PREMIER ISSUE

Emergent Defense



THE BEST COMPANIES TO WORK FOR IN DEFENSE

> DEFENSE FORCE OF 2030

THE FUTURE OF DRONES

TACTICAL WHEELED VEHICLES & THE MILITARY

Even the defense industry needs defenders.



Glenn D. Bellamy

For decades Wood Herron & Evans has worked with clients across the defense industry to protect their inventions, brands, and creative content. We bring expertise in all fields of engineering and in all phases of IP protection, enforcement, and monetization. Let's discuss how Wood Herron & Evans can protect your competitive edge.



Patents | Trademarks | Copyrights | Litigation | Media | Advertising | Privacy

600 Vine Street | Suite 2800 | Cincinnati, OH 45202 tel 513.241.2324 | whe-law.com

Contents



- 2 Letter from the Publisher BY ERIC HARMON
- **3** Contributors
- Web Exclusives
- **5 Local Developments** News and updates from throughout the country.
- 8 Under Contract Recent contract awards from the military.
- 9 Education Connection UDRI making headway in defense research and digital transformation. BY BRYN DIPPOLD



FEATURES

- **10** Finding a New Way Forward Military strategy shifts in response to changing global challenges. BY TERRY TROY
- **15 2024 Best Workplaces in Defense** The businesses that are providing for their employees while working to support our national defense. BY THE EDITORS

A DEEPER DIVE



Don't Fear the Reaper Drones continue to be a featured part of future combat. BY TERRY TROY

24 An Ever-Changing Workhorse Tactical wheeled vehicles adapting to meet military's current and future needs. BY DAVID HOLTHAUS

FROM THE EXPERTS

26 Tiger Traps

The defense planning conundrum. BY COLONEL J.P. CLARK

- 28 Mitigating the "Tyranny of Distance" Technological evolution and the continued requirement for mass in warfare. BY COLONEL CHAD M. PILLAI
- **32** Flying Across Borders Parallax's collaboration with Quebec will expand opportunities for AAM. BY TERRY TROY
- **34** Upcoming Conferences & Events

36 Parting Shot

A concern for all. BY TIM CRANE

Ready to Launch

ut us in, coach!

Who can't remember a time when you were ready to get out on the sports field and enjoy the game you had practiced for all week? The launch of *Emergent Defense* feels a little like this. Tim Crane,

our editor-at-large, brought this idea to me over a year ago, and ever since it's felt like we've been in preparation mode. Now, as they say, it's finally game on.

This project has evolved for years as Tim served in various roles in the Army, seeing what needs there were to be met. I also served, and Tim and I are very proud of both attending the United States Military Academy (West Point). In fact, we both came from the same high school as classmates in Bay Village, Ohio.

For the last decade, I have sought to grow our media company, Main Street United, and one way I saw to do this was to engage with federal contracting, and

specifically for the Department of Defense. What I saw was that starting that endeavor was not for the faint of heart. To me, it was like launching an entirely new business, one outside of what we had already been doing for the past 20 years.

Mastery of how to best learn of new opportunities, engage in the RFP process and properly bid was paramount, and, unfortunately, once COVID came along, all bets were off. I went into survival mode, as we all did, and federal contracting was put on hold.

Once Tim and I reconnected, his idea made all the sense in the world to me. Tim pointed out that with our community-based media company, we already had the tools in place to act on behalf of the many that are seeking to get involved like I was, but needed a way to learn and connect so they could best move forward.

Are you interested to engage and join a community of leaders and companies serving in our country's defense? As the voice



for leaders in innovation, technology and industry who serve in the defense of America and its allies, *Emergent Defense* magazine looks to inspire, inform and chronicle the most fascinating entrepreneurs, breakthroughs and the collaborative efforts from the ecosystem dedicated to defending durable freedom.

> Our intent is to ensure that our coverage and connectivity includes not only those just starting to investigate contracting-in fact, far from it. We seek audience that are the decision makers within the military ranks, contracting officers, major prime contractors, government, institutions, universities, incubators and much more. This is why we have launched our Global Editorial Board with the intent to hear directly from thought leaders and experts from across the spectrum of the defense community. This is also why you will see features like we have in this first issue, such as Best Workplaces in Defense. Is there a better way to showcase the quality

companies in this community than to share their stories in how they provide opportunities for those that are their "go-to" players?

We encourage all to get your complimentary subscription at **EmergentDefense.com**, where you can also sign up for our email and engage with us over social media. As with any launch, and as the military has taught us, we are very interested to learn. We want to get your feedback about our content and, of course, to hear your story. You can reach me at eharmon@emergentdefense.com. My direct line is 513-297-6205.





J.P. Clark is a retired armor officer and strategist. He is the author of *Preparing for War: The Emergence of the Modern US Army, 1815-1917* (Harvard University Press, 2017) and is currently working on a history of U.S. military strategy in the Pacific from 1898 to 1941.



David Holthaus is an award-winning, independent journalist based in Cincinnati, Ohio, with more than 25 years experience covering business, urban affairs, government, health care and commentary. He is a graduate of Kenyon College and the Indiana University Graduate School of Journalism.



Colonel Chad M. Pillai is a senior Army strategist with multiple Army and Joint assignments in the U.S., Europe and the Middle East. Col. Pillai conducted his War College Fellowship at Queens University, Canada, earned his master's in International Public Policy from Johns Hopkins University School

of Advanced International Studies (SAIS), and is a member of the Military Writers Guild.



With a professional journalism career spanning more than 40 years, **Terry Troy**'s work has appeared in publications as varied as *Ohio Business Magazine* and *Scientific American*.



President & Publisher Eric Harmon

> Editor-At-Large Tim Crane

Managing Editor Corinne Minard

Associate Editor Bryn Dippold Contributing Writers J.P. Clark, David Holthaus, Chad M. Pillai, Terry Troy

Digital Content Coordinator Danielle Cain Designer Guy Kelly Ad Designer Mindy Jacobson Production Coordinator Katie Burks

Sales

Scott Chaffee, Angie Collins, Brad Hoicowitz, Kenneth Pierce, Jennifer Smith, Bridget Thornberry, Margie Widay Advertising Assistant Kelly Dorsey Burdick

Chief Operating Officer Katelynn Webb Marketing & Sales Administrator Joshua Squirrell Sales & Event Coordinator Madelyn Webb Finance Marylin Sutton

www.EmergentDefense.com Emergent Defense Magazine 120 W. Second St., Suite 318 Dayton, OH 45402

Contact Emergent Defense: publisher@emergentdefense.com. Go to www.EmergentDefense.com to get your complimentary subscription to Emergent Defense.

Top 3 Digital Exclusive Stories

- 1 Partnership Accelerates Technology by Terry Troy
- 2 Rockwell Improves Autonomous Robots by Terry Troy
- **3** New Low-Cost ISR Drones by Terry Troy



SUBSCRIBE TO OUR NEWSLETTER!

Get the latest insights, expert analysis and emerging trends delivered straight to your inbox. Sign up today at EmergentDefense.com/Subscribe



CONNECT WITH US!





@emergentdefensemagazine



@emergent-defense-magazine



MOUNTAIN-PLAINS

Honeywell to Produce or Acquire Microelectronics

The Department of Defense announced a \$25.8 million award to **Honeywell** in Plymouth, Minnesota, on Sept. 6 to produce or acquire trusted strategic radiation-hardened microelectronics. According to a press release, the Defense Production Act Investment (DPAI) award provides an assured capability of essential DOD components for operation in radiation environments. This effort supports the 2024 National Defense Industrial Strategy to expand domestic production and increase supply chain resilience.

"The DOD requires trusted and

reliable radiation-hardened microelectronic and subcomponents to support strategic and space missions," said Dr. Laura Taylor-Kale, assistant secretary of Defense for Industrial Base Policy, in the release. "This project ensures components are available to meet demand for current and future U.S. systems."

The funds will be used for strategic radiation-hardened microelectronics fabrication via a Defense Microelectronics Activity-accredited manufacturing process and support 90nm technology development in Honeywell's Minnesota microelectronics foundry.

MIDWEST

DOD Invests in Microelectronics Education, Workforce Training in Indiana

In September, the Department of Defense announced that it awarded a three-year, \$9.5 million award to the nonprofit **Regional Opportunity Initiatives, Inc. (ROI)**. According to a press release, the goal of this effort is to address the need for increased microelectronics production and serve the critical shortfall of a skilled microelectronics workforce.

ROI will work closely with K-12 schools, postsecondary colleges and universities, employers, and other institutions to develop and enhance



the region's advanced microelectronics expertise and ecosystem. This partnership bridges the gap between urban and rural technology opportunities, fosters innovative and economic growth in underserved areas, and supports the National Defense Industrial Strategy's strategic priorities of enhancing Supply Chain Resilience and Workforce Readiness.

Carla Zeppieri, deputy assistant secretary of Defense for Industrial Base Resilience, said in the release, "ROI's participation in strengthening the Indiana Uplands cause is directly aligned with the DOD National Imperative for Industrial Skills initiative's vision for a robust microelectronics workforce development ecosystem that will perform as the backbone in obtaining reliable access to microelectronics research, development, design and manufacturing."





SOUTHWEST

DOD Approves Grants Under the DCIP

On Sept. 20, the Department of Defense awarded 14 Defense Community Infrastructure Program (DCIP) grants, including two for projects in Texas, from the Office of Local Defense Community Cooperation. According to a press release, DCIP is a competitive program for states, territories and communities to undertake infrastructure enhancements to support military value, the training of cadets at independent "covered educational institutions," installation resiliency and/or family quality of life that benefits their local installations.



Dr. William A. LaPlante

"The Defense Community Infrastructure Program continues to be a significant tool for the Department to enhance the critical relationship between installations and their respective communities," said Dr. William A. LaPlante, under secretary of Defense for Acquisition and Sustainment. "This year's program demonstrates how communities can come together with their military partners to address critical infrastructure needs that will enhance both the military mission and community resilience. The Department looks forward to seeing these projects come to fruition."

The two Texas project grants are:

- \$10,308,887 to the city of **Copperas Cove** to undertake a project to construct road improvements for better installation access and to reduce traffic congestion, which will support the facilitation capabilities for future larger-scale enhancements, such as a regional multi-modal transportation hub, which will benefit both Fort Cavazos and the community at large.

- \$12,700,000 to El Paso Water Utilities Public Service Board to replace the Mc-Combs Well's aging 30-inch diameter water collector line, which provides 100% of the McGregor Range's water supply at Fort Bliss.

