STP

NAVY SBIR TRANSITION PROGRAM

West 2023 Navy Innovative Technology Showcase

Technology Guide

STP — NAVY SBIR TRANSITION PROGRAM

At WEST 2023, Navy STP will showcase 27 projects at the Navy STP Innovative Technology Showcase booth (#1709) in the main conference exhibition hall. 13 projects will be displayed on 14 February giving participants a chance to meet the experts one-on-one while the next 14 projects will be displayed the next day on 15 February.

Featured SBIR/STTR Technologies at the Navy STP Showcase

14 February:

- Advanced Electronics (3 Projects)
- Autonomy (1 Projects)
- C4I (6 Projects)
- Electronic Warfare (1 Project)
- Human Systems (2 Projects)

15 February:

- Battlespace Environment (1 Project)
- Ground and Sea Platforms (5 Projects)
- Materials and Manufacturing (2 Projects)
- Sensors (4 Projects)
- Sustainment (1 Project)
- Weapons Technology (1 Project)

Quad Chart Index

Company	Topic	Project Title	Tech Category
Altron, Inc.	N19A-T012	Unified Logging Architecture for Performance and Cybersecurity Monitoring	Ground & Sea Platforms
Applied NanoFemto Technologies LLC	N20A-T012	Electromagnetic Interference (EMI) Resilient, Low Noise Figure, Wide Dynamic Range of Radio Frequency to Photonic (RF Photonic) Link	Sensors
BANC3, Inc	N201-024	Augmented Reality Headset for Maintainers	Human Systems
Calabazas Creek Research, Inc.	N20A-T015	Compact and Efficient Magnetron Source for Continuous Wave Microwave Power Generation	C4I
Caliola Engineering LLC	N193-149	Satellite Communications Antenna Pointing for Positioning (SCAPP)	Ground & Sea Platforms
Colorado Engineering Inc.	N141-053	Compact High Speed Signal Processor	Ground & Sea Platforms
Colvin Run Networks, Inc.	N204-A02	Digital Logistics	Sustainment
Cornerstone Research Group, Inc.	N192-084	Room Temperature Shelf-Life Pre-Impregnated Carbon Fiber Fabric for use in Out-of-Autoclave Aircraft Repair	Materials & Manufacturing
Gloyer-Taylor Laboratories INC	N201-048	MK 48 Torpedo Composite Fuel Tank	Weapons Technologies
Hedgefog Research Inc	N193-147	Multi-Band Laser Source for Atom Interferometry	Sensors
IERUS Technologies, Inc.	N201-079	Extremely Accurate Star Tracker	Advanced Electronics
Innovative Defense Technologies	N191-020	Target Identification Interrogation Data Stream Analytics System	C4I
Inovati	N07-122	Method and Device for In-Service Repair of Magnesium, Aluminum and High-Strength Steel	Materials & Manufacturing
Knowledge Based Systems, Inc.	N202-098	Voice Recognition to Support Assessment of Cross Platform Situational Awareness and Decision Making	Human Systems
Machina Cognita Technologies, Inc	N201-077	Machine Clustered and Labeled Decision Tracks Derived from AI-enabled Intent Recognition	Autonomy
Makai Ocean Engineering, Inc.	N192-109	Undersea Sensor Network Performance Modeling and Cost Tool	C4I
MaXentric Technologies LLC	N192-090	Modern Forward Error Correction (FEC) and Automatic Repeat Request (ARQ) Algorithms for Tactical Data Links	Advanced Electronics
Mayachitra, Inc.	N20A-T007	Cross Platform Reinforcement and Transfer Learning for Periscope Imagery	C4I
McCormick Stevenson Corp.	N192-102	Blind Mating Connection for 19-inch Electronic Industries Alliance Racks in AEGIS Computing Infrastructure	C4I
Metamagnetics, Inc.	N192-078	Network Retention During Jamming Mission	Electronic Warfare (EW)
Physical Sciences Inc.	MDA14-001	Secure and Survivable Electronics and Software	Sensors
Physical Sciences Inc.	N141-053	Compact High Speed Signal Processor	C4I
Ryalinks LLC	N204-A02	Digital Logistics - AI Enabled Sensor Logistics Network (AIESLN).	Advanced Electronics
Spectral Energies, LLC	N20A-T020	Non-intrusive Diagnostics to Quantify Interactions between High-speed Flows and Hydrometeors	Ground & Sea Platforms
Trident Systems Incorporated	N192-103	Field Serviceable Non-Acoustic Data Logging Sensor Module for Towed Arrays	Ground & Sea Platforms
Voss Scientific, LLC	N181-075	Navy-Electronic Battle Damage Indicator (eBDI) Tool for Non-Kinetic High-Power Radio-Frequency (RF) Engagements	Sensors
WindBorne Systems Inc.	AF193-CSO1	Long Duration Global Sounding Balloon for In Situ Weather Observations in Remote Areas	Battlespace Environment

