

Thoughts on PC20: Project Convergence History & Way Forward

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When General John M. Murray, Commander Army Futures Command, stated that Project Convergence (PC) ¹ is – other than current combat operations – the “most important thing happening in the Army right now” at a roundtable discussion on 23 September 2020, both Secretary of the Army Ryan D. McCarthy and Army Chief of Staff, General James C. McConville nodded in agreement. Project Convergence (PC) is not only changing the way the Army acquires new technology; it is changing the Army itself.

What is PC? It is rooted in an overarching requirement to reduce the time needed in combat decision-cycles. PC is central to the Army’s goal of becoming Multi-Domain Operations (MDO)-capable by 2028 and MDO-ready by 2035. PC represents an opportunity to achieve transformational change to the way the Army operates. The ability to synchronize synergistic effects from all WfF across all domains will allow the Army to realize the MDO tenet of Convergence. While PC is obviously a focus on technology, that cannot be fully realized without an understanding that it is the people and organizations that have contributed to its success.

Born of a brainstorming session at the Next Generational Combat Vehicles Cross Functional Team (NGCV CFT), PC is an ongoing Campaign of Learning that brings together new and developing technology from across the Army enterprise. Experimentation events are held annually to converge the latest technology development efforts across the Army, with Joint and Allied participation, in order to better inform those individual efforts within a complex and demanding operational experiment, similar to the operational environment of the future.

PC20 culminated in a 6-week experiment of technologies at the Yuma Proving Ground (YPG) in Arizona. YPG was specifically selected for its harsh conditions, which offered a challenging environment to experiment with new technologies. The final event of PC20 was a demonstration of the key experiments conducted at YPG for Senior Leaders from the Army, Joint Service, and select Allied partners to witness on September 21 and 23, 2020.



The U.S. Army autonomous weapons system known as "Origin," maneuvers through desert terrain as weapons testing commences during Project Convergence 20, at Yuma Proving Ground, Arizona, August 25, 2020. Photo by SPC Carlos Cuebas Fantauzzi, Army Futures Command.

History of Project Convergence

In January 2019, Brigadier General (BG) Ross Coffman, Director of the NGCV CFT, gathered his staff and outlined his vision of future combat vehicles. Specifically, BG Coffman envisioned commanders, whether in tanks or in command posts, having immediate, digital access to all fires available to them -- and targets automatically populated on a common operating picture for the commander to action against. From the beginning, it was clear that the use of Artificial Intelligence (AI) and Machine Learning were going to be the key toward augmenting the largely manual processes. The NGCV CFT's G3 Operations Officer, and G5 Strategic Plans Officer, assigned to take the lead and developed Project Quarterback².

The task consisted of four problems, which eventually became Quarterback's four lines of effort (LOEs):

1. AI-enabled Aided Target Detection, Recognition (AiDTR) that geo-locates and identifies the enemy
2. Tactical Behaviors inherent within their Autonomy/AI systems that enables them to operate effectively in the environment in collaboration with manned systems
3. AI Decision Support Agent that analyzes the data and cues sensors & effectors, accounts for the operational plan and guidance, and offers options for execution
4. Synchronized Data Management strategy that enables access to the appropriate data, in the proper format, to enable the other three sub-problems

These LOEs coalesced by May 2019 and the team moved toward finding solutions. The NGCV CFT sponsored an AI-symposium and advertised the forum across the Department of Defense (DoD) searching for any organization working against these problems. Any individual or entity anywhere in the DoD who had any equities that might align with one or more of the four LOEs were invited. Intentionally, little to no vetting was done on those organizations wishing to send a representative. "To us, it didn't matter how close the tie was but if the offeror thought it was close, we brought them in," Mr. Horning recalled.

For a week at Ft. Belvoir in July 2019, each attending organization presented their relevant projects to the entire audience. Technologies and programs were organized and prioritized based on relevance to Quarterback's four objectives. In some cases, the team found many sister organizations were developing very similar capabilities. In other cases, no organization was working in a specific problem area, creating a potential gap in Army capabilities.

Closing the symposium, four LOE Leads were selected to lead the established LOEs. The leads were tasked to look objectively across their LOE areas to find ways to integrate and synchronize related efforts, regardless of the project's home organization; and to evaluate commercial or contracted organizations with similar capabilities, bringing them onto the team if warranted. The leads' role was to cross cut all Science & Technology (S&T) portfolios, regardless of project home organization or DoD branch, to find the best in breed of any specific capability within their lane. A series of experiments, called Technology Rodeos, were held to experiment with and compare similar capabilities, regardless of where they came from, to find the best solution. From there, related technologies began integration into a single system.

All efforts were challenged with a firm timeline to hold a large-scale experiment and demonstration within one year to benchmark where the Army stands. The threshold goal of the demonstration was to demonstrate the ability to use two sensors to identify two targets and to task two shooters to destroy both targets simultaneously. "Two sensors, two targets, two shooters." The team was directed to focus on this simple objective then stretch the objectives from there.

