Defense One

REBUILDING THE MILITARY *for the* NEW THREAT ERA

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The post-war era for the U.S. military was supposed to be a time for having more time – to reset, rethink and renew the services to get back to being whatever they used to be. So much for that plan. Instead, the U.S. enters the second year of a new era that brought two very unexpected conflicts: one, a new and horrific form of terrorism spreading globally, and the other a dangerous geopolitical standoff with Russia on Europe's doorstep. All while members of Congress dither with partisan gamesmanship more than statesmanship, yet again.

Senior military and defense leaders are again scrambling to reset and rethink to create, this time, a force and national security structure that can be as flexible as the threats it faces. The following five articles from *Defense One* explore some of the challenges those planners face in rethinking the military for tomorrow. In our annual State of Defense assessment it is clear it's time that Washington stop complaining about "uncertainty" (from Congress to Cairo) and start planning for it. Our friends at New America's Future of War project weigh in on what the U.S is not doing to prepare for that future. Then we look into three key future weapons and capabilities. Forget the F-35, this year the Joint Chiefs began telling what they expect from the next fighter, the so-called 6th Generation, in the year 2030. No surprise, they want something much simpler. No forces will do more fighting than special operators, yet their budget remains hidden – and far less protected – than traditional services. Finally, the Pentagon is unlikely to buy anything and commanders unlikely to train anyone without first putting their ideas through simulations. It's a lucrative business meant to save the Defense Department money and time, for sure, but it is also another technical solution when manpower and human needs require just as much attention and taxpayer dollars.

Perhaps the lesson of the last decade isn't how the U.S. should fight national security threats, it's that America will continue to lead those fights. If Washington can adopt a new expectation — and new institutions and processes for it — that U.S. military interventions will continue at the current fast and fluid pace, especially in perpetual counterterrorism operations, then rebuilding itself may become the new norm.

Kevin Baron
Executive Editor
Defense One

Defense One

STATE OF DEFENSE

It's time Pentagon leaders stop complaining about uncertainty and start planning for the unexpected.

BY KEVIN BARON

In the Pentagon, senior U.S. military leaders often like to say that historically they are terrible at predicting the next war, while critics argue that generals constantly are planning for the last war. Both may be true. Ironically, those same leaders have spent the last two years complaining that they are being forced to live in an era of too much uncertainty.

Why do Pentagon leaders think they can make uncertainty go away? The year 2014 could not have proven more unpredictable. Maybe it's time to start planning for the unexpected.

The new era of global conflicts for which political leaders demand constant U.S. military intervention offers the Pentagon a new opportunity to stop fighting against the age of uncertainty and start embracing it.

These days, the "uncertainty" complaint refers to the budget, and to the automatic sequestration cuts lingering over budget writers' heads. The mood around Washington this year is that the sequestration stunt's time has passed. With the midterm elections behind them, a new secretary of defense on the way, and new political battles to be fought for something bigger (the White House) few seem eager to keep the sequestration fight alive. That will make a lot of folks happy: the arms industry, Defense Department purchasers, combatant commanders, and a few of those "J" divisions of the Joint Chiefs of Staff that plan for the future, at least.

But even with an agreed upon budget, there will come no added certainty to what the world will bring to the Pentagon's doorstep this year. And that's an uncertainty leaders in the Pentagon, Congress, White House, intelligence and law enforcement communities could do much more to anticipate and manage.

The year 2014 was supposed to the intermission. Remember? The time between eras, when the war in Afghanistan

PHOTO BY CPL. COLBY BROWN

wound down and the military could get back to some fantasized version of itself that predated Sept. 11, 2001 – with training operations back at the bases, eased deployments, smaller forces and no more big land wars.

Instead the world gave chaos. At the Pentagon one year ago, not many people expected Russia to invade Ukraine, the Islamic State to take over half of Syria and Iraq, Western journalists to be beheaded one after another, Islamic extremists to attack civilians in Ottawa, Sydney and Paris, and half of the African continent to be embroiled in terrorism. By December, the mood around the Pentagon was one of exhaustion and exasperation at the never-ending stream of national security bad news.

Each week brought another crisis, another possible deployment of U.S. firepower or "boots on the ground," another political fight inside the Beltway, or another fight with adversaries outside of alliances. But inside Washington, little changed.

Institutions pivot as slow as aircraft carriers. That's a luxury modern national security professionals can no longer afford. The institutions that fund, govern and oversee the U.S. defense machine remain organized in a way that barely resembles the current threat matrix it faces and, critics complain, operate too slowly as the world races by. Last year, incoming Senate Armed Services Chairman John McCain, R-Ariz., pledged to create a new subcommittee on cybersecurity. That a standing committee did not already exist was shocking to many.

Army leaders have said they wanted the post-war years to allow that service to become more "agile" and "flexible" for a new counterterrorism age. It's an idea the entire national security community should consider for itself, too. Among the chief criticisms of President Barack Obama on foreign policy is that he was too reluctant to use U.S. military force of any kind anywhere because he is spooked by the big wars of Iraq and Afghanistan.