Advanced Electronics
(Navy STP Booth: 14 February)

Company	Topic	Project Title	SYSCOM
MaXentric Technologies LLC	N192-090	Modern Forward Error Correction (FEC) and Automatic Repeat Request (ARQ) Algorithms for Tactical Data Links	NAVAIR
Ryalinks LLC	N204-A02	Digital Logistics - AI Enabled Sensor Logistics Network (AIESLN).	ONR
IERUS Technologies, Inc.	N201-079	Extremely Accurate Star Tracker	SSP

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NAVAIR SPR Number: 2022-845

Topic # N192-090
Modern Forward Error Correction (FEC) and Automatic Repeat Request (ARQ) Algorithms for Tactical Data Links
MaXentric Technologies LLC

WHO

SYSCOM: NAVAIR

Sponsoring Program: PEO(T)/PEOC4I - PMA101/PMW101

Transition Target: technology is desired for transition with a start in FY23 and a potential full release in FY25. The platform would be F/A-18s, E/A-18Gs, E-2Ds and PMW-150 surface afloat platforms.

TPOC: (619) 524-1582

Other Transition Opportunities: In the future there maybe applicability to other radio families.

Notes:

WHAT

Operational Need and Improvement: Many current FEC implementations are offered only in packages that utilize a large portion of FPGA resources. These solutions are often considered bulky while being limited on the capability to optimize usage of the channel. Maxentric's solution addesses these concerns while offering the capability to scale for future improvements.

Specifications Required: Improve channel effeciency under variable conditions while minimizing the utilization of valuable resources and maintaining latency/throughput requirements.

Technology Developed: Maxentric has developed a practical implementation of Polar Codes FEC that reduces utilization of valuable resources while meeting/exceeding existing performance metrics.

Warfighter Value: Improve communication performance for lower SNR environments while maintaining LPI/LPD specs.

WHEN

Contract Number: N68335-21-C-0147   **Ending on:** Apr 06, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Establish Matlab Simulation of Polar Codes FEC	Medium	Matlab Simulation	3	2nd QTR FY21
Analyze Polar Code Performance in Harsh Environments	Medium	Matlab Simulation	3	2nd QTR FY21
Develop bit-accurate RTL Model	Medium	RTL Simulation	4	3rd QTR FY21
Transceive Loopback Demo	High	Hardware Demo	5	1st QTR FY22
Matlab Integration w/ Prime Simulation	Medium	Matlab Integration	6	TBD
RTL Integration w/ Prime Simulation	Medium	RTL Integration	6	TBD
HW Integration	Medium	Functional HW demo	7	TBD

HOW

Projected Business Model: Package our poduct solution suitable for distrubatable IP license agreements

Company Objectives: Our goal is to work with customers and primes to inject the proposed solution into multiple target radio platforms.

