NAVAL AIR WARFARE CENTER WEAPONS DIVISION, CHINA LAKE, Calif. - After six months of rapid research, development and testing, Naval Air Warfare Center Weapons Division participants of the annual Naval Air Systems Command Innovation Challenge welcomed workforce members to test out and view their final products before holding formal presentations on Sept. 21 at China Lake.

“The Navy must get to work now to move forward and innovate as we go…we must improve faster,” said Richard Chairez, NAWCWD Innovation Challenge lead, paraphrasing a quote from Chief of Naval Operations Adm. John Richardson just before the teams’ presentations. “To get faster, we have to develop this culture of innovation.”

To help tailor their project, the Next Generation Augmented Reality Display (NGARD) team from Point Mugu traveled to Whidbey Island to speak with EA-18G Growler pilots. With a focus on precision alignment and threat range domes, the team set out to create a prototype augmented reality headset to help the pilots visualize battlespace data in a 3D format over an actual location.
“Going and talking to the warfighter completely changed how we were going to do our project,” said team lead, Stephen McIver. “Right now, the pilots use a 2D display to find surface-to-air-missile sites. Augmented reality could potentially help guide them through safer zones for jamming. As the enemy threats get better and can target better, we also need to jam better.”

NGARD teammates, McIver, Brandon Barr, Nicholas Desautels, Zeed Jarrah, Priya Malavia and Jordan Schwichtenberg used Microsoft’s HoloLens and Unity 3D engine to help develop their augmented reality system. HoloLens initially posed its own set of limitations, however, forcing the team to create strategies to integrate GPS and get the system to work outside.

“This experience has helped me work with a team better,” Malavia said. “You don’t get much time to iron out kinks, you get thrown together and you have to figure out how to jive, get things done quickly and how to adapt to change because with a short project, we’re running into issues all the time. Quickly adapting to the problems that we’re facing has been a really good learning experience for me that I can carry over to other projects that I do.”

As the project grew and progressed, the team benefitted from their relationships and mentoring from the military to help create solutions that would be a win-win for both the teammates’ personal goals and the needs of the warfighter.

“Having groups of young folks who have not seen this before, who are not biased and are open to looking at a problem without any preconceptions or any expectations of how it should be tackled often come with out-of-the-box approaches that we never would have come up with on our own,” said Lt. Cmdr. Christopher “Oscar” Meyer of VAQ-133 during a visit to Point Mugu to interface with the workforce and demo the team’s work. “Oftentimes, it’s more efficient and more effective than what may have come out of the way we’ve been doing things for the past 20 or 30 years.”

Fostering diversity of thought and talent, Chairez opened the NAWCWD challenge up to non-Engineer and Scientist Development Program members. Additionally, he introduced the Maker Missile Challenge and asked interested teams to develop a low cost, guided rocket using commercially available parts and open source algorithms to hit a 3 meter by 3 meter stationary target that was 1 kilometer away in less than 10 seconds.

Two missile teams, Hobby Off-the-Shelf Open Source (HOTSOS) from China Lake and Target Orange Missile at Low Expense (TOMALE) from Point Mugu, answered that call.

“I found out about the Maker Missile opportunity during an ESDP meeting,” said Kevin Costner, HOTSOS teammate. “I got excited and I really wanted to work on it. Wheels started turning and I started thinking of who I could get to join me. We were all willing to
listen to each other’s ideas and wanted to be successful and we knew that, sometimes, that meant throwing out our own ideas in favor of a better one. We’ve done that a lot throughout these last couple of months, but it’s been for the better over time.”

The challenged provided China Lake teammates Costner, Nathan Boyer, Michael Brown, Malin Crewse, Jonathan Duncan and Adam Price opportunities to build their first seeker, use additive manufacturing and dive into the world of acquisition.

“We’re mostly electrical engineers, but we have a physicist and a mechanical engineer,” said Brown, who served as the team’s lead. “We have learned that there are some weaknesses that we have and there are some skills that we just don’t have on the team, but we’ve also learned how to fill those gaps.”

Boyer, who has a background in physics, found himself learning how to develop computer-based simulations on the fly since the team was unable to physically fly their rockets until month five of the challenge.

“I've learned quite a bit of programming” Boyer said. “I hadn’t really used SimuLink before and with MatLab, I was relearning it and doing more than what I’d learned in college, which was great. I also picked up a little bit of Java with our original simulation in OpenRocket, so that’s been really helpful.”

With funding from their Threat/Target Systems Department (AIR-5.3), the TOMALE team, looks to take their missile beyond the Innovation Challenge. Teammates Jared Berry, Chelsea Capps, Matt Jenks, Leann Kampley, Chris Karba, Ian Mann and Leah Zaragoza were tasked to develop a replacement for Smokey Sam, a small, unguided rocket developed by NAWCWD as a threat simulator for use during military exercises.

“This has really been a speed to fleet effort from initial inception,” said Mann, who served as team lead. “In 5.3, we have what we call red cells where we ask the customer what their needs are and where we’re not performing up to what they’d like. One key thing they said was that the Smokey Sams weren’t working, and they need something that turns; the Smokey Sam just goes straight. Our supervisors and managers have been keeping the customers updated on how our project is going and they’ve already expressed interest in wanting to do some threat simulation for the fleet.”

Additionally, the TOMALE team is working toward shooting rockets off of a boat to represent a Fast Attack Craft/Fast Inshore Attack Craft threat. Like the HOTSOS team, TOMALE performed their ballistic tests on China Lake’s land ranges.

“We’re trying to get as much data as we can from the Innovation Challenge,” Zaragoza said, “so that when we are ready to launch it in a much more high risk situation such as on an unmanned boat, we have data to help back up what we’re doing. You work on projects and sometimes a project can get cancelled or doesn’t work, so the most rewarding part is
NAWCWD teams rise to the occasion for annual Innovation Challenge

being able to see your product and what you’ve created actually fly, actually work, actually get shot off and then being able to look at all of the data afterward."

As NAWCWD gears up for the FY18 Innovation Challenge, this year’s teammates encourage others to give life to their ideas.

“If you have an idea, just put it out there,” added Zaragoza who’d observed past Innovation Challenge participants before joining, herself. “Even if you don’t think you’ll win, if you have a great idea, people will listen; it might not be the Innovation Challenge that listens, but there are other ways of getting your voice heard. There are 219 proposals or even if that doesn’t work, maybe someone in your department will back you up and fund it. If you think that it’s something that the warfighter is going to need, put it out there and go for it, otherwise, nobody is going to hear you.”

Innovation Challenge teammates from Naval Air Warfare Center Weapons Division Point Mugu’s Target Orange Missile at Low Expense team talk about how they built and tested their maker missile during an exhibit and presentation at China Lake. Pictured, behind the table from left, are Leann Kampley, Chris Karba, Leah Zaragoza and Ian Mann. (U.S. Navy photo)
NAWCWD teams rise to the occasion for annual Innovation Challenge

A visit by pilots of Electronic Attack Squadron 133 to Naval Air Warfare Center Weapons Division Point Mugu brings together members of the Innovation Challenge team, Next Generation Augmented Reality Display, from left, Zeed Jarrah, Stephen McIver, Nitish Bhardwaj, Priya Malavia and Nicholas Desautels. (U.S. Navy photo)