

# Army Digital Transformation Challenge

Inside: See this year's winners, and all 64 transformative entries

# 2024



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# 2024 Army Digital Transformation Challenge Seeks New Paths for Modernization

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In partnership with the United States Army DEVCOM Ground Vehicle Systems Center (GVSC), the National Center for Manufacturing Sciences (NCMS) has initiated the 2024 Army Digital Transformation Challenge (DTC) to identify digital technology catalysts.

The competition has targeted innovative and transformative technologies, techniques or capabilities that enable the acceleration of digital transformation across the US Army. These could include novel technologies, resourcing strategies, business processes, production processes, and other transformative capabilities that have the potential to make the US Army more digitally agile, effective, efficient, affordable, and scalable.

Participants were required to submit a 300-500-word abstract, a graphic depicting the capability, and an optional demonstration video. A total of 64 entries were submitted by industry, academic, and government partners.

## Key Issues

GVSC leaders compiled a list of key questions for participants to consider:

- How do your digital enterprise (DE) tools plan to incorporate security to protect Army specific details?
- Are the Army's current security protocols and requirements too strict or not strict enough when it is known our US technology and information about our systems and procedures are actively sought?
- Should data and tools, with the right amount of security, be managed by the DOD, Army, or Industry? What is best solution to meet Army goals?
- Should DE tools be hosted in a single location (cloud) or in a variety of clouds? Is there a best strategy to interlink tools in different clouds?
- How can the Army ensure open, interchangeable tool selection and integration? The Army does not want to vendor lock into one tool and would like flexibility to change between engineering tools while maintaining an easy, and secure, connection to all tools.
- Is there a best format to receive CAD data to allow for all tools, and users, to allow the best information exchange between industry, academia, and Gov, and vice versa?
- Is there a best format for Advanced Manufacturable Parts (3D printing) that can be universally accepted by any type of printing machine?
- What is the number one barrier to DE adoption in a Department of Defense (DOD) workplace, and what are your solutions to this barrier?

A panel of senior Army GVSC leaders gathered to review the eight finalists' innovations in a virtual presentation on November 15, after which two winners were selected. NCMS has committed to support the winners' innovations by making available \$50,000 of in-kind support and \$50,000 project funding to each of the winners. The funds will enable the winners to take part in a demonstration project with the Army.

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## Scoring Criteria

Judging has been based on the following criteria:

- **Digital engineering relevance/impact:** How much does it impact digital engineering? Does it improve the efficiency and/or effectiveness of current engineering practices (e.g., cost, safety, cycle time, necessary manpower, readiness, etc.)?
- **Originality/contribution to the state-of-the-art:** How original or innovative is it?
- **Avoidance of commercialism:** Does it describe a technology and how it will improve digital transformation or does it attempt to market the organization?
- **Technical maturity:** How mature or ready is the technology? Has it been prototyped or successfully demonstrated?
- **Cross-service applicability:** Is it potentially applicable to all service branches of the military and the Defense Logistics Agency (DLA)?
- **Feasibility/practicality:** How viable would it be to transition the technology for use by the DOD? Considerations include Army digital engineering needs, needs of specific DOD programs, implementation, the readiness level of the technology, and the strength/validity of test or simulation data supporting performance claims.

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# Army Digital Transformation Challenge Finalists

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The following entries have been selected as finalists for the 2024 Army Digital Transformation Challenge:

**AI-Driven Digital Engineering: Transforming Army Readiness Through Personalized Skill Development**, by Enterprise Minds, Inc.; page 35

**IRONPIPE with RAG Capabilities: Revolutionizing Army Digital Transformation with IoT and Generative AI**, by Aptima, Inc.; page 70

**Altair Graph Studio for the Army Digital Transformation Challenge**, by Altair; page 16

**SBE Vision Digital Engineering Ecosystem**, by SBE Vision; page 73

**AURA SmartThread**, by AURA Technologies, LLC; page 71

**Secure Resilient Data Infrastructure for Digital Transformation**, by Kinnami; page 12

**Collaborative Digital Engineering Environment**, by Pratt & Miller Defense; page 13

See the winning technologies on page 6, and a full abstract for all the entries in the pages ahead.

**Intentional Design of Tailored Digital Engineering Technical Reviews (T-DETRs) for GVSC**, by George Mason University; page 43

# Army Digital Transformation Challenge Winners

NCMS is excited to announce the two winners of the 2024 Army Digital Transformation Challenge! In partnership with the United States Army DEVCOM Ground Vehicle Systems Center (GVSC), this competition aimed to highlight innovative and transformative technologies, techniques or capabilities that enable the acceleration of digital transformation across the US Army.

A total of 64 entries were submitted and carefully reviewed by the judges, to determine the top technologies that will have the greatest potential to make the US Army more digitally agile, effective, efficient, affordable, and scalable. Last week, the eight finalists presented their solutions to a panel of Army subject matter experts through a private virtual event on November 15. After careful consideration, the judges selected their two winners. The winners are:



## **IRONPIPE with RAG Capabilities: Revolutionizing Army Digital Transformation with IoT and Generative AI, by Aptima, Inc.**

The IRONPIPE platform, developed by Aptima, is an IoT-based, cloud-integrated system designed to address digital transformation challenges in distributed operational environments. Originally developed for the Department of Navy, IRONPIPE provides real-time situational awareness by consolidating data from environmental, human, and machine sensors into a unified Common Operating Picture (COP). Building on this foundation, its latest innovation—Retrieval Augmented Generation (RAG)—introduces generative AI capabilities to the IRONPIPE platform. It allows users to automatically generate actionable reports on-demand based on real-time data collected from IRONPIPE sensors. This eliminates the need for manual data analysis and report generation, providing critical insights on personnel, equipment, and environmental conditions.

## **SBE Vision Digital Engineering Ecosystem, by SBE Vision.**

SBE Vision has developed an enterprise-class interoperability solution, the SBE Digital Thread Platform. Engineered to manage large-scale data through advanced cloud-based technology and a distributed architecture, this platform enables seamless data integration across a variety of engineering applications. A defining feature of the SBE Platform is its cloud-agnostic deployment capability, which allows it to operate in an on-premise, cloud, or hybrid environments. In addition to this flexibility, the platform's innovative hub-and-spoke model enables the traceability and auditability of data across the digital engineering ecosystem (DEE). As the needs of the DEE evolve, and additional tools are integrated, data is transformed between tools without requiring constant updates to individual connections.

NCMS will be awarding both of the winners' innovations with \$50,000 of in-kind support and \$50,000 of project funding, applicable to a future DOD demonstration project.

For more information about the 2024 Army Digital Transformation Challenge, visit: <https://ncms.org/events/2024-army-dtc>.



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# Army Digital Transformation Challenge Entries

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## Aelius Exploitation Technologies, LLC

### Synthetic Environment Tactical Engineering Experience (TEX)

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Video: [https://drive.google.com/file/d/1z299DpDyDxeDto\\_f4uj8SrfUkIs8N21X/view?usp=sharing](https://drive.google.com/file/d/1z299DpDyDxeDto_f4uj8SrfUkIs8N21X/view?usp=sharing)

#### Problem Statement

Current DOD system design timelines cannot keep up with peer/near-peer adversaries who are accelerating technology delivery. Adopting digital engineering transformation can significantly decrease design times and costs.

#### Transformation Solution

AELIUS has created a military-industrial metaverse in a synthetic environment / Tactical Engineering Experience (TEX), hosted on the cloud, to support cutting-edge model-based system engineering programs for the DOD programs over the last 5 years. Projects include the MC-130J Amphibious Capability (MAC), which focuses on developing digital twins, model-based systems engineering (MBSE), and digital engineering. The team used the platform for concept development, testing, and evaluation of ramp heights, load configurations, and installation launch and recovery planning.

#### Benefits to the Army

TEX accelerated the design process and down-selection to 8 weeks on a major cargo aircraft. The team continued to integrate more levels into the digital environment and showcased aerodynamic analysis and wave height testing, with adjustable configurations. This platform allowed seven teams from multiple locations to meet virtually for design updates and view, test, and evaluation plans. With TEX, the design team compressed a major modification of a USSOCOM platform preliminary design review (PDR) in only 40 weeks. AELIUS' TEX platform accelerates concept-to-prototype at the speed of combat relevance and at an order of magnitude of savings.

#### Expected Challenges

AELIUS continues to incorporate cutting-edge technologies into TEX since its development in 2019 and continues to evolve TEX with new software and platform integration. In the last 6 months, the AELIUS team has used TEX to develop digital twins of the Moon for DARPA and integrated the NVIDIA Omniverse.

#### Technical Maturity/Demonstration Results

TEX has been in development for 5 years and used successfully on 7 major programs, including NCMS MAC, AFRL Project Zero, AFRL Project Autonomous Aircraft Experimentation (AAx), Blue Horizons "Killer Bees", DARPA DSM, and SCO Project One. AELIUS continues to evolve TEX with added capability, including concept development, mission planning, digital engineering, concept of operations (CONOPs) development, and common operational picture (COP). AELIUS is currently on contract and deploying TEX to customers with DLA and can integrate TEX into cross-domain solutions to work on-prem or in the cloud.

TEX was built from an NCMS concept to use digital engineering and advanced manufacturing for the US Army Robotics Combat Vehicle. This 2019 project was well before the Army was ready to transition to MBSE models. AELIUS continues to add capabilities to TEX to include the generation of machine learning (ML) models and integration of autonomous control units (ACU), and now includes the ability to conduct sensor fusion from physical world sensors to integration of training simulators.



# Intact Partners Tele-maintenance

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### Contact

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### Problem Statement

Modern DOD equipment and support systems are complex and require technical skills that are difficult to develop and maintain. Capability and expertise to repair and maintain this complex equipment is not available in remote locations. Thus, repair/maintenance time, repair team travel requirements, equipment down time, and lack of capabilities when the equipment is down is challenging and expensive.

### Transformation Solution

Our Mixed Reality (Augmented Reality & Virtual Reality) Tele-maintenance system operating on our XRiren platform will provide Microsoft HoloLens 2 (HL2) mixed reality headsets combined with digital work instructions and existing system expertise to enable quicker fault diagnosis, repair actions, equipment availability and improved unit combat readiness and effectiveness. A remote person equipped with a HL2 headset device instantly receives the capability to directly connect (e.g. reach-back) for assistance using existing communications capabilities. For example, personnel untrained in complex equipment repairs can access Subject Matter Experts (SMEs) at select locations and repair bases. This system extends the repair locations reach via the HL2 to personnel in the field and brings the virtual SME into an environment where they can provide coaching and support. An expert can direct the maintainer for the repairs, utilization modifications, disposition of the asset if field repair is not possible, and direct support if more assets are required.

### Benefits to the Army

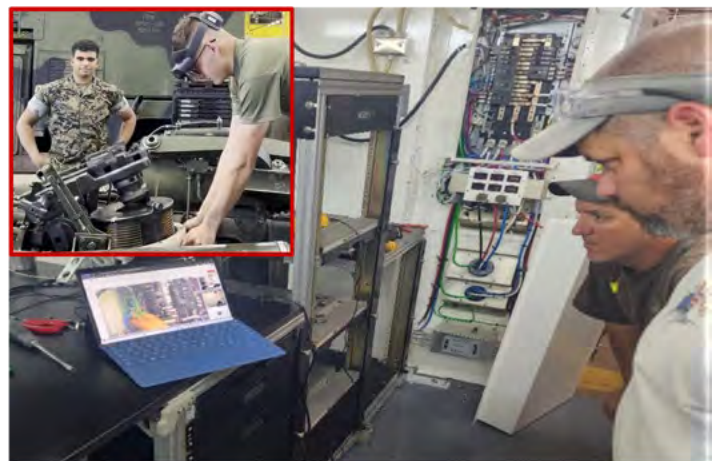
Deploying the proposed, “What you see, I see” capabilities through the tele-maintenance system to the

field will increase DOD personnel capability to field repair his/her equipment. Holographic 3D live, hands-free, 2-way video streams provide an answer to this problem. The Microsoft HL2 is a lightweight, untethered, unit coupled with XRiren cloud services software delivering critical, timely, data to the field. The tele-maintenance continues the years of investment and advances the mixed reality abilities already deployed to USMC units.

By utilizing these capabilities, the DOD can provide the virtual on-site expertise to repair equipment without either sending a repair team forward or sending equipment back. This capability directly and drastically reduces repair cost and downtime while quickly regaining combat capability.

### Expected Challenges

- Create a “Center of Excellence” staffed with trained support personnel.
- Equip the data system with technical manuals in digital form.
- Introduce AI (artificial intelligence) capabilities for problem solving and part recognition.
- Continuously capture data about the field use for future analysis and improvements.



*Tele-maintenance (Digital Work Instruction)*



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**Transformation Solution**

At Kinnami, we provide a resilient hybrid data mesh for edge devices (satellites, sensors, drones, etc.) and the Cloud. Our distributed data management software securely collects, processes, stores, and shares data delivering a holistic solution for extending autonomous capabilities of platforms and supporting real-time data exchange. This provides assured, resilient, low-latency data to the military through client-side encryption and data movement, assuming all devices are hostile, and networks are unreliable (Zero-Trust). The platform fragments, encrypts and transmits data by automated policy between devices.

Kinnami AmiShare’s data mesh software architecture significantly impacts digital engineering by:

**Improving Data Accessibility and Sharing:**

- **Centralized Repository:** AmiShare provides a common data exchange for engineering while taking advantage of distributed cloud and network configurations.
- **Real-time Updates:** Data is synchronized in real-time, ensuring all stakeholders can access the latest information.
- **Collaboration:** System enables teams to share data and work together on projects more effectively.

**Enhancing Data Quality and Integrity:**

- **Data Governance:** With data governance policies, users ensure data is accurate, consistent, and reliable.
- **Data Validation:** The platform can validate data to prevent errors and inconsistencies.

**Accelerating Development and Innovation:**

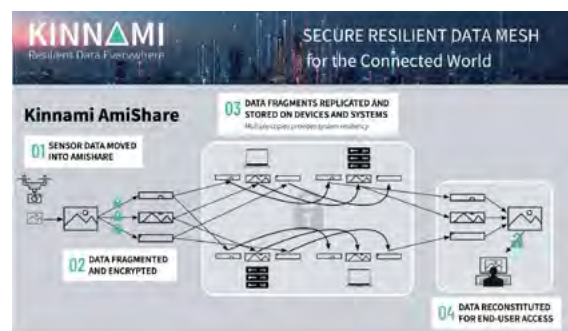
- **Rapid Prototyping:** AmiShare can be used to accelerate the development process by enabling teams to quickly iterate on designs and prototypes.

- **Data-Driven Decision Making:** By providing access to high-quality data, platform can help engineers make decisions for better efficiency and effectiveness.
- **Improving Operational Efficiency:**
  - **Predictive Maintenance:** Platform collects and analyzes data from sensors to enable predictive maintenance, reducing downtime and costs.
  - **Supply Chain Optimization:** The platform can help optimize supply chains by providing real-time visibility into inventory levels and transportation data.
- **Enhancing Safety and Security:**
  - **Risk Assessment:** The platform can be used to assess risks and identify potential safety hazards.
  - **Cybersecurity:** The platform can help protect sensitive data from cyber threats.

**Benefits to the Army**

**Specific Benefits to Engineering Practices:**

- Reduced Costs
- Shorter Cycle Times
- Reduced Manpower
- Increased Readiness



<p><b>Problem</b></p> <ul style="list-style-type: none"> <li>• Edge devices (sensors, IoT, drones, satellites, wearables, etc.) now have increased computing capabilities</li> <li>• Data needs to be securely stored on these devices for real-time processing &amp; autonomous operations</li> <li>• Data needs to be securely transmitted from one edge device to other edge devices or back to datacenter/cloud</li> <li>• Millions of such devices deployed in physically unsecure locations, where networks may be degraded or under-attack</li> <li>• Traditional IT solutions for protecting centralized data not sufficient to secure data in edge environments</li> <li>• Secure, resilient data management is crucial to missions</li> </ul>	<p><b>Solution</b></p> <ul style="list-style-type: none"> <li>• Distributed peer-to-peer data management &amp; security software</li> <li>• Data security, protection, availability on any device &amp; network</li> <li>• Protects data at rest, in transit, from edge device to cloud</li> <li>• Supports data movement between devices</li> <li>• Data replicated, stored &amp; encrypted at source</li> <li>• Multiple copies stored in multiple places</li> <li>• Real time auditing</li> <li>• Works across unreliable or air-gapped networks</li> </ul>
<p><b>Key Successes</b></p> <ul style="list-style-type: none"> <li>• 22 JAFWEEK S&amp;IR Phase 2: Inertial Sensor and Tactical Assessor Kit (ITAR) integration for CSAR</li> <li>• 23 JAFWEEK S&amp;IR Phase 2: M3 for Compass Call data</li> <li>• Active Force Phase 2 S&amp;IR: Enabling accurate localization using UWB in GPS degraded environments for CSAR</li> <li>• USACE EDC: In project to secure sensor-based data collection from critical infrastructure (bridges, etc.)</li> <li>• Air Force DTI S&amp;IR Phase 2: Securing movement of large engineering AECI datasets for Digital Engineering</li> <li>• Air Force ABMS: S&amp;IR contract for Secure Processing &amp; M3, M3A: Part of the NSA's first ever accelerator program</li> </ul>	<p><b>Key Benefits</b></p> <ul style="list-style-type: none"> <li>• Data security everywhere (even on non-DoD devices)</li> <li>• Dynamic data deliver to the user optimized for low bandwidth</li> <li>• Back up and disaster recovery while ensuring data integrity</li> <li>• Automated policy-based admin transparent to the end-user</li> </ul> <p><b>Enabler</b></p> <ul style="list-style-type: none"> <li>• Resilient data for complex environments—edge to cloud—ad hoc/unsecure devices, disconnected data, smart cities, IoT devices</li> <li>• Ensure regulatory compliance (GDPR, CCPA, etc.)</li> <li>• Instantaneous detection &amp; rapid recovery</li> <li>• Secure data sharing (customers, partners, suppliers, etc.)</li> </ul>



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**Problem Statement**

Pratt Miller Defense believes that digital transformation must acknowledge and facilitate rapidly evolving requirements, as current conflicts demonstrate the increasingly changing threat environment. Army leadership has expressed the need for Modular Open System Architecture, which our team has embraced; further, our team has incorporated the means to prototype solutions and solicit operational feedback.

**Transformation Solution**

Our immersive digital engineering environment and feature set can be extended in partnership with the government in a collaborative cloud environment, connecting government teams in a common simulator instance. Extending our capabilities and complimenting the government’s tools enables industry and government to work together in an effort to accelerate requirement validation. Transportability of our Connex-contained simulator is currently a featured offering; the following is a list of further improvements proposed:

- Deploy hosting to an Army and Industry user accessible cloud platform. This approach enables GVSC to host multiple units, geographically dispersed, and iterate tactics similar to the National Training Center’s Opposing Force.
- Incorporate a flexible data model and AI/ML models for Red Force unmanned assets, enabling increasing difficulty in training and a means to train these models based on currently observed behaviors.
- Extending this data model and AI/ML, we turn our concept to Blue Force unmanned assets to support experimentation in the Human Machine Integrated Formation concepts currently under consideration.
- Leveraging the data model, we can provide a

quantitative means to measure effectivity of individual changes to Human Machine Interface and Machine Assisted functions.

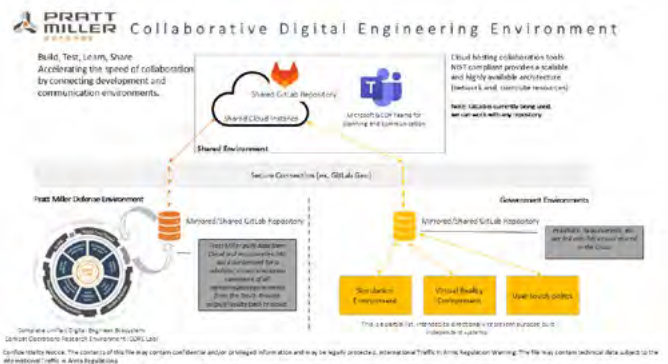
- Design changes to be considered, especially software behaviors, can be expressed in a sysML model and driven to virtual assets through integrating our modeling tools to our software IDE.
- Extend our DevOps environment to incorporate Government users, to include an Asset request feature, enabling current team members to further develop virtual platforms and their behaviors.
- Leverage MBSE and MOSA to standardize an approach and foundation for digital engineering collaboration between Industry and Government.
- Integrated Augmented and Virtual Reality for immersive interactive experience for cognitive load assessment.
- Leverage integrated biometric data capture to assist in measuring soldier performance levels.

**Benefits to the Army**

Continuous Integration/Development (CI/CD) processes will enable Army and Industry collaboration, accelerated innovation, and ultimately shortens the time cycle to deliver functions and features to the warfighter.

**Expected Challenges**

GVSC hosts CoDev for exposing virtual assets for Industry use; this limits the benefits of industry contributions. Our team would promote hosting shared asset development and the ability to capture government request.





## Vector Stream Systems LLC

### Vector Stream Systems LLC: Digital Transformation Challenge Submission

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#### Contact

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#### Problem Statement

The Army faces inefficiencies in fielding and sustaining a fighting force due to vendor lock-in, fragmented digital tools, and security vulnerabilities. These issues, along with the lack of interoperability between platforms and growing system complexity, lead to delays and increased costs. To enhance readiness and operational flexibility, the Army requires a Digital Enterprise (DE) solution that strengthens data management, tool integration, and security protocols.

#### Transformation Solution

Vector Stream Systems LLC proposes a secure, modular DE platform that integrates cloud-based tools for managing data and systems while avoiding vendor lock-in through the adoption of universal standards. Our solution supports multi-cloud environments, improving system resilience and scalability. Military-grade encryption and secure access controls ensure data security, while the platform allows easy interchangeability of CAD and engineering formats, fostering collaboration across the Army, industry, academia, and government.

#### Benefits to the Army

This solution improves the Army's ability to field and sustain forces more effectively by enhancing operational efficiency, reducing cycle times, and lowering costs. By streamlining processes and enabling interoperability of tools, the Army can adapt quickly to future requirements. The platform's flexibility ensures that it remains future-proof, meeting both current and evolving needs.

#### Expected Challenges

Adopting new digital tools often encounters resistance, along with technical integration challenges and the need to balance security with usability. A phased implementation, robust training, and gradual adoption of new standards will be key to overcoming these challenges.

#### Technical Maturity/Demonstration Results

The DE platform leverages established cloud technologies and security protocols that have been successfully demonstrated in both commercial and government sectors. Initial pilot programs show promising results, improving data security, tool integration, and operational efficiency.



Contact

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**Problem Statement**

Ineffective Configuration Management (CM) and Configuration Compliance Monitoring (CCM) creates significant inefficiencies in supply chain and maintenance operations for the Army. Resolving these issues requires a comprehensive Digital Fabric that integrates all relevant systems of record—a transformation often seen as unattainable. Is there a single CM “source of truth” that unites original technical design documents and subsequent technical publications, detailing precisely how a specific weapons platform should be maintained? Without this, achieving CM and CCM is almost impossible. Can artificial intelligence (AI) help provide a solution?

**Transformation Solution**

Configuration Specification Language (CSL) is a domain-specific language that serves as a “lingua franca” enabling seamless communication between various data sources to exchange and augment (using metadata) configuration rules and maintenance policies. While today’s Large Language Models (LLMs) lack the precision required for critical compliance checks, they excel in interpreting complex technical documents. Using AI to transform these interpretations into CSL expressions ensures accuracy and consistency. Combined with a CSL processor, CSL forms a robust foundation for creating the digital infrastructure the DOD needs to achieve full CM and CCM.

**Benefits to the Army**

By establishing comprehensive CM control over its most valuable assets, the Army can significantly reduce supply chain and maintenance costs, enhance operational readiness, and extend the lifespan of critical equipment. Conversely, poor CM—or a lack of it—leads to mismanagement of parts, incorrect

purchases, incorrect issues-from-stock, and potentially dangerous installations that violate technical directives, compromising mission success and safety.

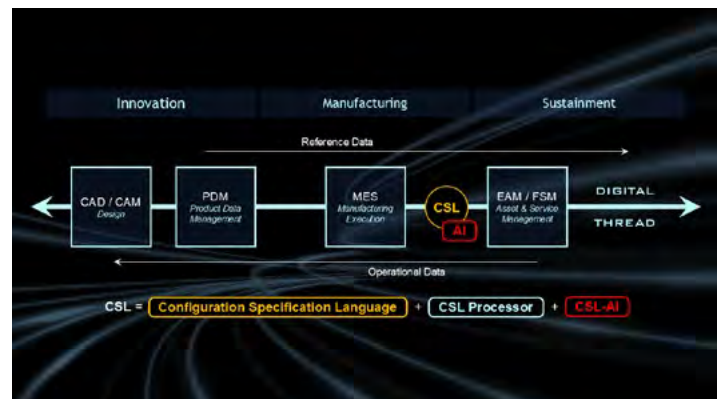
**Expected Challenges**

The primary challenge lies in cleansing existing inaccurate asset assembly data and historical records. But with a structured, fault-tolerant approach based on CSL, accurate and reliable asset data can be achieved over time, paving the way for more effective CM and CCM. The demo uses ChatGPT, but a production-ready solution would require a dedicated and properly trained AI.

