, please just go ahead and write those down because I'm going to save some time at the end so that you can participate as well.

**MICHAEL GRIFFIN:** Thank you. I'll try not to spend too great a length of time pontificating, but let me maybe set some context. The job I'm in is a new job. It has existed at significantly lower levels in the organization before, but not since the Goldwater-Nichols Act of 1986 which created AT&L, Acquisition, Technology and Logistics, as an entity, not since then has the R&E organization occupied undersecretary-level stature.

Since it's been 32 years since the enactment of Goldwater-Nichols, since we've had a major reorganization of the department, I think we can expect this particular instantiation to remain around for a while as well. So I'm the first occupant of the office at the undersecretary level, but I think we can expect many more. And my primary purpose is to get the things started off right and set the proper tone for what we really ought to be doing.

So what ought we be doing and why? For that, I have to pull on a little bit of history, some of it recent, some of it of longer standing. I'm going to start by saying that in the United States we've been on holiday for 25 years and

maybe a little bit more, since the fall of the Berlin Wall and shortly thereafter the collapse of the Soviet Union. At that time, China was not a great power. Russia was devolving from great power status into a much more fractionated regime. We had not seen, of course, Putin had not risen to the top. At that time it would have been really unimaginable for someone to stand up and say that the dissolution of the Soviet Union was the greatest tragedy of the 20th century as Putin has since stated.

I think that's for you. I'm sorry.

Yes. Let's turn that off. I forget how to turn it off, later.

So we not in the early '90s have envisioned island building by China, preemption of international waters or the attempt to preempt international waters with rather bold territorial claims that no other nation in the world would recognize, never mind lay claim to. We just didn't see and couldn't have anticipated these things. So for at least a couple of decades, the United States enjoyed a degree of alumnus at the top of the global power ladder that really we'd not seen for a while in history. It has been quite a while since a single great power was so unchallenged.

And my personal opinion is we kind of went to sleep. I was in the Pentagon when the wall came down and I was in the Pentagon when the Soviet Union dissolved. I had not yet gone over to my third incarnation at NASA. So watching those events from a seat in the Pentagon as a deputy at the Strategic Defense Initiative Organization, the ancestor of today's Missile Defense Agency, watching those events occur, I will say and not as Monday morning quarterbacking, it bothered me a lot because we started talking about the peace dividend as if that was going to be perpetual entitlement.

And there's a saying about optimists and pessimists which I love, which is that an optimist is a person who believes we live in the best of all possible worlds and a pessimist is a person who's afraid that might be true.

So in the early and mid-'90s I frankly was quite cynical about the peace dividend. I was quite cynical about the practice that the Defense Department and other agencies of government aided and abetted of allowing companies to merge from many competitors into a few large super companies.

I did not think that -- I did not believe that there would be a peace dividend that would last out the rest of my life and certainly not into my children's and grandchildren's. And I did not believe that reducing our ability to have internal competition among many corporate competitors was in our long-term best interests. So you can chalk that up to premature, old age cynicism and because in their early '90s I was in my early to mid-40s and maybe too young to be so cynical but I was anyway.

So if we fast forward a couple of years, a couple of decades, I think it is now observable in hindsight that we failed to continue to fund the practices that had gotten us where we were, which was at the very top of the technological heap.

The United States from the time that we entered World War II until it was ended was about three and a half years. World War II lasted for six years. It was in our presence and our technological, engineering, production preeminence that allowed the war to be brought to a close. As regrettable as it may be, the war ended with the first use of nuclear weapons, it did end the war and I think there's no historian alive today who would say that more lives were lost because of that than would have been caused by an invasion of the Japanese mainland.

So it was America's technological preeminence that brought an end to World War II, that won the Cold War and that got us to the place where we could fall asleep at the switch in terms of maintaining that preeminence.

By the time we looked around in call it 2015, 25 or so years later, it was and remains today observably true that while in many categories America still leads the world and in company with our allies and partners in the western nations it still leads the world in many areas of technology, with regard to certain areas in defense, science and technology, really we just don't anymore. That's a hard thing to say and a hard thing to hear.

But the fact of the matter is that in the area of hypersonics, to pick one, both China and Russia are observably ahead of where our current state of practice is. It's not ahead of where we could be, but it's ahead of our current state of practice and we're playing catch-up ball.

