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The Future of Conflict

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Despite assertions to the contrary, war is not disappearing. If anything, it is increasing in frequency and duration. Armed conflict will remain central to relations among states and nonstate actors. It will remain a contest of human wills and thus the domain of uncertainty, compounded by human passions, friction, and fog. Technology will not bring clarity or brevity. Century after century, political and military leaders have embarked on wars they "knew" would be short and decisive—and subsequently paid the price for ignoring the true nature of war.

War is unlikely to disappear from human relations.[1] In contrast to the unchanging nature of war, its character—how it is fought—will change continually. How people fight wars is based on the social, economic, political, and technical aspects of their societies. Furthermore, it is not based solely on those aspects of one society but on those aspects of all societies in the conflict—and how they interact. One of the great challenges is to anticipate the changing character of war well enough to adapt rapidly when conflict reveals those changes. Perhaps the most important change to the character of war today is the proliferation of smart, small, and cheap weapons. These allow small states and even nonstate actors to acquire capabilities that previously were the exclusive preserve of major powers, such as space systems, long-range precision strike, and massed short-range autonomous weapons.

Creating further friction for policymakers is the fact that military planners are trained to ask for clear-cut objectives and a defined "endstate." Planners do so because it apparently simplifies the military planning for the conflict. Too often the desire for a defined endstate is a false hope.[2] A clear military endstate has been a rarity since World War II and will remain so in the future. While the armed conflict may end, the political entities involved in the conflict will remain, and the United States will

have to maintain a relationship with them. A badly executed war may in fact greatly complicate those continuing relationships. The real goal of a military operation is not to reach a military endstate per se but rather to set the conditions for an acceptable, continued political relationship—the desired "better peace." Such relationships have historically required continuing military support as seen in the cases of Germany, Japan, Korea, the Balkans, Iraq, and Afghanistan.

What policymakers do owe military commanders is a description of the desired continuing state and the policy parameters for a particular effort. Policymakers must also understand that this guidance should be just the beginning of an ongoing dialogue between civilian and military leaders that will evolve into the plan for the conflict. Furthermore, the past 50 years have clearly demonstrated that both political and military objectives will change over the course of a conflict. Thus dialogue must continue throughout the conflict and the subsequent peace. As always, the most important task for policymakers is to understand both the nature and character of the conflict they are engaged in—"neither mistaking it for, nor trying to turn it into something that is alien to its nature."[3]

State Actors

Among state actors, China has taken the lead in developing methods to neutralize U.S. strengths. It has either demonstrated or is developing a wide range of capabilities that the Pentagon has characterized as being in the antiaccess/area-denial (A2/AD) arena.[4] Many of these A2/AD systems are already proliferating among large and medium states. Moreover, as these capabilities become cheaper, smarter, and more numerous, we can be sure they will migrate to smaller states.

In addition, we will likely see an increase in the number of nuclear powers since nuclear weapons provide a guarantee against externally driven regime change. Once a regional power gets a nuclear weapon, its neighbors will seek the same capability as a matter of self-preservation. Thus proliferation is likely. While proliferation is not a desirable outcome, it should be noted that the presence of nuclear weapons has tamped down the level and intensity of conflicts and confrontations between nuclear-armed states. However, these confrontations have taken place between relatively stable states (the Soviet Union–China, India-Pakistan, and the United States–Soviet Union). The prospect of politically unstable states developing nuclear weapons remains a great concern. As unstable states acquire nuclear weapons, we have to plan for not only the potential collapse of a nuclear state but also the potential for a civil war with nuclear weapons.

States will also employ surrogates to keep their own forces off the battlefield. We have seen Iran use Hizballah and Pakistan use the Taliban to pursue their strategic interests without committing their own forces to the conflicts. More recently, the Russians made extensive use of so-called little green men as surrogates in Ukraine. Contractors are another form of surrogate that states have used in numerous conflicts for a variety of reasons. Even criminal organizations have been employed to execute a range of activities from cyber to propaganda to kinetic attacks. This trend will continue. In summation, states will use a wide variety of methods and resources to neutralize conventional U.S. military power to achieve their strategic goals.

