Marine-Crafted Tech: NPS Grad's ARES App Optimizes Battle Planning

The Augmented Reconnaissance and Estimate of the Situation (ARES) application accelerates the planning of complex USMC missions from months to mere seconds.

MONTEREY, CA, UNITED STATES, July 2, 2025 /EINPresswire.com/ -- What began as a Marine infantry officer's frustration during a field exercise has now – thanks to his dedicated work at the Naval Postgraduate School (NPS) – become a transformational piece of technology poised to reshape how the U.S. Marine Corps plans tactical ship-to-shore operations.

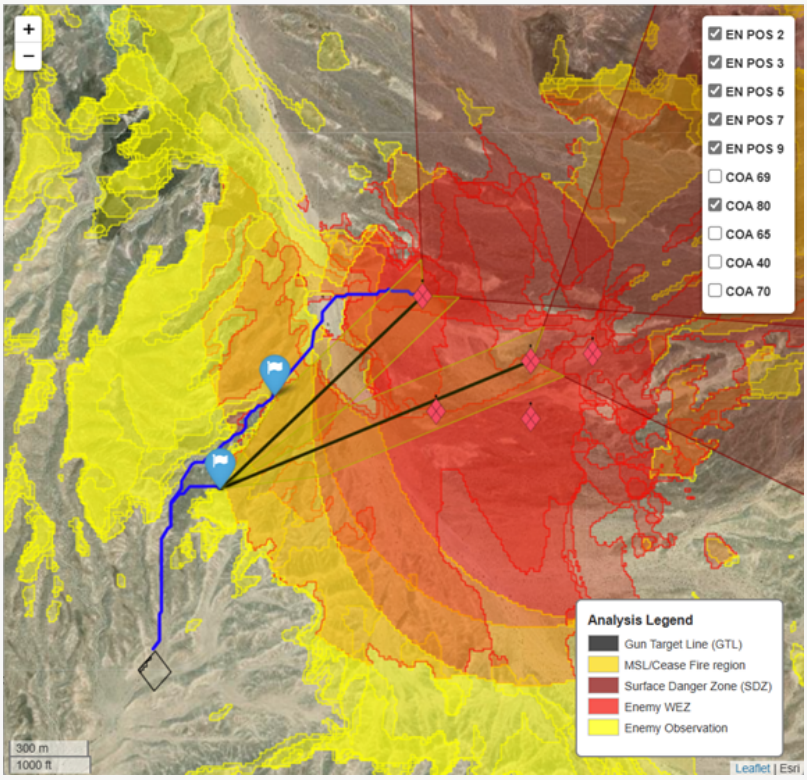
U.S. Marines with 1st Battalion, 3rd Marine Regiment, use a Marine Common Handheld tablet for the ARES app during exercise Island Marauder on Marine Corps Base Hawaii, Kaneohe Bay (USMC photo).

U.S. Marine Corps Capt. Ryan Helm graduated from Naval Postgraduate School's operations research program in June 2023, created the ARES app.

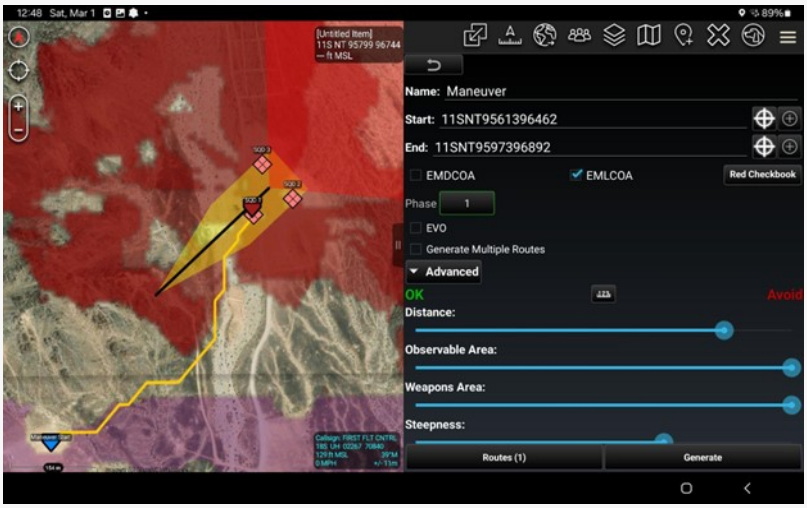
For his June 2023 NPS graduate thesis in operations research, "Mission Planning Optimization for Infantry Operations," U.S. Marine Corps Capt. Ryan Helm focused his research on first-hand knowledge of a real-world capability gap. His solution, the Augmented Reconnaissance and Estimate of the Situation (ARES) application, is an innovative digital tool designed to automate and accelerate the planning of complex assault missions, from months to mere seconds.

