



THE IMPERATIVE OF THE ARMY'S OPTIONALLY MANNED FIGHTING VEHICLE

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This whitepaper comes from Rheinmetall and is written by Grant Turnbull

The geopolitical and security landscape has changed dramatically over the last two decades. For most of the 21st century the U.S. military has been in continuous conflict, predominantly fighting counterinsurgency wars in Iraq and Afghanistan. At the same time, countries such as China and Russia have become more assertive on the international stage and have invested heavily in military modernization.

Russia's invasion of Crimea and eastern Ukraine in 2014 signified a return to a great power competition and a breakdown of the traditional rules-based international order. China's aggressive actions in its regional sphere has also contributed to this assessment, as was noted in the Pentagon's 2018 National Defense Strategy (NDS). Russia's "use of

emerging technologies to discredit and subvert democratic processes in Georgia, Crimea, and eastern Ukraine is concern enough, but when coupled with its expanding and modernizing nuclear arsenal the challenge is clear," the document read.

U.S. Army leadership has recognized that near-peer competitors are building forces that could match, or even exceed, some of its own capabilities. "Even in the absence of direct conflict with such states, we should expect to encounter their weapons and systems in the hands of others," added Mark Esper, the then secretary of the Army (now U.S. defense secretary), in testimony before the Senate Armed Services Committee in 2017.

This complex environment is being defined by "rapid technological change" as well as a "rapid dispersion

of technologies", the 2018 strategy read. "To address the scope and pace of our competitors' and adversaries' ambitions and capabilities, we must invest in modernization of key capabilities through sustained, predictable budgets," it added.

This became a critical first step because in this context, many capabilities fielded by the U.S. Army were increasingly seen as obsolete compared to those of the United States' competitors. It was particularly true in the case of the service's vehicles, including the Reagan-era M2 Bradley Infantry Fighting Vehicle (IFV), which would be expected to fight in high-intensity conflicts against a peer threat.

"The U.S. for the last 30 years has had a massive competitive advantage over its adversaries; it now doesn't in

terms of a lot of its core capabilities. If you look at a M2 Bradley, it is obsolete against a [Russian] T-15 for example,” said Jack Watling, a leading land warfare expert at the London-based Royal United Services Institute think tank.

The T-15 is thought to have an unprecedented level of armor protection as well as improved cameras and sensors. Its 57mm cannon far exceeds the capability of the 25mm cannon on the United States’ M2.

Despite the Bradley’s shortfalls, soldiers and officers praised its performance in 1991’s Operation Desert Storm and 2003’s Operation Iraqi Freedom, particularly during the conventional stages of the conflict. However, the vehicle’s vulnerabilities were clear during the insurgent phase of the Iraq War, with several dozen hulls lost to IEDs and other weapons.

The return of “heel-to-toe” rotational Armored Brigade Combat Teams (ABCTs) - made up of M1A2 tanks, M2 Bradley vehicles and M109 howitzers – to bolster US Army Europe (USAEUR)’s Operation Atlantic Resolve mission in 2017 highlighted the return to large, heavily armored combat formations necessary for confronting a near peer adversary. It also revealed the need for modernization to address eroding overmatch particularly against Russian armored force capabilities.

“I think the Bradley at that time was just about maxed out on what it could do,” said Ben Hodges, a retired U.S. Army lieutenant general and the commander of USAEUR from 2014 to 2017. He said the Bradley lacked space for a full squad and the power required for multiple C4I systems including networking. “Which is partly why I liked the Stryker so much, not only did it carry a lot of infantry in the back and

you could mount different weapon systems on it, but it could carry the network.”

Lacking a replacement, the Bradley underwent several upgrades since its initial fielding in the 1980s. The latest of these was the A4 upgrade that improved primarily its mobility and to a lesser extent its survivability.

“That modernization was very focused and limited within the confines of the physical architecture of the Bradley,” said Rick Burnnett, a former U.S. Army Bradley commander and an experienced industry program manager who worked on Bradley programs for 15 years. “That’s the challenge that the U.S. Army is facing, and any military that is operating a legacy combat vehicle, you get to a certain point where it has reached the end of its life and additional modernization to keep pace with the threats simply are not fiscally responsible or, in many cases, possible.”

By the late 2010s, the Bradley could no longer integrate new technologies for future battles, especially elements that required high levels of electrical power such as C4I equipment, Active Protection Systems (APS) and Electronic Protection systems such as IED jammers.

Plans for an A5 variant – which Army planners had envisaged to prepare the M2 for improved sights and fire controls – were shelved.

