DOUGLAS ELMENDORF: Good afternoon, everybody, and welcome to the John F. Kennedy, Jr., Forum at Harvard Kennedy School. I'm Doug Elmendorf. I am the dean of the school, and I'm delighted that all of you could join us today.

We are honored to have as tonight's speaker Ash Carter. Ash served two years as Secretary of Defense and stepped down a few months ago. During his time in that position, he designed the coalition military campaign to county ISIL; executed a strategic pivot to the Asia Pacific region; and launched the Defense Department's latest strategy, among other specific aspects of defense policy.

He also spearheaded revolutionary improvements in the functioning of the Defense Department to strengthen the Department's ability to succeed in future years. Those improvements include pushing new investments in technology; changing the way the Department recruits and retains quality people; opening all military positions to women, without exception; and establishing Pentagon outposts in Boston, Silicon Valley, and other tech hubs.

Before become Secretary of Defense, Ash served as Deputy Secretary and Chief Operating Officer of the Defense Department. And before that, as Under Secretary for Acquisition Technology and Logistics.

A full rundown of Ash's accomplishments would use up all of our time, and you have not come to hear me; you've come to hear him. So I will press ahead.

Moderating tonight's discussion is our very own Graham Allison. Graham needs no introduction to a Forum audience. As you know, he is a very distinguished scholar of US national security and defense policy; the Douglas Dillon Professor of Government here at the Kennedy School; the founding dean of the modern Kennedy School; and the director

of the Belfer Center for Science and International Affairs. As the director for nearly two decades, Graham's vision and energy have been instrumental in making the Belfer Center the top-ranked university-affiliated think tank in the world.

Graham's latest project is a very important book titled, *Destined for War: Can America and China Escape Thucydides's Trap?* The book is coming out in a few months and lots of people are already talking about it.

Speaking of things that people are talking about, many of you have presumably heard the important news this afternoon regarding Ash Carter, Graham Allison, the Belfer Center and Harvard Kennedy School. For those who have not heard, let me summarize briefly: Ash will be joining the faculty of the Kennedy School as the Belfer Professor of Technology and Global Affairs, and he will become director of the Belfer Center. He will lead the Belfer Center's programs, teach our students, and focus his own scholarship on the role of innovation in technology and addressing challenges at home, here, and around the world. I am so excited by what lies ahead.

Graham is stepping aside as director of the Belfer Center, but fortunately will remain vigorously engaged in the work of the Center and in the broader mission of the school. I said earlier at a meeting, and I meant it, I am a better dean because of Graham's wise counsel, and I look forward to benefiting from that and working with him on the mission of the school for many years to come.

I should also mention that Eric Rosenbach, an alumnus of the Kennedy School, will be returning to become co-director of the Belfer Center and a lecturer in public policy. And we're delighted to welcome Eric back.

And I want to recognize the ongoing exceptional generosity of Bob and Renee Belfer. To bolster Ash and Eric's work at the Belfer Center, as well as the Kennedy School's other activities in global affairs and science and technology, the Belfers are making a major new funding commitment that will establish the new-named professorship to which Ash is being appointed, support additional financial aid for students interested in the topics of concern at the Belfer Center, and fund research initiatives and policy engagement by faculty members affiliated with the Belfer Center.

So for all of the Belfer Center's magnificent accomplishments for many, many years, we are on the cusp of a terrific new era. And that is to the credit of Ash Carter and Graham Allison. You've come to hear them, not me, so I will get off the stage.

Thank you all very much. [applause]

ASHTON CARTER: Thanks, Doug. And thanks to the Forum, by the way, for putting this on with short notice and no real understanding of what we were up to here. So I'm grateful to all of you, faculty and students, for attending.

Two months ago, I left the Pentagon as Secretary of Defense 35 years after I began my defense career there. And after working under Presidents of both parties and under 11 Secretaries of Defense, and I guess I was the 12th that I worked for. And as Secretary of Defense, I stressed the importance of innovation and of the next generation of young people to the future of defense. And now, in this new phase of my career, and across a wider range of issues, I wanted to continue to focus on both those things – innovation and the generation that will make a better world for us and our children. Because they will determine our future. And that's what I want to talk about with all of you tonight.

But first, I need to thank Dean Elmendorf, President Faust, Graham Allison and everyone here at HKS for this opportunity to join this exceptional institution and its noble mission. Indeed, Bob and Renee Belfers' unique and enduring vision has helped enable the links between science and international affairs and between the university and the public good for a long time. And with this new major gift, as Doug said, Bob and Renee have built another bridge between the Belfer Center's amazing presence and its bright future.

And to Doug. Doug, we've been discussing this possibility over the last few months. I deeply appreciated your inspiration, your warmth and your exceptionally thoughtful and organized approach to pursuing our ideas together. It's been a pleasure getting to know you. And the university and HKS are fortunate to have such an outstanding leader.