**Technical Maturity/Demonstration Results**

CSL, along with its processor, is already proving its value in live, mission-critical projects. Two key examples include:

- The JPEO-CBRND (Joint Program Executive Office for Chemical, Biological, Radiological, and Nuclear Defense) program in the Republic of Korea employs the same CSL solution to manage its high-priority Environmental Air Monitoring (EAM) assets, ensuring critical configuration compliance.
- Amentum (Jacobs Engineering), a leading manufacturer/provider of complex equipment to the US Intelligence Community, successfully uses a CSL-based solution to manage design compliance for all of its new, upgraded, or returned-for-repair equipment.





Contact

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Video: <https://drive.google.com/file/d/1KnW5NbqsTBUOf-iAm9kpRu2Vjurcz9x/view>

Problem Statement

The US Army is challenged by ubiquitous disparate data syntaxes, structures, schemas and semantics, resulting in excessive work to understand deliverables and much custom coding to mediate differences. This fragmented data architecture hinders effective decision-making and timely outcomes. Additionally, the Army faces significant hurdles to integrate, understand, and secure vast amounts of data across diverse platforms, all while seeking greater flexibility and minimizing vendor lock-in. Consolidating an enterprise’s data holdings into a single system, for example PLM data, is not practicable or desirable.

Transformation Solution

We propose a modern data architecture based on knowledge graph technology. Altair Graph Studio (AGS), our cutting-edge knowledge graph platform, actualizes the Army’s digital transformation. AGS delivers seamless integration of complex data and delivery of consistent access to changing complex data. Its open architecture and standards-based formal ontological data model—originally developed by DARPA and the EU—enable easy connectivity with existing digital tools and frameworks. AGS avoids vendor lock-in and creates data interoperability across platforms. AGS provides a critical technical enabler to operationalize trusted AI. With Graph Studio operated as an overlay, the Army enjoys a non-disruptive transition to interoperable, intelligent data.

The platform supports multi-cloud environments, allowing secure data exchanges across a hybrid infrastructure. Graph Studio facilitates collaboration, automation and secure data management responsive to changing demands.

Benefits to the Army

Altair Graph Studio supports digital transformation efforts by enabling:

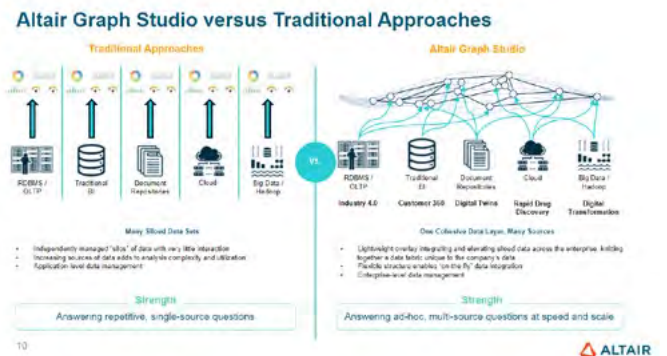
- Faster decision-making and cycle times through real-time, intelligent data insights.
- Reduced manpower by automating complex data integration and analysis tasks.
- Increased readiness through seamless data sharing and collaboration across teams, ensuring better resource allocation and operational planning.
- Scalability and security through cloud-agnostic architecture, offering flexibility without vendor lock-in.
- By creating interoperable data and enabling better coordination, this system enhances the Army’s ability to field a more agile and efficient fighting force.

Expected Challenges

The primary challenge to employ Altair Graph Studio may be access to existing data sources. Users and developers require no new skills; and we explicitly transfer knowledge to appropriate personnel to ensure mutual success. Additionally, validating security protocols in a multi-cloud environment requires careful planning and testing.

Technical Maturity/Demonstration Results

Altair Graph Studio is a mature, proven platform currently deployed across multiple industries for advanced data integration and access. Its adaptability for military use has been proven through initial testing in controlled environments.





Contact

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Problem Statement

Digital transformation (DT) is key to the modernization of the US Army to adapt to technological advances with agility to achieve Waypoint 2028 and Aimpoint 2035. The DOD Digital Engineering Strategy (DES) 2018 emphasizes a shift from document-centric methods to a model-based approach, where the digital models form an authoritative source of truth (ASoT). The DT of systems starts with defining the requirements the defense systems need to satisfy and terminates with validating the system with the elicited requirements. The role of requirement verification (RV) cannot be understated as the failure in writing the requirements right risks the developed/acquired systems failing at their validation.

Transformation Solution

We develop ReqCity, a City of Requirements, to verify the requirements for their individual and set level characteristics to conform to the 'ISO/IEC/IEEE 29148:2018 (E) Requirements Engineering' standard. ReqCity is powered by artificial intelligence (AI), rule-based natural language processing (NLP), graph theory and data visualization. It serves as an ASoT of requirements as it incorporates the requirements, rule evaluations, characteristics, levels of requirements and traceability.

As requirements are elicited primarily in natural language (NL), they suffer from inherent ambiguity and incompleteness. Thus, we developed a framework that employs AI and a rule-based NLP pipeline to evaluate the requirements according to the 42 rules outlined in the INCOSE Guide to Writing Requirements. We determine the characteristics of the requirements from the rules to verify the requirements to conform to the standard. Furthermore,

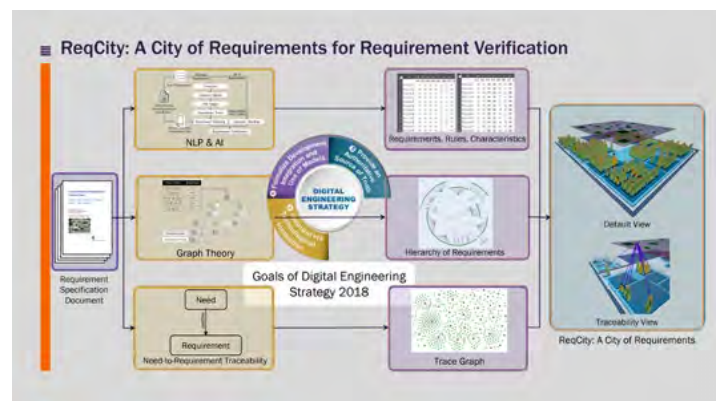
we create a tree structure of the requirements to make them level-appropriate and establish need-to-requirement traceability. The framework visualizes the artifacts using 'ReqCity, a City of Requirements' to overcome the ensuing information overload. Each requirement becomes a building in ReqCity with the rules and characteristics transforming to windows and balconies, respectively. Selected characteristics are mapped to additional building attributes, such as building size, roof, color and orientation. The hierarchical structure of specifications become city blocks for the foundation of the buildings.

Benefits to the Army

ReqCity can make DOD agile by guaranteeing verified requirements in the acquisition and system development processes. ReqCity will move DOD from being document-centric to data-centric while enabling accelerated decision-making, better communication, easier workforce training and increased confidence in system design.

Technical Maturity/Demonstration Results

ReqCity is ready for deployment for requirement verification tasks. It meets the the DOD DES 2018's first three goals: 1) it formalizes the requirement verification process to conform to ISO/IEC/IEEE 29148:2018. It integrates requirements, rule evaluations, characteristics, hierarchy and traceability of requirements. 2) it serves as an ASoT by incorporating the five crucial artifacts with the flexibility to incorporate other requirement traceability. 3) it incorporates technological innovation by leveraging AI, NLP, graph theory and data visualization technologies.



## DATA FORMATTING

# Edlore Inc

## Redesigned Platform Maintenance Process Solution for Enhancing Serviceability

### Contact

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### Problem Statement

The current maintenance processes for military vehicles, including the Joint Light Tactical Vehicle (JLTV), rely on manual methods that are inefficient and costly, causing downtime and decreased mission readiness. The US Army needs an integrated digital platform that not only modernizes maintenance but also addresses the challenge of Line Replaceable Units (LRUs), which require efficient management and replacement to ensure operational efficiency in harsh environments.

### Transformation Solution

Our solution combines four key technologies—Maintenance Aware Design Ecosystem (MADE), Edlore’s AR/VR tools, Siemens Teamcenter, and Mendix—to create an advanced digital platform for managing and maintaining military systems. By integrating MADE’s predictive analytics with Teamcenter’s lifecycle management, Edlore’s interactive 3D models, and Mendix’s customizable dashboards, we streamline the maintenance process and enable predictive, data-driven decisions. The platform enables real-time tracking and management of LRUs, ensuring rapid identification, replacement, and optimization of these critical components. Currently, we are collaborating with the Office of Naval Research (ONR) on a JLTV project that is demonstrating the platform’s effectiveness in reducing errors, improving operational readiness, and speeding up LRU replacement.

### Benefits to the Army

This integrated platform significantly reduces maintenance cycle times, minimizes human error, and enhances mission readiness by ensuring that LRUs are replaced before failure occurs. Predictive analytics

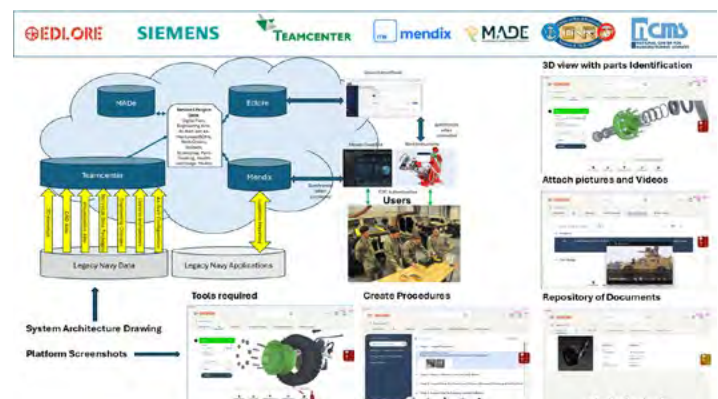
from MADE reduce unscheduled maintenance and downtime, while the seamless integration of Edlore’s AR/VR tools improves training efficiency. The solution is scalable across the Department of Defense (DOD), including applications in the Army, Navy, Air Force, and Defense Logistics Agency (DLA). It offers substantial cost savings through optimized workflows, predictive LRU management, and reduced operational risks.

### Expected Challenges

Challenges include integrating the solution with legacy systems, ensuring cross-platform compatibility for managing LRU data, and training personnel to effectively use AR/VR and digital twin technologies. The security protocols and data governance frameworks must also meet stringent Army standards.

### Technical Maturity/Demonstration Results

Our project is currently in the feasibility study phase, where we have successfully identified the full platform architecture, including MADE, Edlore, Siemens Teamcenter, and Mendix integration. This platform has been conceptualized to forecast LRU failures, streamline repairs through 3D visualizations, and manage lifecycle data. The next phase will involve building and testing this integrated system to demonstrate its operational effectiveness. As we move forward, we anticipate refining and validating the platform in collaboration with the Office of Naval Research (ONR) for future deployment.





## DATA FORMATTING

# Lockheed Martin

## Rapid Computer Vision for Inspection Using NVIDIA Omniverse For Model-Based Synthetic Data Generation

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### Contact

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### Problem Statement

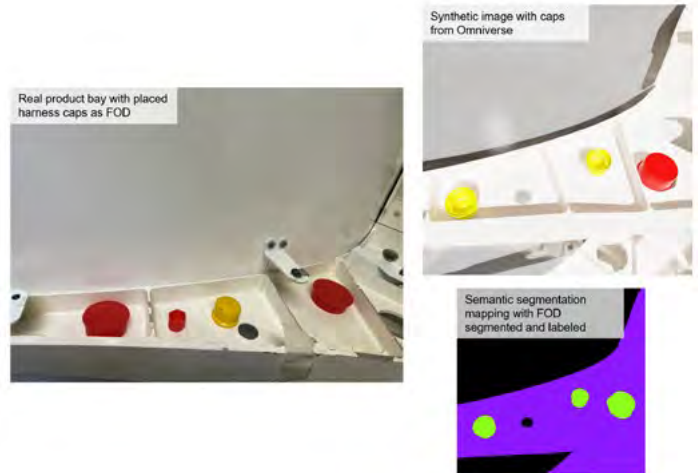
Using computer vision for defect and foreign-object-debris (FOD) detection has been a key focus area at Lockheed Martin. However, the expense associated with manually generating and labeling training data has posed a significant barrier in rapid deployment.

### Transformation Solution

We have found a solution to this issue using NVIDIA's Omniverse. Omniverse can intake product CAD models and synthetically generate the training data, and in modern computer vision frameworks such as Mask2Former and YOLO. The generated images can also be segmented, allowing for real-life identification of objects in a scene (such as the type of FOD detected).

### Technical Maturity/Demonstration Results

We have seen costs to train and deploy computer vision models reduce by nearly 80% from this automation approach.



### Contact

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### Problem Statement

Army mechanics use diagrams and schematics (wiring, hydraulics, pneumatics, hydro-mechanical) in technical manuals to troubleshoot faults. Many platforms still rely on cumbersome paper foldouts up to 45 inches wide or static PDFs. Mechanics often print and tape pages together, then use a highlighter to trace circuit paths. Large diagrams are difficult to view in digital environments. Mechanics often struggle with zooming in and out, making tracing paths on 2D images hard. Troubleshooting becomes even more difficult when flow jumps between sheets of a multi-sheet diagram.

### Transformation Solution

Mechanics will benefit from an electronic interactive wire/fluid tracing tool that supports highlighting a circuit path on a set of graphics. The solution simulates the operation of a switch, valve, or relay, changing the flow's highlighted path. The tool will add to existing technical data viewing tools and will be accessible on portable devices mechanics already use in the field.

### Benefits to the Army

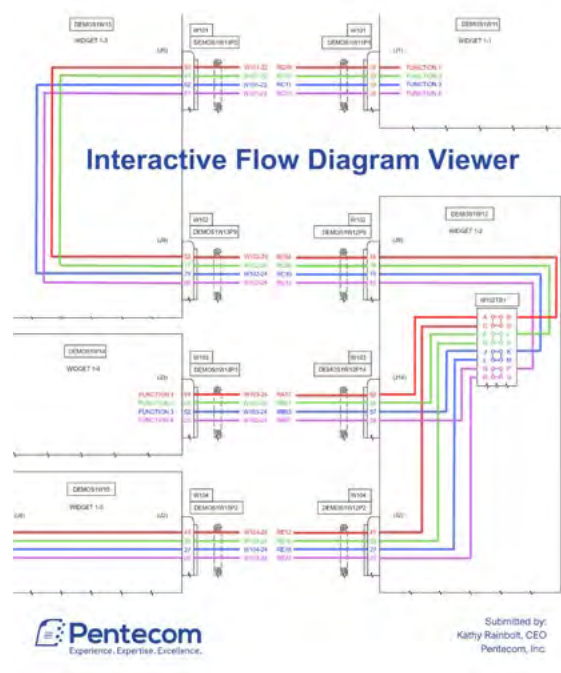
Interactive flow tracing helps mechanics identify and follow circuit paths as they perform maintenance on complex systems such as aircraft or other vehicles and will make maintenance and sustainment less costly and more effective and efficient. A tool that highlights paths in real time will save maintenance hours and expedite the return of equipment for use in the field. Circuits are highlighted, providing a visual cue that is easy to see even on a small screen and when circuit paths jump across diagram sheets. This tool can be used by all services (even industry) to trace circuit flow within a diagram.

### Expected Challenges

Standardization of the structures for the interactive flow diagram are in process in S1000D, the international specification for technical publications. Traditionally adoption happens many years after the standard is published. Until the standards are approved, COTS vendors are reluctant to invest in development. By developing the viewing solution in tandem with the standardization effort, we are accelerating US adoption for this critical need.

### Technical Maturity/Demonstration Results

Interactive flow tracing is not a new concept; however, existing solutions are proprietary and outdated. The proposed standard is still in the infancy stages and will not be published for 3-5 years at best. Army platforms need this capability now, but technology that works with the standard does not yet exist. Early adoption of the proposed standard by the Army will fill the immediate need. The accompanying video provides a brief proof of concept.



## DATA FORMATTING

**University of Arkansas; Purdue University; SAIC;  
Deloitte Consulting**

# Data-Driven Decision Making: Enabling Trusted AI and Army Digital Transformation

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## Contact

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## Problem Statement

Technological advancement is pivotal to national defense; however, innovation is more than simply replacing old technologies with new. Innovation requires achieving the same valuable outcomes through different patterns. Perhaps the greatest example of innovation in today's acquisition environment is Artificial Intelligence (AI).

Because AI optimizes data-driven decision-making, it has the ability to transform how decisions about the best systems and tools are selected and integrated; additionally, because AI evolves decision-making, it is often an attractive alternative for those decisions, itself. As both a novel alternative and transformational capability, AI creates a truly virtuous cycle. However, to fully realize its utility, a critical problem for the Army to overcome is "How can we trust AI to automate mission critical decision-making when decisions of geopolitical importance are made via opaque, learning algorithms?" Government and Industry must make AI auditable.

## Transformation Solution

The International Council of Systems Engineers (INCOSE) Decision Analysis Working Group (DAWG) introduces the Decision Analysis Data Model (DADM). The DADM addresses a critical barrier to the widespread adoption of DE by providing an open model built for reuse; and the DADM addresses the challenges described above by driving transparency into decision-making through a domain-agnostic definition of the information required for decision analysis, which is validated using INCOSE-recommended processes. The Minimally Viable Product

(MVP) of the DADM is a SysML model, built using Cameo Systems Modeler version 2021x. The DADM defines data and processes at both the conceptual and logical abstraction layers.

## Benefits to the Army

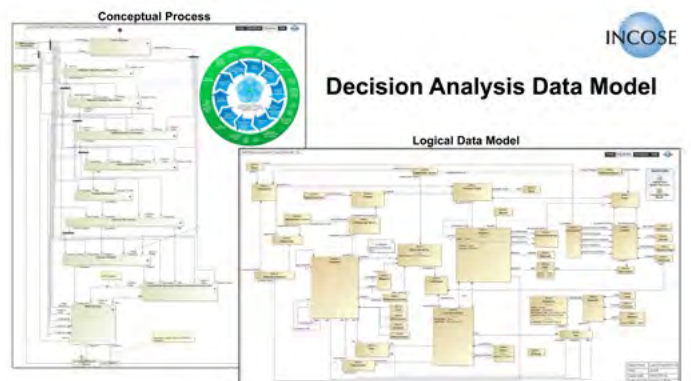
Integrating data models into decision-making processes offers a structured framework for analyzing complex variables, forecasting outcomes, and optimizing resource allocation. Data models provide a systematic approach to gathering, processing, and analyzing large volumes of data. Leveraging big data analytics, ML, and AI, decision-makers can derive actionable insights with unprecedented accuracy. The DADM can enable the Army to allocate resources judiciously by identifying patterns, predicting needs, and simulating scenarios, which facilitates a proactive approach to identifying and mitigating risks.

## Expected Challenges

The greatest challenge the DADM faces is the lack of AI and advanced analytic platform prototypes that apply the DADM to foster feedback and refinement.

## Conclusion

In conclusion, the DADM enables data-driven decision-making, resource optimization, effective risk management, accelerated innovation, and continuous improvement. As the Army navigates the future, leveraging data models will be essential to maintaining a strategic edge.



## OTHER

# 8tree

## Digitalizing Airframe Damage-mapping to Accelerate Warfighter Readiness

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### Contact

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### Problem Statement

A damaged airframe impacts flight operations and compromises warfighting efforts. Battle damage, hailstorms, runway debris and bird strikes are some of the most common causes of airframe damage.

### Transformation Solution

To facilitate quick recovery from such damage events, 8tree created dentCHECK: the world's only Augmented Reality (AR)-enabled 3D damage-mapping tool designed by and for aviation maintainers. dentCHECK is a precision 3D scanner that works like a point-and-shoot camera. It is purpose-built to address the specific damage-mapping demands of the aviation maintainer.

### Benefits to the Army

dentCHECK empowers aviation maintainers to accelerate warfighter readiness by delivering —

- Massive gains in quality and efficiency that enhance warfighter safety (90% faster, 25x more accurate than traditional methods).
- AR-enabled real-time results empower maintainers to shrink aircraft Turn-Around-Time (TaT).
- 1-button ease-of-use that supports DOD's mission to foster multi-capable airmen in an expeditionary force.
- 100% digitalized workflow that eliminates subjectivity and human error, creating permanent digital records for future action/reference.

### Expected Challenges

Aircraft maintenance is very demanding. Support equipment and tools must work in all environments and be ready to deploy at a moment's notice. dentCHECK was

purpose-built to address these challenges, by combining handheld portability, tether-free operation, integrated AR, instant results and 1-button operation into a single tool. The combination of these dentCHECK design elements are protected under US Patent 8,937,657. As a result of these 'all-in-one' features, dentCHECK can be used seamlessly everywhere—the workshop, the depot, the field and the battle theatre—by operators of every skill level.

### Technical Maturity/Demonstration Results

dentCHECK is a TRL-9 COTS tool that is widely used by dozens of commercial aviation maintenance organizations globally to assess and disposition airframe damage accurately, objectively, and efficiently. Numerous publicly available dentCHECK customer case-studies reinforce the quality and efficiency metrics stated above. Early defense sector adoption of dentCHECK includes use by 86MXG (C-130 Ramstein), 89MXG (Jt Base Andrews), several Allied Air Forces and major defense contractors. Other DOD units evaluating dentCHECK to improve maintenance Quality include:

- USAF's Mobility PEO, which is exploring steps to recognize dentCHECK as a program funded equipment item for their sustainment teams.
- FRCE/Navair and NavalX.
- Army Aviation/CCAD.
- Various Air National Guard sites.





## OTHER

# Accelerated Knowledge Transfer Optimize, LLC

## Accelerated Knowledge Transfer for Army Digital Transformation

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### Contact

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Video: [https://www.aktoptimize.com/demo/DJI\\_Inspire\\_Setup/](https://www.aktoptimize.com/demo/DJI_Inspire_Setup/)

### Problem Statement

Today's soldiers and personnel are digital natives that expect digital enterprise (DE) information/guidance to be easily understood and instantly absorbed. The newest weapons and systems require digital technical instruction on par with capabilities being enabled. Majority of current DE technical instructions are not developed and delivered at this level. Deficiencies in soldier / technical personnel performance is often caused by lack of DE understanding, which directly impairs or degrades new weapons/systems readiness and performance.

### Transformation Solution

Accelerated Knowledge Transfer (AKT) applications (software incorporating a focused mix of pictures, videos, animation and text) are enhanced technical instructions that enable instant learning and understanding, instilling confidence to correctly execute technically challenging and/or first-time DE operations/procedures with subject matter expert (SME) levels of performance. This AKT approach rapidly captures and clearly communicates critical, sensitive, and highly complex / infrequently performed DE operations and procedural processes. AKT enables DOD personnel to rapidly understand those specific operations/procedures and SME approach/best-of-best techniques for optimally performing and accomplishing all of them correctly the first time.

### Benefits to the Army

Through digital storytelling, DE operations and processes in technical instructions are demonstrated in attention-grabbing ways so that everyone can understand and repeat. This involves all four learning preferences of

reading, hearing, seeing and doing. All necessary technical reference materials are also linked for instant access through digital library. Examples are diverse and include topics such as: operating new missile/weapon systems; first time additive manufacturing (AM); calibrating thermal optic systems; and performing emergency quadrax connector repairs (under battle conditions). The tools are rapid and inexpensive to develop: most DoD AKTs are produced within one (1) week from start to final approval (on average), with Red Flag deliveries in less than 24 hours following video capture and same day updates as required.

### Expected Challenges

Enabling easy and instant soldier access to future AKT enhanced DE technical instructions/guidance.

### Technical Maturity/Demonstration Results

AKT applications are hardware agnostic and easily viewed to desktops, laptops, tablets, Smartphones and helmet mounted devices. AKT development and updates utilize Secure interactive environment with automated digital programming engine hosted on AWS GovCloud (US) meeting DoD Cloud Computing Security Requirements (SRG) Levels 2, 4, and 5, as well as FISMA, FedRAMP High Baseline, CJIS, ITAR, and HIPAA standards.



**SEE IT**

- Read, hear and see step-by-step for easy understanding/recall
- Interactive 3D, VR, and AR simplifies complexity
- Embedded hyperlinks to additional resources

**DO IT**

- Perform individual steps enabling tactile understanding
- Creates muscle memory and repeatability, with less errors
- Capture knowledge easily and empower/impart SME training

**KNOW IT**

- Resulting experience involves all senses and improves procedures
- Imparts "sticky" / instant recall, transfer and reduced rework
- Significantly improves accuracy and efficiency, boosting performance and productivity



## OTHER

# Anark Corporation

## The Collaborative Digital Thread in Support of DOD 5000.97

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### Contact

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### Problem Statement

Engineering product data is a strategic asset that should be leveraged to bring immediate and lasting military advantage. DOD Instruction 5000.97 on Digital Engineering reinforces this position, while adding “collaborative digital environments” as a key requirement for successful DOD programs.