“The Army knows they need to replace the Bradley given the threat environment,” said Burnnett, who is now program director at American Rheinmetall Vehicles. “They are in a tough place; they have soldiers that are using the Bradley today, so you’ve got to keep investing in that. But at the same time, those dollars, would they

be better spent on a new vehicle that can deliver superior capabilities now and also be much better prepared to rapidly integrate emerging new technologies in the future?”

Today, the Army has decided that to keep up with threats from near-peer competitors, a more effective investment would be to begin fielding a new vehicle and limit any future Bradley upgrades. “It is the Army’s intention not merely to make incremental change, but a transformational change in our IFV to ensure overmatch against any adversary,” said Brig. Gen. Ross Coffman, director of the Next Generation Combat Vehicles Cross Functional Team (CFT).

A new beginning

The start of a Bradley replacement effort, initially called the Next-Generation Combat Vehicle (NGCV), coincided with the establishment of the Army Futures Command (AFC) in 2018 as well as the creation of the Army’s new Multi-Domain Operations (MDO) concept.

Futures Command represented one of the most significant organizational reforms for the service since the 1970s and consolidated the Army’s modernization efforts under one roof. CFTs at Futures Command are responsible for areas including technical experimentation and demonstrations, which are carried out in conjunction with industry and commercial partners.

Leaders there want to ensure that solutions are mature before a program of record begins.

Today, replacement of the Bradley IFV is known as the Optionally Manned Fighting Vehicle (OMFV), which falls under a wider NGCV “family of

vehicles.” This includes manned and unmanned vehicles including the OMFV, the Armored Multipurpose Vehicle (AMPV), Mobile Protected Firepower, the Robotic Combat Vehicle, and a future M1 Abrams replacement known as the Decisive Lethality Platform.

“The OMFV will serve as the Army’s IFV tasked to maneuver through the enemy’s disruption zone and deliver soldiers to their dismount point unharmed,” explained Coffman. “The OMFV will provide direct fire support to soldiers by detecting and destroying targets at a range beyond the enemy’s capability.”

The new vehicle is expected to transform how soldiers and squads accomplish their missions and serve as a “lethal node” in the wider ABCT, working alongside the M1 Abrams Main Battle Tank and other elements. In short, it must be an effective 21st century vehicle and it must be acquired in a 21st century way.

The need for rapid acquisition

The U.S. Army’s initial approach to the Operationally Manned Fighting Vehicle was to attempt to field a new IFV capability “under a significantly reduced timeline, as compared to traditional acquisition efforts,” as was set out in a request for proposal in March last year.

Rapid acquisition was key as the Army raced to keep ahead of peer competitors such as Russia and China, and service leaders recognized that a traditional acquisition approach – potentially lasting decades – would not suffice.

Instead, the Army elected to use a non-traditional contracting method known as middle tier acquisition (Section 804) to streamline and ultimately accelerate the testing and fielding of

prototypes. This approach – which exempts programs from existing DoD acquisition policies – has also been used on other key programs under Future Command’s six modernization priorities, such as the Extended Range Cannon Artillery and the Next Generation Squad Weapon.

The plan for the original program was to enter an engineering and manufacturing development phase with two mature designs. In theory, this would negate the need for a technical development phase that could take as long as three years. The Army was scheduled to award two vendors firm-fixed-price development contracts for the rapid prototyping effort in March 2020. Then, each vendor would manufacture 14 vehicle prototypes, with one contractor eventually selected for OMFV production and a fielding date set for 2026.

This rapid prototyping strategy proved challenging for industry, particularly when it came to sharing the cost burden of development efforts and with meeting the service’s timelines and requirements.

Many companies recognized they could not meet the requirements set out and simply chose not to compete. This lack of entrants was not acceptable, especially to Congress. Those who give the Army solutions still presented shortfalls against the Army’s expectations. As a result, in January 2020 the service canceled this initial effort, but not the program.

“The Army asked for a great deal of capability on a very aggressive schedule,” said Bruce Jette, the assistant secretary of the Army for acquisition, logistics and technology. “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.”

Ensuring success

This year, the U.S. Army reset the OMFV program and the service re-engaged with industry partners to determine the best strategy and to introduce robust competition once again.

“The most prudent means of ensuring long-term programmatic success is to get this multi-billion-dollar effort correct,” said Gen. John M. Murray, the head of Army Futures Command. “We are going to take what we have learned and apply it to the OMFV program to develop our path and build a healthy level of competition back into the program.”

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Head of Army Futures Command*

Speaking in March, Army Chief of Staff Gen. James C. McConville said the Army will now give industry “key characteristics” for the OFMV, rather than constraining the design and setting requirements that caused confusion last time around. “We don’t want to get into our requirements until



we actually see what the prototype is going to be,” he explained.