Nonstate Actors

Nonstate actors fall into three major categories: insurgents, terrorists/super-empowered small groups, and transnational criminal organizations. The United States has extensive experience in conflict with each type, yet each provides a unique challenge based on the political, economic, and social conditions of the conflict. Each has also been steadily evolving and has been greatly empowered by the information revolution.

The first category, insurgents, will be driven by different goals than in the past. Such efforts will still be about self-governance but now will add a desire to change borders. Since World War II, insurgencies have been primarily driven by a desire to throw off an imperial power. Once the colonial powers had withdrawn, the driving force became determining which local group would control the new nation. The People's Movement for the Liberation of Angola's long war against the National Union for the Total Independence of Angola is a prime example. After a multi-decade conflict, the People's Movement won. It now rules over a nation with essentially the same boundaries as existed when the country was a Portuguese colony. More recently, insurgents are fighting to redraw boundaries to align with social/cultural/religious boundaries that preceded the colonial era. This has been accomplished in places such as the former Yugoslavia and Sudan. Somalia, while not de jure separated, is de facto three separate political entities today. In the Middle East, the Islamic State in Iraq and the Levant (ISIL) is fighting hard to redraw boundaries and has plans to change boundaries far beyond. The Baluch and Kurds fight to create new states without regard to existing borders. The mismatch between the borders drawn by imperial powers and those needed to create functioning states is most acute in the Middle East and Africa and will increasingly be sources of conflict. It will reinforce other

drivers of insurgency—corruption, government incapacity, failure to address minority needs, and resource scarcity.

This desire to change borders will have a significant impact on U.S. counterinsurgency efforts. Current U.S. doctrine calls for supporting the host-nation government against the insurgents. If an insurgent movement crosses international borders, such as the Pashtuns who straddle the Afghan-Pakistan border, there is no single host nation. Thus the United States will have to work with two or more nations in most counterinsurgency efforts. The problem will come when the contending nations have irreconcilable strategic objectives. The fundamental differences between the strategic goals of Pakistan and Afghanistan have prevented effective cooperation against the insurgents. A variety of insurgent and terrorist groups based in the Pashtun regions have taken advantage of this fact. We must expect this to be the norm in insurgencies that strive to redraw international borders.

We are seeing the same issue in our conflict with ISIL. Iraq, Syria, and various insurgent groups have different strategic objectives, and each draws external support from several actors. Today's insurgencies are often a mix of the angry, who seek redress of a perceived injustice, and the opportunistic, who simply seek wealth. Thus U.S. doctrine for and experience with both counterinsurgency and unconventional warfare (support to an insurgent) are inadequate to these circumstances. Insurgencies that focus on creating new states—either across international boundaries or within an existing state—present a much more complex challenge than insurgencies focused on maintaining current boundaries. Historically, such efforts at state formation have taken from decades to centuries. Achieving relative political stability in these cases will be a much longer and more difficult process. An understanding of the long timelines must inform any decision to become involved and then must guide the subsequent commitment. Decisionmakers must understand that they are getting involved in a decades-long struggle and only make commitments that can be sustained for that extended period.

For their part, terrorists will continue to act in the name of various causes. While high-profile attacks such as the September 11 and Paris attacks will continue, it is essential to keep risk in perspective. With over 32,000 deaths per year in auto accidents, roughly as many Americans are killed *every month* on our highways as died in the Twin Towers.[5] Thus, while the violent loss of life by terrorism is heinous, our response should be appropriate. That said, we should be concerned about terrorists' potential to use society's destructive power against itself. Accidents like the one at the Bhopal, India, chemical plant that killed 15,000 people in 1984 and the 1947 ammonium nitrate explosion that leveled Texas City,

Texas, show that a terrorist can create mass casualties and catastrophic damage using material we keep in our cities. The easiest way for a terrorist to create mass casualties is to "bring the detonator." It is difficult, if not impossible, to acquire and transport massive amounts of explosives or chemicals. It is much easier to detonate or release materials already in place. Terrorists will also benefit from new technology that will provide easier, cheaper ways to deliver the detonator to a wide variety of targets.