### Transformation Solution

The commercially available Anark solution will meet the diverse US Army workforce where they are today and provide a scalable path forward to DODi 5000.97 digital transformation. The platform securely extends the digital thread from authoritative sources of truth to optimize engineering data exchange and collaboration.

The web-based platform integrates directly with your existing engineering tools and systems to bring engineering product data together with communication, work management, and knowledge capture features. Bringing these capabilities together with high quality engineering product data is the key to securely extending the digital thread.

### Benefits to the Army

Bring together heterogeneous engineering product data into a single collaborative environment that meets everyone, not just engineering experts, where they work. This prevents traditional engineering tool and system vendor lock-in by making high-quality engineering product data accessible and actionable for everyone.

Typical business benefits also include reducing unplanned, and often hidden, manufacturing costs,

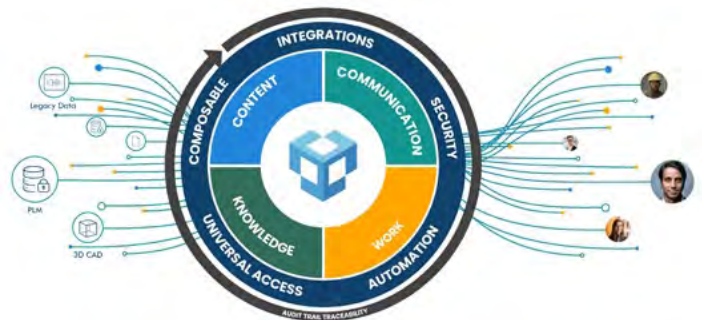
delays, scrap, rework, quality issues, and poor supplier performance. Real-world examples include:

- 50% of engineering time freed up to faster design cycles and innovation.
- 90% reduction of supplier interaction time.
- 40% reduction of engineering errors.
- 30% savings on annual part fabrication costs.

### Expected Challenges

There are several barriers that stand in the way of realizing the collaborative digital engineering environment outlined in DODi 5000.97:

- Most personnel struggle using specialized digital engineering tools like CAD and PLM, preventing scalable solutions.
- The above difficulty accessing data forces organizations to resort to primitive file sharing and communication tools.
- Culture change. Manufacturing organizations and their suppliers are resistant to change. Collaboration gaps begin with phrases like, “I don’t have credentials to access that system”, or “It is a requirement to have a paper print for the work I’m about to do.” Breaking down these barriers requires a “people centric” approach that meets people where they work so they can experience the value firsthand.
- Maintaining data security across a collaborative digital engineering landscape. Closing data access and feedback loops is a must to ensure full end-to-end traceability.



## OTHER

# AURA Technologies

## AURA TrustedDM and Transaction Manager

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### Contact

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### Problem Statement

DOD is facing multiple supply chain issues. Navy submarines as well are experiencing shortages with castings, forgings and fittings. The Navy is now rethinking the supply chain process by supporting a new distributed manufacturing model – engaging small and medium businesses and organic capabilities to achieve shorter resupply times. However, this approach raises a different issue – how does the technical data get to those producers, particularly when the OEM may “own” the data rights?

### Transformation Solution

AURA Technologies Commercial Products Division proposes the use of our TrustedDM trusted endpoint combined with our Transaction Manager web-based software to enable the secure transmission of digital product data from a secure digital data repository to a digital machine (DM) such as a CNC or 3D printer at the Navy shipyard or 3rd party. Any part can be made if the Navy has access to a machine that can produce the item. The system allows the OEM to encrypt the digital file and send it to the Navy, protecting any intellectual property in the data. The Navy can use that file to manufacture the part as if it were manufactured at the OEM, without needing access to the contents of the file. The encrypted file is not viewable by anyone outside the OEM, thus protecting any IP in the file. Each dedicated TrustedDM device (a) isolates the DM machine from other networks or devices and (b) secures the data path and technical data (e.g., gcode) of each transaction. It accepts the encrypted file, de-encrypts it and sends the commands to the DM. Upon completion, it deletes the file so only the contracted quantity can be produced, and documents the job (e.g., quantity produced, available quality data,

etc.) in a report to be sent to the OEM as evidence of job completion and file deletion.

### Benefits to the Army

This approach enables the Government to fabricate parts on-demand while assuring the IP owners that their IP is protected. The result is a limited quantity production run, including all manufacturing and quality controls, delivering a required part in a matter of days vs the previous long lead time.

### Expected Challenges

This approach has minor technical challenges. The TrustedDM hardware is high maturity, and the software required is industry standard. The key challenges are with the DoD/Navy, where they will have to change some of their processes to enable this approach. Contracts for license fees will replace contracts for manufactured parts. The local manufacturing capability will require qualification, including setting up a new production line.

### Technical Maturity/Demonstration Results

The hardware is TRL/MRL 8.5. It has been demonstrated and has been installed at Letterkenny AD, GVSC, USMC Quantico, and Harrisburg University.



## OTHER

# CN-Seamless Inc

## Cost-Effective Deployable Maintenance Automation Tool

### Contact

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### Problem Statement

Maintaining DOD equipment often requires skilled operators and expensive depot-based machinery. Manual metal cutting with handheld torches is slow, hazardous and imprecise. Large automated cutting equipment is costly, and transporting equipment/materials to depots is inefficient. Maintenance teams need portable, easy-to-operate automation equipment to execute precision repairs onsite, improving mission readiness.

### Transformation Solution

The CN-Seamless Mach 1 is a lightweight, portable machine designed to automate field maintenance tasks. It mounts to equipment using magnetic or vacuum bases and is operated remotely via WiFi using a touchscreen tablet, allowing safe operation from up to 100 ft away. The Mach 1's robotic arm and 2.5" height adjustment offers precision control over a 68" working area. It supports modular attachments for various tasks, including plasma and oxyfuel cutting, marking, and painting, with future developments planned for welding, engraving, corrosion removal, waterjet cutting, laser cutting and more.

### Benefits to the Army

It includes a quick designer capable of making simple shapes or tracing existing geometry. Designs from CAD can be directly imported via flash drive with no additional software, and adjustments can be made without needing to cycle back to CAD. Designs can then be accurately placed on the workpiece by touching off of known points with the tool at the end of the robotic arm. The construction of the machine enables it to thrive in harsh environments despite its weight of only 25 pounds. The

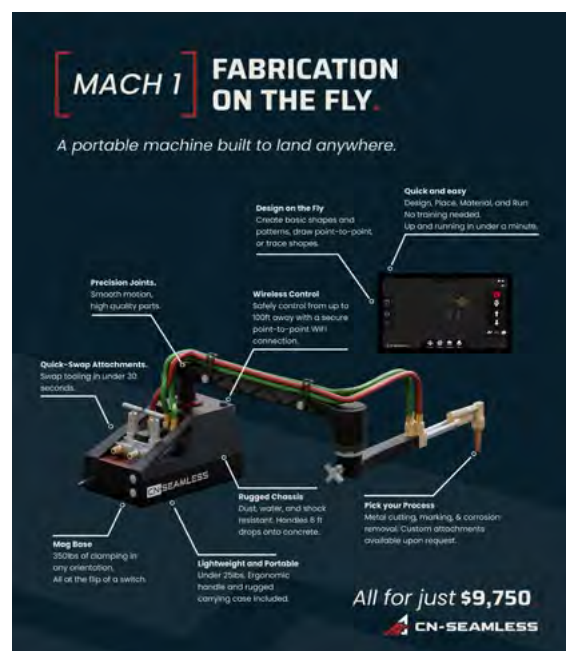
machine easily handles 6 foot drops to concrete and is dust and water resistant. It packs into a hard carrying case with rollers for convenient storage and deployment.

### Expected Challenges

The CN-Seamless team faced challenges in designing the Mach 1 to be affordable, portable, and easy to operate while offering 3-axis motion over a decent range. The design is mechanically simple, with robotic joints, a vertical rail system, and an electromagnet for mounting.

### Technical Maturity/Demonstration Results

The Mach 1 is a fast, convenient, and powerful tool for a wide variety of applications. By setting up in under a minute, requiring minimal training and drastically improving cut quality, current customers have reported an 80% reduction in processing times as compared to hand-cutting. Customers are now able to offer new, value-added services that they could not perform before, expanding their portfolio of capabilities. Thanks to all these time savings, the Mach 1 tends to pay for itself in under 3 months of use thanks to the affordable end-user pricing of \$9,750.



OTHER

# Consultadd Inc

## Eagle Eye: Automated Parts Ordering Excellence

### Contact

Darshan Tiwari

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Video: <https://drive.google.com/file/d/11lXamZrpnorAnwJqAZs3SIsT8S9foY62/view?usp=sharing>

### Problem Statement

We identified a critical gap in how the US Air Force orders parts through its maintenance request system through discussion with the 92nd Maintenance Squadron. The current lack of a centralized, automated system causes delays and errors, and forces personnel to rely on manual, time-consuming processes and unorganized data for ordering maintenance parts. A report released by the GAO has found that such delays can account for 30-40% of downtime. This gap increases risks pertaining to operational readiness and exposes the personnel to major shortcomings for logistics and part management.

### Transformation Solution

Eagle Eye was developed specifically to address these issues. It's an AI-driven, integrated part-ordering solution designed to streamline and automate the maintenance process. Using image recognition and API integration, it identifies parts, matches supplier part numbers and NSN, and connects with systems like DPAS and G081. Eagle Eye enables users to capture, connect, and submit part requests online within minutes by reducing the time spent on parts management.

“This product is going to make such a significant impact on our unit. We will finally be able to focus on training and developing our junior Airmen.” — SSGT Andrew Hutter, 92nd MX SQD

### Benefits to the Army

- Automation of the parts ordering process reduces the time from 60 minutes to under 1 minute, helping save over 200,000 hours across all DOD units.

- Reducing labor costs and ordering errors, with estimated savings of over \$330,000 per DOD unit annually (e.g., 92nd Squadron in the US Air Force).
- Adaptation of Eagle Eye has displayed a promising 5% increase in equipment readiness.
- Eagle Eye is highly versatile and can be implemented across all military units.

### Expected Challenges

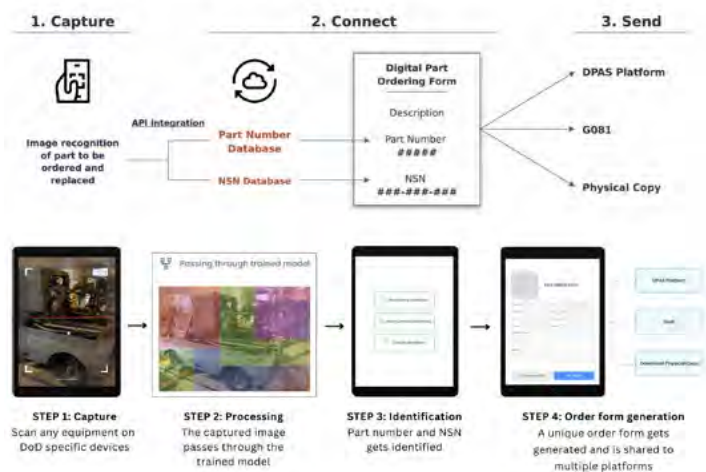
In order for Eagle Eye to transition from a concept to practical implementation, challenges must be addressed before efficiency across units can be improved. These include building a scalable database, enhancing AI capabilities, developing APIs for integration, expanding pilot deployments, and testing scalability for larger operations.

### Technical Maturity/Demonstration Results

Eagle Eye is currently a prototype idea. Any agency can only utilize once it is executed. Data results suggest the system could save approximately 1,000 hours annually for a single squadron and 200,000 hours across DOD units. The system's digital form and image recognition technology could improve mission-capable rates by 5% and shorten training periods for maintenance personnel by up to three months.

### Eagle-Eye Maintenance

Parts ordering: Fast, Easy and Secure





**OTHER**

# Corning Optical Communications, LLC

## Multiclassification Mesh Solution

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### Contact

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Video: <https://youtu.be/odVvqaPNzy4>

### Problem Statement

Security of our nation’s sensitive information is vital to missions around the globe. Cabling infrastructure required to support those missions are often outdated, not supporting mission requirements and require upgrades to meet the demands.

### Transformation Solution

Corning’s multiclassification mesh solution was created to deliver efficiencies in fiber deployment, reduce complicated maintenance, all while delivering infrastructure to support those missions at a reduced total cost. The passive mesh solution delivers multiple networks, carrying different security enclaves, to the desk in a new and innovative approach.

The solution utilizes high fiber count (up to 144) colored trunks with either 8F or 12F MTP connectors. These trunks are installed in a zone location while the mesh module is housed in the zone box and has an MTP coupler on both the input and output sides. The input receives one leg of each high fiber count trunk, holding different security enclaves. Inside the mesh module we separate and deliver two fibers from each incoming trunk and deliver to each outgoing port. Ensuring all network enclaves are delivered to the user in a single cable. The single cable is pulled to the workstation and broken back out with LC duplex connectivity.

### Benefits to the Army

The benefits include reduced labor costs, space savings, and reduced risk of vulnerability. The preterminated mesh solution reduces the cost of labor up to 75%, while using 70% less cabling.

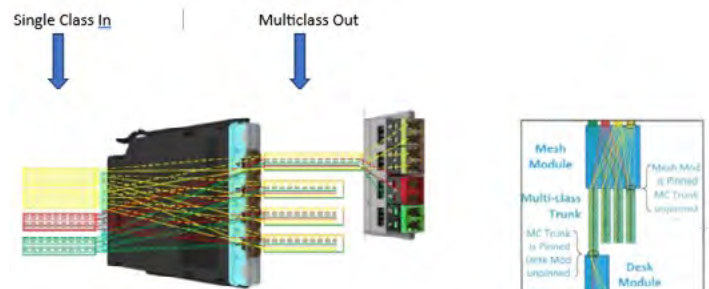
### Expected Challenges

Human error is one of the common failures in a traditional cabling infrastructure build. Our solution reduces errors during installation and maintenance. Fiber continues to be the preferred medium to copper.

### Technical Maturity/Demonstration Results

This solution has been a part of the Corning’s data center business for the past decade, winning multiple awards. While this product is not new, it has only been utilized in the DOD space for approximately six years. It is currently deployed or being deployed in a dozen projects thus far and approved by the tempest security officers. DIA approvals came in October 2023 and will further the implementation inside the intelligence space.

The newest evolution is a 6x6 mesh module, six networks in and six networks out, over twelve fibers. The comfort of utilizing a 12F vs 8F solution remains strong and steady in the DOD space. The solution comes in both multimode and singlemode options to support fiber to the desk applications. Working to educate users on the new technologies is our priority. Development is another challenge our industry faces. Things often move slowly and the time it takes to develop a new product which is why Corning is so passionate about delivering products based on the customers’ needs. Our process of discovery comes from our VOC process and moves to new product development. Even though there are innovation challenges, the multiclassification mesh solution is truly unique, unmatched by anything in the industry.





## OTHER

# DISCUS Software Company

## Determining Producibility Using Automated Analysis of Legacy 2D Drawings

### Contact

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### Problem Statement

Additive manufacturing (AM) has matured significantly in recent years. The extended promise for AM is that it will support the full range of needs for new and fielded systems, including rapid field replacement, sustainment for out-of-production legacy hardware, and new-design parts. However, one of the largest problems when absorbing thousands of requests per year for AM parts is the amount of time and labor expended to answer the basic question, “Can we produce this part using AM?”

### Transformation Solution

The automated extraction of information from 2D drawings can be used to quickly inform an end-user about the producibility of a specific part and reduce the time and labor by more than 50% for this type of evaluation. In the referenced video, I demonstrate our prototype software that provides the ability for a user to submit one or many legacy 2D PDF drawings for such automatic evaluation.

Of the 27+ attributes that are automatically extracted from drawings, the most notable are:

- Base Material
- Dimensional Envelope
- Material Form
- Minimum Dimensional Tolerance
- Minimum Surface Toughness
- Drawing Owner
- Distribution Statement/Export Control

After this automated analysis of the drawings, the software tool uses the extracted attributes to generate part-specific producibility scores. This scoring mechanism is driven by a Microsoft Excel workbook using embedded formulas, which are referred to as

‘producibility models.’ Any user familiar with Excel can easily customize these models to reflect their operational constraints. For example, the producibility models can be rapidly modified to reflect the specific manufacturing capabilities of their production facilities.

### Benefits to the Army

With many DOD services needing to evaluate legacy parts for rapid replacement and additive manufacturing, there is a need to accelerate the process and reduce the labor required. By interpreting the 2D drawings and providing the information needed to evaluate producibility, I believe this time can be reduced by 50%.

DISCUS Software Company has worked with both the Department of the Air Force and the Department of the Army under previous and current SBIR efforts. Over the past several years, various SBIR topics and other publications issued by DOD services have suggested there is a demand to digitize legacy technical information.

### Technical Maturity/Demonstration Results

While this is not a COTS solution, it currently has a TRL of 6. The aforementioned technology is currently operating in a FedRAMP approved environment. The plans are to mature the software to TRL 7 in 2025 in preparation for commercialization.



## OTHER

# DMEA (OSD>A&S)

## USMC/DMEA Collaborative Technical Data Package Innovation

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### Contact

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Video: <https://vimeo.com/1013205110>

### Problem Statement

The USMC has existing capabilities for repair and support of equipment (such as Satellite systems, ground radios, generators, vehicles, etc.) with electronic components in them. When these systems fail, the electronics can be sent to an Electronic Maintenance Company (ELMACO) for analysis and repair, where a Micro-Miniature (2M) Marine will generate a Huntron “disk” via manually probing a Circuit Card Assembly (CCA)—which is a month’s long labor-intensive process that gives no real insight into the architecture of the CCA when finished—and use this guess-and-check method to identify and replace failed components. As weapon systems become increasingly complex this approach becomes less efficient and useful.

### Transformation Solution

The USMC/DMEA Technical Data Package (TDP) innovation is the remedy to this obsolete workflow model. We’ve developed processes to work with the 2M Marines at DMEA to collaboratively perform reverse engineering on their systems to generate a TDP (consisting of an assembly diagram, bill of materials, schematics, and failure analysis guide) for their use. The program offices for systems supply the electronics to work on and cover the travel costs, while the Marines rotate to DMEA to perform the work.

### Benefits to the Army

The DMEA/USMC-TDP ensures that Marines are no longer required to attempt repairs on unknown CCAs without data, allows them to work successfully in forward or disadvantaged locations by understanding the common failure modes, and achieves cost effective inventory management by lowering time to repair from months to days or hours.

The TDP enables not only efficient fault localization and failure analysis, but with the training and skills the Marines receive at DMEA they are better equipped to improve their own processes and workflow. When applied to projects or systems TDPs allow for sustainability improvements such as: technical refreshes, reproduction of CCAs, and may increase supportability by improving important metrics such as Mean-Time-Between-Failure.

### Expected Challenges

Understanding the USMC workflow and developing solutions that could be implemented at their level, with their training, and integrated into their processes was the first hurdle. DMEA did site inspections and visits to the facilities and created reports which functioned as our roadmap.

Once the size of the need was identified, the second difficulty was to improve the speed at which they were generated. DMEA began innovating by investing in electrical probing, creating failure analysis guides to increase workflow speed, and partnering with the ELMACOs to prioritize work and rotate Marines more efficiently.

### Technical Maturity/Demonstration Results

This innovation has been successfully deployed already—USMC Systems Command estimates the PRC-117radio TDP will give a lifetime cost savings of \$27M and has already seen savings in the millions. DMEA is currently making improvements to process workflow.



OTHER

# DMG MORI Federal Services

## DMG MORI - Advanced Mobile Manufacturing & Support Delivery System (AMMSDS)

### Contact

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### Problem Statement

The majority of the life cycle costs of a US military program are spent on sustainment and operations — not acquisition. To better support warfighters, sustainment must be a priority and solutions from the OIB are critical to success.

### Transformation Solution

The AMMSDS technology increases the maintenance capacity, efficiency, and effectiveness of the Military, which translates to increased safety, reduced cost of sustainment, reduces manpower and quicker deployment of the asset to the theatre of operation. Safety can be increase by a minimum of 25% and cost reductions can be realized of up to 45% for each component manufactured or repaired, with a decrease in manpower of 25%+. This allows quicker deployment of assets and an increase of 50%+ can be realized based on industry standards and current DOD programs.

### Benefits to the Army

The concept of the mobile factory is a novel concept not new to the DOD or industry, and DMG MORI has the required technologies and personnel to develop, deploy and execute mission. The technical innovation lies with the ability to deliver digital twin capability and to manage the eData across the government environment with real-time / theatre ready manufacturing solutions to the warfighter.

DMG MORI “Advanced Mobile Manufacturing & Support Delivery System” [AMMSDS] can be utilized by all branches and in almost all theatres of operation, including land and sea based. Maintenance requirements can be met across all DoD programs and can be ready for implementation within a short time, with readiness levels of C-2 / C-3.

### Technical Maturity/Demonstration Results

The additive and subtractive technologies platforms are based on decades of in-house and industry knowledge and know-how that utilized “standard” off-the-shelf systems which translates to quicker deployment, easier operation and reduced maintenance.



OTHER

# Dr. Diesel Technologies

## Automated Telematic Logic Analysis System – A.T.L.A.S.

### Contact

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 Video: <https://youtu.be/8aBGp3IWZuA>

### Problem Statement

Since the late 1990s, the DOD has introduced a wide range of increasingly complex vehicles and equipment, both tactical and commercial. While advancements in computer-controlled technologies have improved these subsystems, CBM+ and its data collection efforts have often been neglected. As CBM+ initiatives mature, the DOD faces challenges in integrating CBM+ hardware with both legacy and newly deployed systems. Key issues include managing diverse physical interfaces, navigating various CAN bus protocols (e.g., SAE J1708/J1939), and identifying relevant CBM+ centric data from each ECU, hindering effective implementation of these initiatives.

### Transformation Solution

To address these challenges, ATLAS was developed as a modern, adaptable, and scalable CBM+ solution. This autonomous data collection system exposes built-in digital sensors, switches, and solenoids from commercial and tactical vehicles equipped with various CAN bus protocols (SAE J1708/J1587/J1939/OBD-II). ATLAS features a secure cloud architecture that normalizes data across multiple platforms and includes an advanced dashboard for visualizing data from the fleet level down to individual vehicles. Utilizing a mesh network, ATLAS collects, stores, and transmits vehicle data to a Base Station, which then relays the information to the dashboard for analysis.

### Benefits to the Army

The ATLAS solution offers several key benefits: accurate reporting on vehicle and equipment operational readiness, precise usage cycle tracking for effective logistics planning and PMCS scheduling, and robust data collection to support CBM initiatives. It also

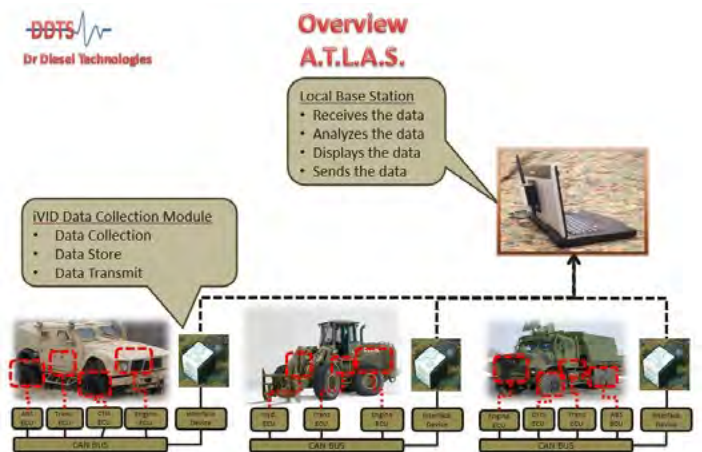
provides fault analytics, linking parameters to DTCs, and includes a predictive maintenance engine. By delivering actionable insights, ATLAS helps reduce MTTR, enabling stakeholders to make informed maintenance decisions based on actual needs, thus enhancing operational fleet readiness. Data and reports can be exported in formats like XML, HTML, CSV, and text.

### Expected Challenges

Integrating the ATLAS solution with DOD vehicles involves three challenges: hardware integration of the intelligent Vehicle Interface Device (iVID) with non-standardized connectors, software support for various CAN bus protocols, and unclear technical data regarding operational thresholds for parameters.

### Technical Maturity/Demonstration Results

The ATLAS has been successfully demonstrated in two projects. In 2014, a MCSC project at MAGCC 29 Palms generated about 1,600 near-real-time data reports from 40 MRAPs during an ITX exercise, tracking metrics like miles, engine hours, and fuel usage, along with DTCs and alerts. Additionally, a 12-month proof-of-concept at 1st Maint. Bn. EMC-1 produced around 17,000 reports from 20 pieces of heavy equipment, capturing similar usage and alert data.





## OTHER

# Egglar Institute of Technology

## Breaking Through Barriers to MBSE Adoption – Only Strong Systems Engineering Foundations Unlock MBSE Tools’ Strategic Value

### Contact

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### Problem Statement

A critical barrier to effective Model-Based Systems Engineering (MBSE) adoption in the DOD is overemphasis on tools at the expense of foundational systems engineering (SE) principles. This tool-focused approach leads to misaligned priorities. Personnel fixate on software mechanics rather than how tools enhance system design and project outcomes. This limits the strategic value of MBSE, causing inefficiencies and missed opportunities for system design and process improvement.

