**RedZone Podcast Episode #59: What Could We Learn From Biology and Nature to Defend Our Own Systems – with Peter W. Singer, Top 100 Innovator and Global Thinker**

Bill: That works, oh fantastic. Have you done a podcast before?

Peter: I have not done yours no, but I have done podcasts.

Bill:

[00:01:00] Okay, excellent. I just want you to know that I am here just to elicit the best and I have met you at the [Arsay 00:00:20] Conference so my listeners are going to be, typically, enterprise leaders that are concerned about cybersecurity, that generally is the theme. I also cover a lot of exponential technologies. I am a chapter ambassador for Washington DC for Singularity University so I cover a lot of exponential themes covering all sorts of topics related to robotics, AI, machine learning, deep learning and 3D printing, digital manufacturing. All of those areas are in the wheelhouse that I cover with the podcast, of which a lot of my core audience is interested in they cyber part, but that doesn't necessarily mean we can't go into different areas and themes. I just wanted you to know about the general listenership.

Peter: Mm-hmm (affirmative). Cool, okay.

Bill: Didn't know if you knew some of that background, but that is who the listeners tend to be.

Peter: Okay.

Bill:

[00:02:00] Okay, so if we could started, I would like to ask you a couple of questions just about how you got started covering the technology and war. I noticed from your books and reading material from your website and reading about presenting in front of Congress and the themes of your past two books in 2014 and 2015, that you covered war and technology, or that is your focus. How did your interest develop?

Peter: Oh gosh, like with all things I think it goes back to our youth. For myself, I was growing up that weird little kid but, where maybe a little bit more typical where, at the age of six, you gave me a stick. Within about a minute, that stick would have been magically transformed into either a lightsaber or some kid of Tommy Gun and I would be off fighting either Darth Vader or German invaders of our neighborhood. Same thing when I think about building Legos but then attacking them with a model of the fighter jet that my uncle flew in Vietnam.

[00:03:00] It is that kind of mix and I have always had a deep love of history. Again, I think shaped by your family experience. I love going to my grandfather's study and pulling out the history books about his experiences in World War Two. He had been a US Navy captain, but then also science and science fiction. You can think about whether that is on the literature side and the books that you grow up reading to the movies, the TV shows. It has always been that cross that is there.

[00:04:00] When I look at, now that I am grown up, so to speak, the books I have written have had a theme that connects them all and it has been, in essence, what is changing. Comparing the history of conflict and technology to the present to what is changing and what do we need to wrap our head around. For example, my first book was on the private military contractors, the black waters the Haliburtons were there but didn't really fit the way we understood war. The book was on warlord groups and child soldiers.

Another book was on the rise or robotics, it was called 'Wired For War' where we were ... This is an incredible moment in history, not just history of war but human history. Robots are starting to be used and yet we weren't wrestling with both the reality of it and all of the dilemmas. Then a book on cybersecurity and that hits everything from war, but it is a conflict that inherently moves on the civilian side.

[00:05:00] When you think about the experiences of anything from banks to you and I on our personal privacy levels. Finally 'Ghost Fleet', especially with what does this potentially look like in five, 10 years out and tries to bring these different themes together in terms of a ... It is a novel, but it is a unique kind of novel in that it has got 400 footnotes to document how everything in it is real. It crosses, for me, the fun that I had of reading early Tom Clancy but also the non-fiction work that I have been doing, for example, consulting with the military and the like.

Bill:

[00:06:00] Yeah, it is the science fiction of the Jetsons era when ... I guess the Jetsons were only on TV for about two seasons, I just learned that the other day when I was out in Silicon Valley at the Global Summit for Singularity and it was interesting. A lot of things that we just used to dream about now are here and now they are a reality. Is part of your mission to ... With the trepidation and the debate around this, is it to educate and inform or do you have a firm opinion about whether these are inherently good or bad or you just want to be in the middle of the debate?

Peter: I see my role first as to explain and to help people understand the context of whatever the change is and that context may be the historic context. What has changed, what has come before. The context in terms of, "Why is it happening now in the marketplaces?" When you think about the field of cybersecurity, too often it tends to focus on the technology side when we know it is how the marketplaces are organized.

[00:07:00] How the businesses and the government agencies themselves are organized, that shape things more. That is both on the good and the bad side. In terms of the defense and also how the marketplace, in terms of the front side is organized. To the legal, moral, ethical questions that are being presented by these changes. What I hope to do is equip people to better understand them and that allows them to make better decisions.