In the area of microelectronics in the time of which I spoke of, early '90s, everybody bought American microelectronics because they were the best. They didn't buy them because we were making people buy them. They bought them because we had the best stuff.

Now, 80 percent of microelectronics, if I understand the figure correctly, come from Taiwan, not that Taiwan is not a reliable partner, but they're not coming from America and Taiwan is uncomfortably close to a nation which in many ways has declared itself to be an adversary of the United States, a World War II ally which is not an adversary, meanwhile our other World War II adversaries are now allies. This is an unfortunate turn of events, but it's something we must pay attention to.

Microelectronics undergirds everything we do in a way today that it did not even 25 years ago and certainly not when I started in the business 25 years before that. Today, even if, and this is a big if which is not even true, even if our defense industry were not dependent upon or solely dependent upon civilian microelectronics, I often ask if we are victims of malware or undesired features in the microelectronics that we buy from offshore, if another nation can bring about the collapse of the civilian economy through such features or through such malware, in what sense can the Department of Defense have been said to defend the nation? I mean, if you think about it, the purpose of our national security community writ large is not only to defend our bricks and mortar but to defend our economy and our way of life.

If we cannot rely upon our software and the controllers that that software implements, if we cannot fully trust and rely upon the microelectronics and software we purchase and implement, then in what sense can we be sure we have defended the nation? It's not a comforting thought. So what do we have to do? How do we have to reinvest to get American microelectronics back at the top of its game, to where not because we subsidize it but because economically it competes with the best in the world and becomes once again the first choice?

How do we develop hypersonic systems that can hold Chinese assets at risk in a way that they can hold our assets at risk? How do we expand and extend our missile defense system to be everywhere all the time instead of waiting on the ground in case an adversary re-entry vehicle shows up in the skies overhead? That's the last place, not the first place that I want to start the engagement.

So the grounding principles behind the undersecretariat for Research and Engineering are rooted in the National Defense Strategy released in January. This is the first National Defense Strategy in a very long time that, in my opinion, has had real meat to it. And even the unclassified version of the strategy is unmistakably blunt, a characteristic I share.

The strategy calls out areas of current practice that need to be addressed, but it also calls out 10 or a dozen areas of modernization priority, areas in which the department and the national security community in general must modernize to get ahead and keep ahead of our adversaries. And that modernization is exactly -- that set of priorities is what has been handed to the research and engineering establishment to address.

My job is not F-35. My job is what comes after F-35. What are we doing to modernize our way of war and the weapons we bring to it that we don't have today? And so those 10 or a dozen or so priorities that are called out in the National Defense Strategy, everything from artificial intelligence, to microelectronics, to directed energy weapons, to more comprehensive missile defenses, to more comprehensive space offensive and defensive capability across the board, those are my priorities so and that's why the history lesson is why they're priorities and why I believe why the secretary has said that Congress was wise to reorganize the department to address these priorities, because the department frankly would not have reorganized itself. That's just too hard. So let me stop there.

Rebecca, I'm happy to answer your questions. I'm happy to engage with the audience as best I might be able to do so.

**HEINRICHS:** Wonderful. Thank you. I want to start sort of bigger picture policy and then if I could kind of zoom in a little bit and ask you some more technical questions. One of the things that has been and I have perceived as a cause for how we've gotten behind is that there's still sort of an even bipartisan consensus that one of the ways to maintain stability is to have parity between peers. And this idea, it's very popular in the missile defense community. If we don't want to have an arms race with the Chinese and the Russians, we can't go beyond parity. I know that is not your view. Could you speak to that point?

**GRIFFIN:** Well, in my view, the concept of obtaining parity is intellectually bankrupt. The United States after World War II through the decisions and actions of some very far-seeing gentlemen at the top of the group, people like George Marshall, who was both secretary of state and secretary of defense at different times as well as chief of staff during World War II, the United States recognized, those people recognized that the necessity of a worldwide rules-based order having at its root principles such as the rule of law, the relatively free movement of trade and money and the capitalist enterprise, the sovereignty of nations. That rules-based order, the rule of law, the kinds of things that undermine western principles that are deeply rooted in the American DNA, if you will, and in western civilization generally.

That American-led and buttressed international order has served us well for over 70 years. We've not had a major global conflict for over 70 years. Yes, we've had brush fire wars. Yes, we have had times when Americans did not fully adhere to our own best principles. But those are bumps in the road. They're not the strategic path.

