# PERFORMANCE REPORT 2025

COME TOGETHER

ARMY APPLICATIONS LABORATORY

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# LETTER FROM THE DIRECTOR

**"Coming together is a beginning, staying together is a process, and working together is success."**
**– Henry Ford, American innovator**

Army Applications Laboratory spent the last year trying to answer two questions. The first is, are we doing things the right way? And by that I mean, do our decision making and processes lead to mission success? Are we putting better technology in the hands of Soldiers faster? And second, are we doing the right things? In other words, are we solving the right problems? Are we actually delivering overmatch, either directly (with weapons) or indirectly (with cost savings, for example)?

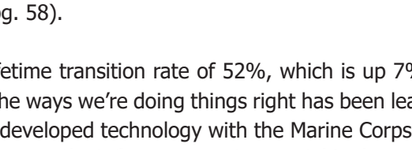
In 2024, we transitioned 10 technologies, and we were true to our mission of getting the best technology to Army units faster by putting new solutions in the hands of Soldiers, either through pilot programs (H2FMS, pg. 59) or with units for extended experimentation (ARMORS, pg. 58).

With those 10 transitions we have a lifetime transition rate of 52%, which is up 7% from last year. It gives us confidence that we are doing things right. One of the ways we're doing things right has been leaning into cross-service collaboration. In just the last year, AAL has successfully developed technology with the Marine Corps (DTSO, pg. 11), the Air Force (VISION, pg. 54), the Navy (Survivability Coating, pg. 44), Defense Innovation Unit (DIU), and a whole host of Army offices and units. By investing, experimenting, and transitioning together, we get better capabilities faster, and with less impact to the DOD budget. A joint $5 million project will develop a better technology than two duplicate $3 million projects to develop the same tech separately for two services.

This high transition rate is also good because it helps capitalize on the more than $150 billion in VC investment in defense-related technologies since 2021. We're now even seeing increased VC investment in "defense first" companies – startups that develop lethality and other technologies with a purely military customer. I think this creates even more of a requirement for us to come together to create the returns for private capital and the ROI for the DOD that sustains this trend.

There's a downside to transitioning such a large part of the portfolio. While a 52% transition rate confirms that we're doing things the right way, it aggressively begs the question, are we doing the right things? A .500 average probably means we're not taking enough technical risk and settling for 2x solutions when 10x might be possible. I expect next year's report to be a tale only an innovator could love: how innovation succeeded more by succeeding less. The deliberate pursuit of more tech risk should drive our transition rate down while bringing the Army's ROI up as we discover more solutions with outsized battlefield utility. We can mitigate that risk by working together, giving us more shots on goal and more opportunities for a three-pointer. Or a home run. Or whatever your sports analogy is.

Coming together to deliver better commercial capabilities faster and cheaper is unquestionably doing things right. I look forward to working with innovators, investors, and governments this year to figure out how we leverage our network effects to do more right things. A relay race is the sports analogy I like. Our adversaries are determined and fast, but as we continue to pass the baton from one of us to the next and the next, we'll continue to distance ourselves from them until they see that the race is, for them, no longer within reach.



Dr. Casey Perley
Executive Director
Army Applications Laboratory (AAL)



DR. CASEY PERLEY

# EXECUTIVE SUMMARY

AAL's Performance Report provides metrics and insights on projects, funding, technologies, and ROI for Congressional stakeholders, the Department of Defense (DOD), industry, and investors. It showcases metrics that demonstrate how we deliver value to the DOD and industry. We discuss achievements, challenges, and lessons learned in hopes of creating an open dialogue within the DOD community. We highlight points for the DOD innovation ecosystem to examine and question. We look forward to your feedback so we can keep improving our innovation processes.

**AAL's impact on the Army and industry includes:**

**Technologies Transitioned: 23**
To date, 52% of AAL's completed projects have transitioned to programs of record, Soldiers, other DOD services, or other science and technology (S&T) organizations for further development and integration.

**Requirement Documents Influenced: 22**
AAL's ability to influence requirements documents is critical to help technologies cross the valley of death.

AAL's strategic contribution to national defense is to grow the base of commercial technology firms solving Army tech problems:

- AAL's solver network has grown to include more than 18,000 companies.
- 82% of AAL portfolio companies are made up of small businesses with 100 employees or less.
- Since 2019, AAL has awarded more than $123.5 million to companies, which has been matched by $82.3 million from other government and industry partners.
- AAL portfolio companies have raised more than $1.68 billion since receiving an AAL contract.
- AAL portfolio companies average 13.6 follow-on contracts after working with AAL.

AAL focuses beyond just improving capability development processes. We eliminate barriers that make it harder for industry professionals, government stakeholders, and end users to work together on solving some of the Army's toughest challenges. To accomplish this, we've created new venues for collaboration, changed how the Army and industry communicate, and increased industry applications to certain types of Army problems. Two of the approaches AAL uses for its innovation programs include:

Cohorts: where the Army finds real innovation. Technologists from various disciplines work side-by-side with Army technical experts and Soldiers to frame and solve complex Army problems (pg. 16).

VERTEX: an event series that captures market intelligence and builds networks of innovators, end users, and capability developers to inform everything from requirements to solutions (pg. 18).

The case studies in this report provide details and insights about our work with industry and government stakeholders, our intentions and methods, and the results of our work. These case studies highlight innovation best practices and lessons learned, such as:

- Improved outcomes when DOD services collaborate on solution development.
- Flexibility in project funding to help mitigate the inherent uncertainty of technology development and transition risk.
- Building teams of stakeholders aligned on priorities, funding, timelines, and taking an active role in experimentation. Well-aligned teams can result in solutions with more military utility and higher user adoption while increasing the odds of transition.

# CROSS-SERVICE CO-FUNDING

## SEEKING SIMILARITIES

The DOD services often face similar technical challenges. If the services develop redundant solutions, this can result in wasted resources, supply chain inefficiencies, and misspent time. Cross-service collaboration not only delivers value to the DOD, it also opens additional opportunities for companies with potentially transformative solutions to work with more than one service.

Each service has its own technology needs and use cases. Aligning these goals requires intentional communication, in-depth project understanding, strong boundaries on scope of work, and flexibility throughout the solution development process.

## COMING TOGETHER

Co-funded projects are initiated in several ways. Often, AAL's program managers reach out to colleagues in other services when they foresee project alignment with one or more of them. AAL is also connected with liaison officers within AFC's enterprise who participate in project meetings and are on watch for co-funding opportunities. Sometimes co-funded projects happen purely because AAL is located on the same floor of the same building in Austin, Texas, as offices of the other DOD innovation organizations.

## HOW WE COLLABORATE

While each project presents new opportunities and challenges, our process for collaborating across services is similar:

**Problem Breakdown and Coordination**

AAL works with other services to identify the problem subsets that overlap, project needs, and resource allocation. The group then works to provide the right information for industry solvers to better develop solutions that meet those needs.

**Service-Specific Exploration**

There are often requirements specific to one service or group that need to be addressed. Individual groups will commit time to research, testing, and solution development with their experts, facilities, and resources.

**Sharing Information**

Sharing research and testing data relevant to the common problem or to aspects of service-specific needs can better inform each groups' activities and prevent duplicated efforts. This collaboration creates more efficient and well-informed solution development.

**Project Completion and Transition**

There can be multiple paths for transition depending on the needs of the service organization. Services can transition once they've met their individual goals, leaving behind any necessary information for the project to continue development. Organizations determine what technologies they want to move forward with based on their budget and priorities.

## BENEFITS OF CO-FUNDING

Cross-service collaboration allows AAL to tap into more expertise and funding while saving time and creating solutions that benefit more than one organization, sometimes with better features and in less time because of the increased budget for the project. Co-funding and joint development bring unique insights from a wider range of experts to ensure that solutions are as versatile as they are effective, ultimately reinforcing the resilience and readiness of the DOD.

# CROSS-SERVICE PROJECTS

## DIVER PERFORMANCE MONITOR SYSTEM (DPMS)

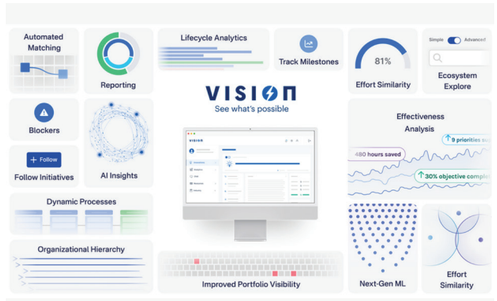
**Problem:** The Combat Diver Qualification Course (CDQC) in Key West, Florida, has experienced tragic fatalities over the past few years during diver training. Instructors face significant difficulty monitoring divers' safety in real-time, lacking the visual or audio alerts necessary to detect potential problems underwater.

**Solution:** DPMS improves diver safety through biometric monitoring technology that provides real-time alerts. This may include wearable biometric sensors — such as chest or waist straps that measure heart rate and oxygen saturation levels — alongside visual or audio cues to signal when a diver is at risk. By consolidating monitoring systems and delivering alerts instantly, DPMS supports safer, more responsive diver oversight.

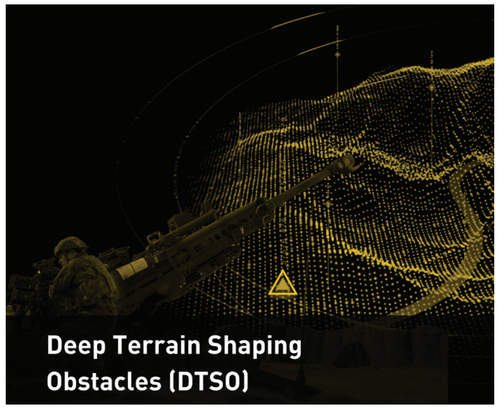
**Co-funding in Action:** The Navy's $3.25 million co-investment, in addition to AAL and other Army stakeholders' investment of $7.75 million, will enable the development of three potential wearable solutions for underwater monitoring, each using a different technical approach to reduce risk. This co-funded effort will provide solutions to CDQC and the Naval Diving and Salvage Training Center (for the Navy SEALs) to identify physically at-risk trainees rapidly.

In addition to military applications, DPMS technology has strong commercialization potential in recreational diving, water sports, and survival activities. It may also help professional and amateur athletes improve immensely through accurate measurement of vitals and recovery during water sports.

Diver Performance Monitoring System (DPMS)




Virtual Innovation Support Integration Operation Network (VISION)



Deep Terrain Shaping Obstacles (DTSO)

## VIRTUAL INNOVATION SUPPORT INTEGRATION OPERATION NETWORK (VISION)

**Problem:** Army innovation is hampered by siloed data systems, including different forms, CRMs, spreadsheets, and project management tools that cannot seamlessly communicate. This separation often results in many organizations throughout the DOD duplicating research efforts and costs to solve similar problems.

