LIFE AFTER ABRAMS: IF IT DOESN'T LOOK OR ACT LIKE A TANK, IT STILL MAY BE THE TANK OF THE FUTURE

SCOTT R. GOURLEY, CONTRIBUTING WRITER

Wednesday, May 29, 2019

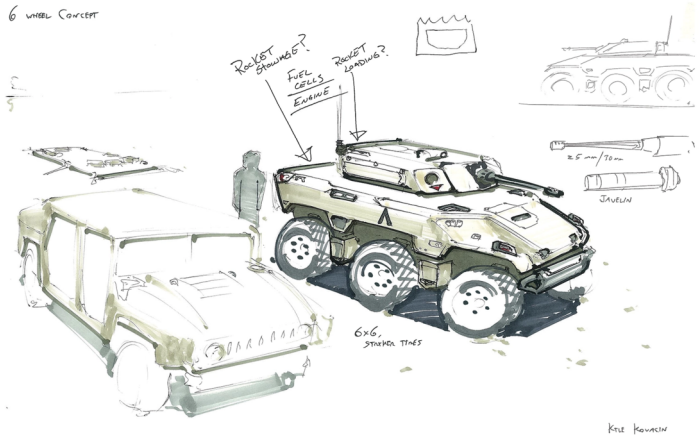
The almost 40-year-old Abrams tank has a significant role in the Army's vision for 2028 because of a major facelift that upgrades the engine, sensors and sights, along with advanced armor and an active protection system aimed at fighting, surviving and winning.

But it is not quite the radical new tank the Army needs for the future.

While tanks have been declared obsolete many times since their first use in the Battle of the Somme in 1916, the latest high-tech upgrades to the legendary M1 Abrams make it more reliable, effective and lethal, allowing the Abrams to be a key asset in the land portion of the evolving multidomain battle. It can't fly. It can't swim. It doesn't fight cyberbattles or knock out satellites, but it is an essential piece of the multidomain fighting force.

The improved Abrams, the M1A2C, moves toward the Army's expectations for the next-generation combat vehicle by having improved crew protection and mobility, but it lacks the option of autonomous operation, alternative fuel and directed energy weaponry capabilities being studied by the cross-functional team trying to set a road map to the future.

The next tank may not even be a tank-looking and tank-acting vehicle.



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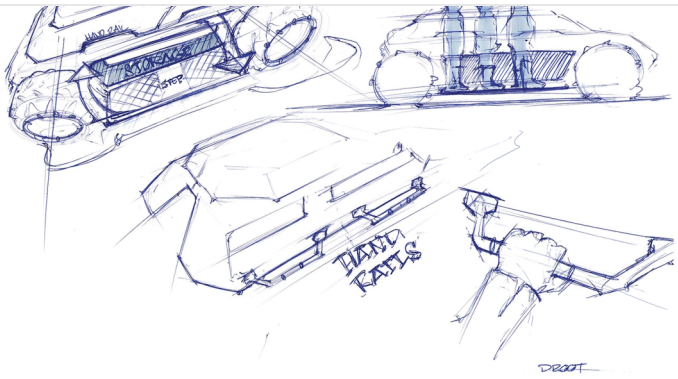

Immediate Future

Current tank modernization efforts focus on "an immediate future" and reflect study and close cooperation between the Program Executive Office Ground Combat Systems, the Next Generation Combat Vehicle Cross-Functional Team and supporting research efforts being conducted under the umbrella of "Team Warren," a name based on the Michigan location of the U.S. Army Tank Automotive Command.

Attendees at the Association of the U.S. Army's Global Force Symposium and Exposition in March were told that any concept of a replacement system for the Abrams would be fed from two ongoing studies: one being conducted by the Army Science Board and the other by the U.S. Army Combat Capabilities Development Command (CCDC) Ground Vehicle Systems Center.

"In the future, a decision will be made for Abrams replacement," said Brig. Gen. Ross Coffman, who heads the cross-functional team for the Next-Generation Combat Vehicle. "This is a decisive lethality that has to fight in really, really bad places. Is it a tank? I don't know. But it will be decisively lethal, protect the crew against their main battle tanks, allow us to identify the enemy before they can identify us, and engage them at farther ranges.

"We are confident in the Abrams today. But at some point, the Abrams will have to be replaced. So, in 2023, we will have a decision point, with guidance from senior leaders on how to proceed."

In addition to the two studies underway, he highlighted "a lot of exciting work in this space," citing examples like "directed energy" and "other munitions that could be put in place."