When we allow nations who clearly do not believe in a rules-based world order, do not believe in national sovereignty, do not believe in fundamentally capitalist principles of movement of money and people and trade, when we have nations that declare themselves and global powers as Russia has declared itself to be an opponent of American influence, China declares itself to be in opposition to American influence, what they're really declaring themselves to be is opponents of a worldwide rules-based order with international norms along the lines I've spoken in favor of an autonomy that they direct. And that ought to be unacceptable to westerners generally, to those who adhere to western principles, and to Americans. That ought to be unacceptable.

The only way to discourage and deter such people is to be clearly so much more powerful than they that they choose not to fight. If we strive for parity, then we are always leaving room for a slight change on the margin to result in greater capability on an adversary's part than our own and that is a very tempting situation for them. There is always a temptation if a small gain is made that can be decisive in the outcome to use that while they have it. So parity is the adversary's friend, not our friend.

The way to maintain the relative degree of peace we've had for the last 70 years in contrast to centuries of warfare before that, the way to maintain that degree of relative peace and to extend and increase the degree of that peace is to be so powerful that no one believes ever that they could prevail in a conflict.

Now, is that costly? Yes, it is costly. It is very expensive and it has used a substantial portion of fortunately a very rich American economy for 70 years. It is expensive. It is trivially cheap compared to the cost of the war that we avoid. The cost of World War II was I can't count it like I don't have a good finger for the economic cost, but it must have been measured in trillions, even in then-year dollars.

And it was, according to the best historical estimates I've been able to find, some 50 to 60 million people dead, 50 to 60 million people and some estimates are higher. I think there are none that are lower. This is 50 to 60 million individual lives whose lives were as valuable to them and their families as any of us in this room today. Those lives were not less valuable because only 500,000 of them were Americans. They were people's lives. This is the cost of global conflict that we avoid by being so strong that adversaries are not tempted.

So parity does not achieve that goal and I do not support it. Fortunately, my boss agrees. His words repeated over and over or we need to be in a position of dominance by 2028. His goal is not parity so...

**HEINRICHS:** And I think that's great. I think it also really explains well why this characterization I know I often hear that we're overly worried about China and Russia because if you look at the amount of money that the United States spends defense versus theirs, ours is so much bigger that clearly we have superiority. But...

**GRIFFIN:** We spend ours so much less efficiently that we don't have as much of a lead as the monetary comparison would have you believe.

**HEINRICHS:** And not only that, but we're trying to do different things. Our mission is different and we're trying to do very different things. But having said that, you already mentioned specifically the area of hypersonics, so one thing I tell people who make that argument is you have to look and see what the enemy, what the adversaries are investing in. It's not just enough, the total money, but what it is that they're investing in and what they're trying to hold at risk for the United States and our interests.

So you spent a lot of time talking about hypersonics, but can you explain to us why in particular that threat to the extent you can in an open and unclassified setting, why is that such a concern of yours? And then I'm just going to ask it now and maybe you can touch on that in terms of against it, what is the hard part about it? Is it sensors or is it shooters or is it sensors and shooters?

**GRIFFIN:** Well, let me start with the last question first then, and I'll try to give a more comprehensive and regrettable long-winded answer to the first part. So the hardest part of hypersonics is the sensing frankly. The shooting is not. It's frankly one of the easier targeting tasks we would have in the missile intercept world because attacking hypersonic vehicles themselves are relevantly fragile during their long phase of cruise flight. They're fairly easy to destabilize. They're in a very difficult flight regime and their, decoys are not possible. They glow brightly in the infrared. If they're going to reach their target, they have to be in relatively straight line trajectories. Yes, they can maneuver, but they can't maneuver in their cruise phase as easily as an interceptor can maneuver.

And so if you can see them coming and if you can get them during the vulnerable phase of flight from a guidance guy's point of view and I'll say here I used to teach the subject from a guidance guy's point of view, the hypersonic interceptor in cruise is not the hardest problem we have. Now, if you let them get into terminal phase where we've observed that they can pull many, many G's, that then becomes a hard target. So if you allow an attacking vehicle to get close enough to begin its terminal dive and the terminal diver might be from 100,000 feet onto a carrier battle group. If you let them get that close, you're probably dead meat because that's a very hard intercept problem to get it at that point.

