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FOREWORD

As the U.S. Army looks to the future, it expects enemies who are much better armed than the ones U.S. soldiers encountered in the first two decades of the 21st century. The Islamic State fighters who learned to do tremendous damage with cheap roadside bombs are now learning to go vertical, raising the spectre of swarms of IED-carrying drones.

But Army leaders aren't just looking at non-state actors. Military officials have made it clear they feel they have little choice but to prepare for a possible conflict with China or Russia over the next several decades. Among the weapons they believe necessary for this fight are ones that can strike an enemy at an extremely long range. So it's developing what we call a "supergun" that can shoot up to 40 miles.

Yet the deadliest threat to arise this year is biological. The global coronavirus pandemic is forcing Army officials to rethink everyday operations in an era of social

distancing and mandatory masks. Some believe the future of the Army means staring at screens and monitors, making sure machines are running the proper loops, not deviating from norms too wildly, and intervening quickly and decisively when needed. This may sound like the sort of cyber soldiers the Army badly lacks. How it might better find those soldiers is something you'll learn about in this ebook, too. And yet there's still so much more to the Army's vision of the future — from thermal cloaking to the next armored vehicle. So what are you waiting for? Let's get started.. 

BEN WATSON
NEWS EDITOR

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STORY ONE



U.S. Air Force Senior Airman William Lopez, with the New Jersey Air National Guard's 177th Fighter Wing, stands for a portrait at a Federal Medical Station set up at the Atlantic City Convention Center in Atlantic City, N.J., April 15, 2020 | U.S. AIR NATIONAL GUARD / MASTER SGT. MATT HECHT

Army Aims To Train Hundred of Soldiers in Coronavirus 'Safety Bubbles'

Entire companies and battalions could be isolated in the field for a month, Secretary McCarthy said in an interview.

BY KATIE BO WILLIAMS
SENIOR NATIONAL SECURITY CORRESPONDENT

THE U.S. ARMY IS WORKING on plans to continue training large groups of troops amid the escalating coronavirus pandemic by creating “safety bubbles” around groups of healthy soldiers, Secretary Ryan McCarthy said in a Thursday interview.

The idea is to test an entire company or battalion of soldiers, and if none have COVID-19, send them into the field for a month with prepackaged meals to do the kind of collective training exercises that social distancing guidelines have made risky on military bases throughout the United States.

“We’re going to look at how big the size of a cohort can be. This is all brand new for us,” McCarthy said. “These are concepts we’re looking at that we may have to put in play downstream in the very near future. Because, obviously, we can’t wait a year until there’s a vaccine.”

The Defense Department has sought to balance the need to protect troops from the virus while maintaining

their readiness to fight. Some critics — including senior commanders within DoD’s own ranks — have argued that a healthy force is an essential part of readiness that is being neglected to prepare for a hypothetical war the U.S. isn’t fighting right now.

“We are not at war. Sailors do not need to die. If we do not act now, we are failing to properly take care of our most trusted asset — our Sailors,” Capt. Brett Crozier, commander of the aircraft carrier Theodore Roosevelt, wrote in an **extraordinary March 30 letter** to Navy leaders begging for help to **evacuate and isolate** the majority of his 4,800-person crew.

The key to the Army’s plan is pushing more coronavirus testing kits out into the field, McCarthy said. His service has a “substantial amount,” he said, but is still figuring out where to send them. (The first shipments went to deployed troops in Afghanistan and Iraq.) Right now, Army leaders don’t have a clear projection of how many troops they expect to be sickened by the virus.

National health experts **believe** that 100,000 to 250,000 Americans are likely to die of COVID-19.

The Army uses the Center for Disease Control and Prevention’s **hotspot** models as a baseline and “we’re trying to apply it to our installations,” McCarthy said. But the CDC’s model is “not an apples-to-apples comparison, which is why we don’t have enough data to make a pure determination yet, but we’re getting close.”

The Army has already tested an early pilot model of the “safety bubble” concept. On Tuesday, some 800 soldiers were taken in 32 sterilized buses from Basic Combat training in South Carolina to bases in Virginia, Oklahoma, and Texas. The soldiers were screened for COVID-19 symptoms, but not tested for the coronavirus. The effort required more vehicles than normal because service members maintained social distancing on the buses, which were equipped with bathrooms so that they could travel without making any stops.

The biggest weakness McCarthy sees — the easiest opportunity for the virus to wreak havoc among Army troops — are combat arms units, like infantry battalions,



and basic training environments in which recruits live and eat in close quarters.

“I see a lot of challenges there,” McCarthy said.

