An Interview with Robert O. Work

JFQ: *You have become well known for your efforts to develop a Third Offset for the United States military. Is the overall intent behind this effort to reestablish conventional deterrence against major competitors or is it something more?*

Robert O. Work was confirmed as the 32nd Deputy Secretary of Defense on April 30, 2014.

DepSecDef Work: Essentially what we are trying to do is reestablish our overall deterrent position. The Nation aspires to achieve comprehensive strategic stability in which the likelihood of a major war between large state powers or a destabilization of the global system is avoided. To do so our strategy must be comprehensive from top to bottom, and, in my view, such a strategy has three big pillars. One is strategic deterrence, which has both a nuclear and a cyber aspect. For cyber, in this regard, cyber capabilities that can be used against another nation's cyber structure that can cause major damage to that nation's social fabric or social functioning of the state. Nonstrategic nuclear weapons are probably in that same category. Next, conventional deterrence is focused on large state powers as well as medium-sized revisionist powers. Conventional deterrence is designed to keep us from having a state-on-state war. The third pillar is managing the strategic environment or the strategic competition. The link between managing the strategic competition and conventional deterrence is crisis management; and the link between conventional deterrence and strategic deterrence is escalation control. So, the Third Offset Strategy is really focused on conventional deterrence. It is future-focused on large state powers such as China and Russia. It is designed primarily to make sure that we never have a nuclear confrontation with those two countries and that we would prevail in any conventional confrontation regardless of the opponent.

We are trying to offset three things that all of us can see in the operational environment. First, because most of our combat power rests in the United States, our adversaries would have an advantage in time and space and initial force correlations. As a result, this is about counter-power projection against states that would push out from their own territory, especially against our own allies, partners, and friends. So, how do we get there and how do we arrest power projection when we are not in the theater ready to fight? That is a tough problem.

Second, there are two pacing competitors—not adversaries—and they have very nearly achieved what we would consider to be parity in the ability to put together theater-level battle networks with a sensor, a C4I [command, control, communications, computers, intelligence] grid, an effects grid, and a logistics and support grid, and be able to fire guided munitions as far as we can. Third, our pacing competitors have spent a lot of money on taking apart our

battle networks because they know how powerful they are. They have invested a lot of money in cyber, electronic warfare, and counter-space capabilities. When you add those three together, you have anti-access/area-denial [A2/AD] capabilities, making it hard to get into the theater and, once you are in theater, making it hard to maintain freedom of action. That is what we are trying to offset. It focuses on our pacing competitors, China and Russia, with the understanding that if we are able to solve that problem, we could solve any regional state problem.

You can have a battle network focused on the fight against global extremists and you can have battle network focused against a regional power, and you can have a battle network focused against a great state power. This ability to have battle networks is transferable across the range of military operations. This drive to enhance and expand battle networks is about trying to offset the fact that our big state adversaries can put together networks like this already. The Defense Science Board [DSB] said the way you offset those competitor networks is to inject artificial intelligence [AI] and autonomous systems into your battle network. The result should be a step function increase in effectiveness, which in turn should increase your effectiveness relative to your potential competitors. As some have said publically, these competitor networks are composed of technology that everyone has access to. So, we need to build better networks.

This isn't going to be a one-time process of innovation. We won't just inject autonomy and all of a sudden it's going to be great for 40 years. This is going to be a tough competition—we're in a world of fast followers. We are a good, fast leader, but we should be prepared for operational and technological surprise. The force of the future is designed to get a force that is agile enough to adapt to surprise, because in the next 20 to 30 years, that may be endemic. We just don't know, and that is another aspect of the offset.

The introduction of AI and autonomous systems is key to this concept. It's unbelievable when the machines have been taught to perceive the environment a certain way and to make judgments, or highlight things that are happening in the environment. The machines are talking to each other and the human literally just watches the information flow, but then can say, "I need to intervene now to make a decision," and it really happens fast. It's really something. So, it is not only learning machines and big data analytics, it is connecting the machines with common data standards. That is critical. It allows seamless machine-to-machine communication so that the human operator can make relevant decisions and more timely decisions, and can achieve effects on the battlefield faster than expected. It is not just about making faster decisions; it is about achieving effects on the battlefield faster.