"The ARES project is a direct indicator that a student can arrive at NPS and

learn the technical skills needed to solve challenging operational problems," said Chris Fitzpatrick, faculty associate for research at NPS' Modeling, Virtual Environments and Simulation (MOVES) Institute and second reader on Helm's thesis. "In two years, Capt. Helm's forward thinking and technical know-how provided the fleet with a new tool that makes infantry squad leaders better planners today."



Screenshot of ARES tactical planning tool displays recommended courses of action during testing and development (Courtesy photo).



Screenshot of ARES tactical planning tool displays recommended courses of action during testing and development (Courtesy photo).

Helm's inspiration for ARES can be traced back to Exercise Steel Knight 2020, where, as a 1st Lt. and acting company commander, he spent nearly two months calculating an optimal helicopter landing zone (HLZ) for an air assault. The experience left a lasting impression.

"If it takes two months just to find where to land a helicopter in a garrison environment," Helm said, "what would it be like doing it for real, from a ship under combat conditions?"

Ground force maneuver planning is an intensely manual process, he noted, balancing terrain analysis, fields of fire, cover and concealment, doctrinal considerations, and more, often under intense time pressure. Geospatial intelligence is readily available in the mission-planning process, but end-users in the field need to make decisions swiftly, even in low-information environments. And Marines' lives hang in the balance.

"Recognizing this capability gap, I developed the tactical decision support system that I wished I'd had as a junior officer – one that digitally transforms the "science" of ground combat maneuver planning into rapid, actionable insight," Helm recounted in a recent article describing ARES for The Connecting File, a Substack for infantry Marines to share information.

He accomplished this through his second duty tour: a graduate degree in Operations Research (OR) at NPS. But his work developing the tool was just the beginning.

Driven from the get-go by a desire to get this innovative idea into the hands of fellow Marines in the fleet, Helm devoured everything the school's OR curriculum had to offer. Every course he took successively added new concepts, tools, and techniques to apply to the growing framework of the ARES application.

Calculus refreshers let him optimize battle space geographies; programming helped him establish a framework for ARES and gather geospatial data; for data analysis, he used machine learning to determine the HLZ; and network theory enabled him to figure out a pathfinding tool.

"When it came time to actually write my thesis, I had everything I needed to do what I wanted to do, which was to prove that you could have a tool that generates a plan that would normally take a person many hours to do," Helm said.

ARES consists of four subcomponents: an HLZ detection tool to identify suitable landing zones using terrain and environmental data; a tactical pathfinding tool to map optimal ground movement routes from HLZs; battle space geometry optimization to configure unit formations and boundaries for operational efficiency; and a course of action (COA) generation tool, which integrates the previous components to recommend actionable plans.

In total, ARES generates tactical planning that puts HLZ prediction, route planning, and direct-fire geometry analysis squarely in the hands of maneuver leaders, expands decision space by saving time, and integrates with existing automation platforms on Android and desktop for immediate use.

"I built a system capable of considering all combinations of insertion locations, maneuver corridors, enemy visibility, and geometries-of-fire to recommend optimal COAs," Helm said. "Instead of manually plotting geometries and evaluating lines-of-sight, a commander could focus on contingencies, transitions between subordinate unit actions, and enemy reactions."

To validate ARES for his thesis, Helm tested ARES against an air assault course at Camp Pendleton, California, to determine whether it produced COAs comparable to range-walk informed designs.

Considering choice of landing zone, route, supporting machine gun position, and objective entry point, the model found 785,664 possible decision combinations for the scenario. Considering user preferences and doctrinal considerations, ARES narrowed this down to 220 COAs before presenting the decision-maker with a preferred number of optimal COAs.

“If the system could generate a COA on par with a pre-planned training exercise, then it could do the same anywhere – without a range walk or leader’s recon,” Helm noted.

With support from NPS faculty including thesis advisors Professor Ruriko Yoshida and retired U.S. Army Lt. Col. Ross Schuchard, along with additional guidance and resources from his second reader, Fitzpatrick, Helm transformed a personal initiative into a product ready for prime-time development.