I, of course, have opinions on what is good, what is bad. More so on what we should do, how we should wrestle with these changes, but I think when you are crossing that space between analyst and writer, you need to lay out the different options. It is not just pathway one as the only way to go. That is not being honest ... Not just kind of lying, but intellectually honest. Instead, what you need to lay out is, "Here is the different pathways, here is the advantages, here is the disadvantages and this is why this pathway seems to be the best one."

[00:08:00] That helps the reader, that doesn't mean they might not disagree. "You know what? I actually like pathway number two, but now that is awesome to understand it." I will say a position that cut through a lot of my work when it comes to technology itself is that I see technology itself as neutral. It is a tool. Tools, though, can be used for both good and bad and we have seen that pattern throughout history.

Whether you are talking about the story of the very first tool, some rock that was picked up that was used to bash someone else in the head that was also used to build for the first time. Same thing whether you are talking now about drones or the internet. The internet, for example, has been one of the most powerful tools for raising human understanding, transforming business marketplaces. It has also been one of the most powerful tools for spreading hate since the printing press.

[00:09:00] It is now being used as a way to attack others. Those others might be large corporations, they might be small cupcake shops, they might be you or me, they might be nations. Again, it doesn't mean that the internet is somehow inherently bad. You and I are using it to have a great conversation about the internet, to hopefully inform people. I tend to take the position in terms of the technology is neutral, but there will be people who use these technologies in both good and bad ways.

Bill:

[00:10:00] Yeah that is ... By the way, it was interesting, you were talking about where a lot of our careers have their genesis when growing up as kids. I do remember having battles in ... Just a quick story. I do remember having battles in the woods with my friends as well. We used to be just throwing rocks and sticks at each other and hide behind trees and then the other day my 13 year old asked me to go play an AirSoft war with him and his friends in the woods. I couldn't believe the sophistication of these little AirSoft guns that shoot these little soft pellets at 30, 40, 50 yards very accurately. Talk about what 40 years ...

Peter: Your kids sound old school because I was thinking you were going to have a story of either they were going to be using drones, in some case, or ... Again, with science fiction technology generation ago and now I got three drones for Christmas.

Bill: Right, right.

Peter:

[00:11:00] On the other is the virtual side of it. What is the Pokemon craze now? Part of it is layering technology and our experience of it over the real world, including using it to clash, so to speak, with each other. Again, it is interesting to take this idea, the neutrality of technology, and compare it to the discourse over it. There is this split between ... It is kind of like in rap. East Coast and West Coast. East Coast, Washington DC, where I am speaking to you from the policy world looks at technology with great suspicion, fear.

A lot of it underneath is just ignorance. I remember talking with a senior official who was involved with making cybersecurity policy and he talked about how he didn't really well understand it. It was a lot like, as he described, how is VCR still flashed 12. I was like, "One, you don't understand it. Two, you are still using a VCR. This is disturbing." Then you go out to Silicon Valley, you go and it is, "Technology will solve all the world's problems." Whether it is war, whether it is poverty, whether it is hunger.

[00:12:00] There is this blissful solution set. It is either already solving it or just wait it will solve it. Of course, that ignores history and, frankly, the customer side, the human side. People are going to make things and break things. It is to help people ... Let's get our blinders off in both communities.

Bill: I love that. Since you really are grounded in the historical pieces, I love reversing the clock and get your perspective on this because it is interesting. I was going back to the ... Someone told me the other day that the Gutenberg printing press sort of democratized education, of course, and took the power of reading and writing out of the scribes and into the people.

[00:13:00] When you look back at the literature of that day, it was actually quite frightening and disturbing to the clerics and the scribes and they thought, "Oh my God. All of these people are going to go out of work because they can no longer write endlessly." Someone said the other day that we have about 10, 12, 13 Gutenberg moments going on right now in a the variety of different technologies. What do you think ... From that lens, how do you look at what is going on now from an historical perspective within the domain that you spend the most of your time in?

Peter: Gosh. Well the first is the question of can you still divide things into domains like that where something is obviously a military technology or a civilian technology or a banking technology or whatever. Computers is a good illustration of how the borders, in many ways, don't exist anymore. The computer started out as a military technology but it ripples back and forth, affects every sector.

[00:14:00] I think we are seeing the same in a number of areas. I like the way you framed it as sort of the simultaneous nature of it. I was part of a project a couple of years ago. It was paid for by the Pentagon, but it was not classified. It was called NextTech and we were essentially trying to wrestle with what are the game changing, revolutionary, disruptive killer apps? Whatever your buzzword you want to use, what are the technologies right now that really matter?

[00:15:00] The framing of it is that we essentially interviewed some 60 different experts and it was everything from people working at organizations like DARPA or companies like Facebook, Google, Apple. University professors, scientist, venture capitalists. People putting their money in making the future come true. We asked them all a basic question, "What technology today do you thing is the equivalent to the computer in 1980?" It is not science fiction, it is real, but go back to 1980 [crosstalk 00:15:08] truly change the world.