**Solution:** VISION was originally developed by Joy Labs DBA Mobilize in response to the Air Force's need for increased collaboration and situational awareness. After AAL joined the project, VISION's new goal was to expand user capabilities and create an integrated platform that fosters awareness and resource consolidation across multiple services. Adding a Dynamic and Autonomous Process Management (DAPM) system empowers the Army and its DOD partners to customize workflows, automate processes, and streamline project management, reducing the time and manual effort required to move ideas from concept to implementation.

**Co-funding in Action:** The Air Force, through AFWERX, developed the VISION platform in collaboration with the Navy. With a $1.85 million SBIR investment, AAL joined this cross-service initiative to expand VISION's capabilities with DAPM. This initiative will equip users to adapt innovation and improvement processes to their unique requirements for speed, agility, and scale, ultimately accelerating solutions for the warfighter. This collaboration ensured that solutions were developed with interoperability in mind, benefiting multiple services and enhancing overall efficiency across the DOD. VISION is currently being piloted across 20 DOD organizations including 150 licenses within the Army. Learn more about the project on page 54.

## DEEP TERRAIN SHAPING OBSTACLES (DTSO)

**Problem:** The Army requires advanced solutions to emplace obstacles that hinder enemy maneuvers 70-150 km beyond the forward line of troops (FLOT), effectively delaying, deterring, or denying enemy access to critical terrain.

**Solution:** DTSO will develop technology that can create obstacles from a distance via unmanned aerial or ground systems. Solutions include advanced terrain management systems that use lethal munitions capable of differentiating between types of targets. Such innovations shape the battlefield remotely, giving Soldiers time and space to maneuver or counter enemy forces, improving their survivability.

**Co-funding in Action:** This project, still in development, has received co-funding from the Army at $3.4 million and Marine Corps at $1.9 million, illustrating the overlap in project scope for cross-domain operational scenarios. For example, DTSO technology could be used to remotely deploy barriers in contested areas during joint force amphibious operations, delaying enemy reinforcements and securing critical beachheads for advancing Marine Corps and Army units.

The DTSO solution will further advance capabilities for Army engineers and Marine Corps counterparts. Currently, the Project Manager Close Combat Systems is using DTSO as a reference for further research into terrain shaping solutions. Additionally, the Army is considering these technologies for inclusion in the requirements document for a close-terrain shaping effort.

CALENDAR YEAR

# 2024

## TOTAL INVESTED
## $44,199,599

**AAL INVESTED**
$29,913,147

**CO-INVESTED**
$14,286,452

# AAL FUNDING & METRICS

CUMULATIVE FROM AAL START THROUGH 2024

**28 ACTIVE PROJECTS**

TOTAL INVESTED: $98,568,214
AAL INVESTED: $54,936,766
DOD & PRIVATE CO-INVESTED: $43,631,447

**31 COMPLETED PROJECTS**

TOTAL INVESTED: $107,180,320
AAL INVESTED: $68,539,789
DOD & PRIVATE CO-INVESTED: $38,640,531

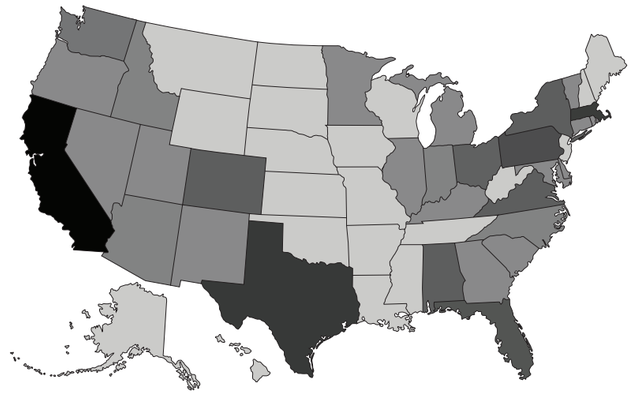
**TOTAL VALUE FOLLOW-ON CONTRACTS**
**$58,656,150**



# PORTFOLIO DEMOGRAPHICS

TOTAL # OF AAL PORTFOLIO COMPANIES ON CONTRACT
**172**

TOTAL # OF STATES AAL PORTFOLIO COMPANIES SPAN ACROSS
**30**




## PRIOR DOD WORK

0 DOD CONTRACTS: 29
1-20 DOD CONTRACTS: 79
21-100 DOD CONTRACTS: 33
MORE THAN 100 DOD CONTRACTS: 32

## COMPANY SIZE

1-10 EMPLOYEES: 57
11-100 EMPLOYEES: 84
101-1,000 EMPLOYEES: 26
1,001-10,000 EMPLOYEES: 5

# AAL PORTFOLIO METRICS

CUMULATIVE FROM AAL START THROUGH 2024

**$1.68 BILLION** FUNDING RAISED AFTER CONTRACT WITH AAL
**13.6** AVERAGE NUMBER OF FOLLOW ON CONTRACTS
**6** REACHED $100-MILLION VALUATION
**14** $100-MILLION VALUATION OR HIGHER
**22** SUCCESSFUL EXITS

# AAL TRANSITION METRICS

CUMULATIVE FROM AAL START THROUGH 2024

## TOTAL TRANSITIONS
# 23

## TRANSITION RATE
# 52%

## PROJECT TRANSITION DESTINATION

LABS FOR RESEARCH: 31.8% OF 23
LABS FOR INTEGRATION: 22.7% OF 23
PROGRAM EXECUTIVE OFFICES: 22.7% OF 23
DIRECTLY TO SOLDIERS: 9.1% OF 23
SISTER-SERVICE: 4.5% OF 23
INDUSTRY AS SUBCONTRACTORS: 4.5% OF 23

## CONTRACT AMOUNT FOR FOLLOW-ON TRANSITIONS

APPTRONIK: $375,000
AUDIBLE: $1.2 MILLION
CR TACTICAL: $424,000
EXERGI PREDICTIVE: $1.25 MILLION
GAN CORPORATION: $260,000
H.A. ECKHART: $1 MILLION
HENDRICK MOTORSPORTS: $24 MILLION
NEAR EARTH AUTONOMY: $5.7 MILLION
STRIVEWORKS: $9.6 MILLION
VECTOR ATOMIC: $11 MILLION
VIRTUVIA (COACHMEPLUS): $6.5 MILLION
WILLOWVIEW CONSULTING: $1.7 MILLION

## VC STATS FOR PORTFOLIO COMPANIES

BACKED BY VC: 24.4% OF 172
VC-BACKED THAT TRANSITIONED: 23.8% OF 42
NON-VC-BACKED THAT TRANSITIONED: 10% OF 130

## REASONS PROJECTS FAILED

TECHNOLOGY FAILURE: 33% OF 15
ARMY'S NEED CHANGED: 20% OF 15
TRANSITION FAILURE: 47% OF 15

Transition Failure: Technology met its goals, but the Army did not continue development or use the technology.



# BUDGETS, REQUIREMENTS, AND DUE DILIGENCE

CUMULATIVE FROM AAL START THROUGH 2024

## AAL & ARMY BUDGETS

### CONGRESS APPROPRIATED BUDGET IN FISCAL YEAR 2024 FOR THE ARMY $17.1 BILLION

*Accounts for 11.5% of the DOD's total RDT&E budget.

The AAL obligated $35.2 million in calender year 2024, just 0.2% of the Army's research, development, test, and evaluation budget. Despite its modest funding, AAL delivered significant value – by transitioning 52% of its completed projects – rapidly developing innovative solutions to pressing warfighter challenges, proving that even a small, strategic investment can drive substantial and lasting progress in the Army's transformation efforts.

## AAL OBLIGATED BUDGET

*These funds were obligated in CY 24 but include a mix of funding from FY 23 and FY 24.

**Obligated in 24: $35.2 million**
**SBIR: $25,025,088**
**RDT&E: $10,164,408**

Want to check the math for yourself? See the the DOD budget here, and find the total the Army spends on research, development, test, and evaluation on page 20. AAL executes program element 0603025A CK8 which can be found here.

## 22 REQUIREMENTS DOCUMENTS INFLUENCED

A requirements document enables the Army to buy things through a program of record. These documents include the technical specifications of the solution, the packaging, and the training and personnel requirements for the technology as well. The Army uses more than 10 different requirements documents like the Initial Capabilities Document (ICD) and the Capability Development Document (CDD) to outline the identified capability gaps and needs to help guide industry partners in developing and delivering the necessary capabilities.

Companies are able to influence requirements documents through their work on AAL contracts, whether helping shape them from inception or adding new KPIs.

## DUE DILIGENCE

### 10.6% COMPANIES THAT HAD A FLAG
### 0% COMPANIES THAT WERE UNMITIGABLE

AAL's Corporate Ventures team performs in-depth security reviews on new industry companies applying to participate on projects. This process minimizes risk for the Army and enables AAL and AFC to make more informed decisions on contract awardee selections.

# INNOVATION PROGRAMS

## EVOLVING ARMY BUSINESS PRACTICES

A critical part of AAL's mission is to experiment with process and share the lessons to help the Army ingest innovation more effectively, from problem framing to sustainment. By questioning and adapting the conventional approach to capability development, AAL provides new ways for industry and the Army to work together, expands the number of companies willing and prepared to work with the Army, and ensures Soldiers have faster access to cutting-edge technology.

AAL's novel solution development initiatives bring together industry, problem owners, and end users in ways that bring forward purposeful, Soldier-informed innovation that solves current Army problems. Two of our most impactful programs are cohorts and VERTEX.

## COHORT PROGRAM

Technologists from various disciplines work side-by-side with Army technical experts and Soldiers to frame and solve complex Army problems. These cohorts often result in more options for stakeholders and deliver real, relevant solutions in which every part is designed by a best-in-class problem solver.

### COMPLEX PROBLEMS

AAL cohorts take on challenges that can require multiple technologies in complex systems. In pursuit of a solution, teams of expert technologists sometimes uncover additional facets of the problem that the Army had not considered, but would need to address to create the best solutions.

### MULTIPLE SOLVERS

Technology challenges are examined through many lenses to identify a variety of potential solutions and to provide government stakeholders with numerous approaches to address the challenge. Companies are encouraged to cooperate, sharing expertise and technology development, which often results in multiple companies advancing to future contracts, and even an entire new class of small, nontraditional integrators. Cooperation between companies with complementary technologies can lead to beneficial partnerships that extend outside of the cohort.