JFQ: *Can you describe how the Defense Reform Agenda relates to the so-called Third Offset and what you intend it to accomplish?*

DepSecDef Work: What Secretary of Defense Ashton Carter talks about now as the "Defense Reform Agenda" has four main items. The first agenda item, if you will, was to take a look at the future of the force, in which he said, "I've got the greatest fighting organization that the world has ever seen, and I want to make sure my successors do too." So, the Force of the Future was designed on the personnel aspects of the force. The second thing he wanted to do was talk about upgrading or revamping our war plans to reflect the new defense strategy. The third item was to take a look at technology and study how it was having an effect on the character, but not the nature, of war. And, finally, we needed to take a look inside the business operation of the department and identify ways to become more efficient.

On the issue of reexamining war plans in the context of the notion that all of them are global, you have probably heard Chairman Joseph F. Dunford, Jr., talk about how no war plan is just a theater war plan, as each plan has effects and connections to the other combatant commands. Therefore, all our plans contain global problem sets, and we need to look at them that way. So, it is not enough to have a combatant commander build a plan for a particular conflict or crisis, you actually have to attend all the other supporting operations that are conducted by the other combatant commanders. Currently, we are working on this idea of revising the war plans to address the global problem sets we see, labeled the "4+1," which refers to Russia, China, Iran, North Korea, and violent extremism. The Secretary and the Chairman agreed on the need to start revising the war plans to make them consistent with our national security strategy. They also wanted these plans to consider the areas that the DSB said are likely to emerge as the most significant technologies over the next 20 to 30 years. For example, combining artificial intelligence and machines that can help humans is a huge step forward, and right now we have the technological advantage. It is not the 30 to 40-year advantage we had when we developed the Joint Surveillance Target Attack Radar System, airborne early warning and control, stealth, precision-guided missiles, and all the maneuvering forces to take advantage of them, but it is an advantage that we hold into the near future. We need to be thinking about how to capitalize on that advantage to move the joint force forward over the course of the next 10 to 15 years. So, these two pieces of the four pillars, emerging technology and their role in our war plans, contribute significantly to this idea of a potential offsetting strategy, or Third Offset, for what we have called for years A2/AD, which may be better described as efforts to counter U.S. power projection capabilities. That is the path that we are trying to move DOD down, to think about the strategic imperatives that are imbedded in these "agenda items" and then develop the organizational changes that might be required both inside our operational plans for war and inside the Services—and DOD itself—as we take advantage of those developments. The framework for the development of our war plans is focused on ensuring they consider and account for transregional, multidomain, and multifunctional aspects.

JFQ: *What kind of management architecture was set up to bring all the stake holders involved in this effort and guide it to success?*

DepSecDef Work: We established several mechanisms. The principal one, called the Advanced Capabilities and Deterrence Panel (ACDP), is actually a partnership between the Deputy Secretary, the Vice Chairman, and the Deputy Director of National Intelligence. The three of us chair an oversight panel that tries to manage all the moving parts that exist within this journey in how to implement the Third Offset Stragey. Deterrence is embedded right in the title, which emphasizes that this is about deterrence. We chose the word capabilities rather than technology because this is much more than just technology, it is the operational and organizational constructs and also the capabilities that we can bring to improve conventional deterrence and warfighting effectiveness of the joint force. The key thing about the Third Offset Strategy that I hope all of your readers will understand is that this is not about technology per say; it is about technology enabled operational and organizational constructs that give us an advantage at the operational level of war, which is the surest way to underwrite conventional deterrence.

What we sought with ACDP was a partnership between a number of interested agencies whose work overlaps in the areas of policy, operations, and intelligence, and would assist in defining and managing the different interests and capabilities that might be potentially useful for a Third Offset Strategy. The three of us meet no less than quarterly and review the progress of groups like the Rapid Capability Offices in the Services, the DOD Rapid Capability Office, and the wargaming initiatives that are now embedded throughout the force. The Office of Cost Assessment and Program Evaluation [CAPE] presents their wargame outcomes as well as the way forward for the next quarter as we look at the warfighting lab initiatives. It is that panel of three that approves the warfighting lab innovative grants that go out to the Services as they develop new concepts. That overarching process is the basic governance. Below that level there are several other subordinate groups that do very detailed maintenance of things like demonstrations or wargames or warfighting lab work; but, fundamentally, it is the three of us who provide the oversight for the process.