Over the past two weeks, he said, he spent considerable time with TRADOC commander Gen. Paul Funk looking at the protocols and thinking of ways to adjust.

As of Thursday morning, there were **893 cases** of coronavirus among active duty service members, according to the Pentagon’s daily fact sheet.

Some service members **have complained** that the Pentagon – including Army leaders – didn’t do enough early on to prevent the spread of the disease amongst its servicemembers. In several cases, the Army moved before the Defense Secretary to put travel restrictions and other public health measures in place for its service members, giving the impression of an institution reactively lurching to respond to the ballooning crisis.

McCarthy said communication between senior leaders in the Pentagon has improved in recent weeks,



U.S. AIR NATIONAL GUARD / BY STAFF SGT. ZACHARY VUCIC | U.S. ARMY PHOTO / STAFF SGT. BRANDY NICOLE MEJIA

streamlining the building’s response to the crisis.

“This is decentralized because this is a massive organization,” McCarthy said, referring to the Pentagon’s COVID-19 response efforts. “What we’ve done as a collective leadership team is meet more frequently, all the services and all the [combatant commands].”

“Some of it is good because by doing it uniformly with the services and OSD, it’s not, ‘Why are you Charlie?’ ‘Why are you Bravo?’” McCarthy

said, referring to health protection statuses that the military designates its installations to dictate public health policy. “We don’t want to confuse anybody. That’s how this has kind of morphed.”

So far, senior leaders across the service branches insist that coronavirus has not reduced force readiness.

“Quite frankly, we’ve weathered the last month pretty well from a readiness standpoint,” McCarthy said.

Navy leaders insisted Wednesday that the Roosevelt remains “fully operational” now, even as over 4,000 of its crew members are being evacuated to shore-side facilities in Guam.

“If the ship needs to go, the ship can go,” Acting Navy Secretary Thomas Modly **told reporters.**

Defense Secretary Mark Esper has pushed back on



the notion that the military should curtail its defense activities to combat the virus.

“There seems to be this narrative out there that we should just shut down the entire US military and address the problem that way. That’s not feasible,” Esper said during the White House’s daily coronavirus press briefing on Wednesday. “Our mission is to protect the United States of America and our people... I’m confident that the commanding officers and senior noncommissioned officers are taking every reasonable precaution to make sure that we practice as best we can social distancing, sanitizing environments, etc, consistent with that mission.”

It was not immediately clear who was suggesting that the military should “just shut down.” **D**

STORY TWO



U.S. AIR FORCE PHOTO /
SENIOR AIRMAN JOSEPH PICK

THE ARMY JUST TESTED ITS NEW SUPERGUN

It's the latest weapon meant to intimidate China and Russia: a giant cannon that can fire shells about three times farther than a standard howitzer.

BY PATRICK TUCKER
SENIOR NATIONAL SECURITY CORRESPONDENT

In the tests, conducted at Yuma Proving Ground in Arizona, the 58-caliber XM1299 cannon used a “supercharged” propellant to fire two types of munitions about 65 kilometers – much farther than a traditional howitzer’s 18-kilometer range. The Excalibur precision-guided munition hit a “precise” target, officials said. The other, the rocket-assisted XM1113, was tested for range, not precision, the officials said. It was the longest test yet for the cannon, which is essentially a modernized howitzer being developed under the **Extended Range Cannon Artillery** program.

Brig. Gen. John Rafferty Jr., who directs the Long Range Precision Fires Cross Functional Team at Army Futures Command, said that the cannon promises a new way to attack targets that lie some 20 to 60 kilometers away. It “allows commanders to attack differently, provides them a weapon system other than helicopters and armed drones to go after targets that are deeper on the

battlefield,” he said.

The Army has ordered 18 XM1299s from BAE Systems, and aims to send them to a battalion in 2023.

“That will give us the opportunity to test the platform in the hands of an operational unit and evaluate the operational concept for support fires at the division level,” said Rafferty. “We’ve proven the capability; we’ve proven the range.”

The Army is also looking at different projectiles, including one that uses a **ramjet**. Rafferty said he expects a contractor to demonstrate it this year.

The big challenge now is finishing an autoloader that will allow the cannon to fire six to eight rounds per minute – to “deliver that volume of fire to create the effect of mass,” as Rafferty put it: in other words, to devastate an enemy position the way an enormous bomb would. But he cautioned that an autoloader is “not a simple machine.” It has to load the munition, the propellant, and the course-correcting fuze that allows the shell to change



direction (slightly) in mid-air.