Critics like Sen. Lindsey Graham, R-S.C., (who is considering a run for the presidency) and allies like former Israeli Prime Minister Ehud Barak say Obama should have armed Syrian rebels and launched military strikes there sooner. Instead, Washington leaders spent months debating if new war powers were needed to strike in Syria, or Iraq, against the Islamic State group or anyone else. The Pentagon spent months to come up with even a plan to send a few hundred trainers into Syria, years after that war began.

INSTITUTIONS PIVOT AS SLOW AS AIRCRAFT CARRIERS.

Others this week point to Yemen, whose capital is under siege by Houthi rebels after months of openly staging for such an attempt on the government, while the U.S. stayed mostly on the sidelines. Yemen has been collapsing on itself for years, but this weekend McCain blamed Obama for Yemen's chaos.

Inside the military services that have to be ready to carry out the U.S. response to any conflict, planners are moving forward with some of their own changes so that they don't have to wait for uncertainty. In 2015, there will be new chiefs of the Army and Navy. Until then, the Army is expected to win its request to scrap the downsizing plan it wanted one year ago, thanks to the high demand for rapidly deployable troops to the world's hotspots. The Army also will proceed with a complete overhaul of its helicopters. The Air Force is pressing on with the F-35, with no alternatives at this point, while calling for more drone pilots. That service also will continue to mend after repeated scandals in its nuclear force and sexual assault issues. The Navy spent the winter finally scrapping its ship of the future, the littoral combat ship, or LCS, and rebranding it as an up-gunned frigate, while the service explores how to keep top personnel in the modern age. The Marines continue to be that "middleweight" amphibious force its leaders prefer, but the president and Corps leaders keep sending them deep into landlocked countries as tip-of-the-spear reaction counterterrorism forces. The new commandant is expected to lay out his plans within weeks.

Nobody wants more certainty about their futures more than the men and women in uniform. Congress and the president may finally move them beyond the sequestration era, easing fears in pocketbooks and at PXs. But the world certainly won't be tipping its hand anytime soon. That means it's up to the new stable of decision makers – from likely next Defense Secretary Ash Carter to McCain and the new Joint Chiefs to come – to figure out how the state of defense can remain one that is prepared for anything, anytime, anywhere. Because if past is prologue, that's how often U.S. soldiers, sailors, airman and marines must be ready to fight in the new era. D

Defense One

WHAT IS THE FUTURE OF WAR?

Facing a new inflection point, New America's 'Future of War' project members sound off on where conflict is headed in the 21st century.

BY PETER W. SINGER

Whether it has been fought with sticks and stones or improved explosive devices and drones, war has been a seemingly permanent and unchanging part of human history for the last several millennia. It remains a tragedy caused by our human failings, violence and politics crossed to awful consequences.

And yet, it is also clear that the forces that shape warfare, in everything from the tools we use to fight to the locations where we battle, are at an inflection point of change. Indeed, the very definitions of what is "war" and "peace" may even be shifting. It is with this in mind that New America, a nonpartisan think tank network; Arizona State University, the nation's largest public university; and *Defense One*, the home for innovative online reporting and debate about security, have teamed up to launch a new series on the future of war. The site will host original reporting, commentary, analysis and public databases, all designed to help us better understand the new trends, technologies, and forces shaping war.

Reflecting the ideas that warfare is becoming highly networked and plays out on multiple levels, the project has forged a multi-disciplinary network of experts and leaders. Occasionally, we'll survey them for a "wisdom of the crowd" approach to the key questions.

To help launch the project, we asked: What does a group that ranges from policy wonks and historians, to special operators and technologists think that we get most wrong today about the future of war tomorrow?

Peter Bergen, vice president at New America and professor at Arizona State University, CNN national security analyst and the author of best-selling books about al-Qaeda, including Manhunt: The Ten Year Search for Bin Laden from 9/11 to Abbottabad.

Just as the United States lost its monopoly on atomic weapons shortly after World War II, the U.S has now lost its monopoly on armed drone warfare and effective cyber warfare. These two forms of warfare both take place outside of traditional war zones and so are not really covered by the Geneva Conventions. These conventions don't contemplate the use of drones to assassinate someone in a country where no war has been declared (for instance, in Yemen), nor do they contemplate the use of cyber warfare to inflict significant damage to the national security apparatus of a state we are not at war with (Iran/Stuxnet), or economic damage to an important American industry in a time of peace (Sony/North Korea). We need to construct international laws that would create rules of the road for these new forms of warfare. These would not, of course, constrain groups like the Islamic State (also known as ISIS) or countries like North Korea, but they would make it harder for countries like Iran to give armed drones to groups like Hezbollah or countries like Russia to carry out serious cyber attacks. In the U.S such new laws would likely face opposition from the right (they constrain American power) and also from the left (they legitimize new forms of warfare), but just as the States and indeed the world has benefited from laws about nuclear proliferation we would also benefit from having an international legal framework about these powerful new weapons of war, weapons that right now are only in their infancy.

Rosa Brooks, New America fellow and professor at Georgetown University School of Law; former counselor to the under secretary of defense for policy.

We assume that change will be both predictable and incremental and we will have time to plan and adapt. We're wrong. If we can't accept this and build a strategy that itself premised on uncertainty and exponential change, the U.S. will continue to decline as a global power.

