

The Outpost

U.S. ARMY YUMA PROVING GROUND, YUMA, ARIZONA 85365

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YPG supports advanced aviation testing during Project Convergence

By Mark Schauer

Project Convergence, the Army's campaign of learning, has returned to U.S. Army Yuma Proving Ground (YPG) to test a vast and astonishing array of new technology.

For the first time ever, every branch of the United States' armed forces are testing their sensor-to-sensor capabilities in tandem.

In addition to representation from all branches of the military, this year's iteration features all eight of the Army Futures Command's cross-functional teams (CFTs). There is also a dramatically larger Soldier presence.

Among these CFTs is Future Vertical Lift (FVL), which is aggressively testing virtually every

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U.S. Army PFC Terry Hollywood, assigned to 224th Military Intelligence Battalion, conducts maintenance on a Grey Eagle in preparation for Project Convergence at Yuma Proving Ground, Ariz. (Photo by SGT Marita Schwab)

Army team blasts to record velocities from an Extended Range Cannon Artillery Test Bed

By Ana Henderson

The Extended Range Cannon Artillery (ERCA) weapon system has made headlines in recent years for its ability — as its name states, to fire at an extended range. Yet in early August the weapon system made history by firing at the highest velocity on record with this program at Yuma Proving Ground (YPG).

While shooting far distances is desirable and part of the Army's modernization

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YPG supports Veterans Day Parade



Yuma Proving Ground representatives past and present turned out in force to support American Legion Post #19's annual Veterans Day Parade Oct. 11. YPG Commander Col. Patrick McFall and wife Heidi, Command Sgt. Maj. Herbert Gill, and Soldiers from the Airborne Test Force all participated. Making a special appearance as parade grand marshal was former YPG Commander Ross Poppenberger (bottom right). (Photos by Brandon Mejia and Mark Schauer)



The Outpost

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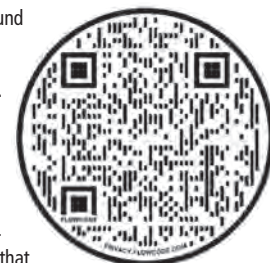
Commander recognizes food service employees

Yuma Proving Ground

(YPG) Commander Col. Patrick McFall and Command Sgt. Maj. Herbert Gill

recognized the hard work and dedication from the YPG Morale, Welfare and Recreation kitchen staff that was responsible for feeding

the more than 1,500 Soldiers that took part in Project Convergence 2021 (PC 21). (Left to right) Chef Edgar Garcia, Cooks Betty Ramirez, William Symons, and Manager Tony Williams pushed out more than 5,000 pounds of food each week for those involved in PC 21. (Photo by Ana Henderson)



Santa's coming to Yuma Proving Ground to deliver gifts on Christmas Eve!

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Rigorous data collection and analysis underpins Army modernization progress

By Maureena Thompson

As it executes Project Convergence 2021 (PC 21), a modernization experiment intended to test the functionality of cutting-edge defense technologies, the U.S. Army is simultaneously working to ensure that vital details of each experiment are rigorously observed, documented and assessed.

The Army is achieving this aim through its PC 21 Data Collection and Analysis Team (DC&A), which is responsible for collecting, harvesting and condensing data related to the experiment, then analyzing, integrating and synthesizing the most pertinent information for onward use.

The team includes members from across Army Futures Command, the lead for PC 21, including from Army Test and Evaluation Command, the Data and Analysis Center, Joint Modernization Command and The Research and Analysis Center, as well as from other parts of the Army. The relatively large footprint of

DC&A — nearly 300 staff located at Yuma Proving Ground (YPG), Ariz., and White Sands Missile Range, N.M.— allows the Army to capture detailed insights on individual experiments as well as draw upon a wide range of technical expertise.

Data collectors and observer-analysts could be on site viewing an exercise or on an aircraft as it operates; they go wherever they are needed to record key information.

Those participating in an experiment evaluation capacity at PC 21 attended an observer-analyst



Project Convergence 21 operations research analysts assist with managing data, supporting analysis and building dashboards and visualizations for enhanced data tracking. (Photo by Pfc. Vincent Levelev)

training academy that was part virtual, part on-site and part on-the-job training to ensure alignment with planned procedures and objectives.

According to members

of DC&A, gathering data is essential to the Army's modernization efforts because it informs next steps and helps clarify what works well and what doesn't.

"There's no use in doing the exercise if we don't capture data from it," said Lt. Col. Chris Collins, deputy team lead for DC&A at PC 21. He explained that data collected will help generate requirements and create further experimentation for Project Convergence 2022.