# VERTEX
## 2024 SERIES

# CONTESTED LOGISTICS

Army Applications Laboratory hosts VERTEX on behalf of Army Futures Command. VERTEX identifies and accelerates the development of new capabilities for the Army by facilitating dialogue between industry and military experts. Each VERTEX brings focus to a different topic, and each topic brings together a new set of Army problem owners and innovative technologists working in that topic area. Army solution development stakeholders like PEOs, PMs, or CFTs can request a VERTEX topic, or topics are derived from guidance from AFC senior leaders to support priority Army transformation initiatives.

Before each VERTEX, Army subject matter experts go to VERTEX | FORGE to work with AAL to identify, verify, and refine the real-life use cases that will be discussed at VERTEX. These experts help describe the nuances of these Army use cases so that industry has the best information to inform possible solutions. Use cases are discussed during VERTEX morning panels and then explored deeper in the afternoon breakout sessions.

Since April 2022, eight topics have been covered including energy, human performance, robotics, human-machine integration in armored formations, contested logistics, air-ground littoral, tactical information and network, and advanced autonomy. In 2024, applications to attend VERTEX and attendance increased consistently, with new Army stakeholders requesting to better understand the commercial landscape, find novel solutions to problems, and new industry solvers.

## FEBRUARY 12-14, 2024

**VERTEX | Contested Logistics** explored the Army's logistical challenges when operating in areas of conflict. This two-day event created a public-private exchange on new or novel logistics solutions to improve the Army's efforts in the Indo-Pacific. Together, commercial innovators and government experts examined promising concepts, tackled real-world use cases, and uncovered current opportunities and trends.

Entrepreneurs, engineers, and end users discussed cutting-edge technology and ways to employ it in these eight real-world use cases to enhance:

1. Decision-Making Tools
2. Difficult Island Landing
3. Distribution of Ugly Freight
4. Enterprise Reporting Integration and Resiliency
5. Increasing Survivability of Transport Assets
6. Optimizing Supply Chain Performance
7. Protection of Engineering Capabilities
8. Safer, Larger, Faster Resupply


## JULY 16-17, 2024

**VERTEX | Air-Ground Littoral** explored the current state of air-ground littoral — the area between the ground and a few thousand feet above it. It is heavily populated by both friendly and enemy drones, air-defense systems, aircraft, rockets and artillery, electronic warfare systems, and other capabilities that represent offensive opportunities and defense challenges for the Army. The Army recognized a need for technologies to control the space and to provide US forces superiority in this newly-defined threat environment.

VERTEX | Air-Ground Littoral's 10 breakouts blended insights from Army stakeholders, industry, and academics:

1. Accessing Drone Data
2. Assured Position Data
3. Concealing EMS Signatures
4. Defeating Electronic Countermeasures
5. Disrupting Drone Manufacturing
6. Drone Classification
7. Identification and Tracking
8. Increasing Drone to Operator-Ratio
9. Minimizing Operators' Cognitive Load
10. Scalable Counter Drone Defense


## NOVEMBER 18-19, 2024

**VERTEX | Tactical Information and Network**, in partnership with Next Generation Command and Control, explored the data and networks commanders use to understand the environment and to lead and assess operations. Next generation tactical networks will be open and modular, and will have to manage unprecedented amounts of data coming from sensors, uncrewed systems, and Soldiers. How quickly and accurately this information transforms into common understanding across a formation and how easily Soldiers can access, manipulate, and share information translates directly into rapid, accurate decision making and effective operations.

The eight breakout sessions drew out challenges, potential technology solutions, current efforts, policy restrictions, and other issues relevant to these topics:

1. Adapting In Real Time
2. Application Ecosystem
3. Data Fusion and Synchronization
4. Intuitive Applications and Training
5. Path Diversity
6. Tactical Communications
7. Tactical Security
8. Workflow Integration

# CASE STUDIES

# HOLISTIC HEALTH AND FITNESS READINESS KIT (H2FRK)

The Army's $2 billion Holistic Health and Fitness (H2F) program was designed by the US Army Training and Doctrine Command to address Soldier fitness holistically, enhancing physical, cognitive, and nutritional readiness across the force. "Facilities and equipment are essential parts of the H2F system. As such, the Army plans to construct new or convert existing facilities into Soldier Performance Readiness Centers (SPRCs)" (Holistic Health and Fitness Handbook, 2023, pg. 31). These physical structures provide the space Soldiers need to care for their overall health, from typical gym training equipment to rehabilitation areas and classrooms for education.

The H2F program planned to build SPRCs at 110 Army brigades by FY2030. Traditional construction methods, costing around $18 million for a one-acre facility, made the goal infeasible. The Army needed a solution to build full size facilities while keeping the cost to less than half of the construction of a traditional building.

Engaged on another H2F project at the time, AAL was asked to take on an additional project investigating if widespan structures, such as SPRCs, could be built for less than half of the cost and encompass human-factor design to create spaces that reinforce the pillars of H2F. This project is the H2F Readiness Kit, which aims to reduce construction costs by more than 50% through the use of advanced materials and techniques, making it possible to build full-size facilities at each brigade within budget. While expected to be adaptable and quick to set up, they also need to meet or exceed traditional brick-and-mortar energy-efficiency standards for environmental control. SPRCs could be located in different environments and therefore need to withstand wide ranging weather conditions including wind speeds of up to 115 mph.

The kits are expected to include spaces for maximizing Soldier performance and readiness across all five H2F domains:

**Physical Health:** Areas equipped for fitness training and recovery

**Mental Resilience:** Dedicated spaces for mental health support

**Nutritional Support:** Facilities for nutritional education and meal planning

**Sleep Hygiene:** Designed environments that encourage good sleep practices

**Spiritual Well-Being:** Spaces for personal reflection and spiritual needs

H2F is the primary transition partner, responsible for delivering SPRCs to participating installations including Fort Drum, Fort Bragg, Fort Moore, and Joint Base Lewis-McChord. The stakeholder teams involved are primarily installation management teams responsible for building maintenance and planning, and H2F directors are focusing on Soldier-specific performance regarding the health domains and requirements detailed for SPRCs.

Other stakeholders that are overseeing the infrastructure include the US Army Corps of Engineers, Huntsville District, Installation Management Command (IMCOM), and Army Materiel Command.




**PHASE I SBIR: $1.27 MILLION**

**ASATI:** $200,000
**Assisted Building Solutions:** $111,000
**BeaverFit:** $160,000
**Black Lab Sports:** $200,000
**Burchell Professional Group:** $200,000
**Improve Group:** $200,000
**Modula S:** $200,000

**PHASE II SBIR: $3 MILLION**

**ASATI:** $1 MILLION
**BeaverFit:** $1 MILLION
**Modula S:** $1 MILLION

## PHASE I

Seven companies were selected for Phase I to address the construction and performance needs of H2F facilities at Army installations. ASATI, Assisted Building Solutions, BeaverFit, Black Lab Sports, Burchell Professional Group, Improve Group, and Modula S each received up to $200,000 in SBIR funding. Companies ranged from traditional construction firms to performance-focused businesses (those that typically renovate spaces for specialized or boutique fitness studios).

Phase I of the project focused on generating data, models, and preliminary designs for SPRCs over a three-month period of performance. The final products showcased 2D/3D designs and gave estimates on construction techniques/ materials, cost, and timelines.

## PHASE II

Three companies – ASATI, BeaverFit, and Modula S – received $1 million each, advancing to the next phase of development. They were given a 12-month period of performance to determine the long-term maintenance requirements and assess the structural integrity of fabric-based buildings over time. The project teams participated in a multi-day, on-site discussion with the Army Corps of Engineers and Directorate of Public Works (DPW), which gave the solution providers a clear understanding of stakeholder concerns, needs, and guidance for moving forward. In Phase II, project teams conducted in-depth evaluations, focusing on energy efficiency, durability, and cost-effectiveness of three distinct structure solutions.

**ASATI** proposed an air-supported dome design that required minimal equipment for installation. This proposal required special equipment such as a 15,000 lbs capacity forklift with extending boom and 80-foot boom lift to reduce construction time. Additional labor needs also included installation of a door and airlock, dome construction, cabling, lighting, insulation, netting, and curtains. All together, the estimated construction time per dome is expected to be 27 days.

**BeaverFit** focused on pre-engineered buildings for their proposed solution, which the Army has traditionally used as a baseline. The company distinguished itself with remarkable progress, achieving a 95% design completion. The project guidelines allowed companies to choose up to four installation sites to research. While the other companies opted to work on all four, BeaverFit focused on only two sites. This enabled them to complete more detailed tasks like soil sampling to ensure site readiness, utility engagement, and structural assessments for building stability.

**Modula S** created tension fabric structures with significant durability and insulation factors (R-60 value). The combination of modular construction offsite and readily available materials enabled Modula S to deliver a building within one year, to include site preparation and construction. The company conducted a template design for all four installations and included rough estimates for site preparation based on existing soil samples and geotechnical data available from the installations.

## TRANSITION

At the end of Phase II, the companies delivered plans for a 95% design for at least one Army installation, plans for LEED Silver certification, and detailed cost and timeline estimates. This gives H2F, IMCOM, DPW, and the US Army Engineer Research and Development Center several options for SPRCs at different sites. Currently, at least one structure is programmed to be built and tested in 2027. Army leadership may accelerate the timeline based on priorities.

## LESSONS LEARNED

**Hesitation to Collaborate:** To move from Phase I to Phase II, companies were allowed (but not required) to form multi-company project teams, combining their respective expertise. Such a team would be allowed to submit only one proposal, and would have to name one company as the primary partner and the other as a subcontractor. This reduced each company's chance of securing individual contracts and required they split any funds awarded. These proposal limitations deterred the companies from collaborating and submitting a solution as a team.

**Construction Challenges:** Building SPRCs to support the H2F program is complicated by the Army's traditional approaches to construction, including strict regulations such as building codes, funding, and multiple approving authorities, which often lead to delays. The H2FRK solutions addressed some of these complications through coordination with stakeholders, more effective construction strategies emphasizing modern building techniques, and carefully chosen building materials.

At the beginning of the project, the minor military construction threshold for unspecified projects limited spending for building construction to $6 million, making the proposed SPRC solutions unworkable. This threshold increased to $9 million before the start of Phase II, thereby making the designs feasible.

**Assembling the Right Team:** The selection of companies was not solely based on their technology offerings but also on their ability to perform under pressure. BeaverFit, Modula S, and ASATI assembled expert teams that included construction professionals, architectural engineers, and human factors specialists to ensure that their designs were both practical and robust. This effort was a key factor in their successful delivery of high-quality designs within the project's timeframe.

**Changes for Future Military Construction Projects:** ASATI proposed an air-supported dome design that could not accommodate the Army's current fire code regarding ceiling sprinkler coverage. Even if they could mount a ceiling sprinkler system, the water would be too high to achieve fire suppression. ASATI offered to use ground mounted water cannons with thermal camera detection as a potential solution, but this proved unnecessary. Ultimately, a waiver for the fire code was issued based on mitigations such as additional exits, clear walkways to leave the structure, and ensuring safety protocols are posted in the building. Although the current waiver only applies to ASATI's solution, providing this waiver to other companies is under consideration to allow more flexibility in military construction projects.