Potential Commercial Applications: Our solution is generally applicable to many wireless communication solutions that operate in low SNR environments (IoT, etc)

Contact: Dylan Vizcarra, Design Engineer
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ONR Approval #DCN# 43-10519-22

Topic # N204-A02
Digital Logistics - AI Enabled Sensor Logistics Network (AIESLN).
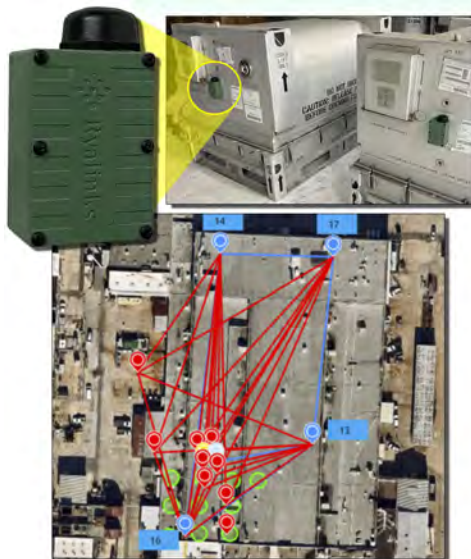Ryalinks LLC

WHO

SYSCOM: ONR

Sponsoring Program: ONR

Transition Target: NAVAIR/NAVSUP

TPOC: Woei-Min Lin
woei-min.lin@navy.mil

Other Transition Opportunities: - Joint Logistics Board
- US Army (Aviation) - T700 Engine Container tracking and analysis
- US Air Force
- Oil & Gas Industry for Emission Measurements as well as Telemetry for Stripper Wells
- Fire Agencies for wildfire management, specifically for planning and execution of prescribed fires
- Electric Utility companies for monitoring infrastructure to enable Predictive Maintenance

Notes: This is a visualization of the mesh network during test and evaluation in the NAS North Island
The blue nodes are modules creating the mesh.
The red nodes are the Ultra Low Power sensors attached to the T700 engine cans and placed in challenging positions in the warehouse/shop.
The yellow node is the back haul node that is communicating data back to the cloud.
This test was replicated aboard the USS Carl Vinson in Hangar Bay 3 - June 2022.

Ryalinks 2022 - Resilient ML-driven mesh network testing at North Island AIMD "Jet Shop"

WHAT

Operational Need and Improvement: The US Department of Navy (DON) is seeking to evolve the complex logistical support needs of a system that could be made remote and inaccessible by external events (e.g. health emergencies, natural disasters, wartime). The ultimate goal is to provide logistics transparency which will, in turn, improve operational efficiencies, save costs, and improve readiness.

Specifications Required: In order to address these needs, systems comprising three types of capabilities would be necessary: 1) real-time data acquisition of critical equipment and platforms, both before and during operation. 2) The robust and real-time delivery of such data in remote and fragile environments 3) The real-time processing of this data enabling intelligent decision making

Technology Developed: Ryalinks has developed a highly resilient Machine Learning driven mesh network solution designed to operate in remote and fragile environments. Over the course of two phases of SBIR, expanded the platform to include Ultra-Low Power sensor nodes specifically designed to work with Navy platforms (such as the T700 Engine Can), as well as the ability for the ML algorithms to perform Predictive Diagnostics prior to a fault arising, operating with little or incomplete data.

Warfighter Value: Reduced costs, increased readiness, and improved lead times to accomplish our missions.
Reduced costs: Instrumenting jet engine containers will:
- Significantly reduce the man hours required and increase the number of engines that 'RFI' engines are produced. Man-hours that were previously used to perform daily engine container inspections and 28-day repackaging efforts, can be reapplied to production.
- Significantly reduce the man hours required to account for condition of jet engines in storage.
- Instrumenting ground support equipment will enable Ground Support equipment to be more effectively deployed in support of squadrons. Adequate numbers of Jack stands, tow tractors, gas carts, and all manner of GSE will be more effectively accounted for and managed.
The increased readiness: Increased availability of RFI engines will ensuring greater readiness.
Improved lead times: The mesh network will deliver data to the Naval Autonomous Data Collection System (NADACS). This data will provide the means to employ a variety of AI systems to improve forecasts enabling procurements to be executed with greater accuracy and earlier execution of contracts for a variety of spares.