So the challenge with hypersonic vehicles is to know that they are headed your way from several thousand kilometers out in time to get your defending asset into the battle space. Frankly, right now we just don't have, there are areas, of course, if we were a land mass nation like Russia knowing that an attacking vehicle was coming from several thousand kilometers away would not be so difficult.

But what we are trying to do is to maintain a certain degree of global order largely through maritime power projection which centers and has centered since the Japanese sunk our battleship fleet at Pearl Harbor, it has centered around carrier battle groups and submarines. And the main way in which we project American tactical power is through the carrier battle group. Well, the hypersonic weapon, because we don't wallpaper the surface of the ocean with radars to allow us to know when an attacker is coming, largely in the current environment we don't see those things until they're way too close for comfort.

So sensor problem is the critical one. We need and do not yet have global, persistent, timely accurate knowledge of what's going on in space and the upper atmosphere and that's what we have to have. So from my point of view from the defensive side, the sensor challenge is the hardest one.

Now, why is this such a threat? Well, when we talk about our relative level of expenditures in defense between us and, say, China or Russia or any other in some unknown future punitive adversary, you mentioned that we have to spend more because we have to do so much more. Well, that's exactly right. See, the defense has to defend against everything all the time. We don't seek to be an attacking nation. We seek to defend and promote a stable

world order. So we can have no areas of vulnerability. An adversary nation only has to win once. We have to win every time across all theaters. That's a serious challenge.

The offense can seek out our weakest point and concentrate its efforts there. So at present, the United States has actually given adversary capabilities a relatively impressive missile defense capability. It is my assessment that we have quite a good capability now against re-entry vehicles in their mid-course and terminal defense with THAAD and SM3 and SM6, our Aegis systems. We have relatively good missile defense capability for a relatively limited attack. I don't think we could withstand an ICBM onslaught by Russia, but that's not our most immediate threat.

We have very good air defense capabilities. But hypersonic systems, the way that they are built and flung and targeted overfly our air defense systems and underfly our missile defense systems. So China has, over the last decade with great care, developed a tactical system capable of reaching out through ranges of several thousand kilometers that overflies air defense, underflies missile defense and can hold our assets, our forward-based assets whether land or maritime at risk. Nothing I'm saying here is classified. You can find these assessments in open literature, Aviation Week, for example, or other things. Not putting any numbers on anything, I'm just saying this is just a general level of capability.

But that's critically important because that's a tactical capability that an adversary has developed that holds what for us are strategic assets, carrier battle groups and forward-deploy forces on land at risk because for us these are means by which we project strategic power short of nuclear deterrence.

So by allowing that non-parity to continue to exist and it's non-parity on the adversary side, we allow their tactical systems to leverage our ability to project strategic power, leaving us no option in the case of aggressive behavior on their part, leaving us no option except either to accept their behavior or go nuclear. I don't think we want to do that. And so this is an area where we must see their hand and raise them one. We must at least be able to defend against their use of hypersonic weapons should that come about and we must be able to hold their assets at risk with systems similar to but better than what they have fielded. And that's why this is so important to me. It's the leverage of the tactical asset on our strategic intentions.

**HEINRICH:** And on that point then, too, so you said sensors so we've got to have better space sensors. We have the...

**GRIFFIN:** Unfortunately, the only way that I know to be able to, in my phrase, "see them coming" is from space. I mean, if I had enough ships with radar in the right places and enough radars on land masses where we have come control, then you could do it that way, but we don't in that sense, and so that's an impractical solution to the problem. The only way I know to survey all the required area, you have the tracking level of accuracy we need in space.

**HEINRICH:** And General Hyten, commander of Strategic Command has said the same thing. He's also made the point that having a robust space architecture or even just better than the one that we've got that that would also significantly qualitatively squeeze out more capability from current systems even against the ballistic missile threat.

**GRIFFIN:** Oh, of course, yes.

**HEINRICH:** So it's not like it's going to get just at this high-end threat, it also will significantly improve the entire system against the threats that we're seeing from North Korea. So that's expensive. Space sensors are expensive, worth the cost. Of course, I agree with you on that.

But you talked about how in your job you're looking at over the horizon, but some of this stuff is not that far over the horizon. It's sort of near horizon. So how do we -- and there was no money for this kind of thing in this latest Missile Defense Agency budget. There's about \$11.5 billion for current programs and expand programs that if we're going to talk about space sensors it's probably a lot. It's going to be more money in there. So can you talk about that?