JFQ: *What is the relationship between the DOD Force of the Future and the Third Offset?*

DepSecDef Work: One very interesting intersection has to do with the ability to recruit and retain the people who are going to be required to fight in this new environment. If you believe as a proposition that there is going to be a competition for talent between commercial industry and the military, then we have to be able to compete for the same talent. As we move into some of these areas that are actually analogues to what is happening in the commercial sector, DOD is going to have to be able to compete for the very talented young men and women who are educated in the kinds of technology we are looking to acquire and understand how to organize around that type of technology. We are looking to take advantage of the intersection of the Force of the Future and the Third Offset. For the future force, the key is continuing to bring in the right talent we need and to retain that talent over time. This is not an indictment of current processes and certainly not an indictment of the willingness of young men and women to join and stay in the Service today; but it is a realization that, over time, we have to have the tools to compete for that talent, in the open marketplace, as we have internally since the late 1970s.

Another important aspect of the Force of the Future is what the Secretary refers to as improving the "permeability" of the Department, and in this competitive environment, the thing that is really driving the technologies that are going to have applicability to a Third Offset Strategy—if we decide to pursue one—is the commercial sector. The commercial sector is not being driven by U.S. Government labs. It includes Big Data, advanced computing, miniaturization, robotics, AI, and nanotechnology, among others, and all these things are being driven by the commercial sector. So, an important aspect of the Force of the Future is providing new avenues for ideas from the outside to permeate into DOD and the defense enterprise. Equally important is the need for ideas from DOD to permeate to people in the commercial sector so they understand the problems that we are interested in and might be able to find a solution that industry would not otherwise have pursued. In addition to recruiting and retaining the right personnel—and that's the key focus—we want to be well positioned to take advantage of one of the key aspects of the Third Offset, which is human-machine teaming. We need to answer some key questions. What type of commander do you need to best lead in a world of advanced human-machine teaming? Are you going to have younger commanders? Are you going to look for seasoned commanders who have worked through a wide variety of human-machine teaming relationships? How you pick for command, how you train your forces, all of this is part of the Force of the Future.

JFQ: *Where do DARPA* [Defense Advanced Research Projects Agency], *Secretary Carter's Special Capabilities Office* [SCO], *and the Defense Innovation Unit Experimental* [DIUx] *fit within this overall initiative and is this how DOD gets the commercial industry to actually work on things that might be useful for DOD's yet-to-emerge requirements?*

DepSecDef Work: To advance the journey toward bringing in innovative software and hardware solutions to the problem sets we are trying to solve, we need to make room for the small companies that do the sort of niche things that DOD will find useful. In general, the companies are able to scale their products within the boundaries of their own capacity, but they generally aren't comfortable working with the Defense Department. Having an intermediary such as DIUx,

Ohio-class ballistic missile submarine USS *Maryland* transits St. Marys River, August 2012 (U.S. Navy/James Kimber)

which can go out and actually examine what is available, allows them to bring to those software and hardware developers unique military problems that they can begin to solve, and then offers them an avenue to scalability. That avenue to scalability might be a partnership with a larger company, which would function as a normal defense contract. DIUx is supposed to be a place where DOD could identify the pieces of potential future capabilities that are of interest. Moreover, DIUx can ask industry if there are any commercial products that it might bring to the table for consideration. DIUx is also a means by which a commercial entity could come to DOD and present a new technology it thinks might be useful, but needs the Department to help them think it through. The whole idea of DIUx, which now has three points of presence, one on the West Coast, one on the East Coast, and one in Texas, is designed to allow that connection to the commercial industry.

It might be that a company can do some new process or technology on its own, but until we can understand what that might mean to DOD, DIUx is a useful intermediary. We can bring the knowledge those commercial companies have into DOD, and that could mean bringing them in as advisors, as civilian employees, or it could mean sending military members to those companies to learn the processes they use and bring some of those processes back to DOD.

To answer your question more directly regarding how do DARPA, SCO, and DIUx fit together, they are on a continuum where DARPA is experimenting with the most advanced technologies that we can get our hands on, and developing them at the same time. DARPA is looking out on the 20-year horizon and beyond for whatever technologies might empower military operations in the future. SCO is looking at taking current capabilities and mixing them in different ways and doing demonstrations of capabilities that could emerge in the next 5 to 10 years, but which are not here today because of the way we choose to organize and mix weapons systems. DIUx, as I've already discussed, is looking for the best minds in the commercial sector who are willing to work on military problems, and we have already given them some very compelling military problems to work on.

