The Lessons of World War 3

US and Chinese warships battle at sea, firing everything from cannons to cruise missiles to lasers. Stealthy Russian and American fighter jets dogfight in the air, with robotic drones flying as their wingmen. Hackers in Shanghai and Silicon Valley duel in digital playgrounds. And fights in outer space decide who wins below on Earth.

Are theses scenes from a novel or what could actually take place in the real world the day after tomorrow? The answer is both.

Senator McCain, Senator Reed, thank you and the rest of the committee for inviting me here today. I am a defense analyst, who has written nonfiction books on various emerging topics of importance to the discussions in this series, ranging from private military contractors to drones and robotics to cybersecurity. Today I'd like to present a few of the lessons from my new book Ghost Fleet: A Novel of the Next World War, which combines nonfiction style research with the fictionalized scenario of a 21st century great power conflict to explore the future of war.

Old Conflict Risks and New Stakes

Great power conflicts defined the 20th century: two world wars claimed tens of millions of lives and the "cold" war that followed shaped everything from geopolitics to sports. At the start of the 21st century, however, the ever present fear of World War III was seemingly put into our historic rearview mirror. We went from worrying about powerful states to failed states, from a focus on the threats of organized national militaries to transnational networks of individual terrorists and insurgents. Indeed, just four years ago the *New York Times* published an article arguing the era of wars between states was over and that "War Really Is Going Out of Style."

If only it would. Today, with Russian landgrabs in the Ukraine and constant flights of bombers decorated with red stars probing Europe's borders, NATO is at its highest levels of alert since the mid 1980s. In the Pacific, China built more warships and warplanes than any other nation during the last several years, while the Pentagon has announced a strategy to "offset" it with a new generation of high-tech weapons.

Wars start through any number of pathways; one world war happened through deliberate action, the other a crisis that spun out of control. In the coming decades, a war might ignite accidentally, such as by two opposing warships trading paint near a reef not even marked on a nautical chart. Or it could slow burn and erupt as a reordering of the global system in the late 2020s, the period at which China's military build up is on pace to match the US. Making either scenario more of a risk is that military planners and political leaders on all sides assume their side would be the one to win in a "short" and "sharp" fight, to use common phrases.

Let me be 100% clear, I do not think such a conflict is inevitable; though it is noteworthy that the Communist Party's official People's Daily newspaper warned that if the US didn't change its policies in the Pacific, "A U.S.-China war is inevitable..." While this may be a bit

of posturing both for a US and highly nationalist domestic audience (A 2014 poll by the Perth US-Asia center found that 74% of Chinese think their military would win in a war with the US), it illustrates further a simple but essential point: The global context is changing and what was once thinkable, and then became unthinkable, is again thinkable.

For the committee's important work, it means our planning for deterrence and warfighting must recognize these risks, and the greater stakes. To give a historic parallel, it is the difference between the challenges that the British as a dominant global power in the last century faced in many of the very same places we find ourselves today, like Afghanistan and Iraq, versus the stakes and losses of World War One and Two.

Multi-Domain Conflict

A great power conflict would be quite different from the so-called "small wars" of today that the US has grow accustomed to and, in turn, others think reveal a new American weakness. One of the key aspects is where it might take place, not in specific locations on a map like the South China sea, but in overall domains.

Unlike the Taliban, ISIS, or even Saddam Hussein's Iraq, great powers can and will fight across all the domains. This will present new threats in areas whwre we've had unfettered access; indeed, the last time the US fought a peer in the air or at sea was in 1945.

But a 21st century fight would also see battles for control of two new domains. The lifeblood of military communications and control now runs through space, meaning we would see humankind's first battles for the heavens. Indeed, both China and Russia have anti-satellite weapons programs. Similarly, we'd learn that "cyber war" is far more than stealing social security numbers or email from gossipy Hollywood executives, but the takedown of the modern military nervous system and Stuxnet-style digital weapons causing physical damage. Worrisome for the US is that last year the Pentagon's weapons tester found every single major weapons program had "significant vulnerabilities" to cyber attack, while many of our newest weapons are powered by microchips increasingly designed and built by those they might face off against, opening up the risks of hardware hacks.

In both spaces, we have to focus more on building up resilience to achieve "deterrence by denial," taking away the potential fruits of any attack. This will require new innovative approaches, like networks of small, cheap satellites, rather than a small number of billion dollar points of failure, and new additions to our cybersecurity activities. This again is not merely a matter of greater spending, but being willing to explore new approaches and forgo our pattern of putting new challenges and capabilities into old boxes. For instance, there is much to learn from how Estonia went from being one of the first state victims of mass cyber attacks to one of the most secure against them, including through the creation of a Cyber Defense League.

A New Race

Since 1945, US defense planning has focused on having a qualitative edge to "overmatch" our adversaries, seeking to be a generation ahead in technology. This assumption has

become baked into everything from our overall defense strategy all the way down to small unit tactics.