WEST

Three Companies Selected to Provide Communications Solutions

The Defense Innovation Unit (DIU) is investing in the future of Small Unmanned Aerial Systems (sUAS) with its Electromagnetic Interference (EMI) project. The project's goal is to provide a baseline hardware and software capability to allow for rapid iteration on a constantly changing battlefield environment. In August, DIA announced that **Auterion**, **ModalAI** and **Neros** had been selected to develop prototypes, with initial demonstration and testing to begin two months after contract award. The three companies were selected from more than 90 applicants.

"We have seen firsthand in Ukraine the quick tempo and change in war and how spectrum challenges affect tactical level operations. This is a vitally important effort to provide critical tools to allow our warfighters to win if forced to fight and enable them to respond quickly to changing battlefield conditions," said David Michelson, DIU autonomy portfolio director, in a press release.

NORTHEAST

NEMC Hub Wins Federal Grants

On Sept. 18, Massachusetts announced that it had received a \$37,782,565 federal award for the Northeast Microelectronics Coalition (NEMC Hub). The goal of the hub is to advance the development of microelectronics in the Northeast.

According to a press release, the NEMC Hub, which is part of the Microelectronics Commons program and executed through the Naval Surface Warfare Center Crane Division and the National Security Technology Accelerator (NSTXL), received six of the 33 critical technology project awards announced, the most

awards received by one of the eight Microelectronics Commons Hubs.

"Today's awards highlight the innovation and expertise that exists across the Northeast when it comes to microelectronics and semiconductors, especially right here in Massachusetts," said Massachusetts Governor Maura Healey in the release. "The NEMC Hub is creating research and partnerships that will have long-lasting, positive impacts on our national security, bring more of this critical chip research back to the U.S. and our region, and result in the development of



cutting-edge tools that will help protect our country and empower our service members stationed around the world. We're grateful to the Biden-Harris Administration for prioritizing this sector and investing in Massachusetts."

SOUTHEAST

DOD Awards \$190 Million for STEM Education

On Aug. 27, the Department of Defense announced the award of the Defense Science, Technology, Engineering and Mathematics Education Consortium (DSEC) Cooperative Agreement to the **Research Triangle Institute** and its consortium of over 25 regional and national partners to



provide STEM education and outreach programs in communities across the nation. These programs are foundational to the department's strategy to build a 21st century workforce with the skills and talent to meet evolving defense challenges.

According to a press release, the North Carolina-based group will receive up to \$190 million over the course of 10 years to implement a diversity of STEM programming, allowing the department to increase the permeability of ideas into its science and engineering workforce.

"Outreach is incredibly important for the Defense Department, and we continue to seek out the best and brightest minds across the nation," said Dr. Aprille Ericsson, assistant secretary of Defense for Science and Technology, in the release. "Our men and women in uniform depend on talent and expertise within our science and technology workforce to out-innovate our peer adversaries, and I consider development, recruitment and retention of STEM talent to be one of my top priorities."

MIDATLANTIC



EDA, DIU Codify Partnership

The U.S. Department of Commerce's Economic Development Administration (EDA) and the U.S. Department of Defense's Defense Innovation Unit (DIU) signed a memorandum of understanding (MOU) on Sept. 5. According to a press release, this agreement aims to enhance American competitiveness by leveraging each organization's assets and connections nationwide, helping connect more American-made innovations to avenues for scaling, commercialization and procurement.

This collaboration seeks to integrate EDA's Tech Hubs program with DIU's regional outreach initiatives, thereby creating a more cohesive and effective approach. The MOU outlines seven broad activities: prize challenges, contracts and grant opportunities, accelerators, workforce development, supply chain resilience, technology demonstrations, and test and evaluation projects.

"This agreement between EDA and DIU will position America's leading innovators to best leverage the resources, assets and connections that create more jobs, advance American competitiveness and strengthen our national security," said EDA Deputy Assistant Secretary Cristina Killingsworth. "EDA's Tech Hubs consortia members will gain insights into DOD needs, have opportunities to showcase cutting-edge technologies-from autonomous systems to durable batteries—and hopefully secure contracts to supply these critical innovations to DOD. By helping Tech Hub companies secure key customers within the DOD, we empower them to grow, create jobs and become integral parts of new supply chain networks."





ne way the military succeeds is through the support of civilian-owned and -operated businesses. Almost daily, the Army, Air Force, Navy and other factions of our Armed Forces announce new contracts with U.S. businesses. Some of the most recent announcements are listed below.

Collins Aerospace in Cedar Rapids, Iowa, was awarded a \$279,592,539 modification to a firm-fixed-price, indefinite-delivery/indefinite-quantity contract in September. This modification exercises an option to procure up to a maximum quantity of 8,493 AN/ARC-210(v) radios and



ancillary equipment to install in over 400 strategic and tactical airborne, seaborne and land based (mobile and fixed) platforms in support of the Navy, Marine Corp, Coast Guard, Army, other government agencies and Foreign Military Sales customers. Work will be performed in Cedar Rapids and is expected to be completed September 2027.

The **Boeing Co.** in St. Louis, Missouri, was awarded in September a \$85,200,000 cost-plus-fixed-fee, ceiling increase modification to a previously awarded contract for continued research and development. The modification brings the total cumulative face value of the contract to \$130 million from \$44.8 million. Work will be performed in St. Louis and is expected to be completed by Sept. 28, 2027.

Trailer Bridge Inc. in Jacksonville, Florida, was awarded in September an indefinite-delivery/indefinite-quantity contract, with a face value of \$60,547,899. This contract provides stevedoring and related terminal services in connection with the import and export of Defense Transportation System sponsored and non-sponsored cargo throughout Denmark. The base period of performance is from Oct. 1, 2024, to Sep. 30, 2029.

AAR Government Services Inc. in Wood Dale, Illinois, and Standard Aero Inc. in San Antonio, Texas, were each awarded a firm-fixed-price, time-and-materials, indefinite-delivery/ indefinite-quantity contract in September. The estimated aggregate ceiling for both is \$1,210,116,191, with the companies having an opportunity to compete for individual orders. These contracts provide depot-level engine maintenance, repair, overhaul and field assessment and repair in support of the P-8A Poseidon aircraft for the Navy, the Royal Australian Air Force and Foreign Military Sales customers. For AAR Government Services Inc., work will be performed in Atlanta, Georgia (88%); and Wood Dale, Illinois (12%), and for Standard Aero Inc., work will be performed in Winnipeg, Manitoba, Canada (99%); and San Antonio, Texas (1%), and is expected to be completed in September 2029.

Palantir USG Inc. in Palo Alto, California, was awarded a \$99,804,561 firm-fixed-price contract for user licenses for the Maven Smart System AI tool, ancillary software support and hardware for the Army in September. Work locations and funding will be determined with each order, with an estimated completion date of Sept. 24, 2029.

Zone 5 Technologies Inc. in San Luis Obispo, California, was awarded a \$20,000,000 ceiling, indefinite-delivery/indefinitequantity, cost-plus-fixed-fee contract for the Counter-Maritime Integrated Demonstration requirement in September by the Air Force. This contract is seeking to integrate Zone 5 operational weapons platform avionics and software into kinetic kill vehicle hardware in the loop. Work will be performed in San Luis Obispo, California, and Eglin Air Force Base, Florida, and is expected to be completed by Sept. 18, 2029. ■

Innovation Center Takes Off

UNIVERSITY OF DAYTON RESEARCH INSTITUTE MAKING HEADWAY IN DEFENSE RESEARCH AND DIGITAL TRANSFORMATION

BY BRYN DIPPOLD

he University of Dayton Research Institute (UDRI) in Ohio is known for innovative and exciting research in engineering and development, but its newest hub, The Digital Transformation Center (DTC), is meant to foster collaboration and accelerate innovation among small and large businesses, academics and the Department of Defense.

The DTC also hopes to bridge a critical gap of a lack of personnel with expertise in digital transformation in the current workforce. Digital transformation, which is the process of integrating digital technologies into all areas of a business, changes how a business operates and delivers value to customers.

This collaboration will help to develop and transition cutting-edge digital technologies for both civilian and military use, according to

David Dunn, director of Innovation and Collaboration at UDRI.

"By offering specialized collaborative spaces, coupled with dedicated industry offices, the DTC enables its partner companies to quickly move from concept to implementation, streamlining the path to fielding new solutions," Dunn says.

By creating this environment, the DTC has eliminated traditional barriers to collaboration by accelerating technology transition and empowering businesses to more effectively support and advance the **U.S. Air Force**'s digital transformation efforts.

The DTC also provides ample opportunities for training the existing workforce and preparing the workforce for the future in these critical technologies.

The DTC opened in November 2023 as an 8,500-square-foot "seedling" space, which has gotten activities started until the permanent center is constructed at the onMain Innovation Hub, which is anticipated to open in early 2027.

Dunn shares what the center has achieved thus far.

"Since that time, 18 member organizations have joined us at the DTC, including two government, one academic and 15 industry members, eight of which are small businesses," he says. "Eleven new jobs and eight internships have been created, and



we've hosted 60 events in the form of technical information exchanges, training sessions and concept exploration meetings, among others."

These events have brought an average of 30 visitors daily to the DTC and \$2.65 million has been awarded to organizations for new projects to advance digital transformation innovations with the DOD. These projects are based on ideas and connections made because of the DTC.

Dunn shares that one of the major challenges for the Air Force and DOD more broadly has been "supporting an interconnected digital environment."

"The current stove-piped acquisition process leads to silos of information, often at the weapon system level," he says. "This makes interoperation across a single service difficult and across multiple services an ongoing challenge."

The DTC has provided a location where industry partners can work daily to funnel this information into the correct channels and create a stronger culture of teamwork.

"Through the center, we're encouraging industry growth and profit through innovative ways of analyzing, displaying and working with the data rather than controlling the data," Dunn says.

Finding a New Way Forward

MILITARY STRATEGY SHIFTS IN RESPONSE TO CHANGING GLOBAL CHALLENGES



BY TERRY TROY



hen it comes to our national defense, the window of opportunity to implement new military strategies is getting shorter and much more complex. It's also fundamentally changing direction of multiple strategies.

Most branches of the military have published projections of what the modern battlefield will look like in 2030. Today, these can only be used as a guideline of long-term strategic visions, which are constantly evolving.

"Many military strategies look five to IO years out," says Michael Ball, who, after 30 years of service, retired as a colonel and commander of the 7th Special Forces Group (Airborne). "That's why they tend to be baselined upon a specific year. The reality is that five years out in the military, in terms of developing strategy, is an extremely long time—especially with how fast things change today, literally turning on a dime.