What is fascinating is they gave us so many different answers. No one agreed on the one single technology but, basically, it came down to what I would describe as five technology bucket areas and they are as follows. One is hardware and, more specifically, robotics and increasingly advanced and more and more autonomous robotics. It was fascinating for me to look at that because I had done a book on robotics in 'Wired For War' and as a comparison in the space of war. As a comparison just in the space of war, you and I are talking just after the 15 year anniversary of 9/11.

[00:16:00] When our forces go into Afghanistan, we have a handful of drones, none of them armed, and zero unmanned ground vehicles, ground robotics. Today, US military has over 10,000 drones, many of them armed. Over 12,000 manned ground vehicles, but we are not the only player. Over 80 countries have military robotics. Of course, it is now civilian technology as well. Whether you are thinking about drones to driverless cars on the streets of Pittsburgh so you have hardware.

[00:17:00] Next area is software and in particular, Internet of things, Big Data, artificial intelligence all crashing together. Third bucket area, I call it waveware. Basically the energy side where we are seeing new energy sources, new energy forms. That is everything from how the American economy is being changed by ... We have become an energy producer rather than an importer. That will continue to shift. Again, it is everything from what has happened in oil and gas to solar to hydrogen, but also energy as a weapon. Lasers were science fiction when we were kids. They are no longer.

[00:18:00] Another area is ... You can think of it not as the where, in terms of the location, but the where in terms of the tool and this bucket is things like additive manufacturing, 3D printing. Again, however you want to frame it, our ability to turn bits, computer designs, into atoms, things. What does that mean for marketplaces, production, weaponry? Then, finally, is the area of wetware and that is the idea of human performance modification. Jokingly, Captain America meets Iron Man meets the Russian Olympic athlete program.

It is everything from finances shifts and what we are seeing in genomics to carrying technology on the body to technology in the body and amazing shifts in what the human body can do. Those five areas, each of them happening simultaneous and, of course, each of them feeding off one another. What is playing out in robotics is not just about the robot being able to walk better, it is its intelligence that shifts over to the artificial intelligent software side. In turn, much of the human performance modification, a lot of it is about how do we keep up with our technology? How does it change us? These things shifting back and forth.

Bill:
[00:19:00] The human performance side is interesting. I was thinking about external exoskeletons and a couple of Olympics ago, that guy from South Africa was running in the 400 meters with that prosthetic device on his right leg, are you referring to a full frame, external skeleton on a human body? Maybe you can explain that a little bit.

Peter: Think about ... It is literally all the different ways that human performance, what the body can do, is modified, is enhanced, is changed. We see this in terms of it at a fundamental level and the sciences in genomics. People are excited about Moore's Law, but the breakthrough in IT is much slower than what you are seeing in the biosciences. It might be through chemical changes in performance.

[00:20:00] Everything from affecting your endurance, your ability to go without sleep for long periods of time, your concentration levels, how smart you are. Again, don't think of this as super soldiers. Even very modest shifts can have a significant impact. People who ... Whether you are a kid studying for a class to you are a writer. Be it a book writer or writing a memo, we don't hit our peak mental performance, or highest concentration levels, but for a very limited time out of an hour.

[00:21:00] One study I saw had it at about six minutes out of an hour, it was really when you were 'in the zone' as you might think. We have lots of different ways of getting in the zone. Drinking coffee, listening to music, meditate, whatever. What if we could take that six minutes and change it to eight minutes? Change it to 12 minutes? That sounds modest, that is actually possible and that doubling effect, what does it mean for productivity? What does it mean of for the size of your, be it military unit or your business unit? What does it mean for training time?

Then you get to the hardware application of the human body. Might be hardware on top of the human body. You went to science fiction exoskeletons, but think about all of us walking around ... To go back to the example of Pokemon Go. You are carrying around that phone and using it to navigate and look at the world in a very different way. Those leads, we look at what will come next with Google Glass? It was a very ... A lot of people had a lot of fun with it but we all know that those kind of enhanced vision devices are not stopping with that.

[00:22:00] What about hardware not the body but in the body? It might be to replace something that has been lost, as you used the example of the athletes or soldiers who have lost limbs, and robotic prosthetics. They have gone from being less than a standard human capability to greater than human capability. It might be in the ability to run fast. There was a gentleman a couple of weeks ago who showed off a robotic arm that was inspired by the video 'Metal Gear Solid'. His robotic arm mounts everything from a smartphone in the wrist to a drone on the shoulder.