# COME TOGETHER

# LOGISTICS ENTERPRISE ENHANCEMENT PLATFORM (LEEP)

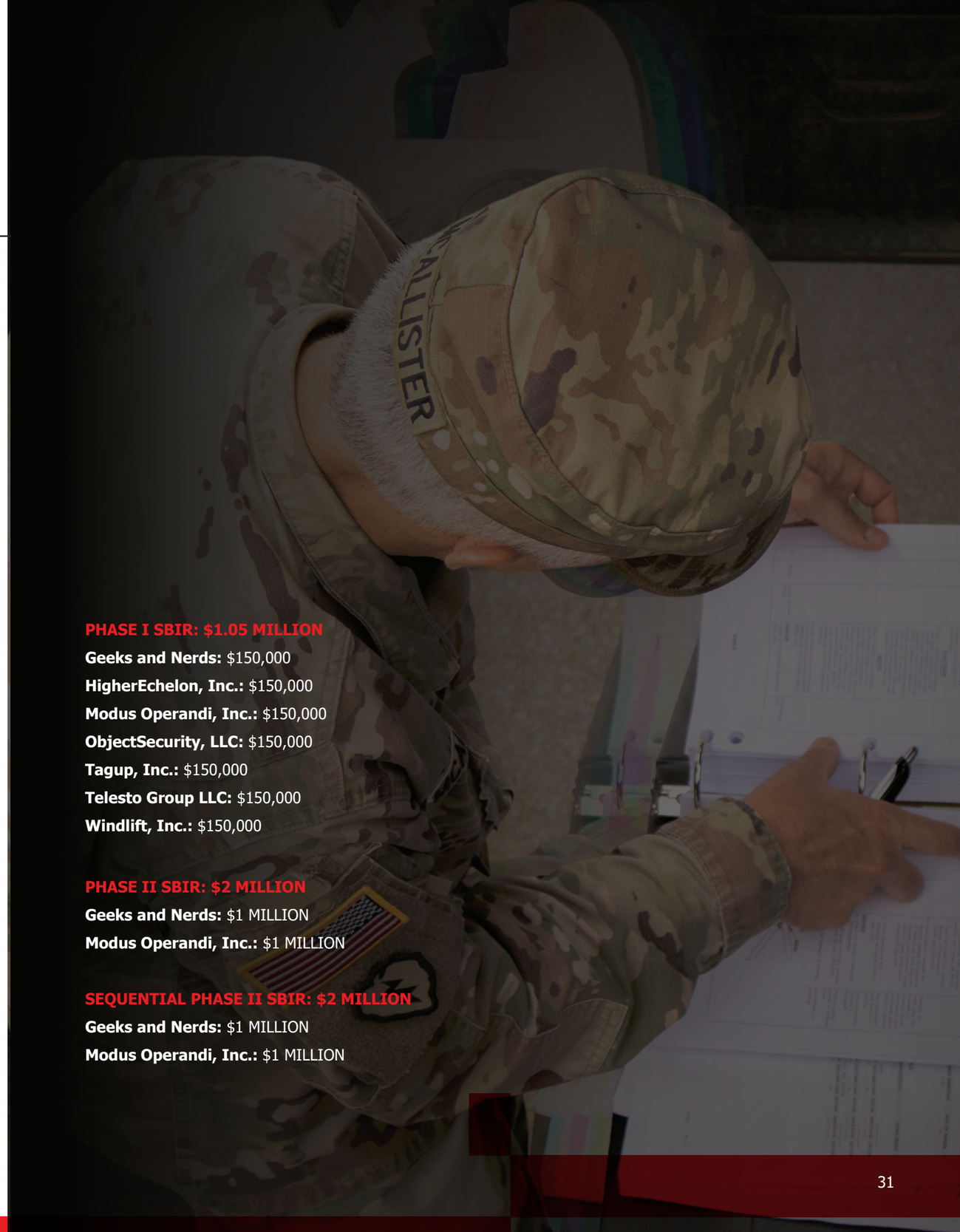
The Army's tactical Enterprise Resource Planning (ERP) system, Global Combat Support System – Army (GCSS-Army), is outdated and struggles to meet modern user needs. The parts ordering process has an error rate of 25-40% largely due to the system's lack of an intuitive user interface/user experience (UI/UX). Errors and inefficiencies, such as ordering incorrect parts or quantities, have been estimated to cost the Army hundreds of millions dollars annually.

GCSS-Army integrates multiple logistics functions to streamline Army operations by connecting maintenance, material management, property accountability, financial management, and logistics planning within a single digital system. Soldiers undertake intensive on-the-job training to become adept in the system. During the nine-week training course they learn essential supply principles, including navigating sustainment networks, military publications, and correspondence. Additionally, they gain hands-on experience with GCSS-Army for maintenance management, warehouse operations, and hazardous materials handling. While the official training educates Soldiers on the inner-workings of running GCSS-Army, operators typically require 6-10 months to become proficient. Company-level units usually have a maximum of two automated logistical specialists, the people that are proficient with GCSS-Army.

The GCSS-Army interface is cumbersome and has many free-form text data fields that leave room for improper data entry. This leads to impure data with high error rates, making it harder to train ML models/algorithms and leads to excessive waste of time and money. Mechanics rely on their GCSS-Army clerks to place orders involving unique, multi-digit part numbers and 13-digit National Stock Numbers. This indirect relay of information increases the likelihood of errors or misunderstandings as orders are placed in the system. Most tangibly, this results in incorrect parts or quantities.

Three years ago, a chief warrant officer at the Combined Arms Support Command (CASCOM) – responsible for education, training, and development of sustainment Soldiers – raised the need for a more intuitive interface that also features predictive algorithms to help guide ordering. Major General Rodney D. Fogg of CASCOM and Lieutenant General Thomas Todd of Army Futures Command agreed to tackle this challenge.

AAL led the Logistics Enterprise Enhancement Program (LEEP) with support from CASCOM and Penn State University Applied Research Laboratory (PSU ARL). LEEP aimed to enhance the current ERP system with more intuitive navigation, increase automation and analytics, and address data errors through predictive typing, controlled decision making, and AI/ML help and warnings. This resulted in less training time required to achieve proficiency, cleaner data for AI/ML optimization, and real-time insights to boost overall readiness.



**PHASE I SBIR: $1.05 MILLION**

**Geeks and Nerds:** $150,000
**HigherEchelon, Inc.:** $150,000
**Modus Operandi, Inc.:** $150,000
**ObjectSecurity, LLC:** $150,000
**Tagup, Inc.:** $150,000
**Telesto Group LLC:** $150,000
**Windlift, Inc.:** $150,000

**PHASE II SBIR: $2 MILLION**

**Geeks and Nerds:** $1 MILLION
**Modus Operandi, Inc.:** $1 MILLION

**SEQUENTIAL PHASE II SBIR: $2 MILLION**

**Geeks and Nerds:** $1 MILLION
**Modus Operandi, Inc.:** $1 MILLION

**PHASE I:**

In 2021, seven companies each received $150,000 in SBIR funding and were awarded contracts for a 12-week period of performance: Geeks and Nerds, HigherEchelon, Inc., Modus Operandi, ObjectSecurity, Tagup, Telesto Group, and Windlift.

During Phase I, each company was tasked with designing a proof of concept that updates and improves the tactical ERP UI/UX and integrates ERP data to provide analytics and predictions. Specifically, solutions could include any of the following capabilities:

- Intuitive user experience that reduces the amount of time per task
- Automated management functions related to fleet management, including both scheduled and unscheduled maintenance requirements: management of maintenance plans, work-flow, skills identification, automated workload balance, data capture for predictive analysis
- Optimized inventory management to support current and future operations
- Balanced inventory at the lowest unit level
- Capacity planning and performance metrics that can be used to optimize worker assignment to task
- Mission based forecasting based on a set mission and element

Companies were evaluated on their proposed solution's ability to perform the tasks above. Two companies were chosen to further their technology based on their concept design and development plans.

**PHASE II & SEQUENTIAL PHASE II:**

In Phase II, Modus Operandi and Geeks and Nerds each received $1 million in SBIR funding for a 28-month period of performance to develop their own prototype systems that would perform all required functions for fleet maintenance and supply chain management.

With support from the PSU ARL, which owns and manages the GCSS-Army clone "sandbox" for testing, the LEEP project piloted a new Amazon-like interface for GCSS-Army that simplifies the parts ordering process. Soldiers could use the application's predictive typing feature to easily search for parts by name, category, or item number, view detailed product descriptions, and see correct options, availability, and estimated delivery times – all similar to online shopping. The interface includes features like "smart suggestions" that recommend frequently ordered items based on historical data, one-click reordering of commonly used parts, and warnings for infrequently ordered parts. Additionally, the checkout process was streamlined, enabling users to review and confirm orders with clear cost breakdowns and budget impacts.

This new interface requires minimal training, virtually eliminates data entry mistakes, and offers powerful data analytics using AI/ML capabilities. These enhancements will not only improve the accuracy of part ordering but also eliminate significant GCSS-Army user training and provide extensive decision-making support, including predictive logistics and mission based forecasting tools that will aid commanders in making better informed decisions.

LEEP developers worked with Soldiers from the 101st Brigade Support Battalion during the Project Convergence Capstone 4 (PC-C4) experiment, where Modus Operandi and Geeks and Nerds' solutions were evaluated in simulated logistics scenarios. Some of the results included:

- LEEP greatly reduced the time to order parts, reducing processing time from 10-20 minutes per form to less than 1 minute.
- LEEP's intuitive interface has shown it can greatly reduce on-the-job training time for ERP clerks and increase user proficiency of GCSS-Army in hours instead of months.

LEEP also features an AI-powered maintenance leader dashboard. Units currently spend as much as 40 hours each week creating manual reports for the commander displaying items like equipment availability and supply levels. LEEP creates customizable, real-time, and actionable dashboards that eliminated the need to generate these reports manually. LEEP's dashboards can be configured to meet commanders' needs, saving many hours of manual data gathering.

The addition of a Sequential Phase II provided each company roughly $1 million in SBIR funding to further develop their solution in an advanced testing environment. The LEEP solutions are designed to be "bolt-on", user-friendly enhancements for GCSS-Army, bridging the gap to the Army's future resource management system, forecasted to be implemented by 2032. The new Enterprise Business Systems - Convergence combines the Army's ERP programs, improving the system's capacity, speed, and efficiency by seamlessly integrating 24 major Army capabilities across the finance and logistics enterprise.

