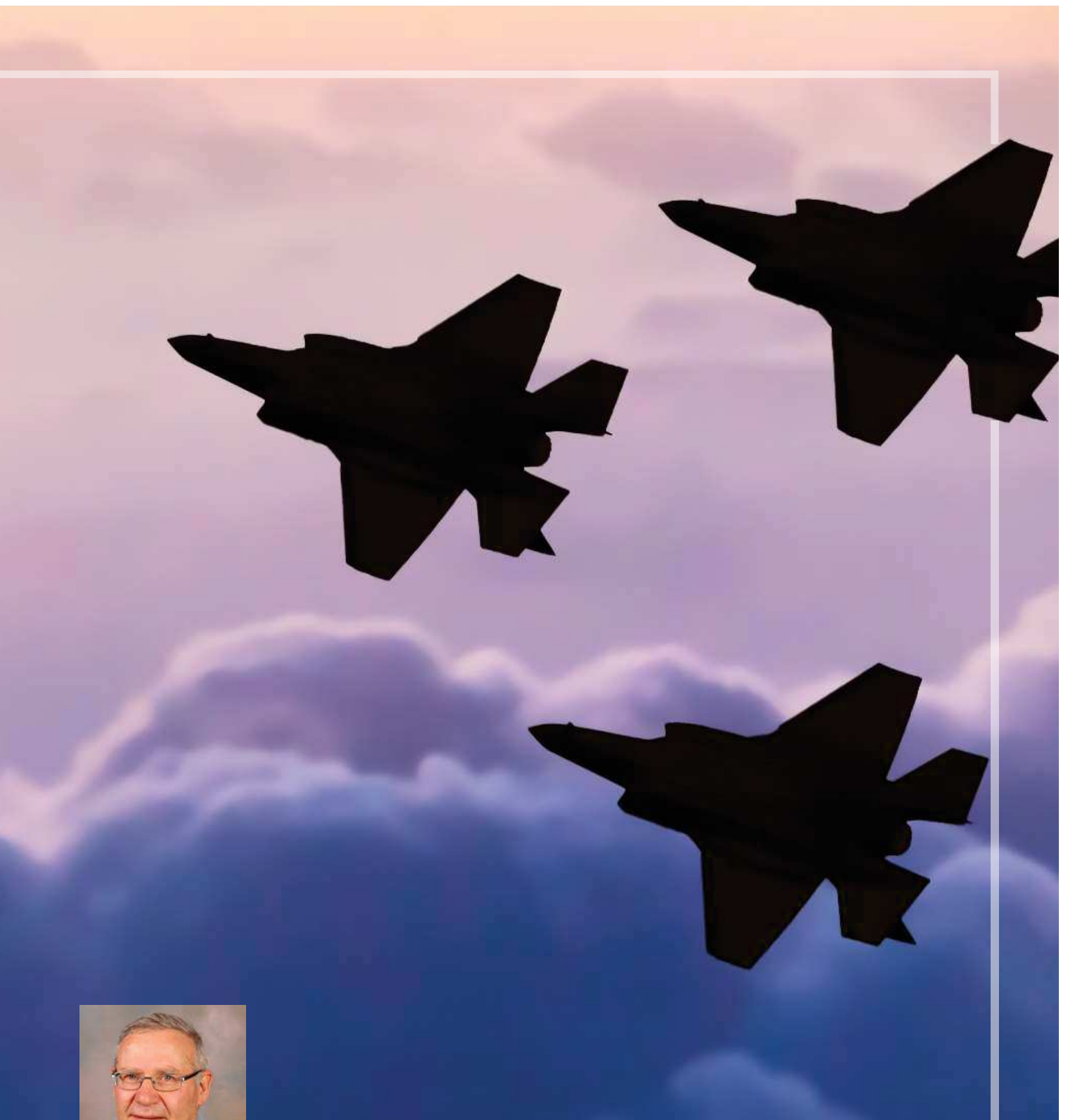




The Upcoming Technological Revolution on the Battlefield? Not So Fast



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The race to build next-generation technology is reshaping the contours of global relations. Nowhere is that more apparent than in the competition between the United States and China to become the world leader in artificial intelligence (AI), quantum computing and fifth generation wireless networks (5G). The prediction among many is that these technologies will bring about the next revolution

in military affairs by improving the collection and analysis of data, encryption, the transfer of large amounts of information and the creation of autonomous weapons systems. However, this prediction may be flawed, as new technology will neither cause a revolution on the battlefield in the next 10 to 15 years nor will it necessarily ensure military victory for those who master it.