And then also just the need to go faster, so you're talking about long-term, but again I would still consider these things that you're talking about, simply because we're behind we got to go faster. General Hyten has talked about the need to go fast. How do we get the necessary funding for these priorities, get them into budget, get cracking on them and then especially not just because of the partisan politics in Congress and all that kind of stuff but the bureaucratic inertia that exist that always seems to be slowing down really good, big picture policy initiatives?

**GRIFFIN:** Well, let me kind of get at that, then. So, first of all, for budget priorities there is a -- so the National Defense Strategy was released in January and until then I think it could be fairly said that the department had not, since the last administration, laid out new priorities. OK, that's now been done. Those priorities are available for anyone to read. No one is trying to hide them or keep them from you. Priorities are clear.

The National Defense Strategy openly states that we have returned to an area of global power competition and that the United States must recognize that and prevail. We've laid out our technical priorities. If you think we've missed one, drop us a note. There's no pride of authorship there really. We're happy to add priorities, but we have I think a pretty good list.

Obviously, since the report came out only in January and the team for this administration, I was not confirmed until three weeks after my job officially started. It's been difficult to get appointees through in the Trump administration. Some of that has been because of just the normal churn of doing business as you change administrations and some of it is because frankly not everybody accepts the results of the election. But it has been notably more difficult to get appointees onboard in the Trump administration, but I think the last of us are now in place at DOD.

So, of course, we have to reshape the budget, Okay? And the budget that we inherited, the plans that we inherited are not the plans going forward. We're making new plans. We're going to reshape the budget. If you look at the FDIP today there is exactly zero dollars allocated against any of these new priorities. I mean, how could it be otherwise?

So our task, the fiscal 2019 budget is already largely prepared. We will work at modifying it on the margins. But our real task is to reshape PB20, President Budget 2020 and beyond. I have a real sense that not bipartisan but non-partisan thoughts are largely governing this renewed vigor in American defense preparedness. I'm personally getting acceptance from both sides of the aisle and nobody's asking who I voted for or why, they just want me to do my job. Right after this meeting I'm headed up to the Hill for just those sorts of discussions.

I think we have in our secretary someone who is absolutely accepted as somebody who doesn't care about any of that stuff. He just wants to move the ball downfield. He spent several hours yesterday in testimony to the House Armed Services Committee and I thought the level of acceptance by the Congress of him is extraordinary.

So we're going to be reshaping the budget to fit the priorities that we say we have. We're going to do our very best to deliver value for the money that the American taxpayers have given us because we've done very well in the budget this year.

Now, an important part of doing well for the taxpayer is to speed things up. I started out today by saying we've kind of been on holiday for 25 years. It is always shocking to me to hear myself say this, but I turned 69 this year, so I don't have to read in history books. I can remember when, I participated in programs which moved at light speed, OK? This country knows how to do things urgently when we're frightened or when there's a major priority.

I had the privilege of speaking with Chairman Thornberry a couple of weeks ago just in a private meeting and he was asking, what can you do to make things move faster because when I hear reports that it takes 16 years to go from stating a need to initial operational capability, I don't even care if the number is right. Even if it's not exactly right, it's so far wrong that it's unacceptable. What can you do to bring that into a small number of years? And I said, well, sir, my immediate reaction is we can either keep our processes or we can keep our preeminence, but we cannot have both.



We've become a process-driven acquisition and development culture where our primary goal seems to be to make sure that we never make a mistake in acquisition, we never have a protest, we never make a wrong technical choice and we spend so much time trying to prevent a mistake that the cost of not making a mistake in the large is bigger than the mistake. I mean, at some point try something and see if it works and that's what I think the Congress was going after when they created my position.

But, I mean, I can cite specific figures of things that this nation used to do. I believe it is true. I hope I don't misremember the number. But we developed the SR71 in 22 months from a standing start. I know for a fact that it was 32 months from contract award to first flight of the first F-117A Stealth Fighter. A technology we had never done before at all in any field and we built an airplane with fly by wire control systems and stealth capabilities and it was pivotal in the first Gulf War. And we had it on the ramp in 32 months. It would take 32 months today we'd still be arguing about the requirements. I mean, that's not a joke. That's not a hyperbolic statement. We would be spending 32 months to argue about what the requirements for the Stealth Fighter should be.