"Just look at five years ago. The world was relatively stable. We withdrew from Afghanistan. We have the Russians in Ukraine, and the threat of China, which might want to do something as it relates to Taiwan. We have the Israeli conflicts with Hamas and now Hezbollah, which are really heating up."

When it comes to combat duty and implementing new battlefield strategies, Ball has more than ample experience. And that's something of an understatement.

Prior to being named commander of the 7th Special Forces Group, he served in a wide variety of Special Forces leadership positions, from a detachment commander to deputy commander for the 3rd Special Forces Group (Airborne) based at Fort Bragg. He served as a special operations task force commander and as an adviser to the Afghani Army Special Operations commander.

A graduate of the United States Military Academy, Ball was commissioned as a field artillery officer, serving in various leaderships positions before graduating from the Special Forces Qualification Course in 1997.

Prediction of the future battlefield scenarios for the individual branches of the service can be tied to presidential cycles, but that is actually more related to an overall national security strategy, which is a part of a top-down process that filters down to individual units.

"Are there radical changes to an overall strategy with every administration? No, not necessarily, but that is how the process works," says Ball. "The strategy gives you overall guidance and direction. It is a grand gesture of what a combat command or a functional command wants to accomplish." It's also the way units get funded, establishing requirements and then finding capability gaps as that are made in the structure of a command.

One example of a change in organization and structure is how the Marine Corps changed an infantry platoon's force structure to include a better definition of the use of squads and fire teams. In terms of force modernization, the Marine Corps found a capability gap within its structure.

"I have been given this requirement, I therefore need this capability," says Ball of how a commander might answer questions of operations on the battlefield. "And that capability might not even exist at the specific

"The strategy gives

you overall guidance

functional command

wants to accomplish,"

commander of the 7th

Special Forces Group

says Michael Ball,

retired colonel and

and direction. It is a

grand gesture of

what a combat

command or a

(Airborne).

point in time. Or it could be something that a unit has to procure because the ability already exists."

A good example of that would be with the U.S. Army (and Marine Corps) leaning toward a new individual rifle to replace the M4.

"We need to see China as the new challenge. We have fought a war for more than 20 years in which we have not faced opponents who have body armor," says Ball. "Today, the standard issue weapon across the military is a 9 mm for a handgun and a 5.56 mm round for the M4."

But the Chinese have developed body armor with a 7.62 mm capability, "and

why, because the AK is so cheap," says Ball. (Meaning it is less costly and a favorite rifle of many militaries around the globe.)

So what's the new Belle of the Ball when it comes to our future infantry? Earlier this year, soldiers at the Cold Regions Test Center at Fort Greeley Alaska fired the new XM7 rifle and XM250 automatic rifle as a part of the Next Generation Squad Weapon program.

The XM7 will replace the M4 Carbine while the XM250 auto-

matic rifle will replace the M249. Both are 6.8 mm and designed for close combat uses in infantry, special ops, scouts, combat engineers, combat medics and forward observers. But get this: Both new weapons have an advanced fire control, which helps shooters compensate for bullet drop and distance through a ballistics computer.

The 6.8 mm round is an intermediate caliber (the first of its kind for our forces), is heavier and can have lethal impact at greater distances. It can also punch through barriers that stop the standard 5.56 mm.

But new infantry weapons and technological developments such as drones must be paired with a new way of thinking. For 20 years, we have been at war in conflicts that are defined in numerous ways, "whether you call it asymmetrical, counter terrorism or whatever you want to call it, it all comes under the umbrella of irregular warfare. To this day, we still have a counter ISIS mission set.

"But now we have to start looking at rebalancing our national efforts, and that includes everything from diplomatic efforts and information to military and economic challenges," says Ball.

"We need to look at China as a key challenger. That takes a different mindset—how to re-orient all of our forces to prepare for potential large-scale operations. We have a generation of the military who have grown up in 20 years of GWOT (Global War on Terrorism).

"We have been at it so long we have even stopped calling it GWOT. Now we have to start transitioning to understand this new competition phase with potential peer adversaries. The question is, how do we compete in these transitioning conflicts? What is that going to look like? How do we compete as a military within the global space? Because that is where China is competing."

Here is a breakdown of the military's long-term strategic thinking, although some of this may have changed since its original publication and new specifics and technology are unavailable to the public for obvious reasons.

U.S. ARMY

The U.S. Army's senior leaders have developed fresh concepts and logic to guide the Army's most significant transformation in the past 40 years to ensure the service retains the capability to defeat current and future adversaries. It plans to do this by maintaining an advantage in speed of decision-making, an ability to create a shared understanding of the battlefield and an overmatch in lethality in time and space. Army leaders are committed to establishing a sustainable strategic growth path



to transform its counter-insurgency-optimized force to a force prepared for the challenges of any major conflict.

U.S. MARINE CORPS

The U.S. Marine Corps has already proposed sweeping changes aimed at transforming the Corps from its established, land-focused role in the Middle East back into a naval expeditionary force-inreadiness primed for active engagement in contested maritime spaces, especially within the Indo-Pacific region.

The MarCorps Force Design 2030 imagines a leaner, more agile force equipped for naval expeditionary warfare and prepared for an unpredictable future. The strategy underlines the deployment of cutting-edge technologies like unmanned aerial and ground systems, advanced air defenses, and anti-ship missiles to enhance the Corps' ability to sense, strike and counter targets.

U.S. NAVY

The Navy released a long-term strategy of shipbuilding outlining the construction and retirement plans for the fleet over the next 30 years. It provides for two different outcomes based on how much funding can be obtained.

The first reflects the Navy's goal of reaching 381 ships in support of the National Defense Strategy. The goal is aligned with the





Battle Force Ship Assessment and Requirement (BFSAR) report released in June of last year. In a best-case scenario, the Navy's force would grow to over 330 ships in the mid-2030s, reaching 377 ships by 2045. One option is 348 ships by 2042, with the force continuing to grow to 387 ships by 2054.

U.S. AIR FORCE

Recognizing the global implications of a rapidly growing China and resurgent Russia, the Air Force is quickly recognizing that it operates in a changed strategic environment. In order to dominate in time, space and complexity in future conflicts, the Air Force realizes that it must operate at an unrivaled speed, to achieve unparalleled global awareness, reach and effect.

The 2030 Science and Technology Strategy from the Air Force aligns with this call, but it also requires transformational strategic capabilities that must be driven by scientific and technological advances. According to the strategy, rather than reacting to others' advances, the Air Force will set an unmatched pace. Instead of looking at where potential adversaries are heading, the Air Force scientific and technical enterprise will predict where adversaries cannot easily go and then ensure the Air Force gets there first.

U.S. SPECIAL OPERATION FORCES

While it has focused on countering terrorists since 9/II, Special Operations Forces realizes the need to face adversaries that have become increasingly capable of countering our capabilities and national interests. To protect and advance our national interests, SOF will adapt its formation, concepts and capabilities, while strengthening critical relationships with allies and partners. The SOF strategy provides a framework to guide evolution from the world's premier counter terrorism force into one optimally suited to support our joint forces and our nation.



BY THE EDITORS

For the inaugural Best Workplaces in Defense, *Emergent Defense* called for nominations from throughout the country and was met with several exciting and innovative businesses. These businesses represent what is next for defense technologies, all while supporting their employees and fostering growth from the inside out. Check out this year's awardees in the following pages

NOMINATION PROCESS

For the 2024 Best Workplaces in Defense, a link to a nomination form was emailed to businesses and people throughout the country and subscribers of *Ohio Business* magazine, inviting them to self-nominate. A form was also posted online so that other businesses could participate. For-profit, nonprofit and government institutions were able to selfnominate. Nominees were asked to provide details about their workplace, benefits and interactions with the community. The winners were then selected by committee. If you are interested in nominating your company next year, subscribe to *Emergent Defense* magazine and its newsletter (both of which are complimentary) at EmergentDefense.com.

3D ENGINEERING SOLUTIONS

Cincinnati, Ohio Metrology lab offering reverse engineering services with certified scanning and 3D CAD modeling 3d-engineering.net 3D Engineering Solutions in Cincinnati, Ohio, founded in 2006, is an accredited metrology lab that offers reverse engineering services with certified scanning and 3D Computer Aided Design (CAD) modeling. Over the last few years, the company has supported the USA Diminishing Manufacturing Sources and Material Shortages Program with dozens of reverse engineering projects.

At 3D Engineering Solutions, only U.S. degreed engineers are hired. All project engineers are cross trained on all ISO-17025 accredited coordinate measuring machines, structured blue light scanners, Industrial Computed Tomography and a CAD program for modeling purposes.

According to the company, its employees are its No. I asset, and they are provided with the most accurate tools in a state-of-the-art metrology lab led by 3D Engineering Solutions' U.S. Air Force veteran president, James Irwin.

The company recently received the 2024 Quality Plant of the Year Award from *Quality Magazine*, and its team has a social event planned soon to celebrate.

ADVANCED ENGINEERING CONSULTANTS, LTD.

Columbus, Ohio Provides engineering design services for governmental, for-profit and nonprofit organizations aecmep.com

Advanced Engineering Consultants, or AEC, provides mechanical, electrical, plumbing, technology and fire protection engineering assessment, design and construction administration services to governmental, for-profit and nonprofit organizations.

The company, which was founded in 1998 in Columbus, Ohio, is proud to have been providing these services to various Department of Defense (DOD) agencies since 2007. Since then, AEC has completed over 200 projects at U.S. military installations located in 25 states. These services typically include assessment of existing facilities, design of new facilities, renovation of existing facilities, energy studies and construction administration services.

In addition to DOD agency clients, AEC has also provided services to the National Aeronautics and Space Administration (NASA) at Glenn Research Center in Cleveland, Ohio, and Langley Research Center in Hampton, Virginia.

Through these various contracts, AEC has gained experience with the design of a wide range of military facilities like aircraft hangars, vehicle maintenance facilities, research laboratories, barracks, training facilities, administrative buildings and utility systems.

Employees of AEC are an integral part of the company, and they are treated with the respect and attention they deserve, according to AEC.

As an employee-owned company, all employees wear the "ownership hat" and can provide feedback on ways to make AEC better. Under this ownership model, AEC encourages all employees to act and think like an owner in their everyday tasks.

All of AEC's principals, team leaders and project managers



have an open-door policy. If an employee needs help on a project, wants to discuss career aspirations or just have an open conversation, the leaders all make themselves available and listen with an open mind.

Outside of having an open-door policy, AEC supports employees interested in advancing their careers by supporting professional memberships, providing tuition reimbursement and encouraging employees to attend educational sessions that improve or advance their skills.