Bill: Oh wow.

Peter:

[00:23:00] Yeah. This is not in the year 2050, this is today. It might be combinations of hardware, software, wetware coming together. Brain/machine interfaces. We have seen this, for example, the Brain Gate project that was designed to help people that have been paralyzed. It is a DARPA project. It has linked their brain up to a computer. It changes, in essence, the electric signals in your brain to digital code and it allows the person via thought alone to do things like, for example, move a cursor around a computer screen. Which if you can do that ...

Bill: Sure.

Peter: ... [crosstalk 00:23:25] navigate the web, you can write email, you can ... The thing people have been getting most excitable about is one of the individuals was able to change TV channels by thought alone. That is not limited to people that are paralyzed. It may be in forms less evasive. We have seen, for example, using it to control the flight of drones via thought alone, kind of, via wearing the equivalent of wearing a skull cap.

[00:24:00] It will also go into other [inaudible 00:23:56]. There is a project, also supported by DARPA, called Subnets, and it is basically systems base looking at neuroscience in a very different way. In essence, just think about it as instead of your brain signals going out, it is taking digital code and reshaping what is happening inside your brain. Like so many technologies, go back to something we were talking about before, is designed to help people. It is designed ... Medical applications range from Parkinson's to why DARPA, the military research lab interested in it, is to help soldiers who have experienced PTSD, post-traumatic stress disorder, to help them. It, in essence, modulates their emotions and their memories of traumatic moments. Very good.

Bill: Yes.

Peter:
[00:25:00] Very powerful, but one of the things we ... Maybe the scariest scene in our 'Ghost Fleet' book is how we project how this will be used in interrogation. Then you get these interesting, again, science fiction like questions. "Is it torture if you don't remember it or you don't actually feel it but you think you are feeling it? Is that torture?" That seems like science fiction, that is a question that we are now wrestling with.

Bill:

[00:26:00] Interesting. It is interesting that most of the people think ... A lot of people think that a lot of the innovation is coming out of Silicon Valley, which of course would be hard to dispute that that wouldn't be the case, but then there was a gentleman that spoke at our salon two months ago that said that from the cell phone, of the 30 major breakthroughs that enable our current cell phones, from the GPS locations and to the variety. Of the 30, over 70% of them came out of the military, from projects within the military, DARPA, or what have you, which I think most people are under the assumption that it is coming from Silicon Valley.

Peter:

[00:27:00] There is also Silicon Valley needs to go back to its own history and remember that it was started by the military and not in the story we like to tell ourselves of chip makers and the like, but it actually dates back to a Navy blimp base. Can't have a long conversation around that, but that is the origin of Silicon Valley, is actually the ... Essentially the big facility Moffat Field that you will see if you find San Francisco Airport, right in the middle, that is the origin of Silicon Valley dating back to the 1930s when the plan was it was going to be the hub for flying aircraft carriers and the city fathers of Sunnyvale struck a deal with the Navy to provide the cheap real estate and naming it Sunnyvale because the idea was that it was the one sunny part of the Bay Area.

[00:28:00] My point is that we actually look at the real history, if we look at the real data, there has always been this back and forth between Silicon Valley and the military. Sometimes it is funding, sometimes it is people, sometimes it is inspiration and that continues to today. The shift, though, is, I would argue, the advancement, the pacing and the challenge for the government now is it is more often reacting to what is happening out in Silicon Valley and the broader technology field.

It is not just Silicon Valley, whether it is in Texas or if you are looking at robotics, exciting things, arguably more exciting things happening in Pittsburgh and Route 128 and Boston, you name it, we have had a very US centric discussion, there is also things playing out in China and Israel and Sweden. The point is that, in general now, government is, at least on a policy side, struggling to keep pace and I think that is at the heart of a lot of the disputes that you see. For example, the Apple/FBI dispute is as much about encryption as much as it is about the general discomfort on the government's side that it is falling behind, it doesn't know what to do. It is not driving the conversation anymore.

[00:29:00]
Bill:
I think that the pace ... I think the debate, it goes around our governance infrastructure so fast because software can be downloaded to the phone and to, all of a sudden, hail a taxi in France but they don't have time to debate whether or not they want Uber in town and then everybody gets angry because people are hailing Uber drivers [inaudible 00:29:24] horse leaves the barn before the infrastructure of governance can really take a look at the situation.

Peter:
[00:30:00] It is an interesting question about this idea of beta tests. This is a great concept of, "Let's push out our new technology into the world before it is perfect and the people who use it will let us know how to improve it." This is a tested, tried system, particularly for software. The challenge now is that we see change in these bucket areas that I mentioned and hardware, robotics or human performance modification, is beta testing, pushing it out in the real world before you work through, not all, but at least some of the major implications of it, dilemmas of it.