I personally was the chief engineer, project engineer, whatever you would want to call them, on an SDIO mission, an intelligence-gathering mission that did reconnoitered on the first soviet boosters in powered flight where we watched them come up off the pad, do staging, inject payloads into orbit. The other name for those was targets, all right? So if you're going to shoot at a target, you really need to know what it looked like and we did not have any, we did not have any in defense intelligence information on what rockets look like in powered flight. So we put together a mission that would make those measurements in several spectra and we built and flew it in 13 months from a standing start.

In another mission that we did in something like 30 months, don't shoot me if I have it wrong by a few weeks, we put together a similar intelligence gathering mission that looked at our own re-entry vehicles during mid-course flight. What does a re-entry vehicle look like in mid-course flight to the sensors to have to shoot it? We did that in 30 months. I was for a time involved with something else. I was chief engineer on that one as well.

In the early years of SDIO, I was privileged to being again the project engineer on the first space intercept we ever did in this country against the booster in powered flight. From the time that Lieutenant General Abramson, the first director of Missile Defense Agency said go, which was in May of 1985, seems like a long time ago now, until the intercept, which we executed in September of 1986 was 16 months from nothing. Now, no one argues that those systems that we developed were ready for production. In fact, they were prototypes to demonstrate that you could do what you were trying to do at all. Our first interceptor weight a ton, literally, weight a ton. That's not tactically traceable.

That's not the point. The point is to demonstrate that you can do it at all. As PT Barnum said once famously about waltzing bears. The miracle is not how well the bear waltzes, but that it can waltz at all.

So in developing new systems, we have to move with that kind of a pace. Think F-117, don't think F-35 when you talk about our development pace. Now, the F-35 is proving to be an incredible weapons platform, an incredible warfighting platform.

But no one wants to repeat that acquisition cycle, neither the government nor the contractor want to repeat that acquisition cycle. So, my answer to your -- my long-winded answer to your question is those of us who are nearing the end of our career do not have to read about it in books.

We can remember when we participated in programs that developed systems along the timeframe that our adversaries are now doing. We can do that. Again, we just have to allow ourselves. And that will be part of my job.

**HEINRICHS:** And it's a leadership issue and it's managing expectations I think at the Congress because I was just talking about this the other day sometime in the Congress just expects every intercept test that we have to be a success. They don't understand that sometimes the SM-3 IIA is going to have a missed intercept and you're going to learn from that -- those mistakes...

**GRIFFIN:** The SM-3 IIA miss was the first version of this built by our Japanese partners in certain areas. But that was actually not the cause of the miss. I don't want to at this point go public with the issue, but the miss -- the flaw was in a highly standardized component that's used in other areas.

And I'm glad we spotted it because our question will be, is this a fleet issue or not because it's in other fleets? The component in question is used in other areas than just what we do in SM-3 IIA. So if you don't test and find flaws, you lead yourself down the garden path.

**HEINRICHS:** And then you made a great point. You talked about the confidence you have in our current homeland missile defense system, the Ground-based Midcourse Defense System. And there's a lot of mischaracterization of that program because people tend to look at the history of the entire testing record and sort of judge and condemn the system based on the whole testing record, which the early prototypes that we used for intercept tests are not the ones that are in the ground today.

**GRIFFIN:** Yes. I have shocking news for you. Our early interceptors were not as good as the ones we're putting in the ground today. I know that that upends your world, but the early interceptors that we put in the ground at Fort Greely and Vandenberg are not as good as the ones we have today. Go figure.

**HEINRICHS:** Mind-blowing, yes.

**GRIFFIN:** Anyway.

**HEINRICHS:** I want to save some time for questions from the audience, so if you all have questions, we'll go back here first and then we'll come back to the front row. Oh, right behind, the gentleman with the pin. Yes, Sir?

**QUESTION:** I work with Huntington Ingalls Industries.

We have a vulnerability today with drones, drones from Iran are flying center lane right down our ships in the Straits of Hormuz. Ploughshares are flying drones over our nuclear weapons facilities in Kings Bay in Bangor.

And in the not too distant future, you could certainly envision swarming drones as being a threat. Is there anything in R&E in your priorities that would address that somewhat immediate threat?