Collins also stressed the importance of being open to exploring, and sometimes eliminating, multiple options to find the best one for Soldiers.

"Failure is an option, because we ultimately can learn from these failures," Collins said. "As long as we can collect data, it is worth the time and money."

Collins described members of the team as "arbiters of truth" who ask the hard questions about why and how new technologies undergoing assessment will benefit the Army.

"It's not just about the tech in a vacuum," Collins said, explaining that smart application and integration of technology is designed to serve the needs of Soldiers. His team's unique "mix of uniforms and scientists" ensures that all angles are assessed — and documented — to further experimentation lessons learned.

PC21 DC&A execution lead Joseph Cruse, who served in the military for

33 years — including as an enlisted Marine and an Army officer — before transitioning into an Army civilian role, understands that the process of moving from "observation through all the steps to where it actually becomes a finding" takes time, analysis and sometimes multiple iterations of the same exercise.

Cruse sees the long-term aim of DC&A's work as determining how to "use the modern technology, network and all the other command and control systems and make it so you can call upon somebody to provide some effect within seconds."

At PC 21, "different parts of the service are working with each other to establish the communication and show that it can happen," Cruse said.

Daniel Badger, a PC 21 observer-analyst from the Army's Data and Analysis Center, assesses the strengths, weaknesses and operational implications of various technologies undergoing field testing at YPG, and thus far is encouraged by what he has observed.

"The system works," Badger said. "We have a lot of different sensors that are detecting targets, without too many false positives or false negatives. Those targets get passed through multiple systems, through a common data fabric," he explained, "and ultimately it's getting to shooters who are engaging in a timely fashion."

Thomas Baran, a test officer who serves as the aviation team lead for unmanned aerial systems at YPG, is coordinating with PC 21 data collectors to ensure information collected is tailored to end users.

"When it comes down to testing, every bit of data is important," Baran said. "You might not think about it at the time; however, if issues arise, it's super valuable to have the ability of going back and looking at data logs."

Baran said data can provide measurable insights into critical Project Convergence questions such as "was everything done correctly?" and "has anything changed?" to pinpoint issues or failures.

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A return to 'normalcy': how childcare services continue at YPG

By Brandon Mejia

For the last eight months children living on post at Yuma Proving Ground have been reunited in the classroom with their favorite teachers and staff in Child and Youth Services (CYS). COVID-19 shutdowns occurred sporadically throughout most of 2020 impacting School Age Care (SAC), School Age Services (SAS), and the Middle School Teen (MST).

"When the kids were able to come back in the building they just looked older," said Theresa Robinson, the Director for the Child Development Center (CDC). "They have gotten taller, those that were learning how to talk, they were speaking clearly, those that still couldn't walk were running, the teachers were extremely happy to see that."

Prior to COVID-19 there were about 45 kids enrolled at the CDC, which can range in ages from infants to five-year-olds. Robinson said the facility is only seeing about 30 kids. "That has been the norm for about eight months or so."

While there are fewer children, there is also fewer staff. "We have lost staff along the way but not because of

COVID though," Robinson said.

With staff being shorthanded managers have stepped up to take on more responsibilities like watching the children or jumping into the kitchen.

"My assistant director, he has really stepped to the plate, he has been covering the kitchen. He has taken the initiative on his own, and when he sees that somebody is out, he immediately goes into the classroom," Robinson explained. "The staff has been amazing through the whole thing and they still come to work with a smile on their faces."

Melissa Anderson is the Director of Youth Services. They oversee SAC, SAS, and MST. Those include kindergarteners up to 18-year-olds.

Before the pandemic there were 32 kids enrolled with Youth Services (YS). Now, with MST closed due to staffing concerns, there are 13 kids enrolled in YS. However, 15 are registered with MST.

When YS reopened its doors Anderson recalls the youth being relieved for some "normalcy" and to see more of their classmates in person as opposed to virtually.

"Everybody missed each other,



Enjoying the classroom time, two girls put their artistic ability to the test following the reopening of Youth Services during the Summer of 2021.



Kids a part of Youth Services at YPG enjoy the game of air hockey after returning to in-person learning back in October of 2020. (Photos by Ana Henderson)

everyone needed each other," Robinson said.

Amid the shutdowns last year staff would meet every day over the phone to check on everyone, conduct trainings, lesson plan, and take part in team building exercises.

However, nothing felt better than when teachers and staff could reunite with the children. "when they saw each other for the first time it was tears of joy and lots of hugs. It was awesome, it was a beautiful thing to see," Robinson shared.