Work is proceeding at Picatinny Arsenal in New Jersey, where engineers expect to begin lab testing later this year and hope to issue requests for proposals to industry in three to four months. **D**

STORY THREE



U.S. Army Spc. Michael Breneman signals to a Japan Ground Self Defense Force light armored vehicle during an onload evolution aboard U.S. Army Runnymede-class landing craft utility USAV Coamo (LCU 2014) at Commander, U.S. Fleet Activities Sasebo, Japan, July 27, 2016. | U.S. NAVY / MASS COMMUNICATION SPECIALIST 3RD CLASS KRISTOPHER S. HALEY

US ARMY CANCELS \$45B ARMORED VEHICLE CONTEST THAT DREW ONE BID

The service now plans to reboot its effort to replace the Bradley Fighting Vehicle, but with different bidding parameters.

BY MARCUS WEISGERBER
GLOBAL BUSINESS EDITOR

THE U.S. Army said it would reevaluate its effort to replace the Bradley Fighting Vehicle after just one company submitted a qualifying bid in the \$45-billion contest.

“Based on feedback and proposals received from industry, the Army has determined it is necessary to revisit the requirements, acquisition strategy and schedule before moving forward,” the Army said in a **statement** released Thursday afternoon.

The statement did not mention that only General Dynamics submitted an eligible bid. The Army **disqualified** a Raytheon-Rheinmetall team because it was unable to get its German-made Lynx fighting vehicle to the United States by Oct. 1. SAIC and Bradley-maker BAE Systems **did not submit bids**.

Thursday’s decision is a setback for Army Futures Command, founded in 2018 to lead the modernization of the service’s weapons. But the Army did live up to Secretary Ryan McCarthy’s **edict**: “If you fail, we’d like

you to fail early and fail cheap.”

After several **failed attempts** to buy **new combat vehicles**, the Army tried to fast-track the Bradley replacement, which it calls the Optionally Manned Fighting Vehicle. But the speed helped contribute to its demise.

“The Army asked for a great deal of capability on a very aggressive schedule,” Bruce Jette, assistant Army secretary for acquisition, logistics, and technology, said in a statement. “Despite an unprecedented number of industry days and engagements, to include a draft request for proposal over the course of nearly two years — all of which allowed industry to help shape this competition — it is clear a combination of requirements and schedule overwhelmed industry’s ability to respond within the Army’s timeline.”

The Optionally Manned Fighting Vehicle was to **replace the M-2 Bradley**, a tracked armored vehicle that carries infantry soldiers into combat, with a more modern vehicle that could be driven remotely. Replacing the Bradley is still

the Army’s No. 2 acquisition priority and Army leaders are hoping to have more bidders the next time around. “We are going to take what we have learned and apply it to the [Optionally Manned Fighting Vehicle] program to develop our path and build a healthy level of competition back into the program,” Gen. John Murray, the head of Army Futures Command, said in a statement.

BAE Systems, which did not submit a bid, said in an emailed statement that it “is dedicated to providing combat vehicle solutions to meet the needs of the U.S. Army’s modernization efforts. When the Army releases the new [Optionally Manned Fighting Vehicle] approach, we look forward to evaluating it and making a determination about how BAE Systems can best continue our commitment to the warfighter and the Army.”

A General Dynamics spokesman declined to comment. Raytheon-Rheinmetall and SAIC were not immediately available for comment.

McCarthy acknowledged at the at the Reagan National Defense Forum in December that officials were reviewing the Bradley replacement effort.

“You always want more competition, but this is entirely about how we can meet these requirements so we can have a capability that has much greater lethality ... than we have today,” he said. “Requirements are incredibly important. We’ve made dramatic steps as an organization to put the strong leadership in our requirements community and to partner with our acquisition leadership.

“Getting requirements right on the front-end prevents you from the catastrophic failures that we’ve endured for the past 20 years,” McCarthy said. **D**

STORY FOUR



A BQM-74E Chukar target drone equipped with jet-assisted takeoff packs launches from the flight deck of USNS Amelia Earhart (T-AKE 6) for an air gunnery exercise in the South China Sea July 14, 2010, during Cooperation Afloat Readiness and Training (CARAT) Singapore 2010. | DOD PHOTO / MASS COMMUNICATION SPECIALIST 1ST CLASS KIM MCLENDON



WHEN BOTH SIDES HAVE DRONES, HOW DO YOU KNOW WHICH ONES TO KILL?

The U.S. Army recently tested a system that helps defenders wipe the skies of just the unfriendly aerial robots.