Graham. Graham Allison is quite simply a living legend. Graham's not only been a great director of the Belfer Center, named four years running as the top university-affiliated think tank in the world, but also a man without whom there would be quite literally no Kennedy School, the finest public policy school in the world. I want all you students to understand this, if you don't already: Look around you, this is, and always will be, the house that Graham built. [applause]

There's more cause for applause even than that. In recognition of all of our debt to Graham, Doug and I and Bob Belfer wanted to use this moment to create something to honor him. And I'm delighted that through the Belfers' commitment, we will establish a new Allison fellows program, which will be endowed scholarships for exceptionally qualified HKS students who focus their studies on the most pressing issues of technology and global affairs, fields that Graham has done so much to enrich.

And I also want to acknowledge one other debt to Graham. I appointed him to the Secretary of Defense's policy board, a group that includes Henry Kissinger, Madeleine

Albright, Bill Perry and others, that advised me on the most sensitive strategic matters. As with his scholarship and advice to government officials over decades, Graham's counsel contributed greatly to DoD's mission and to protecting the country and making a better world for our children.

Graham, for all this, and for our past and future friendship, thank you. Let's give you another round of applause. [applause]

In the Pentagon and out, Kennedy School students excel in leading roles. And one of the most exceptional among them is here tonight. Eric Rosenbach was my chief of staff at the Defense Department, and he'll be here with me at HKS as co-director of the Belfer Center. And as you will all come to know, and many of you will be reminded, Eric's one of America's finest public servants, cybersecurity expert, a remarkable teacher, and a real role model for young people dedicated to public service.

Now, as a former Secretary of Defense, I realized in leaving office that I had a chance to do many things, or actually nothing at all if I wanted to do, just hit the beach. But this new job has the mission to which I want to dedicate the next phase of my life – the innovation, science and technology and the next generation of young people that together will determine our future. And as I said, these were major commitments of mine in my last job. The Secretary of Defense needs to meet the security challenges and win the wars of today – destroying ISIL, which we will surely do, standing strong against Russian aggression, maintaining stability in the Asia Pacific, countering Iran's malign influence in the Gulf, deterring North Korea, to name a few. But also, at the same time, to meet the challenges and opportunities that an uncertain future holds.

That meant ensuring that my successor and my successor's successor continue to have what I inherited from my predecessors – the finest fighting force the world has ever

known. But I was always highly aware that this strength depended, above all, on those two ingredients, once again – excellent people who serve and unrivaled technology. Both are the reasons for the excellence of the US military. And this excellence isn't a birth right, it's not automatic. It has to be re-earned in each generation.

Let me start with technology. When I started out my career as a physicist, most technology of consequence originated in America. And much of that was sponsored by government, especially the Department of Defense. Today, government's still a major sponsor, but the technology base is global, and more technology is commercial. That provides us with enormous opportunities, but, at the same time, other countries have been using those facts to try to catch up and overtake our edge.

And as a result, when I became Secretary of Defense I realized I could only accomplish our goal of tech excellence if the Defense Department was connected to America's tech community. And that's why I set out not just to spend more on technology, which we did, $72 billion in one year on R&D, which, just to give you a little calibration of that, is more than double what Apple, Intel and Google spent, combined, in a year. But we also had to build and rebuild bridges between the tech community and the national security community.

One way we did so was through the Defense Innovation Unit, experimental or DIUxes, which I created to help connect the DoD with start-ups and other commercial tech firms here in Boston, in Silicon Valley, in Austin, and everywhere in between. Another was the Defense Innovation Board, which I established and Google Alphabet's Eric Schmidt chaired; Jeff Bezos served on it; LinkedIn's Reid Hoffman; and many other leading innovators, top thinkers and doers from the private sector, from academia. And they brought a culture and a mindset and the practices of the tech community – and this was my intent – to the Department of Defense.

Another way I tried to do the same thing was by establishing the Defense Digital Service, to recruit talent from the tech community to work with the military for a specific time, on a specific project. To apply a new approach to solving an existing challenge, not forever, not for a lifetime, not for a career, maybe just for a year, maybe just for one project. Give it a try. Do something you'll always be proud of.

In building these bridges, I discovered two things, which are important to my view of the use of technology to support and pursue not only the mission of security, but other critical aspects of the broader public good. And that's why I took this job.

The first is that the bridges between tech-driven change and public purpose need to be repaired and restored in fields well beyond defense. They don't maintain themselves. When I was the age of many HKS and Belfer fellows, the influence passed down by the World War II generation of technologists to those who trained me was still very strong. To win that war, those giants developed radar, nuclear weapons and so forth. In the decades that followed, they believed they also had a continuing responsibility to wrestle with all the consequences of their innovations, particularly in those days in regards, of course, to nuclear weapons, one of the many topics of research in the Belfer Center.