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TESTING

FROM PAGE 1

facet of the Army's Future Attack Reconnaissance Aircraft (FARA) and FVL, as well as advancing knowledge on electronic warfare. Unmanned aircraft, air to ground missiles, rotary cannons, and all manner of ancillary technologies to expand communications capabilities and Soldier survivability are all being tested simultaneously here.

"There is a lot of learning going on out here over these several weeks," said Jim Thomson, Acting Deputy Director of the FVL CFT. "Yuma Proving Ground is really a unique place to enable us to do this."

YPG's vast size includes nearly 2,000 square miles of restricted airspace. The proving ground's clear, stable air and extremely dry climate combined with an ability to control a large swath of the radio frequency spectrum makes it a desired location for this type of testing. YPG's vast institutional unmanned aerial systems (UAS) and counter-UAS testing knowledge is an added bonus,

as is the presence of a wealth of other infrastructure meant for other sectors of YPG's broad test mission that can be leveraged to support aviation evaluations. YPG is home to things like technical and tactical targets, as well as generator and combined maintenance shops.

"YPG in particular has been an outstanding host," said Lt. Col. Tanner Spry, FVL CFT experimentation planner. "It's a great area based on the distances that exist here to challenge our platforms."

The breadth of equipment tested here over the course of the six-week demonstration is astonishing, and boasts multiple firsts. Testers say this year's demonstration increased their ability to integrate into the joint force and improved the command and control network to extend the range Army aviators can operate in. This was shown multiple times in realistic scenarios in which Soldiers from the Army's 82nd Airborne



One of the more exciting technologies used was Air Launched Effects drones attached to a helicopter or other vehicle that can be an aviator's eyes in an area of interest. These remarkable and low-cost surveillance UAS can also be launched off of light ground vehicles. An A K-1000 ultra-long endurance is pictured in flight. (Photo by Spc. Cody Rich)

conducted simulated air assaults across YPG's vast ranges.

"We'll take a use case and run through multiple iterations to stress and challenge the technologies to make sure they are resilient," said Spry.

One of the more exciting technologies used was Air Launched Effects, drones attached to a helicopter or other vehicle that can be an aviator's eyes in an area of interest. These remarkable and low-cost surveillance UAS can also be launched off of light ground vehicles, but integrating them into aviation platforms is much more complex.

"They've done a tremendous amount of work to get the 'air launched' into the name air launched effect," said Thomson. "But there are a lot of other options, too."

As for the FARA and FVL themselves, multiple other facets are being tested here. A new Gatling-

style 20mm machine gun that could serve as one of the platforms' rotary cannon was integrated into a UH-60 Blackhawk serving as a surrogate and fired in flight for the first time here.

"It shoots fast, it shoots well, and it shoots accurately," said Lt. Col. Cameron Keogh, Chief of Flight Test for U.S. Army Combat Capabilities Development Command. "As a previous attack and recon pilot, I like it."

With things like the Gatling-style gun, Artificial Intelligence-aided threat targeting and detection systems, and even the ability to fly autonomously, developers are using a modular systems approach that would enable these things to be used on a variety of aircraft as needed. During PC 21, the testers demonstrated flying a legacy UH-60 completely autonomously.

"We have to be able to demonstrate autonomy in any environment," said

Stuart Young, Defense Advanced Research Projects Agency program manager. "Yuma is a great location to be able to bring all of these different pieces together. We have a lot of flexibility that we don't have in other locations: we have large safety margins and here we have the space we need to conduct all of these firsts safely."

All of these technologies are being refined to prepare for the potential of warfare with a near-peer adversary. As such, the participation of hundreds of Soldiers in PC 21 was useful for testers: Engineers had the opportunity to gain input about systems under test from Soldiers who have operated earlier iterations of the platforms in theater overseas.

"We are leveraging technology to reduce Soldier workload," said Spry. "Sometimes moving yourself out of chaos by being able to operate at greater distances and ranges can give us a strategic advantage."

VELOCITIES

FROM PAGE 1

strategy, firing at a high-velocity is also a vital element to eliminating threats through Multi Domain Transformation, in this case, increasing the range, speed, and convergence of cutting edge technologies.

“We want to get this projectile in the air and to its target as fast as possible because the targets are getting faster,” explains Paul Henderson, lead hypervelocity propulsion engineer with the Combat Capabilities Development Command-Armament Center (DEVCOM-AC).

In general, artillery systems can be more cost efficient compared to using missiles and rockets. An artillery round can potentially complete the same mission at a fraction of the cost.

Henderson led the effort of designing and building the propelling charge for this high-velocity test.

The YPG Ammunition Plant personnel constructed the propelling charge specific to this project based on historical data collected from the DEVCOM-AC team.