The argument about the limited effects of digital technology in a military context is based in part on the “power of three twos” formulated by Israeli Brigadier General (ret.) Isaac Gat. The first “two” is that the development and production of every new weapons system is twice as expensive as initially estimated. The second “two” is that innovation takes twice as long as expected to build operationally significant capabilities. And the final “two” is that new weapon systems tend to be only half as effective on the battlefield as predicted.

It is also worth noting that throughout history every measure of technological superiority on the battlefield has, sooner or later, been mitigated to a degree by countermeasures.

For example, air power was once considered the decisive capability that would condemn armies and navies to irrelevance. General Giulio Douhet of Italy and General William Lendrum Mitchell of the United States were two of the most notable proponents of the importance of airpower in the early 20th century. But their expectations proved far beyond what planes were actually able to achieve in World War II. Modern-day radar and anti-aircraft weapons, as well as stand-off targeting (the launching of missiles from points far away from targeting areas), have only added more complications to the aviation equation. All this is to say that unquestioning

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belief in the benefits of advanced weapons systems, without accounting for their exploitable vulnerabilities, ignores lessons from history. It also ignores other fundamental factors that often prove determinative in military conflict.

The human factor

While humans have slower processing speeds than supercomputers, our unique ability to think creatively, and even unpredictably, is highly instrumental in war. For example, creative thinking could allow humans to develop methods to fool AI-based systems and take advantage of their systematic computerized thought, inability to read situations, or other weaknesses. It is also worth remembering that the logic of war can be the opposite of the logic of everyday life; as a result, it may be especially difficult to train computers to understand when or how to act in a counter-intuitive manner. Because of these vulnerabilities and limitations, some advanced weaponry of the future will likely seek to harness computerized processing while maintaining human input for creativity, judgement and safety.

At the same time, because the nature of warfare is unlikely to change, strategy and doctrine will continue to play important roles on the battlefields of the future. Fundamental concepts, like nuclear deterrence resulting from mutually assured destruction and mutual conventional deterrence between states (the idea that modern war is usually not “worth it” because the destruction outweighs what can be achieved), are not going to disappear after AI enters



REUTERS/Aly Song

the battlefield. It is also safe to assume that having a more advanced military will do little to serve state interests if not employed effectively towards achieving political aims, nor will technological inferiority condemn one to failure. This truth is evident when comparing Russia's recent success in Syria with US strategic blunders in the Middle East: they were not the result of military superiority or inferiority but the ability to set achievable goals to advance the national interest and executing them at acceptable costs – under totally different rules of engagement.

Furthermore, despite the fact that some semi-autonomous weapons capable of selecting targets are already in use, many weapons will not be automated or made autonomous as soon as it is technologically possible to do so. For example, although lethal unmanned aerial vehicles are commonplace, “the U.S. Army has for years resisted the idea of arming unmanned ground vehicles”, according to reporting.¹ This is particularly surprising considering that over 90% of US casualties since 1945 have been ground forces, and robot replacements for infantry would likely save many lives.² If automation could prevent soldiers from having to face the dangers of battle, why is it not used in every case? Some

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of the many considerations for not using automated or autonomous weapons when it is possible to do so might be cost, effectiveness, survivability or ethical and legal concerns.

Does new technology pose a new threat?

Proponents of the argument that digital technology will fundamentally change warfare point to several potential scenarios:

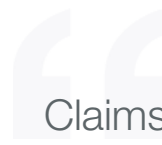
- A paralysing cyberattack on power stations or command and control stations, often referred to as a “cyber Pearl Harbor”.
- The deployment of autonomous weapons systems based on AI that are small, cheap, deadly, multifunctional, long-range and can “swarm” the traditional weapons platforms of the great powers (aircraft carriers, stealth planes, armoured divisions, special forces, and intelligence bases and command posts).
- The destruction of a given country’s social fabric and the disruption of its political system through a media campaign that damages citizens’ ability to discern what is real and what is not and radicalizes discourse, including through the use of “deep fakes” (the manipulation of video content to make it appear individuals said or did things they did not).

While these predictions are chilling on paper, there are several reasons they may not come to fruition.