Sharon Burke, senior fellow at New America; former U.S. assistant secretary of defense for operational energy.

We don't pay enough attention to the big picture: the world order that has favored U.S. prosperity and security is crumbling, and war is becoming increasingly unaffordable for the United States. We face a future of individuals, groups and states that want everything from mischief to market domination, armed with anything from keyboards to nuclear weapons where even nature itself will be more hostile. The great question is whether the United States is up to the challenge of re-imagining what prosperity and security mean in such an age, or if we're going to just keep building F-35s.

Christopher Fussell, senior fellow at the New America Foundation and a principal at the McChrystal Group. He has spent the past 15 years as an officer in the Navy SEAL Teams.

The vast majority of our current system for considering and engaging in conflict is based on and biased by a nation state-centric optic. As these systems fail, the vacuum will continue to be filled by distributed networks with little recognition of the traditional rules of the game. It is our system, not theirs, that will need to adapt.

Mark Hagerott, nonresident fellow at New America and distinguished professor of cyber security at the U.S. Naval Academy; retired Navy captain, his experience ranges from nuclear engineering to security force assistance/advising to Afghan Army, Air Corps, and police programs.

Warfare and policing have always involving balancing freedom of action by combatants, or citizens and police, with the desire for centralized control exerted from headquarters or political centers. We are experiencing perhaps the "Mother of all Control/Freedom Crises" brought on by proliferating autonomous machines, networked cyber technologies, social media induced social disruption and advancing artificial intelligence. What kind of officers (Defense Department, military, para-military or police) can achieve this new balance with both wisdom and efficacy in the face of novel technologies and social responses (e.g., ISIS, narco-terrorism, hacktivists), in a compressed time scale that is shorter than normal career development cycle?

Shane Harris, fellow at New America and senior writer at the Daily Beast; author of @War: The Rise of the Military-Internet Complex, and The Watchers: The Rise of America's Surveillance State.

The U.S. is far more equipped to identify our adversaries in cyberspace than most people understand. The recent hack on Sony, which was quickly and definitively attributed to North Korea, demonstrates that our national security agencies know who is attacking us. The more important and far trickier question is: what do we do about it?

Drew Herrick, Future of War fellow at New America and PhD student in international relations & methods at George Washington University.

The use of new war-fighting capabilities is not limited to financial or technical concerns. We need a better understanding of the political, cultural and institutional constraints that influence the skill of a military and shape how actors understand, integrate and use new capabilities. They have a very real effect on force employment and military effectiveness.

David Kilcullen, senior fellow at New America and former special advisor to the Secretary of State, senior advisor to Gen. David Petraeus in Iraq, author of Accidental Guerrilla, Counterinsurgency, and Out of the Mountains: The Coming Age of the Urban Guerrilla

In 1993, during his confirmation hearing to be CIA director, James Woolsey said of the Soviet Union and the Cold War that just ended, "We have slain a large dragon, but now we find ourselves in a jungle filled with a bewildering variety of poisonous snakes." We spent most of the past several decades confronting these snakes—terrorism, insurgency, narcotics, state weakness, humanitarian crises—but today the dragon is back: we face state and non-state threats at the same time, and in many of the same places. In thinking about future war, we can't ignore state-based threats but we're dealing now with a dragons who've watched closely as we struggled in Iraq and Afghanistan, and learned new ways to sidestep our conventional strength. Strategic paralysis and national overstretch are the risk here – and new ways of war, conceptual and technological, are critically needed.

Ioannis Koskinas, senior fellow at New America, and CEO of the Hoplite Group, he retired from the U.S. Air Force in 2011 after a twenty-year career in special operations.

The aspect of future of war that does not receive sufficient attention is time; there is a vast disparity between the time

necessary to achieve results and the time we allot to achieve results. The aspect of future of war that also doesn't get sufficient attention is that of the need for nuanced long-term strategies. Vast disparity between the need for nuanced macro-strategies devised and implemented by specialists in micro-campaigns versus the Defense Department's innate propensity to leverage one size fits all conventional solutions implemented by conventional generalists.

Michael Lind, co-founder of New America, former editor/staff writer for The New Yorker, Harper's, and The National Interest, author of multiple books including The American Way of Strategy.

The greatest challenges to America's world order goals will arise not from stateless actors but from rival global and regional great powers, which will avoid direct conflict in favor of cold wars involving trade war, propaganda war, sabotage, arms races and proxy wars. The demands of arms races can be met by credible, ever-evolving finite deterrents, while success in proxy wars in third countries will require the intelligent provision of advice, arms and aid, with the introduction of combat forces only as a last resort. We need a military designed for indirect, low-level cold war competitions, not one structured to wage unlikely conventional wars against powerful states.

Tim Maurer, research fellow at New America, focusing on cybersecurity, cyberwar and internet security and freedom.

Modern technology will increasingly provide the option to replace humans in complex decision-making processes. That is not necessarily a bad thing - think of accidents caused by human error. Yet, while much of the worry has been about having humans in the loop, we need more debate about if, when, where and why we need to keep humans in the loop when it comes to the fast paced, complex decision-making and execution of future wars, especially on the cyber side.