# LEEP

## TRANSITION

Modus Operandi secured a Phase II contract with the Navy and a Phase III contract with the Air Force based on part of their LEEP solution. Since Modus Operandi uses the same object-based management backend engine, Movia, to support the various development efforts of each service, the DOD has been able to indirectly pool its money to help advance system capabilities. In turn, the Army's LEEP system and the Air Force's and Navy's software products benefited from each other's funding, which was used to advance the Movia engine far beyond what each service could have done with just their own resources. Modus Operandi also secured agreements outside of the government, including a deal with Carahsoft, to provide similar intuitive and simple-to-learn "bolt-on" solutions to old commercial ERP platforms.

Geeks and Nerds is negotiating opportunities with other government entities based on their LEEP solution.

## LESSONS LEARNED

**Communication is Critical:** When trying to advance a capability for a system that is large and widely used within the Army, it is crucial to fully understand who can make funding decisions and changes to the system. LEEP involved many Army commands and associated offices with complex hierarchies. It took the entire 31 months of the LEEP project to identify every stakeholder of GCSS-Army.

Toward the end of Phase II, AAL learned from a non-Army entity of an additional 12+ different GCSS-Army add-on tools that had been created to fix various ERP problems. These delays in communication caused LEEP to be mistakenly viewed as no different than the rest of the add-on projects. AAL recognized the critical miscommunication and addressed the concern with Headquarters Department of the Army - G4 (logistics directorate). This discussion brought awareness to the extensive time and resources being spent on these specific add-ons and how LEEP differed in its features and capability to meet more user needs.

**Opportunity for Further Development:** Both Modus Operandi and Geeks and Nerds have significantly enhanced their capabilities over the last three years for both the DOD and the commercial market. The access to end users and subject matter experts enabled by AAL projects allowed them to improve their technologies substantially throughout the contract. This project empowered these small businesses to deliver specialized, cost-effective software solutions, usually only delivered by large prime contractors at a much higher cost.

# ROBOTIC COMBAT VEHICLE SUSTAINMENT (RCV-S)

PM Robotic Combat Vehicle (RCV) and Next Generation Combat Vehicle (NGCV) Cross Functional Team wanted to add prognostic and predictive maintenance capabilities to the Robotic Combat Vehicle (RCV) program to enable logisticians and maintainers to be better prepared and less reactive. The most reliable maintenance fault sensors on current combat vehicles are the operator and crew. They see, hear, feel, and smell abnormalities which can be reported to mechanics. Because RCVs are remotely operated, human oversight is limited, and they must rely on remote monitoring, sensors, and predictive analytics to stay mission ready.

To address this challenge, AAL initiated the Robotic Combat Vehicle Sustainment (RCV-S) project. Additional stakeholders included: Future Battle Platforms Project Manager, DEVCOM Ground Vehicle Systems Center, Sustainment Center of Excellence & Training and Doctrine Command Capability Manager, Soldier Centered Design Integration Directorate, Maneuver Center of Excellence & Training and Doctrine Command Capability Manager, US Army TACOM, and 1st Cavalry Division.

The project's goal was to develop tools that use data analytics and apply AI- and ML-enhanced capabilities to reduce maintenance costs, extend the lifespan of combat vehicles, and increase equipment availability. The requested requirements included incorporating a Modular Open Systems Approach and low size, weight, power, and cost design principles to ensure scalability and integration into different vehicle platforms.

**PHASE I SBIR: $2 MILLION**

**Beacon Interactive:** $200,000
**BH Sensors:** $200,000 + $50,000 option
**Charles River Analytics:** $200,000
**Exergi Predictive:** $200,000 + $50,000 option
**Hypergiant Galactic Systems:** $200,000 + $50,000 option
**Intelligent Fusion Technology, Inc.:** $200,000
**krtkl:** $200,000 + $50,000 option
**Qualtech Systems Inc.:** $200,000 + $50,000 option
**RoboTire:** $200,000
**SparkCognition:** $200,000

**PHASE II SBIR: $11.2 MILLION**

**BH Sensors: $2 MILLION**
Base: $1.5 MILLION | Match: $500,000
**Charles River Analytics: $1.5 MILLION**
Base: $1.5 MILLION
**Exergi Predictive: $1.7 MILLION**
Base: $1.5 MILLION | Match: $242,000 | Mod: $24,000
**Hypergiant Galactic Systems: $2 MILLION**
Base: $1.5 MILLION | Match: $500,000
**krtkl: $2 MILLION**
Base: $1.5 MILLION | Match: $407,000 | Mod: $50,000
**Qualtech Systems Inc.: $2 MILLION**
Base: $1.5 MILLION | Match: $500,000

## PHASE I

Sixty-nine companies submitted proposals for RCV-S. Ten companies were selected to develop concepts for predictive maintenance solutions, with initial awards of $200,000 each: Beacon Interactive, BH Sensors, Charles River Analytics, Exergi Predictive, Hypergiant Galactic, Intelligent Fusion Tech, krtkl inc., Qualtech Systems, Inc., RoboTire, and SparkCognition.

The cohort proposed technology with features such as:

- Novel sensors that can be easily integrated into the RCV system (e.g. visual, audio, vibration, fault, etc.)
- Remote and autonomous monitoring and integration with Modular Mission Payloads (e.g., weapons, sensors, targeting, etc.)
- Optimized analysis to prioritize what information needs to be sent in real time vs post mission
- Integration with current or planned user interfaces to display timely and accurate information effectively
- Optimized communications for degraded or limited bandwidth
- Existing and/or planned network transport options
- Ruggedized technology that works in various environments under austere conditions
- Process data onboard and in cloud (if available)

At the end of Phase I, each company provided a proof of concept written report for further development of their solution.

## PHASE II

Six companies were selected for Phase II and received $1.5 million each – BH Sensors, Charles River Analytics, Exergi Predictive, Hypergiant Galactic Systems, krtkl, and Qualtech Systems, Inc. Each company had the opportunity to receive additional funding via SBIR matching funds.

This enhancement would help fund the creation of additional solution capabilities. Phase II focused on developing prototypes and scaling the technology to TRL 6, with a total Phase II budget of $11.2 million.

The cohort companies developed a system that provides accurate, tailorable sustainment decision support for RCVs. The team also used feedback from Soldier touchpoints and testing environments like Texas A&M's Bush Combat Development Complex to refine the system.

Each commercial partner contributed specialized portions of the overall solution:

- **BH Sensors** developed hardware sensors to monitor vehicle subsystems and components.
- **Charles River Analytics** created software for predictive and prognostic data outputs.
- **Exergi Predictive** developed a software application focused on predictive energy management.
- **Hypergiant Galactic Systems** developed software to visualize predictive data that integrates with the Warfighter Machine Interface (WMI).
- **krtkl** produced a central hardware board to process and transmit vehicle data.
- **Qualtech Systems, Inc. (QSI)** created a digital twin model of the vehicle system, offering predictive feedback for operators and maintenance personnel.

Here is how each company's solution plays its part in the overall RCV-S solution: Exergi Predictive's energy usage and prediction software is used to better inform mission planning by providing predictive logistics, such as system power status and fuel levels. BH Sensors' hardware sensors collect vehicle system data and send it to krtkl's data board. There, the information is translated, packaged, and offloaded from the platform in a usable format. Charles River Analytics' software receives the packaged data and begins predictive and prognostic modeling. Then, the information is displayed on an operator's WMI using Hypergiant Galactic Systems' software. QSI's software provides the necessary feedback and recommends actions based on all gathered data.

The integrated system was tested on commercial and military platforms, demonstrating its flexibility and adaptability. Despite an initial focus on the RCV Medium, the solution was successfully demonstrated on the Autonomous Mobility Extended Range Cannon Artillery (AMERCA) platform toward the end of the project, showcasing its potential for retrofitting onto other military vehicles.

In July 2024, the team provided a final demonstration, where the system successfully visualized real-time data and provided actionable insights for vehicle sustainment. Induced faults and clean data runs allowed stakeholders to see the system's ability to predict failures and offer preventive maintenance recommendations.

## TRANSITION

Of the six companies involved in Phase II of the RCV-S project, three transitioned to further government contracts or industry applications:

- Exergi Predictive transitioned to Operational Energy Capability Improvement Fund (OECIF) and PM RCV for a Phase III contract.
- Two companies became subcontractors to prime vendors on RCV-related Phase II proposals. These transitions were facilitated by AAL's introductions between project companies and prime vendors. Early in the project, AAL recognized requirements for predictive maintenance were not included in the RCV platform design. The introduction was made to help the prime include a sustainment package with their RCV solution. For new technology to be accepted into the Army, sustainment packages are often required before adoption of a new platform.

The technology developed during this project has dual-use potential. It can be used by industry for fault detection in autonomous vehicles and equipment. Specific automotive components being monitored on this project include:

- Power System Assessments
- Infrared Thermography
- Temperature Monitoring
- Fluid Analysis
- Circuit Monitor Analysis
- Vibration Monitoring

## LESSONS LEARNED

**Clearly Defined Solution:** Early in the process, the desired solution was clearly defined for the industry partners, allowing for a more efficient design phase. While there are always new development opportunities found during the process, establishing an accurate baseline helps companies create solutions that truly address the Army's needs.

**Demo Flexibility:** The intended platform for the RCV-S project (RCV Medium) was unavailable for the final demonstration, and the team had to quickly shift to the AMERCA platform instead. This unexpected but successfully-executed shift highlighted the solutions' dual-use/scalability as well as an important reminder to remain flexible on projects due to potential resource changes outside of the team's control.

**Shifts in Priorities:** Throughout the solution development process, the RCV-S team maintained consistent stakeholder engagement, despite shifts in key Army leaders. As critical leaders changed command, so did the overall priorities of the project. These major changes in vision led to evolving requirements, to which the RCV-S team was able to quickly adapt.

# ROBOTIC MODULARITY (ROB MOD)

The Army faces a challenge in its robotic and autonomous systems (RAS): the absence of standardized connectors that enable quick and seamless integration of payloads across various platforms. The current problem lies in the use of vendor-specific connectors for RAS payloads, which make it nearly impossible to swap or upgrade components between platforms. It also increases logistical burdens, as maintaining separate inventories for different systems is costly and slows response times in critical situations where speed and flexibility are essential.

The Robotic Modularity (Rob Mod) project, led by Next Generation Combat Vehicles (NGCV) CFT and facilitated by AAL, focused on developing standardized mechanical and digital interfaces for robotic systems, ensuring Soldiers can adapt their payloads to mission needs in record time.

**Picatinny Rail**

Rob Mod seeks to create a family of systems akin to the "Picatinny rail," a mounting platform used to attach a variety of accessories such as scopes, lasers, and bipods to firearms. A similar standardized attachment system for modular payloads across all RAS platforms is needed. Developing this common mechanical and digital connector for payloads will allow the Army to focus on what the payloads can do, while giving industry clear standards for design, fit, and function.