And on the one hand, those scientists recognized that their work to produce the bomb had likely hastened the end of World War II, deterred the Soviet Union and the Cold War and made nuclear power possible. But on the other hand, of course, it posed the danger of total and annihilating war, proliferation to other nations, possibly to nonstate actors like terrorists, and accidents like Chernobyl and Three Mile Island.

With all of this experience, it was in the DNA of that generation of technologists to work for the public good and to continue to apply their technical insights to resolving the

challenges that came during the Cold War. I was fortunate to know and to be mentored by many of those technologists from that era. And they instilled in those they trained a sense of the same responsibility.

So the first thing I discovered when trying to build bridges to the tech community is that many of today's innovators do not have the same historical links to thinking about the broader public good.

But I discovered a second thing about today's innovators here in Boston, in Silicon Valley and elsewhere, and that is that many of them were extremely receptive to the commitment to serve the public good. After all, these are people driven by a desire to do things of consequence, and who have the thirst to turn their innovative minds on big challenges. They just need the partners to do so, they need the route to do so. They don't always find them in the private sector since understandably investors in capital markets start by focusing on the upside and not all the effects of tech-driven change.

That's why I believe we need to ensure that our innovative engine works for all of our fellow citizens by building bridges that bring innovators and public purpose together. We have to do this to retain our competitive edge as a society in the same way that I sought to retain our competitive edge as a military.

When I was building and rebuilding bridges as Secretary of Defense, I found most technologists and innovators increasingly feel both the opportunity and the responsibility to address these challenges, and they're seeking ways to do so. They're looking for ways to do so. And I've seen in my experience that technologists who are experts at these innovations must be at the table as society figures out how to maximize the benefits and minimize the downsides to protect people and communities and livelihoods and more from potential unintended and adverse consequences.

Before I became Secretary of Defense, for example, I was working with a group of technologists and innovators and educators in opportunities to use technological change for the broader good of Americans. Spent the better part of a year on this. Indeed, the night President Obama called to offer me the job of Secretary of Defense, abruptly interrupting this interlude in my life, I was at dinner, focused on this project. And I still remember looking for a quiet place to take the call. I was standing outside the kitchen, talking to the Commander in Chief, going back and forth about the job and him asking me whether I'd take it. Which I did.

The point of the dinner and the project though were to get all these people together that we had together at the dinner, not for national security, but to engineer ways we could make sure Americans had the skills to be secure in their careers and livelihood and competitive in the world. We looked at ways, for example, to widen the use of Linked-In-type communications, which I had introduced into military recruiting and retention, between a broader range of employers and employees, not just professional, traditional professional employees, but a wider range. We investigated approaches to lifelong training, skill development and to credentialing.

We sought opportunities to provide tech-enabled market access to US companies, large and small, so that they could export goods and services to the global middle class. Not only manufactured goods, but also services, like energy, engineering, architecture and design, and so forth.

We looked at how to give small and medium-sized enterprises access to big data and the tools to use it. And we worked with public and private institutions to develop regional tech hubs.

I believed then that these efforts to widen the opportunities of technological change, to lift up all citizens would be critical to the American future. And at the same time, when too many people in too many parts of the country feel left out by change and innovation, I believe we must do more here to make sure all Americans can benefit from the revolutions we're experiencing.

What that project help me understand about putting technology and technologists in service to the public good today is that the spirit is there with many innovators. But the bridge connecting them to contribute too often is not. So I'm encouraged by this spirit of public responsibility by innovators in this generation, just as in mine. And I believe that HKS and the Belfer Center specifically, and all the researchers and students here can be the very place to identify and build the bridges for technologists and innovators to make that essential and responsible contribution.

Seizing these opportunities is essential to our success as a nation and a civilization in the 21st century. And I'm excited to work on all of these challenges with you.

And finally – and now I want to address all the students that are here – there's another key ingredient besides technological innovation that will determine our future, and that's young people who commit themselves to the greater good. Here, too, my experience at DoD was an important factor in my thinking. The US military is an all-volunteer force. So I devoted an enormous amount of effort to building what I called the Force of the Future. We launched a series of initiatives to ensure DoD continues to attract and retain quality young people even as the economy changes, labor markets change and generations change, including how people think about such things as career and family.

As you may know, for example, I made a decision to open up all military positions to women, without exception. I did that because 50% of the population is not something that

an all-volunteer force can afford to leave on the table if they're the best qualified to do the job. But you might not know something else. And that is that at present, 40% of military recruits come from just six states. So one Force of the Future initiative sought to get recruiting going in those other 44 states.

For retention of those who were further along in their careers, continuing education and training are big motivators. But so are family issues since the US military is a much more married force than the US population more broadly. And that's why I directed expansion of maternity and paternity leave for all DoD employees, which has, since DoD has by far the largest number of federal employees, was quickly followed by the rest of the federal government.