### Transformation Solution

The Egglar Institute of Technology proposes a new MBSE education paradigm built on contextualized defense case studies. These case studies significantly enhance learning by reducing effort needed to adapt knowledge to real-world applications. By integrating MBSE tools within the SE process, we foster critical thinking and problem-solving skills that go beyond tool mastery, ensuring practical, immediate applicability in defense projects.

### Benefits to the Army

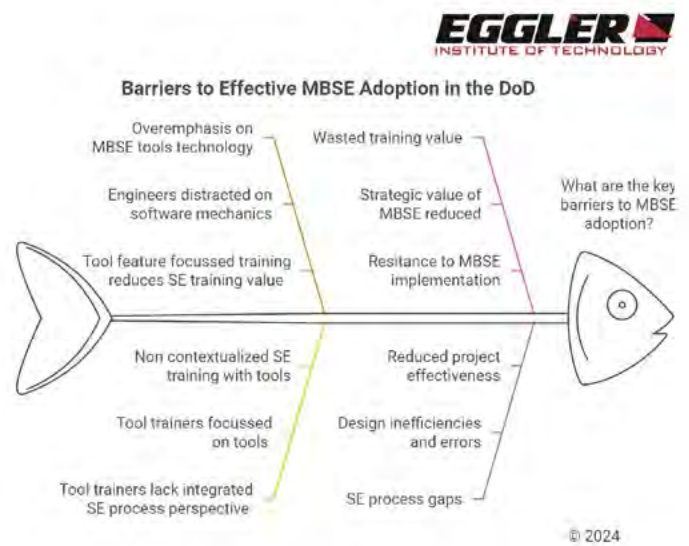
This shift will enhance personnel flexibility and productivity across all service branches, equipping them with essential MBSE knowledge and skills. SE is service-agnostic, and this solution provides critical thinking and technical skills that apply to any military project. Whether for the Army, Navy, Air Force or DLA, this approach leads to better systems designs, faster implementation, and reduced project costs, creating a more agile workforce supporting digital transformation across the DOD.

### Expected Challenges

The transition from a tool-centric to a scenario-driven training approach may face resistance from personnel accustomed to traditional SE methods. Ensuring consistent engagement and demonstrating the value of this approach to senior leadership will be essential to overcome cultural inertia.

### Technical Maturity/Demonstration Results

The Egglar Institute’s MBSE programs, deployed globally, use highly relevant case studies—such as simulating high-level architecture design for next-generation combat vehicles. Proven to improve learning outcomes, this approach facilitates rapid adaptation to DE environments. Our solution is fully mature and ready for immediate deployment to support Army’s digital transformation.



## OTHER

# Emerging Technology Ventures, Inc

## Autonomous Inspection and Maintenance Support System for Aviation Operations in Austere Environments

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### Contact

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Video: <https://app.box.com/s/kgse1eby38ngo0pxeyhi9b10sxycp8r>

### Problem Statement

Distributed operations utilize agile, mobile forces across forward operating bases. Maintenance personnel must operate from austere forward sites with reduced personnel and limited external support placing a significant workload on available personnel.

### Transformation Solution

Our patent pending KeenAI (TRL 5-7) configured as a fly-away solution utilizing autonomous platforms, multi-modal sensing, and analytics at the edge delivers the capability to identify/classify existing anomalies, along with predicting future anomalies that could affect mission performance. KeenAI includes modules to:

- **Plan:** Module utilizes the aircraft digital twin (DT) to create autonomous inspection plans by tail number for the inspection platforms.
- **Sense:** Module utilizes Plan module inspection plans, autonomous platforms, and sensor packages to optimize the aircraft inspection coverage area.
- **Understand and Decide:** Modules fuse the Sense module outputs to develop a comprehensive 3D view of the aircraft and updates the DT with the latest scans and anomalies.
- **Act:** Module provides repair support as anomalies are addressed by the maintainer. Mixed reality (MR) devices support AI driven/SME reach back to guide repairs.

### Benefits to the Army

Key performance parameters supporting improved operations include:

- Reduced quick-turn (QT) aircraft inspection times.

- Improved personnel safety through reduced above ground operations.
- Reduced personnel requirements for QT inspection and maintenance allowing reallocation to other critical duties.
- Increased probability of identification/classification of anomalies with precision multi-modal sensor suites.
- Improved repair cycle times and accuracy through over-the-shoulder MR devices delivering repair guidance and subject matter expertise.
- Improved detection of anomalies and trends across platforms supporting root cause analysis.

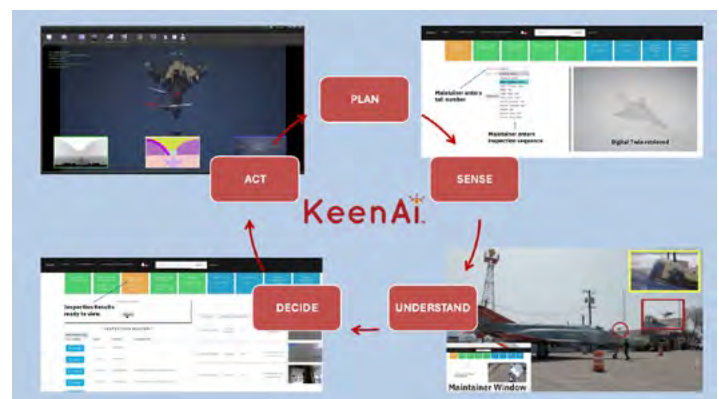
### Expected Challenges

Key activities required to address transition of the technology:

- Integrate into current maintenance workflows.
- Harden design and test for transportability.
- Receive Authority to Operate over DOD networks.
- Develop training and system operating manuals.
- Complete production planning.

### Technical Maturity/Demonstration Results

KeenAI was initially developed under a Navy SBIR for the Accelerated Delivery & Acquisition of Prototype Technologies pilot. The project delivered a MVP and is currently at a TRL 5-7 after subsystem evaluation.





**Contact**

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**Problem Statement**

Existing DE training programs are limited by manual assessments and generalized learning paths, making it difficult to address specific skill needs. This creates gaps in critical competencies, impacts workforce engagement, and limits flexibility in applying DE tools across different stages of weapons programs. Furthermore, the lack of systematic knowledge transfer results in the loss of “tribal knowledge” when personnel exit. These challenges highlight the need for a dynamic, personalized approach to skill development.

**Transformation Solution**

The proposed solution introduces five core components:

- Skill Assessment and Gap Analysis: AI-driven tools conduct organization-wide skill assessments focused on DE expertise, analyzing surveys and individual CVs to identify specific skill gaps at both the employee and organizational levels.
- Personalized Learning Paths: A recommender engine dynamically generates custom learning pathways based on each employee’s skill level, role in the product lifecycle, and interests to ensure relevant, targeted training.
- Continuous Learning: Gamified elements and real-time, AI-driven feedback foster an engaging, continuous learning environment focused on DE tools, processes, and use cases, promoting long-term skill development.
- Employee Feedback and Collaboration: Smart chatbots provide guidance, encourage collaboration, and facilitate ongoing feedback, enhancing DE knowledge and user engagement.
- Skill Transfer and Mentorship via AI Co-Pilots: AI “co-pilots” act as virtual mentors, supporting

new hires by retaining and sharing essential DE knowledge, which mitigates knowledge loss from workforce turnover.

**Benefits to the Army**

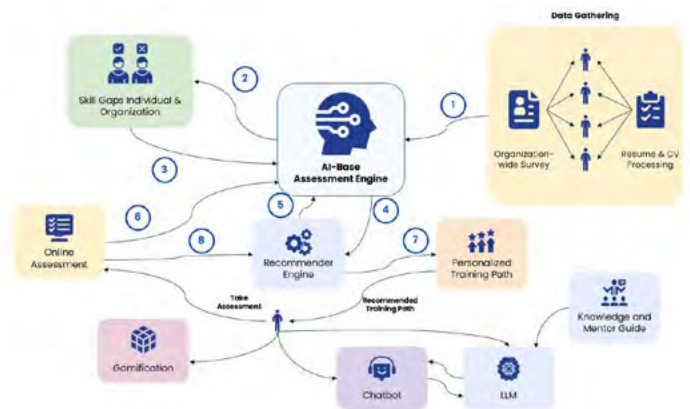
The solution offers several benefits, including improved readiness through precise skill alignment, enhanced engagement through personalized and gamified learning, and streamlined knowledge transfer for DE tools and processes. Additionally, it reduces training redundancies, optimizes resource allocation, and preserves critical DE knowledge for future use, ensuring smoother transitions during personnel changes.

**Expected Challenges**

Challenges include data integration, privacy concerns, resistance to adoption, and scalability. Addressing these challenges will require strong cybersecurity, comprehensive training programs, and an adaptable system design to maintain long-term effectiveness.

**Technical Maturity/Demonstration Results**

The solution leverages TRL 7 and higher technologies. Initial demonstrations in commercial education have shown promising engagement, with personalized learning paths improving user interaction by 20-35%. Feedback emphasizes the effectiveness of AI co-pilots and chatbots, with users reporting increased adaptability and confidence.



## OTHER

# Enterprise Minds, Inc

## Enhancing Army Equipment Readiness: Casual Digital Twin Integration for Predictive Maintenance in IoT Systems

### Contact

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Video: <https://youtu.be/pcib6A1muvM>

### Problem Statement

The Army's existing equipment monitoring systems rely primarily on correlation-based insights, which can identify co-occurring issues but fail to clarify causation. Without understanding root causes of equipment failures, maintenance teams are limited in their ability to take targeted, proactive measures. This restricts Army's capacity to effectively address equipment health.

### Transformation Solution

The CDT enhancement for the ERM IoT system introduces causation-based analytics, enabling more effective condition-based maintenance (CBM) that focuses on underlying causes rather than just symptoms. Key components of solution:

- **Digital Twin:** CDT creates a virtual model of each piece of equipment, reflecting real-time and historical data to enable detailed causal analysis.
- **Causal Analysis:** This framework supports root-cause analysis, identifying cause-effect relationships and facilitating prescriptive actions targeting specific fault origins, improving reliability.
- **What-If Scenario:** Allows for "what-if" analysis on the virtual model, enabling simulations of various maintenance scenarios to prevent future failures.
- **MRO Alignment:** By aligning equipment conditions with the Army's Maintenance, Repair, and Operations (MRO) capabilities, the CDT optimizes maintenance workflows, reducing downtime and extending equipment lifespan.

### Benefits to the Army

The CDT-enhanced ERM IoT system is expected to provide several critical benefits:

- **Reliability:** Causative analysis allows for more accurate, preventive interventions, reducing unexpected breakdowns.
- **Maintenance:** Targeted, prescriptive actions reduce repair times and optimize the use of resources, improving overall operational efficiency.
- **Lifecycle Management:** Aligning equipment status with MRO capabilities helps extend the lifespan of equipment, supports sustainable operations, and lowers life-cycle costs.
- **Increased Equipment Availability:** Predictive logistics enabled by the CDT system provides better visibility into equipment condition, increasing availability while reducing maintenance frequency and costs.

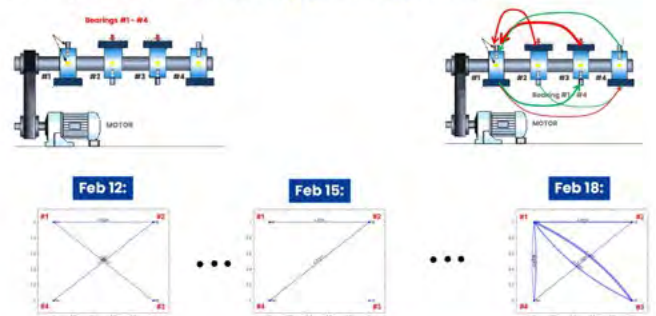
### Expected Challenges

Challenges include ensuring data compatibility across various systems, securing sensitive data within the IoT network, and training personnel to effectively interpret causal analytics. These challenges can be mitigated through robust cybersecurity measures, cross-system data integration, and comprehensive training programs.

### Technical Maturity/Demonstration Results

In a proof-of-concept using NASA's experimental bearing testbed, the CDT successfully modeled escalating risk as equipment degradation approached failure. Before Bearing #1's failure, the causal graph indicated increasing risk, demonstrating its potential for predictive maintenance.

CAUSAL Graph in action - NASA bearing system Daily Variations





## OTHER

# EXTAG – Custom Asset Management

## Digital Tags and Smart Forms for Inspection and Maintenance

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### Contact

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Video: <https://youtu.be/zy32akX5snQ>

### Problem Statement

Inspection and maintenance data for military equipment are still collected using clipboards and spreadsheets. Additionally, inspection and maintenance documentation is vast, complicating the retrieval of required forms, work instructions and checklists for each type of equipment.

### Transformation Solution

EXTAG provides an innovative approach for enhanced inspection and maintenance. The EXTAG Platform identifies equipment and collects inspection and maintenance data from operators using passive NFC technology and custom smart forms. First, an NFC chip is embedded inside a digital tag. Then, digital tags are attached to military equipment. Digital tags come in various formats with MIL-SPEC materials and use-specific attachment mechanisms. When digital tags are tapped by users of the EXTAG Platform with a smartphone or tablet, equipment-specific smart forms and documentation become available. EXTAG's smart forms are digital versions of existing forms, with updated functionality for digital data entry. Documentation includes work instructions, checklists and other information.

### Benefits to the Army

The EXTAG Platform will improve the effectiveness and efficiency of DOD sustainment through enhanced inspection and maintenance. Primary benefits include reducing administrative hours, increasing visibility of equipment through all levels of the DOD, and decreasing time to achieve equipment readiness. Secondary benefits are realized by enabling future applications from digitally cataloging equipment and implementing flexible data input and retrieval tools.

### Expected Challenges

When developing EXTAG, key innovation challenges included operating in offline environments, solving operational vulnerabilities and ensuring security of the equipment and data collected. First, we created a cloud platform solution that could operate in offline environments, which include fully disconnected, intermittent and low network environments. Also, the digital tags do not connect to any network, so operators can use the EXTAG Platform in contested, remote, low-visibility, and extreme weather environments.

Another area of development was using NFC technology, rather than bar codes or QR codes. NFC provides a robust, no data, passive solution with the same outcome, but without the vulnerabilities.

### Technical Maturity/Demonstration Results

Security was another challenge we solved. For enhanced security, no equipment information is stored on the digital tag. Moreover, the EXTAG Platform requires users to be authenticated and authorized before tapping digital tags to access smart forms and documentation.

The EXTAG Platform is at full readiness. Currently, EXTAG provides its digital tags and smart forms to the Oil & Gas and Mining sectors in Australia, South America and the Middle East. Additionally, in 2024 EXTAG was accepted into the Defence Trailblazer accelerator program in Australia, commissioned by Defence, Industry & Academia Military Innovation & Commercialisation.



## OTHER

# Extreme Scale Solutions

## AI-Powered Maintenance Advisor: Enhancing Readiness and Reducing MTTR for the DOD

### Contact

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Video: [https://www.dropbox.com/s/ams2doclwomcp8l/MA\\_5.mp4?raw=1](https://www.dropbox.com/s/ams2doclwomcp8l/MA_5.mp4?raw=1)

### Problem Statement

The DOD relies on asset readiness for operational efficiency. However, maintenance processes are often slowed by the need to manually search through vast, disparate technical documentation. This inefficiency extends Mean Time to Repair (MTTR) and increases the risk of using incorrect procedures or parts, especially for less experienced personnel, impacting readiness and raising maintenance costs across the DOD.

### Transformation Solution

Maintenance Advisor is an AI-powered tool that streamlines access to critical maintenance information using Large Language Models and Retrieval Augmented Generation. It searches, analyzes, and extracts relevant data from technical manuals, standard operating procedures, test program sets, and test reports, enabling quick location of accurate documents and guidance, reducing errors and rework. With a user-friendly interface and natural language processing, it allows interactive queries and precise, actionable responses. A graph database enhances its ability to handle complex queries by structuring maintenance content. The system functions without internet in many deployments.

### Benefits to the Army

Maintenance Advisor offers immediate benefits, such as reducing the time maintainers spend searching for documentation, lowering the MTTR, and minimizing the chances of rework due to incorrect procedural steps. It works on new and existing commercial off-the-shelf (COTS) PXle and PCIe systems. By ensuring accurate and timely access to information, the system also helps improve

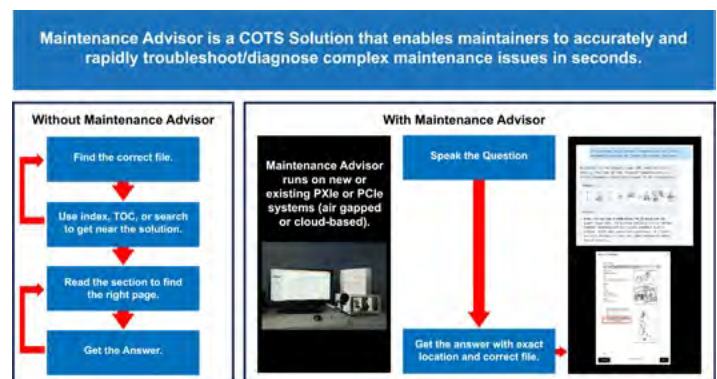
operational availability and readiness. The tool's scalability ensures that it can be implemented across various DOD platforms, supporting aircraft, ground vehicles, and other military equipment, which makes it an ideal solution for improving maintenance efficiency across the DOD.

### Expected Challenges

Key challenges in developing Maintenance Advisor include handling the diverse formats of technical documentation, ensuring high retrieval accuracy, and creating a system that can interact with users in a natural, intuitive manner. Overcoming these challenges required advanced AI techniques like optical character recognition for image annotation and a graph database for structured information retrieval. Another challenge is ensuring the system operates efficiently in both cloud-based and locally hosted environments.

### Technical Maturity/Demonstration Results

Maintenance Advisor builds on an existing COTS platform, Wisdom Vault, which has demonstrated its ability to process large technical documents and retrieve relevant information based on user queries. The system has shown promising results in retrieving text and images with high accuracy, handling complex queries, and improving the overall efficiency of maintenance operations. The technology has been evaluated using CH-47D Chinook maintenance manuals, providing a strong foundation for broader adoption across DOD services.



## OTHER

# Fleet Readiness Center East

## Strategic Contracting: Transforming Sustainment for Global Competitive Edge

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### Contact

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Video: <https://youtu.be/GKErIN5IX9k>

### Problem Statement

When the DOD fails to procure the necessary Integrated Product Support Elements (IPSE) upfront, the depot is often left with inadequate resources and support, resulting in operational delays and increased costs.

### Transformation Solution

To address the issue of inadequate resources and support at the depot due to the DOD's failure to procure necessary IPSE upfront, this contract verbiage introduces an innovative business process. By establishing standardized contractual language for the procurement of IPSE associated with major weapon systems, the process ensures that depot-level requirements are addressed early in the lifecycle. This proactive approach facilitates early procurement of IPSE, enhancing mission success, improving cost-effectiveness, and ensuring fleet readiness. As a result, it prevents the depot from bearing the burden of unmet sustainment needs, thereby reducing operational delays and increasing efficiency.

### Benefits to the Army

The proactive procurement of IPSE enhances mission success and operational readiness across the board. By addressing depot-level requirements early in the lifecycle, the DOD can improve cost-effectiveness through reduced last-minute expenses, minimize operational delays, and ensure that military assets are fully prepared for deployment. This approach streamlines procurement processes with standardized contractual language, fosters collaboration among stakeholders, and enhances resource allocation, ultimately mitigating risks associated with inadequate support. The result is a more agile, efficient, and responsive defense procurement system that not only

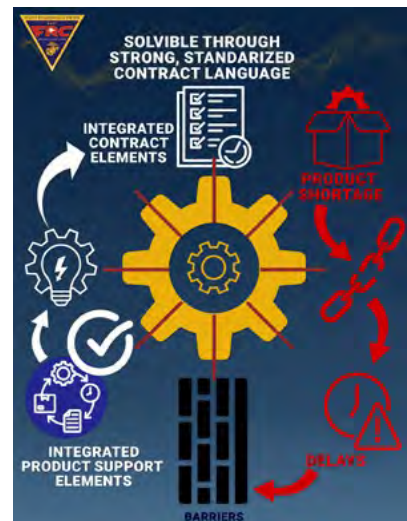
meets immediate sustainment needs but also establishes a sustainable framework for future weapon systems, promoting long-term operational viability.

### Expected Challenges

Implementing proactive procurement of IPSE across the DOD faces several challenges, including cultural resistance to change and the need for interdepartmental coordination. Standardizing contractual language for various weapon systems is complex, and personnel may face skill gaps adapting to new processes. Budget constraints, data integration issues, supplier engagement, regulatory hurdles, and developing metrics for effectiveness further complicate efforts. Addressing these challenges is crucial for improving operational efficiency and resource management within the DOD.

### Technical Maturity/Demonstration Results

The technology maturity is sufficiently advanced to enable immediate deployment or implementation in new weapon system contract vehicles, having already been prototyped successfully in only a couple one-off component contracts rather than full platform TMS/Weapon systems. However, it would greatly benefit from input and review from other DOD depots, as they are often excluded from the early acquisition cycle.



## OTHER

# FormAlloy Technologies, Inc

## Directed Energy Deposition (DED) Additive Repair and Manufacturing Onsite Resource (ARMOR)

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### Contact

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Video: <https://s3.amazonaws.com/embed>.

[animoto.com/play.html?w=swf/production/vp1&e=1729775087&f=zKWpE8PNAZeexdCt9km10g](https://animoto.com/play.html?w=swf/production/vp1&e=1729775087&f=zKWpE8PNAZeexdCt9km10g)

### Problem Statement

According to Air Force Lt Gen Warren Berry, “80% of all demand for aircraft parts is satisfied by a repair instead of a replacement...of those part repairs, 92% can only be performed by a single supplier.” Needed are in-situ repairs and the production of high-quality replacement parts at the point of need in a shipping container, ARMOR reduces the need for costly logistics and inventory management.

### Transformation Solution

FormAlloy’s Directed Energy Deposition (DED) ARMOR technology presents a transformative solution for the DOD’s maintenance, repair, and spare parts production, enhancing the efficiency and effectiveness of current practices. FormAlloy’s DED ARMOR addresses the long lead times and high costs associated with spare parts for legacy systems.

This technology also enhances readiness by minimizing downtime, as critical components can be repaired on-demand. The use of advanced materials in repairs improves the durability and lifespan of components, reducing the frequency of maintenance interventions. Safety is improved, as the need for hazardous materials and processes involved in conventional repair methods can be removed. DED ARMOR elevates state-of-the-art by printing both powder and wire feedstocks in a single system.

The second is the ability to scan a component and automatically generate a tool path for a repair, without the need for a model of the part or programming

knowledge. This capability is unique in the market. The real-time process monitoring and control ensure precision and repeatability, as well as an auto-generated build report, useful for data-driven qualification.

### Benefits to the Army

FormAlloy’s technology is versatile, making it applicable across all branches and the DLA. Whether repairing components for aircraft, naval vessels, ground vehicles, or missile systems, the technology can be adapted to a wide range of platforms. Its ability to work with various materials, including steel, nickel, and lightweight alloys, as well as various sizes further extends its relevance. Transitioning FormAlloy’s DED ARMOR technology for use by the DOD is well-supported by existing performance data and successful use cases. DED ARMOR’s modular design allows for easy integration into existing DOD maintenance workflows.

### Technical Maturity/Demonstration Results

FormAlloy’s DED technology has high technical maturity, with machines and parts across defense, aerospace, and energy sectors. The technology has been validated through testing, such as resistance, and metallurgical analysis, proving its readiness. FormAlloy’s DED systems have a Technology Readiness Level (TRL) of 7-8.





## OTHER

# FTL Labs Corp

## DADTMA – Distributed Acquisition Digital Twin Maintenance Architecture

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### Contact

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### Problem Statement

There is an urgent need to digitize maintenance records for aging fleets of defense assets. The current process is inefficient, requiring time-intensive human-performed inspections and data collection before, during, and after maintenance tasks. The process frequently requires tedious and error-prone record keeping with pen and paper before transcription to a computer for access by other teams or departments.

### Transformation Solution

FTL's DADTMA is a digital twin knowledge acquisition system that reduces manpower-intensive engineering costs associated with repair and maintenance inspections. DADTMA accelerates and automates inspection data collection, streamlines data sharing, and provides tools for predicting maintenance requirements. DADTMA revolutionizes maintenance and inspection decision making via a secure graph database utilizing big data mining and AI on a GovCloud web app that can be quickly accessible across departments, DOD components, or with outside manufacturers.