In a subsequent media roundtable at the AUSA event, Coffman smiled while repeating his previously quoted assertions that he "doesn't care if [the Abrams replacement] hovers, is run by a flux capacitor or shoots lasers."

In all seriousness, he continued, "Everything is on the table. It's got to deliver decisive lethality in the worst places on earth. And it has to be survivable in the worst places on earth; in cities and in cross-country terrain. So what that looks like, we're open to."

He said the two studies "are answering questions on what is out there as far as current technology and what we think to be immediate future technology to provide us options. That's really the focus. No one, at least in my office, disagrees that we need something that has the capability to deliver decisive lethality with a survivability level that outpaces our peers. But I've been very purposeful in saying it may not be a tank, because I don't want to limit what is available to our soldiers."

Beyond Immediate Future

But what about a tank beyond the immediate future? Where is the focus *beyond* 2028?

act like a tank, it still may be the tank of the future

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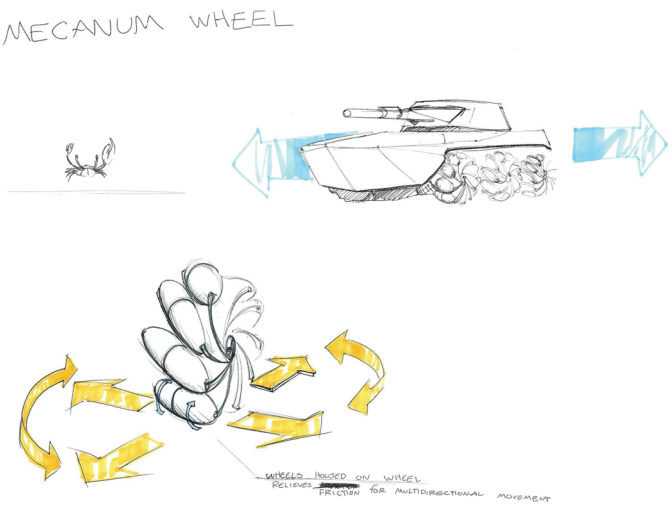
reluctance to get wild," adding, "No one wants to talk sci-fi or get too futuristic."

Likewise, industry planners tended to keep their focus on more of a 10-year technology window, with several company representatives declining to speculate even that far.

For example, as a possible reflection of Coffman's comments about "other munitions that could be put in place," Craig Aakhus, director of large-caliber ammunition for Northrop Grumman Innovation Systems, was quick to highlight the 120 mm Advanced Multi-Purpose, XM1147 High Explosive Multi-Purpose—Traced round "and the capabilities that round will bring to Abrams."



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AMP will replace four currently inventoried tactical rounds—M830, M830A1, M908 and M1028—with a round that not only retains performance against the existing target set but adds new capabilities for antipersonnel airburst.

"We're finishing up on design work right now and then going right into qualification," Aakhus said. "That looks like it will be completed over the next several months, and we are looking to go into low-rate production in the next year."

Another "future" tank projectile, which he dubbed "the next-generation kinetic energy round," is the M829A4. Again, that's in its second production year and hardly a "far future" concept.

When pushed further toward the future, Aakhus pointed to significant potential in technologies like the advancement of forward-looking infrared and acknowledged multiple "extended line of sight activities underway" to extend the range of the AMP type of capability and also include "hard-target armored defeat out at range."

'Quantum Technologies'

John Baylouny, executive vice president and chief operating officer for Leonardo DRS, was able to offer a look a few years further out, pointing to some of his company's efforts in so-called quantum technologies.

Noting that "quantum can be broken up into a lot of different areas," Baylouny said, "A lot of people are putting time and energy into quantum computing, because of the promise of breaking codes and things like that. We don't. We're putting our energy into quantum sensing and working to apply quantum sensing theory to the tough defensive security problems that we have today."

He cited a number of university partners in the company's efforts to apply the technology, focusing the combined expertise on a subset of quantum sensing known as weak measurement amplification.

LIDAR and communication systems. They all try to find a signal in a heavy background. And weak measurement amplification allows you to get more signal-to-noise ratio than you thought was possible by using quantum techniques."

The company has focused both internally funded and government-funded efforts on the problem, citing progress in validating, extending and then applying the theory, he said.

"We believe that this work will eventually inflect and disrupt a number of areas of signal detection: LIDAR, radar, communications and navigation systems. All these systems will be influenced by quantum-sensing techniques, probably in the next 10 years," he said.

Soldiers' Future Vision

The industry view of "future technologies" seems to fall in the same 10-year window as the Army's 2028 Multi-Domain Operations vision.