JFQ: *How are the allies going to be interfaced with this effort and what would you expect from them as partners to this enterprise?*

DepSecDef Work: In the Second Offset, where we created theater-wide battle networks designed to employ guided missions across the depth and breadth of the battlefield, and to achieve effects such as maneuver and kinetic operations and electronic warfare operations very quickly. The coin of the realm during the Cold War was armored brigades, mechanized infantry brigades, multiple launch rocket system battalions, self-propelled artillery battalions, tactical fighter squadrons, among others. Now, the coin of the realm is going to be learning machines and human-machine collaborations, which allows machines to allow humans to make better decisions; assisted human operations, which means bringing the power of the network to the individual; human-machine combat teaming; and the autonomous network. Network-enabled, autonomous, hypersonic, and directed energy weapons, and electromagnetic rail guns, inserted into the grid, are the five things we are really focused on. Furthermore, any ally can create an application or an algorithm that improves the whole battle network, so even a small country that has a vibrant technological sector can improve the entire network. So, the Third Offset, in our view, is extremely coalition friendly. It allows nations to avoid building up large forces, which they can't afford, but to focus on applications in the network that would allow the entire coalition to operate better. For example, Sweden, which is an

Soldier adjusts M7 Spider Networked Munitions during Network Integration Evaluation 16.2 at training village Kamal Jabul, Fort Bliss, Texas, May 2016 (U.S. Army/Chenee' Brooks)

enhanced opportunity NATO [North Atlantic Treaty Organization] partner, does a lot of cutting-edge, state-of-the-art work concerning unmanned underwater vehicles. They were anxious to say that this is how they might contribute, so you could easily see an underwater network in the Baltic sea region that, for example, would keep an eye on things. So, no matter how large or small the country, they will be able to operate in this Third Offset battle network, and we really want to make this as coalition-friendly as possible.

JFQ: *How is the wargaming element of this effort being implemented and will experimentation become an extension to the analytical components to explore new ideas and how systems perform? So, is it more than just ideas that we are looking for?*

DepSecDef Work: This is about new operational and organizational concepts that provide much better battlefield performance and, therefore, underwrite conventional deterrence. You have the Warfighting Lab Incentive Fund, which is designed to assist the concept and doctrine developers of each of the four Services to conceive new operational concepts. For example, if the U.S. Marine Corps said they'd like to do a Hunter Warrior II, based on the Hunter Warrior series of exercises they ran in the late 1990s, to inject more AI and autonomy, and said they could fund it for $1 million but to run it right they really needed $2.1 million, the Warfighting Lab Incentive Fund is designed to allow the concept developers and doctrine developers to look at concepts. Then, hopefully, you can run the concepts through scenario-based wargames. If it's something we want to explore further, the next step would be to test it in an exercise. Then we could go from doctrine and concept, to wargaming, to exercise, to refinement, to additional refinement, and so on, and you would keep it in this virtual circle, much like the scenarios the U.S. Navy and Navy War College put together in the interwar period. I came into this thinking wargaming had kind of atrophied, but it wasn't true. There was a lot of wargaming activity going on, but the leaders had no idea.

Importantly, a new classified repository was created where wargame results can be shared across DOD, and which so far contains the results of more than 250 games. The repository has allowed CAPE to brief us on a periodic basis in the Deputy Secretary's Management Action Group and say, "Here are the broad themes that are coming across in terms of the transregional, multidomain, multifunctional aspect of warfare." All of these things together—the wargame repository, the Warfighting Lab Incentive Fund, the wargaming incentive fund—are designed to help us think of the operational and organizational constructs. Furthermore, the repository not only tells us what happened in past wargames, it tells us which wargames are coming up, and has now become a function that all 4 of the Services and all the combatant commanders are looking at, saying, "This is something I want to participate in." So, it not only connects the leadership, it also starts to help synchronize wargaming across DOD.

