Peter W. Singer: The Future of War

How and why did you get interested in the field of military robots?

I have always been interested in changes in warfare. It is my sense that this field of new technologies might be one of the biggest changes not just in our lifetime, but over the last several years – millennia even we could argue. I first got into it in a sense drawn by two things: First, I have always loved science fiction as a young boy, and robots of course populate that. Second, I was struck by how I kept seeing more and more of these things from science fiction that I had grown up with – robots – popping up in the experience of my friends in the military itself. I recall, for example, talking to a friend in the US Air Force who was fighting in the war in Iraq, but he never left the US. That means he was part of operations using these drones, and it was just very different from the way we understood war.

The same thing you would notice more and more mention of these robotics in civilian industry and in civilian life. For example, I own a robot vacuum cleaner. And, yet the people who study war, who talk about war, were not talking about it, and it was striking at me. I remember going to a conference in Washington DC about what was revolutionary in war today. It had all of the top experts, the well known people, as well as leaders in the military, and yet the word *robot* was never said once. This just did not fit with what was happening there, it did not fit the experience of my friend in the Air Force and it did not fit the raw numbers how we are using these systems more and more.

That is what set me off on this journey to write the book "Wired for War," really to capture just what was happening in this incredible moment in time, who are the people who use these systems in all sorts of different ways, and what are their perspectives on it. But I also wanted to capture the deeper questions. As we start to use more and more robots in war, what would that present to us in areas of ethics, law, public policy? Do they make it more or less likely to go to war, what is their impact on our democracies? So, that was really what I was trying to do – to capture this moment in time.

In your books "Children at War", "Corporate Warriors" and "Wired for War" you have tackled crucial issues in a substantial way. How do

you see the role of the media in these issues and their influence on the general public but also on politics? How do you see your role and can books like yours help to provide a differentiated approach?

What has been striking about each one of those books that I have written is that at the time I started them, that issue was not much in the media; in fact it was not much studied in the research community. I, for example, remember starting out on my journey dealing with "corporate warriors" – private military firms – and I was actually told by a professor, that I had at Harvard, that I should quit graduate school and go to Hollywood and become a screen writer, instead, for thinking to write on such a fiction as private companies operating in war. And, of course, today, this is a multibillion dollar industry; there are more than a hundred thousand of these private military contractors serving in Iraq and another seventy thousand of them serving in Afghanistan.

This, I think, is one of the challenges for those of us in the research role, but it carries over to the media side, which is often reactive, often ex-post, and does not report on a trend that is becoming important until after something bad happens. You can use that same example of the private military industry that I looked at in "Corporate Warriors" and that much of the media reporting of it really does not take off until the 2007-period, most particularly after the shootings involving employees of Blackwater in Nisour Square in Baghdad[1]. We already had well over a hundred thousand of these contractors on the ground, and yet the media was not truly covering it. In fact, there was a study that was done of news stories coming out of Iraq. It found that less than one percent of all these news stories mentioned private military contractors. Now, let us put that in the context: More than half of the soldiers on the ground were private military contractors and yet only one percent was mentioned in news stories. I think this again points to the issue of how the media often is chasing after the news rather than trying to take a step back and figure out what is really happening today. There is also a change in the media, of course, right now, which is that it has become often aimed at servicing the public in a way that is profitable. By that, I mean that it is often not trying to report the news, but rather report the news in a way that will make the public feel good about itself. We see that with the way news networks have become aligned with one partisan political position or the other, the "Fox News Effect," for example, but you see its opposite on the opposite side of the coin. So people turn to media to see news stories that validate their preexisting understandings of the world

around them. That is unfortunate because it does not equip us well to deal with changing circumstances in the world.