At the risk of entering the "too futuristic" minefield, the Army solicits more futuristic ideas directly from soldiers through its Soldier Innovation Workshops, conducted at the CCDC Ground Vehicle Systems Center.

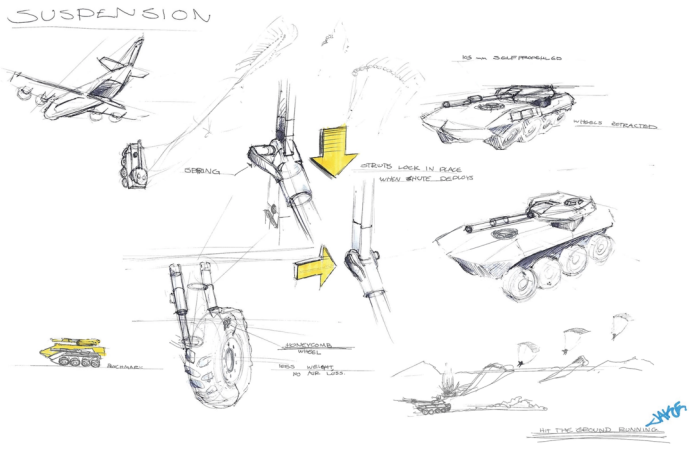
"The Soldier Innovation Workshops are events that we hold here two or three times a year," said Dave Centeno, who leads the workshops. "They are our attempt to get ideas directly from soldiers, the users in the field, on what are some of the capabilities that they would like to see in the future, and by future we are talking five years to 20 years out.

"These ideas range from subsystem components to full system-level thoughts or ideas," he continued. "What can the Army provide them to make their job easier and to make their mission execution more effective?"

Program planners coordinate with units across the active Army, as well as National Guard and Army Reserve units, to get participants to provide their perspective on a limited problem or a certain gap or objective. The soldiers are teamed with industrial designers and artists to obtain a graphical depiction of the ideas that emerge. Past workshops have produced ideas ranging from specialized wheels that fold away under a vehicle, to see-through armor systems that allow a fighting vehicle crew to see exactly what's happening outside of their vehicle, Centeno said.

"Once we get those products out of that interaction, it gives us a better idea of what the soldiers were thinking, and it gives us a product you can now work with and start shaping and moving in a virtual environment," he said.

Some of the products then move beyond paper into 3D models.



Graphic artists translate soldiers' ideas for future tanks and other innovations into images.

based on some level of feedback from the users. And I think in that sense, the Soldier Innovation Workshops could help inform and shape some of the features on future systems or platforms," Centeno said.

Significantly, Centeno said plans are underway to direct one of the workshops toward elements of a "future tank."

Science Fiction Future?

If the Soldier Innovation Workshops double the future vision to 20 years, the most obvious step after that would be the Defense Advanced Research Projects Agency. Proof that DARPA is not afraid to go "too futuristic" can be found in the agency's June 2018 Tactical Technology Office Broad Agency Announcement: Disruptive Capabilities for Future Warfare.

Under "Ground Systems," the Tactical Technology Office announcement seeks to "break the symmetry of ground combat through the application of numerous autonomous agents, as bulwarks for our service men and women exposed to high-casualty risks across the spectrum of conflict. Threats in this domain are often met with marginal technical evolution, meant to re-establish equilibrium. TTO is interested in generating a more permanent asymmetry to better safeguard personnel while increasing lethality, reach and situational awareness in combat operations."

Among potential technical thrusts identified is: "Innovation in hypermobility and hyper lethality for small units, or even individual warfighters, to enable undeterrable presence, anywhere (i.e., Starship Troopers)."

There it is. DARPA said it. *Starship Troopers*. Published in 1959, the book introduced a far-futuristic "mobile infantry" deploying from space transport ships in "dropships," more akin to armored personnel carriers (APCs) than tanks.

When it was published, the book's dropships were being crafted on paper as the Army was rapidly transitioning three generations of APCs from the M75 to the M59 to the original gasoline-powered M113. However, the timing of the APCs and the book's publication may have been merely coincidental. The fact is that the author, Robert Heinlein, was a 1929 graduate of the U.S. Naval Academy who served as a naval officer in the early 1930s. In their *Starship Troopers* applications, the futuristic dropships look quite a bit like the early models of Landing Vehicles, Tracked, that the Marine Corps began to explore in the late 1930s.