***JFQ:** Can you discuss your views on how autonomous and robotic systems are likely to influence the outcomes of these innovations in years ahead?*

DepSecDef Work: I think it is a bit of a double-edged sword. On the upside, we have built the theory that AI and autonomous systems can empower humans to be much more effective and efficient in cultivating all the tactical and operational details they have to deal with in order to make decisions. Whether that means you partner a human with a piece of software that makes them more effective or you partner a unit with machines that are embedded in the unit that makes them more effective in combat is still debatable, but there is growing evidence that both are actually true. One of the big debates we have is if you build robotic systems that have robotic autonomy built in, how will you keep humans in the decision cycle to use lethal force? I think that is a debate we have to have. It is a command and control function that we have to understand. It is a process that we have to put some doctrinal limits around so the idea of advanced robotics being autonomous and capable of lethal force all at the same time, without building in some checks and balances where humans make decisions, is a process that we are going to have to understand better. Many would argue that it's a step we shouldn't take. I have a different take. Building in autonomy in advanced robotics means that you could possibly make a partnership between a human and a machine that allows the human to be in control, and that allows the machine to use lethal force at the behest of the human. I think that is a path we have to explore and understand, and we are not there yet. This is a 20- or 30-year journey.

Most of the advanced robotics people will tell you that what we are doing with advanced robotics today is in the infancy of the technology, and we are 20 or 30 years from completely understanding how robots could change the way we live, work, and fight. Will we ever build a robot that is completely autonomous that will exert lethal force? I think the answer to that is no. Such a concept is part of the wargaming process we are exploring. Our conception of autonomy is to empower the human, and that's why we are focused on human-machine collaboration and human-machine combat teaming. The human is central in our conception of the use of AI and autonomy. An authoritarian regime might approach this in an entirely different way, in which they might view humans with decision authority as a potential impediment to the achievement of the master plan and field capabilities that take people out of the decision loop in favor of algorithms that the regime leadership prefers.

In fact, we know that the Soviet Union thought exactly this way because their theater-wide battle networks—known as reconnaissance-strike complexes—were fashioned as a totally automated system. They would press the "I believe button" and let the machine make the decisions. That's not what we are seeking. In movie analogy terms, instead of Skynet and Terminator, we think in terms of Iron Man, where a human empowered by AI and a learning machine is making better decisions, resulting in a more effective fighting force.

We know, for example, that we have to rely on machines in cyber warfare, electronic warfare, and probably missile defense. These are primarily defensive applications because the attacks are coming so fast human reaction would be too slow to prevent unacceptable damage. In some situations, there is no way a human can keep up with everything. Currently, in primarily defensive situations, we might consider delegating the authority to machines to make those decisions. But regarding offensive lethal action, in which we are taking action on the battlefield in an offensive, proactive way, our conception is that human beings will always be making those decisions. But 30 years from now, they'll need to check in and see how this goes.

***JFQ:** What are the likely impacts on the DOD research and development as a result to this effort?*

DepSecDef Work: As I said, we are just starting this journey, so you haven't seen major changes in the DOD program. We have a $3 trillion DOD program in the Future Years Defense Program, which is about $600 billion a year when you add in the Overseas Contingency Funds. Over the course of fiscal year 2016 through fiscal year 2018, we have probably injected about $25 billion of new conceptual demonstrations and capability development, so it is a relatively small part of the program. But this is like a snowball. Once you start the demonstrations and these new capabilities developments moving, things start to propagate very quickly across these portfolios. What I would expect to see over the course of the next 3 to 4 years are major kinds of muscle moves in directions that are very useful and often unexpected.

In just a short period, these demonstrations have shown us that capabilities we had thought were useful in a particular way are actually more useful in another—an unexpected but welcome advancement. For example, we started off thinking electromagnetic rail guns were the right way to go for a certain new projectile, but we learned it could be fired from an existing conventional gun. We now have a whole new set of options by combining new and existing capabilities that we can explore. Such discoveries can lead us to ask questions such as what would a capability as I just described do for a NATO operational fires network that also was leveraging artificial intelligence? I think it would revolutionize it. It could allow small empowered teams, the hunter warrior teams, along the forward line of troops to be able to call in fires from the entire NATO battle network. So, over the course of the next 3 to 4 years, you will start to see us explore such ideas further. But we have chosen an approach that isn't just about technology. In our view the work on the Third Offset is about operational and organizational constructs to achieve innovative battlefield effects that will improve our conventional war fighting, which in turn strengthens our conventional deterrence, allowing us to meet the challenges we see in the future. JFQ