This new approach is taking elements of the original OMFV strategy, but also reintroduces elements of a traditional acquisition program to ensure areas such as risk, cost and maturity are managed properly. In the near term, it will focus more on digital designs, rather than building a physical vehicle, which was a hurdle for industry in the first OMFV effort.

For example, while Rheinmetall has a physical asset in its KF-41 Lynx vehicle, the company will rely on modeling and simulation tools to further adapt and modify that design as a way to meet Army requirements. They will also use digital designs in what is known as Computer Assisted Virtual Environments, or CAVE, where soldiers can virtually train on the vehicle and carry out tasks such as replacing a powerpack.

Understandably, the new OMFV strategy has been altered by the ongoing COVID-19 pandemic. A face-to-face industry day to discuss the new strategy planned for March 2020

was canceled as many U.S. states imposed “stay-at-home” orders, and international travel came to a standstill.

In its place, the service released an “Industry Day Narrative” document that outlined the revised approach for the OMFV program. That document set out a new five-phased approach focusing on “encouraging innovation, maximizing competition, and producing a vehicle that will dominate cross-domain maneuver in Multi-Domain Operations”, said Maj. Gen. Brian Cummings, Program Executive Officer, Ground Combat Systems.

The phases are as follows:

- **Phase 1:** Develop and refine OMFV acquisition and contracting strategies
- **Phase 2:** Preliminary design (culminating in a preliminary design review)
- **Phase 3:** Detailed design (culminating in a critical design review)
- **Phase 4:** Prototype build and test
- **Phase 5:** Production and fielding

Here, the Army highlighted how it would approach the requirements development process by “broadly refining the desired characteristics.” This runs parallel to “an iterative, ongoing dialogue with industry to understand how industry intends to approach designing and developing the OMFV, as well as what is in the realm of the possible”.

“We recognize the importance of 8 accurately defining the required set of capabilities without over constraining the design,” said Coffman. “Everything we are doing now with industry will help ensure the Army gets the characteristics right up front to properly inform the requirements that will be set in the future.”

The industry day document also highlighted how the first phase will examine ways to reduce foreign barriers to entry; identify pathways to integrate “relevant but immature technologies”; and establish the overall OMFV analytical framework to verify vendor design compliance for use during phase 2.

For this phase, the Army intends to

utilize emerging technologies such as virtual reality, as well as modelling and simulation tools, which will ensure that preliminary digital designs are operationally suitable and technically achievable.

The milestone for phase 2 is a preliminary design review, which will confirm two elements: 1) that the program has sufficient maturity to go to the next phase; and 2) that the OMFV contract specifications are technically achievable on cost, performance and schedule.

“The digital design approach and PDR checkpoint is going to give the Army a pretty good idea of the vehicle capabilities that each offeror is presenting, including what is the cost, what is the risk, and what is the payoff for the program,” Burnett said. “That will be helpful. They are setting up the program for success.”

Phase 2 will also include two “soldier touchpoints”, which are becoming a common feature for new Army programs. This technique allows frontline troops that have experienced combat to provide valuable feedback on proposed designs. By the end of phase 2 and as part of the transition into phase 3, the Army plans to downselect to three vendors as part of a full and open competition.

Phase 3 will prepare vendors to go into building a prototype and will include a critical design review, which ensures that designs are adequate to move into fabrication, system integration, demonstration and test. This will also ensure that the designs can meet stated performance requirements within budget, schedule, and risk parameters.

By Phase 4 and completion of the critical design review, which is currently scheduled for fiscal

year 2024, the remaining vendors (potentially all three) will build and deliver prototypes based on their designs. Those contracts associated with the third and fourth phases are expected to include an option for low-rate initial production (which validates manufacturing processes and includes initial operational test and evaluation), which will be awarded to one vendor around fiscal year 2027.

Plans call for the first unit to be equipped with the OMFV in the fourth quarter of fiscal year 2028.

Attributes of a new vehicle

For now, it appears the priority for a new vehicle is survivability. This takes precedent over attributes such as mobility, growth, lethality and weight. In contrast to the previous OMFV strategy, the Army documents state the service is not quantifying or prescribing critical levels of performance in these areas, where possible, and there is currently not a stated requirement for two to fit into a C-17 as before – a requirement that was in clear friction with the need for high levels of survivability, which drive up weight. In July, the Army released a draft request for proposal (RFP) for the preliminary digital design phase, which forms part of phase 1 of the new OMFV phased approach. After considering industry feedback, a final solicitation is expected to be released by the end of 2020, which will then see up to five contractors chosen around the fourth quarter of fiscal year 2021 to execute their preliminary digital designs as part of Phase 2.