Now for myself, for my research obviously, I am drawn to these things that are changing and so I see the role of my books as a way to create a resource book for the media and the public, a book to turn to when these issues emerge in importance. That means whenever that topic comes to the fore, that I have already done the book that lays out the issues, explains the dynamics, and presents some of the questions that people need to wrestle with. I tried to do that on the private military side and on the child soldiers issue. This was also my approach for "Wired for War", given that we have something emerging of great importance, namely the growing use of these robotics, the growing use of them in war. Let us capture that moment, figure out what are some of the key dynamics, meet the various players and also look at the implications of this on various areas that we care about. Then, hopefully, when people start to wrestle with these dilemmas, I have fleshed out a fact-based study to turn to, something that is written in a way that is very accessible.

I think that another challenge of those of us in research is that we often intentionally disconnect ourselves from the public, from the media. We only engage in discourse with each other and the result is that often public policy, as well as often the media, is not all that well informed. It is not just them to blame, but it is us, because we are often speaking only to ourselves. You can see this, for example, in the debates in academic journals, which have become so esoteric at time that I do not even like to read them anymore, although I actually *do* theory and research. I think that presents another challenge to those of us in the field: How to take what we are working on and apply it to real world problems in a way that real world people can understand?

Before we get in medias res of military robots themselves, I would like to ask for your assessment of the impact the new government under President Obama will have on unmanned systems regarding budget, strategy and related fields?

I am obviously biased on this; I was a big supporter of President Obama. In fact I coordinated his defence policy team during the campaign, so take what I am saying here with a grain of salt. There are a couple of indicators to show that we are going to see greater and greater use and purchasing of these systems under the administration of President Obama. The first indicator is that in the defence policy statements that he made during the

campaign itself, he only identified a very limited set of military systems, that he pushed for greater research and investment and understanding of. I believe there were just five of these, and unmanned systems were one of those five. So, out of the entire realm of all the various military weapons and systems, the fact that he said here are the five that I think are important, and that unmanned systems are one of those five is a pretty good indicator. The next indicator is the defence department budget itself: The new one is coming in. The budget itself for the overall US-military is relatively flat and some people predict that in coming years it will decline. However, within that budget, there is one area that is growing and that is unmanned systems. For example, on the aerial side they are retiring several jet fighters such as the F-16. They are retiring them earlier than planned and purchasing more unmanned systems to replace them. The idea is to use the Predator and Reaper drones as a replacement for 250 manned jetfighters.

This is not something though that is just limited to President Obama. You saw this growth take off during the period of President Bush: For example, when we went into Iraq we had just a handful of these drones in the US-Military inventory, and by the end of 2008 we had more than 7,000. Now, under the new budget, we are going to continue to add to that. The point here is, this is not a system, this is not a technology, that you can describe as partisan, as one President being involved in and another not being. This is a sea-change in war itself. These are systems that are being used in greater and greater numbers and they are not going away regardless who the president is; it is a global technology shift. And the parallels that people make to this in history are very instructive ones. Bill Gates, the founder of Microsoft, for example, described that robotics are right now where the computer was in 1980. It is poised for a breakup and for a takeoff to the extent that very soon we will not call them robots any more. The same way we have computers all around us, but we do not call them computers. In my car, for example, there are more than a hundred computers, but I do not call it a "computer car"; I have a computer in my kitchen, but I call it a "microwave-oven." The point is, if that is a parallel, we would not describe the computer as being democrat or republican; it was a new technology and the same thing is happening with robotics today and their use in war.

The technization of the military (unmanned systems, surveillance, precision ammunition), models like the Future Combat Systems (the soldier as one system of systems)

and new concepts of using private military contractors have changed the role and the (self-)image of the army and the soldiers in the last decade. How is your perspective on this fundamental change?

This is a fantastic question. It cuts to one of the biggest issues, the biggest changing dynamics at play of warfare today and maybe even overall history. Think about our image of the warrior. If we imagine a warrior, if we imagine a soldier, there is a certain image that comes into our mind. It is most likely a man. They are most likely wearing a uniform. If they are wearing a uniform, it means they are probably part of the military. If they are part of the military, of course they are serving for that nation. And what motivates that service? Patriotism. Why is that military sent into war? Because of politics, because it is linked to the nation state.