By standardizing how payloads attach to platforms, Soldiers could easily adapt to mission needs without being bogged down by compatibility issues. For example, a standardized attachment system could allow a surveillance drone to switch seamlessly between carrying a high-resolution camera for reconnaissance and a payload for electronic warfare. This reduces downtime significantly, as Soldiers wouldn't need to spend hours troubleshooting or modifying hardware to ensure compatibility.

## RDT&E PROJECT

In September 2023, Axle Box and Draper were selected to each design and prototype a standardized interface over a 12-month period of performance, supported by $2.2 million in RDT&E funding.

During the design phase, each company evaluated payload modularity requirements across multiple current and future air and ground systems, ensuring their solution met operational demands. Preliminary designs were presented at quarterly briefings, allowing stakeholders to refine the approaches before final testing and implementation.

The Rob Mod companies developed and tested their prototypes to identify the optimal interface solution to create connectors that not only ensure compatibility but are rugged and reliable enough for battlefield conditions.

Draper and Axle Box's final demonstrations displayed functioning mechanical and electrical payload attachment systems that could be used on the RCV. Draper additionally displayed a small modular rail system, with similar mechanical and electrical connections, that could be used on the smaller Group 1 UAS platforms. Axle Box performed their demonstration in conjunction with the Human Machine Integration (HMI) Summit IV held at Texas A&M's RELLIS Campus in front of various Army stakeholders.

## RDT&E: $2.2 MILLION

**Axle Box Innovations:** $1.03 MILLION

**Draper:** $1.17 MILLION

## TRANSITION

The Army is still evaluating the connector solutions. Ideally, one of these would be transitioned into use through the Army's RCV program, with potential long-term applications across the DOD. By addressing the current inefficiencies in payload integration, the Army hopes to enhance the flexibility, speed, and effectiveness of its robotic systems in the field.

## LESSONS LEARNED

**Modernize Defense Technologies:** While the project is focused on immediate Army needs, it also reflects a larger effort to modernize defense technologies. The implementation of standardized attachment systems will not only improve interoperability across platforms but also foster innovation in payload design, unlocking new possibilities for robotic and autonomous systems.

**Consistent IOP Standards:** A key takeaway from the project is the Army's need to establish consolidated Interface Operational Procedure (IOP) standards that will enable consistency across the Army.

**Clarity on Payloads:** Rob Mod's effort to create a common connector highlighted the need for government problem owners to list what payloads are needed for particular platforms. This allows solution developers to determine the proper power, mechanical, and data requirements for the platform's connectors. These can differ greatly based on the type, size, and weight of payloads.

# SURVIVABILITY COATINGS

Army equipment, especially vehicles and airborne assets, can be vulnerable to directed energy attacks. This type of attack can be difficult to avoid because its effects can be nearly instant and arrive on the target with little to no warning. With directed energy weapons (DEW) expected to be fielded by major militaries in the next three years, the Army needs to be able to increase safety of platforms from directed energy weapons systems to increase both platform and Soldier survivability.

Existing aviation platform coatings are unable to mitigate or neutralize the impact of DEWs such as high-energy lasers or high-power microwave weapons. To address this challenge, the Army is advancing counter-DEW technologies and developing innovative countermeasures. The project stakeholders include the Office of Naval Research DEWS and DEVCOM Army Research Laboratory.

The Survivability Coatings project's aim is to develop a specialized coating for aviation platforms that mitigates or dissipates directed energy attacks. The solution capitalizes on the expertise of both commercial and DOD partners to create coatings that are mixable with current paint systems and designed to protect platforms from DEW attacks. The coatings should provide an affordable and scalable countermeasure to directed energy weapons, laying the groundwork for future protective technologies.

## PHASE I

During Phase I, Luna Labs, Arcarithm, Force Engineering, and General Nano contributed to initial feasibility studies and proof of concept development, supported by $200,000 each in SBIR funding. The goal for Phase I was to establish the feasibility of producing a testable and easily applied coating capable of defending against high-power microwave and/or laser energy attacks.

## PHASE II

Following review of the final Phase I submissions, AAL awarded Luna Labs and Arcarithm SBIR Phase II contracts, each receiving $1.05 million, to continue their work developing samples and refining their solutions.

## TRANSITION

The project is currently being tested with joint survivability partners, with results pending. These tests are vital for transitioning the technology to operational use. The Office of Naval Research (ONR) is the planned transition partner, positioning the solution for broader adoption across Navy platforms and other military services, including the Army.

## LESSONS LEARNED

**Accessibility:** By providing access needed to stakeholders, equipment, and materials, solution developers are able to test their coatings' performance, ensuring compatibility with current aviation platforms and meeting stakeholders' needs.

**Engaging Beyond the Army:** Based on this project's high potential for broad application across military services, the team engaged stakeholders in and outside of the Army. This helped solution developers consider multiple use cases and align goals with multiple services in mind.

## PHASE I SBIR: $800,000

**Arcarithm:** $200,000
**Force Engineering:** $200,000
**General Nano:** $200,000
**Luna Labs:** $200,000

## PHASE II SBIR: $2.1 MILLION

**Arcarithm:** $1.05 MILLION
**Luna Labs:** $1.05 MILLION

# TETHERED UNMANNED AERIAL SYSTEM (TeUAS)

Unmanned Aerial Systems (UAS) have become a cornerstone of modern military operations. Current tethered UAS platforms are unable to produce an accurate common operating picture for navigation and planning as well as the control algorithms to steer the TeUAS to avoid potential hazards and the ability to detach and reattach to the tether. This limits their operational flexibility and effectiveness in austere environments. The TeUAS project's goal was to develop an advanced tethered UAS system with capabilities more suitable for combat.

Stakeholders for this project included PEO Intelligence, Electronic Warfare & Sensors (IEW&S), DEVCOM AvMC, DEVCOM GVSC, and DEVCOM C5ISR.

## PHASE I:

Six companies were selected from 68 applications and each was given $200,000 to participate in Phase I of this SBIR project: AvaWatz Company, Charles River Analytics Inc., Dragonfly Pictures Inc., EpiSystems Science Inc., KEF Robotics, and La Jolla Logic Inc.

## PHASE I SBIR: $1.2 MILLION

**AvaWatz Company:** $200,000
**Charles River Analytics Inc.:** $200,000
**Dragonfly Pictures Inc.**: $200,000
**EpiSystems Science Inc.:** $200,000
**KEF Robotics:** $200,000
**La Jolla Logic Inc.:** $200,000

These companies were tasked with the design of a preliminary architecture consisting of sensors and software that would enable on-the-move operation of deployed tethered UAS while attached to unmanned ground vehicles.

Specifically, they researched capabilities such as:

- **Obstacle Avoidance:** Integrating sensors capable of conducting obstacle avoidance while on the move in urban and rural environments.
- **Hardened Tether:** Tethers more suitable to operate in combat environments including cyber resiliency.
- **Detachment and Reattachment:** Allowing for detaching and reattaching of UAS while conducting on-the-move obstacle avoidance, providing flexibility for dynamic operational scenarios.
- **Common Operating Picture:** Developing sensor configuration concepts and software algorithms that will provide the ability to share and integrate their data with the common operating picture of the attached ground vehicle and larger ground formation. This collaborative sharing will enable greater mobility for the team using coordinated maneuvers to avoid obstacles and prevent the tether from becoming entangled.

## PHASE II SBIR: $3 MILLION

**KEF Robotics:** $1.5 MILLION
**La Jolla Logic Inc.:** $1.5 MILLION

**PHASE II:**

Based on their proposals, KEF Robotics and La Jolla Logic Inc. were selected for Phase II, and each was awarded $1.5 million to further develop their solutions.

The companies were asked to refine their preliminary architecture by adding a capability to tolerate and/or reject poor-quality data without degradation, have persistent memory of an area, and support collaboration with another ground vehicle-UAS pair. The software was tested in urban, rural, and suburban environments to evaluate performance with various obstacles and lighting conditions. The final Phase II deliverables were a live demonstration for GVSC and a final report.

Throughout the project, prototypes were field-tested to ensure alignment with Army requirements, and continuous feedback loops helped refine the technology. Emphasis was placed on scalability and compatibility with existing platforms, ensuring the tethered systems could meet both current and future operational needs.

**KEF Robotics**

As part of Phase II, KEF used SBIR funding to develop advanced computer vision algorithms to fly tethered autonomous drones through urban environments in day and night conditions. Specifically, they studied the use of tethered drones for highly mobile ground platforms by using advanced sensors, machine learning algorithms, and powerful computation to build a dense and long range map of its surroundings. This real-time map generation, paired with KEF's planning and navigation modules, would allow the drone to avoid obstacles autonomously while moving in an urban environment at high speeds.

**LA JOLLA LOGIC INC.**

La Jolla Logic proposed a system they called Hermes, which combined multiple TRL 9 technologies that were being used by the Army into a highly capable obstacle detection and avoidance system for tethered UAS and ground vehicles. The Hermes system used the TRL 9 obstacle detection and 3D mapping system used for manned helicopters operating in degraded visual environments. This guided their algorithm and sensor selection to create a high-assurance 3D world model at long ranges that would allow the tethered UAS sufficient time to mitigate the detected obstacles.

**LESSONS LEARNED**

**Aligning Innovation Timelines:** The TeUAS project technology developed faster than the Army's anticipated timeline and the Army was not ready to intake the TeUAS solutions. PM RCV is the only program with the tethered requirement and the platform is currently in the early stages of development. In the end, the companies' solutions outpaced what the Army thought possible. The technical insight gained during this project has been transferred to GVSC to support the design of future tethered UAS systems. This highlighted the importance of aligning innovation timelines across interconnected systems to ensure synchronized advancements and successful transition.

# UAS PROPOLUSTION (UAS-P) MOTOR-GENERATOR SYSTEM

Unmanned Aircraft Systems (UAS) have been pushed to the forefront of current and future conflicts, and the need to enhance capabilities of current UAS is at an all time high. The current practice of onboard power generation uses technology developed for ground vehicle applications, which is often heavy and does not meet Army UAS requirements. As a result, there is a need for UAS to have more onboard power to support all phases of flight and new attachment capabilities.

Challenges faced by Group 3 and 4 UAS include insufficient onboard power generation, low-power-density power generation components, limited altitude relight capability at higher altitudes, inefficient descent capability, and ever-increasing prime power demand. UASs must also meet the need for additional attached equipment such as high-resolution cameras for reconnaissance, radar systems for detecting targets, and electronic warfare equipment that can jam enemy communications.