Management at AEC is dedicated to making everyone at AEC feel seen and heard and to staying engaged with employees to continue improving its workplace culture.

AEC's benefits, Employee Stock Ownership Plan structure and engagement have led to a productive and positive impact on overall operations. The company has also always encouraged its employees to be active in their local communities and in professional associations. By being involved with these associations and programs, AEC's employees can further their professional careers and spread AEC's name in the industry.



BAKER INDUSTRIES, A LINCOLN ELECTRIC COMPANY Macomb, Michigan

Supplier of tooling, flight hardware, prototyping, CNC machining, fabrication, additive manufacturing, assembly, finishing, quality inspection, and design and engineering services to OEM and Tier 1 manufacturers bakerindustriesinc.com

Baker Industries, a Lincoln Electric Company, was founded in 1992 but acquired by Lincoln Electric in 2019. The company, which is headquartered in Macomb, Michigan, is an industry-leading supplier of tooling, flight hardware, prototyping, CNC machining, fabrication, additive manufacturing, assembly, finishing, quality inspection, and design and engineering services to original equipment manufacturers (OEM) and Tier I manufacturers in the world's most demanding industries. The company also supplies services directly to the Department of Defense.

Its Michigan campus is home to five state-of-the-art facilities, totaling over 250,000 square feet, and some of North America's largest CNC machining and advanced manufacturing equipment.

Being a diverse and highly engaged organization is essential for Baker Industries' success by cultivating a workplace that actively involves employees, ensuring they align with the company's core values, contribute to the organization's success and feel confident about their future.

To encourage active engagement and inclusivity, Baker Industries' supports an open-door policy all the way up to the chairman's office, promoting transparency and collaboration, and sends out an annual global employee survey and topic/region-specific surveys to gather valuable insights.

Baker Industries also has skills and career development programs that support professional growth, internal promotions and a strong succession pipeline. Employee-led resource groups, such as Cleveland-based Diversity Councils, Young Professionals, Veterans and Women in Lincoln Leadership (WILL), are all supported by senior executives and organized around special interests.

The company also has a comprehensive benefits program, including medical, dental, vision, disability, life insurance, health savings accounts, flexible spending accounts and other programs that provide value to its employees. Baker Industries also provides its employees with a 401(k) plan with an employer match and a tuition reimbursement program to eligible employees to further their education.

The company has volunteerism and giving programs that encourage employees to engage with and contribute to their communities. By matching U.S. employee donations and supporting various local initiatives, Baker Industries fosters a spirit of giving and community involvement.

The company's employee-relations policy has profoundly impacted its company operations and the local community, according to Baker Industries.

By investing in employees' well-being, professional growth and engagement, Baker Industries has created a resilient, innovative and committed workforce that drives its business forward and positively influences the local community.

THE PDI GROUP LLC

Solon, Ohio, & Mount Laurel, New Jersey Designer and manufacturer of weapons handling systems, ground support equipment and aircraft support equipment and a supplier of critical fasteners and failure-critical gun parts

thepdigroup.com

The PDI Group in Solon, Ohio, consists of three member companies: PDI Ground Support Systems (PDI), KWD Aircraft Support Equipment (KWD) and Polytech Defense Spares (Polytech).

Founded in 1962 in Solon as Prototype Development Incorporated, PDI has evolved into a leading designer and manufacturer of weapons handling systems and ground support equipment used primarily by the U.S. Air Force, Navy and Army Special Operations Command, in addition to 49 allied air forces worldwide.

PDI's engineering team is critical to the success of the company, assisting customers in new designs (utilizing 3D modeling software) while also assisting the production team in the technical aspects of product flow and operational efficiencies.

One of its member companies, KWD (formerly KWD Manufacturing), was founded in 1986 and is a leading designer and manufacturer of aircraft support equipment used by the U.S. Air Force and Navy and many other air forces and navies throughout the world. KWD's major product lines include quick engine change dollies, propeller dollies, radome dollies and tire dollies, all to support C-130 aircraft maintenance.

Another one of PDI's member companies, Polytech, which is located in Mount Laurel, New Jersey, was founded in 1970 and has been a longtime supplier of critical fasteners and failure-critical gun parts to the Department of Defense. It was also placed on the DOD's Qualified Suppliers List of Manufacturers, a list of esteemed manufacturers that the DOD deems trustworthy to manufacture these parts.

To maintain timely communications with the PDI Group's employees, numerous engagement opportunities take place throughout the year, like an extensive onboarding process, monthly meetings with all production employees and the vice president of Operations, and an annual luncheon with all employees hired during the previous 12 months, among other programs and meetings.

Because of its strong culture and relationships, the PDI Group retains its employees for an average of almost 15 years. The local community has also been positively impacted by a successfully operating business and a consistent and professional workforce. Annually, the company provides a \$1,000 scholarship for a graduating high school senior to be used for college studies.

As a company, PDI recognizes the importance of supporting charitable organizations throughout the community, state and county, and provides approximately 1% of its revenues towards University Hospitals, Cleveland Clinic Foundation and the Greater Cleveland Food Bank, among others.

TAKING RESEARCH to a NEWLEVEL



University of Dayton Research Institute

At UDRI, our people are our greatest asset. Our team brings their innovation, teamwork, and dedication to the work we do every day. While technology drives our work, we are consistently driven as a team to reach and exceed our partners' expectations.

See how far you can go with us.

THE POWER OF THE INSTITUTE

WEST OHIO TOOL CO.

Russells Point, Ohio Manufactures and services custom cutting tools westohiotool.com

West Ohio Tool Co. in Russells Point, Ohio, was founded by Kerry and Kim Buchenroth in 1989 and is led now by CEO Kaci King, their daughter.

Kerry was one of four people, and one of two Americans, that was selected to start the Honda Engine Plant in Ohio. After this, he worked his way into engineering and cutting tools and developed a passion for teaching others how to problem solve. He started West Ohio Tool Co. to do just that, helping people in manufacturing solve problems with cutting tools became the company's niche.

West Ohio Tool Co. is still family owned, and as a family-owned company, it places value on its employees being with their families. The company established a single shift and created benefits to be competitive with other facilities in the area like Honda because the company truly "values people," according to King.

Kerry and Kim continued to manage the business until Kim retired in the late 2010s. King and her husband, Rea King, then stepped in to manage West Ohio Tool Co. in 2020.

Since then, the company has implemented a system called "EOS" to help manage the business. The system helps to make sure processes for everything are in place and followed by all employees.



Over the last few years, King has also looked at benefits and processes and continued improving both along with obtaining new quality certifications and compliances that lay the foundation for obtaining Department of Defense contracts.

West Ohio Tool Co. has an extensive benefit program, which includes 100% paid health insurance premiums and a health reimbursement account for services like chiropractic medicine.

King shares that "giving back goes deep to our roots," which is evident in the company's programs. West Ohio Tool Co. established three initiatives in 2022: I) For every manufactured part number ordered, IO free meals are donated to Feeding America, which funds the local food bank, 2) employees can have up to two paid days annually while volunteering with an organization of the employee's choice and 3) employees can volunteer as a team within the local community to load holiday meal boxes for those in need.

PROUD TO BE A BEST WORKPLACE IN DEFENSE



SETTING THE STANDARD IN MANUFACTURING INNOVATION & WORKPLACE EXCELLENCE

Flight Hardware · Tooling CNC Machining · Fabrication 3D Printing · Assembly Finishing · Quality · Design

Explore our leading-edge manufacturing solutions or join a team that's powering the future of defense technology!

www.baker.aero/emergent-defense

 EXPERIENCED. CLIENT-FOCUSED. RELIABLE.

An engineering leader with over 25 years of sustainability and growth, providing high quality design consultant services in support of our nation's defense.





MECHANICAL | ELECTRICAL | PLUMBING | TECHNOLOGY | FIRE PROTECTION ENGINEERING DESIGN SERVICES

NAICS Code: 541330

SB | SDB | DBE | MBE

UNIVERSITY OF DAYTON RESEARCH INSTITUTE (UDRI)

Dayton, Ohio Sponsored research and development, technology transition, and education and workforce training udayton.edu/udri/

The University of Dayton Research Institute (UDRI) in Dayton, Ohio, provides research, development and technology transition services in many science and engineering fields. Most of UDRI's capabilities are in the areas of advanced manufacturing, autonomy, energy and power, fuels and combustion, human technologies, hypersonics, materials, sensors and software systems, structures and systems, and sustainment.

The leadership of UDRI connects its nearly 1,200 employees through various media, including email, intranet and video messaging. The institute's

intranet site offers employees many resources for all aspects of business operations, training and development.

UDRI's leadership also prioritizes personal engagement to foster in-person, two-way communication with employees. In-person meetings range from large gatherings to visits by the vice president and associate vice president to employees in their research and business offices in Dayton as well as in Utah, Georgia, Oklahoma and Florida.

UDRI Vice President Sukh Sidhu, head of the organization, maintains an open-door policy and reminds employees that they are always welcome to meet with him directly to discuss ideas.

While UDRI has some team- and morale-building events hosted at the organizational level, employee groups are also encouraged to coordinate events designed to bring fun to the workplace.

All employees enjoy the benefits offers by the University of Dayton, including health, dental, vision, life and disability insurance, flexible spending accounts, retirement programs, tuition remission for employees and their dependents, separate leave for vacation and illness, and a generous holiday calendar.

Throughout UDRI'S 68-year-history, one tenet has been held above all others by every UDRI leader to this day: Its employees are its biggest asset.

In the last several years, the institute has experienced significant growth in the amount of sponsored research it performs, the diversity of capabilities and off-campus locations employees from which now work (in addition to on-campus labs and offices).



With this growing number of employees, UDRI leadership saw a need to expand the employee relations program to make sure employees continue to feel connected to one another and to the institute.

Although most of the employee relations initiatives described have been in place for decades, there has been an effort in recent years to enhance and grow them.

To accommodate this change and demonstrate the importance of employee engagement, UDRI leadership created the Office of Employee Experience and Engagement in 2023. This office drives initiatives such as the deployment of improved communication tools, the development of comprehensive leadership training programs and the expansion of opportunities for employee recognition.

This office also elevated the UDRI co-op program to become the UDRI Scholars Program, providing enhanced experiential learning opportunities for student employees.

Other initiatives in employee relations include a new hire onboarding program, supervisor training, security awareness training, professional development programs, employee morale and team building events, surveys and feedback mechanisms, and employee recognition programs.

Last fall, UDRI launched the Digital Transformation Center, a physical space to provide resources to enable collaboration among government, industry and academic partners that will drive open approaches and solutions to advance the digital transformation goals of the Air Force.