All this was important to continuing to attract the best young people to Defense and keep them. But in the end, by far and away, the biggest factor always, these are the things that are important, the biggest factor wasn't DoD's talent management, but its mission. As I said earlier, everyone in DoD is doing one of the noblest things a person can do with their life, which is defending their country and making a better world for our children. DoD's people provide the security that allows us all to come here together tonight, allows millions and millions of people, not just in America, but in so much of the rest of the world, to be safe, to raise their children, to dream their dreams, to live lives that are full.

And more than a few of them are HKS students and alumni. I ran into HKS folks everywhere I went – forward operating bases in the remotest parts of Afghanistan, at defense ministries around the world, at tech incubators working with the Pentagon, here in Boston or in Silicon Valley, in the board rooms of the world's most respected foundations and nonprofits, in the White House Situation Room, of course in the hallways of the Pentagon

One of my favorite memories was when I met one of my former students, who was a Special Forces lieutenant colonel in Erbil, where he was leading one of the most secretive and critical initiatives in our coalition campaign to destroy ISIL. And I greeted him and he said, "Hello, Secretary Carter– I mean, Professor Carter." [laughter] And then he said, "Listen, I hate to bother you with this, but I've got an embedded reporter with me and I can't shake him, so do you mind talking to him?" I said, "No, it's fine, I'll go talk to him." We go down to the bunker. The reporter's my student. [laughter] They're all over the place!

And then I met another example, just last year, when I was abroad the *USS Blue Ridge* in Goa, India, which was making an important port visit to one of America's most promising and fastest-growing security partners. And I walked up the gangplank and there was a vice admiral, also an HKS student.

So each of those HKS grads, like each of you here today, each of you here today, that I'll be joining shortly, is dedicated to putting their days and their talents in service of the public good. And I'm so proud of you for making that choice. So proud of you and all you're doing to prepare yourselves and to develop the ideas that'll make a better world for our children. You're my kind of people. And that's why I'm so confident in the future. And that's why I wanted to be here, and who I want to work with to continue to make a better world.

So I look forward to doing so with all of you. Thanks. [applause]

GRAHAM ALLISON: So this is a great day for the Kennedy School, and it's a great day for me personally. And I think it's a great day for students and fellows to imagine that we're just about to have on our faculty, come the new academic year, July 1st, and just about to have as director of the Belfer Center a fellow who was just a couple months ago

called the Secretary of Defense, who's this normal, reasonable, interesting, generous human being, our colleague Ash Carter.

For me personally, I want to say thank you to Ash and to Doug for the generous words. It's been deeply satisfying for me to have led the Belfer Center and to be part of the Kennedy School. And I continue to look forward to be part of the Belfer Center and be part of the Kennedy School. But I think it's especially gratifying to think that now the reins are being handed to Ash. And then Ash even doubles up and we get two wonderful opportunities with Eric as well. So the reins of the Belfer Center and this part of the activity of the Kennedy School are going to be in the hands of people who, for the next generation, will make people like Joe and me, Joe Nye, my colleague, people who've got some institutional sort of memory of the place extremely proud. And this is kind of building from strength to strength. So I think we ain't see nothing yet. [applause]

So there's going to be an opportunity for you to ask questions from the floor in about 10 or 15 minutes, but we're going to do a kind of rapid-fire– I said, Ash, I can ask you heavy questions about China or Russia or nuclear, and Ash, that's where he lives all the time, but I think it'll be more interesting for those of you who don't know Ash to get a little more sense for who is this former Secretary of Defense, who is this person that's going to be part of our community. So we're going to try to go sort of tweet-sized questions and tweet-sized answers. We'll see how that works.

So Ash, you studied physics and classics.

ASHTON CARTER: And medieval history.

GRAHAM ALLISON: If you were doing it over again, that's what you would study in college?

ASHTON CARTER: I would. Everybody's different. For me, it was a right brain/left brain thing, and I was captivated by physics and the orderliness and the discipline and the rigor. Medieval history, the reason I stressed medieval, the thing that appealed to me, if you think about the Middle Ages happens to be long; it was 1000 years. So the medievalists got themselves a big chunk of real estate and an awful lot happened. The Church was established. The nation state was established. Many aspects of the banking system were established. The common law.

And so, many of the things that we inherited came from there. And so, it helped to understand how things are the way they are by understanding that period. I thought that was neat, and I liked everything was in foreign languages, and I like to learn foreign languages.

So they were two different things; ultimately I had to choose and I chose physics. But it's good training, I think, to not only go where you're comfortable but sort of stretch. And that was what I was doing.

GRAHAM ALLISON: So if you look at Ash's résumé, you'll see he was a summa in college, and then he studied at Oxford as a Rhodes Scholar, and so forth. But there's one really serious blemish, if you examine carefully, that he somehow went to school in New Haven. [laughter] So if you were doing it again, you would do that again?