UAS propulsion systems need a solution that is compact, lightweight, and capable of generating sufficient power while maintaining reliability.

DEVCOM ARL partnered with AAL and PEO Aviation, DEVCOM AvMC, and the Air Force Research Laboratory to seek out commercial solutions for a new motor-generator (M-G) system for UAS propulsion to increase onboard power density while reducing engine weight. Together, they sought solutions that could solve multiple issues:

- **Decrease Engine Weight:** Lighter engine components are critical to improving the overall efficiency of engines.
- **Boost Onboard Power:** The system should provide at least 7kW of power to address the increasing power demands for onboard electronics and sensors.
- **Improve Reliability with New Materials:** Enhancing power system component reliability will greatly improve one of the major failure points of UAS motor-generators in use today.
- **Enhance Takeoff and Flight Capabilities:** Solutions should provide a significant power boost during takeoff and better reliability at high altitudes and during descent.

**PHASE II SBIR: $4.7 MILLION**

**Aveox:** $1.7 MILLION

**HFE International:** $1.7 MILLION

**PC Krause & Associates:** $1.3 MILLION



## DIRECT TO PHASE II:

In September 2022, three vendors were chosen to design and test a new M-G system: Aveox, HFE International, and PC Krause & Associates. This was a Phase II SBIR effort with $4.7 million in total funding. Although originally scheduled for 12 months, the period of performance extended to 25 months due to COVID-related supply chain delays. Despite these setbacks, the team progressed through bench testing at DEVCOM ARL to assess the system's viability. Throughout the development process, the companies had access to Army scientists from ARL and experts from PM UAS to better inform their solutions.

All three companies developed compact, lightweight motor-generator systems that connected to a gearbox design, with one variant (Aveox) that featured a novel crankshaft solution.

The project met its objectives, with each contractor producing two working prototypes that underwent rigorous contractor lab testing. Prototypes will be delivered to DEVCOM ARL for further testing and assessment over the next year.

AAL is moving forward with additional RDT&E funding to further develop the technology from PC Kraus & Associates for an airworthy and reliable compact, lightweight motor-generator system, which provides more power density, generates power while flying, and decreases the weight of current engine components.

HFE INTERNATIONAL

AVEOX


PC KRAUSE & ASSOCIATES

## TRANSITION

Aveox, HFE International, and PC Krause & Associates each moved toward successful transitions by the end of the UAS-P project. Each company's unique technology solution will go through further development, testing, and evaluation and will play a role in the future of the Army's UAS systems:

- All three companies' solutions will transition to DEVCOM ARL for further testing to support the design of future systems. Technologies developed led to new requirements in the program of record to support existing UAS systems.
- The solutions can be scaled for additional air and ground systems.

## LESSONS LEARNED

**Supply Chain Issues:** Industry-wide supply chain issues created significant delays, particularly during the COVID-19 pandemic. This highlighted the need for flexibility in project planning, with contingencies in place for material shortages and other delays beyond the team's control. Ultimately, the project's timeline was extended beyond the initial 12-month plan. While it is critical to set realistic timelines from the start, accounting for potential external disruptions can help avoid misaligned expectations.

**Trust Industry Experts:** The expertise provided by a high quality industry partner creates well-rounded solution development, leading to more effective technology and better-informed requirements. AAL partners with industry solvers not just for their specific technological offerings, but also for their subject expertise, industry knowledge, reliability, and professional network.

**Flexible Funding:** While the project was originally funded through the SBIR program, AAL was able to provide RDT&E funding to continue developing PC Krause & Associates' solution. Capitalizing on this rapidly developing technology serves AAL's mission of getting the best technologies into the hands of Soldiers faster, rather than delaying development due to funding.

# VIRTUAL INNOVATION SUPPORT INTEGRATION OPERATION NETWORK (VISION)

Army and DOD innovation efforts are siloed, and organizations use different tools and platforms – such as CRMs, spreadsheets, and project management tools – that do not speak to one another. This separation often results in many organizations throughout the DOD duplicating research efforts and costs to solve similar problems.

AFWERX had begun development of a tool called Virtual Innovation Support Integration Operation Network (VISION) created by Joy Labs DBA Mobilize to track and manage initiatives within the Air Force.

AAL saw the potential of VISION as a low cost solution that could deliver many of the major features the Army and DOD sought from an innovation tool with project management and CRM-like functionality. Adopting VISION would allow the Army to share costs for a top-flight innovation tool without risking creating another custom, siloed product.

AAL's goal with VISION was  to create an integrated platform that fosters awareness and resource consolidation across multiple services in the DOD. AAL collaborated with the Army's XVIII Airborne Corps and the DEVCOM Catalyst Pathfinder Program to track unit innovation efforts within the Army and the DOD community. This allowed for initial evaluation and testing of the VISION platform which included new collaborative features.

**PHASE II SBIR: $1.9 MILLION**

**Joy Labs DBA Mobilize:** $1.9 MILLION

What emerged was a platform that delivers a suite of capabilities that enable users to design, update, and manage customized workflows, specialized for individuals and organizations' needs. VISION uses machine learning to find commonalities between projects, follows projects to maintain awareness, and allows organizations to create their own customized problem curation and approval pipelines. VISION is being piloted across 20 DOD organizations including 150 licenses within the Army to address the need for flexible process management, enabling faster execution of initiatives and reducing reliance on manual processes and inputs.

Key features AAL's project added to VISION include:

- **Dynamic & Autonomous Process Management (DAPM):** Allows users to create adaptable pipelines and manage all aspects of their innovation processes from initiation to completion. Provides a sustainable framework for customization while maintaining data standardization that allows users to properly aggregate data and report the impact of their efforts.
- **Enhanced Inter- and Cross-Agency Project, Stakeholder, and Resource Management:** Facilitates shared project management and analytic reporting functions, designed specifically for the DOD environment using the DAPM capabilities to create workflows within an organization and between different organizations and services.

## DIRECT TO PHASE II

AAL was able to award a direct-to-Phase II SBIR to expand VISION's capabilities because it had already received a Phase I through AFWERX. The Phase II grant of $1.9 million was executed over a 12-month period of performance.

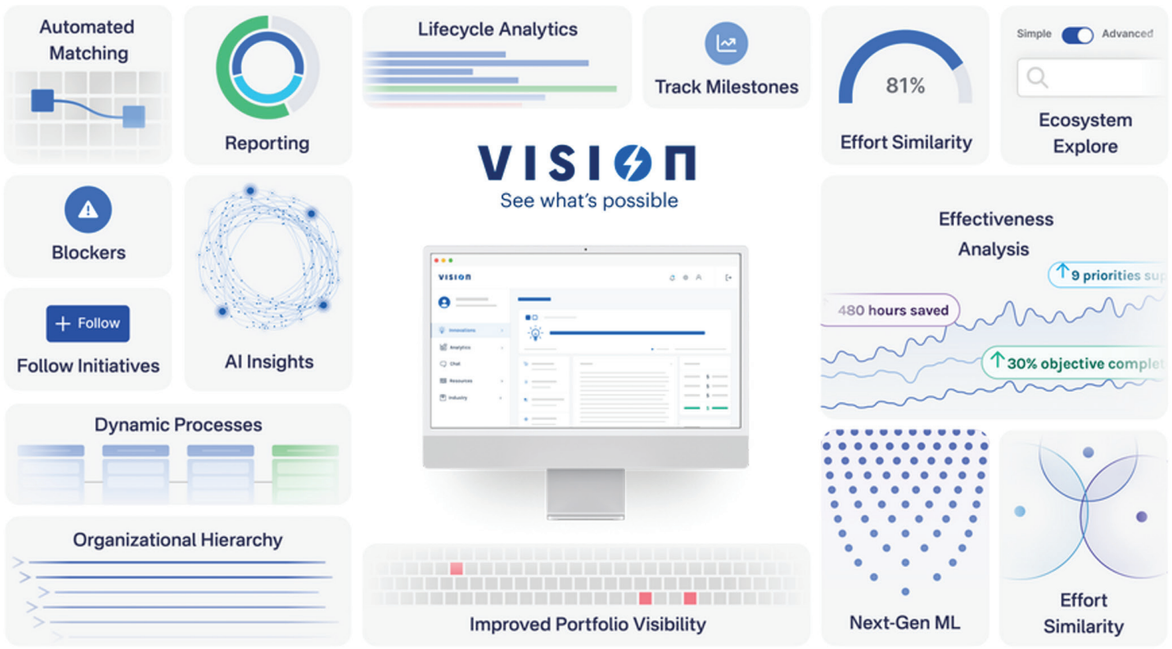
Major milestones included:

- Researching and analyzing current innovation processes used by organizations like 82nd Airborne, Catalyst Pathfinder, and AAL
- Creating prototype of tool incorporating stakeholder feedback
- Developing pipeline and stage initiation components
- Creating initial Dynamic Processes Engine, prerequisites, and UI/UX design
- Completing backend analytics and database updates
- Performing user acceptance testing, stakeholder feedback, and VISION IL4 deployment

VISION benefited from direct user feedback when Soldier touchpoints were integrated throughout the development cycle. For example, the XVIII Airborne Corps used VISION in projects like the Dragon's Lair innovation competition. Early feedback came from innovation officers during initial meetings, such as one held at Fort Liberty allowing iterative adjustments to VISION's functionality based on their insights.

This developmental phase underscored the platform's potential to streamline processes across multiple organizations, and create awareness and collaboration opportunities, while eliminating redundancies across the DOD. Each Phase II milestone, including data architecture and analytic reporting, was completed successfully, allowing VISION to progress toward full operational deployment.

**EXAMPLE:** VISION Capabilities




## TRANSITION

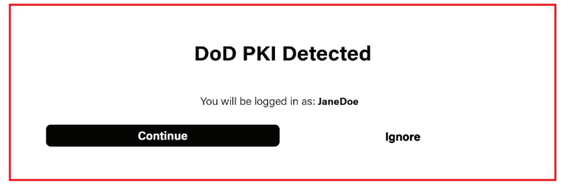
With further development funding expected from the Office of the Secretary of Defense and the Air Force, VISION is positioned for increased capabilities and wider integration. AAL plans to stay involved as the project transitions under broader DOD management, ensuring that the program remains responsive to Army and joint force needs which will be central to its future success.

By lowering redundancies and fostering resource sharing, VISION is poised to become a unifying and critical asset in the DOD's innovation toolkit. While the primary challenge for similar programs attempting to unify DOD resources has been adoption, VISION has the advantage of early buy-in from stakeholders already familiar with its capabilities. As the project advances into broader implementation, ongoing support from stakeholders and incremental updates, based on user feedback, will be crucial to its widespread adoption in the DOD.