### Benefits to the Army

The Army and other DOD components must adapt to the increasing complexity of aircraft maintenance and quality assurance processes, including the use of scanning, digital tools, and modeling technologies to capture maintenance data and automate workflow management. Of paramount importance is validation that all parts and assemblies are free of anomalies which could cause failures and increased life-cycle costs. FTL's DADTMA has been developed with direct input from aerospace manufacturers Lockheed Martin, Sikorsky, and Northrop Grumman. Applications include

the US Department of Defense and civilian aerospace markets and large-scale manufacturing, such as for heavy machinery, medical devices, and silicon chips. Northrop Grumman anticipates a 10% time-reduction in inspections yields \$10M savings in lifecycle costs for a single product.

### Expected Challenges

Challenges currently being addressed include ATO and DADMS approval as well as expanding application tools for broad use across multidisciplinary teams.

### Technical Maturity/Demonstration Results

Navy's aircraft sustainment depots such as FRCSE, Jacksonville and FRCE, Cherry Point have expressed an immediate need for a comprehensive Maintenance Sustainment Tool and are currently testing and evaluating DADTMA.



## OTHER

# G.C. Laser Systems Inc

## Improving Production Processes and Maintenance of Assets and Electronics with Unique American Laser Technology

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### Contact

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### Problem Statement

G.C. Laser Systems is an American WOSB that offers the most compact and powerful laser cleaning and surface prep systems on the planet, and these globally patented systems are proudly designed and made in the USA and are currently being used in the DOD to improve process efficiencies and to accelerate asset readiness.

### Transformation Solution

These systems have diverse applications ranging from improving production processes such as additive manufacturing, welding, cladding, and general surface prep, to cleaning fire damaged circuit boards and sensitive electronic components. This technology can offer significant improvements to 3D printed part performance and effective removal of oxides and soot from battle damaged or fire and water damaged electronics and components. Quickly and effectively removing soot with this unique laser technology can eliminate the possibility of electrical continuity and shorting of critical electrical circuits.

### Benefits to the Army

Our unique laser systems are 2-3 times faster than other lasers on the market and offer unmatched precision and control with cleaning sensitive substrates. These systems can be deployed as handheld units in the field and/or integrated into fully automated robotic cleaning cells that dramatically improve process efficiency and safety. We make automated cleaning stations and fully turnkey cells using various motion systems, robots, and cobots that can efficiently process thousands of parts.

This technology is durable and usable outdoors during all four seasons, environmentally friendly, operator friendly, and is a significantly more effective alternative to traditional methods for removing salts, soot, corrosion, contaminants, and coatings. These systems can quickly remove corrosion, soot, and coatings from metal surfaces without making the surfaces hot, and without causing any damage or alteration to the substrate, even at a microscopic level. The “GC” stands for “Game Changer”.

### Technical Maturity/Demonstration Results

Built with the practical wisdom of over 23 years of laser cleaning experience and an in depth understanding of the photomechanical, photothermal, and photochemical effects that laser pulses can have on surfaces, our highly tunable systems offer unmatched precision, control, and repeatability with laser ablation cleaning and surface prep. We make the most powerful compact and portable hand carry laser systems on the market such as the GC-300 and GC-500 that still plug into a standard 120V outlet or any standard single-phase outlet anywhere in the world (90V-240V 50/60Hz). Systems have “easy buttons” in preset menus for end users to have repeatable consistent results and onsite operator training and technical support is available worldwide.





Contact

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Problem Statement

Significant effort has been expended in developing digital, model-based specifications for the next generation and legacy systems and products at the Army Ground Vehicle Systems Center (GVSC). These digital specifications and model-based artifacts have transformed the acquisition process to maintain a competitive edge for future army and the warfighter. But one area where the digital specifications have not been fully leveraged is in the conduct of Technical Reviews (TRs)—e.g., Preliminary Design Review (PDR) and Critical Design Review (CDR). For example, the digital specifications can be leveraged during the technical reviews to perform specific review analysis tasks that are difficult to perform in traditional documents.

Transformation Solution

Since PDR and CDRs are conducted differently by different organizations and are shaped by the domain and type of systems under review, it is imperative to understand the existing processes and culture to apply some standardization that maximizes the value of the technical review.

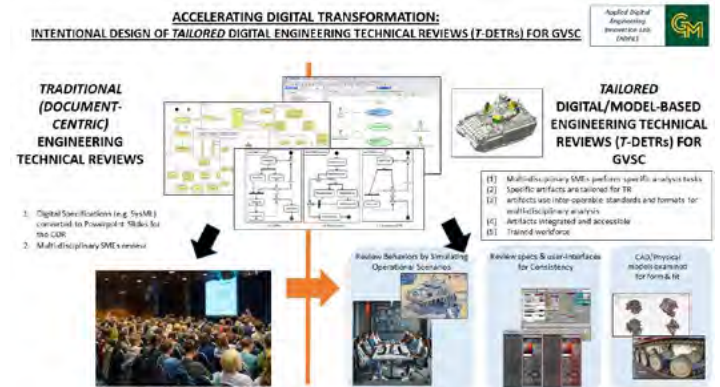
This proposal is to conduct a thorough study of the existing CDR processes for a set of GVSC systems/products, as well as a study of the digital specifications. Working alongside GVSC personnel, tailored processes, methods and tools can be developed to leverage the digital specifications for the purpose of more valuable technical reviews. Training will also be provided.

Benefits to the Army

- Produce digitally engineered assets that are:
• On schedule.
• Under budget.
• High quality.

Expected Challenges

- Reasons for the slow adoption in Technical Reviews has been identified as:
• Mismatch between the artifacts and analysis needs at the TRs.
• The formatting, integration, and access of the digital specifications for multi-disciplinary teams.
• Training of the workforce to leverage the digital specifications for TR tasks.



## OTHER

# Georgia Tech Manufacturing Institute

## Modern and Secure Motion Controller for Rapid 5-Axis Machine Tool Fabrication

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### Contact

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Video: [https://www.dropbox.com/scl/fo/d1vay80yo0w77p9r0847q/ABtcoE5TEo9fOPxtfc7\\_2dM?dl=0&e=1&preview=GT+-+NCMS+Digital+Transformation+Challenge+Video.mp4&rlkey=6oo5jq1vjy44gkibju1z0g5lg&st=z4h14a4f](https://www.dropbox.com/scl/fo/d1vay80yo0w77p9r0847q/ABtcoE5TEo9fOPxtfc7_2dM?dl=0&e=1&preview=GT+-+NCMS+Digital+Transformation+Challenge+Video.mp4&rlkey=6oo5jq1vjy44gkibju1z0g5lg&st=z4h14a4f)

### Problem Statement

American supply chains are lacking national sources for two primary components of precision machine tools: (1) Reliable castings and forgings for machine bases, (2) Electrical components for proprietary motion controllers. Subsequently, the US is currently unable to respond to rapid demands in manufacturing precision computer-numeric controlled machine tools (MTs). Previous work has demonstrated viability of concrete as a suitable, nationally sourced alternative to traditional castings and forgings for MT bases, exhibiting appropriate damping ratio and stiffness to reduce vibrations when machining case hardened materials. However, modern motion controllers are similarly required to rapidly produce MTs.

### Transformation Solution

This proposal will develop a methodology to leverage an extensible motion controller for CNCs systems and automation platforms, based on LinuxCNC and the Robotic Operating System (ROS), supporting up to 5-axis motion. The developed controller will retain cybersecurity at the core through modern software practices including user and G-code authentication, encrypted communication, and zero-trust architectures. Furthermore, a controller that conforms to modern software practices allows for high-speed data connectivity, enabling use of containerized machine learning applications for operational efficiency and defect detection. Due to the open-source nature, this controller enables interchangeable front-end Human-Machine

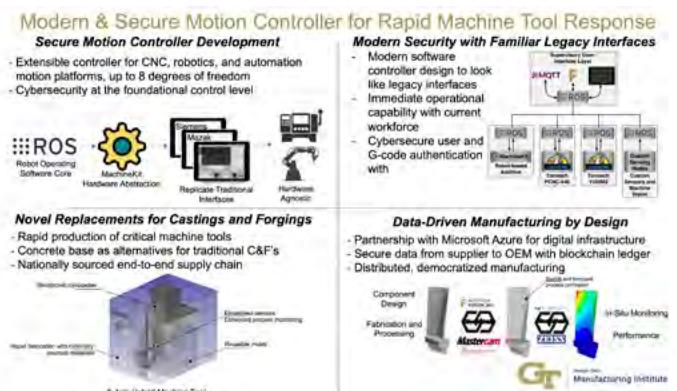
Interfaces (HMIs) to mimic legacy interfaces such as Fagor, Fanuc, and ProtoTRAK, regardless of the underlying machine configuration or kinematics. This removes the need for additional operator training, enabling low barriers to entry for existing machining operations.

### Benefits to the Army

Rapid design of custom machine tools to fit highly specific component geometries would deliver functional fabrications systems within 30 days. The ability to design and fabricate a custom MT kinematic arrangement enables high productivity as the mechanical MT design can be tuned to minimize chatter and maximize stiffness for the specific geometry to be produced. Additionally, LinuxCNC is capable of running on a variety of computing architectures, reducing reliance of MT controllers on specific, vendor-locked custom electronics components.

### Technical Maturity/Demonstration Results

Existing demonstrations have demonstrated viability of open controllers for concrete machine tools at a fundamental level. Previous work shows the viability of this concept, with previous efforts developing secure controllers for 3-axis motion. However, additional integration analysis and development is needed to support scalability of the technology to 5-axis motion. This project aims to complete the initial 5-axis controller design in approximately 8 months, with a demonstration controlling industrial hardware completed in additional 4 months.





## OTHER

# Grid Raster Inc

## Spatial Intelligence with Dynamic Extended Reality (SPIDER) for Enhanced DOD Depot Manufacturing and Sustainment

### Contact

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### Problem Statement

The DOD depots perform critical manufacturing and maintenance tasks for key weapons systems, including the C-130, C-17, F-15, F-35, CV-22, HIMARS and others. These tasks range from painting, grinding, and quality inspection to robotic applications, work instructions, and process simulations. For effective maintenance and sustainment, precise 3D spatial mapping, object localization, and accurate mesh model generation are critical. However, current methods are slow, labor-intensive, and prone to costly errors.

### Transformation Solution

Grid Raster's SPIDER™ system, powered by Artificial Intelligence (AI) and Extended Reality (XR), offers a transformative solution that improves these capabilities by delivering faster and more cost-effective results—10 times faster at one-tenth the cost. Grid Raster's SPIDER™ system significantly improves 3D spatial mapping, robotic integration, and a variety of maintenance and quality assurance tasks. SPIDER's key features include real-time object detection, localization, and alignment within 3D environments. SPIDER utilizes COTS devices such as smartphones, tablets, and XR headsets (HMDs) to automate high-precision digital twin creation, defect and anomaly detection, and object localization. By drastically reducing workflow time by a factor of ten and cutting costs to just one-tenth of conventional methods, SPIDER addresses critical technological gaps.

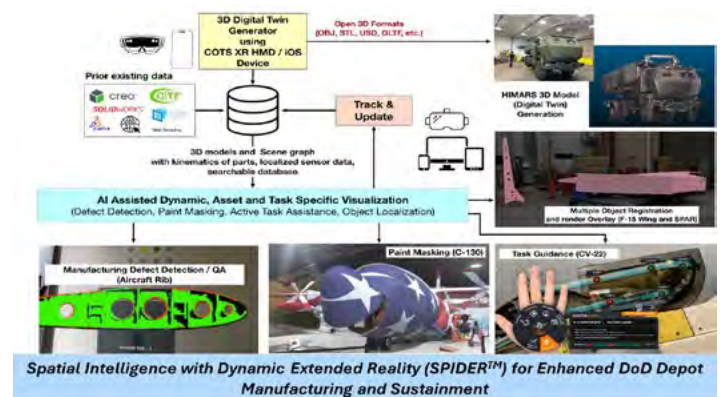
### Benefits to the Army

SPIDER enhances mission readiness by accelerating sustainment activities while reducing human error in object placement and localization. Its advanced

capabilities in defect detection, object localization, active task guidance, simulation and visualization of work coverage and robotic intent, support various complex systems and ensure seamless integration with both existing and future components. This technology boosts operational readiness, streamlines sustainment processes, and provides strategic advantages throughout the lifecycle of defense systems, demonstrating broad applicability and value (e.g., 90% reduction in 3D scanning and model generation time and similar reductions in paint masking tasks with significantly reduced total cost of ownership compared to alternatives).

### Technical Maturity/Demonstration Results

SPIDER is currently at TRL 7. The system's 3D model generation (demonstrated on F-15 wing repair) and alignment capabilities (applied to C-130 paint masking) were showcased during an operational testing and demonstration workshop at WR-ALC on November 2, 2023, with over 40 DOD and industry experts in attendance. The system's 3D scanning/model generation capabilities have transitioned to Phase III, and further testing with robotic integration and precision object localization took place in March and July 2024, demonstrating millimeter-level accuracy.



## OTHER

# Hill Engineering

## Digital Thread Tools for Automated Data Capture at the Point of Maintenance

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### Problem Statement

Tools and methodologies for capturing the digital thread generated during aircraft structural maintenance is a key focus area for improved structural integrity management. However, gaps exist between tools utilized on the shop floor and systems available to collect and leverage that data. Currently, most processes and the associated data collection are performed manually by a technician which can drive inefficiencies and opportunities for inaccurate or missing data. These issues lead to conservative fleet management. Ensuring the correct maintenance occurs at the correct locations, along with the digital thread to prove it, is key to improved depot efficiency and aircraft structural integrity management.

### Transformation Solution

The Integrated Maintenance System (IMx+) is an advanced maintenance technology which integrates smart shop tools with automated data collection and spatial position tracking to capture critical data, expedite maintenance actions, and decrease maintainer time to capture and document results. IMx+ provides real-time feedback to the maintainer, increasing efficiencies and ensuring 100% accountability of maintenance requirements. Full digital thread capture of critical maintenance data streamlines the entire maintenance, inspection, and reporting process.

### Benefits to the Army

The IMx+ technology bridges the gap between maintenance tools on the shop floor and maintenance information system utilized to manage structural integrity, enabling data capture from the point of maintenance for utilization throughout the lifecycle of the weapon system. With annual DOD depot maintenance

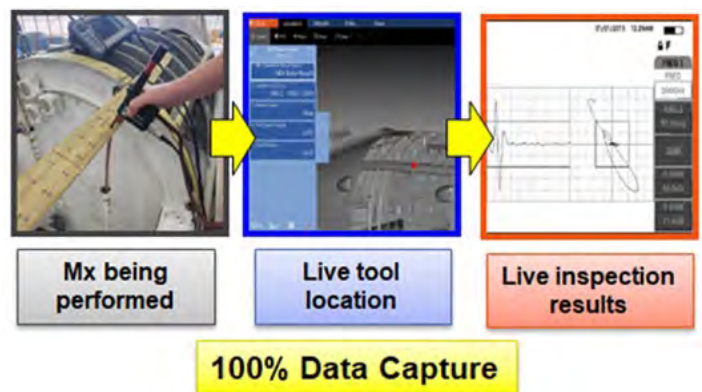
costs expected to exceed \$30B in FY25, increased efficiencies can result in significant cost savings. Utilization of the IMx+ system provides an estimated 20% reduction in inspection time through real time feedback and ~50% reduction in time to document inspection results. These benefits are not limited to the USAF and have far reaching benefits across the aerospace industry.

### Expected Challenges

The USAF uses a variety of tools on the shop floor to support various maintenance requirements, all of which have differing abilities to capture and share data. These tools will vary by depot location and evolve over time. Instead of developing a hard-wired approach, the IMx+ system utilized a modular API framework, allowing for flexibility to add new tools and spatial tracking technologies to accommodate different depot needs. Also, the development focused on integrating existing USAF tools and information systems, resulting in quick implementation for the USAF.

### Technical Maturity/Demonstration Results

IMx+ is currently being utilized by depot maintenance at Hill AFB for A-10 and F-16, with planned implementation for F-35, B-1B, Lockheed Martin, The Boeing Company, and others. Hill Engineering has secured an Authority to Operate (ATO) for the IMx+ system meeting stringent DOD cybersecurity requirements.



## OTHER

# Intact Partners

## Mixed Reality Tele-maintenance

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### Contact

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### Problem Statement

Modern DOD equipment and support systems are complex and require technical skills that are difficult to develop and maintain. Capability and expertise to repair and maintain equipment is not available in remote locations. Thus, repair/maintenance time, repair team travel requirements, and equipment down time are challenging and expensive.

### Transformation Solution

Our Mixed Reality (Augmented Reality & Virtual Reality) Tele-maintenance system operating on our XRiren platform will provide Microsoft HoloLens 2 (HL2) mixed reality headsets combined with digital work instructions and existing system expertise to enable quicker fault diagnosis, repair actions, equipment availability and improved unit combat readiness and effectiveness. A remote person equipped with a HL2 headset device instantly receives the capability to directly connect (e.g., reach-back) for assistance using existing communications capabilities. For example, personnel untrained in complex equipment repairs can access Subject Matter Experts (SMEs) at select locations and repair bases, who are experts on their equipment. This system extends the repair locations reach via the HL2 to personnel in the field and brings the virtual SME into an environment where they can provide coaching and support. An expert can see what the repair technician is doing, the equipment they are working on, and direct the maintainer for which repairs and modifications are needed.

### Benefits to the Army

Deploying the proposed, “What you see, I see” capabilities through the tele-maintenance system to the field will increase DOD personnel capability to field repair

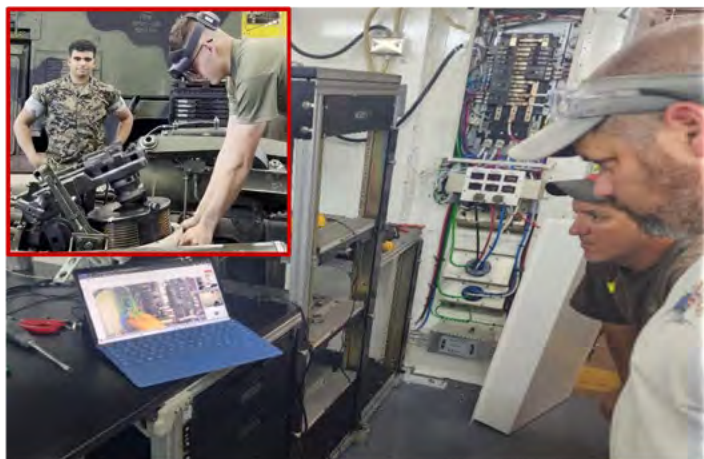
his/her equipment. Holographic 3D live, hands-free, 2-way video streams provide an answer to this problem. The Microsoft HL2 is a lightweight, untethered unit coupled with XRiren cloud services software delivering critical, timely, data to the field. The tele-maintenance continues the years of investment and advances the mixed reality abilities already deployed to USMC units.

By utilizing these tele-maintenance and digital work instruction capabilities, the DOD can provide the virtual on-site expertise to repair equipment without either sending a repair team forward or sending equipment back. This capability directly reduces repair cost and downtime while quickly regaining combat capability.

### Expected Challenges

Innovation Challenges:

- Create a “Center of Excellence” staffed with trained support personnel.
- Equip the data system with technical manuals in digital form.
- Introduce AI (artificial intelligence) capabilities for problem solving and part recognition.
- Continuously capture data about the field use for future analysis and improvements.



*Tele-maintenance (Digital Work Instruction)*

## OTHER

# J3D Labs, Inc (FLIP AI)

## FLIP AI: Transforming Predictive Maintenance with Advanced AI for Enhanced Asset Reliability and Mission Readiness

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### Contact

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### Problem Statement

Asset maintenance remains a critical challenge, with unscheduled repairs leading to increased costs, downtime, and reduced mission capability. A reliable system that predicts and prevents unscheduled breakdowns is needed to optimize maintenance and enhance operational readiness. Existing approaches to predictive maintenance lack the necessary accuracy and adaptability for various environments, leading to inefficiencies in both commercial and defense sectors.

### Transformation Solution

FLIP AI (J3D Labs, Inc.) leverages advanced data analytics and AI / custom machine learning models (XGBoost and Random Forest) to predict asset breakdowns with high accuracy, allowing for more effective scheduling of preventive maintenance. This technology converts maintenance data into actionable insights, identifying the likelihood of asset failure and streamlining repair processes. The solution integrates seamlessly with existing DOD Data Sources (Advana, BLADE, and GCSS), using a combination of predictive algorithms and data aggregation to enhance real-time decision-making. The solution clusterizes data into unique modules to allow for model training. It is designed to be scalable, supporting both commercial and defense applications, and is capable of handling diverse data environments.

### Benefits to the Army

For the DOD, this solution offers significant improvements in asset reliability and mission readiness. By reducing unscheduled breakdowns and optimizing maintenance schedules, it increases the lifespan of equipment and

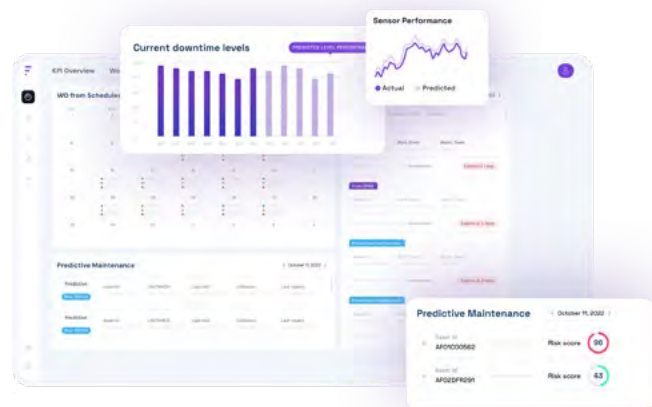
ensures that critical assets remain operational. The system's ability to integrate with various data sources also allows for cross-service applicability, benefiting the entire military ecosystem. The real-time data insights provide enhanced visibility, driving informed decisions to improve operational efficiency and reduce costs.

### Expected Challenges

A challenge for this solution is ensuring that it can adapt to the unique operational environments of both commercial and defense users. Different datasets, varying operational tempos, and the need for real-time processing in disconnected environments pose technical hurdles.

### Technical Maturity/Demonstration Results

The solution has completed 4 proofs of concept at USAF bases. The technology is currently in an advanced stage of development and has undergone several successful demonstrations. The commercial application is live with a FedEx last mile delivery fleet. Through the application of FLIP's AI and machine learning models, the system has demonstrated a 92% accuracy rate in predicting asset failures within a 30-day period. These results indicate strong potential for transitioning the solution into operational environments, where it can further be refined and validated against real-world data. The technology has won multiple DOD related awards including the Logistics Officer Association Trailblazer award and DOD CIO award.





## OTHER

# Kongsberg Ferrotech

## Robotized Vessel Hulls Repairs – by Use of Additive Manufacturing Techniques

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### Contact

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Video: [https://youtu.be/sFedgM7gvqc?list=PLBBNsX\\_rWhONcoCW1cUNC\\_D\\_6hswMob-m](https://youtu.be/sFedgM7gvqc?list=PLBBNsX_rWhONcoCW1cUNC_D_6hswMob-m)

### Problem Statement

Maintenance and repair of vessel hulls are today mainly done by divers, by building cofferdams or by dry docking the vessel. For diver operations, the work is performed in open sea, with the limitations of products and quality documentation that naturally follows. Building cofferdams are time consuming and increase the cost of the repair. Dry docking of the full vessel requires lengthy planning to get access the facility and high total cost.

### Transformation Solution

Kongsberg Ferrotech have developed a system for performing underwater inspection and repairs by a robotic tool, named Hullius, that can be deployed on the vessel side while the vessel is afloat. The robot crawls to the area of interest, whilst performing removal of marine growth. When at the correct location, the Hullius establishes a Habitat around the repair area, to ensure a controlled environment. The system carries all tooling and consumables necessary for performing a full operation, including tools for NDT inspection, coating removal, milling, AM/welding and re-coating. The Hullius is connected to a manned topside control system.

A typical repair sequence will be as follows:

- Deploy the Hullius on the vessel side.
- Crawl to repair location where habitat is established.
- Visual inspection, 3D scan and NDT inspection to detect surface geometry, cracks, holes, pitting etc.
- All inspection data is sent topside to a Digital Twin simulation tool, which establishes the repair procedure and performs a full simulation,.

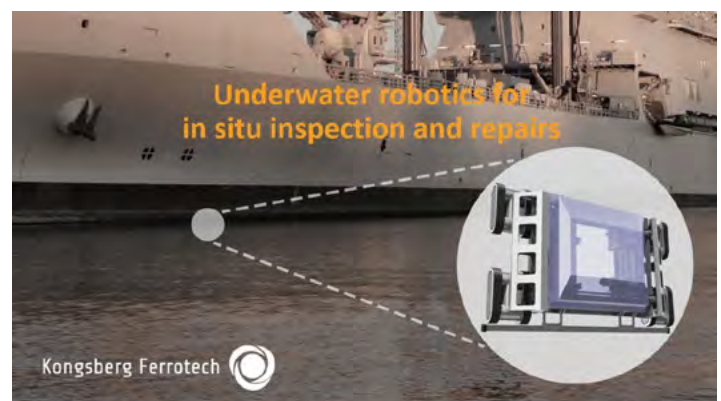
- When the procedure is agreed and verified, commands are sent to the Hullius, which will perform the repair as simulated.
- After the repair is performed, the Habitat is re-flooded and the Hullius can continue to the next location or crawl back topside.