ASHTON CARTER: At the risk of being locally unpopular, it was a great education. And I was one of these kids that came out of a public school in Philadelphia, and I had no preppy distractions or anything like that. I was just, I'm paying the money, I'm going to get the education. And they delivered. So I enjoyed it. And there are a lot of good places; Harvard's obviously an excellent place as well. But on regrets, it was a great place.

GRAHAM ALLISON: You've emphasized what you think is relevant for the Belfer Center and the Kennedy School in the next phase – science, technology and innovation. For students at Harvard who are studying physics or biochemistry or engineering, what's the opportunity in the space that excites you?

ASHTON CARTER: Oh, geez. I'll just take a few of them. I'll start in a place you may not expect me to, which is, you mentioned, biotech. And you actually have some work going on here at Belfer, which I think is important in that field. That is the field of science which will, as tech-tech – that is, IT-type tech – has dominated the last few decades, including warfare and conflict, it will disproportionately dominate the next few decades. And as usual, it'll be complicated, and the pace of change and the nature of change will be good in many ways, but will be disruptive, as the phrase goes, and that disrupts people's lives. And somebody needs who understands what's going on also needs to understand society's need to deal with it. And that is a public good. And we're in that business.

I also want to say though, you don't have to be a technical expert to get behind the agenda. We have a lot of people who were trained in other academic fields and other academic disciplines. It's not the point that you have to be a scientist, it's just that you have to– if you're using whatever skills you have to address the pace of change and the need to help our fellow human beings to get what's good out of that, and be able to not be afflicted by it, that's a good thing. Because that's one of the major things driving our society. And if you want to be in the middle of things, you have to be in the middle of technological change. But you don't have to be a scientist. I would like scientists, as I said, to be more involved, motivated. They're actually quite motivated, as I said, but have some way of getting there.

AI, automation; these are things I was always asked about as Secretary of Defense – what are we going to do about AI, and what are we going to do about autonomy in weapons systems and so forth. And if you want to know the answer to that, I believed, and I actually promulgated the rule that there will always be, and should always be a human being involved in decisions to use force. But I think that that can be done in a way that's consistent with getting the best out of autonomy.

So all these fields are exploding. They have major consequences for people. And even things that are technically quite mundane, Graham, like a new app, which isn't rocket science in its own right, can have cosmic consequences on the people who are affected by it. So it doesn't have to be a Nobel Prize-winning breakthrough to make a substantial difference to public life. And those of us who care about the public, we all need to pay attention to those things.

GRAHAM ALLISON: For those of you who don't know Ash as Doug introduced him, I think you were certainly best-prepared person to be Secretary of Defense. You were Assistant Secretary of Defense, and you were Under Secretary of Defense, and you were Deputy Secretary of Defense. So you basically had to do all the jobs that almost at all the levels. So how did that advantage you?

ASHTON CARTER: Bureaucracy in a box. [laughter] I hit all the layers. Well, I mean, it's not everything, because you have to know the world and you have to know your society and you have to know how the rest of government works, and so forth. But it is very valuable when I did happen to know very well how the Department of Defense worked. And what that means very simply is, nobody can hide anything from you. Believe me, I know where every nickel in the whole place is, and I know what everybody does, and I know every operation that we're conducting and who's where around the world, and everything we're buying, and so forth. And that helps.

Again, it's not everything, but it's a kind of mastery, and if the President asks a question and you can help the President who has a tremendous span of control of things to understand and master, help him understand that, it's a real asset.

And don't forget, the job isn't just a foreign policy job and a warfare job, important as those things are. It's also a huge management job. It's half of the federal budget. So when I was COO, the number two job, and when I was the spending guy, the number three job, that's half the federal government. Everything else – education, road –, everything else is the other half. And they're very extremely important things. But that's a lot of spending.

GRAHAM ALLISON: My wife Elizabeth said, "Do you realize that during Ash's tenure as Secretary, he spent over a trillion dollars of our money. Ask him, did we get our money's worth?" [laughter]

ASHTON CARTER: I think you by and large do, but I'm not entirely satisfied with that. By the way, it's a lot more than a trillion dollars. [laughter] Tell Elizabeth actually accumulate a little bit more than that.

I say not entirely satisfied because you do see programs that are cost overrun and so forth, and I don't want to excuse them or try to apologize for them. I fought hard for what I call something called better buying power, to instill more discipline and rigor in the process of spending the taxpayers' money. I said I can't go and ask you to give us more money or the amount of money that we need to defend you if I can't show that I'm spending all of it well. And so, it's essential to retain the trust of the population, and therefore their ability to support us in doing what has to be done, that we spend this money responsibly. That's a constant struggle.