That is our image, our understanding, our assumption of the warrior. And yet compare it to what is actually taking place. It is not just men, it is of course women, but it is also children (more than 10% of the combatants in the world are under the age of 18; many as young as 5 years old), and it is also increasingly not human. The US Military for example has 7,000 drones in the air and another 12,000 unmanned ground vehicles. The organisations that they fight in are not just militaries. In fact, look at the experiences of the US Military and NATO in places like Afghanistan and Iraq. Who are they fighting against? They are fighting against warlords, terrorists, insurgents, drug cartels. Look at who is fighting on their behalf: the "coalition of the willing", that President Bush supposedly built to fight in Iraq, actually had far more private military contractors than they had troops from others state allies. So if we are being honest, we simply had not a "coalition of the willing"[2], but a "coalition of the billing", the rise of this private military industry, which does not seem to be going away.

Then you look at the motivations: a soldier serves, he is motivated by patriotism. He goes to war because of politics and national interest. But there are other motivations at play now for other actors. So a contractor, for example, does not serve; he works, he carries out a contract. The motivations for why someone might go to war can be anything from their personal profit for a contractor; it might be for religious reasons, if we look at some of the various radical groups out there; it might be because they were forced into it, such as young child soldiers. And, of course, the motivations for the organisation itself are very different. Name me one war right now that is just about politics, where national interest is the sole driver in terms of the political level. Wars are driven by anything from politics to

religion, to economics at the organisational level. But also at the micro-level, they are driven by ethnicity, society etc. There is not this clear-cut assumption that we have of war, and I think this is one of the changes of the 21st century, understanding that it is much more complex out there than our assumptions.

Would you think there is a need for additional national and international legislation on the deployment and development of military robots? And is there a plausible possibility of international treaties regarding this matter?

I think there is very much a need for a look at the legal issues as well as the ethical issues that surround this entire new technology. And, again, think of the parallels that people make to this revolution. Some people describe that it is akin to the rise of the computer, other people note that it is just about parallel to when automobiles were first introduced; they make the parallel that it is about 1908. Some other people say, 'You know it is equivalent to the invention of the atomic bomb and that it is something that can both change warfare but maybe we might later on determine that we ought not to have built it'. That is what a lot of the scientists that I interviewed for the book discussed. The point here is this: each of these parallels are ones where we realize that we do need to create a regulatory environment around it, a sense of accountability around it, a debate about what are the laws, what are the ethics, what is the right and wrong that surrounds this. And this is true of any new weapon and almost any new technology, as they create new questions to figure out. And these questions, these legal questions, can have a huge impact.

I'll give you an example from history, a parallel, that I think of. Before World War One, there were a number of technologies that just seemed like science fiction; in fact they were only talked about in science fiction, for example the airplane, the tank, the submarine. In 1914, Arthur Conan Doyle, who was the creator of Sherlock Holmes, wrote a short story about the use of submarines to blockade Great Britain[3]. It was a science fiction story. The British Admiralty, the British Royal Navy actually went public to mock Arthur Conan Doyle's vision of the idea of using this new technology in war this way. They mocked it not because of operational reasons, but because of legal reasons. They said that no nation would use submarines to blockade civilian shipping, and if any submarine did, its officer would be shot by his own nation for committing this kind of crime. Well ,of course, just a couple of months later, World War One begins and the German Navy starts a submarine blockade of

Great Britain, just along the lines that Arthur Conan Doyle had predicted using this new technology. Now what is interesting is not that it just happened, but also it was a debate and a dispute over the legality of this, i.e. how to use these new technologies in this way. That is actually what helped draw the United States into that war. There was a dispute over the right and wrong of attacking civilian shipping using this new technology, the submarine. And the dispute over it is part of why the United States entered the war, because it took a very different view than of course Germany had during this period. That debate was also part of the US becoming a global superpower. So, my point is that these questions of right and wrong can have a huge impact.