Don't Fear the Reaper

DRONES CONTINUE TO BE A FEATURED PART OF FUTURE COMBAT

BY TERRY TROY



veryone who has seen any of the war stories coming out of Israel, Gaza, Lebanon and the entire Middle East knows about the growing importance of drones in future combat. There will soon be a time, and it's just around the corner, when drones and UAV out-

number conventional aircraft, missiles and even ground forces on the battlefield.

It's a whole new combat paradigm. And our military is already training for it.

At Hurlburt Field in Florida recently, more than 30 MQ-9 Reaper squadrons from across the Air Force came together for the fifth annual **Reaper Smoke** competition. Hosted by the 2nd Special Operations Squadron, Reaper Smoke is a competition that highlights skills and advancements in the MQ-9 community, emphasizing innovation and operational readiness.

"This event isn't just about tactics, training or collaboration within the MQ-9 community, it's about preserving our heritage and keeping the camaraderie strong," says Lt. Col. David Payne, 2nd SOS commander. "It's important we carry on this tradition, which dates back to the original Air Force Gunsmoke competition in 1949, by recognizing and crowning the top MQ-9 crews and continuing the rich heritage." The 196th Attack Squadron with the California National Guard took home the top prize.

Participating in 30-minute tactical scenarios, pilots and sensor operators tested their skills and decision-making capabilities facing challenges that ranged from tactical maneuvers to skills requiring precision flying and advanced techniques that are a part of the evolving nature of the future battlefield.

Not only did Reaper Smoke allow for friendly competition between units, it included briefings from leaders across the MQ-9 community.

"Air Force Special Operations Command is focused on specialized air power," says Col. Mark Jones, AFSOC Concepts and Capabilities Development Division chief. "The MQ-9 inside AFSOC is focused on training the fundamentals—training airmen to be skilled and adapt to use the MQ-9 in ways we haven't used it before—for the future."

To fully leverage the capabilities of the MQ-9, seamless communication between those behind the controls is essential to maintain operational readiness. Competitions like Reaper Smoke are designed to enhance these skills and strengthen collaborative problem-solving.

"It's important to get that face-to-face, so if you do encounter



a problem in the future, you know a name, you know a face and a person that you can call to problem solve together," says Maj. Aaron Christensen, 2nd SOS chief of combat operations, assistant director of operations and officer in charge of Reaper Smoke. Reaper Smoke is not only a competition aimed to build camaraderie, it promotes a culture of innovation, continues Jones. "It helps us tell the airmen in the seats that they're the smart ones, they're our hope for tomorrow," Jones says.

The MQ-9 is hardly new to the battlefield. It debuted in combat in Afghanistan in 2007. While the Reaper's primary mission was as an intelligence collection asset, and secondarily a weapon, its significant loiter time, wide range sensors, multimode communications and precision weapons offered a unique capability to perform military strikes against high value, fleeting and often time-sensitive targets. So, it only makes sense that the MQ-9's mission started to evolve.

Our enemies and rivals are already on board when it comes to expanding the role of drones in combat. The first recorded instance of drone-on-drone combat occurred above the Donetsk region of the Ukraine. During the Russian invasion, both sides used drones for reconnaissance until a Ukrainian DJI Mavic quadcopter rammed a Russian drone of the same model, resulting in the crash of the latter on the deck below. A new era of air combat was officially born.

But air-to-air combat is but one future battlefield use of UAV. When it comes to logistics, resupply and cargo, drone usage continues to expand, at a rate that matches the industry's technological innovation.

Reliable Robots, a developer of autonomous aircraft systems out of California, recently completed a series of automated missions across airfields in California and Nevada for the Department of the Air Force.

In conjunction with Air Combat Command, Reliable demon-

strated aircraft automation capabilities as part of the Agile Flag 24-3 exercise. The company transported cargo between military bases and airports, some hundreds of miles apart, over the course of a week.

The exercise was designed to be representative of the Indo-Pacific region, demanding agility, readiness and multi-domain operations. Automated flights of a Cessna 208B Caravan included autotaxi, autotakeoff, en-route navigation and autolanding. All flights were managed by Reliable's remote pilot while an onboard pilot monitored.

Reliable deployed a mobile control station onsite at Mojave Air and Space Port, which served as a base of operations for the military exercise. The rapid deployment of Reliable's mobile control station enabled onsite demonstrations of the remote piloting side of the

operation for Air Force and NASA personnel.

Drones have also proven useful for tactical resupply in much closer proximity to the actual battlefield. Earlier this year, the U.S. Army's completed its first nighttime autonomous aerial resupply of ammunition during a battalion-level Leve Fire Exercise using a vertical takeoff and landing (VTOL) unmanned aircraft system (UAS) from **Soaring** Gabriel, using its GI multi-purpose, multi-payload autonomous aerial vehicle.

The GI completed 40 tactical drills to resupply platoons with class I and class V supplies, including food and ammunition. That included completion of three emergency class V resupplies, delivering 800 rounds of 87.62 ammunition to the platoon's weapons squad during each drop.

Capable of transporting mission-critical payloads to infantry platoons and squads at the tactical edge directly from the Battalion's Combat Trains Command Post (CTCP), Soaring's GI system successfully demonstrated its ability to resupply entire platoons faster and with less risk than ground vehicle-based resupply missions. The GI offers mounting compatibility for varying cargo needs, supporting mission agility.

We can expect to see military drone usage to grow, especially as technology continues to evolve and improve. A new liquid hydrogen refueling system for drones has already expanded drone range six times or more, with conservative estimates placing the range of even the smallest of drones at more than 1,000 miles. And the technology is scalable, meaning it can be used for everything from Quadro copters less than 55 pounds all the way up to fixed wing UAVs. (See related story on page 32 in this issue.)

Drone-on-drone aerial combat, drones for all phases of ground war logistics... will we see drones descending from space platforms any time soon?

The expanding use of battlefield drones seems to be limited only by military imagination. ■

Emergent & Contraction of the co

The Global Editorial Board of *Emergent* Defense magazine is where expertise converges to illuminate the intricate landscape of defense. Led by seasoned president and publisher, Eric Harmon, our board boasts a formidable assembly of military veterans, defense analysts, geopolitical strategists and industry pioneers.

With a keen eye on emerging technologies, evolving threats and shifting geopolitical dynamics, our diverse team ensures that *Emergent Defense* magazine remains at the forefront of informed discourse. Through rigorous analysis and profound insights, we endeavor to provide our readers with a comprehensive understanding of defense matters, empowering them to navigate the complexities of today's security challenges with clarity and foresight.

Are you interested in learning more or possibly joining our board? Visit EmergentDefense.com to meet our board members or email Eric at publisher@emergentdefense.com to connect with us directly.

www.emergentdefense.com

Sign up at EmergentDefense.com

to receive a complimentary subscription and the weekly *Emergent Defense* newsletter.

An Ever-Changing Workhorse

TACTICAL WHEELED VEHICLES ARE BEING ADAPTED TO MEET THE MILITARY'S CURRENT AND FUTURE NEEDS

BY DAVID HOLTHAUS

actical wheeled vehicles (TWVs) are the workhorses of the military. They move food, fuel, mail, people and gear, and can sometimes be equipped with weapons. Because they are essential to moving an army around, they must be able to operate reliably in harsh environments without the benefits of paved roads.

Rising demand for personnel mobility, the growth of the military and the demand for technological advancements are expected to result in steady growth for the market for military trucks and other wheeled vehicles. That's true not only in the United States, but in other countries. Canada is updating its fleet of light and heavy logistics vehicles, and countries in the Middle East and North Africa, such as the United Arab Emirates, Kuwait and Morocco, are also examining their needs for a modernized tactical capability for their armed forces, according to **GM Defense**, the North Carolina-based military subsidiary of General Motors.

Perhaps the most recognizable TWV is the High Mobility Multipurpose Wheeled Vehicle, better known as the Humvee. The Humvee entered service in the 1980s, but became the image of the conflicts in Iraq and Afghanistan in the 1990s and early 2000s. It was designed to get traction on difficult terrain, such as a desert, was lightweight but able to bear several soldiers and mounted weaponry on patrols and into battle.

It's also an example of how the demands of the military change with the times and the nature of conflicts. The Humvee was not designed for urban conflict, and while its light weight meant better off-road mobility, its armor did not provide adequate protection

The demands of the military change with the times and the nature of conflicts.

for soldiers in conflict zones. Over the last few years, the Humvee has been gradually replaced by the Joint Light Tactical Vehicle, the JLTV. Since 2015, **Oshkosh Defense** has provided the U.S. military and some of its allies

with more than 22,000 JLTVs, the Wisconsin-based defense contractor says. The vehicle is designed to improve performance, payload and protection capabilities, and its variants and add-ons make it a versatile and adaptable vehicle.



The JLTV is designed to perform on rocky coastlines, snow and ice-covered regions, mountains, and deserts. Along with the U.S., NATO allies that use Oshkosh JLTVs include Montenegro, Slovenia, Slovakia, Belgium, Lithuania, North Macedonia and Romania, the company says.

Oshkosh also manufactures the FMTV, the Family of Medium Tactical Vehicles, which is actually a series of vehicles that are based on a common chassis. Its role in the military is similar to that of one of its forerunners, the long-lived 2.5-ton cargo truck that was known as the "deuce and a half."

In September, Oshkosh announced that the Army had placed a \$72.9 million order for FMTV. It was the company's fourth FMTV order of the year and came on top of a \$108.8 million order in May for the U.S. military and some of its international partners.

Companies in the supply chain for TWVs must be able to adapt to changing global situations and to the military's evolving needs, says Mark Lyall, director of industrial sales at **Cummins**.

"It's largely dependent on the geopolitical situation at the time," he says. "In the early 2000s, we were developing gigantic vehicles capable of playing in the sand. Now we have to keep in the back of our mind things like ice and snow, which is a completely different vehicle setup."

In 2022, Columbus, Indiana-based Cummins, a manufacturer of engines, merged with Troy, Michigan-based **Meritor**, a sup-

plier of drivetrain and braking systems. The merged company now provides integrated powertrain systems for a wide variety of applications, including defense.

Urban environments with narrow streets present different challenges than wooded regions with streams and mountains, Lyall says, meaning contractors must adapt. "It's a constant evolution and a constant pivot for our industry."

The Army has been urged to work more closely with industry to develop these vehicles. A 2021 report from the General Accounting Office said, "The Army could expand the cur-



rent industrial base for TWVs. This is due in part to a healthy commercial truck market."