Science fiction origins aside, futuristic ideas can come from many sources. Perhaps some of those ideas are with a soldier about to undertake an innovation workshop. Or perhaps they are on the mind of a cadet at the U.S. Military Academy. Putting aside the risk of "too wild" or "too futuristic," the fact remains: "Every one of you is part of our evolution and the construction of the future force," according to outgoing Army Chief of Staff Gen. Mark A. Milley in the foreword to the U.S. Army Training and Doctrine Command Pamphlet 525-3-1: The U.S. Army in Multi-Domain Operations 2028.

Abrams tank Modernization future

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Cluebat Vanexodar • 2 years ago

Hammer's Slammers.

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StevenRobert ➚ Cluebat Vanexodar • 2 years ago

My thought exactly. Iridium armor, lift fan propulsion, fusion power, e directed weapons, and very gender neutral, in that women are often most lethal combatants and fit perfectly into military combat comma structure.

2 • Reply • Share ›

Yeet ➚ StevenRobert • 10 months ago

Fusion power. Someday...

Also, current (and near future) directed energy weapons just have the shock value of a 120mm shell. I think a better optio would be an extensive cyberwarfare suite.

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MilitaryVeteran • 2 years ago

Very tempting to integrate a six-sided sensor package for near & far detecti identification, and tracking - tied to on-board computer and networked to "h command. Indeed, potential today for link to satellite network transform the tactical combat vehicle into a "strategic asset." Of course, tying the weapon systems to the on-board computer with enhanced sensor package brings fo all sorts of interesting command & control issues . . . for the fully automatec Robo-Tank? These various technologies already exist. Major point-of-failure cyber security as was the case of the US Lockheed Martin RQ-170 Sentine by the Iranians on 5 December 2011.

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LazyReader • a year ago

Barrel wheels.....

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BMitchell • 2 years ago

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Exo92Seven • 2 years ago • edited

The sketches here seem to resemble future concepts around the Mobile Protected Firepower Light Tank (MPF), the Future Scout Vehicle, or an Airb Light Tank, and not the Future Main Battle Tank (FMBT), meaning the draw here are too "light" for a heavy tank. As such, I'm kind of wondering the vali the sketches matching with the topic of the Next-Gen 2028 Tank article. So handholds on a FMBT Next After Next Generation Tank...seriously? Since v did soldiers ride alongside a Main Battle Tank like S.W.A.T. hanging onto th sideboards of an armored truck? And take a look at the gun text...25mm to 70mm? That is IFV armament. Tanks have 105mm to 120mm and maybe i future 140mm cannon.

If you search the Internet for Sci-Fi tanks and FMBT concepts, there are ma awesomely cool concept art dating back years to decades that resemble fu heavy tanks with great concepts. I would love to see another expanded anc depth article on this topic because none of the line art drawings portrayed h match the title of the article. None of the art shown here is as big as a M1 Abrams, which sure isn't HMMWV size. I do question if the U.S. Army fulfill author's Next Generation Main Battle Tank of the Future assignment and di give him something else. We're talking about replacing the M1A2 Abrams M and not some futuristic Airborne Light Tank or Light Armored Scout or Fire Support Vehicle.

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Exo92Seven ➚ Exo92Seven • 2 years ago • edited

To add to my above post...

Similar articles to M1A2 Abrams upgrades in other Defense blogs a generating quite a debate and discussion on the internet and forums Commentators are saying that the US Army isn't experimental enou replacing the M1A2 Abrams with something more extraordinary and revolutionary in design. I somewhat disagree. There has been many Army FMBT studies and programs in the 1990s and 2000s explorin concepts and designs (FMBT and FCS Programs). Some of these d seem to have been copied by foreign nations as the FMBT designs published and printed online or in magazines.

Dismissing the drawings in the article, I think that the M1A2 Abrams replacement needs a totally new turret redesign for the M1A3 or M1 But to replace the M1A2 family?

I strongly believe that in the future, the FMBT of 2028 and beyond s have advanced tank missiles, and I don't mean fired through the gu or infantry-carried ATGMs. Missiles have advanced so much that th

see more

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kevinthepope ➚ Exo92Seven • 10 months ago • edited

but the smaller the missile, the less chance you are going to out a MBT. You need something along the lines of the huge, high speed missiles the US tested out on m113's a decade p ago. Otherwise the reality is only top attack type missiles or shots from the back are going to knock out a MBT and the A proven to handle full sized ATGM's today; In that regard, the seem to be less and less effective once they go up against a competent APS.

• Reply • Share ›

Exo92Seven ➚ kevinthepope • 10 months ago

The US Army had the CKEM missile dating back to th 1990s and somehow just got shelved for no apparent reason. CKEM was tested to Mach 6+, meaning that Army had Hypersonic missiles long before the Russia CKEM's range out to five miles is decent...the issue w be reloading the CKEM launchers.