At the same time, there are really great wonders. In the summer of 2010, for example, as Under Secretary, building 258 bases in Afghanistan. Nobody else can do that, the United States. We built 258 bases in the space of a few months in what is the most god-awful logistics environment you can imagine, a landlocked country in the heart of Central Asia.

I'm very proud. It's a complicated and subtle campaign but it's proceeding on the path that we put it on a year-and-a-half ago to deal ISIL a lasting defeat. I'm confident that that will occur. You see it unfolding today in Mosul and Raqqa and elsewhere around the world. And it's a very complicated thing being executed by and large– and there are always ups and downs in a war. But by and large with tremendous skill.

So I think overall people, they should be demanding, because this is your money and it's your security. But overall, I thought that the Department, not me personally, but the Department does a pretty good job.

GRAHAM ALLISON: Ash, I had the great opportunity to work with you. I would wander down. And the great thing about being a consultant is you say, "Boil the oceans. The submarines will come up. Now a few details for you. And I'll be back next week." You had a very specific set of ideas about what you were trying to accomplish in a short period of time. So as you look back on it, in what area did you wish you had been able to do something more different or otherwise?

ASHTON CARTER: I'll answer that more in a minute. First, you sell yourself short though, Graham, and I need to say this. That's not the kind of advice Graham gives. And there were a number of occasions, and one we were talking about today, and I can't actually share it with everyone here, but it had to do with Iran. And I was wrestling with a particular problem and I just couldn't figure out what to do. And Graham unstuck it in one of our conversations in his office. He gave me a way of thinking about it, and I said,

bingo. And I remember it very clearly. And I remember I went and called Marty Dempsey, who was the chairman. I said, "I got it." And I said, "I got it from Graham." So you were of very great value.

I got around to starting everything I set out to do. I didn't get to finish everything. You don't really finish big things in a short period of time. In some ways, they're never finished. But I started everything I wanted to do. Whether they were our campaigns in NATO, Russia, whether they were the Asia Pacific rebalance, whether it was the counter-ISIL campaign in the politico-military sphere, or whether it was these initiatives in technology and talent management.

I think these things make sense. And I'm a big believer that logic, and if things are logically constructed and explained logically, that they will carry themselves forward on that basis. And that gives me confidence that a lot of these things will continue into the future. But there wasn't anything I didn't get around to.

By the way, I want to compliment you also for that, Graham, because one of the things Graham did when he'd come in every once in a while, we'd talk, is we'd go through the list of things that I told him right at the very beginning I wanted to do, and we'd just make sure we were actually doing all those things.

GRAHAM ALLISON: Give a shoutout to another Kennedy School graduate. When you would arrive at Ash's office at the Defense Department, the Secretary of Defense's office, if you've never been to, it's pretty spectacular, this huge thing and cavernous and whatever. Every face you would see were Kennedy School graduates. [laughter] One person actually in the military said to me, "Is it required that you go to the Kennedy School in order to work at the front office?"

So Sasha Rogers, Sasha Reagan when she was here, graduated in 2014 or '15 from the public policy program. Went to work for Ash. She was the one that sort of kept the list of, okay, this week did we accomplish what we were supposed to do?

ASHTON CARTER: And how did you spend your time? She'd give me this, "You said this was a priority. I see two hours."

GRAHAM ALLISON: I would simply come in and be the chorus for Sasha. So she was actually the ventriloquist.

Let me turn to the audience. We've got two microphones on the floor and two microphones in the loge. Let me suggest students please should get a first choice. But we're going to start with this gentleman. Introduce yourself. Short question and a question mark.

Q: Good evening. My name is Nico. I'm a fellow with the program on science, technology and society here. I'm also the co-founder of the Future Society here. My question regards the governance of technosciences and technologies. You've said and you've pointed to AI, you've pointed to biotechnologies being not only contested in the potential effects in terms of opportunities and challenges they could have over the next decade. So their effect is very uncertain and very disruptive. Knowing what you know now with your amazing experience, do you think that the– the executive branch seems to be well equipped to deal with that, but it seems that abolishing the office of technological assessment in a country, in Congress, in a country that is very divided around party lines, to create a matter of fact based on which, like we have with the Congressional Budget Office with numbers, based on which we can assess, the nation can assess the potential effect of AI or biotech is missing. So would you say we need to in a way move towards resurrecting this kind of office of technological assessment?

ASHTON CARTER: I think we do need mechanisms, because the reality is that a lot of technical talent won't reside in the government. And there is more than you'd think. But many people don't want to work for the government. They want to work for a company or for some other reason they don't. So that's why it's so important to have those bridges and those connections, so that all of society's work can be done in these areas that are so sensitive.

Now, you mentioned a place that I worked once upon a time. You've obviously been doing this for a long time because it's a long time since that got abolished. But it was abolished long ago. It turns out I worked there. It was called the Office of Technology Assessment. And it did very good things, but it had the disability that it was small and thereby easily extinguished. [laughter] And it occasionally did something controversial, including some things that I did.