Criminal organizations across the globe will continue to challenge governments for control of territory. These organizations take various forms—from street gangs to drug cartels to transnational criminal networks—and will deal in a variety of commodities, from guns to drugs to people to counterfeits. With the exception of first-generation street gangs, these criminal organizations have a common motivation: profit. While some commentators dismiss them as a law enforcement problem, criminal organizations have demonstrated the ability to ally with both insurgents (Colombia) and terrorists as well as to seize and rule territory within a state (Mexico). Thus they can have an impact on the security of the United States, and our response may well go beyond law enforcement.

Hybrid Warfare

As if these challenges were not enough, we will also see the merging of state and nonstate actors in hybrid war. With Russia's occupation of Crimea and eastern Ukraine, the concept of hybrid warfare became a major topic of discussion. Unfortunately, it also led to major confusion on what hybrid warfare is. In 2007, Frank Hoffman provided a clear definition:

> *Hybrid threats incorporate a full range of different modes of warfare including conventional capabilities, irregular tactics and formations, terrorist acts including indiscriminate violence and coercion, and criminal disorder. Hybrid Wars can be conducted by both states and a variety of nonstate actors. These multi-modal activities can be conducted by separate units, or even by the same unit, but are generally operationally and tactically directed and coordinated within the main battlespace to achieve synergistic effects in the physical and psychological dimensions of conflict. The effects can be gained at all levels of war.*[6]

In short, the military cannot focus on a single aspect of war but must be prepared to meet the full range of challenges at the same time in the same battlespace. Recent events in the Middle East and Eastern Europe have led to much discussion about hybrid war, gray zone conflict, and ambiguous actions. The discussion has done little to clarify the challenges the Department of Defense (DOD) faces. If one uses Hoffman's definition, the military aspects of each of these concepts are covered. In fact, hybrid warfare is not new. The participants on all sides in the Napoleonic and world wars used mixes of conventional operations, irregular operations, terrorism, and crime to achieve their goals. But while not new, the hybrid warfare concept as expressed by Hoffman is useful; it highlights for policymakers the range of challenges that must be met simultaneously in most conflicts.

Technology Converges, Power Diffuses

This does not mean technological changes are irrelevant to warfare. The convergence of dramatic improvements in electronic miniaturization, additive manufacturing, nanotechnology, artificial intelligence, space-like capabilities, and unmanned systems (drones) will significantly change the character of conflict in all domains. Of particular concern, this convergence is creating a massive increase in capabilities available to smaller political entities, extending even to the individual. Power is diffusing as capabilities that used to be the preserve of superpowers are becoming widely distributed among states and even some nonstate actors.

Electronic Miniaturization

We have watched electronic miniaturization transform almost every aspect of our lives. The cell phone combines the functions of dozens of stand-alone systems at a fraction of the weight and volume. Miniaturization is revolutionizing command and control and intelligence, surveillance, and reconnaissance systems as well as bringing smart technology to smaller weapons systems. Today even cheap miniature drones are capable of limited autonomous navigation and target selection.

Additive Manufacturing

Additive manufacturing (AM) is over 30 years old. It has been a useful tool for rapid prototyping to allow designers to see their final product in three dimensions. It also sparked a collection of hobbyists who were making a range of plastic items. However, in the last few years, AM, also known as three-dimensional (3D) printing, has exploded. It has gone from an interesting hobby to an industry producing a range of products

from a growing list of materials. AM is dramatically increasing the complexity of objects that it can produce while simultaneously improving speed and precision. It is progressing from a niche capability that produced prototypes to a manufacturing industry. United Parcel Service has created a factory of 100 printers with room to grow to 1,000.[7] It accepts orders, prices them, prints them, and ships them the same day from the adjacent shipping facility. Recently Dr. Joseph Simone has demonstrated the ability to make 3D printing 100 times faster and has set a goal of making it 1,000 times faster, all while providing higher quality than current methods.[8] Only three decades old, AM is rapidly encroaching on a wide range of traditional manufacturing. Soon it will allow small states and insurgent groups to print thousands of cheap drones.

Nanotechnology

Nanotechnology is science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 nanometers. For comparison, a sheet of newspaper is about 100,000 nanometers thick. It was only in 1981 that nanotechnology was established.[9] At the nanoscale, materials act very differently and thus provide opportunities in chemistry, biology, physics, material science, and engineering.