[00:31:00] The fact that people are going to misuse it, either accidentally or deliberately, because the world has bad people in it, it comes with very real human cost and consequences. You can see that disconnect, you can see that discomfort. For example in Tesla, push of ... It has been very open about the fact that it is doing a beta test with its driverless car technology, human assist, or however you want to frame it. Basically that it was pushed out and, clearly, parts of it weren't ready and you have had accidents that people have died in.

The company has said ... They sort of made two responses. One is very [inaudible 00:31:26] going back to this East Coast, West Coast, gave a classic engineers' statistician response saying, "Look, when you crunch the numbers, we have saved more people from accidents that didn't happen because of the technology vs the accident that did happen." That is arguably true, but also that is not how we sometimes work through issues in the social human side of things.

[00:32:00] The philosopher side should be the classic idea of the trolley. [crosstalk 00:32:04] Of course, you know your discomfort with killing five people vs killing a cute little kid and is it a deliberate choice or an accidental choice. The point is that they give very classic engineering response and then the second thing is, shortly thereafter, they pushed out new technology, new upgrades, that fixed it and said, "We have learned, isn't this great?"

[00:33:00] Again, this is where you get into this back and forth between the beta test or not, which is, "Oh gosh, couldn't we have figured out a way to get this technology before we push it out so wildly?" Again, this is the back and forth and people ... You will see this now, the discourse over the taxis, robotic taxis being introduced in the cities. Pittsburgh is an example of that happening with Uber despite the fact that there is really no good legal codes policy around it and people take different positions.

People say, "Well, I would much rather get this rather than waiting for this slow, bulky government to get itself in order." Then others strike back "Well, when things go wrong, how do we figure out how to handle it, how do we figure out accountability?" Everything I just talked about, same things play out in war and we have seen that, for example, recently with the discourse over drones that are remotely operated right now, that the back and forth of ... We have essentially ended up with drone wars without having policy debate about it, without having Congressional authorization around it.

[00:34:00] Whether you like it or not, you can admit that we didn't have the kind of discussion or debate the decision to ... The same thing is playing out with autonomous robotics right now. We are moving towards them. It obviously raises a lot of deep, deep questions. Policy world is not ready for it, the laws are not ready for it, but we are pushing forward.

Bill: It is super interesting because the traditional methods of developing software, the waterfall methods, now really don't support current needs of businesses and consumers. Now they are more agile. You release the code and like Reid Hoffman says with LinkedIn, "If you are waiting for your software to be perfect, you are already too late." That is really interesting because when we move over to the policy side, from a threat point of view, we are kind of launching before we have determined the philosophy or debate around whether or not something is right or ethical.

[00:35:00] I would like you to talk about ... Our drones right now, aren't they 100% human being ... If a kill decision is made, doesn't it have to be made by a human being at this point vs a lot of countries in the world, they maybe don't have a human being in the loop. Is that true or is that a false assumption.

Peter: There is a number of different things you are touching on there. First on the US vs global you said. None of us, yet, are in fully autonomous world. We are not in the world of the Terminator. The way that technology is used still involves ... If you are thinking of drone strikes and Syria, Iran or the not so covert CIA operations in Pakistan. They are still a human in the loop, a human is making that decision. That time, that may change in the future, but right now a human is still in the loop.

[00:36:00] Same thing if we are looking at other actors use of the technology. As I have mentioned, roughly 80 militaries around the world have robotics. So far, I believe the number is eight that have conducted drone strike. They are nations like Israel to Nigeria, Iran, Iraq, most recently, Turkey claimed that it had conducted a drone strike.

[00:37:00] The issue ... Now we get into this fun thing of looking at the technology vs how we use it, where we use it, under what circumstances. For the most part, the concern over drone strike campaigns is not the technology itself, it is how it changes the way we look at the politics of it, and most particularly where and when we conduct these strikes and these ideas of ... If you go back 15 years and said, "We are going to be conducting more than 500 airstrikes into Pakistan, do you think that is a war?" People would have said, "Yeah, 500 airstrikes?"

We don't see ourselves as being at war with, or at war in, Pakistan because they are drone strikes and it is the way that they have changed the media reporting, the political discourse. That is the long and short of it, it is because not having to expose people to danger, etc. Again, it is not specifically the technology, it is how it has changed the politics of it. It idea is to sort of go back to this beta testing and release of technology and you will never get perfect software, 100% agreement and that is why you need to remember that.