As an example, GM Defense, a subsidiary of General Motors, has developed the Infantry Squad Vehicle (ISV), a light and agile all-terrain troop carrier that can transport a nine-soldier infantry squad and its equipment. The ISV is based on the Chevrolet Colorado midsize truck architecture and uses 90% commercialoff-the-shelf parts, GM says. It is light enough to be sling-loaded from a Blackhawk helicopter and compact enough to fit inside a Chinook helicopter for air transportability. The ISV was the first major award for GM Defense since the subsidiary was reestablished by its parent company in 2017.

In 2020, GM Defense won the initial \$214.3 million contract to develop the ISV, and last year, the Army provided GM a full-rate production decision, allowing production to ramp up.

"We're seeing an increased need for light tactical wheeled vehicles that deliver agility, speed and lethality," says John Johnson, vice president of business development for GM Defense. GM Defense has delivered more than 300 of the vehicles to the Army, with many of them fielded by the 82nd and 101st Airborne Divisions.

One of the more recent developments in this area is the Army's Common Tactical Truck (CTT) program. In 2023, the Army announced agreements, totaling \$24.25 million, with four contractors to provide three prototypes of each of their variants of the CTT family of vehicles. The contractors were Allentown, Pennsylvania-based **Mack Defense**, Lisle, Illinois-based **Navi**- star Defense, Oshkosh Defense and a partnership of Sterling Heights, Michigan-based American Rheinmetall Vehicles and GM Defense.

The Army says the CTT program is intended to redesign its truck fleet to integrate commercial technologies such as advanced driver assist systems, autonomy-readiness, fuel efficiency, exportable power and predictive maintenance. "This approach allows the Army to modernize at the pace of industry, integrating new technologies as they are developed," the Army says.

Testing of the prototypes began this year, and a production contract decision is expected in 2026.

The DOD is also funding production of vehicles that use artificial intelligence, autonomy, computer vision and other capabilities to be used in areas considered too risky for human travel. In December 2023, the Army announced three agreements, worth a total of \$14.8 million, to Clarksburg, Maryland-based **Forterra** (formerly Robotics Research Autonomous Industries), Warrendale, Pennsylvania-based **Neya Systems**, and Pittsburghbased **Carnegie Robotics** to provide four prototypes from each for the Autonomous Tactical Vehicle System, or ATV-S, program.

The Army says it's looking for potential solutions to convert existing military vehicles into uncrewed vehicles. The systems will be designed to deploy in the Army's Palletized Load System, a key element of the Army's supply capability consisting of trucks and trailers. The technologies may eventually be adapted to other Army tactical wheeled vehicles and other vehicles within the Department of Defense's fleet. ■



Tiger Traps THE DEFENSE PLANNING CONUNDRUM



BY COLONEL J.P. CLARK

n World War II, German tanks like the famous "Tiger," with its powerful main gun and thick armor, spread terror among the Allied tank crews. These individually fearsome vehicles were also difficult to maintain, strained logistical systems and could not be produced in large enough numbers to win the war.

The conundrum of military planning today is how to escape our contemporary "tiger trap." The modern battlefield demands highly capable systems and skilled personnel operators. Yet these systems are so costly and the training so extensive that militaries cannot generate the mass necessary to achieve strategic objectives. As one experienced observer neatly summarized it in private conversation, "The problem is that we can only get 80% of the way there."

This tiger trap, to varying degrees, is evident in all advanced militaries. The perils of making it only 80% of the way are evident in Ukraine, where Russian forces almost reached Kyiv in 2022. There are tiger traps in the Asia-Pacific as well. A recent wargame conducted by the Center for Strategic & International Studies received far more general media attention than is typical for such affairs. Most stories focused on the outcome: a victory for the United States-led coalition, albeit at a staggering cost. These accounts tended to overlook the telling title of the report, "The First Battle of the Next War." With what would the two sides fight the second and later battles with the exquisite forces with which they began shattered?

There has long been a quiet understanding that we need to move from the present "tactics-up" approach, in which we first design systems to meet expected battlefield conditions at the platform and small-unit level and hope that scales up. Recent events and wargames demonstrate that this will lead to a strategic cul-de-sac in great power conflict. Aside from overcoming those with vested interests in the status quo, there are two substantive issues to adopting a "strategy-down" approach that begins with designing for the mass required to win a conflict.

The first is that the tactical requirements to which present systems are designed are real. The oft-used description of "exquisite" defense programs is never meant as a compliment but implies that the systems are needlessly exquisite. Undoubtedly, there are instances of "gold-plated" requirements demanded by the military or unnecessary "bells and whistles" sold by defense contractors. But it is possible to acknowledge an imperfect requirements and acquisitions process and still admit there is also ample justification for current systems and forces.

The war in Ukraine has trended toward stalemate due to the relative ease of frustrating the enemy's efforts compared with the great difficulty of operating with coordinated mass in deadly environments on the ground, in the air and at sea. This poses great challenges for any state that will demand its military to achieve some positive aim, whether Russia in conquering further territory and Ukraine in retaking it, or China in invading Taiwan or the United States defending the island from thousands of miles away. Those tasks require systems and forces with exceptional all-around capability.

This trend is most evident in the air. Fourth-generation aircraft are by any reasonable measure technological marvels. Yet the air war in Ukraine, even after the full introduction of F-16s, is likely to remain one of stand-off glide bombs, air-launched cruise missiles and long-range intercepts. We can only speculate as to what would happen if the most advanced fifth-generation aircraft were employed. Even they might not be enough, but they are certainly costlier to buy and operate than their predecessors (which are far from cheap themselves).

Ground warfare has its own version of exquisite in the trained all-arms tactical unit. Offensive action requires armored vehicles, infantry, artillery, electronic warfare, an array of reconnaissance and lethal drones, and air defense. It was difficult enough in the 20th century to simply integrate maneuver with direct and indirect fire. Now, layering in the interlocking battles in the electromagnetic spectrum and the drone-filled air-ground littoral, commanders and staffs will require an exceptional level of proficiency that only comes with extensive—and costly—training.

The alternative is what we see in Ukraine, where even relatively well-equipped forces rely on either positional defense or offensive operations at only the company-level or below. Yet even the U.S. Army cannot afford to create as many exquisite battalions and brigade combat teams to conduct a campaign in the breadth, depth and duration required to achieve significant operational effect. And for those who hope that the widespread introduction of drones will be the silver bullet that solves these problems, commentary by Michael Kofman of the Carnegie Endowment for International Peace and Justin Bronk and Jack Watling of the Royal United Services Institute note that the cost of militarily useful drones at scale is much greater than many think, as well as requiring large numbers of personnel to support and overcoming significant technical and organizational challenges.

The second problem is that a "strategy-down" design approach has its own inherent flaws. Militaries optimized to massive expansion rely upon much simpler tactics and equipment. Any country adopting such a design wholesale would find itself at a disadvantage in crisis and the early stages of a conflict. It is organizationally and politically difficult to knowingly cede the first battles to an enemy, even with the recognition that they have fallen into a tiger trap and that your side will—provided that political will survives devastating early losses—eventually prevail. In the meantime, an expansible military is often a miserable experience for professional soldiers, who chafe at the simplified tactics, obsolete equipment, low readiness and skeletonized units that are the daily reality in such a force, as seen with the U.S. military in the interwar years.

Thus, all militaries must seek a solution to the tiger trap. The solution might be is not evident, but whoever solves the challenge will have an immense advantage. ■



J.P. Clark is a retired armor officer and strategist. He is the author of *Preparing for War: The Emergence of the Modern US Army, 1815-1917* (Harvard University Press, 2017), and is currently working on a history of U.S. military

strategy in the Pacific from 1898 to 1941.

Mitigating the 'Tyranny of Distance'

TECHNOLOGICAL EVOLUTION AND THE CONTINUED REQUIREMENT FOR MASS IN WARFARE



BY COLONEL CHAD M. PILLAI

"Quantity has a quality all its own." - JOSEPH STALIN

he Russo-Ukraine War validated Stalin's statement as the U.S. and its European allies struggled to respond to Russia's illegal invasion of Ukraine effectively. The Russian military had a quantitative advantage in comparison to the Ukrainian defense forces; however, due to inept leadership and planning, the Russian offensive failed to achieve its strategic objectives of rapidly subduing the Ukrainians. The Ukrainians utilized asymmetric tactics, including the use of commercially available drones, to conduct intelligence, surveillance and reconnaissance (ISR) and strike to decimate Russian formations and command and control (C2) nodes.

Despite their tactical success, the Ukrainians faced an enemy willing and capable of absorbing punishing losses as the war transitioned from maneuver to attrition. Additionally, the Russians adapted and utilized their drones and those provided by third parties, such as Iran, in a similar manner to conduct ISR and strike missions. To mitigate the Ukrainian and Westernsupplied precision strike capabilities, the Russians employed more electronic warfare capabilities to disrupt communication links and precision navigational systems actively.

Beyond the tactical and operational lessons learned, the observations from the Russo-Ukrainian war profoundly impact current and future planning for modernization, doctrine and the execution of war by foes and friends alike.

Since 1991, the U.S. and its allies and partners have planned and conducted unmolested military operations that allowed for the creation of "iron mountains" and large static command and control nodes to C2 fights from hundreds or thousands of miles away from the tactical edge of battle. From 1991 until today, the U.S. and its allies and partners faced third-rate state enemies such as Iraq or non-state actors such as Al Qaeda and ISIS who had limited means to challenge their adversaries across the full spectrum of conflict: air, land, sea, space and cyber domains.

However, today, the U.S. faces adversaries such as China, Russia and Iran, who have invested in the capabilities to contest the electromagnetic spectrum (EMS) and use both kinetic and non-kinetic means to contest the logistical force flow model the U.S. has become too familiar and comfortable with since 1991. The contested EMS and logistical realm mean the Joint Force must reconsider its approach to planning and executing operations with the realization that things will take longer and that attrition must be acknowledged and mitigated.

A recent congressionally mandated report highlighted that the U.S. faces a multi-theater fight involving China, Russia and Iran and that the U.S. needed to not only invest more money in weapons procurement but reform its strategy for "integrated deterrence" to make it more effective. As a result, the Joint Force must consider the impact of homeland defense as an aspect of strategic and operational planning since it will require forces to protect critical infrastructure, critical supply and transportation nodes for the defense industrial base (DIB) and air and sea ports necessary to deploy the force to the European, Indo-Pacific and Middle East.

Strategic planners at the Joint Staff, Combatant Commands and service components must account for the impact the homeland defense mission will have on forces available for overseas missions and the impact of enemy kinetic and non-kinetic effects on deployment timelines. Using space, cyber or long-range air and maritime drones to impact air and sea operations could conceivably disrupt carefully developed deployment plans that could impact operational plans in forward theaters that require reinforcements from the U.S.