Sascha Meinrath, founder of New America's Open Technology Institute and director of X-Lab; named to the "TIME Tech 40: The Most Influential Minds in Tech."

The Geneva Conventions state, "the following rules... shall be observed in all circumstances... The civilian population as such, as well as individual civilians, shall not be the object of attack." However, "cyberwarfare" as currently conceptualized often targets civilians and civilian infrastructure, as epitomized by shutting down Internet connectivity everywhere from Georgia to Syria to North Korea. International conventions need to be clarified to ensure that cyber attacks against civilian populations do not become the new war norm.

Doug Ollivant, senior fellow at New America; retired US Army officer, he served as a director on the National Security Council, counterinsurgency advisor in Afghanistan and leader of the team that wrote the 2006-7 Baghdad "surge" plan.

The impotence of military force to bestow popular legitimacy on a changed regime (e.g.—Iraq, Afghanistan, Libya). Unfortunately, regime change is frequently a politically assigned war aim. Ignored is the very real danger of trading a bad regime for a worse situation of chaos/suffering/instability, as the military is directed by political leadership to do something outside its capability.

Matthew Pinsker, ASU Future of War fellow; Brian Pohanka chair of Civil War history at Dickinson; professor at the Strategic Studies Institute of the U.S. Army War College; and director of the House Divided Project.

One overlooked key to planning for the future of war is to understand better the past of war. Learning lessons from the past is often a pretty shallow exercise in Washington, but it can be transformed into a rich, vigorous one that fully acknowledges multiple interpretations while always seeking to measure them carefully against each other. The body of historical evidence for war-planners is certainly deep, perhaps more than people realize, with arguably dozens of American wars, declared and otherwise, hundreds of separate combat deployments and countless covert operations in the years since 1776.

Tom Ricks, senior advisor at New America and Pulitzer Prize-winning former Washington Post reporter, author of best-selling books about the U.S. military including Fiasco: The American Military Adventure in Iraq.

The most neglected area, I think, is the huge difference between possessing firepower and knowing how, where, when and why to use it.

Daniel Rothenberg, co-director of the Future of War Project, Future of War fellow at New America, professor of practice at Arizona State University, and co-editor of Drone Wars.

What rules can we use to regulate war and conflict as these practices rapidly change? Are there ways to recon-

ceptualize the laws of war to more effectively include non-state actors; to reasonably address an expansion of the use of force beyond traditional temporal and spatial constraints (thereby avoiding "forever wars" and the dangerous idea that legal conflict can take place anywhere); and to provide guidance for emerging technologies, increasingly automated weapons systems, and ever-more complex surveillance and data-driven targeting? What are the risks of failing to elaborate new, more appropriate, and context sensitive rules on the projection of deadly and damaging force and what are the long-term implications of inadequately creative planning?

Peter W. Singer, strategist and senior fellow at New America, consultant for the U.S. military and Defense Intelligence Agency, author of multiple bestselling books including Corporate Warriors, Children at War; Wired for War; Cybersecurity and Cyberwar: What Everyone Needs to Know and the forthcoming Ghost Fleet: A Novel of the Next World War.

What was once abnormal quickly becomes the new normal. Non-state actors, unmanned technologies, cyber – these are all important new parts of the present reality and likely future of war. But we don't talk enough about the trends looming that make us most uncomfortable. Examples like: could 3-D printing do to the current defense marketplace what the iPod did to the music industry? Could ubiquitous sensors and artificial intelligence utterly change the way we think of the observe, orient, decide and act (OODA) loop? What major platforms of today, or even planned buys of tomorrow, are the equivalent of the battleship or Gloster Gladiator of yesterday? How will human performance modification technologies change the human side of war? And, perhaps most uncomfortable of all, because no one wants it but it must be weighed as a real risk, what would the 21st century version of full-out, great power, state-on-state warfare look like?

Anne Marie Slaughter, president of the New America Foundation; former director of policy planning, State Department, and dean of the Wilson School of Public and International Affairs at Princeton University

War has been a constant of human history; understanding how it is evolving is essential to planning for peace. Much of conflict is in potential flux at its most essential levels: Will the wars of the future be more or less frequent than today? More or less expensive? Who will fight them? And with what weapons? Will we able to distinguish 'war' from 'violence'? These are the kind of fundamental level questions we have to answer.

Ian Wallace, senior fellow and co-director of the Cybersecurity Initiative at New America; previously a senior official at the British Ministry of Defence and the British Embassy, for Washington's defense policy and nuclear counselor.

Far too little consideration is given to the organizational implications for militaries of new and emerging technologies, up to and including their service structures. The organization of private sector companies has changed radically over the past two centuries, largely in order to stay competitive in a changing world. As the character of conflict evolve, not least as a result of the ongoing information revolution, militaries will also need to face up to fundamental questions about whether the organizational constructs of the nineteenth and early twentieth centuries are really best suited to winning the wars of the twenty-first century."

Michael Waltz, senior national security fellow with the New America Foundation, and president of Metis Solutions. He commanded a U.S. Army Special Forces unit in the reserve component with multiple deployments to Afghanistan and the Middle East.