[00:38:00] Anyone telling you, "Oh, this is going to be perfect, it is going to solve all of our problems." They are full of it. Second thing, though, is that the focus may not always have to be on to technology but where and when you use it. For example, if we are looking at a future of armed autonomous robotics, some people want an outright ban, never use them anywhere. That may or may not be possible. We have a discussion debate around that.

I don't think an outright ban is going to work, I just don't think the technology trend lines are going to allow it because we are going to be using more and more autonomous systems in civilian life so to think, somehow, that you will be able to prevent it on the military side, I don't see it happening. Also because war. Sides are always trying to get a competitive advantage so if one sides think autonomous robotics are going to aid it, it is going to work on them because it think it is going to win them wars. The point is, not so much the technology, but you may be able to regulate where, or how, you use that technology.

[00:39:00] If, for example, if we are worried about civilian harm, we may be able to agree, "We can't use this in places where it is very easy for a robotic system to get confused. For civilians to be caught in a crossfire in a city." On the other hand, we may decide, "We are comfortable with them being used in domains where that is less likely." For example, undersea warfare. Undersea warfare is actually highly automated already. The torpedoes, the way the sonar works.

[00:40:00] It is not the way it is in the movies, Jonesy listening in with his really, really good ear. It is already computers, in essence, matching algorithms. Torpedoes being fired off and hunting on their own. The point here is that, we are already turning towards it, but if things go wrong, you are less likely to harm civilians in undersea warfare because we don't have civilian cruise liner submarines, the way you could confuse a tank and a truck quite easily. Or a solider, an insurgent and a reporter all look the same at a distance. The point is there may be locales where we are comfortable with it. These are the issues we are going to have to work out.

Bill: You wrote an article just recently about the use of robots in Dallas for lethal purposes and it was very, very interesting. Is your ... Again, this is probably out in front of the debate, nobody sat there and said, "Should this happen," it just happened. Am I correct with that or was there a debate prior to this happening?

[00:41:00]
Peter:
The choice to use a robot in Dallas in a lethal manner was not something that was written into Dallas or, more widely, police doctrine, training, etc. The police on the scene, the police chief has been very clear in saying that this is something that they came up with in the moment. They ad hocced it. They faced a very difficult situation and they came up with an answer to it. Now, for me, the issue is not to Monday morning quarterback them but to go, "Okay, what next? Is this a precedent that we want other police to follow? Is it something that we want technology companies to do that they previously have not been selling armed robotic systems to police? What do we want to happen here?"

Bill: Sure, sure.

[00:42:00]
Peter:
My concern is actually that we may be setting ourselves up for an ironic and circular moment. How we got into this in the first place, how we got this situation of these police shootings and places that range from Minnesota to Ferguson in Missouri to Baton Rouge that then led to the protests that then had the sniper shooting at police at it. Basically, what we have seen play out is, in essence, each state, each local police department, is making up their own ... Not making up, I don't want to use that.

[00:43:00] They each have their own approaches to their doctrine, their training requirements, how they interact with the public. They have their own histories of race relations. To put it simply, some do it really well and some don't. For example, Ferguson police have quite a checkered history, a lot of problems there. The irony of the shootings in Dallas is that Dallas police have actually gone through a number of reforms and was widely known as one of the police departments that was doing really well.

[00:44:00] It had changed its relations with the civilian populace, had its numbers of shootings gone down and the like. The point simply is that some are going to it well, some are not. Do we want that with robotics? Do we want Ferguson police coming up with its own way of how to use armed robots and Dallas doing its own way and none of them being informed by everything from technologists to law to public debate. I am not comfortable with that. I actually don't want each and every little police department deciding how it is going to use armed robots or not. I rather us try to get ahead of this and start to figure it out at a national level.

Bill: Yeah, I think that is the importance right now of the debate, is to get out ahead of the technologies and enforce the debates. I think, as we wrap up, I would love to give the listeners some things that they can learn from and one of the things from your book and from your books and your writing materials and even your talk to Congress was the importance of resilience.

[00:45:00] I would love to ... This is a theme a lot of my listeners is creating ... We are never going to be secure, we are never going to be 100% certain, and never have in these days. How do you interpret resilience in the context of your domain that you spend most of your time? How could people be more resilient, either within the context of Estonia or some of these other examples that you have been using, moving forward?

Peter: When you are looking at cyber security and whether it is US and individual, US and business leader, you are thinking about national security. Too much of the discussion has been defense and deterrence. Keep the bad guys out, scare the bad guys away. The reality is that will not work. On the keep the bad guys out, attackers will get in. It is the nature of the beast. By the way, the attackers may already be on the inside.