Now when it comes to robotics in war, there are all sorts of different legal questions that we have got to wrestle with: Who should be allowed to build them? What are the parameters in terms of what you can put on them? How autonomous can they be? Can they be armed or not? Who can utilize them; are they just something which should be just limited to the state? Which states? Are they something that can be utilized by non-state actors, and which non-state actors? Are we comfortable with, for example, private military companies using them; are we comfortable with non-state actors like the Hezbollah having them? – Well, you know what, too late, they already have them. Another example: Can they be utilized by governments for other functions, such as policing? – Well, guess what, too late, they are already starting to be utilized in these roles; you have police departments in places like Los Angeles or Vancouver in Canada that have been exploring drones for their use. How about individuals, should they be allowed to have armed robots? Is that my 2nd amendment constitutional right as an American[4]?

My point is this: It may sound like very silly science fiction, but these questions are very real ones that we have to flesh out. Unfortunately, these questions of right and wrong, this ideal of legislation, of legality, really is not being wrestled with all that much. You certainly cannot find any legislation about it at the national level. The closest you come is in Japan, where there are safety limitations on certain commercial robots, and the reason for it had nothing to do with war. It was that at a robotics convention, where companies were showing their latest systems, the organizer got worried about a robot running someone over, and that was the point of it. It was a sort of personal safety thing that had to do with liability.

You have a similar problem at the international level. One of the things

I talk about in the book is a meeting with folks at the International Red Cross, which is an organization, that has done so much for international law, basically the sort of godparents of international law itself. And yet when it comes to robotics, when it comes to unmanned systems, they say, 'You know what, there is so much bad going on in the world today, we cannot waste time with something like that.' It is a valid answer from one perspective; there are a lot of bad things going on in the world, be it the genocide in Darfur to human rights problems around the world, you name it. And so why would you want to waste time – so to speak – on this new technology. But the problem is that you could have said the same exact thing about that submarine back in 1914 or you also could have said the same thing about that crazy invention of using radioactive materials to create a bomb. There were so many bad things happening during World War Two; why should people wrestle with the right and wrong of this new weapon? The point of this, and this is what concerns me, is that our track record is usually waiting for the bad thing to happen first and that is also for those who deal with the law side of both the national and the international level. So, we did not start to wrestle with the implications of atomic bombs until it was, in a sense, to late. And then we have 40 years of arms control movement trying to roll that back, and we are still not there yet. It is the same thing I worry a little bit about the robotics side: Unless we start a dialog about it, we are going to play catch-up for the long term.

Military robots are a reality on the modern battlefield, and many nations beside the United States have begun ambitious projects in military robotics. Do you see the danger of a new arms race?

This revolution – this robotics revolution – is not merely an American revolution; and this is one of the, perhaps, biggest misunderstandings among those from other countries, particularly from Europe, who wrestle with these issues. They often look at the American use of this and say, "Gosh, that's the Americans again using their toys, using their technology" And, then you also see an angle of coverage on the drones' strikes into Pakistan for example saying this is just prototypically American. It is just fundamentally wrong. And by that I mean that there are 43 other countries working on using military robotics today. They range from large countries like the United Kingdom, France, Germany, Russia, and China to smaller countries like Pakistan, Iran, and Belarus. This is not a revolution that is going to be limited to anyone nation.

It is not going to be limited to just states themselves. Again, non-state

actors of a whole variety of different types have utilized these unmanned systems. It is everything from Hezbollah, which flew drones against Israel during its recent war, to one of the groups in the book, a group of college kids in Pennsylvania. They negotiated with a private military company for the rental of a set of military grade drones, that they wanted to deploy to Sudan. These were college kids starting to use that advanced military system.

This globalization leads to what I view as almost a flattening of the realm of war and the technologies that are used in it. By that I mean we are seeing warfare go the same way that software has gone. It is going "open source." The most advanced technologies are not just limited to the big boys. All actors can now buy them, build them, use them. The same way it is played out for software. And that is happening in warfare as well.