## LESSONS LEARNED

**Collaboration:** This project allowed us to address a need in the Army by building upon an existing platform created by AFWERX. AAL's contribution to the effort grew VISION from a service-specific platform to a widely-adoptable DOD platform, saving time and resources. Previously, sharing project information was facilitated through direct communication between agencies, such as AFWERX and AAL. This method of manual information sharing is slow and inefficient which only proves to be more difficult as the scale and complexity of DOD innovation efforts grow.

**EXAMPLE:** Common Access Card User




**Authority to Operate:** A notable achievement during this project was configuring VISION to support all DOD Common Access Card (CAC) users. VISION was unable to allow access to all DOD card holders, severely hampering the goal of collaboration across all military services. Joy Labs DBA Mobilize worked closely with Platform One and their Cloud Native Access Point team, which is the authority to operate (ATO) holder for VISION. The CAC solution required changes to the standard interconnection security agreement and needed to be reviewed and approved by multiple government organizations and levels.

**Controlled Customization:** In further developing VISION, AAL learned that controls would need to be in place to recommend and validate capabilities and software changes before they are made to the program. While it is important that VISION remains customizable to meet the unique needs and use cases of different military services, it is critical that the program remains easily accessible and usable across services.

# AUGMENTED REALITY MAINTAINER-OPERATOR RELAY SYSTEM (ARMORS)

**COMPANY: TAQTILE**

**PROJECT DESCRIPTION:** ARMORS is a telemaintenance tool that employs augmented reality-based guidance displayed on AR goggles or tablets. It allows Soldiers to identify, document, and manage vehicle maintenance faults easily and efficiently, and provides remote assist capability to keep systems operational when maintenance support is not available. ARMORS originated from a 2019 feedback session at Fort Cavazos where a 1st Cavalry Division Soldier highlighted that inefficient vehicle maintenance procedures were negatively impacting operational readiness.

**UPDATE:**

- ARMORS software is now available on Computer Hardware, Enterprise Software and Solutions (CHESS) for individual units to purchase licenses.
- Currently, ARMORS is being used in the USINDOPACOM and USEUCOM theaters.
- PEO Ground Combat Systems, Integrated Logistics Support submitted ARMORS for consideration in the Rapid Sustainment Improvement Process funding request, seeking additional R&D and procurement support.

# HOLISTIC HEALTH AND FITNESS MANAGEMENT SYSTEM (H2FMS)

**COMPANY: COACHMEPLUS**

**PROJECT DESCRIPTION:** H2FMS created a software/cloud solution that tracks Soldier/unit readiness across the five domains of the Army's Holistic Health and Fitness (H2F) program: physical, mental, nutrition, sleep, and spiritual. H2FMS enables data to move to new units and new locations with the Soldier in a way that legacy platforms did not. This level of streamlined, long-term tracking of H2F data, amalgamated into a user-friendly system for data collection and display, should allow leaders to understand the readiness level of their force and identify Soldiers who may be struggling before the Soldier fails a physical fitness test, suffers an injury, or requires practitioner intervention.

**UPDATE:**

H2FMS is currently in an Office of the Secretary of Defense-sponsored SBIR Sequential Phase II, ending in June 2026, intended to scale the project for active duty Army, National Guard, and US Army Reserve.

CoachMePlus also received two Phase III awards from H2F.

- The first Phase III award for $4.1 million, ending in September 2025, focuses on pressure testing their solution with eight brigades (i.e., how does the software handle 10,000 people using it at the same time). The National Guard Bureau will be part of this as well, focusing on content development for the application.
- In the second Phase III award, CoachMePlus software will be piloted during One Station Unit Training for Soldiers in the infantry branch, which combines basic and advanced training in one location. Testing is scheduled to be conducted at Fort Moore and other military installations.

# LESSONS LEARNED

Through many different projects and events, AAL has learned about cutting-edge technology and how policy and organizational behaviors can affect its development and implementation. What follows is a list of lessons we have learned as well as recommendations for how to move forward.

## CLARITY ABOUT MARKET SIZE

A challenge companies and their investors face is understanding the size of the defense market for a given technology. This is especially important for companies with defense-specific technologies, like next-generation missiles, that don't have commercial uses. Investors need to know how big of a market the company could break into to evaluate if their investment makes business sense.

Luckily, the Army's budget is available to the public and allows companies to see specifically what areas of defense and types of technology are being developed and purchased. Companies have the ability to search the budget by organization name, like DEVCOM, or by technology types, such as robotics and navigation. The search will then display any R forms (a summary document that includes mission description and budget item justification, accomplishments, funding, and cost details) that match the query. For example, AAL's R form is PE 0603025A CK8, it gives you a good look at the size of our budget, how it's spent, and its distribution throughout the years.

## LOCATION MATTERS

One of the major successes of DOD innovation is the growing efficiency gained because DICE organizations collaborate more frequently. This has been possible in large part because many of these organizations occupy the same floor of Austin's Capital Factory. The face-to-face interactions have enabled better coordination, faster problem solving, clearer and more frequent communication, and stronger relationships among DOD innovation organizations. From co-funding to shared research and joint experimentation, these collaborations are increasing productivity while reducing the costs of putting superior solutions into the hands of Soldiers, Sailors, Airmen, and Marines. One example from 2024 is AAL's Deep Terrain Shaping Operations project with the Marine Corps (pg. 11).

## LEARN FROM ALLIES

Different countries learn different lessons about innovation and capability development, and it's important to consider and integrate them. The geostrategic environment varies substantially for US allies and partners based on many factors, even for countries with relative proximity, which affects how and why countries develop military capabilities. Our meetings with Australia, Poland, and Great Britain last year were outstanding opportunities to discuss where allies and partners are succeeding and where we can learn from each other's obstacles and opportunities. International defense ecosystems also represent critical markets for companies whose products don't have commercial applications and we need to understand them to support portfolio companies and their investors.

## RISK AND AUTONOMY

The Army must develop and train Soldiers to fight as if we are at war. War in the 21st Century is, and will increasingly be, centered on the capabilities of unmanned systems. The Army needs to incorporate new skill sets into its formations, but current training with autonomy is ad hoc, system specific, and location dependent. This training also does not leverage full autonomy, and is typically one-operator-to-one-system, not the one to many that will be needed in combat.

If Soldiers lack experience training with fully autonomous systems they will not develop trust with autonomous platforms, and will neither know how to nor want to employ them in combat. Industry, on the other hand, has developed autonomy that enjoys significant trust from the public, and leaders have assumed a significant amount of risk to mature autonomous systems to the point that they function side by side with people with no human in the loop. A two-and-a-half-ton self-driving vehicle carrying passengers through a crowded downtown area is risky in the extreme.

AAL is working with Army Test and Evaluation Command to get safety releases to allow Soldiers to get hands-on time with autonomous technology at Soldier touchpoints, where they typically watch companies operate it. The upcoming MSPIX experiment, which features AAL's DTSO and autonomous breaching projects, is an important effort to help the Army graduate to realistic training with imperfect systems and determine the extent to which this is more valuable than canned exercises with exquisite systems.

## ATO REMAINS A PROBLEM

If we want the best solutions from industry, we must make it easier for companies to be approved for an authority to operate (ATO). The cost (often over $1 million) and the length of time (up to a year) to receive an ATO are prohibitive. If the Army is sincere about working with cutting-edge technologists to solve the Army's toughest technical challenges, this process needs to be less difficult. Without ATOs, projects can come to a standstill, which leads to busted budgets, delays, and most importantly, the inability to deliver capabilities to Soldiers. These impediments also make it difficult to conduct extended experimentation and iterative development with units.

Some services have developed government-owned environments where companies can place their software for evaluation purposes. However, these environments can have significant back-end costs for the government and are inaccessible to SBIR companies, who cannot use SBIR funds to pay the government to use the environment.

The government should explore solutions that allow companies to put their software in accredited environments at low cost for short periods of time to support experimentation and testing – including business to business options. This will help the government make more informed decisions on potential software solutions while reducing the cost and time burden on companies who have never managed the ATO process before.

## COMMERCIAL RANGE DATABASE

The lack of access to commercial test ranges, especially National Institute of Standards and Technology (NIST)-certified ranges that can accommodate electronic warfare and explosive payloads, limits companies' ability to test their solutions before scheduled Army demonstration events. These demos can be contract milestones that Army stakeholders use to evaluate performance and can lead to future contracts. When ranges are unavailable before official evaluations, the chances of a successful demonstration are greatly reduced, and companies exhaust valuable time and resources on unsuccessful tests.

As defense innovation attracts more new performers to solve the toughest defense challenges, the requirement for commercial access to ranges likewise increases. The creation of a database of commercial ranges could help new entrances identify places to experiment with their technology, even if far from home, and could identify if more ranges are needed nationwide.

# TERMS, ACRONYMS, AND LINKS

**AFWERX:** Innovation arm of the Department of the Air Force

**AFC:** US Army Futures Command

**AI:** Artificial Intelligence

**CASCOM:** US Army Combined Arms Support Command

**CDID:** Capability Development Integration Directorate

**CFT:** Cross-Functional Team

**DEVCOM:** US Army Combat Capabilities Development Command

**DEVCOM ARL:** DEVCOM Army Research Laboratory

**DEVCOM AvMC:** DEVCOM Aviation and Missile Center

**DEVCOM C5ISR:** DEVCOM Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance

**DEVCOM GVSC:** DEVCOM Ground Vehicle Systems Center

**DEVCOM SC STTC:** DEVCOM Soldier Center Simulation and Training Technology Center

**DICE:** Defense Innovation Community of Entities

**Low-SWaP:** Low Size, Weight, and Power

**ML:** Machine Learning

**PEO:** Program Executive Office

**PM:** Program Manager (job title) or Project Manager (DOD department type)

**PM UAS:** Project Manager, Unmanned Aircraft Systems

**R&D:** Research and Development

**RCV:** Robotic Combat Vehicle

**RDT&E:** Research, Development, Test and Evaluation

**SBIR:** Small Business Innovation Research

**SOCOM:** US Army Special Operations Command

**TACOM:** US Army Tank-automotive and Armaments Command

**TRL:** Technology Readiness Level

**UAS:** Unmanned Aircraft System

**UAS Groups 1-3:** Smaller, short-range UAS

**UAS Groups 4-5:** Larger, long-range UAS

**UI/UX:** User Interface/User Experience

**VC:** Venture Capitalist

## Links:

**Army Budget:** www.asafm.army.mil/Budget-Materials/

**Battlefield Utility Article:** warontherocks.com/2025/02/how-can-we-measure-if-defense-innovation-works/

**DOD Budget:** www.congress.gov/118/plaws/publ47/PLAW-118publ47.pdf

**SBIR Phase I & II:** https://www.sbir.gov/tutorials/program-basics/tutorial-1


U.S. ARMY