[00:46:00] About one third of the major breaches are caused by insiders and that is true whether you are looking at the most sophisticated organizations in the world. The NSA and Edward Snowden to a small business and an employee who is disgruntled because they didn't get a promotion. On the deterrent side, the reality is some attackers will be scared by threats to retaliate against them and some won't. It is just the nature of it.

Instead, we need to shift to an approach of resilience and you can think about resilience in cyber security in two different ways. One is on the actual design, the actual approach and the other one is the psychological. On the design side, rather than relying on one single way of keeping them out, I like to think about ... When you are thinking about your networks, the parallels to the human body.

[00:47:00] The human body has an incredible external layer of defense. My skin right now, your skin. If you just look at your fingertips, it is stopping over 10 million attackers, keeping them out. Just on your fingertip. The reality, though, is that that is not enough. Inside my body, inside your body, there are 10 times as many foreign attackers as there are human cells. Our body, though, plans for that, our body is designed around it.

It does things like channels the attackers into places where they can't cause as much harm, your gut. It has extra layers of defense, extra layers of security, around its most important parts of it. In business, we call it the crown jewels. In your body it is things like the skull around your brain, the rib cage. [crosstalk 00:47:35] Exactly, these are really important things. "I am going to protect them even more, I am going to invest even more in these parts."

[00:48:00] Your body has internal monitoring systems that are always active and always important and very easy ways of signalling that something is amiss. You get a fever, your body triages when an attacker penetrates and causes harm. Recovers from it, etc. We should be thinking about this in the dawn of our, essentially, network.

Bill: The biological metaphor, basically what you are talking to is like a biological metaphor like how would nature secure itself?

Peter:

[00:49:00] Exactly. The biological metaphor can also work when you think about the public/private interaction here. Health, there is ... No one actor can do it all, just like in cyber security, so you need federal government level public health investment, and that might be anything from research on diseases to information sharing programs. By the way, corporations work in public health and that is everything from health care companies to your own, albeit, your retail company that puts out the sanitizer for hands. All of that doesn't matter if you don't have good personal hygiene.

If you aren't covering your mouth when you cough and the like. It is the same phenomenon in cyber security, everything matters, everything needs to be working together in a holistic ecosystem. Anyone saying that this one part can do it alone, they are wrong. I want to get back to that resilience in terms of psychological resilience. Compare the way we think about cyber security vs the British mentality towards terrorism

[00:50:00] Cyber 9/11, cyber Pearl Harbor. Get scared, catastrophe vs keep calm and carry on. Which mentality incentivizes attackers to come after you. That you are going to get hysteric and overreact? Oh by the way, the difference for private business ... Invariably when breaches do happen, and the actual cost of the breach, for some major corporations, it has been a difference of millions of dollars in losses vs over a billion dollars has been how they handled their public affairs.

How their legal team has responded, how [inaudible 00:50:19] responded, not [crosstalk 00:50:22] factor. Again, that idea of, "I am going to be resilient. I am going to design and think in a manner that plans for the bad and how I am either going to power through it and get back up quickly when I get knocked down." That is how we will solve cyber security.

Bill:

[00:51:00] Yeah, I love that. I absolutely love that metaphor and I was reading the blog post that you wrote for, I think it was Military Aviation Week, and you talked about the importance of air and space. You also mentioned cyber security and you also mentioned that there were two parts. We already covered cyber. What is the importance of our satellites and our satellite infrastructure and the ability of our phones? There is a whole world above us that I don't think I am fluent in and you are. Can you give us the one on one version of what you think we need to be aware of regarding this, moving forward from a resilience ... Either from a US or a personal perspective?

Peter:

[00:52:00] What we play with in 'Ghost Fleet' is the idea of what would happen if there was an actual war in the present day through the 2020s? When I say actual war, I mean the old school definition of a war. State on state conflict. That is not to say we haven't been in war, even though we haven't called it the last 15 years, but it has been against non-state actor networks. What I mean is a return to, not network threats, but states. Russia, China. What would a World War Three style conflict look like?

One of the differences is that it would involve battles in all the domains. Not just on land but domains that we haven't fought in for a long period of time. The last time the US Navy battled a peer at sea was over 70 years ago. The last time the US Air Force battled a peer power in the air, it wasn't the Air Force, it was the Army Air Corps. It would also involve battles in places we have never fought before.

[00:53:00] In cyberspace and outer space. Both those spaces are integral, not just to the military but to the civilian side. One of the issues of battles in these domains is that, very quickly, the lines between military and civilian would grow fuzzier or disappear. If you are thinking about targets you would go after in cyberspace, the medium itself, 98% of US military communications go over the civilian owned and operated internet.