**GRIFFIN:** Well, yes, although nothing as rapidly as we would like. So the swarming drone problem is something that we absolutely see and recognize and are very, very concerned about. So there are two issues there. One is, of course, you have to have just plain enough shooters to take out the number of drones that you have.

Now, as we look toward the future, I frankly, I think our DE capabilities today, our directed energy capabilities are very close to the point where they're an effective countermeasure against swarming drones.

The other -- meaning we don't have to necessarily shoot bullets at them to get them, although I don't object to that. But the other part of the issue, the really difficult part of the issue is the acquisition, targeting and fire control.

And that's where I'm frankly looking to advances in AI, for artificial intelligence machine learning for a solution. The problem there is, I mean if you're a human being or even a crew of human beings and you're in a B-17 over Europe in World War II and you see half a dozen attacking Messerschmitts, your B-17 crew can probably deal with that.

They can't deal -- they can probably deal with six. They can't deal with 106. As Stalin famously said, "Quantity has a quality all of its own." A human crew just can't deal with that many. I don't know what the threshold is but 100 is going to be beyond it.

So a swarming drone attack is of concern just because of the mass. But an AI system I hope can be trained to deal with just such things. I mean in mathematical terms I like to fall back on the geek that I am. The targeting problem for swarming drones is a version of what's called the traveling salesman problem in linear programming.

It's a tough problem and in fact you can prove that there is no optimal solution available to you, but there are some pretty good solutions and you can prove that they're pretty good. If we can implement some of those kinds of solutions in an AI scheme, which appropriately prioritizes the ones which are some combination of the ones which are nearer, the ones which are faster, the ones which are apparently headed for the more crucial targets, that seems like to me exactly the type of challenge that we want to use AI to go after. Are we there yet? No. Do we recognize it as a problem? Yes. Do we have some thoughts we want to try on it? Yes. So, with all deliberate speed we're moving out on that one.

I'm going to pick.

**HEINRICH:** Okay. Well, go here then. Gentleman right here and then I'll go back to you, sir.

**QUESTION:** I'm an analyst at Capital Alpha Partners. Want to pick a little bit at research and development resources. When you look at the R&D and key spending profile for the Department, do you have the right mix between 61, 62, 63 and should more be for 64, 65 to get a little wonky on this?

And then for contractors, how do you incentivize the industry to spend more on R&D? Because we're still looking at two percent for most companies of their sales, is that adequate in this type of environment?

**GRIFFIN:** Well, I'll answer the second question first. Two percent is not an adequate R&D budget for America writ large, whether government or a corporate, okay? They historically accepted figure is more like 10 percent. I'm not here to tell you that it needs to be 10.0, but two is wrong.

In the old days at NASA, the first time I was at NASA in the early '70s our R&D budget was like 10 percent. And we were then a very vital organization. I think you need something like that to be properly funding the future.

Our mix between 61 and 2, 3, 4, 5, I don't know yet. It's easy to say, well, it's probably not what we want it to be, but I don't actually yet have enough time on target to know. I know that I want to return us to an era where prototyping is king before we get into production.

And my counterpart, Ellen Lord in A&S (ph) wants exactly the same thing. By the time she gets ready to sign off on milestone C for production she wants to know that we're buying the right thing.

And the way we've been doing it for some decades now doesn't -- it doesn't allow us to wring out the bugs until too late in the acquisition cycle and costs too much money and takes too much time.

**QUESTION:** Thank you. I'm with the Boeing Company. First of all, I just want to say thanks for coming back and taking this job. We're really glad you're there.

**GRIFFIN:** I'm glad I have enough money to fund it.

**QUESTION:** Some of the examples you gave earlier of when we were successful in going fast, great examples. What came to my mind was that one of the key aspects of that were the right people, with the right authorities.

Do you feel like you have enough levers to pull to make sure you have people with the right skills, experience, judgment to get us back to going fast?

**GRIFFIN:** Good question. We have the right authorities. The Congress has been very generous in the authorities that they've given us to hire people to execute programs quickly. They've given us a rapid innovation fund, which I plan to use.

I can really only offer praise to the Hill for their recognition of the issue and their rather strong lean-forward posture in trying to give us what we need.

Getting the right people is frankly not that difficult. People will make enormous sacrifices to work on these kinds of things if they believe we're for real. It's been a while -- the kinds of things we're talking about here were not a priority for the last administration. They just weren't.