For the purpose of this discussion, nanotechnology is advancing in two areas of particular interest: energetics and materials. As early as 2002, nano-energetics (explosives) could generate twice the power of conventional explosives.[10] Since research in this field is now close hold, it is difficult to say what progress has been made since then. Even if twice the power is as good as it gets, a 100-percent increase in destructive power of the same size weapon is a massive increase. Continued major improvements in the power of explosives steadily reduce the delivery system requirements—and thus favor the smaller state. If they come in to commercial use, they will also be available to nonstate actors.

The second area of interest is that of nanomaterials. This field has not advanced as far as nano-energetics, but numerous firms are applying nanomaterials to batteries and increasing their storage capacity.[11] In fact, a recent accidental discovery may triple battery power storage and increase battery life by a factor of four.[12] At the University of California, San Diego, researchers have found a cheap way to coat products with a super-thin, nonmetal material that manipulates radar waves and thus may lead to inexpensive stealth coatings for missiles and aircraft.[13] Various experiments have demonstrated that the use of nanomaterials can greatly improve the strength of a given weight of material. These improvements in energy storage, materials, and explosives will lead to

increases in range, payload, and stealth for a wide variety of vehicles to include cheap drones.

Space and Space-Like Capabilities

Until recently cost and technology requirements limited the number of nations that could venture into space. This provided a great advantage to those few countries that could do so. The addition of cheap persistent space-based and air-breathing surveillance will soon provide small states and even nonstate actors access to a full suite of space and space-like capabilities. They will be able to surveil, communicate, and perhaps even attack in space. DOD has acknowledged the threat and is taking steps to protect U.S. space infrastructure.[14]

While states, particularly China, are steadily improving their own space capabilities, the democratization of space is being driven by private companies. Several companies are deploying cube satellites today. One, Skybox Imaging, has a goal of selling half-meter-resolution imagery with a revisit rate of several times a day—to include interpretation of what the buyer is seeing.[15] The company's recent purchase by Google gives it the depth of resources necessary to bring this idea to fruition. Using this service, a buyer could track port, airfield, road, and rail system activity in near real time. Also, New Zealand's Rocket Lab is proposing to conduct weekly launches specifically for cube satellites to provide a rapid, cheap launch capability.[16]

Other companies are duplicating space capabilities with systems that remain in the atmosphere. Balloons like those of Google's Project Loon[17] and drones such as the Global Observer drone[18] and solar-powered follow-ons[19] will provide space-like communications and surveillance capabilities at much lower costs.

Artificial Intelligence

Two areas of artificial intelligence are of particular importance in the evolution of small, smart, and cheap weapons: navigation and target identification. In fact, widely available systems have attained limited autonomy based on these capabilities. The U.S. Global Positioning System (GPS) has proven satisfactory for basic autonomous drone applications such as the Marine Corps KMAX logistics helo-drone in Afghanistan.[20] However, GPS will be insufficient for operations in narrow outdoor or indoor environments, dense urban areas, and areas in which it is jammed. Academic[21] and commercial[22] institutions are working hard to overcome the limitations of GPS to provide truly autonomous navigation for drones. Inertial and visual navigation are advancing rapidly and are already cheap enough to use in small agricultural drones.[23] The commercial ap-

plications for navigating in agricultural areas and inspecting buildings in urban areas clearly could be adapted for military uses. Such a system would serve to get a drone to the target area but would not ensure that it could hit a specific target. To select a specific target, there are already commercially available optical and multispectral recognition technologies in use that allow autonomous drones to attack specific classes of targets and perhaps specific targets.[24] And they are cheap.

Autonomy means drones will be highly resistant to jamming and will be able to operate in very large numbers. They can also be programmed to wait patiently prior to launch or even proceed to the area of the target but hide until a specified time or a specified target is identified.

Drones

Drone usage has spread widely. Most discussions of drones have focused on large, highly capable, and expensive drones such as the Predator or the Navy's X-47B. Too little discussion has considered the impact of small drones in all combat domains. While small drones can carry only a limited payload, this limitation can be overcome with three approaches. First is to think in terms of "bringing the detonator." The second is the use of explosively formed penetrators (EFPs).[25] The third is to employ swarms of small drones to magnify impact.