### Benefits to the Army

This technology can reduce the cost and increase the quality by performing repairs that normally would require to take the vessel to dry docking. The capability to weld cracks, pitting damages and other through wall defects, while at sea, opens for totally new ways of performing inspection and repair campaigns. With the simulation tool integrated in the Digital Twin, the process is ensured and verified prior to performing the actual repair. For combat situations, the Hullius system can heavily reduce the need for taking a vessel out of theater and keep the fleet operational over long periods of time.

### Technical Maturity/Demonstration Results

The Hullius have been develop for oil & gas industry, together with oil majors as Shell and Equinor, and a full demonstration unit have been built. The technology for assessing and repairs of fatigue cracks, dented structures and through wall holes are developed and verified down to 300m water depth. For oil & gas, the technology is at TRL level 4, in a 7-ladder system – ready for building of full-scale prototype in its intended environment.



## OTHER

# M3DI

## M3DI Automated 3D Scanning Systems

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### Contact

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Video: <https://www.dropbox.com/scl/fi/joa1dnlm9u8o5fn5lb7u6/M3DI-digital-transformation-application.mp4?rlkey=wk157g04mhetsbgccwa68h6y6&e=2&st=gyab5lt0&dl=0>

### Problem Statement

The US Army's digital transformation requires advanced capabilities, including the ability to reverse engineer obsolete parts, create models with Product Manufacturing Information (PMI), support remanufacturing, and provide data for part quality prediction during manufacturing as well as corrective action control. These capabilities enhance efficiencies in both historical part production and new product development. The solution must be versatile, integrable with various production teams and equipment, and maintain secure connections to all necessary tools.

### Transformation Solution

M3DI's advanced 3D imaging technologies simplify 3D scanning, delivering high-quality results at an affordable price. Designed with modularity, M3DI systems use the latest off-the-shelf technology for quick, cost-effective upgrades. The proprietary AEOS software supports model-based workflows for inspection, enabling push-button operation and seamless integration with existing processes. M3DI's technology digitizes processes through edge devices for real-time data collection, correlating this data with post-inspection results to create predictive models for real-time corrective action control. This system uses advanced AI algorithms to create an AI-based digital twin, supporting both digital thread and digital twin applications.

### Benefits to the Army

M3DI provides extreme resolution and high accuracy 3D scans for reverse engineering, in-process inspection, automated production programming, and real-time corrective action feedback for production, all within a

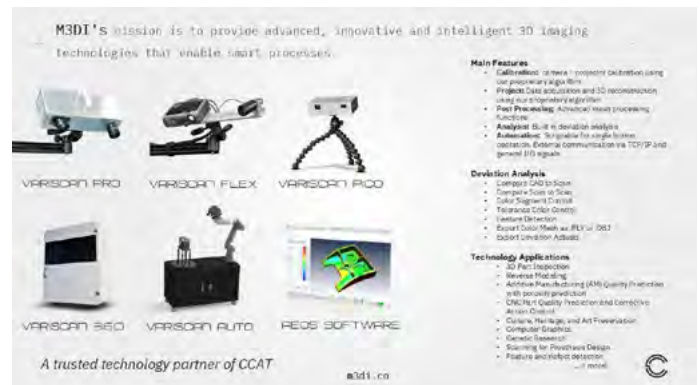
single, modular system. This technology is particularly beneficial for ground vehicle applications, ensuring precise and efficient inspection and manufacturing processes. The system's support for digital thread and digital twin applications helps maintain high standards of readiness and operational efficiency.

### Expected Challenges

M3DI currently supports commercial applications, with ongoing R&D to adapt the technology for secure environments. The goal is to integrate with Army-based Digital Enterprise tools such as the NCMS Digital Testing and Digital Proving Grounds. M3DI is committed to meeting existing security protocols and demonstrating technical maturity and connectivity to these systems.

### Technical Maturity/Demonstration Results

The Variscan 360 and the Variscan Auto exemplify M3DI's automated systems, offering a fully automated 3D scanning solutions that produce complete 3D model data with a single mouse click. The Variscan 360 uses dual 3D scanners and a motorized glass rotary platform to capture object surfaces comprehensively, while the Variscan Auto employs a collaborative robot, custom designed robot workstation with an integrated rotary stage and the Variscan Pro dual camera system to provide automated part and process digitization. Both systems provide easy-to-use, high-accuracy solutions for industrial applications, utilizing M3DI's proprietary fringe pattern projection technology.



M3DI's mission is to provide advanced, innovative and intelligent 3D imaging technologies that enable smart processes.

**Main Features**

- Calibration: 10-min in-camera calibration using our proprietary algorithm
- Projects Data Acquisition and 3D reconstruction using our proprietary algorithm
- Post Processing: Advanced mesh processing functions
- Analytical: Built-in statistical analysis
- Automation: Single-click single-button operation. External communication via TCP/IP and general I/O signals.

**Deviation Analysis**

- Compare CAD to Scan
- Compare Scan to Scan
- Color Segmentation
- Threshold Color Control
- Feature Selection
- Export Data Mesh as STL or OBJ
- Select Location Arrows

**Technology Applications**

- 3D Part Inspection
- Reverse Engineering
- Additive Manufacturing (AM) Quality Prediction with porosity prediction
- Critical Quality Indicators and Corrective Action Control
- Color, Height, and Area Visualization
- Computer Graphics
- Genetic Feature Set
- Scanning for Process Design
- Fixture and defect detection

A trusted technology partner of CCAT

m3di.co

## OTHER

# Marine Depot Maintenance Command

## Empowering Warfighters with ‘You See What I See’: Enhancing Field Repair Capabilities through Mixed Reality

### Contact

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### Problem Statement

Traditional maintenance at Marine Depot Maintenance Command (MDMC) is reliant on in-person diagnostics and repairs, which often leads to extended downtime, higher costs, and logistical challenges. This is particularly important for equipment that is in a remote and/or contested environment. As the demand for timely, efficient, and precise maintenance grows, the limitations of current tele-maintenance solutions, primarily based on video calls and remote guidance, becomes apparent.

### Transformation Solution

The Mixed Reality (MR) headset tele-maintenance system (TMS) with digital work instructions provides warfighters with expert coaching on equipment and tasks. It reduces travel costs and downtime by eliminating the need for depot Subject Matter Experts (SMEs) on-site. This system enables quick access to depot and industry experts for faster fault diagnosis and repairs, enhancing equipment readiness and unit combat effectiveness. It will be deployed globally across USMC depots and maintenance units.

### Benefits to the Army

Deploying the “You see what I see” capabilities to the field will increase the warfighter’s ability to diagnose and conduct field level repairs. This solution, utilizing Microsoft HoloLens 2 (HL2) or similar device, provide holographic 3D live, hands-free, 2-way video streams to the SME and end-user. The device is a lightweight, untethered, multi-purpose unit coupled with cloud services software to deliver critical, timely data. TMS enables technical experts to see and hear exactly what the warfighter sees and hears. An expert can direct the maintainer on repairs, utilization modifications, and disposition of the asset if field repair

is not possible. By utilizing the tele-maintenance and digital work instruction capabilities, the Marine Corps can provide the virtual on-site expertise to repair equipment without either sending a repair team forward or sending equipment back. This technology can be leveraged by all services to enhance their maintenance capabilities and provide real-time support to the field.

### Expected Challenges

Introducing new technologies requires precise scheduling and planning. For MR, challenges include network reliability, data security, accessibility, employee training, and user acceptance. Training can be time-consuming, and employees may resist adopting unfamiliar or disruptive VR technologies.

### Technical Maturity/Demonstration Results

On May 17, 2024, Marine Wing Communications Squadron 28 at MCAS Cherry Point, NC, sought MDMC assistance to fix four non-operational shelters with electrical issues. Using MR with the Marines on the ground, the depot team remotely identified and resolved the problems in a matter of hours versus days. Previously, the depot deployed contract teams, incurring travel costs, and disrupting the main production lines to resolved similar issues.

**UNCLASSIFIED//FOUO**

**AR/MR**  
(AR Tele-maintenance)

**MDMC – Augmented Reality (AR) Tele-maintenance**

On May 17, 2024, Marine Wing Communications Squadron 28 (MWCS 28) at MCAS Cherry Point, NC, sought MDMC Business Development's assistance to fix four non-operational A TAM shelters with electrical issues. Using augmented reality (AR), the MDMC team remotely identified and resolved the problems, proving the effectiveness of AR-enabled tele-maintenance. Previously, MDMC deployed contact teams on TAD, incurring travel costs and disrupting production.

On June 15, 2024, a virtual collaboration occurred between MDMC Production Plant Albany (PPA) NAVAIR Shelter electricians, MDMC II MEF, 2nd Maintenance Bn Marines, and MWCS 28 Marines. Through a live video feed, PPA experts guided MWCS 28 Marines in real time, swiftly resolving issues with the first shelter. The maintenance approach enhanced operational safety awareness and effectively mitigated potential electrical damage to the shelter(s).

Key lessons from this operation highlight the effectiveness of AR for real-time collaboration, significant safety enhancements, and substantial cost savings from reduced travel. This successful implementation of AR-enabled tele-maintenance demonstrates advancements in military maintenance operations, a promising strategic future program of MDMC centered with maintenance consulting. It showcases the potential for widespread adoption and efficiency, providing an optimistic outlook for this technology's future financial and operational benefits.

**UNCLASSIFIED//FOUO**

## OTHER

# Mitek Analytics LLC

## Scalable AI Solution for Effectiveness of DOD Maintenance Supply Chains

### Contact

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### Problem Statement

Just 70% of DOD aircraft are mission capable. Improvement requires resolving bottlenecks in the complex network of sustainment processes. Initiatives such as CBM+ and PBL require knowing effectiveness of supply chain; the same for the Pivot to the Pacific mission. Such analyses face high labor costs and a shortage of qualified analysts. AI is a solution.

### Transformation Solution

Supply Chain AI Tool (SCAIT) was developed under the guidance of USAF 748 SCMG by Mitek Analytics. Ten Phase I, II, II+, and III SBIRs over ten years built upon Stanford Industrial AI approaches. SCAIT uses existing maintenance and logistics data to predict the effectiveness of operations for run-to-failure parts, Predictive Maintenance, or Time Change. The analyses of Reliability, Availability, Maintainability, and Cost cover demand and supply in retail and wholesale supply chains. SCAIT finds bottleneck issues and helps solve them. Monitoring of 25 advanced KPIs provides executive alerts. Over 50 detailed engineering analyses provide observability of root causes. Compared to using MTBF for Reliability and NMCS/MICAP for Availability, SCAIT addresses data consistency, process variability, and many more Reliability, Availability, Maintainability, and Cost metrics.

### Benefits to the Army

SCAIT enables cost avoidances and optimizations of line maintenance, part overhaul, reliability, spares supply, fleet readiness, and more. Users can scope and trade improvements across the processes and organizations. Early in the program, 416 SCMS documented cost avoidance of \$270M for just one case. Later, SCAIT improved reliability

by 40% for the part causing half of A10 groundings. For a F16 part, concern about a rare but catastrophic failure drove discussion of fleetwide replacement. SCAIT provided objective argument against that; a large cost was avoided. These are just a few examples.

### Expected Challenges

One challenge is Explainable AI/ML working for smaller data sets. The AI must address data variations: parts that are reparable or not, organic depot or PBL part supply, part serial numbers are tracked or not, single or multiple WUC/MDS/NSN, large or small fleets, parts are very reliable or break often. Mostly, there are data quality issues that require robust data cleansing. Another challenge is certifying the software for DOD enterprise use.

### Technical Maturity/Demonstration Results

SCAIT matured in close collaboration with 748 SCMG users. The AI is rigorously verified, validated, productized, and certified. USAF 448 SCMW has operationally used SCAIT for 5 years in A10, F16, F15, C130, KC135, B52, E3, T38, and other fleets with significant impact. SCAIT was used for combat and transport aircraft, civilian aircraft, helicopters, and missile fleets. The SCAIT cloud app is onboarded on DOD Platform One and interfaces with ADVANA data. It can also generate formatted AI reports off line, from provided data sets.

#### AI for Reliability, Availability, Maintainability, and Cost



#### Supply Chain AI Twin cloud app and report



F-16  
F-15  
A-10  
B-52  
C-130  
KC-135  
E-3  
T-38  
ALCM  
...



## OTHER

# NAVSEA 05T Navy Expeditionary Sustainment and Repair (NESAR) NESAR Distance Support Kit (DSK)

## Contact

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## Problem Statement

Every day, hundreds of Subject Matter Experts (SMEs) travel globally to troubleshoot various complex systems and components, addressing mission-critical deficiencies. However, with increasing demand and limited SMEs, technical resources are overextended and disrupted by emergent work. Modernizing distance support is essential to maintain operational readiness and streamline assistance where it's needed most.

## Transformation Solution

Deployable video telepresence provides the solution, offering instant connectivity in communication-denied environments where traditional methods falter, specifically in difficult locations inside the skin of a ship like shaft-alley and machinery spaces. This approach virtually assembles SMEs from various locations, enabling faster, more cost-effective solutions while freeing up personnel for other critical global events. NAVSEA 05T's Navy Expeditionary Sustainment and Repair (NESAR) team has developed a portable telepresence system, the Distance Support Kit (DSK), that brings real-time secure video and audio communications to any location within the ship, ship to ship, and ship to shore—including ships at sea.

## Benefits to the Army

The DSK integrates three proven technologies to connect SMEs globally. Dedicated satellite broadband for the DOD ensures high-speed, encrypted connections with priority processing on the Starlink network. Secured wireless radios create high-throughput data mesh networks that penetrate signal-restricted areas on ships and extend miles for ship-to-ship and local connectivity. Finally, dedicated telepresence apps on DOD tablets enable high-definition video and audio communications

between shipboard operators and remote SMEs, with advanced tools such as document sharing, step-by-step instructions, and on-screen annotations for improved collaboration.

Designed for rapid deployment, the DSK can be set up in less than 10 minutes and is highly portable to ensure that SMEs and sustainment personnel can have immediate reach-back to their support network from any location. Components can be easily stowed shipboard, in forward facilities, or transported on commercial airlines.

## Technical Maturity/Demonstration Results

The DSK proved its effectiveness during multiple events, including a ship damage assessment that connected participants from 10 global locations in the US, Europe, and Middle East. At its peak, 66 participants connected simultaneously with high-definition video and audio, engaging directly with the shipboard team in real time.

Growing interest in the DSK is driving efforts to scale availability to meet the DOD's expanding needs as technical teams work to provide real-time support to their deployed assets. As demand for rapid, reliable support in forward and communication-denied environments increases, the DSK stands out as the critical solution. By enabling real-time assistance, reducing downtime, and minimizing people in combat theatres, this system plays a key role in mission readiness and global operational superiority for US military forces.



## OTHER

# odysightAI

## AI/ML Vision-Based and Video Analytics Predictive & Condition-Based Maintenance Technology

### Contact

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### Problem Statement

Legacy HUMS systems based on traditional sensing technology like vibrations, acoustic, temperature etc. provide partial coverage in detecting common failures for safety critical elements such as mechanical elements (landing gears, push-pull rods), Hydraulic leakages, Rust/Corrosion, Cracks and others. Large amount of class A-C mishaps in military aviation caused due to failures of safety critical elements located in hard-to-reach areas and are extremely challenging for visual inspections. In addition to safety, current maintenance policy relies on costly time-based inspections and complicated procedures decreasing the mission readiness.

### Transformation Solution

Odysight.ai TruVision is a visual sensing & video analytics-based Predictive & Conditioned Based Maintenance solution. The system includes multiple miniature cameras installed on critical locations inside the platform monitoring safety critical components and hard to reach areas through the various mission phases. The visual information is streamed to a ruggedize processing unit which provides real time failures/anomalies detection based on computer vision AI/ML algorithms, events/data recording, mission systems interfaces and video stream to platform displays. Our technology provides real time visualization thus enabling technician to perform visual routine inspections (Pre/Post-Flight etc.,) remotely and automatically without complicated maintenance operations such as disassembling panels thus saving time, effort, lowering maintenance costs and parts replacements and increasing mission readiness.

### Benefits to the Army

The key advantage is the ability to provide accurate diagnostics and prognostics capabilities for safety critical elements based on AI/ML Data driven platform allowing run of multiple different failures/anomaly detectors and video analytics algorithms in real time.

### Expected Challenges

A key challenge involved in our solution development is the ability to train/validate AI/ML algorithms due to the lack of high-fidelity training data which is visual images or videos describing the monitored elements operation during failure. For that we developed an innovative synthetic photorealistic simulation environment which provides the ability to use an accurate CAD model of the monitored element and its environment.

### Technical Maturity/Demonstration Results

The solution is applicable to maritime platforms, ground vehicles and aircrafts. The TRL is 7-9, the system was deployed on operational platforms and tested in its full operational environment such as UAVs (flying more than 15 months), AH64 (deployed on operational A/C). The system MRL is 7 and it is ready for low-rate production.

**Odysight<sup>AI</sup> TruVision<sup>TM</sup>**  
AI/ML visual-based Predictive & Condition based (CBM) maintenance   
Odysight<sup>AI</sup> Proprietary AI rights reserved. Confidential 2024

#### System Installation

The images below describes the system installation monitoring safety critical components including cameras which installed in hard-to-reach areas For example inside an aircraft engine bay



Odysight<sup>AI</sup> camera in a hard-to-reach area   Odysight<sup>AI</sup> camera installed for fuel distribution leakage monitoring   Odysight<sup>AI</sup> camera installed for engine engine monitoring  
Odysight<sup>AI</sup> camera installed to monitor air compressor leakage   Odysight<sup>AI</sup> camera installed to monitor engine belt condition

#### Failure Mode Detection Algorithms

The images below demonstrate some of the failure mode detection algorithm models. The top image describes the Landing gear system visual monitoring for extraction, retraction and lock verification, the middle image describes aircraft engine liquid level monitoring and engine belt tension verification based on computer vision, the bottom image shows the position and velocity measurement and monitoring of the engine throttle



## OTHER

# Palladyne AI

## Palladyne IQ: Closed-Loop Autonomy for DOD Robotics

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### Contact

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Video: <https://vimeo.com/991796162>

### Problem Statement

The DOD must strive for efficiencies to ensure each service maintains the highest feasible state of operational readiness. Increasing efficiency within budget, time, workforce availability and experience, operational tempo, and many other constraints present a major challenge—one that requires innovative methods to overcome. One approach is the adoption of advanced robotics technology, which can significantly enhance task execution speed, efficiency, and reliability. A key problem, however, is maintaining robotic system configurations for variable tasks and conditions.

### Transformation Solution

Palladyne(TM) IQ enhances the utility and functionality of COTS third-party robotic systems by enabling these systems to quickly observe, learn, reason, and act in structured and unstructured environments. It leverages AI/ML techniques to enable robotic systems to perceive their environment and quickly adapt to changing circumstances by generalizing (i.e., learning) from their experience to complete dynamic real-time operations “on the edge.”

### Benefits to the Army

With Palladyne IQ, optimal task configuration efficiency that meets or exceeds quality standards can be achieved with limited robot training and programming. This “human-like” ability to learn and adapt is a key differentiator in helping the DoD maintain optimal productivity in dynamic environments, where unexpected challenges can cause costly delays and downtime. That Palladyne IQ does not require cloud connectivity to function further amplifies its value-add to existing DOD systems: this mitigates performance issues spurred by

poor connectivity and latency that can occur with cloud processing, expenses associated with moving large amounts of data to and from the cloud, and related cyber vulnerabilities.

### Technical Maturity/Demonstration Results

Palladyne IQ is available as a commercial product today, and we are currently performing a series of military utility assessments (MUAs) of elements of Palladyne IQ with USG end-users. These MUAs focus on leveraging Palladyne IQ software to enable existing robotic assets to learn and execute high-priority aircraft maintenance tasks. There is significant emphasis on USG personnel training these systems themselves, as well as on task flexibility that copes with new parts and random part placement. “The Palladyne AI software is a transformational technology that will benefit both commercial and Department of Defense (DOD) industrial and maintenance automation advancements,” said Mr. Shane Groves, Warner Robins Air Logistics Complex Robotics and Automation SME. Several early adopter trials are also underway with commercial customers spanning a variety of priority use cases.

### Conclusion

Implementation of Palladyne IQ would equip the DOD with intelligent and adaptable robotic systems, in turn increasing worker safety and expanding organic maintenance and repair capabilities to improve overall military readiness and capacity. Palladyne IQ enables robotics that are cost-effective, scalable, and deployable to diverse environments.

#### Palladyne™ IQ: AI Software Platform for Robotics

Real-Time Closed-Loop Autonomy Software to Enable Machines to Observe, Learn, Reason, and Act Like Humans





## OTHER

# Ricardo Defense

## Digital Transformation of Army Sustainment Operations

### Contact

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Video: [https://drive.google.com/file/d/1LUUfCNpA5xqwQrGrmsAF1iwt9u3-NBNK/view?usp=drive\\_link](https://drive.google.com/file/d/1LUUfCNpA5xqwQrGrmsAF1iwt9u3-NBNK/view?usp=drive_link)

### Problem Statement

Predictive Logistics (PL) is a Sustainment force multiplier that will enable the Army to proactively anticipate and address potential equipment failures, optimize supply chain management, and ensure readiness. However, due to its manual-intensive and paper-based sustainment operations, the Army lacks sufficient maintenance, repair, and supply data quality and integrity required by Digital Engineering, AI, and Machine Learning (ML) tools to generate useful PL analyses. The Army requires a Digital Transformation in its sustainment operations to realize the benefits of PL.

### Transformation Solution

Data Integration for Ground Systems (DIGS) is an expeditionary sustainment capability that digitizes, automates, and streamlines Army maintenance, repair, and supply operations in both connected and contested network environments. DIGS connects a handheld device directly to ground platforms, wired or wirelessly, to provide real-time status of equipment readiness. DIGS auto-populates complete and accurate platform configuration, fault, and usage data onto digital maintenance records that replace today's paper-based forms filled out manually by Soldiers. DIGS streamlines sustainment operations using software-based workflows that fully integrate with the Army's current and legacy Interactive Electronic Technical Manuals (IETM), IADS and EMS, and the GCSS-Army supply system. DIGS digitally transports data from edge-to-echelon, enabling data-driven decisions and high-fidelity PL analyses.

### Benefits to the Army

DIGS digitally transforms Army paper-based sustainment

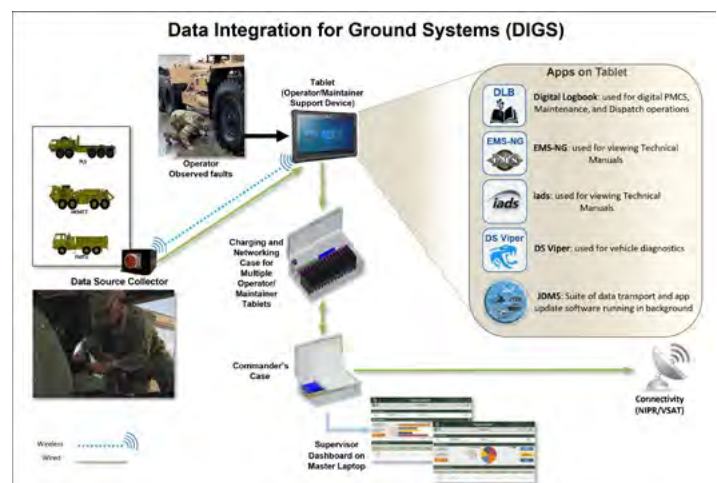
operations, while also deploying digital threads to the field, resulting in several benefits for the Army: (1) enabling data-driven decision-making and PL analyses by feeding high-fidelity data to Commanders and Digital Engineering, AI, and ML tools, (2) reducing equipment downtime through data automation and validated digital thread workflows, (3) reducing costs by eliminating ordering errors and ordering excessive parts quantities, (4) synchronizing and transporting sustainment data in disconnected and contested logistics environments, and (5) adopting a platform-agnostic, MOSA-based solution with Open-API software that is being leveraged in multi-domain operations.

### Expected Challenges

The challenges for the Army are to define a sufficient PL requirement that facilitates platform POM funding for DIGS, and to solidify Army ownership of DIGS to enable lifecycle sustainment of this digital transformation solution.

### Technical Maturity/Demonstration Results

DIGS is a mature capability developed through a partnership between PM Transportation Systems, DEVCOM GVSC, DEVCOM DAC, PMO JTDI (NAVAIR), and Ricardo Defense. DIGS has completed Soldier Touch Points and Operational Experiments at numerous locations, including Ft Irwin (NTC), Ft Stewart, Ft Cavazos, Ft Johnson, Camp Grayling, and multiple Project Convergence events.





## OTHER

# Sharp Vision Software

## AVARIS- AI-Powered 3D Model-Based Work Instruction Authoring and Viewing Tool

### Contact

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### Problem Statement

The Army faces critical challenges in maintenance operations, particularly regarding the effectiveness of traditional MRO processes. Reliance on paper-based documents hinders efficiency, increases errors, and delays repairs, impacting readiness and operational capability in dynamic environments.