The United States government is not organized appropriately to wage current and future warfare. Our authorities and expertise often lie with our civilian agencies while our budget and ability to operate in difficult places lie within our defense department. This gap manifests itself from border control to counterinsurgency to cyber to illicit finance. Stopgap measures such as provisional reconstruction teams and the civilian response corps have been largely ineffective and institutional reform is needed.

Dan Ward, non-resident fellow at New America, is a bestselling author and expert on military technology and innovation. He served more than 20 years as an Air Force acquisition officer.

In a word, deterrence. We spend a lot of time thinking, talking and writing about how to fight future wars - drones, cyber, the Joint Strike Fighter, various naval ships, etc. - but I don't hear nearly enough discussion about how to not fight a future war. What can and should the U.S. military do to deter and prevent (rather than accept as inevitable) future armed conflict? Yes, we must be prepared to fight, but far better to seek the "ultimate excellence," in Sun Tzu's words, of defeating the enemy without fighting.. D

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PEELING THE ONION BACK ON THE PENTAGON'S SPECIAL OPERATIONS BUDGET

When compared to the Pentagon's $560 billion budget, U.S. Special Operations Command's share is relatively small, but not as tiny as officials say.

BY MARCUS WEISGERBER

The U.S. special operations budget has been seen as one of the most stable parts of the Defense Department's $560 billion budget in recent years.

That's because the Obama administration has placed a premium on the use of these elite units for complicated missions in places like Yemen and Somalia. And don't forget these were the types of units that flew deep into Pakistan on the mission that killed al Qaeda leader Osama bin Laden in 2011. Now, more than 12 teams from Special Operations Command, orSOCOM, are advising and assisting Iraqis who are battling Islamic State militants.

While military spending has come down following large-scale ground wars in Afghanistan and Iraq over the past decade, SOCOM's budget has remained relatively flat.

In 2015, SOCOM received about $10 billion of that $560 billion defense budget, according to commanders and budget documents. That's about 1.8 percent of DOD's budget.

SOCOM commander Army Gen. Joseph Votel mentioned that small percentage during a presentation this week at the National Defense Industrial Association's annual special operations-low intensity conflict conference in Washington, D.C.

"SOCOM accounts for approximately 1.6 percent" of the defense budget, he said, referencing that figure while articulating the need for the command to get the biggest bang for its buck.

But let's peel back that onion a little bit on the Pentagon's complicated and secretive special operations spending. That 1.6 percent figure referenced by Votel is the percentage ofSOCOM's 2015 base budget ($7.7 billion) when compared toDOD's base budget ($496 billion). SOCOM received an additional $2.3 billion in 2015 war funding known as Overseas Contingency Operations. Overall, the Pentagon received about $64 billion in war funding.

But SOCOM's budget does not include two key factors, the cost of the nearly 70,000 special operation forces and major weapons.

That includes pay and benefits for those troops and equipment, like Bell-Boeing CV-22 Ospreys, Lockheed Martin MC-130J combat tankers, Boeing MH-47G Chinooks, Sikorsky MH-60 Blackhawks, General Atomics MQ-9 Reaper drones and MRAPground vehicles. The individual military services pay for that.

In 2015, the services contributed about $7 billion in what is termed "enabler support," according to Air Force Lt. Gen. Thomas Trask, SOCOM vice commander.

With that money factored in, we're now at about 3 percent of the overall defense budget.

The majority of SOCOM's budget is allotted toward operations, money spent flying aircraft, putting gas in vehicles and deploying troops into battle. More than $5 billion will go toward this in 2015. As for weapons buying, SOCOM spends much of its procurement money modifying the equipment purchased by the services. This includes putting advanced sensors and other high-tech gear on Lockheed MC-130Js.

For example, Lt. Gen. Bradley Heithold, head of Air Force Special Operations Command, said he is looking to update his aircraft incrementally in the coming years. This includes adding a second weapon to new Lockheed AC-130J gunships in the near-term and eventually adding

a laser weapon in the 2020s.

Todd Harrison, an analyst at the Center for Strategic and Budgetary Assessments, said it's difficult to pin down precisely who is shouldering how much of the cost of special operations forces.

"That's one of those things that's a definitional issue — what do you consider a SOCOM-related expense? I don't think you can come up with a definite number amount of special operations force cost," he said. "It's greater than SOCOM's budget for sure, and the services provide all of the kind of enabling infrastructure that also supports SOF ... what fraction of the budget goes to SOCOM becomes a definitional issue."

For example, out in the field, SOCOM may be using a portion of the satellite systems, or if SOCOM aircraft are flying somewhere, Air Force tankers may be handling the refueling.

"I don't think it's any one organization," Harrison said.

Where SOCOM is unique in terms of spending, he said, is in its independent acquisition authority. "They can use that to good effect, they can buy specialized things for their needs that the other services do not necessarily buy for them. That's a good thing, and they have used that very effectively in the past. But they also rely on things the services are already buying, and it makes sense some capabilities are being provided by the services. So it's a mixed bag — not SOCOM alone or any one service out of proportion with the others."