WHEN

Contract Number: N68335-21-C-0285   **Ending on:** Sep 26, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstrate the ability to perform effective predictive maintenance through simulation	High	Successfully demonstrated based jet engine data provided by NASA	4	4th QTR FY20
Test end to end system for an USN T700 Engine Can in a simulated environment	Medium	Successfully demonstrated on a pressurized T700 engine can in a test environment (i.e., non-Navy warehouse)	5	3rd QTR FY21
Test end to end prototype system on actual USN Engine Cans in a operational environment	High	Successfully demonstrated prototype full system on USN T700 engine cans in the NAS North Island AIMD	6	1st QTR FY22
Test end to end system on pre-production hardware connected to actual Engine Cans	High	Successfully performed multi-day test of the entire resilient ML-driven mesh network at NASNI AIMD	7	2nd QTR FY22
Test and the demonstrate the end-to-end pre-production system operating in a shipboard environment (USS Carl Vinson)	High	Successfully demonstrated real-time capture and communication of location/sensor data in GPS denied environment without other connectivity	7	3rd QTR FY22

HOW

Projected Business Model: Ryalinks will leverage the core technology developed throughout this SBIR to develop custom verticalized solutions for various government agencies. Ryalinks plans on licensing the IP and partnering with a prime contractor for the manufacturing of the hardware sensors used in the system. The back-end software will be developed and managed by Ryalinks and delivered to DON based on a Software as a Service (SAAS) model.

Company Objectives: The ultimate objective is to improve maintenance and logistics efficiencies for various DOD segments by significantly improving transparency in the location and health of equipment with the ultimate goal of improving readiness while reducing costs. Ryalinks' technology is unmatched in the marketplace and we intend we leverage our capabilities of low-powered wireless sensors, as well as Machine Learning on the edge with limited data sets to solve targeted problems that require real-time decision making particularly in remote and fragile environments.

Potential Commercial Applications: The technology and solution developed by Ryalinks could be directly beneficial to Commercial Airlines, Oil and Gas Industry, and Utility companies. Preliminary discussions with the Oil & Gas Industry has validated the interest in the product.

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12/14/2022

Topic # N201-079
Extremely Accurate Star Tracker
IERUS Technologies, Inc.

WHO

SYSCOM: SSP

Sponsoring Program: Trident II (D5) ACAT I

Transition Target: Trident II (D5) weapons system

TPOC: SSP.SBIR@ssp.navy.mil

Other Transition Opportunities: The star tracker may be used for astronomical data collections (including measures of stellar photometry, variability, and astrometry) that are used by the Navy such as the Naval Observatory.

Notes: IERUS has supplied hardware components to Raytheon Missiles & Defense for the Lower Tier Air and Missile Defense Sensor (LTAMDS) program. The LTAMDS is a new, next-generation radar designed for the U.S. Army's Integrated Air and Missile Defense system.

https://media.defense.gov/2021/Sep/18/2002857201/-1/-1/0/210917-N-JS726-0148.JPG
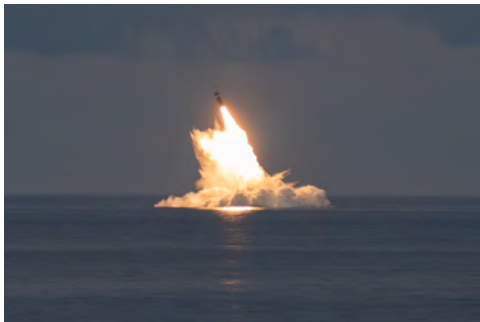
WHAT

Operational Need and Improvement: Current commercial star trackers' size, weight, and power (SWaP) needs preclude the Navy from considering deploying these star trackers to the Trident II weapon system. Acquisition of an accurate, low-weight, small, and power-efficient star tracker would allow strategic weapon systems to be deployed with less expensive maintenance cost while also providing weapons system designers options to increase weapon system performance with less expensive hardware cost and maintenance. Furthermore, the new developed star tracker could assist in exo-atmosheric astronomical data collections needed for Navy, DoD and other commercial utility.