In Europe, the NATO allies are in a "Race of Logistics" as they increasingly prepare to deter Russian aggression by improving sustainment infrastructure and energy reserves. However, NATO's

challenge will be coordinating logistics at the operational and tactical level, where NATO doctrine and policy dictate that logistics is a national responsibility in a collective fight.

The Joint Force must reconsider its approach to planning and executing operations.

In a contested EMS

and logistical framework, NATO's approach may be increasingly untenable, especially if smaller allies are not able to sustain their forces for prolonged periods of conflict against an enemy with much larger magazine depths and too much time is wasted coordinating cross-leveling of national supplies from one alliance member to another. Such an outcome would have political and military consequences as the alliance struggles to maintain the initiative against an enemy with a singular approach to its military operations.

Additionally, the alliance is facing the reality that its rear operational areas are vulnerable to kinetic and non-kinetic attacks, including cyber-attacks or drone surveillance against its

The development of new technologies such as unmanned systems, artificial intelligence and telecommunications networks are critical elements to the future of warfare. critical infrastructure and sabotage by covert or clandestine operatives.

A critical element of how the U.S. and its allies and partners deploy and employ their joint forces in a theater of operations relies on space-based and terrestrial platforms to process large amounts of data that inform civilian and military decisionmakers. Since 1991,

the U.S. has used GPS significantly for precision, navigation and targeting (PNT) to support operations worldwide with manned and unmanned platforms. However, nations such as Russia, China and Iran have invested in technologies to disrupt GPS signals, as seen in Ukraine, with Russian jamming impacting GPS-guided munitions. The strategic threat lies in their investments and desires to threaten the space-based and terrestrial infrastructure that supports strategic ISR and PNT.

A recent Center for Strategic and International Studies (CSIS) space threat assessment report on adversary counter-space weapons by China, Russia, Iran and North Korea illustrated the growing threat and its impact on U.S. strategic operations. In addition to space-based systems, Russia and China can threaten under-sea fiber optic cables, where most internet traffic for commercial and military communication systems exist. The expanded use of unmanned systems and artificial intelligence (AI) to support military operations is already straining the ability of the joint force to process information in a non-contested environment.

In a contested EMS environment, including degraded spacebased and terrestrial infrastructure, the quantity and quality of information decision-makers will have available will be severely limited. Additionally, the information network used to support the commercial and military transportation network to mobilize, deploy, employ and reconstitute forces will be severely degraded, impacting military operations' strategic and operational tempo. As seen in Ukraine, the rapid maneuver will transition to an attritional war as both sides suffer degradation to their C2 networks and logistical nodes. At this point, the side that could mass sufficient manpower and material at battle's operational and tactical edge will gain the competitive edge.

The U.S. and its allies and partners must accept that its advantage in technologies such as unmanned systems and network communications that support ISR, PNT and global force deployment is also its greatest vulnerability to adversaries such as Russia and China, who have invested in asymmetrical capabilities. To mitigate against these threats, the U.S. and its allies and partners must adapt their planning to account for operating in a contested EMS and logistical environment that includes accounting for a realistic assessment of its forces being mobilized, deployed and employed at the strategic, operational and tactical levels. Joint Force reconstitution, regeneration and reorganizational planning must also account for a degraded EMS and logistical environment.

Finally, the U.S. and its allies and partners must work with their defense industrial base to rapidly produce and field new equipment at the speed of war. Programs such as the U.S. replicator program are a good start for unmanned systems; however, it must consider innovative ways to utilize old systems, such as the Army's 1960s-era M113, in new ways to provide operational and tactical flexibility.

The development of new technologies such as unmanned systems, artificial intelligence and telecommunications networks are critical elements to the future of warfare; however, what they do not change is the requirement for ensuring that mass remains a crucial element as the employment of those new technologies by both sides of conflict negate each other's advantage. Finally, acceptance of the need for mass is how the U.S. and its allies and partners can mitigate the "tyranny of distance" that no current technology can overcome with "just-in-time" delivery of forces and material. ■



Colonel Chad M. Pillai is a senior Army strategist with multiple Army and Joint assignments in the U.S., Europe and the Middle East. Col. Pillai conducted his War College Fellowship at Queens University, Canada, earned his mas-

ter's in International Public Policy from Johns Hopkins University School of Advanced International Studies (SAIS), and is a member of the Military Writers Guild.



Flying Across Borders

PARALLAX ADVANCED RESEARCH AND OHIO AEROSPACE INSTITUTE'S COLLABORATION WITH QUEBEC WILL EXPAND OPPORTUNITIES FOR AAM



BY TERRY TROY

hat started as helping a company to find funding for the research and development of unique new hydrogen fuel technology has grown into an international collaboration between Ohio and the province of Quebec. That collaboration

could further grow to establish Ontario, Quebec, and seven states surrounding the Great Lakes into an international hub for the advanced air mobility (AAM) and drone industries.

Parallax Advanced Research of Beavercreek, Ohio, through funded programs that it manages, such as the Academic Partnership Engagement Experiment (APEX) on behalf of the U.S. Department of the Air Force, helped NEOEx Systems, Inc., a company headquartered in Amherst in Northeast Ohio, develop a technology that will enable a revolution in unmanned aerial vehicles (UAV) by providing on-board energy and power for extreme long-duration, long-range operations.

Liquid hydrogen has been used as rocket fuel for years. However, generating and storing large amounts of liquid hydrogen is extremely costly because of the cryogenic temperatures needed. The NEOEx system can generate small quantities of liquid hydrogen to the drone, where another on-board system stores the liquid and directs it to a fuel cell. In turn, that fuel cell produces electricity that powers drone flight. Water and heat are emitted as byproducts, making liquid hydrogen a cleaner energy source than fossil fuels or batteries.

Called the EXTreme ENDurance (EXTEND[™]) Energy and Power System and the LH(2)Direct[™] Liquid Hydrogen Refueling System, the technologies started garnering the attention of the U.S. military.

"I started NEOEx in 2015 with the idea of using my cryogenic hydrogen background to enable small and large drones to increase their endurance and range," says Mark Haberbusch, founder of NEOEx. "As a part of that process, I pretty much talked to everybody in the state of Ohio, trying to find funding opportunities. Then came Bob [Tanner] of Parallax, who suggested I work through the APEX program."

APEX has the mission to connect universities, businesses and the government; build collaborations among these sectors; identify their transformational operational defense solutions and capabilities; and advance defense technology development for the Department of the Air Force. APEX is a partnership intermediary agreement between Parallax and the Department of the Air Force.

"We put together a really good pitch on what we were trying to do with liquid hydrogen and drones and solving the problem of how to use small quantities of liquid hydrogen as fuel," says Haberbusch.

It wasn't long before NEOEx landed a multi-million-dollar defense contract to develop systems that fuel drones for the military.

Drones, outfitted with NEOEx's on-board storage and power system, are capable of flying up to 20 hours or 1,000 miles. That's many times farther than drones using gasoline or batteries. The best news is that the technology is scalable, meaning it can be used for drones of less than 55 pounds up to large AAM vehicles.

"Mark continues to do great innovative work here in the U.S.," says Tanner, who serves as executive director of Aerospace Partnerships for Parallax Advanced Research, which is also affiliated with the **Ohio Aerospace Institute** (OAI) in suburban Cleveland. "They ultimately got a second military contract."

But the story is far from over.

This past summer, Parallax and OAI were invited to the International Aerospace Innovation Forum hosted by **Aero Montreal**.

"We went north to talk about a collaboration called the Great Lakes Aviation and Space Technology Alliance (GLASTA), which was formed through a memorandum of understanding (MOU) between the OAI, Council of the Great Lakes Region, Canada, the U.S. and Aero Montreal," says Tanner.

The purpose of GLASTA is to strategically explore regional opportunities for collaborative innovation, supply chain and business development. Haberbusch from NEOEx attended the innovation forum as well.

"Aero Montreal is something of a sister organization to Parallax and the OAI, only it's in Canada," says Jarrod Morley, senior

Drones, outfitted with NEOEx's on-board storage and power system, are capable of flying up to 20 hours or 1,000 miles.

director of Strategy and Innovation for the organization. "Quebec represents the critical mass of the aerospace industry in Canada. We have close to 300 suppliers as well as five OEMs within a 30-mile radius of Montreal, so it really is a strong cluster.

Aero Montreal signed the MOU for GLASTA,

"and the goal of that alliance is to showcase the capability, capacity and resiliency of the Great Lakes region as an aerospace hub in North America and the world, even though currently it's just Quebec and Ohio that are a part of the process. Even so, we intend the world to know that the Great Lakes region is a great place to do business," says Morley. From Aero Montreal's perspective, there are two goals, says Morley.

"One is more of a supply chain element, where we want to make sure that what is going on in the Great Lakes is promoting business exchange," he says. "The second, where Bob is critical and Mark [Haberbusch] comes in, is on the innovation side.

"Bob brought Mark into the picture to showcase what he is doing with hydrogen," Morley adds. "What we are bringing in is our drone community. We



have payload manufacturers and drone manufacturers. What we are trying to do is play matchmaker between Mark's technology and our drone manufacturers, to see what we can do to further commercialized drone usage on a scalable size.

"That means starting with small Quadro drones, moving up to fixed wings—wherever it takes us. What we are bringing to the table is not only the drone but also an environment and infrastructure that will support the engineering, certification and business validation between Ohio and Quebec—to validate Marks' work as well as his business proposition."

One of the upsides to the new hydrogen-based fuel technology, according to Morley, is that it provides a cleaner means of power generation for the AAM industry.

"Which has implications not just for sustainability but also attracts younger people to the industry," says Morley. "They need to know that aerospace can be clean in nature, and I think that is going to happen, not just across drones, but the entire aerospace industry."

While the collaborative relationship is off to a promising start, there is still much work to be done.

"Ultimately, our goal is to expand our alliance to include the seven other U.S. states surrounding the Great Lakes as well as Quebec and Ontario," says Morley. "We need to demonstrate the capacity and capabilities of an international collaboration to make that happen."

Another key element of any international collaboration is understanding the policies and regulations of both countries.

"You can't just fence off an operation because it crosses a border and they don't permit certain activities on the other side," says Tanner. "That's a big challenge for both governments. As a part of this project, we are going to tackle that and bring regulatory bodies to the table to set the right policies in motion."