Now, a concern for states is of course how do they keep up with this trend and how do they limit it and does it lead to just a quickening and the potential risk of an arms race. It is also, I think, a concern for some of the western states, in particular for the US in this trend and that they are ahead right now but that is not always the case. There is a lesson in both technology and war: there is no such thing as a permanent first mover advantage. Think about this in technology: It was companies like IBM, Commodore, Wang that were the early movers in the computer realm. And, yet, they are not the dominant players anymore. It is now companies like, for example, Microsoft or Google or Apple. So being first did not mean that you came out on top in the end.

The same thing has happened in war. For example, it was the British who invented the tank. It was the Germans who figured out how to use the tank better. And the question for the US and its partners in Western Europe is, where does the state of their manufacturing today as well as the state of their science and mathematics and engineering training in their schools have them headed? That is, where does the current trajectory of these important underliers have them headed in this revolution? Or another way of phrasing it is: What does it mean to be using more and more soldiers whose hardware is increasingly built in China and whose software is increasingly being written in India? Where does that have you headed? So it is not just a concept of an arms race, but in fact will some of the players in that race find it sustainable for themselves?

For your book you have spoken with many soldiers. How is your estimate on the influence of military robots on the soldiers using them

(individualization and anthropomorphism of robots is something which comes to mind but also the psychological stress of UAV remote operators)?

For that book I made a journey of meeting with everyone, from people who design robots to the science fiction authors who influenced them; from the soldiers who use them on the ground and fly them from afar to the generals who command them; from the insurgents that they fight to the news journalist who cover them; add to this the ethicists and human rights lawyers, who wrestle with the right and wrong of it. These are all the type of people that I interviewed for the book. One of the most important findings and one of the things that was fascinating to me, is that all of the ripple effects of this new technology, all the things that are important about robots' impact on our real world do not come back to the machine, but come back to human psychology. It is all about us and how we view and understand the world around us and how these technologies help reshape that – that is the important part of the discussion.

I think we can see this, for example, on the soldiers themselves. We are seeing this going lot of different directions. One is of course the distancing effect, the change of what it means to be fighting from afar, fighting by remote. It has taken that phrase "going to war" and given it an entirely new fundamental meaning. For the last 5,000 years, when we described somebody as going to war – whether we are talking about the ancient Greeks going to war against Troy or my grandfather going to war against the Japanese in the Pacific during World War Two –, we were at a most fundamental level talking about going to a place where there was such danger that that soldiers might never come home again, that they might never see their family again. That is what going to war has meant for the last 5,000 years… until now.

One of the people I remember meeting with was a US Air Force Predator drone pilot, who fought against insurgents in Iraq but never left Nevada. He talked about what it was like to go to war in this case, where he described how he would wake up in the morning, drive into work, for twelve hours he would be putting missiles on targets, killing enemy combatants, and then at the end of the day, he would get back in the car and he would drive home. And 20 minutes after he had been at war, he would be at his dinner table talking to his kids about their school work.

And so we have this entire new experience of war of being at home and simultaneously at war. And that is creating some psychological

challenges for those who fight from afar. They found for example that many of these remote warriors were suffering from levels of combat stress equal or in some cases even greater than some of the units physically in Iraq and Afghanistan. It is very early, we are still learning about this, and as one military doctor put it, 'We have 5,000 years of understanding normal combat stress, but we only have a couple of years understanding this entire new model.' But there is a couple of drivers that we believe: One is that the human mind is not set up for this sort of dual experience of being at war and being at home and going from killing someone to then having your wife be upset at you because you were late for your son's football practice. People are having that experience right now. Another is the grinding nature of the remote work. These units may be fighting from afar, but they are doing it day after day after day and, in fact, doing it for years, and they do not get weekends off, they do not get holidays off, because war, of course, does not play that way. And so they do not deploy in and out the way that soldiers have traditionally done. Therefore, it can be quite grinding.