### Transformation Solution

Sharp Vision Software (SVS) developed the AVARIS digital maintenance solution for NAVAIR under a Navy SBIR Phase II with additional funding from OSD's SBIR Program to modernize MRO activities by giving government engineers the ability to generate digital work instructions for their depot maintainers. This proven solution aligns with the Army's Digital Transformation efforts by modernizing MRO procedures from paper-based to model-based digital work instructions that incorporate multimedia elements—such as 3D models, videos, and interactive content—into a user-friendly viewing format.

SVS's AVARIS key features include:

- An intuitive AI-powered authoring tool for in-house creation of custom digital work instructions and training materials.
- The ability to convert and enhance existing legacy PDF documents into interactive digital formats.
- Tools to import and decimate existing 3D models or generate new 3D content using handheld scanning technology to enhance understanding of complex parts and processes.
- A versatile viewer app compatible with PCs, tablets, and head-mounted displays, which condenses digital content into an easy-to-navigate window that

can be easily accessed by maintainers on a viewing device—which otherwise may be a 100+ page PDF.

- Ability to deploy as standalone software solution or integrate with enterprise PLM tools.

### Benefits to the Army

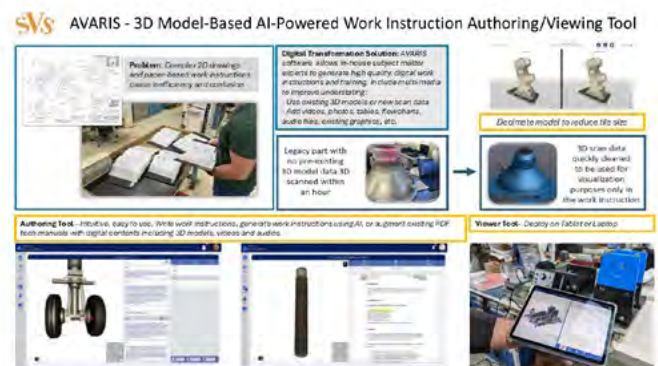
AVARIS enhances the Army's MRO efficiency, enabling rapid knowledge transfer between Army engineers and maintainers/technicians. By streamlining access to interactive instructions, AVARIS minimizes errors, improves quality, and reduces maintenance turnaround times. This solution fosters self-sufficiency and directly contributes to the Army's overarching digital transformation goals.

### Expected Challenges

Challenges may include addressing cultural resistance to transitioning from traditional paper-based methods and buy-in from various GVSC programs for enterprise-wide adoption and various Army Vehicle Sustainment Depots.

### Technical Maturity/Demonstration Results

Successful demonstrations of AVARIS at NAVAIR's Fleet Readiness Center Southwest and with NAVSEA during the 2022 NCMS Repair Technology Engagement Exercise (REPTX) have shown cross-service applicability and effectiveness. AVARIS is at a Technology Readiness Level (TRL) of 8 and is already accredited with authority to operate (ATO) and being used at NAVAIR's Fleet Readiness Center Southwest on the Navy RDT&E computer network.



## OTHER

# Siemens Government Technologies, Inc Siemens Digital Transformation Strategy

## Contact

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## Problem Statement

The advantages of digitalization are quickly becoming the difference between organizations that advance in a competitive marketplace or environment, and those that fall behind. A comprehensive digital twin is a virtual representation of a product or process in the correct context of users or teams. In order to be useful, a digital twin must be tied to the latest authorized configuration.

## Transformation Solution

The Siemens digital twin extends beyond the standard definition of the digital twin because it represents the design, its risk, performance, etc., and is part of an open ecosystem connecting tools from multiple vendors.

Why do organizations need a digital twin?

- It takes too long to field new platforms and historically when we do. We start from scratch wasting development time because we failed to capture and maintain the complete authoritative technical data product baselines at delivery.
- We have failed to capture the physical configuration of each vehicle. We traditionally required allocated baselines which equates to “ONE” configuration representative of a vehicle. This approach results in incomplete product baselines which means we start our program with incomplete individual inventory breakdown.

This scenario make the Army dependent on the OEM for the life of the program because they:

- Lack of complete authoritative data results in:
  - Degraded readiness.
  - Unplanned and cost overruns.
  - Long lead times for obsolescence items.
  - Lack of historical data requires complete rework.

Baseline Product Lifecycle Management (PLM)

Configuration Management is the software suite that creates the digital twin of the ground vehicle or the production/sustainment process and provides integrated configurations capabilities at all phases of the lifecycle that is the single source for interactive knowledge across multi-domains with visualization.

## Benefits to the Army

- Design: Enables better design collaboration and provides tools to manage what parts need to be tracked and maintained.
- Production: Provides a cradle-to-grave, end-to-end solution from design to sustainment closing the loop of disconnect between design/develop processes and field/sustain processes.
- Product: Provides a centralized data management system to improve the control of product configuration to have real-time, on-demand access to product asset data.

## Technical Maturity/Demonstration Results

PLM Creates a Digital System Model using Model Based Systems Engineering (MBSE) that describes the end-to-end business process. This PLM software suite is technically mature as it is Commercial-Off-The-Shelf, and is being used for Navy ship, US military aircraft, shipyards, and depots, as well as throughout private industry. Siemens PLM software has been ATO'd in both Navy and Air Force environments.

The infographic illustrates the Ford Motor Company's challenge and solution using Siemens PLM software. On the left, a photo of an orange Ford Mustang is shown. The challenge is to improve timing, cost, and quality of engine manufacturing launches. The solution is Streamlined processes using PMI, reducing manual data entry through the manufacturing lifecycle. The engine launch process is detailed in a diagram showing Machine ready PMI, Smart Machining Rules, CMM Simulation, Automation, and Process Validation. The Siemens logo is at the bottom right.

**Challenge**  
Improve timing, cost and quality of engine manufacturing launches

**Solution**  
Streamlined processes using PMI, reducing manual data entry through the manufacturing lifecycle

**Engine launch process**

- Machine ready PMI
- Smart Machining Rules
- CMM Simulation
- Automation
- Process Validation

**Siemens**

## OTHER

# Siemens Industry Software

## Enhancing Engineering Systems and Manufacturing Efficiency Through Digital Twins

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### Contact

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### Problem Statement

Traditional engineering systems often face challenges related to rigidity, inaccuracies in CAD/CAM, and efficiency of manufacturing processes. These issues can lead to increased costs, longer production times, and reduced overall efficiency. A solution is needed that improves engineering efficiency, offers more accurate simulation, and enables process improvement via analytics.

### Transformation Solution

The proposed solution leverages digital twins of CNC machines and robots to create a dynamic and interactive virtual representation of the physical assets. Digital twins enable early simulation, optimization, and data validation of manufacturing processes. This leads to improvements in flexibility, data accuracy, and manufacturing efficiency.

### Benefits to the Army

- Increased Flexibility of Engineering Systems:
  - Digital twins provide a detailed virtual representation of physical assets, allowing for rapid adjustments and modifications prior to deploying manufacturing processes.
  - Engineers can simulate various scenarios and predict outcomes, enabling more agile and responsive decision-making.
  - Testing and validating changes in a virtual environment reduces the risk of errors and downtime in physical systems.
- Improved Accuracy of CAD/CAM:
  - Digital twins, when integrated with CAD/CAM systems, increase the fidelity of simulations and provide a more integrated iteration environment.

- The process time for manufacturing a part is highly accurate and yields benefits in overall manufacturing planning.
- Enhanced data accuracy facilitates better communication and collaboration among engineering teams, reducing the likelihood of costly errors.
- More Efficient Manufacturing Processes:
  - By providing early insights into machine performance and production processes, digital twins enable proactive maintenance planning.
  - Simulate and optimizing manufacturing processes in a virtual environment leads to more efficient resource utilization and reduced waste.

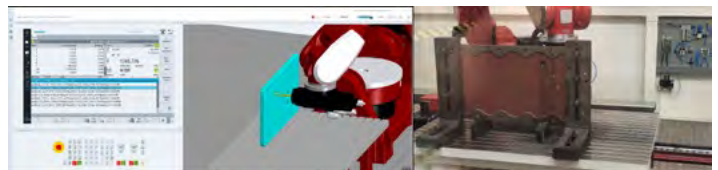
### Expected Challenges

Implementing digital twins involves several key steps:

- Model Development: Acquiring or creating accurate and detailed digital models of physical assets using advanced simulation and modeling tools.
- Model Validation: Ensure synchronization between digital twins and physical machines.
- Analytics and Optimization: Modifying process engineering to utilize the digital twin optimally. Utilizing advanced analytics and/or machine learning algorithms to derive actionable insights and optimize engineering and manufacturing processes.

### Technical Maturity/Demonstration Results

Platforms to create digital twins are available today. Although they are early in industry adoption, the TRL is 9. Several demonstrations of results are available.



# Compact Inner Diameter Evaluation and Repair (CINDER) Repair Technology

## Contact

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Video: <https://youtu.be/oFs3vXrW-gc>

## Problem Statement

Much of military maintenance involve the repair or replacement of damaged parts on high-value assets. In some cases, these parts may no longer be in production, resulting in an entire asset being taken out of operation for lack of a critical part. One area where the US Army suffers this problem in modern combat theaters is with large-caliber gun barrels. Lack of supply of large-caliber gun barrels for both direct and indirect fires actively bottleneck and reduce warfighter effectiveness. They suffer progressive damage inside the barrel during firing, which needs to be replaced on a regular basis. Currently, there is limited capability to produce replacement barrels for systems such as the M1 Abrams, the M109 Paladin, and the M777 towed howitzer. There are presently no qualified processes for repairing damage in these barrels to extend life and maintain their readiness. Soldiers must choose to continue firing from a damaged barrel, potentially causing the barrel to rupture during firing, or to remove the asset from the fight completely.

## Transformation Solution

Additive processes offer a unique solution to revitalize damaged assets. To maintain the supply of large caliber cannons, a prototype Compact Inner Diameter Evaluation and Repair (CINDER) robotic system has been developed for repair and restoration of barrels. The robotic repair system uses a combination of subtractive processes with novel additive repair technologies, removing corroded and damaged areas before it restores the original dimensions of the barrel. This repair approach is on trajectory to extend the life of active tubes and prevent them from experiencing irreparable damage. With continued development, use of the CINDER robot could recommission previously unusable barrels.

## Benefits to the Army

Costs of maintaining weapon systems will be dramatically reduced through repair instead of replacement. Estimates put the cost of repairing assets at less than 25% of the cost of current replacement strategies for 120mm and 155mm systems. The availability of repaired assets will also reduce bottlenecks, keeping weapons in the fight that would otherwise be inoperable. Beyond large-caliber gun barrels, deploying robots capable of subtractive and additive repair processes to maintain and extend operational life of high-value assets can be applicable across the US Army, US Navy, and US Marine Corps.

## Expected Challenges

Future challenges will involve the scaling and automation of CINDER repairs around environmental deployment strategies. Additional inspection elements are being developed for locating damage that can serve as inputs for automated repairs. A containerized version of CINDER has been designed to allow deployment of this technology to expeditionary environments.

## Technical Maturity/Demonstration Results

CINDER currently sits at TRL 4. The technology has been demonstrated with successful lab-scale repairs of 120mm and 155mm tube sections.

There is presently no qualified ID repair method for critical assets after condemnation.

CINDER: Compact Inner Diameter Evaluation and Repair (TRL 4) Robotic System

- Removes corrosion, repairs lost material and finishes machining equivalent to the original structure for extending life and maintaining readiness.
- Compatible with multiple barrel types using high-performance materials, increasing barrel life and eliminating hexavalent chromium processes.
- Applicable to any long-range precision fires across the U.S. Army, U.S. Navy, U.S. Marine Corps, and beyond.



## OTHER

# Systecon North America

## Enhancing Air Force Maintenance and Sustainment with ARES

### Contact

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Video: [https://drive.google.com/file/d/1GWEi2QowxkgKL2nC6\\_HG1wCv74y1uYZ8/view?usp=drive\\_link](https://drive.google.com/file/d/1GWEi2QowxkgKL2nC6_HG1wCv74y1uYZ8/view?usp=drive_link)

### Problem Statement

The US Air Force faces increasing pressure to maintain the operational availability of its aircraft fleet while reducing sustainment costs. Current maintenance practices rely on disparate data sources and unstructured free text discrepancy reporting and maintenance actions from pilots and maintainers. These legacy practices hamper real-time analysis of fleet mission capability rates and sustainment optimization. This leads to longer repair cycle times, increased manpower requirements, higher costs, and reduced mission capability rates.

### Transformation Solution

ARES (Analytics and Reporting for Enterprise Sustainment) is a cloud-native application designed to revolutionize the Air Force's maintenance operations. It captures critical, pilot derived post-flight data on aircraft and mission systems in a structured and user-friendly format, transforming previously unusable unstructured inputs into actionable insights. Rapid access to ARES data enables maintainers to anticipate, identify, and address critical mission system discrepancies that impact mission success. Unlike traditional maintenance systems, ARES enables dynamic, fleet-wide analysis to identify trends, and predict, rather than react, to sustainment requirements.

### Benefits to the Army

ARES delivers a transformative impact on maintenance efficiency and readiness. Instantaneous access to structured, legible data enables faster maintenance cycles, lower sustainment costs, and improved aircraft full mission capable rates. Its user-friendly interface enhances decision-making at unit and enterprise levels, allowing leadership

to track fleet-wide performance in real-time. ARES data can also directly support predictive analytics and CBM+ strategies, aligning with the DOD's goals for improved operational availability and reduced lifecycle costs.

### Expected Challenges

Transitioning from unstructured to structured data inputs remains a challenge. Overcoming cultural resistance to new processes, as well as integrating ARES with legacy systems, will require focused effort. ARES addresses these obstacles through hybrid data input capabilities, enabling maintainers to prioritize structured data and still capture free-form data when necessary.

### Technical Maturity/Demonstration Results

ARES is a TRL 7 application. Upon full implementation, ARES will achieve TRL 9, making it a highly scalable solution for Air Force sustainment operations. Its success in demonstrations to US Air Force and US Navy F-35 squadrons underscores its readiness for cross-service applicability and broader deployment within the DOD.

Cross-Service Applicability: ARES's adaptability across diverse platforms ensures its relevance beyond the Air Force. The application can be integrated on any aircraft in DOD inventory. This cross-service applicability supports DoD's vision of integrated, data-driven optimized sustainment.



## OTHER

# Taqtile

## Transforming US Army Operations with Augmented Reality: The Power of Taqtile's Manifest Digital Agility and Mission Readiness

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### Contact

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Video: <https://vimeo.com/687204916>

### Transformation Solution

#### Digital Agility:

- Manifest enables Soldiers to access real-time digital work instructions and remote support in the field, allowing for rapid adaptability to evolving mission needs, new equipment, and unfamiliar tasks. Its hardware-agnostic design means it can be deployed across a variety of AR devices, including headsets, tablets, and smartphones, ensuring flexibility as technology evolves. This digital agility allows the Army to equip personnel with up-to-date knowledge and critical, context-specific information, ensuring they can respond quickly and effectively.

#### Effectiveness:

- Manifest enhances task accuracy by providing AR-guided, step-by-step instructions, significantly reducing human error in performing complex tasks like maintenance, repairs, and equipment assembly. The platform's remote expert assistance feature allows specialists to guide Soldiers in real time without being physically present, minimizing delays in resolving issues and ensuring mission-critical systems remain operational. Additionally, Manifest accelerates training by offering hands-on AR experiences that turn complex tasks into intuitive, interactive learning experiences, reducing the time needed to develop expertise.

#### Efficiency:

- Manifest increases operational efficiency by streamlining maintenance workflows, reducing the time needed for complex repair tasks and enabling Soldiers to complete them with minimal oversight. The platform supports simultaneous multi-asset task management, allowing Soldiers to

work on multiple pieces of equipment or vehicles at once, improving task throughput. Furthermore, its AR-based training reduces the need for time-intensive, instructor-led training sessions, allowing personnel to gain practical skills while on the job.

#### Affordability:

- By enabling on-the-job AR training and remote expert support, Manifest reduces the need for specialized personnel and costly training programs. This results in lower operational costs associated with deploying experts to field locations and reduces equipment downtime. Additionally, the precision provided by AR-guided maintenance ensures that equipment is maintained properly, extending the lifespan of expensive military assets.

#### Scalability:

- Manifest's flexible, modular design allows it to be scaled across multiple Army units, from individual battalions to brigade-level operations. It supports a wide range of applications, from maintenance and repair to training and operational planning, making it a versatile solution across different Army domains. Its scalability allows the Army to integrate AR-guided solutions into various aspects of operations.

### Benefits to the Army

Taqtile's Manifest provides the US Army with a digitally agile, effective, efficient, affordable, and scalable solution for enhancing mission-critical operations. By empowering Soldiers with real-time guidance, reducing the need for specialized personnel, and improving task accuracy, Manifest aligns with the Army's modernization goals.



## OTHER

# University of Michigan – Dearborn

## ImpLi-Fi: Secure Wireless Optical Communications to Facilitate Condition-Based Maintenance Plus (CBM+)

### Contact

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### Problem Statement

Vehicle maintenance is critical to the operations of any logistics organization, particularly when the vehicles in question are subjected to hard duty cycles or consistently operated over rough terrain. The field of condition-based maintenance plus (CBM+) provides relief by leveraging diagnostic data available via the vehicle CAN bus to provide insight into vehicle system faults, wear item degradation, and sensor malfunctions. However, vehicle diagnostic data is often not checked or analyzed at regular intervals, leading to (preventable) breakdowns.

### Transformation Solution

ImpLi-Fi is a wireless light-based communications technology that easily integrates into existing exterior lighting of a vehicle. By modulating the power fed into the light, ImpLi-Fi is able to transmit data from the vehicle to a ground station without human intervention. When the transmitted light shines on a receiver at the ground station, diagnostic data from the CAN bus is automatically downloaded from vehicle to station.

### Benefits to the Army

Being a light-based communication system, ImpLi-Fi does not add to the RF signature of a ground vehicle, allowing for safer, stealthier operation in contested environments. Furthermore, because light is inherently highly directional and obscured by solid objects, both the beam angle of the data and the angle-of-view of the receiver can be precisely formed. Since the receiver module must be physically located within the beam in order to receive the signal, ImpLi-Fi offers much tighter security control

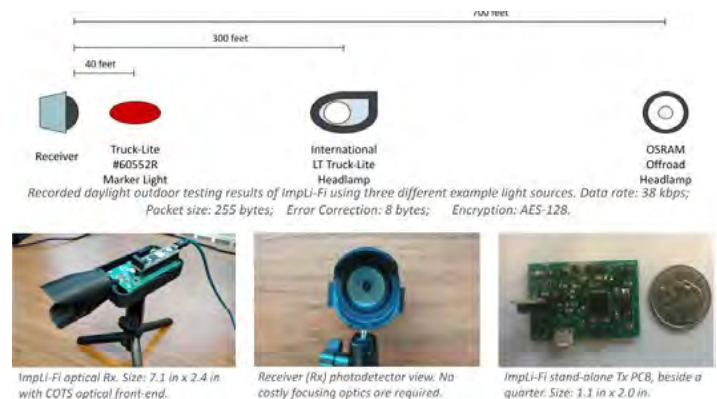
than a comparable radio frequency-based wireless communication link, with greater resistance to interception and jamming. This security is only further increased if integrated with military “blackout” or “light intensifier” lights, which operate in the near-infrared spectrum. On top of this, ImpLi-Fi incorporates AES-128 ECB bitstream encryption. The transmitter, integrated with the exterior light, requires only a CAN input and a connection to the vehicle’s 12V power supply. This provides a ready after-market light replacement solution to retrieving diagnostic data, with no additional hardware.

### Expected Challenges

ImpLi-Fi’s effective operational distance is dependent on the optical output of the exterior luminaire chosen to serve as transmitter: i.e., a headlamp can transmit over a greater distance than a marker light. Effective transmission range of 40 feet at 38 kbps has been demonstrated with a COTS rear marker light from Truck-Lite, and 700 feet with a COTS off-road vehicle headlamp. The next steps include unlocking higher data rates, testing with near-infrared LEDs, and enabling multiple transmitters to access a single receiver simultaneously without interference using protocols similar to LTE/5G or optical IEEE802.3cp.

### Technical Maturity/Demonstration Results

ImpLi-Fi has been validated in two separate pilot tests in operational environments in the commercial trucking sector. Therefore, the technology is self-certified at TRL-7.



## Procurement Throughput = Speed to Lethality

### Contact

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### Problem Statement

Organizations with large and disconnected supply chains can often miss opportunities to increase their throughput due to a variety of reasons. The obvious being the disconnectedness of the supply chains. For many organizations data is siloed by program or program office; it could also be siloed by the weapons manufacturer/s and those organizations are then firewalled from one another for security measures. This compounds problems such as purchase price variance, tail spend, stock outs, overstock, etc.

### Transformation Solution

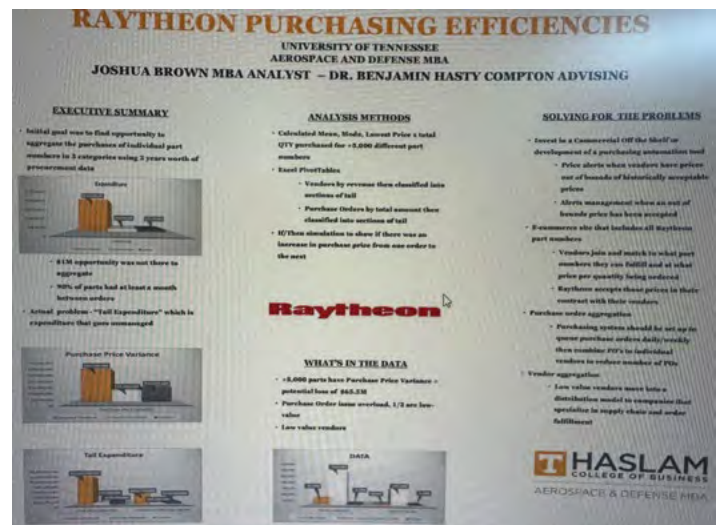
The executive team at V3YL understands disconnected supply chains from several perspectives including procurement, parts availability, part allocation, and part location. A simple fix to the procurement problem known as purchase price variance (PPV) is to create an automated flow from the levels of procurement to intuitively understand how many times this part has been sourced, from what supplier and their location/s, how many, and the price at each volume. This information should be available to the procurement officers at each level of the purchasing process, and these parts and prices can be public without exposing the program to which the parts belong. Additionally, an intuitive supply chain will know where parts are, which may prevent purchasing a part at all. Using a system such as throughput.ai and sparkgov, an organization can pull in their purchasing data from their disconnected pipes to understand exactly their supply chain from a historical perspective, then make that historical data “live” so that the organization knows exactly where things are, how they were purchased, at what interval, to where these purchases ended up, etc.

### Benefits to the Army

Once the data is live it can be used to make better decisions to enable the warfighter to be more lethal, quicker. A very hypothetical example would be an org like MCAS-Cherry Point ordering crucial parts for the F-35 6 years ago. Those parts delivered 16 months too late because that fleet of Lightning’s were transferred to an allied nation such as Norway. Now Norway can’t fly their assets for whatever reason because the MRO inventory they need can’t be sourced. At all. By connecting the most important data, securely, this problem subsides.

### Technical Maturity/Demonstration Results

SparkGov and throughput.ai have patents on their technologies, and we are working to integrate those technologies for a full supply chain lifecycle solution that incorporates AI for predictive analytics and maintenance. In addition to patents for the technology, both firms have contracts with various government agencies. V3YL, the HUBZone integrator does not. V3YL has the past performance in data analytics with Raytheon Technologies to support the procurement aggregation portion of a potential solution.





## OTHER

# Venture Research, Inc

## Digital Transformation Using Hybrid Tracking (Machine Vision using AI and RFID) Systems

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### Contact

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Video: [https://downloads.ventureresearch.com/john/AIMachineVision/MachineVisionDemowithRFID.mp4?\\_=1](https://downloads.ventureresearch.com/john/AIMachineVision/MachineVisionDemowithRFID.mp4?_=1)

### Problem Statement

The market for tracking systems incorporates many technologies such as RFID, BLE, GPS, LoRa, HF, UHF, UWB and Machine Vision. Venture Research provides packaged solutions that typically incorporate a number of technologies to satisfy a use case. With NCMS providing the program management, Venture Research provided this technology to the Navy at all 4 Navy piers.

### Transformation Solution

The solution was a UHF pRFID reader built into a stainless-steel case (due to salt water) that could be retrofitted on trucks, carts and vehicles and as they drove by material in the yard. It would read any pRFID tags in the vicinity but then get a GPS fix and send the item and location information through private Cellular networks. As part of this effort the pRFID readers were sent to Dahlgren, VA to be certified for HERO, HERP and HERF compliance. In other systems we were one of the first Companies to integrate Machine Vision using AI and RFID to provide an Audit of inbound and outbound material that was a mix of different barcoding Symbologies (ITF-14, UPC\_a, QR Code and DataMatrix) and also automatically read RFID tags for materials that did not have a visible barcode tag as part of the same Audit session. AI was used to interpret what was the correct product label where many labels were stacked on top of each other on the same carton due to carton re-use.