If you look at on the satellite side, for US military satellite use, about 80% of it is on civilian satellite. If you are going after these things that enable our military to operate well, cyberspace, outer space, if you are targeting them, you are inherently going to be hitting things that are civilian. You are going to be taking down GPS, you are going to be going after communication networks, etc.

[00:54:00] This thing I am getting at is you have these strange aspects. The opening battles of such a war would be silent. Software doesn't speak and as the Aliens movie put it, "In space no one can hear you scream when things blow up." Then you don't hear [crosstalk 00:54:00] They will resonate widely. Not just in what the military can or no longer would be able to do. You take away GPS, everything from aircraft carriers to drones to missiles won't be able to operate in the same way or at all, but it would also have an impact on the civilian side. Take away GPS, it is not just, "I won't be able to find where my in-laws live." Take away GPS, major business operations, the way companies like a Target or a Wal-Mart do logistics, depends on GPS. Trading on the stock market depends on that. Very quickly, it would have an impact on the civilian side.

Bill: Internet timing systems. A lot of the timing of the gear that we have most of the ... It is called the GPS and the timing systems.

[00:55:00]
Peter:
Yeah. Just like in past wars, the technology will introduce new questions, including just fundamental questions about what we call the home front. The very idea of a home front was redefined by our ability to reach in to the air. Planes and then bomber planes suddenly met that the battles were no longer just on the front lines. They could reach hundreds of miles back and they opened up these questions like, "Can you attack civilian cities or not and when should you, when should you not etc."

[00:56:00] Same issues playing out now with cyberspace and outer space. The difference is the inherent civilian nature of them. Then you get to these questions like, "Does it actually have to wait for an outright classically defined war or some of these things playing out in the gray spaces, having the equivalent impact. There is probably some business executive listening to this going, "You are saying IF China conducts a cyber attack in the future? I am dealing with this every day."

Then the massive campaign and intellectual property theft that has hit businesses that range from defense companies to energy companies to soft drink companies, furniture companies all being attacked to what is playing out in our political system where we have seen Russian government linked attacks. Again, the fuzzy lines just don't affect the who but also the when of how we define war and conflict itself.

[00:57:00]
Bill:
This has been a real pleasure. I am leaving my best question for last, but before we do that, I just want to ask you where my listeners can find more information about your book 'Ghost Fleet', 'Cybersecurity and Cyberwar', 'Wired for War' all of your material both published. Where can they engage with that best that you would prefer to have on the show notes?

Peter:

[00:58:00] The easiest is your local bookstore, which has now been defined as the bookstore physically down the street to your local bookstore that is now inside that computer, your Amazon, Barnes and Noble online, etc. They are all available there and I hope people enjoy them. For each book, though, there is a website that has added extras. There is ghostfleet.com, and, for example, it has a soundtrack that is linked to the book. Imagery, for example, the book is about a conflict in the future, we have commissioned a number of artists and people from advertising agencies to imagine what would the war posters of the future look like? There is a lot of fun extras at cybersecuritybook.com.

Same thing at cybersecuritybook.com. It has resources for people. Again, everything from a soundtrack, what are the songs that make you think of cybersecurity to tools for businesses and even on teachers that are using it as a teaching resource. Then for all of my work, you mentioned a couple of articles. They are all pwsinger.com, that is my personal website.

Bill:

[00:59:00] Yeah, I highly recommend the books. I am staring at the hardcover of 'Ghost Fleet' right now and I really enjoyed your resources and your material. Part of me thinks that we need a huge software upgrade for human beings to deal with the acceleration that we are building digitally. You had mentioned human performance and I think you called it wetware and I am fascinated about this from a leader's ... Leaders are on this phone, they want to upgrade, or start to explore upgrading their own performance, stuff that they can ... Where do you go to personally that you can direct people to to learn more about what they can do. Is there any [crosstalk 00:59:27]

Peter: I am going to do a little bit of an awful thing and say wait.

Bill: Oh, that is [crosstalk 00:59:34]

Peter:

[01:00:00] Wait. No, again the point in all of this is that as much of the leader task is staying informed and trying to track, not one, but various new sources from multiple different fields. Being informed, being aware of your environment, your ecosystem, your marketplace, that is how you survive, that is how you thrive. That is true and we know that in business, we know that from a science side. It is not that animal that runs the fastest, it is the one that adapts to its circumstances that lives on. Darwin taught us that.

Again, it has been a really cool, fun conversation. Hope people are able to check out some of the books, whether it is on Amazon or ghostfleetbook.com and cybersecuritybook.com, but it has been real fun chatting with you on these things. Lots of big, meaty topics that aren't going away.

Bill: Yeah, it has been a pleasure, thank you.

Peter: Take care, bye.