The other aspect that people point to is the change in camaraderie: It is tradition that soldiers who deployed together and have experienced the battle together then have also gone through the sort of psychological management of those stressors together. Air Force officers for example talk about flying out on mission, but then after the mission is done going to "beer call." It is basically that they sit down, the squadron, they have a beer and they get out all the emotions they just had to go through, for example from losing one of their buddies. In the remote warrior work, you do not have a "battle buddy" as they put it. You are sitting behind a computer screen, you are experiencing these aspects of war, but you are never sharing it; and then you clock out and you go home. And so the unit is never together, never has that rest and recovery period.

The final part of it is that while you are fighting remotely in many ways they are seeing more of war than recent generations have. For example a bomber pilot will fly in, they will drop the bomb and they will fly away. Drone pilots will do the same, remotely, but unlike that man bomber pilot, they will see the target up close beforehand using the high-powered video cameras. They will see that target for minutes, in some cases for hours, in some cases for days, as they watch it develop out. And then they will drop the bomb and they will see the effects of it afterwards. That means that war may be happening at a distance, but it is very much in their face. Then of course again, they go home

and they are talking to their kids 20 minutes later.

This stressor can also be one that plays out for their fellow troops. I remember talking to an US Air Force NCO. He described how dramatic it was when they were operating an unarmed drone that was flying above a set of US soldiers that were killed in a battle. And they could only fly above them and watch as these soldiers were killed in front of them. You can imagine just how dramatic that is, that sense of helplessness, and then to walk outside the control command centre, where you can go to the grocery store. America is at peace, but you have just seen people die. You have just seen fellow soldiers die. And so this is one of the remarkable challenges.

It is interesting though, we are seeing other connections, other bonds being built, though in strange new ways. For example, while we are seeing this disconnect from soldiers fighting from afar and the new experiences they are having, other soldiers are bonding with their robots themselves. One of the stories that opens the book is about a US military unit that has their robot killed – it is blown up by a roadside bomb. It literally sends the unit into a deep moral spiral, and the commander of the unit writes a condolence letter back to the manufacturer, the same way he would have written a condolence letter to someone's mother back in the day.

There is another case in the book about a soldier who brings in his damaged robot to the robot hospital – again they call it the robot hospital even though it is just a repair yard, a garage. And he is crying as he carries this robot in, and the repairmen look at him and they say, 'We can't fix it, it's completely blown up but don't worry we can get you another robot.' And he says, 'I don't want another robot, I want this one. I want Scooby Doo back.' It sounds silly, it sounds absurd, but the thing is, he took this to heart, he bonded with this robot because that robot had saved his life countless times, again and again. And so why would he not start to bond with it?

We have seen other cases of course naming them, giving them ranks, taking risks for the robots in a way that they really should not, when we pull back and think about it. There was one incident where a robot was stuck and a soldier in Iraq ran out 50 meters under heavy machinegun fire to rescue his robot. The whole point of us using robots in war is to limit risks, and yet here he was taking far greater risk to rescue it.

It may actually turn again on our psychology and even our brain physiology. One of the interesting things is that they did a study of

human brains. They linked them up to a monitor and they found – there is a part of the brain called the mirror neuron – that the mirror neuron fires when you see something that you believe is alive. So every time you see a dog, an insect, a fellow person, that part of your brain, that mirror neuron, that nerve cell fires. What was interesting in the study is, when they showed these people robots and things that they knew were machines, they knew they were not alive, the mirror neurons in their brains still fired. And so it may just be that we cannot help ourselves, we cannot help but attach our human psychology to these mechanical creations.

What impact will military robots have on the future of warfare itself? And what will we have to expect in unconventional/ asymmetric warfare and terrorism?