Looking to the future, Votel said he is most concerned about the readiness of special operations forces. Coming out of Afghanistan and Iraq, military brass across the services have stressed the need to reset forces, making sure they are properly trained for future battles, something these generals and admirals argue is at risk if federal spending caps remain in place.

U.S. MARINE CORPS FORCES, SPECIAL OPERATIONS COMMAND

"I think it is being shouldered in part by each of the services and bySOCOM itself."

But, Harrison noted the military overall is increasingly relying onSOCOM, as part of an overall shift in the U.S. defense strategy.

"It's fair to say special ops funding has definitely grown significantly in the past decade or so ... and for good reason — we're asking more and more of our SOF community, day to day operations, and it doesn't look like that's going to slow down anytime soon," he said. "That is one of the growing areas of the budget in terms of importance in overall defense strategy, but it's still relatively small if you compare it to our surface fleet in the Navy, or the Marine Corps, or combat aircraft in the Air Force, or other major components of our force."

"We must spend wisely, using our SOF dollars for things that are truly SOF unique and maximizing our relationships with the services to provide the rest," Votel said.

Michael Dumont, DOD's principal deputy assistant secretary for special operations and low-intensity conflict, said he is concerned about the demand on the force and operational tempo.

Votel said the "ability to see and understand" is a "core requirement" for all of SOCOM's operations. Like many of his four-star combatant command counterparts, the general said airborne intelligence from manned aircraft and drones is critical moving forward.

"This is an area where we must continue to collaborate with industry," he said.

Votel also stressed the value of international partnerships, noting the command has partnerships with 60 countries. D

HERE'S WHAT YOU'LL FIND ON THE FIGHTER JET OF 2030

Military leaders reveal their hopes and fears for the 6th Generation fighter they will desperately need.

BY PATRICK TUCKER

On Monday, February 2, President Barack Obama's budget request for the Pentagon featured more than $5 million dollars for an item tagged "Next Generation Fighter." If you haven't heard of it, it's the plane of the future meant to replace the F/A-18 Super Hornet and EA-18 Growler aircraft by 2030. Much like the future itself, it's been a source of much speculation but exists only as an idea.

On Tuesday, February 3, in broad but revealing terms, top Navy leaders described some of the capabilities that they want in tomorrow's fighter.

First, a bit of background: The F-35 Joint Strike Fighter is often called the 5th Generation fighter. It also goes by F/A-XX or, more colloquially, the X Plane. The Navy first put out a requirement for the 6th Generation plane nearly seven years ago, in June 2008. The Air Force followed with its own F-X research program. In 2013, the Defense Advanced Research Projects Agency, or DARPA, began a program to pull the two together. At the time, DARPA Director Arati Prabhakar said "This is not a question about what does the next aircraft look like, this is a question about what are all the capabilities that it will take, layered together, in order to really comprehensively extend air superiority."

Pentagon officials have been tight-lipped about what they want on the 6th Generation fighter so far. In conversation with

U.S. NAVY PHOTO BY MASS COMMUNICATION SPECIALIST 3RD CLASS BENJAMIN CROSSLEY

Sailors conduct pre-flight checks on an F/A-18F Super Hornet assigned to Strike Fighter Squadron 41, aboard the USS John C. Stennis, on Sept. 12, 2011.

reporters during a House Armed Services Committee Hearing in January, Undersecretary of Defense for Acquisition, Technology and Logistics Frank Kendall declined to detail the desired budget or attributes for a new fighter. In a memo to the Defense Science Board from October, Kendall only established a task force to study air dominance.

Companies like Boeing have already unveiled concepts for what the fighter could look like (if they built it). BAE systems has also released some interesting artistic concepts featuring planes that can 3-D print their own replacement parts in the air and fold together multiple small drones into a single craft.

This week, military leaders revealed more detail about what they actually want. In conversation with reporters at the Office of Naval Research's Future Force Expo, in Washington, Adm. Mathias Winter, new chief of the Office of Naval Research, or ONR, named some of the key capabilities he wanted the plane to feature. They were: "full spectrum dominance, next generation advanced propulsion, and autonomous sensor payload integration."

What does that mean?

FULL SPECTRUM DOMINANCE

Full Spectrum Dominance is a large component of the military's Joint Vision 2020 plan released in May of 2000. It refers to the ability of "U.S. forces, operating unilaterally or in combination with multinational and inter agency partners, to defeat any adversary and control any situation across the full range of military operations."

In terms of a plane, that suggests a craft that's suitable for a wide variety of missions, perhaps not just combat, and able to work seamlessly with foreign militaries.

One component of that (probably) is dominance over a spectrum of a different sort, the electromagnetic spectrum. The feature of the F-35 that its makers are most proud of is its ability to jam enemy radar and to use advanced sensors to see, render and collect data in the battle space far beyond the conventional capabilities of a fighter.

Today's advanced aircraft carry electro-optical/infrared and synthetic aperture radar imaging capabilities. Emerging capabilities include "cognitive" electromagnetic weapons and defenses. Cognitive electromagnetic weapons autonomously find new wave forms to use against planes, tanks, or other threats (or, defensively, find ways to detect new wave forms being used against the system). Full spectrum dominance will mean more of that. It could include intelligence gathering equipment we can't fathom. "Today it's radar but it might be something more in the future," said Adm. Jonathan Greenert, chief of naval operations, at the expo.