In "bringing the detonator," the objective is to simply detonate the large supply of explosive material provided at the target site by aircraft, vehicles, fuel, chemical facilities, and ammunition dumps. Against these targets (such as a parked airliner's wing root), even a few ounces of explosives delivered directly could initiate a much larger secondary explosion.

EFPs, weighing as little as a few ounces to a few pounds, will allow even small drones to damage or destroy armored and protected targets. In Iraq, coalition forces found EFPs in a variety of sizes, some powerful enough to destroy an Abrams tank. Others were small enough to fit in the hand—or on a small drone.[26] And of course nano-explosives can at least double the destructive power of the weapons. The primary limitation on EFP production was the requirement for the high-quality curved copper disks that form the penetrator when the charge is detonated. It required a skilled machinist with high-quality machine tools. Today, additive manufacturing can print copper.[27] Anyone with a 3D printer capable of using copper will be able to print an EFP disk. Thus we can expect small- and medium-sized drones to pack a significant punch against protected targets. The improvised explosive device (IED) of the future will be not merely "improvised" but also intelligent, inexpensive, long-range, and active hunters.

One can argue that such long-range autonomous drones will be difficult for nonstate actors to obtain for the next few years. That may be true. But today Aerovel sells the Flexrotor drone that has a maximum range of 3,400 kilometers (km).[28] For shorter range missions, there is a variety of commercially available cheap drones that are already capable of hitting U.S. facilities such as Bagram, Afghanistan, or Taji, Iraq, when launched from within 20 to 40 km of the target. Given the Taliban's demonstrated ability to move within a few kilometers of Bagram, could we keep the airfield open against a threat like this? Would the benefits of doing so outweigh the costs?

The U.S. military is actively exploring the use of swarms for both naval and air applications.[29] While these programs are vague about how many drones they envision being able to employ, recent dramatic cost reductions in each of the needed technologies will increase the number by orders of magnitude. Researchers are using old 3D techniques to print a complex drone in a single day, then adding an Android phone to produce a $2,500 autonomous drone.[30] Thus, a small factory with only 100 3D printers using Joseph DiSimone's process could potentially produce 10,000 drones a day. The limitation is no longer the printing but the assembly and shipment of products. How do we protect our air bases, headquarters, maintenance facilities, and supply centers in theater against potentially thousands of autonomous drones? Even if we could protect such fixed sites, how would we protect our vehicles, in particular soft-skinned vehicles such as fuel and ammunition trucks, when they are moving?

Nor will cheap drones be limited to the air. In 2010, Rutgers University launched an underwater "glider" drone that crossed the Atlantic Ocean unrefueled.[31] Such drones are being used globally and cost about $100,000.[32] The U.S. Navy recently launched its own underwater glider that harvests energy from the ocean thermocline. It can patrol for weeks, surfacing only as needed to report and receive new instructions.[33] In short, small sea platforms have demonstrated the capability of achieving intercontinental range while producing very little in the way of signatures. Michigan Technological University plans to reduce the cost of oceanic gliders to about $10,000.[34] These could be employed as self-deploying torpedoes or smart naval mines.[35] Current versions are launched by hand from small boats. They could be modified for launch from warships, commercial ships, or even the shore.

The convergence of new technologies discussed above may allow these small, smart, and cheap weapons based on land, sea, or air to dominate combat in these domains. Over time, the technology has become cheaper, more reliable, and more widely employed. We are seeing this

with the explosive growth in commercial drones. The *Economist* predicted 2015 would see the sale of 1 million drones.[36] Commercial demand is driving costs down while dramatically increasing capabilities. Advanced manufacturing techniques will soon make them cheap enough for small companies or even individuals to own a large swarm of simple and autonomous but powerful drones. For the first time since the Korean War, American forces will be subject to air attack.

Strategic Implications

Technological convergence will evolve over the next decade or two. It will have direct strategic impact on the United States in four principle ways: the loss of immunity to attack, the tactical dominance of defense, the return of mass, and a requirement to mobilize.