Henderson said the team determined that they needed to see what happens to the propellant in the gun during ignition. Since the charge



In early August, the Combat Capabilities Development Command-Armament Center and Yuma Proving Ground team made history by firing at the highest velocity on record with this program at Yuma Proving Ground from an Extended Range Artillery Cannon Test Bed. (Photo by Ana Henderson)

is inside the gun chamber when fired and unable to be observed visually, the team developed a ballistic simulator (BSIM) to aid propulsion development and emplaced it at YPG. The BSIM tube is transparent and bursts at a low pressure, but the few milliseconds of video data before it bursts are critical to the design of the propelling charge.

Henderson explained the process.

“We come up with different configurations of the propelling charge, and we fire it in the ballistic simulator and we study the video.

We see the transport phenomenon, we get an idea of the temperature, speed of ignition, the turbulence and we conceptualize how we can

control the burning. Our goal is to have uniform burning to minimize pressure waves which damage the gun and projectile.”

Leading up to gun tests, the team used various ballistic computer simulations to project the outcome based on different configurations. These models help during the developmental stage and also provide insight during test fires.

“We go through iterations, then we fire, then we meet, then we do mathematical modeling, check our predictions, do BSIM work and then fire in the gun again until the loop is complete and we meet our mission objectives,” said Henderson.

All this work is for a propelling charge design with a predictable and optimized pressure profile to enhance the projectiles performance, a key

factor to achieve this is a design that approaches uniform ignition. The ignitor, which is part of the ignition system, is behind the propelling charge, which sits behind the projectile. The force of the propellant gas on the projectile is what causes the round to shoot out of the cannon, when optimized breakthroughs in projectile velocity are achieved.

To develop a projectile for these high velocities, the projectile engineering team used a finite element analysis model. Test and Evaluation Engineer Mike Caulfield explained more about the physics-based model.

“Essentially we are simulating what the forces are behind the projectile, and we can see what the stresses inside the rounds are and see how much deformation may or may not occur.”

During test fires, the YPG team collects data such as high-speed video, pressure, and muzzle velocity. The projectile team monitors the projectiles then compares the data collected at the test site against the data of the model.

“The whole infrastructure of data collection is really critical,” remarked Henderson. He gives much credit to Yuma Proving Ground for the success of this test.

“This could not be done without YPG. Without the test directors, charge builders, gunners, the team, and the creativity and the responsiveness, we wouldn’t be able to do it.”



The data collection is critical in developmental testing. High-speed video technician Chris Conner verifies the setting on the camera to ensure it captures video of the projectile as it exits the cannon. (Photo by Ana Henderson)



This is a look at the view from the ballistic simulator used prior to the high-velocity test. “The ballistic simulator at YPG gives engineers data to design efficient ignition systems,” explains Paul Henderson. (Photo courtesy of Combat Capabilities Development Command-Armament Center)



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Coaches needed as youth sports return at YPG

By Brandon Mejia

After being halted in the beginning of 2020 due to the COVID-19 pandemic, youth sports are returning at Yuma Proving Ground (YPG) and the need for coaches to teach the future generation couldn't be greater.

"We are hoping to have our first season since COVID stopped it," said Melissa Anderson, the Youth Service Director at YPG.

The season that starts in January, kicks off with soccer. Before the pandemic hit about 100 kids from YPG took part in soccer, baseball, basketball, and cheer.

In order to make those sports run efficiently, volunteer coaches are critical, Anderson shared.

Registration is on-going for interested coaches. Those signed up would be good to go for the January – March soccer season. However, Anderson urges it 'sooner rather than later' because of the paperwork and background check required.

"Once they are onboard and trained they can stay on as long as

they keep up with their trainings," Anderson said. "Our hope is they jump from one sport to the next if their schedule allows."

Practices for youth sports take place on-post two days a week. The games, which are usually Saturday mornings, happen at Marine Corps Air Station (MCAS) Yuma thanks to a joint effort to make sports available for children on both installations.

"The benefits are empowering the youth, mentoring youth, assisting them with fundamentals and life skills," said Anderson. "For the coaches themselves, it benefits them as well, by being role models, and benefiting their own self-



Children involved in YPG's Youth Sports Services competed with other soccer leagues at Marine Corps Air Station Yuma. (Loaned photo)

development."

On-top of that, a child's registration is free as long as the parent is a coach. However, being a coach doesn't guarantee you will coach your son's or daughter's team, Anderson explained.

"It might work out that their child is on a team that we need a coach

and they are the coach, but it isn't guaranteed," she said.