Yet US forces can't count on that overmatch in the future. Mass campaigns of state-linked intellectual property theft has meant we are paying much of the research and development costs of our challengers (note the F-35 and J-31 fighter jet's similarity, for example). These challengers are also growing their own technology. China, for example, just overtook the EU in R& D spending and is on pace to match the US in five years, with new projects ranging from the world's fastest supercomputers in the civilian space to three different long range drone strike programs on the military side. And, finally, off-the-shelf technologies can be bought to rival even the most advanced tools in the US arsenal. The winner of a recent robotics test, for instance, was not a US defense contractor but a group of South Korea student engineers.

This is crucial as not just are many of our most long trusted platforms vulnerable to new classes of weapons, now in a wider array of conflict actors' hands, but an array of potentially game-changing weapons lie just ahead:

- A new generation of unmanned systems, both more diverse in size, shape, and form, but also more autonomous and more capable, meaning they can take on roles from ISR to strike, flying from anything from aircraft carriers to soldier's hands.
- Weapons that operate using not the kinetics of a fist or gunpowder driving a bullet but energy itself, ranging from electromagnetic railgun, able to fire a projectile 100 miles, to new directed energy systems that potentially reverse the cost equations of offense and defense.
- Super long-range, and hyper fast air to air and air to ground missiles and strike systems.
- Artificial Intelligence, ubiquitous sensors, Big Data, and Battle Management systems that will redefine the observe, orient, decide and act (OODA) loop.
- 3-D printing technologies that threaten do to the current defense marketplace what the iPod did to the music industry.
- Human performance modification technologies that will reshape what is possible in the human side of war.

I would urge the committee and its staff to visit some of the various amazing government labs and facilities, from DARPA to the Office of Naval Research to Sandia to Air Force Research Lab, just to mention a few, where you can see firsthand how none of these science fiction sounding technologies are fictional.

The challenge, though, is the comparison that could be drawn between what is now or soon to be possible versus what we are actually buying today or planning to buy tomorrow. Our weapons modernization programs are too often not that modern. For example, if you start at their point of conception, most of our top 10 Programs of Record are old enough to vote, with a few actually older than me.

We too often commit to mass buys before a system is truly tested, locking in on single major programs that are "too big to fail" and actually aren't all that new. And, this dynamic shapes not just what we buy, but extends their development time, and ultimately our expectations of how much of that system we will buy decades into the future, limiting our present and future

flexibility. To abuse a metaphor, the growing per unit costs of the cart drives where we steer the horse.

At the heart of this failing dynamic is that while "disruption" is a new buzzword in defense thinking today, part of the Pentagon's new outreach to Silicon Valley, we struggle with the dual meaning in the concept: We claim to aspire for the new, but to be disrupted, the outdated must also be discarded. Amazon didn't merely pioneer online book sales, but it also ended the business of most brick and mortar bookstores.

The roadblocks to disruption exist at multiple levels, from specific weapons programs to organizational change and operating concepts. For instance, there is a long record of the government funding exciting new projects that then wither away in that space between lab and program of record because they can't supplant whatever old gear or program, factory, or internal tribe that is in the way. Indeed, there is even a term for it: the "Valley of Death." The same goes for all the new and important concepts you have heard about in these hearings over the last few weeks. To be adapted, something will have to be supplanted.

As you program for the future, ultimately what you support in the new gamechangers of not just programs, but also thinking, structures and organizations, what you eliminate in the old, and what you protect and nurture across that "Valley" will matter more than any single additional plane or tank squeezed into a budget line item or OCO funding. It may be the difference between the win or loss of a major war tomorrow.

The Pontiac Azteks of War

The issue, though, is not just one of pursuing new innovations, but that we too often plan for the best in the future of war, not expect the worst.

A key challenge here is our defense acquisition systems has specialized in designing, building, and buying the Pontiac Azteks of war. The Aztek, which debuted in 2001, was a car that optimistically tried to be everything — a sports car, a minivan and an SUV. Instead, it ended up overengineered, overpriced and overpromised. There is an array of Pentagon programs today with similar characteristics. We optimistically and unrealistically planned for them to be good at all types of war, but they risk being unequal to many of our new challenges.

For example, in the air, we are in the midst of buying jet fighters with shorter range than their World War II equivalents three generations back and a tanker aircraft that lacks the defensive systems for anything above a "medium threat" environment , at the very moment a potential adversary is developing longer reach to target both their bases and themselves in an air to air fight. And at sea, we are embarking on a buying program for a warship that the Navy's own tester says is "not expected to be survivable in high-intensity combat."

There are deep dangers of this kind of "fingers crossed" planning. What will it be like in the 2020s to fly a fighter jet conceived in the 1990s that happens to get in a dogfight or is called upon to do close air support? That leaders in 2015 argued such situations wouldn't happen will be little aid to that pilot. What happens if an adversary decides not to play by our rules and raises the fight above "medium threat" level? What happens to a crew that goes into battle in a ship "next expected to be survivable" for the battle?