These technologies, these systems *are* the future of war. That is the growth curve of their usage is the same growth curve that we saw with the use of gunpowder, the use of machineguns, the introduction of airplanes and tanks, where they were used in small instances often not all that effective at the start and then we began to use them more and more in lots of different ways and they began to globalize. And soon something that was once seen as abnormal was now the new normal. And that is taking place with robotics today. We may think of them as just science fiction but they are battlefield reality. And we are only seeing their use grow and grow. For example the US military has gone again from a handful of these drones in the air to 7,000 in the air, from zero on the ground to 12,000 on the ground all in just the last five years. But this is just the start. One US Air Force three-star general I met said, we very soon will be using "tens of thousands" of robots. Again, it will not just be the US Air Force, it is all of the various militaries out there. You have got 43 other countries building and using these systems and everybody wants more of them. It is the future of war, like it or not.

It is also the future of war for non-state actors. As I discussed earlier, it has that flattening effect of allowing more and more players to use high technologies. So, it is not like in the past where the tools of war were limited just to states, just to governments, just to militaries; this is not the Napoleonic age anymore; now, all the different players can use it. The implications of that for terrorism are of concern, because it means that small groups and individuals will have the lethality of the state. I think we can see this on another impact: it widens the scope of those who can play in the realm of terrorism. That means it is not just that Al-Qaeda 2.0 or the next generation version of the Una-

bomber[5] or a Timothy McVeigh[6] is going to be more lethal with greater distance. For instance there was a group of model plane hobbyists who flew a drone from the United States to Europe – well, one person's hobby can be another person's terrorist operation.

In fact, a recent government report said that the next generation of IEDs – the next generation of these improvised explosive devices that have been so deadly in Iraq and in Afghanistan – are going to be aerial ones, small drones that carry these explosives. But it is not just again their greater lethality; it is the fact that more and more people can play in these roles. You no longer have to be suicidal to have the impact of a suicide bomber. You can utilize the robot to carry out missions, to take risk that previously you had to be suicidal to do. And one of the people I interviewed was a scientist for the US military's DARPA institution (our advanced research lab) and his quote was this: "If you give me 50,000 Dollars and I wanted to, I could shut down New York City right now using robotics." That is a remarkable illustration of the technology itself, but also of the world that we are entering, and then finally how so much of whether it is a good or an evil again depends on us. It is not the technology that is the most important part; it is his willingness or not to utilize that technology that way.

Consequently, when I pull back and think about these technologies, I often go to how I close the book, which is this question: We have built these incredible technologies, we have built these incredible systems that can do remarkable things. They are truly cutting edge. And yet, what does it say about us; that is, we are building technologies that both scientists as well as science fiction authors believe may even be an entirely new species, but we are only doing it to make ourselves more lethal, to give us greater capability to kill each other. Therefore, the ultimate question is this: Is it our machines that are wired for war or is it us?

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[1] On September 16, 2007, Blackwater guards shot and killed 17 Iraqi civilians in Nisour Square, Baghdad. The incident occurred while Blackwater personnel were escorting a convoy of U.S. State Department vehicles. The next day, Blackwater's license to operate in Iraq was revoked.

[2] The term "coalition of the willing" has been used by George W. Bush to refer to the countries who supported the 2003 invasion of Iraq.

[3] Arthur Conan Doyle, Danger! Being the Log of Captain John Sirius in: The Strand Magazine, July 1914.

[4] The Second Amendment to the United States Constitution is the part of the United States Bill of Rights that protects a right to keep and bear arms.

[5] Theodore John Kaczynski, known as the Unabomber, carried out a campaign of mail bombings in the United States from 1978 to 1995, killing three people and injuring 23.

Kaczynski is serving a life sentence without the possibility of parole.

[6] Timothy James McVeigh was responsible for the bombing of the Alfred P. Murrah Building in Oklahoma City on April 19, 1995. The bombing killed 168 people, and was the deadliest act of terrorism within the United States prior to September 11, 2001. He was sentenced to death and executed on June 11, 2001.