"Capt. Helm’s research will greatly impact the Department of Defense in the future, and he will be one of the key leaders in the U.S. Marine Corps,” said Yoshida. “He is one of the best students I have ever had in my entire career as a researcher and statistician. Not only is he brilliant and a hard worker, he is also a great leader to lead this project by himself.”

Fitzpatrick made a connection that would ensure ARES’ continued development after Helm graduated from NPS.

While Helm was working on ARES, Fitzpatrick was also working with Marine Corps Maj. Ed Hickey, a MOVES student, on the Small Unit Mission Planner (SUMP), a broader digital planning application, that was funded through the Office of Naval Research (ONR) Global TechSolutions program.

It was a perfect fit with the information ARES could generate augmenting SUMP’s capabilities, and ONR took up ARES’ development

“Capt. Helm’s ARES was able to provide thousands of COAs to consider in SUMP and we felt that this combined work would directly benefit infantry battalions in the fleet,” Fitzpatrick recalled.

Helm was lauded for his inventive work across the NPS campus as well.

In November 2022, he was one of five NPS students selected for a distinguished Naval Information Warfare Center Pacific (NIWC Pacific) Fellowship, earning him critical funding to support ARES’ development and its field testing with Marine Corps Tactical Systems Support Activity at Camp Pendleton, California, as well as access to NIWC Pacific mentorship to help guide them in their research.

Helm was also awarded the prestigious Military Operations Research Society (MORS) Tisdale Award upon his graduation in June 2023, which recognizes “outstanding achievement in graduate research directed toward improving military force utilization” and increased operating effectiveness of current or near-term assets.

“As I was working on ARES, I thought that if any one piece of it makes it to something that is going to be in the hands of a Marine someday, then all the extra work outside of my coursework would all be worth it,” he said. “The Tisdale Award was validation that this bet I made with my

time and effort would come to fruition."

That bet paid off.

Shortly after Helm graduated NPS, ARES underwent its first validation testing when Marine Corps Battalion Landing Team (BLT) 1/5 utilized the standalone app to support several ship-to-shore maneuvers during pre-deployment training. Their feedback was overwhelmingly positive.

Their commander – also an NPS alum and Yoshida's advisee – identified two key findings in his after-action review (AAR): that ARES rapidly provided non-obvious yet optimal COAs that maximized cover, geometries of fire, and economies of force; and that ARES required a legitimate software development cycle to integrate government data sources and build a robust user interface.

"ARES offers tremendous value to infantry battalions, from junior intelligence analysts to company commanders and the operations officer," he wrote. "Its uses are not limited to vertical assault raids; it may assist planning for all offensive operations, as well as defense and security operations by suggesting likely (optimal) enemy courses of action."

ARES now exists as a component of broader planning software applications like SUMP and Higher-Echelon Mission Planner (HEMP), a related application, being developed under the Office of Naval Research (ONR) Warfighter Code 34. These applications offer streamlined digital planning, and ARES contributes the key feature of automated maneuver generation.

In parallel, the Marine Innovation Unit (MIU)—a reservist-led innovation group—continues to iterate on ARES' sub-components in conjunction with ONR. Most recently, the HLZ detection module was validated by pilots and fleet users, with deployment planned across all Marine Corps-issued Android tablets this summer, according to Maj. David McGee, MIU Marine Coders Team Lead.

"This is a valuable tool for pilots or infantry planners to develop infiltration, exfiltration or casualty evacuation planning and a great resource for urgent and emergency planning on the ground," he said. "This is an especially valuable tool for places where we do not operate constantly like the first island chain."

As the Marine Corps pushes deeper into the era of digital warfare, tools like ARES could mark the beginning of a new standard: Marine-designed, data-driven decision systems that reduce cognitive load and speed the decision cycle in an increasingly complex battlespace.

Helm's ARES app exemplifies what's possible when operational experience meets academic innovation. It is a living testament to NPS' mission: defense-focused graduate education that advances the operational effectiveness, technological leadership and warfighting advantage of the Naval service.

“I hope ARES shows how much of the science of war can be digitally translated and automated,” Helm said. “That frees up Marines to focus on the art of war—the human factors, the judgment, the decision-making.”

LCDR Kristina Wiedemann, USN
Naval Postgraduate School
831-656-3567
PAO@nps.edu
Visit us on social media:
LinkedIn
Instagram
Facebook
YouTube
X