Loss of Immunity to Attack

The United States will cease to have a monopoly on long-range precision strike. China and Russia have repeatedly demonstrated this capability. However, long-range, relatively cheap, autonomous drones will provide this capability to many states and even to insurgent or terrorist groups. They will be able to project force at intercontinental range. These vehicles will provide the capability to strike air and sea ports of debarkation—and perhaps even embarkation. The United States will no longer be able to project power with impunity. This could create major political problems in sustaining a U.S. effort both domestically and internationally. Domestically, will the American public support distant actions if they result in a significant threat to the Nation's security or its economy? The "small, smart, and many" revolution will not only allow enemies to attack the United States, but it will also allow them to undermine our economy. Even a few self-deploying mines in key domestic or overseas container ports would drive up maritime insurance rates—and, hence, the cost of imported and exported goods.[37]

Internationally, opponents could threaten intermediate bases. For instance, a great deal of our support for Iraq flows through Kuwait. Suppose ISIL demonstrates that it can hit an airliner sitting at Kuwait International Airport. Then ISIL states it will hold Kuwaiti airliners hostage until Kuwait withdraws landing and port rights for those nations supporting the Iraqi government. Is the West prepared to provide the level of defense required to protect key targets across the nations providing facilities in the Middle East and Europe? Will it expand the protection to all key targets in those states? Will those states trust our ability to do

so? If not, will those states accept risk to commercial assets to support U.S. actions?

Immunity from air attack is also gone. The Services must develop those defenses and then ensure they can cover the entire deployment and employment chains. Technological convergence means there are powerful, autonomous, stealthy sea and air drones in our immediate future. Defending against this threat is possible, but it will be expensive.

Tactically Dominant Defense

While these systems create a genuine threat to all nation-states, they and their descendants will provide a significant boost to anyone's defense. In state-versus-state war, this might create a situation similar to that existing between 1863 and 1917, when any person in range moving above the surface of the ground could be cheaply targeted and killed. The result was static trench warfare. Drone swarms may again make defense the tactically dominant form of warfare in ground, sea, and air domains and be able to attack the physical elements of the cyber domain.

As noted earlier, state actors could produce these small, autonomous drones in the tens of thousands. The Chinese have already demonstrated how to launch large numbers of drones with minimum force structure. They have mounted 18 Harpy drones in a launcher on a 20-foot trailer. The Harpy is a large drone with a 9-foot wingspan, a 500-km range, and a 32-kilogram payload.[38] Using a switchblade-sized system,[39] a 20-foot trailer could be modified to launch 1,500 drones. Thus a single battery of 6 trucks could launch 9,000 drones. New battery and fuel cell technology is extending the range of the small drones to 40 km. U.S. forces must be prepared to face thousands of autonomous short-range drones and dozens to hundreds of long-range drones. Today's U.S. forces could not sustain a ground offensive in the face of such a threat.

For their part, nonstate actors could use these systems to dramatically increase the cost of maintaining U.S. forces in a combat theater—what the Pentagon calls the area-denial challenge. The small size of many of these systems makes them ideal weapons for attacking U.S. airfields and base camps. Easy to hide, transport, and operate, cheap drones with even limited autonomy will require massive investment in the protection of U.S. logistics facilities and lines of communication in a tactical environment. Proponents of directed energy weapons—lasers and microwave systems—suggest their systems will defeat such swarms and thus return offense to the tactical battlefield. These systems will be expensive and power hungry and subject to defeat by relatively inexpensive countermeasures. While we must continue to develop these systems, we must also be aware that they put us on the wrong side of cost competition with

cheap drones. It is imperative that these systems be tested against a thinking, reacting red team that employs countermeasures such as autonomy, smoke, and electromagnetic shielding. Most important is the willingness to adapt if the testing indicates swarms of small, smart systems can defeat our current inventory of few but exquisite ones.

Even if such systems become capable of defeating thousands of drones, they might also be able to defeat the much smaller number of conventional aircraft, guided bombs, and missiles the United States could deploy. This would reinforce the dominance of the defense.

At this point it is impossible to tell which will dominate. Thus it is essential that DOD run rigorous experiments to understand the character of such conflicts. If the experiments show the defense will become tactically dominant, DOD will have to determine how U.S. forces could exploit this situation to achieve its inherently offensive operational and strategic missions.