GRAHAM ALLISON: That you'd worked on, yes.

ASHTON CARTER: But it was one of the places where I kind of cut my teeth. And again, I didn't think I was going to do this. I was a physicist. And somebody, somebody, said to me, "Just one year, just go work on this terribly important thing for one year." And now 35 years later.

GRAHAM ALLISON: Can we just do a small historical footnote? The founder of the science, technology and public policy program, which is part of the Belfer Center, which John Holdren has come back to chair, was a fellow named Harvey Brooks, a great Harvard figure. And he actually was the impetus for the Office of Technology Assessment.

So, this gentleman.

Q: Mr. Secretary, thank you for being here. My name is Right. I'm a senior at the College. I'd like to ask about the counter-ISIL campaign and the recent changes to it. Do you think that the new administration has instituted changes that are significantly different from the strategy pursued by you and President Obama? And do you think that those changes, if they've been put in place, contributed to the recent mass casualty incident in Mosul?

ASHTON CARTER: I don't see overall major changes. And I certainly hope that they stay on the path that we set, because I think that's the right path. I should say though that we should always be, and we always were looking for new opportunities to accelerate the defeat of ISIL. So in that sense, making adjustments which we always did; every time we saw another way to do something better, we would seize it. And I certainly hope that they do that as well.

I do not know. There is an investigation going on around the air strike issue in Mosul. So I can't give you any detail about it. I'll just say a few things generally speaking. It's entirely appropriate that investigations like that are done. We always do that. And there are two reasons for that: One is that America takes its values to war with it. We don't make any apologies about that. And so that's why we've done that in Afghanistan, Iraq, elsewhere. And we're used to that, and it's appropriate. And obviously some others don't do that, if you follow, for example, the Russian bombing campaign in Syria.

But also, in the case of Iraq, remember we are working with local forces there. The reason we take the strategic approach of working with the local forces and not trying to substitute for them in the defeat of ISIL is that once ISIL's defeated, somebody's got to keep them defeated. And that requires local forces. Therefore, the strategic approach to

where it was local forces. These are Iraqi forces that are behaving very heroically. Last time I was in Iraq, a couple months ago, I decorated a number of these people for tremendous courage. And they're in the fight with us. And we're trying to expel ISIL from the Iraqi population. It's important that they have confidence in us, and that they have confidence in their own security forces. And therefore, if something happens, that it be investigated and accounted for. That's of instrumental value.

So both who we are as a country and being successful require us to do this. And therefore, I'm glad the– I do not know where it will come out. But it's perfectly appropriate that it does.

By the way, what has paced our air campaign over these years hasn't been rules about civilian casualties, though we have rules, but that hasn't been the thing that has paced, it's intelligence and it's progress on the battlefield. So when I first began to design the counter-ISIL campaign, we never knew what ISIL was going to do next. And it was infuriating. But it's very hard to carry out an air campaign if you don't know where the enemy is. Over time we've learned a lot more about the enemy's disposition. And the more we move the battlefield forward, the more we get the local population to tell us what's going on, the Iraqi security forces are engaged, and you just give yourself lots more opportunities.

So those two things, more than rules, are what have created the opportunities in the air campaign. That's the other general observation I'll make.

GRAHAM ALLISON: This gentleman, please.

Q: My name is Officer Candidate Singh. I serve in the US Army. I want to thank you. Welcome back to Harvard. As you may remember, we had last met in December 2015.

back then I was not being allowed to serve in our nation's military. I'm pleased to announce, thanks to your public support, I completed basic training last summer, and I'm currently in office candidate school in the Massachusetts National Guard. So I just want to commend you for all you've done to publicly support religious freedoms for Americans, because now, thanks to your leadership and Secretary Fanning's leadership, dozens of practicing Sikhs, Christians, Muslims, Jews are being allowed to serve our nation. [applause]

ASHTON CARTER: We're glad to have you. It turned out to be something that we could work through, and worked out fine. And as a consequence, we have some more spectacular people. It's important to address these things.

Q: I do have a question for you regarding technology. So DARPA invented the Internet, and that was billions of dollars of investment made through the '60s and '70s. During your tenure as Secretary of Defense, what promising technologies did you see that will have a consequential impact on our lives five, 10, 20, 30 years from now? Thank you, sir.

ASHTON CARTER: Thank you. It's a very good question. And it's a sign of how breathtaking the pace and scope of technology is that there's no one answer to that. But I'm going to pick one anyway. I started on bio, and actually tomorrow one of the things I'm going to do is spend a lot of time down at the Broad Institute getting caught up on things there. But techniques like CRISPR and so forth, these are very portentous. And I have a daughter who works in this field and is a pioneer in this field, and I tell her all the time, "Okay, I was a physicist, elementary particle physicist, that's was the happening field when I was your age. But you're in the happening field at your age."