There are photos of HMMWVs with rooftop CKEM launchers towing trailers of spare CKEMs. Now HMM

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kevinthepope ➚ Exo92Seven • 10 months ago

That was more compact than the ones mounted on th m113's way back when that were tested. Even this or though was supposedly 10 MJ of energy but it could b enhanced with new technology after 20 years have pa Great point Exo92.

Reply • Share ›

Exo92Seven ➚ kevinthepope • 10 months ago

Just an aside, I don't know why some articles on Defe blogs garner (lots of) comments and some good artic don't even get one comment. This has boggled my m years and even the writers and Editors don't know wh Hmmmm...

1 Reply • Share ›

kevinthepope ➚ Exo92Seven • 10 months ago

That is a great point; Sometimes one has to think if it' really a good idea, or weapon, it gets singled out by t and that alone brings in a hive of activity. If it's a dece article with an interesting point but not something that be earth shattering, it stays off radars. Oh well, glad f fighting on some of them either!

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RTColorado • 2 years ago

Where to start, where to start...the term "Arms Race" comes to mind. We liv truly modern age when significant weapon technology changes occur within years and the introduction of new weapon technology alters war-fighting significantly. In our own lifetime we have witnessed the catastrophic effects cost of maintaining "high tech" military, ask the Soviets. The author points c the Abrams will eventually be replaced, but by what ? The answer lies in wh kind of wars do we think we might be fighting in the next thirty years. Until technologies develop that can replace steel and ceramics as armor to provi crew protection, we're pretty much stuck with very large and very heavy tar

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sferrin ➚ RTColorado • 2 years ago

Lemme guess, your solution would be to abandon the field with the guy in the lead? What could possible go wrong?

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RTColorado ➚ sferrin • 2 years ago

Let me reiterate ...the Soviet Union went broke playing "keep up"...when you prepare for every contingency you're bound t something really important and as a very wise person once said..."too little peanutbutter on too much bread does not a P make". You have to make best judgement decisions and plac emphasis were you think best...but you have to make some decisions because there's no such thing as the perfect tank, or airplane that can do it all.

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StevenRobert ➚ RTColorado • 2 years ago

Soviet system collapsed due to their central planning, communist sy The communist party ended up being the corrupt communist system people running things getting Dachas, vacation homes, cars, luxury and people working in factories producing trash that no one wanted, in mass produced housing, and the whole thing apparently held toge by NKVD Secret police and lots and lots of vodka.

The soviet system of arms production did produce some stunning achievements, atomic and hydrogen bombs, ICBM's, Sputnik, man i space, (they were there first), and lots of tanks, and in many ways, t that were superior. T34 during WWII was a deadly tank. Perhaps outgunned by German tanks, but produced in overwhelming numbe used low tech. Tank drivers carried sledge hammers to change gear

So in military applications, low tech in large numbers often overwhel high tech in small numbers.

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Beltway Escapee • 2 years ago

What kills me about articles like this is that it doesn't start with a discussion what the new and old problems or challenges in land and joint warfare are. Where's the discussion of gaining access under contested conditions, and armored units and their log support today have major problems (and opport costs) in establishing and then fighting from a lodgment under A2/AD condi which are the very high-end scenarios that justify their budgets? How to pro meaningful protection with the proliferation and fast improvement of ATGMs other means to create at least mobility kills on tanks by dismounts and vehi every level? Where's the politically viable prepositioned, dispersed and har stock plan to make tank units at all relevant? Given increasing anti-armor proliferation globally at all levels of warfare, should we be designing comba vehicles to fight and survive in cities, or more to provide support to dismour autonomous systems projecting into cities from the outskirts? Where's the discussion of alternative capabilities that mitigate these threats and offer alternatives to force structure planning and investment to actually challenge deter potential enemies with ground forces? Assuming there's 20 years to address these fundamental and obvious challenges to WAGING WAR (not fighting) is short sighted. Whether it's faulty analysis, traditional culture, yea weeding out the mavericks in uniform or whatever, we need to get real here

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StevenRobert ➚ Beltway Escapee • 2 years ago

These are all relevant criticisms. They presuppose that opposing un willing to play by the rules of warfare, but increasingly they don't. Fighting in cities means house to house, often hand to hand combat

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The Army's 2028 vision proposes 1 million soldiers, half in the Regular Army and half in the National Guard and Reserve. Will the Army make the goal?

Yes

No

Yes but not by 2028

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