### Benefits to the Army

The DOD at minimum, can benefit from the usage of Hybrid tracking technologies and with the advent of Machine Vision using AI now available, they will realize a dramatic increase in operational speed and accuracy.

### Technical Maturity/Demonstration Results

The system shown in our video was installed in a tier 1 CPG distribution center on December 5th, 2023, and has already processed 1.5 M cartons. The typical manual audit of a cart of cartons took approximately 1 minute (with errors). The Vision and RFID solution takes 4 seconds to report any anomalies. The (rough) video link is provided to show this solution consisting of the Vision System and then Reconciliation where issues are resolved. Venture Research has >20-year history of developing these solutions and they are all made in America (TAA compliant) in our manufacturing center in Plano Texas. We have shipped our products to 26 countries.



OTHER

# Viaanix, Inc

## Aggregated/Integrated End-to-End IoT Solutions

### Contact

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Video: <https://youtu.be/0CQBAocxLLA>

### Problem Statement

The US Army faces challenges in digital transformation across its operations:

- Seamless interoperability between diverse systems.
- Secure data integration across cloud/on-site settings.
- Vendor lock-in avoided, improving operational agility.
- Existing solutions may lack the flexibility to adapt to changing technologies and requirements, leading to inefficiencies and increased costs.

### Transformation Solution

Our IoT platform and advanced digital solutions are designed to empower the US Army, DOD, and DLA, with digital agility, interoperability, and efficiency. VX-Olympus platform is a robust cloud-enabled backend system that securely integrates various tools/data streams—from equipment sensors to production and monitoring systems. Combined with AlertMate and TrackMate, Viaanix enables real-time monitoring, tracking, and analytics of assets both indoors/outdoors—all critical to readiness and efficiency. The secure and modular architecture enables seamless integration with existing DOD systems and multi-cloud environments, providing flexibility and eliminating vendor lock-in. Our API-driven platform can securely connect various enterprise tools, manage equipment data, and monitor advanced manufacturing processes. Finally, our solution offers on-demand remote monitoring and secure telemetry from sensors deployed across equipment and infrastructure, further improving asset control.

### Benefits to the Army

- Ability to monitor, control, & optimize equipment performance & infrastructure in real-time.
- API-driven platform offers flexibility to integrate current Army tools/software-no vendor lock-in.

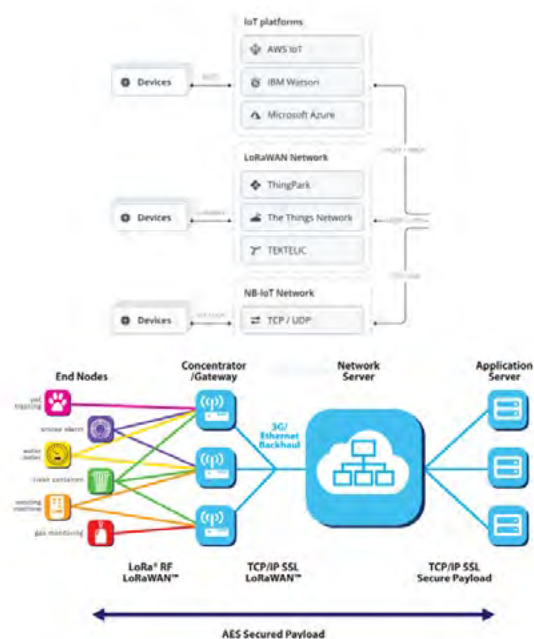
- Compatible with multi-cloud environments, ensuring scalability & maintaining security protocols.
- Easy integration for 3D printing capabilities w/ universal & seamless data exchange.
- Cost-effective, ready-to-deploy platform that connects the Army into a digitally agile force.

### Expected Challenges

Resistance to change, integration with legacy systems, and ensuring compliance with strict security protocols without compromising usability will require coordination with Army IT and operations teams.

### Technical Maturity/Demonstration Results

Our demonstrated robust platform with leading enterprises shows our ability to deploy scalable IoT solutions across complex environments. Our TrackMate solution for indoor/outdoor tracking and AlertMate platform for asset monitoring offer real-time analytics and secure telemetry that aligns with DOD needs. Our solutions are currently integrated into mission-critical systems, providing real-time visibility into operations across multiple environments.



## OTHER

# WPI Services, LLC DBA Systecon North America

## Dynamic Optimization for Enhanced Mission Readiness and Cost Efficiency: Leveraging the Opus Suite for Army Digital Engineering Transformation

### Contact

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Video: <https://player.vimeo.com/video/1020788986?h=6b6c178b96>

### Problem Statement

The Army faces a critical challenge in fully leveraging its vast data stores for optimal decision-making in mission planning, sustainment, and cost management. Existing tools are limited in handling the complex interplay of system reliability, maintenance, logistics, and operational constraints, particularly in dynamic, real-time scenarios. Without a more flexible, data-driven solution, the Army cannot effectively balance readiness with cost control, leading to inefficiencies in system performance, manpower allocation, and resource optimization.

### Transformation Solution

The Opus Suite, a comprehensive digital engineering solution, revolutionizes Army decision-making by integrating advanced simulation, optimization, and life cycle cost (LCC) analysis. It includes three primary components:

- OPUS10: Optimizes spare parts and maintenance strategies to ensure operational readiness.
- SIMLOX: Simulates mission performance using discrete event modeling, predicting system behavior under various conditions to optimize readiness.
- CATLOC: Provides detailed LCC analysis, giving ability to weigh costs over a system's life cycle to balance mission needs and long-term sustainability.

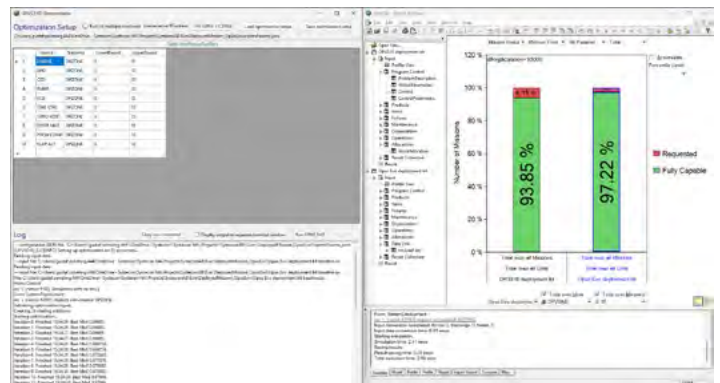
The real breakthrough lies in Opus Evo, which integrates evolutionary algorithms, specifically differential evolution, within a simulation framework. Opus Evo enables real-time, multi-variable optimization of operational strategies, resource allocations, and maintenance schedules. Unlike traditional tools that focus on steady-state scenarios, Opus Evo dynamically

adjusts to real-world conditions, optimizing both readiness and cost simultaneously. This innovation brings a new level of precision and adaptability to Army digital engineering, allowing simulation and optimization of resource usage based on evolving mission requirements.

### Benefits to the Army

The Opus Suite and Opus Evo offer substantial benefits that directly enhance the Army's operational efficiency:

- Improved Mission Readiness: By optimizing spare parts and maintenance schedules dynamically, the solution ensures that critical systems maintain high operational availability across various mission scenarios.
- Cost Efficiency: The Suite identifies the most cost-effective strategies for resource allocation, sparing the Army from unnecessary expenses, while optimizing long-term sustainment.
- Reduced Cycle Time and Manpower Needs: The simulation-driven approach reduces decision-making cycles, enabling faster adjustments to mission-critical plans and reducing the need for excess manpower and oversight.
- Cross-Service Applicability: The Opus Suite's flexible, domain-model-based structure makes it easily adaptable for other service branches, including the Air Force, Navy, Marine Corps, and Defense Logistics Agency (DLA), enabling wide applicability across the Department of Defense (DOD).



## SECURITY PROTOCOLS

# Phillips Corporation

## Smart Factories – A Proposed Framework for Enhancing DOD’s Operational Efficiency, Data Interoperability, and Force Readiness with Secure, Rapid, Part Production Capabilities and Future Digital Marketplaces

### Contact

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Video: [https://www.dropbox.com/scl/fi/lak7caf6ub747clfcyogs/Army-DTC-Demonstration-TrustedDM.](https://www.dropbox.com/scl/fi/lak7caf6ub747clfcyogs/Army-DTC-Demonstration-TrustedDM.mp4?rlkey=owox738qp9zvckpsjrr0ycfi&st=o61e2sjv&dl=0)

[mp4?rlkey=owox738qp9zvckpsjrr0ycfi&st=o61e2sjv&dl=0](https://www.dropbox.com/scl/fi/lak7caf6ub747clfcyogs/Army-DTC-Demonstration-TrustedDM.mp4?rlkey=owox738qp9zvckpsjrr0ycfi&st=o61e2sjv&dl=0)

### Problem Statement

Supply chains today have inherent bottlenecks and struggle to meet the dynamic production demands of the US Army.

### Transformation Solution

We propose leveraging the Phillips Center of Excellence at Rock Island Arsenal to demonstrate distributed digital manufacturing (DDM) capabilities, helping US Army transition from a linear supply chain to a supplier network of interconnected small & medium businesses (SMBs). AURA Technologies’ platform can secure distributed production and ensure quality & traceability of physical parts, by protecting digital data consumed and produced during manufacturing. TrustedDM enables STIG/SRG compliance & sustainment for each Operational Technology “node” in a digital supply network, allowing US Army facilities & SMBs to connect, protect, and collect data (OT = CNC machine, Additive Manufacturing (AM), Robot, PLC, or other industrial plant equipment).

### Benefits to the Army

TrustedDM delivers Data-as-a-Service/Compliance-as-a-Service (DaaS/CaaS) capabilities, by putting an appliance compatible with Federal Information Systems (FIS or “IT”) – allowing direct connections between OT and IT networks (e.g., Joint All-Domain Command & Control [JADC2]). Connected machines allow the creation of shared digital marketplaces (to be owned by the DOD and operated by a neutral arbiter, such as Defense Logistics Agency (DLA) or similar).

Ensuring proprietary data remains protected, and royalty payments are tracked and remitted to data authors/owners, incentivizes companies to make their IP data available to US Army, for maintenance, repair, and overhaul (MRO) operations.

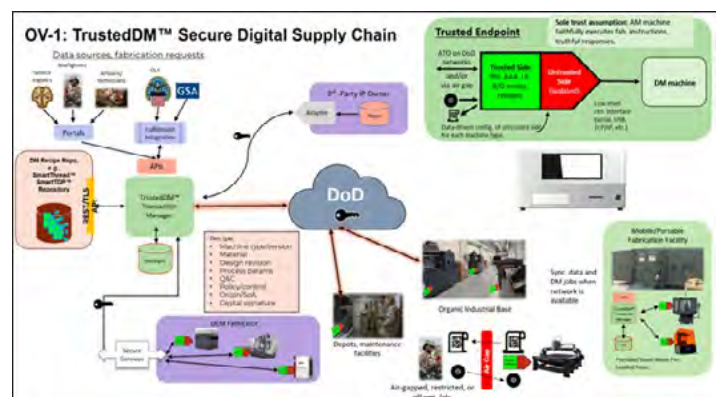
Successful demonstration of DDM concept encourages OEMs and SMBs to adopt advanced manufacturing technologies (AM, 5-Axis, Mill-Turn, etc.), democratizes MRO production, ensures redundancy & resiliency of supplier networks, and can eliminate single points of failure in existing supply chains.

### Expected Challenges

- Initial technology investment required by SMBs to become qualified suppliers and to connect OT to DDM marketplaces.
- Potential cultural resistance to embracing a new manufacturing paradigm.
- Requirements conflicts (e.g., lack of published and adopted AM material, process, and quality standards).

### Technical Maturity/Demonstration Results

TrustedDM is between technical readiness level (TRL) 8 and TRL 9. The hardware is in low-rate initial production (LRIP), has received UL safety certification, and we have obtained conducted and radiated electromagnetic emissions (EMI/EMC) certifications.





Contact

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Video: [https://drive.google.com/file/d/1Kvz7X7k\\_wbThjjm8oc1rJGh9I6-ELQ5e/view?usp=sharing](https://drive.google.com/file/d/1Kvz7X7k_wbThjjm8oc1rJGh9I6-ELQ5e/view?usp=sharing)

Problem Statement

Digital Engineering (DE) models are critical for developing and simulating complex systems, making their security and integrity essential. Unauthorized modifications could compromise decisions based on these models. This proposal outlines a system designed to ensure the security of DE models by providing tamper-proof protection and a verifiable history of all modifications.

Transformation Solution

The proposed system integrates blockchain technology, cryptographic hashing, and digital signatures to safeguard DE models. The blockchain serves as an immutable ledger, recording every change made to a model. Each block contains essential metadata like user, timestamp, and cryptographic hash, creating a tamper-proof audit trail. Cryptographic hashing ensures model integrity by generating a unique digital fingerprint (SHA-256) to detect unauthorized changes. Digital signatures authenticate users, ensuring that only authorized individuals can modify DE models.

The system incorporates role-based access control (RBAC) and encrypted communications to securely manage permissions and data sharing across stakeholders. RBAC controls access based on user roles, ensuring only authorized personnel can modify or view models. TLS encryption protects data in transit from interception or tampering. A prototype of the system will be built within the Azure Gov cloud environment.

The system is a private, permissioned blockchain built on Hyperledger Fabric, using a Byzantine Fault Tolerant consensus mechanism to validate transactions.

Cryptographic hashes are stored in each block to ensure unauthorized changes are detectable by comparing hashes. Each user has a public-private key pair for digital signatures. Changes are signed with the private key, and signatures are stored in the blockchain. RBAC controls access, while TLS encryption secures communications.

Benefits to the Army

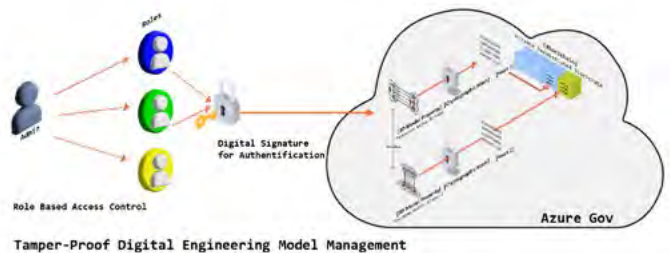
The system enhances security, traceability, and integrity of DE models for the Army. Blockchain provides an immutable audit trail for every change, while cryptographic hashing and digital signatures verify model integrity and authenticate users. RBAC and encrypted communications ensure sensitive information is shared securely among authorized personnel. Deploying this system in the Azure Gov cloud will allow the Army to safeguard DE models.

Expected Challenges

Key challenges include scalability due to blockchain consensus overhead, latency during model updates, and the complexity of integrating blockchain with existing DE platforms. Secure key management and user adoption are critical hurdles. Additionally, secure communications in Azure Gov must meet regulatory requirements.

Technical Maturity/Demonstration Results

The system is currently at Technology Readiness Level (TRL) 2, with the goal of advancing to TRL 3 by developing a proof-of-concept as part of the project.



## Aptima, Inc

# IRONPIPE with RAG Capabilities: Revolutionizing Army Digital Transformation with IoT and Generative AI



### Contact

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### Problem Statement

The IRONPIPE platform, developed by Aptima, is an IoT-based, cloud-integrated system designed to address digital transformation challenges in distributed operational environments. Originally developed for the Department of Navy, IRONPIPE provides real-time situational awareness by consolidating data from environmental, human, and machine sensors into a unified Common Operating Picture (COP). This enables rapid decision-making, efficient resource allocation, and enhanced safety.

### Transformation Solution

Building on this foundation, our latest innovation—Retrieval Augmented Generation (RAG)—introduces generative AI capabilities to the IRONPIPE platform. RAG allows users to automatically generate actionable reports on-demand based on real-time data collected from IRONPIPE sensors. This eliminates the need for manual data analysis and report generation, providing critical insights on personnel, equipment, and environmental conditions. RAG supports both automatic and user-driven report generation, thereby enhancing operational efficiency.

### Benefits to the Army

IRONPIPE with RAG significantly improves the Army’s digital agility by streamlining operations, reducing decision-making time, and minimizing manual reporting efforts. It supports Army digital transformation efforts by integrating multi-modal data from distributed sensors, ensuring that commanders have the information needed for effective decision-making. Additionally, IRONPIPE’s cloud architecture enables scalable deployment across various facilities, making it applicable to multiple operational scenarios.

### Expected Challenges

The primary challenge lies in ensuring interoperability with the Army’s existing systems while maintaining security and avoiding vendor lock-in. To address this, IRONPIPE utilizes open standards and flexible API integrations, allowing it to be deployed in a variety of cloud environments and to interact seamlessly with existing DE tools.

### Technical Maturity/Demonstration Results

IRONPIPE has been successfully demonstrated in Navy and Marine Corps depots and has shown significant improvements in operational efficiency, safety, and situational awareness. The platform’s maturity is evidenced by its deployment-ready architecture and its ability to support real-time data aggregation, monitoring, and decision support. Our RAG AI technology is currently in advanced development, with early prototypes successfully generating reports in real-time based on live sensor data. The combined solution is poised to offer transformative improvements to Army operations, supporting digital transformation goals with high technical readiness.

### Conclusion

This submission showcases our solution’s potential to meet the Army’s need for advanced, scalable digital engineering capabilities while ensuring open tool selection and secure, flexible cloud integration.



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Video: <https://youtu.be/L8ZE09Ku22o>

## Problem Statement

Digital engineering has changed the way the engineering community operates; however, it has also had an impact on the research, requirements, acquisition, test, cost, sustainment, and intelligence communities. All the digital tools and models within these communities are required to interface with each other and exchange data. However, these individual systems, developed independently by disparate companies or organically, typically do not interface with each other very easily. This creates information gaps that are predictably filled with paper documents and manual effort, defeating the purpose of the digital enterprise.

## Transformation Solution

AURA's SmartThread™ is a suite of applications that bridge the gaps between the multiple digital tools and models, allowing the seamless storage and sharing of key product information across the digital enterprise and throughout the lifecycle of the product. SmartThread specifies standardized naming and semantics for each data element (metadata, files, etc.) as well as the digital encoding and packaging of the data package itself to create an accessible single source of truth data set.

More than a standard file folder structure, SmartThread enables compartmentalization and sharing of standardized engineering data from heterogenous engineering tools without forcing the tools to change their data formats. With the ability to segregate and separate data within a particular file, this single, curated, standardized, global view and interface makes it possible to develop complimentary applications such as workflow management and intelligent data search, enabling secure digital data and manufacturing supply chains.

## Benefits to the Army

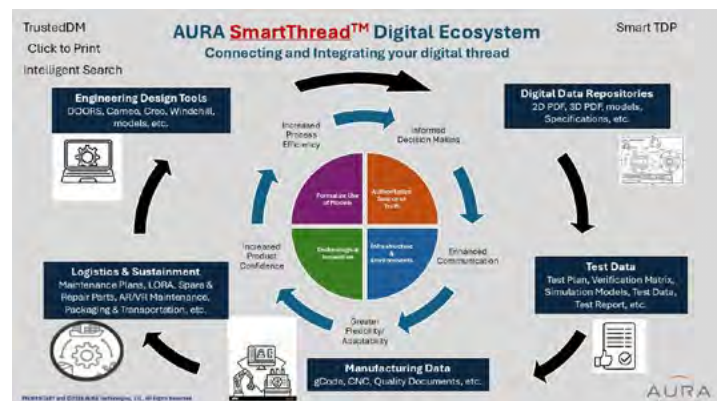
SmartThread empowers a paradigm shift from the traditional design-build-test methodology to a model-analyze-build methodology, enabling Army programs to prototype, experiment, and test in a virtual environment before they are delivered to the warfighter. Key data is stored and shared with verified single source truth so that all members of the product community have collaborative and enduring access. SmartThread can be applied to all Army or DOD programs. Because it runs on existing authorized infrastructure or is cloud based, no separate ATO is required.

## Expected Challenges

Although SmartThread will work with any data source that can export data, metadata may have unique aspects that will have to be considered, particularly with organically developed tools and models. SmartThread is designed to handle discrepancies in metadata construct, however upfront effort may be required to code SmartThread to handle unique situations.

## Technical Maturity/Demonstration Results

SmartThread is primarily a software platform based on industry standards such as JavaScript Object Notation (JSON) with a simple Graphical User Interface (GUI). It has been demonstrated in a lab environment with a subset of engineering tools.



## TOOL INTEROPERABILITY

# EXPANSIA Group, LLC

## SEEKR – Digital Transformation Enabler and Automated AM Part Selection Solution by EXPANSIA

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### Contact

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### Problem Statement

The warfighter faces strained parts availability due to vanishing supply bases and difficulty identifying and implementing a digital sustainment pathway. Lack of supply chain visibility at the program level leads to broken supply chains, decreased weapon system and vehicle availability, and increased supply chain risk.

### Transformation Solution

EXPANSIA has developed a powerful, cloud-hosted, predictive analytics & machine learning software solution—SEEKR—which helps DOD programs predict supply chain gaps and implement a trusted additive manufacturing (AM) program, identifying and selecting critical parts for AM and systematically eliminating the warfighter’s most critical supply chain issues.

SEEKR is an innovative, digital transformation solution that enables AM capabilities by utilizing commercially certified printing processes, methods, and procedures, allowing full use of developed material processing information and repeatability. SEEKR’s agnostic design features a scalable and modular database that can integrate with any data system, regardless of platform, organization, or service.

SEEKR fills gaps left by a shrinking supply base, increases aircraft and vehicle availability, and provides a digital warehouse for low demand parts with print-on-demand capability, reducing lead times from years down to weeks. SEEKR also implements a methodical AM integration and parts qualification process that fosters engineering trust by improving current engineering practices related to cost, necessary manpower, and readiness.

### Benefits to the Army

SEEKR mitigates parts obsolescence and saves thousands of manual labor hours. By consolidating and cleaning up disparate databases, SEEKR implements digital material management (DMM) and allows program platforms to provide higher utility and efficiency for AM, supply chain modernization, and DMM initiatives. SEEKR provides both granular and holistic visibility into supply chains for efficient management. It calculates a ‘readiness impact score’ to allow organizations to focus on the highest part priorities.

### Expected Challenges

The current state of Army data and how ready and reliable it is for consumption will be a challenge for a digital enterprise solution. However, using ETL techniques for a flexible data loader feature, SEEKR can consume and process the Army’s data.

### Technical Maturity/Demonstration Results

SEEKR is currently integrated into an ATO-accredited platform and functions within USAF CloudOne’s security infrastructure, meeting RMF cybersecurity requirements. On an existing USAF contract, EXPANSIA utilizes SEEKR to assess over 6,000 different Air Force parts. We have identified approximately 900 parts viable for AM, specifically affecting the B-1, B-52, E-3, and KC-135 aircraft. We are prioritizing these parts candidates to create AM variants for near-term projects.







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Video: [https://drive.google.com/file/d/1Zw\\_gT5yBu1SEh3PluHXrldnf91OTOe8o/view](https://drive.google.com/file/d/1Zw_gT5yBu1SEh3PluHXrldnf91OTOe8o/view)

## Transformation Solution

SBE Vision embarked on the development of an enterprise-class interoperability solution, culminating in the launch of the SBE Digital Thread Platform (SBE Platform) in 2017. Engineered to manage large-scale data through advanced cloud-based technology and a distributed architecture, this platform has been widely embraced by early industry leaders.

A defining feature of the SBE Platform is its cloud-agnostic deployment capability, which allows it to operate in on-premise, cloud, or hybrid environments. In addition to this flexibility, the platform's innovative hub-and-spoke model enables the traceability and auditability of data across the digital engineering ecosystem (DEE).

## Benefits to the Army

By employing an ontology-based approach, SBE Vision enables seamless data integration across a variety of engineering applications, including, but not limited to Requirements Management, System Architecture, PLM, Simulation, and CAD tools. As the needs of the DEE evolve, and additional tools are integrated, data is transformed between tools without requiring constant updates to individual connections. Users are also empowered to design adapters for legacy or custom-built systems, thereby fostering a collaborative and cohesive environment across the enterprise.

Ontologies—standardized representations of data—play a crucial role in this process, as they provide a human-readable format that simplifies data management. By utilizing a unified language for diverse data, the

digital thread makes it easier for engineers to work with complex information within the confines of their individual tool, reducing cognitive load and supporting innovation.

The creation of the DEE powered by the SBE Digital Thread provides end-to-end traceability, giving management the assurance that all design requirements are met. With intuitive dashboards and deep analytical capabilities, the platform empowers users to gain comprehensive insights into product design and performance.

## Technical Maturity/Demonstration Results

As SBE Vision continues to enhance its platform and expand support for more engineering applications, it aligns its development with customer needs and frameworks like the Department of Defense's Digital Engineering directive. From product conception to manufacturing, the platform's deep analytical capabilities drive process and product improvements. Committed to delivering a best-in-class digital thread solution, SBE Vision remains agile and responsive to evolving market demands.





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