So again, that's one. And there's also AI and its various variants. Automation. There are lots of other things. Quantum computing. You can point to lots of things. But people tend

to think about computer and IT-type tech when they think about the technological revolution. And we need to start thinking more systematically about the biotech revolution.

GRAHAM ALLISON: Unfortunately, we have just four minutes. And what we're going to do is take three questions, one, two, three, and then we'll answer them all together. Please, sir.

Q: Good evening, sir, and thank you for being with us. My name is Greg Allen, and I don't know if anybody has told you, but you happened to show up on the day that all of our master's theses are due. [laughter]

ASHTON CARTER: Sorry.

Q: I have the great pleasure of having my master's thesis supervised by Professor Joe Nye and Professor Bunn. And my thesis was in fact on artificial intelligence and national security. So my question for you is, once nuclear weapons were invented, we immediately recognized the transformative nature of this technology, and ultimately between 1950 and 1990, 11% of every government dollar was spent on nuclear weapons. So my question for you is, if biotech and artificial intelligence are truly transformative, how should that be reflected in the resource allocation of the federal government, and specifically the Department of Defense?

GRAHAM ALLISON: Great question. This gentleman?

Q: Hi, my name's Matthew. I'm a senior at the College. My question is kind of on a related note. How do you think about the ethical implications of lethal autonomous

weapons systems and things like that, particularly in the medium to longer term? And are there any institutionalized ways that those implications are considered?

GRAHAM ALLISON: Then, please, the final question.

Q: Good evening, Secretary Carter. Thank you for being with us, and really look forward to having you in the fall. My name is Gavin Reynolds and I'm a sophomore here at Harvard studying neurobiology. This past summer, I had the opportunity to work on Capitol Hill for Congressman John Lewis. And over the course of the summer, I was able to speak with Congressman Bill Foster, a Harvard-trained physicist. And I got to ask him about an idea that I'd heard your colleague Ernie Moniz talk about here last year; the idea of the scientist statesman. I was curious if you could talk a little about that, particularly focusing on those long, grueling years you spent getting your PhD in physics and how that particularly helped you in your role.

ASHTON CARTER: Okay, long, grueling years. Let me start out with the AI and the money question. It's a very good question. AI, as a technology, most of the R&D activity, simply the way things, the nature of the technology, will take place in the private sector. So we who have the public charge have to watch and interact with. Fortunately, nobody has privatized nuclear weapons. [laughter] Therefore, that's remained our business. And so, we're going to do that. And Ernie Moniz, among many of the excellent things he did, and I'm delighted that he'll be a colleague here, he was spectacular in so many ways, but also in the weapons aspect of the DoE job. Which I counted on because the Department of Energy and Ernie provided me the nuclear weapons for our deterrent, which I thought was extremely important. That remains a government monopoly, thank god. I hope it stays that way for a long time.

So there's an essential difference there from the nuclear weapons time. And so, I don't expect there to be government-sponsored AI labs that have a monopoly over that technology. So governing in the face of this technology requires a very different kind of mechanism that can't be intramural to the government, but has to involve these kind of connections that I've been talking about tonight.

But good luck. I'm sorry to arrive on this day. We didn't have all this planned out.

Autonomy. I think it was four years ago. I was the Deputy Secretary of Defense and I established the rule, which I think is an appropriate one, which still governs the Department of Defense, that any system that uses lethal force has to have a human being in the decision process. I think that's appropriate. I think that still leaves lots of room for the manner in which that discretion is exercised, whether it is machine-enabled and -assisted to make it better and more appropriate or more rapid, or whatever. But I think it's an important principle. It's a good place to start.

I'll just close and go quickly. I didn't spend all that much time doing my physics thesis. And here's why: it was in theoretical physics. And I did experiments at Fermilab in Brookhaven that took years. By their nature, you had to design an apparatus, build the apparatus, put it out there, get beam time, run the data, process the data, which believe me in those days consumed time all of itself. Theoretical physics is just how– and so, you could, if you knew that you were running out of money in three years [laughter], you could motivate yourself to a situation where you were working hard enough to complete your thesis in a shorter period of time. I don't know where that leaves you all in terms of the kind of theses you're writing, but I was able to pace myself and therefore make it an affordable project.

GRAHAM ALLISON: So unfortunately, we've come to the witching hour tonight for this event. But the good news is if you show up here next fall, Ash will be here as a regular member of the faculty teaching a course, directing the Belfer Center, and being a colleague in the community.

So I would say this was a great night for the Belfer Center and for the Kennedy School. And for Ash's service, we're extremely proud.

ASHTON CARTER: I'm glad to be here. Thanks so much, appreciate it. [applause] Thank you all. Looking forward to be part of you.

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