When the very best people see that returning America to a position of unchallenged preeminence across all the domains we must have it, when they see that as a real priority matched by real money and real programs, they will be in my prior experience, frankly clamoring at the door to join the team. I mean that's what people do. And frankly, on the other side, I've seen again from personal experience that when you crank up the demands for excellence at speed, the people who can't cut it self-select out. They decide to go do something else.

**HEINRICH:** Here and then let's take the last one over here.

**GRIFFIN:** You can use the microphone.

**QUESTION:** The small business innovation research program has seen a lot of change over the years and it's one of the major sources of ideas, development, research -- there are two problems, one of it is process.

The process system what it takes for a small company to deal with the Department of Defense is still very cumbersome. And number two; there is a valley of death between the SBIR program and what follows.

If we are going to move fast, this problem has to be solved. I wonder what's your opinion, opinion on what is done there.

**GRIFFIN:** Well, I get a lot of questions like that. That it's difficult for companies to deal with the Department of Defense and frankly, I've served other places in the U.S. government. It's difficult for companies to deal with any part of the U.S. government. That's a fact.

It is in our interest to make it easier for you to deal with us and that relates to the authorities we've been given by Congress for different contracting mechanisms. So, I'm going to throw -- the first part of your question I'm going to throw that challenge back at you. When you see an RFP come out or when you are -- if you put in an SBIR proposal and what you get back from the Department is unnecessarily cumbersome or bureaucratic, raise the game, okay?

Identify what you think is non-value added and bring it back to our attention. Go above SBIR, okay? Come to our office, and I own SBIR for the department now. So go above SBIR and try them first, but if they don't agree that your objection is valid, raise it to a higher level and we'll look at it. I am on the lookout for non-value added processes. But I can't identify them by myself. I could spend all day looking at stuff and I would never get anything else done.

Yes. Okay. So bring to us what you think is not value added and we'll look at it. We will. The secretary has made exactly that same point to larger industry. Tell us what you think is broken and we'll look at it. We won't guarantee to decide in your favor, but you will get a hearing.

The second part of your question, how to deal with the valley of death? Well, okay, the reality is that most things that come out of SBIR should die. Okay? I mean, just because someone has a clever new idea does not mean it's a good idea.

**HEINRICH:** Yes.

**GRIFFIN:** The purpose of DARPA seedlings and SBIR programs and another innovative ways to try new ideas out is to see if they are good. Now, how to get the good ones through the valley of death? This is a long-held problem.

I don't know that I know yet. I recognize that as a problem. Once we like an idea, how do we find a champion for it to move it into prototyping and eventually production. I don't know yet. I would be more than willing to have suggestions on that point. What we can do once something works to move it along. I'm sorry to go limp on you. I just don't -- I don't know. If I thought I knew I wouldn't keep it a secret.

One more question.

**QUESTION:** Hi, I'm with Inside Defense. Yesterday, Secretary Mattis mentioned that you'd be setting up joint program offices for hypersonics and for AI. And obviously the first thing you hear or you think when you hear JPO is F-35 JPO. So I'm wondering what is your vision for these new JPOs and how they'll help you get out these technologies?

**GRIFFIN:** Well, I think the secretary was speaking loosely when he used the word joint, okay? So if you'll pardon me, Joint Program Office is a specific term of art that relates to a specific legal bureaucratic creation.

I don't know, in fact, I doubt that that is exactly what we're going to do. The secretary did say and if you would allow me to rephrase his words just slightly, we are creating a joint artificial intelligence center.

Now, the jointness will be -- will include elements of the intelligence community as well, okay? So it will be crosscutting across services in the intelligence community. We are and in fact my organization is charged with looking at structural alternatives on how we would create it, where we would locate it, who would head it. Who would be participating in it. We owe a report to Congress on that by go days from some date a couple of weeks in the past.

So sometime in mid-summer I will report to Congress on exactly how we're going to go and do that. So that we are going to do it is not in doubt, that it will be joint across not only portions of the department but outside the department is not in doubt.

How exactly we're going to set it up, still studying, when we know -- when we've made a decision, we're not going to keep it secret, we'll tell you. But I can't tell you that I got an answer today.

I don't think you should be thinking, however, I'll say I don't think you should be thinking about a construct that's like the F-35 JPO. That's probably not in the cards.

**HEINRICHS:** I thank you so much. Please join me thanking the undersecretary.

**GRIFFIN:** Thank you.