Return of Mass to the Battlefield

Since the 1980s, U.S. forces have bet on precision to defeat mass.[40] Precision helped numerically smaller allied forces defeat Iraq's much larger army (twice), as well as initially drive al Qaeda and the Taliban out of Afghanistan. However, technological convergence is pointing to the revival of mass (in terms of numbers) as a key combat multiplier. Current manufacturing techniques mean states can manufacture thousands of drones. Advances in additive manufacturing will make them cheaper and may make tens of thousands available to states and thousands to nonstate actors. How will our forces, which are dependent on a few, exquisite platforms—particularly sea and air—deal with the small, smart, and many?

Return of Mobilization

After the fall of the Soviet Union, the United States abandoned the concept of mobilization. A primary driver was the fact that the U.S. defense industry simply lacked the surge capability to rapidly equip a mobilized population. Mobilization in World War II was possible because industry could rapidly convert from civilian to military production. By 1990, the complexity of modern military weapons systems and limited capacity to produce them made rapid mobilization difficult if not impossible. As Richard Danzig has noted, modern manufacturing has been changing this situation.[41] Additive manufacturing may radically change it. AM is inherently flexible since the product depends only on the materials the machine can use, the design of the machine, and the software that is loaded. Thus, as AM assumes a greater role in industry, the possibility of industrial mobilization will re-emerge. However, successful mobilization

is not only about producing the weapons. The Pentagon must also be prepared to enlist and train new personnel, build them into coherent units, and then move those units and the weapons to an overseas battlefield. Eliot Cohen has noted that successful mobilization will require significant peacetime planning, but the Pentagon is not even thinking about the issue.[42]

Policy Implications

This diffusion of military power has implications for U.S. strategy, force structure, investment, and force posture. Scholars have proposed a range of U.S. grand strategies from restraint to aggressive interventionism.[43] Obviously, the strategy selected will drive our force design and our force posture. However, that strategy will itself have to deal with myriad risks posed by the diffusion of power and the kinds of threats we now face. Fundamental assumptions about traditional military power, including the viability of projecting force from the United States, become questionable when almost any enemy can strike selectively from in theater to the United States. While these attacks may not be militarily significant, they will be part of the political debate.

We may be entering an era in which small states and even nonstate actors will attempt to deter the United States through denial or punishment. They could achieve denial by interrupting the deployment chain, either by attacking intermediate staging bases or by tactical A2/AD. While the United States is developing methods for defeating A2 systems, we have made little or no progress on area-denial systems such as IEDs or even land and sea mines. Tomorrow's IEDs and mines will be mobile hunters with at least limited autonomy—and they will be available to any opponent with access to the Internet and a receiving address. In 2014, the mothers and friends of a battalion of Ukrainian soldiers purchased drones to provide the battalion with an aerial observation and spotting capability.[44]

Adversaries might also adopt punishment as a way to deter or terminate U.S. involvement in a region. Would U.S. leaders risk even limited attacks on U.S. aircraft, military or civilian, anywhere on the ground to intervene in Syria? Would other nations provide flight transit or port rights if it meant their homelands would be subject to attacks on civilian aircraft or facilities? How much additional combat power would the United States have to dedicate to protecting both our lines of communications and allied infrastructure and population? Would our political willingness to engage decrease due to increased human and fiscal costs?

Would our traditional allies stay aligned with us if our ability to sustain our access to key regions were imperiled or substantively reduced?

As a power projection nation, our deployment options may become more limited. We have to think through the implications of forward basing in theater versus basing in the United States and deploying only for a crisis. Our enemies and allies see the increasing density of A2/AD systems globally. It is essential we modify our planning accordingly. Wargaming must examine the operational impacts of fighting a variety of enemies with long-range sea and air precision strike. China will not be the only power to own such systems. Just as importantly, wargaming must explore the political implications when an enemy can threaten other nations that support our deployment chain. (Japan, for example, is crucial to any effort to help defend South Korea and could easily be targeted by the North Korean regime in time of war.) Accordingly, we must seek methods to attack an opponent's strategy rather than simply destroying its forces.

We need wide-ranging research and supporting analysis as well as wargames to address key questions. Deputy Secretary of Defense Robert Work's memorandum on wargaming is a very strong first step.[45] Continuing research is required to answer a wide range of questions:

- Most importantly, how can strategy neutralize potential opponents' strategies? For instance, how do we counter the perception that China may be able to exclude U.S. forces from the region? What steps can we take to assure allies that in fact we can honor our treaty obligations?