As Quarterback began to mature, more organizations added complementary capabilities to the effort:

- The Future Vertical Lift CFT added developing aviation concepts
- The Long Range Precision Fires CFT added the artillery component
- Assured Positioning Navigation and Timing CFT brought in key sensor-to-shooter assets.

Ultimately, Quarterback became Project Convergence and the pacing effort for Army Futures Command that it is today.

Project Convergence 20 Distinctives

PC20 was wildly successful in large part because of the talented individuals from across the Army enterprise attacking the problem. The team included Soldiers and Army Civilians from multiple fields and disciplines, from seasoned Master Gunners to Scientists. The team quickly meshed in Yuma, where the sum of the whole was truly greater than the parts.

Even with the right team in place, however, PC20 would not have been successful without adherence to the following foundational tenets:

Experimentation Strategy

1. The PC20 mantra was to "experiment early and often" in order to synchronize and inform all efforts within the project. Experimentation is a significant portion of the campaign of learning, with major experiments planned annually going forward to culminate the year's efforts and inform the Campaign of Learning. Major demonstrations and experiments will include capabilities from across the Army and are planned in Q4 of each fiscal year.
2. Experiments will incorporate an operational scenario against a near-peer adversary in contested environments to ensure PC remains relevant to the future operational environment and to convey the tactical relevance of PC to future senior decision makers.

Use of Best Solutions

1. All potential performers are brought together through Rodeo events, allowing qualified and quantified comparisons between each potential solution to a specific problem. All potential solutions are treated equally regardless of source: Army research laboratories, Science & Technology centers, other DoD entities, traditional Original Equipment Manufacturers, Universities, and non-traditional contractors.
2. PC must continue to consider multiple potential solutions, especially in immature areas, as a way to mitigate risk and to ensure innovative “best athlete” solutions are developed. A broad field of contractor and U.S. Government solutions may be culled through an initial rodeo to a short list of potential high performing solutions for continued development and later selection to one or two specific solutions.

Campaign of Learning

1. PC must be structured around a campaign of learning, designed to identify needs early, iterate solutions against the needs often, and experiment with the operational utility of those solutions in an appropriate environment. Experimentation must be structured to produce data that can be analyzed, cataloged, and learned from in future iterations of solutions to gaps.
2. “What is the problem to solve, what do we currently know, what do we currently think we know, and what do we not know? Answers focus collection, investigation, experimentation, exercises and demonstrations to address these information gaps.” -GEN Mike Murray, CG, AFC

Firestorm & Network

While numerous systems and organizations were employed in PC20, two systems deserve special attention. The first was the data network that provided the backbone through which all other systems were connected. The second was the FIRESTORM³ artificial intelligence decision agent.

The network at PC20, managed by the Network CFT, took in data from all sensors and quickly moved it to all decision makers. PC20 showed that while the network needed to be more robust, it could provide the critical link between sensors in all domains, artificial intelligence, commanders and, ultimately, the shooters in all domains.

FIRESTORM is the brain at the center of all systems. An AI agent that takes the cognitive load off the humans who are ultimately making the fire/no-fire decision. FIRESTORM can process in tenths of seconds what a human might otherwise require tens of minutes to process. To be sure, a human always makes the ultimate decision to fire, but he or she does so armed with recommendations made near instantly by FIRESTORM. While this technology remains relatively nascent, it shows clear promise for the command and control needs of the Joint Force in the near future. Development of FIRESTORM system will be under the guidance of Combat Capabilities Development Command Armaments Center at Picatinny Arsenal, New Jersey.

Final Observations

Nearly 1,000 people participated in some aspect of the PC experiment at Yuma Proving Ground, 10 August to 25 September 2020. Not every round landed on target, not every aircraft launched on time and not every sensor communicated data back to the network. Those were not the goals of this experiment. The goal was to learn, making mistakes was acceptable, and capturing lessons was important. The event lived up to the Army's strategy of experimenting early and often. PC20 allowed the Army to learn where the gaps existed. The Army learned which systems needed to be more robust and which systems are nearly ready to go into the field. Up and down the line came the reminder, if it cannot be put into the hands of our Soldiers (Marines, Airmen and Sailors) in a timely fashion, none of this technology matters. It was incredibly empowering to see an idea formed from a small team brainstorming session gain traction so quickly and with such vigor that it reverberates, causing positive change throughout the entire Army enterprise in less than 18 months.

PC 20 changed from a one-off experiment to the seminal event of a heretofore unrealized major modernization effort. The epiphany that resulted in Project Convergence will ensure the Army remains the world's preeminent, most-technologically advanced and lethal fighting force.

Endnotes:

1. Project Convergence is an Army Campaign of learning, aggressively pursuing artificial intelligence with a machine learning-enabled battlefield management system. Because whoever can see, understand, and act first will win.
2. Project Quarterback transitioned into Project Convergence; it is now part of Project Convergence as a new Army effort to accelerate tank warfare by synchronizing battlefield data with the aid of artificial intelligence.
3. FIRESTORM (FIRes Synchronization To Optimize Responses in MDO) is a computer brain that recommends the best shooter, updates the common operating picture with the current enemy and friendly situation, and engages the best effects to eliminate the enemy on the battlefield.