PATRICK TUCKER
TECHNOLOGY EDITOR

In November, the Army hosted a test of Pierce Aerospace's Flight Portal ID at Fort Sill, Oklahoma. A friendly drone was equipped with a Bluetooth beacon, then sent aloft with a host of enemies, company CEO Aaron Pierce said. Air-defense operators in a Stryker ground vehicle was able to down the "enemy" drones and avoid the friendly one, using a Northrop Grumman anti-drone system called the Sophisticated Counter Unmanned Systems Weapon Radio Frequency that includes a 30mm X 113mm chain gun and a LiteEye electronic warfare system.

Defense One reached out to the public affairs office at Fort Sill and did not immediately receive comment.

"This was the first time getting kinetic with FPID and the results were desirable. I had eyes on the operation from the pilots' location watching multiple UAS fly down range from the Stryker's position. I was enthused when the system engaged the hostile UAS with a high explosive round fired from the Chain Gun, leaving our friendly, FPID

A recently proposed FAA rule would require drones to be remotely identifiable to authorities, so Pierce's system could have commercial use as well.

The U.S. military is pressing ahead with a variety of swarm research efforts, as are the British armed forces. Last June at Fort Benning in Georgia, DARPA's Offensive Swarm-Enabled Tactics program tested flying and rolling drone swarms in the air in complex missions in urban environments, such as identifying and surrounding a mock city hall, maintaining situational awareness around it, going inside to collect an object, and securing it.



equipped UAS, to continue operating in an airspace that was no longer contested," Pierce said in a statement.

Further research will in part ways to better secure the transmission between the beacon and the receiver..

STORY FIVE



A Tennessee National Guard
Soldier assigned to the Military
Medical Response Force (MMRF),
administers a COVID-19 test in
Bledsoe County, Tennessee, April
10. | U.S. ARMY / SGT. SARAH
KIRBY

THE US ARMY IS MAKING SYNTHETIC BIOLOGY A PRIORITY

New thermal cloaking, insect proof uniforms are on the horizon, if the U.S. can get out in front of China.

PATRICK TUCKER
TECHNOLOGY EDITOR

The U.S. Army's new Futures Command is accelerating research into synthetic biotechnology to help the military develop next-generation living camouflage and other never-before-seen organisms and materials.

Dimitra Stratis-Cullum, who is overseeing the research in synthetic biology for the U.S. Army Research Laboratory's Combat Capabilities Development Command, detailed the effort on Thursday at the fourth annual Defense One Tech Summit.

U.S. Army labs have long had a mandate to study biology, but in April, the lab quietly elevated the study of synthetic biology to one of its top ten priorities.

"Synthetic biology is one of the Lab's top ten research priorities. That means we are working across the laboratory and with other regional partners to double the effort that was previously being executed under the Living Materials program," said Army spokesperson T'Jae Gibson Ellis. The Army did not provide specific

numbers on the size of the Living Materials program. The research is being overseen by Gen. Mike Murray, the head of the U.S. Army's newly established Futures Command.

Soldier survivability will be one of the key areas of research, Stratis-Cullum said. That's very different from creating genetically-enhanced super soldiers. Instead, the focus is developing new pieces of technology that will help U.S. troops make it out of battle unscathed.

For instance, the effort will place a big focus on developing new biological materials that could be used for cloaking to prevent detection, said Stratis-Cullum.

"We're talking about trying to make the soldier look like nature, look like natural environments," she said. "Now we can actually take from nature, so if we could do that in a scalable, stable, limited way, we could bring new concepts to concealment."

One of those concepts, she said, is material that could mask an individual's thermal signature,

essentially making them invisible to lenses for cameras that detect heat.

"That is one of the areas we are looking at," Stratis-Cullum said. "We want our soldiers to be able to move and not be detected on the battlefield. We don't want their infrared signature to be detected. There's a whole host of signatures that we worry about that could allow them to be targeted."

Another potential application would be uniforms that repel insects.

"We're moving [away] from a scenario where we are soaking uniforms in DEET, which is toxic to the soldier, toxic also potentially to the natural ecosystem," she said.

But there remains a lot of difficult scientific research to do before the Army will start pumping out new living camouflage products. Researchers need to be able to show that the biological organisms that are coming out of the lab can survive in the wild, and potentially in warfare. Researchers also have to be able to show that they can produce those new materials at scale, by



pioneering new techniques for creating organisms.

“One of our big pushes is being able to do synthetic biology in a very agile way and very quickly,” Stratis-Cullum said. You really have to harness the precision control and assembly over scale. That’s a big part of the push.”

The final area of focus will be forecasting the future of synthetic biotechnology in the hands of potential adversaries. It’s an area of rising concern. A Russian scientist recently **declared** his intention to use a gene-editing tool called CRISPR to create a genetically-modified infant, following in the footsteps of a **Chinese** scientist who did so as well.