If successful in their efforts, Parallax, OAI and Aero Montreal could be responsible for not only a technological revolution in the AAM industry but also a business collaboration that becomes truly worldwide in its scope. ■

Leveraging Artificial Intelligence in **Acquisition Symposium**

Oct. 18, 2024 The MITRE Corporation, McLean, VA ndia.org

During this cutting-edge symposium, leaders from industry, government and academia will unite to explore the transformative power of AI in enhancing the defense acquisition workforce and processes.

26th Annual Expeditionary Warfare Conference

Oct. 22-24, 2024 JHU Applied Physics Laboratory Kossiakoff Center, Laurel, MD ndia.org

The premier event of the year dedicated to addressing the pressing issues in expeditionary warfare and force protection in worldwide.

Peter B. Teets Award Dinner

Oct. 24, 2024

Los Angeles Airport Marriott, Los Angeles, CA

ndia.org

The Space Division's highest honor. It recognizes public and private sector leadership or achievement that results in significant contributions to the development, introduction, operational contribution or support of space systems.

DoDIIS Worldwide Conference

Oct. 27-30, 2025

CHI Health Center Omaha, Omaha, NE ncsi.com/event/dodiis/

Join senior leaders, technical experts and innovators from across the Department of Defense, intelligence community, industry, academia and FVEY partners to collaborate, share unique insights and explore topics related to this year's theme: Integrated Deterrence through IT Superiority.

27th Annual Systems and Mission **Engineering Conference**

Oct. 28-31, 2024 Hilton Norfolk - The Main, Norfolk, VA ndia.org

This conference brings together defense community members from industry, government and academia to highlight ways for improving defense acquisition and system performance, and provides an interactive forum for program managers, systems engineers, chief scientists, specialty engineers and managers.

Hypersonic Defense 2024

Oct. 29-30, 2024 Le Méridien Arlington, Arlington, VA intelligence-sec.com

The event will feature discussions on the current hypersonic capabilities of the United States military regarding offensive and defensive scenarios. There will be discussion on the current collaborations and support universities and research labs provide to improve hypersonic defense capabilities.

2024 Aircraft Survivability Symposium

Nov. 5-7, 2024

Naval Postgraduate School, Monterey, CA ndia.org

This two-day, classified symposium with an optional third day of classified tutorials fosters technical dialogue and exchanges of information on aircraft survivability topics such as design, operational experience, threats current and future, reliability, maintenance and testing of aircraft survivability technologies. Attendees must hold at least a Secret clearance and be U.S. citizens.

EOD/IED & Countermine Symposium Nov. 6-7

National Harbor, MD countermine.dsigroup.org Brings together experts, innovators and policymakers to address critical challenges in explosive ordnance disposal, impro-

vised explosive devices and countermine operations.

2024 Air Armament Symposium

Nov. 19-20, 2024 Destin-Fort Walton Beach Convention Center, Fort Walton Beach, FL ndia.org Two-day interchange for senior Depart-

ment of Defense, service and indus-

try leadership to identify and share opportunities for DoD's Armament Innovation and discuss current and planned armament development and modernization.

Counter UAS Technology USA Conference

Dec. 2-4, 2024 Crystal Gateway Marriott, Arlington, VA smgconferences.com

Brings together key military and government C-UAS program managers, policy makers, research and development experts, along with industry partners, to forge valuable discussions on how to strengthen U.S. protection against the threat of UAS.

Defense Manufacturing Conference (DMC) 2024

Dec. 2-5, 2024

Austin Convention Center, Austin, TX dmcmeeting.com

DMC is the nation's annual forum for enhancing and leveraging the efforts of engineers, managers, technology leaders, scientists and policy makers across the defense manufacturing industrial base.

I/ITSEC 2024

Dec. 2-6, 2024 Orange County Convention Center, Orlando, FL iitsec.org

The Interservice/Industry Training, Simulation and Education Conference (I/ITSEC) is the world's largest modeling, simulation and training conference.

61st Annual AOC International **Symposium & Convention**

Dec. 11-13, 2024 Gaylord National Resort & Convention Center, National Harbor, MD aoc2024.crows.org Leading event for electronic warfare, electromagnetic spectrum operations, cyber-electromagnetic activities and information operations professionals from around the world.



39th Annual National Logistics Forum Feb. 11-13, 2025

DoubleTree by Hilton Orlando at Sea World, Orlando, FL

ndia.org

For nearly four decades, the NDIA Logistics Forum has been a focal point for industry leaders, defense officials, senior acquisition experts, coalition partners, and logistics and financial leaders.

35th Annual Special Operations Symposium

Feb. 19-20, 2025 Washington Marriott at Metro Center, Washington, D.C. ndia.org

Helping industry, government and the public understand the critical role of special operations (SO) and low-intensity conflict (LIC) forces in our national security strategy and how these forces are integrated into our military structure.

2025 Tactical Wheeled Vehicles Conference

Feb. 24-26, 2025 Hyatt Regency Reston, Reston, VA ndia.org

This event brings together leaders from the Department of Defense, the military services, industry, prime contractors, subcontractors, suppliers and academia to address present and future tactical wheeled vehicle requirements.

National Summit on Uncrewed Aerial Vehicles

Feb. 25-26, 2025 San Diego, CA americanconference.com Brings together thought leaders from the Department of Defense, U.S. Government, industry, academia and NATO partners to explore the latest developments in UAV systems and foster collaboration that can drive progress in defense technology.

AFA Warfare Symposium

March 3-5, 2025 Gaylord Rockies Resort & Convention Center, Aurora, CO afa.org

A premier professional development event for the U.S. Air Force, U.S. Space Force and the aerospace and defense industry that supports them, with a focus on the critical concerns and challenges of joint warfare in every corner of the globe.

2025 Munitions Executive Summit

March 18-19, 2025 Hilton Parsippany, Parsippany, NJ ndia.org

This summit aims to provide a meaningful interchange on the challenges confronting the U.S. Munitions Enterprise.

Emerging & Disruptive Technology for Defense 2025

March 19-20, 2025 Washington, D.C. americanconference.com/emergingtechnology/ Brings together military decision-makers,

industry and academia to discuss the course of action needed to advance military modernization initiatives.

Global Force Symposium & Exposition

March 25-27, 2025 Von Braun Center, Huntsville, AL ausa.org Explore the capabilities outlined in the Army's Modernization Strategy to drive transformational change. Special guest presentations, coupled with panel discussions from our senior military and industry leaders, will address critical points of research and development, acquisition and contracting, force sustainment, strategic divestiture, and industry partnerships.

40th Space Symposium

April 7-10, 2025

The Broadmoor, Colorado Springs, CO spacesymposium.org

The premier space industry event. Space Symposium unifies the global space community, providing collaboration, innovation and education from worldwide leaders that you won't get anywhere else.

2025 Department of the Air Force Modeling & Simulation Summit

May 6-8, 2025

Rosen Centre Hotel, Orlando, FL dafmss.org

The goal is to gather Air Force and Space Force M&S experts to learn about new M&S initiatives and techniques, network across military services and with industry experts, and to hear our technological leaders' perspectives on how M&S can transition more training from the real world to digital.

LANPAC Symposium & Exposition

May 13-15, 2025

Sheraton Waikiki, Honolulu, HI ausa.org

International event highlighting the role of land forces in the Indo-Pacific theater and their contributions to the Joint Force in peace and war.



A Concern for All

"A nation without dregs and malcontents is orderly, decent, peaceful and pleasant, but perhaps without the seeds of things to come." - ERIC HOFFER

his magazine concerns everyone. A quarter century ago I believed that everything was peaceful. Then it all fell apart. It wasn't just experiences in combat that changed me; it was everything. The books I read. The people I met. Planes flying into buildings. Violence in our schools and on our streets. Food prices doubling. Where has the safety gone?

It just seems too much. I want to go back to feeling secure. Sometimes, however, it feels as if I am fighting against an entire system. As if I am the delinquent and the one who is wrong.

But then I start to recognize the look of despair on the faces of people at the grocery store, or in the park. I know that look. I *live* that look. We are not alone.

This is economic. This is global. This is fundamental.

As a result of this common desperation, we dedicate this publication to support those who are developing technology to use resources with more efficiency and defend our nation with more efficacy. These efforts need our help. We will make every effort to make the best product, cause no unnecessary harm and use this platform to inspire and implement solutions to the resource and security crisis.

This struggle is never complete. Thomas Hobbes described our basic state in nature as "every man against every man." Hobbes ' notion of perpetual competition seems ever more valid as global economic interdependencies intensify. Money is not an end.



As Friedrich Hayek explained, "The balance of trade problem is a primary threat to our National Security." Hayek's balance of trade problem evolved over the course of the Cold War into a modern battlefield. We may have adopted more benign terms such as "international competition" to describe this battlefield. But I would argue that regardless of the naming convention, the national security implications are not less than open warfare.

With that as a backdrop we will study the idea of modernization and the entrepreneurial efforts to bring new technologies into everyday use. Activities that we will seek to examine and assess

include the securing of reliable sources of critical materials and the development of industrial preparedness. We aim to discover and highlight efforts that strengthen and maintain secure, functioning and resilient critical infrastructure.

As Yvon Chouinard, the founder of Patagonia, wrote, "If you want to understand the entrepreneur, study the juvenile delinquent. The delinquent is saying with his actions, 'This sucks. I'm going to do my own thing."

It's not an excuse, but it may be an explanation of things to come as we explore the seemingly delinquent in order to envision the things to come.

Our most humble ask of our readers is that you keep us honest. We will endeavor to do the same.

Tim Crane Editor-at-Large

OPPRESSORS BEWARE. WE HUNT PREDATORS. IDENTIFY. INTERDICT. EMPOWER





Skull Games harnesses the talents of vetted Intelligence, Operations, and Mission Support professionals to counter online commercial sex trafficking across the United States

THROUGH private donors and corporate sponsors WITH community leaders and organizations BY local, state, and federal law enforcement partners

to

IDENTIFY predators and their prey INTERDICT predators for pleasure and predators for profit EMPOWER communities with purpose to protect and defend

Get in the Game for Good www.skullgames.org



Skull Games is a Veteran Led, Volunteer Enabled and Donor Funded 501(c)(3) Charitable Organization | EIN 92-3817043

Parallax Advanced Research



Elevate your research potential with us as your trusted partners!

At Parallax Advanced Research and the Ohio Aerospace Institute, we lead the way in solving critical challenges to enhance national security and prosperity.

We do this through advanced research, development, science, and technology innovation that enables our clients in industry, academia, and government to innovate solutions and speed them to market.

Join our national network of innovators.

Partner with us to elevate your research potential.

Connect with us today to shape the future of and enhance our nation's security and prosperity in aerospace and defense!