“The OMFV preliminary digital design RFP is not focused on a particular capability improvement over the current force, but is really focused on providing industry as much trade space as possible to be innovative,” said Coffman.

He added: “To ensure the OMFV has that ability to incorporate future capabilities, the Army is evaluating offerors Modular Open Systems Approach (MOSA) concept as a criteria in source selection for preliminary digital design contract award. During contract execution, the Army is requiring the development and adherence to the contractor’s Open Systems Management Plan (OSMP).” The heavy emphasis on MOSA will support the “rapid and affordable” insertion and refreshment of technology through modular design, the use of open standards and open interfaces, the Army stated. This would include new ways to detect, sense, collect and process data.

In the draft solicitation, the Army laid out its evaluation criteria for preliminary designs, which included: 1) design approach, 2) performance, 3) price, and 4) small business participation. As part of the design approach, the Army has highlighted growth, a modular open systems approach and software development as being key subfactors. For the vehicle’s performance criteria, the Army has singled out survivability, mobility and lethality as key subfactors: “Survivability is more important than Mobility which is significantly more important than Lethality,” the document read.

The lack of detailed requirements means industry can be flexible in their design and this will, the Army hopes, open up competition to a number of industry players.

Vendors will demonstrate how they can achieve the Army’s mandatory characteristics while also showing they can trade off those requirements that are not critical. In the digital design phase, the government wants to understand how prime contractors are intending to reach these goals, but also understand the trade space and why

some non-mandatory requirements cannot be met. For example, if one vendor cannot provide all the capabilities the Army wants, how can they create a mix that will work best for soldiers on the battlefield?

Tradeoffs are almost certain, especially around the vehicle triad of protection, mobility and firepower. For instance, a vehicle with high protection levels will of course increase survivability for crews, but it will be more difficult to deploy by air owing to its weight and size. "You have to make a choice, you either have casualties [because of lack of protection], or casualties for showing up late," Watling said.

Furthermore, any new vehicle will need to include the space and power to add new emerging technologies. It also must have the open systems architecture to make integration easier. This is especially true as the Army accelerates its I shift to multi-domain operations and builds capabilities to integrate battlefield capabilities across air, land, sea, space and cyber. Here, service leaders want a web of sensors to share information quickly and to feeding information to the right shooter, at the right time in a tight kill chain. The Army's next-generation combat vehicle must be capable

of being an important part of such a system. "The ability to converge effects across all five warfighting domains -- we're really taking that tenet and putting it together in the dirt, live and bringing multiple things together. The key thing here is being able to act faster than any opponent in the future," Murray said. Former theatre commanders such as Hodges, recognize a new vehicle will integrate new technologies that can enable battlefield success. For example, helmet-mounted displays for vehicle crew members that allow them to "see through" the vehicle while under armor could be a potential game-changer for situational awareness and safety on the OMFV. Such technology will likely coincide with a significant upgrade of vehicle optics utilizing 3rd Generation FLIR and advanced weapon systems, which will allow the crew to detect and neutralize threats from longer distances and outside the range of enemy weapon systems. Having a vehicle that can grow as the technology does is an important part of the OMFV program given the limitations of the Bradley.

While it is still not a firm requirement for the OMFV, the U.S. Army is continuing to fund the development of the advanced XM913 50 x 228

mm cannon. The cannon forms part of the wider Advanced Lethality and Accuracy System for Medium Caliber (ALAS-MC), which also includes new types of ammunition and an updated fire control system to maximize stowed kills and reduce engagement times compared with the Bradley's legacy 25 x 137 mm M242 cannon.

The Army's new plan for OMFV increases the likelihood it will finally have the critically needed IFV replacement it has long sought and desperately needs.

As of fall 2020, it appears the M2 Bradley's replacement is back on track. While the program reset has pushed the new IFV's fielding date back by at least two years, the new phased approach for the OMFV program is likely to ensure robust and healthy competition going forward. In so doing, the Army can expect to procure a highly optimized platform that is a clear transformational upgrade from maxed-out the M2 Bradley upon fielding and one that will restore overmatch against near-peer threats on the battlefield and then sustain it for decades to come, not least by having the capability to rapidly integrate new technologies emerging every year.

About Rheinmetall

American Rheinmetall Defense (ARD), headquartered in Reston, VA, in concert with its three specialized US subsidiaries delivers world class capabilities to the US military in the areas of medium and large caliber munitions, soldier lethality, and next-generation combat vehicles. ARD is a subsidiary of global defense leader Rheinmetall Defence.

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