Claims regarding the dangers posed by cyber due to its potency and low threshold for entry warrant scepticism. The capability to launch major cyberattacks requires the investment of tremendous resources that are not available to most state actors, let alone non-state actors; high-quality intelligence and perfect timing are indispensable for building and launching cyber weapons capable of exploiting vulnerabilities before cyber defenders can patch them up. If such weapons were indeed accessible to the public, there is little doubt that radical terrorist groups would have used them already. Further, when states do possess significant cyber capabilities, they are restrained to some degree by the other party’s ability to respond (perhaps outside the cyber realm) – much the way they are constrained in the case of conventional weaponry. Finally, if cyber were indeed the “perfect weapon” as some believe, it would be difficult to explain why the Russians remain bogged down in Ukraine or why the US cannot defeat Iran despite overwhelming Russian and US cyber superiority in those confrontations.

As for autonomous swarms, despite what appear to have been overly optimistic expert predictions, scientists have yet to perfect the self-driving car for civilian purposes. That indicates that it could be some time before similar capabilities are harnessed to create platforms that are resilient against enemy fire, capable of launching effective strikes on enemy forces, and warrant enough confidence to be sent off to war. In addition, the idea

that these swarms can be cheap, lightweight, fast, smart, long-range and powerful ignores the basic reality that all developers have encountered – weapons have basic trade-offs dictated by the laws of physics, and this dilemma is all too familiar to those who have witnessed efforts to develop weapons like bunker busters that require a difficult combination of speed, power, range and cost-effectiveness.



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And, when it comes to psychological operations, such as misinformation campaigns meant to sow discord, democracies do suffer an inherent vulnerability because they allow for the free flow of information. However, by improving digital literacy among the population and developing measures to detect and halt online influence campaigns, it is possible to minimize the effect of these campaigns on the country's citizens as well as on democratic processes.

Preparing for a more digital world

So how should decision-makers prepare for the emergence of next generation technology? First, in light of the technological race and its security implications, it will be critical to maintain both a technological edge as well as a keen awareness of the research and development of adversaries. As for the former, despite the stated scepticism towards the claim that we are headed for a revolution in military affairs in the next decade or so, continued innovation is still important in that it can yield (limited) battlefield advantages. The latter will prove useful in informing the understanding of emerging threats and ultimately the development of countermeasures.

At the same time, the military ought to maintain and continue to upgrade existing, legacy warfighting platforms. The process of converting an innovative technology into a new weapons system is a long, expensive and uncertain process – and that is all before its gradual introduction and extended period of testing to determine whether it is adequately effective and resilient. It is also important to avoid placing too much faith in any one system even if it seems promising, as only integrating between branches, weapons and technologies can provide synergy. This approach may prove less efficient in terms of budget, production and training, but it provides a range of advantages and ensures that all systems do not suffer from the same weaknesses. The “secret” to successfully executing this approach is understanding what to phase in and what to phase out.

Second, when formulating policy on next generation technology, it is worth considering how these innovations will impact national security beyond their integration into weapons systems. For example, it is conceivable that the competition for leadership in these

scientific fields could affect the global alliance system. Based on what we have seen thus far in regard to 5G, it appears that most countries will line up according to their interest in receiving the best product at the best price rather than traditional alliances or values.

Finally, but certainly not least importantly by any metric, the non-technological dimensions of warfare will remain extremely important into the foreseeable future. One need look no further than the Middle East to find countries that fell victim to the false notion that billions of dollars in cutting-edge weaponry would guarantee security against impoverished adversaries with outdated arms. Of course, those systems proved to be of little use without qualified individuals to operate them within a strategic framework. Whatever future weapons might arise, investing resources to maintain high-quality human capital, up-to-date doctrines and a strategy designed to advance core interests will remain essential to achieving victory.

References

¹ Jen Judson, "The US and its Allies are Getting Serious about Armed Ground Robots", *Defense News*, 13 September 2019, <https://www.defensenews.com/digital-show-dailies/dsei/2019/09/13/getting-serious-about-armed-ground-robots/>, accessed 5 November 2019.

² Nese F. DeBruyne, "American War and Military Operations Casualties: Lists and Statistics", Congressional Research Service, 24 September 2019, <https://fas.org/sgp/crs/natsec/RL32492.pdf>, accessed 5 November 2019.