- How do we protect those nations providing support as we do so—in particular, the politically sensitive targets that can be attacked with long-range, precise, but relatively low-explosive-weight weapons?

- If we forward deploy, how dispersed will forward forces have to be to survive? How much would we have to invest in hardening forward bases versus investing in protecting stateside bases and building the lift necessary to deploy?

- What are the political/alliance costs if we choose to station fewer forces forward?

- Are we willing to employ long-range strike from the United States if we know the enemy can reply in kind?

- Once forces are deployed, how do they operate in the presence of swarms of smart weapons?

- Do we need to deploy more forces forward to ensure they are there for the fight? Or should we just preposition the equipment and supplies? Or are both supplies and forces safer out of the potential theater of operation?

Whether forward deployed or deployed in a crisis, the increased vulnerability of U.S. forces to standoff attack and resultant requirement for hardening and dispersion will dramatically impact our force structure. Hardening, to include digging in whenever not moving, will require increased engineering assets, while dispersion will require international agreements as well as increased logistic, force protection, and command and control assets.

As the United States develops its strategy and subsequent force posture, it will also have to rethink its procurement focus. Is the current plan of purchasing a few extremely capable platforms viable in a world where cheap, smart weapons in large numbers will actively hunt those exquisite platforms? Or should the Pentagon move to a concept of large numbers of much cheaper but individually less-capable platforms? Or is a mix a better solution?

This will not be an easy process with clear decision points. If the development of this new generation of weapons mirrors our past experience, it will take place over a decade or two. The new systems will first support our legacy systems, then the legacy systems will support them, and finally the new systems will completely supplant our legacy systems. Compounding the difficulty of deciding when to shift investment is the fact that we plan to use the weapons we are buying/developing today for decades. Will a *Ford*-class carrier be like the battleships of 1920—dominant at the time of purchase but nearly irrelevant two decades later? If so, when do we stop investing in carriers? Given the political reality, is it even possible to stop investing in new carriers? While extremely difficult, this transition represents one of the critical investment decisions facing Pentagon planners. Similar questions arise about manned aircraft systems, along with the attendant political issues of cancelling or reducing one of these programs.

Perhaps the biggest threat to success lies in our sclerotic development and acquisition process. The convergence of technologies is leading to extremely rapid increases in capabilities in all related fields. Clearly our 10-year development and initial fielding cycle cannot compete.

The convergence of technology and the resultant diffusion of power should force thoughtful consideration of both policy and strategy. Perhaps the fundamental policy question will be a reconsideration of how and under what circumstances the United States can use military force to influence international events. Increasingly, we will have to ask the question: "Is the strategic benefit of an intervention worth the cost when the enemy could strike back in and out of theater?"

Summary

The underlying nature of war will not change, but the number and variety of conflicts will likely continue to increase. Certainly the convergence of new technologies will alter the character of conflict over time, but no matter what technology is employed to abet intelligence collection and human decisionmaking, policymakers will not have a clear understanding about what is happening or what to do about it. In fact, it is almost certain that the best experts on the subject will disagree on both aspects. Every administration has had to deal with these "wicked" problems. Fortunately, there is a growing body of literature articulating various approaches to do so.[46]

Technological convergence is already changing the character of war. It is markedly altering the relative power among states and between state and nonstate actors. The phenomenon of small states possessing the military capabilities and perhaps capacities of large states is a new development that will create new challenges. Some of these challenges undercut key pillars and assumptions of our current defense strategy. However, they will not change the fact that conflict is driven by the interaction of the participants' social, economic, and political structures.[47] Policymakers must drive the Pentagon to actively explore the implications of the changing character of war. Secretary of Defense Ashton Carter's Strategic Capabilities Office is a great start.[48] Furthermore, it must honestly test legacy systems against emerging capabilities in free-play exercises. But understanding the impact of technology must be grounded in the reality that conflict will remain a political competition driven by human ingenuity tied to the societies in conflict. If anything is certain, it is that war will continue to be dominated by this element above all others.

Notes

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