My hope is that in helping the US military prepare for the future, this committee constantly looks to the potential worst day of he future of war, not the best.

Challenge the Assumptions

From the rise of great powers to the introduction of new classes of technology to waves of globalization, we are living through a series of sweeping changes that impact the fundamental where, when, how, and even who of war. Child soldiers, drone pilots, and hackers all now play a role in war. Still, especially given the overreach of acolytes of network-centric warfare during the last 1990s drawdown (who argued that technology would somehow solve all our problems, "lifting the fog of war"), it must be noted that nothing changes the *why* of war — our human flaws and mistakes still drive conflict, whether it is fought with a stone or a drone.

Nor does it mean that we can ignore the historic lessons of war, where we repeatedly fall prey to what HR McMaster has described as key "myths" of war. War will never be perfect. Indeed, when military aircraft gained widespread adoption in the 1920s, a new breed of thinkers like Billy Mitchell and Giulio Douhet claimed that there would be no more need for old ground armies. Yet the need for "boots on the ground" lived on throughout the 20th century — just as it will live on into the 21st.

Such caveats are not to say that the new technologies like the tank or the airplane weren't fundamental shifts in the last century or that the dynamic shifts should be ignored in ours. If the United States wants to hold on to its grip on the top, just spending more is no longer sustainable, nor the right answer. Much as both military and civilian leaders in the British Empire had to rethink their assumptions about the world, our old assumptions need to be re-examined today.

We must be open to change across the system, from rethinking how we conduct professional military education (such as by making the war college more competitive and encouraging and rewarding more externships to diversify thinking and exposure to new technologies and concepts) to re-examining the very roles we envision for weapons. Just as the B-52 went being conceived as a strategic nuclear bomber to offering powerful close air support capabilities, we might see everything from submarines gaining new utility by becoming more akin to aircraft carriers for unmanned air and sea systems or long range strike bombers complicating enemy access denial plans by taking on roles once handled by jet fighters and AWACs and RPA controllers. Much is possible, if we allow ourselves to break free of the status quo and experiment our way into the future.

To continue that Interwar years parallel, we will benefit from programs more akin to the Louisiana Maneuvers and Fleet Problem exercises that broke new ground and helped discover the next generation of both technology and human talent, rather than an approach that focuses on validating present capabilities and approaches and/or making allies feel better about themselves.

Any true change will be uncomfortable, of course, as there will be winners and losers in everything from the defense marketplace to personnel systems. And it is to be expected that

necessary change will inevitably be resisted, sometimes for valid reasons, sometimes for reasons that have nothing to do with battlefield performance. For instance, the British not only invented the tank and used it successfully in World War I, but they carried out a series of innovative tests during the interwar years on the famous Salisbury plain that showed just how game-changing tanks could be in the next conflict. Yet the British veered away from fully adapting to the *Blitzkrieg* concept they arguably birthed, largely because of the consequences that implementing it would have had on the cherished regimental system that was at the center of British military culture. This was not just a British phenomenon; as late as 1939, the head of the U.S. Cavalry, Maj. Gen. John Knowles Herr was testifying to Congress about the superiority of horse forces and resisting the shift to mechanized units. We should be mindful of any parallels today. This resistance will sometime be direct and sometimes be behind the scenes, including by claiming never to be satisfied budget wants prevent change, when that is what should be causing it.

In this time of strategic and technologic shift, my hope is that the committee will be constantly challenging the status quo and the underlying assumptions about what is and is not changing.

Conclusions

There are two quotes that can serve as guide posts in this effort, one looking back and one forward. The first is from the last interwar period, where Churchill may have said it best: "Want of foresight, unwillingness to act when action would be simple and effective, lack of clear thinking, confusion of counsel until the emergency comes, until self-preservation strikes its jarring gong — these are the features which constitute the endless repetition of history."

The second is from a professor at China's National Defense University, arguing in a regime newspaper how his own nation should contemplate the future of war:
"We must bear a third world war in mind when developing military forces."

We need to be mindful of both the lessons of the past, but also acknowledge the trends in motion and the real risks that loom in the future. That way we can take the needed steps to maintain deterrence and avoid miscalculation, and in so doing, keep the next world war where it belongs, in the realm of fiction.

Biography

Peter Warren Singer is Strategist and Senior Fellow at New America, a nonpartisan thinktank based in Washington DC. New America's funding, including full list of donors and amounts can be found at: https://www.newamerica.org/contribute/#our-funding-section

Singer is also the author of multiple bestselling and award-winning books, including most recently Ghost Fleet: A Novel of the Next World War, an editor at *Popular Science*, where he runs the Eastern Arsenal blog on Chinese military technology, and a consultant for the US military, intelligence community, and entertainment industry. Further background at www.pwsinger.com