Tomorrow's innovations in radar, jamming and sensing, will emerge from a variety of research outfits but particularly the DARPA Microsystems Technology Office, MTO, designed specifically to tackle those sorts of problems. A future plane could carry a signals intelligence payload allowing the plane to collect information from devices on the ground, including (theoretically) a single target's cell phone location.

But dominance has many aspects. Greenert touched on what air dominance means for him: in a word, loaded. "It has to have an ability to carry a payload such that it can deploy a spectrum of weapons. It has to be able to acquire access probably by suppressing enemy air defenses," Greenert said.

Loaded with what sort of weapons? One probable answer is lasers. DARPA already has a program to develop a high-energy, 150 KW liquid-state laser to be incorporated onto jets, including fighter jets. The High Energy Liquid Laser Area Defense System, or HELLADS, program was expected to go into testing in 2014. In terms of broader Defense Department spending, next year's budget request includes a big increase in spending for directed energy weapons.

The military wants to put lasers on planes for the same reason it wants to put them on ships. Shooting down swarms of cheaply produced and launched drones with conventional ammunition becomes prohibitively expensive after a certain point.

Some have speculated that Kendall's House Armed Services Committee hearing announcement about the new plane represented a certain amount of Pentagon frustration with the F-35, its cost overruns and mounting technical problems. The 5th Generation plane is obsolete right out of the hanger, critics charge, and the Chinese have already innovated air defenses against it. The new emphasis on next-generation fighter suggested that the military was already looking beyond their most expensive weapons system ever, before it even really got off the ground.

Sam LaGrone at United States Naval Institute News, USNI, has suggested an alternative explanation in that the next generation is not so much a replacement for the F-35 as a complimentary plane.

If air dominance is like a basketball game, then the F-35 would play star forward, or rather would play an "emerging role in the carrier air wing will be—in part—as a forward sensor node for the carrier strike group to relay targeting information via the Navy's Naval Integrated Fire Control Counter Air (NIFC-CA) concept."

Navy Rear Adm. Mike Manazir told USNI, "We're looking to replace the F/A-18E/F"—considered a beloved workhorse for combat missions, rather than star forward—"with an understanding already of what the F-35C has brought to the air wing."

NEXT GENERATION ADVANCED PROPULSION

How fast does the plane of the future go? Winter wants a better engine but not necessarily a speedier plane. "We know we need a bigger wick," Winter told reporters. More specifically, he wants "a propulsion system that can provide... not just more power... I'm talking about being able to reduce the SWaP-C of your propulsion system," he said, referring to the size, weight, power, performance, and cooling (SWaP-C) cost of the system.

Greenert also said that finding new ways to achieve hypersonic speed probably won't be a big part of the effort. "I don't think it's going to be super-duper fast, because you can't outrun missiles," Greenert said. So "next generation propulsion" doesn't necessarily mean the fastest flying object in the air. The military wants a plane efficiently designed to allow for high speed at low power cost. That, in turn, suggests a lot of power going to something more useful than an exhaust stream, like computer elements, advanced weapons or something else.

AUTONOMOUS SENSOR AND PAYLOAD INTEGRATION

An autonomous sensor in the context of a future plane can mean many things. Some market analysts speaking to DoDBuzz have speculated that the plane will probably include '"smart skins' which connect the fuselage with computer technology."

Payloads, in the context of the next generation fighter, could include small drones that use the fighter as a sort of mother ship.

DARPA officials told *Defense One* the current programs most relevant to the next-generation fighter program are the System of System Integration Technology and Experimentation, or SoSITE, program as well as Collaborative Operations in Denied Environment, or CODE. Both programs are aimed at developing technologies to allow drones to work with one another as well as with manned aircraft to swarm bomb an adversary.

A related project at DARPA seeks to develop "distributed air capabilities." The agency describes that as "a large aircraft that, with minimal modification, could launch and recover multiple small unmanned systems from a standoff distance." In other words: a mother ship. Whether or not the fighter will launch drones depends somewhat on how large a fighter can be, or how small a drone can become and still be useful as a weapon or intelligence tool.

THINGS THAT THE NEXT-GENERATION FIGHTER MAY NOT HAVE

Humans. The F-35 once was supposed to be the last manned fighter. Greenert didn't rule out the prospect of designing a 6th Generation plane capable of carrying a human pilot. But he didn't express enthusiasm for it.

"The weight that we put on an aircraft due to the pilot is kind of extraordinary. You take that off and put sensors on there instead," he said.

If you keep a pilot in the cockpit of a plane that's loaded with more and more advanced computational piloting features, what does the pilot do? Answer: less and less actual flying.

A Defense Department program called Aircrew Labor In-Cockpit Automation System, or ALIAS, seeks to cut down on the number of decisions that the pilot has to make by taking over some of the more mundane flying tasks. DARPA Deputy Director Steven Walker on Wednesday described the ALIAS project as "trying to build a co-pilot."