The U.S. military will not be trying to edit the human genome, but, said Stratis-Cullum, advancing research into synthetic biotechnology generally is essential to help the U.S. military prepare and predict what other countries might try and do.

“It’s one of the things we look at,” she said. “We try to also look at what is the common barrier, level of control, to what extent that could be implemented in situ [meaning in nature, as opposed to in a lab] in military environments... [we are] trying to really understand that and then use that to forecast.”

The rapid pace of information technology advancement in the form of more computing power, better machine learning and image and data analysis software, even 3D printing, are all key contributors to the fast pace of synthetic biotechnology development. That has the United States at an advantage, but it’s not an advantage that will last forever, said Stratis-Cullum.

“The convergence of those things is helping us rapidly accelerate, right? Rapidly innovate. If you look at our adversaries, that’s actually a pattern you are seeing



in terms of investment. It’s not just an investment in synthetic biology but those other areas alongside,” she said.

Not only are countries like China and Russia investing in those technologies, they are also investing in the United States. A report from **Reuters** last September calculates that Chinese investment currently makes up about 43 percent of the funds going into U.S. biotech startups, more than \$5 billion a year.

“We’re living in an age of international power competition in synthetic biotechnology,” Justin Sanchez, the former head of DARPA’s Biotechnology office Life Sciences Research Technical Fellow, Battelle said on Thursday. If we’re going to lead as a country we have to get the people together that can lead in this end-to-end development.” **D**

STORY SIX



U.S. Coast Guard Chief Warrant Officer DeAnna Melleby, Information Systems Security Officer for the Coast Guard Command, Control, Communication and Information Technology unit at Coast Guard Base Boston, peers through a space in a server April 20, 2017.
U.S. COAST GUARD / PETTY OFFICER 3RD CLASS ANDREW BARRESI

THE US ARMY IS STRUGGLING TO STAFF ITS CYBER UNITS: GAO

Congress' watchdog concluded that the Army launched its new cyber units before trying to determine whether the concept is affordable, supportable, and sustainable.

BY JACK CORRIGAN
STAFF CORRESPONDENT, NEXTGOV

The U.S. Army is struggling to staff, train, and equip its new cyber and electronic warfare units, and officials haven't assessed how those challenges will affect the Pentagon's digital capabilities, according to a congressional watchdog.

In recent years, the Army has been rapidly expanding its cyber capabilities to stay ahead of the growing digital threats posed by adversaries like Russia and China, but the Government Accountability Office found the service is having a tough time keeping up with its ambitious plans. The Army activated two digital warfare units last year despite personnel shortages, auditors said, and officials are struggling to update the equipment and doctrine used to train soldiers.

Furthermore, the Army hasn't conducted thorough risk assessments for its new units, which could make it harder for top brass to keep the forces running at full capacity in the long term, GAO said in [a report](#) published



Thursday.

While Army officials said the digital threats posed by Russia and other adversaries justify the accelerated deployment process, auditors said the hasty plan could leave the Army "fielding units that are not capable of providing the needed capabilities."

Army officials told GAO they're struggling to recruit personnel to fill their new cyber units, particularly for

high-level positions. Last year, officials stood up two cyber units with numerous vacancies—one unit had only 55% of its posts filled as of March, while the other was operating with less than 20% of its required personnel. According to auditors, the Army is considering increasing pay and offering retention bonuses to make the positions more attractive.

The accelerated activation process has also left the Army scrambling to equip its cyber forces, auditors said. The problem is even more prevalent in the Army Cyber School because officials are diverting resources away from trainees toward its operational units.

"If the Army does not acquire new equipment quickly enough, the result could be that soldiers in the Army Cyber School will be trained on outdated equipment, which they will not use when they get to the field," GAO said. And because the Army is still finalizing its doctrine for cyber units, instructors said they may soon have "difficulty designing training for the new units, and soldiers will not have a clear understanding of their tasks and missions."

Army officials are also required to conduct a risk assessment whenever they activate a new unit, but GAO found the branch hasn't completed those evaluations for its new cyber squads. Such assessments inform the Army's future readiness planning, and without them, "leaders may be left with an incomplete picture of the challenges in affording, supporting, and sustaining these units over the long term," auditors said.

GAO recommended the Army complete risk assessments for the two cyber units it activated last year—the Intelligence, Cyber, Electronic Warfare, and Space unit and the 915th Cyber Warfare Support Battalion—and examine the risk of its accelerated activation strategy. **D**

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