If you are interested in coaching a team you can contact Melissa Anderson at Melissa.g.anderson9.naf@mail.mil, or Melissa.g.anderson9.naf@army.mil, or through the YPG Cyss (Youth Service) Facebook page.

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Chaplain's Corner

What's important

Chaplain's Corner
Chaplain Maj.
Jeffrey Crispin



Hello YPG Family, I'm writing the final day of Project Convergence 21 and heading into a long weekend. I imagine that you are like me and my thoughts are turning to the upcoming holiday season. We are being told that gift giving and food and travel, to visit family, are going to cost more this year, which can cause some anxiety.

But our holidays weren't created to cause stress, anxiety, increasing debt, family squabbles, etc. Maybe we have lost our focus on what's important. I think we should be focusing on faith, family, and making memories for the future, even in our "less well off" seasons.

What is the, "reason for the season?" What is truly most important? That can be hard to

answer with competing demands, and even harder if you have immediate family somewhere else. I really like this quote from Albert Einstein.

"It would be possible to describe everything scientifically, but it would make no sense; it would be without meaning, as if you described a Beethoven symphony as a variation of wave pressure."

Sometimes our "logical" approach to holidays and priorities causes us miss out on what is most important. Beauty, being present in the moment with loved ones, giving of yourself by doing something together instead of buying some plastic thing, laughter, caring for others, etc.

Or to say it another way, perhaps the most important things aren't things. It is hard to compare or measure intangibles, but we certainly know if they are missing.

So before you buy stuff and fill your calendar, I want to encourage you to reflect on what is most important this holiday season.

Be an Angel

ASSIST AN "AT NEED" CHILD OF A YPG SOLDIER.

THIS YEAR'S PROGRAM RUNS FROM 1 NOVEMBER - 9 DECEMBER 2021

PICK AN ANGEL FROM ONE OF THE TREES AT

ROC GARDEN CAFE
KFR CAFE
OR THE YPG EXCHANGE

PURCHASE A GIFT FOR THAT GENDER AND AGE OF CHILD AND RETURN ANGEL WITH WRAPPED GIFT TO ONE OF THE LOCATIONS ABOVE OR ACS BY 9 DECEMBER 2021.

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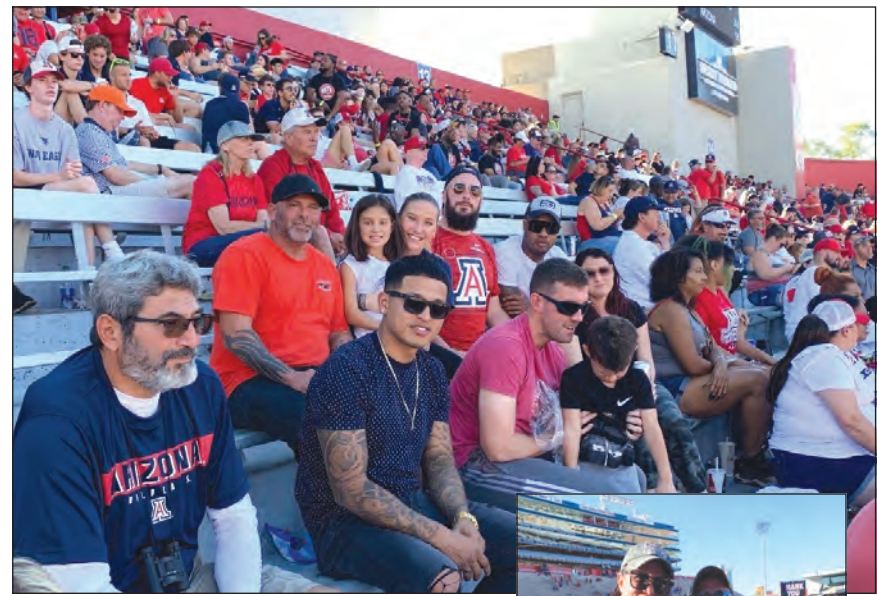
angel tree
U.S. ARMY YUMA PROVING GROUND

Board Game Bonanza day



School age students participating in the Yuma Proving Ground's Youth Services after school program had a great time taking part in the library's Board Game Bonanza event on Nov. 4. (Loaned photos)

Military Appreciation day



Soldiers and their Families including Yuma Proving Ground (YPG) Command Sgt. Maj. Herbert Gill and his wife Amanda had the opportunity to enjoy college football in Tucson Nov. 13. The University of Arizona invited active duty military members as part of the college's Military Appreciation Football game. The Wildcats welcomed the Utes of Utah. More than 50 tickets were provided for military members and families working at YPG. (Loaned photos)



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