If those capabilities can be matured and if at some point the copilot demonstrates its superiority to the fragile and expensive human in the pilot's seat, then the decision to keep a human in the cockpit looks more like an attempt to preserve the mythos of the American fighter pilot and less like a strategic necessity. It still requires human approval to do one important thing with military weapons: kill. Given the military's strong and surging obsession with improving autonomy and artificial intelligence—and given the rapid advance of the current state of the art—the idea of a robotic fighter pilot outtesting a human by 2030 is a safe bet.

Stealth may also be absent on the plane of tomorrow. The F-35 does have advanced stealth capabilities. In explaining why, Air Force Chief of Staff Gen. Mark Welsh has said "in the near term, the stealth technology on our 5th Generation platforms, the F-22 and F-35, is the price of admission into the fight."

Greenert expressed a slightly different valuation of that technology. "Stealth may be overrated," he said. "I don't want to necessarily say that it's over; but, let's face it, if something moves fast through the air and disrupts molecules in the air and puts out heat—I don't care how cool the engine can be—it's going to be detectable."

The problem of trying to design an aircraft for the distant future is that the future is constantly in flux. At some point, new technologies will make even the concepts above look quaint. For now, they represent the military's grandest ambitions for a plane that's merely an idea but that will occupy more and more time, money and resources in the years ahead D

BETTER SIMULATION COULD SAVE THE MILITARY MILLIONS

A new survey reveals how the military is using simulation and obstacles to wider implementation.

BY PATRICK TUCKER

How much is a good video game worth? pecial Operations Command requiresTo the military, the answer is billions. Pentagon leaders responding to a new survey conducted by the Government Business Council, GBC, said that the main thing restraining simulation training was "fidelity." Read that to mean the games just are not feeling realistic enough.

The survey notes that the military appetite for virtual training is strong and growing. Its most commonly associated with Air Force flight simulation. But the Navy also relies on simulations to help servicemen understand how to use equipment on ships and subs. Then, of course, there's also computer-based battlefield training.

The respondents displayed a wide consensus that computer simulations alone will never fully replace live training. But in some instances, simulations can significantly cut down on the amount of live training necessary to keep soldiers ready for missions. Training games can also boost the effect of live training. In all, the military is realizing the same thing about simulations that educators are beginning to understand about massive open online courses or MOOCs. Computer-based education is best used in a blended approach with in person training, to make the later more effective. The report emphasizes live, virtual constructive training or LVC.

How much is virtual training saving the military? The Air Force will save $1.7 billion between FY 2012 and FY 2016 by relying more on flight simulators and less on test and training flights. The Navy believes it will save $119 million a year beginning in 2020 by increasing virtual training for the MH-60 and F/A-18 airplanes, according to the report.

A Marine using a virtual reality parachute trainer.

CHRIS DESMOND / NAVY

Keep in mind, while those numbers come from independent source like the Government Accountability Office, the survey was underwritten by Rockwell Collins, which markets simulation services to the government.

The military is going to press ahead with more virtual training but the pace of adoption is being held in check, which has costs, either in terms of money that went to more expensive live training instead of simulation or in terms of readiness.

The report states "Roughly two thirds (66 percent) of respondents identify insufficient fidelity as a significant concern regarding virtual training, more than any other option. Insufficient simulation fidelity can cause improper training in three ways: omission - knowledge or skills necessary for the real world are not taught or fail to transfer from the virtual training environment, negative transfer - use of virtual simulation impedes real world learning, or negative or non-concurrent training - simulation training provides incorrect or outdated knowledge or skills. This issue forms the crux of the virtual simulation challenge. If LVC training is not sufficiently true to reality, it will only harm trainees."

The best way to make simulations much more realistic much faster could be to go with a software framework that far more people are developing on. That means designing or commissioning more simulations on the Unity game engine as opposed to Virtual Battle Space, VBS, or other architectures of which the military is fond. More than 3.3 million registered developers are designing video games like Wasteland 2 and Shadowrun Returns on Unity.

More importantly, Unity is becoming the engine of choice among virtual reality developers.

"VBS is not a bad engine. We have a small development team. But Oculus is supporting Unity in a big way. It's just much easier for us to build demos in that," Andrew Eiche, a developer with Booz Allen Hamilton who designs simulations and games on the Oculus Rift headset for Defense Department clients, told *Defense One* in July.

The survey respondents were 310 Defense Department personnel including people at GS/GM-11 to 15 grade levels, active duty military personnel, and members of the Senior Executive Service. Some "52 percent of respondents are GS/GM-13 and above or the military equivalent, 10 percent are active duty, 69 percent of DoD civilians surveyed have been active-duty before, and 59 percent have at some point been a military trainer or instructor." The results were then weighted by service component.

Full disclosure: the Government Business Council is the research arm of Government Executive Media Group, which is owned by Atlantic Media, the parent company of *Defense One*.

SIMULATION TRAINING PROVIDES INCORRECT OR OUTDATED KNOWLEDGE OR SKILLS. THIS ISSUE FORMS THE CRUX OF THE VIRTUAL SIMULATION CHALLENGE.

Defense One

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