Specifications Required: The innovation needs to leverage already developed techniques by NASA JPL into a hardware electronics instruments package that is portable for missile and spacecraft environments. The Navy expects the star tracker to be no bigger than 64 cubic inches, weigh no more than 500 grams, and powered for at least two hours, and that new technology will demonstrate calibration of star tracker focal planes up to 100 times more accurate than current commercial capability. The star tracker will be expected to interface with navigation systems that will be matured through the proposal cycle. Power range for the star tracker should be 5W, or under, of navigation system power.

Technology Developed: The technology is a focal plane metrology technique developed by the NASA Jet Propulsion Lab (JPL) that enables the location of pixels in a focal plane array to high precision combined with a precision telescope that measures the the location of stars on the focal plane to better than 100 milli-arc-seconds. The system is capable of detecting a sufficient number of stars to calculate its orientation over >99% of the celestial sphere.

Warfighter Value: The extremely accurate star tracker enables the precision attitude determination for space vehicles; it is anticipated to result in a greater than two orders of magnitude increase in accuracy to many of todays COTS star trackers.

WHEN

Contract Number: N68335-22-C-0840   **Ending on:** Jul 31, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Original Development	High	FPA Calibration	3	3rd QTR FY0
Adaptation to Star Tracker	Medium	FPA Calibration	3	4th QTR FY21
Breadboard Prototype	Medium	System Calibration	7	3rd QTR FY23
Brassboard Prototype	Low	System Calibration	7	1st QTR FY25
Pre-production Prototype	N/A	System Performance	8	3rd QTR FY25

HOW

Projected Business Model: IERUS is a growing, technology-focused business established in the area of engineering, research, and development. We have experts in Electromagnetics Phenomenology, Analytical Computing, and Weapon System Engineering under one roof that have provided our customers with quality, novel solutions over the past decade.

We will deliver to NSWCDD/USNO a refined star tracker manufacturing prototype that the Navy can test for its function and portability in their land-based HWIL testing facilities. In addition we will provide design and test cases that demonstrate that the star tracker's accuracy is 100 times current technology (based on JPL's techniques); and is small, lightweight, and portable. IERUS will assist the Navy in setting up the star tracker manufacturing prototype for Hardware-in-the-Loop (HWIL) testing that emulates missile and space craft environments; and will include trouble shooting plus resolving implementation and execution issues. IERUS plans to support field qualification testing with Navy hardware and software applications.

Company Objectives: We seek to meet/speak with those that are interested in q star tracker (using interferometery fringe methodology developed by NASA's Jet Propulsion Laboratory (JPL)) that is extremely accurate, light weight and consumes little power as compared to current commercial products.

Potential Commercial Applications: The market for high accuracy star trackers is anticipated to increase in parallel with the continuing acceleration of the utilization of space. This product would support commercial aerospace space navigation, telescope pointing and tracking.

Contact: Stephen Fox, PI/PM Optical Innovation Cell
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| Company	Topic	Project Title	SYSCOM
Machina Cognita Technologies, Inc	N201-077	Machine Clustered and Labeled Decision Tracks Derived from AI-enabled Intent Recognition	ONR

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ONR Approval #DCN#43-10531-22

Topic # N201-077
Machine Clustered and Labeled Decision Tracks Derived from AI-enabled Intent Recognition
Machina Cognita Technologies, Inc

WHO

SYSCOM: ONR

Sponsoring Program: Office of Naval Research

Transition Target: Marine Corps Command and Control (MC3)

TPOC: Jeffrey Bolkhovsky
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Other Transition Opportunities: Maritime Tactical Command and Control, Naval Autonomous Systems

Notes: Military leadership has transitioned from prescribed tasking to a concept of Mission Command and Commander's Intent to enable faster response and higher levels of mission effectiveness. Currently, communication between autonomous systems and humans requires exact and complete tasking using machine understandable formats. Unfortunately, this approach does not fit within existing military operations where rapidly changing conditions can impact desired behavior. In addition, military personnel are unlikely to modify their existing processes, procedures, and training to include, utilize, and formulate machine understandable messages. The SMARTS Translation Engine is designed to overcome these issues and enable Human-Autonomous System collaboration.

Human-to-Machine Order and COA Translation
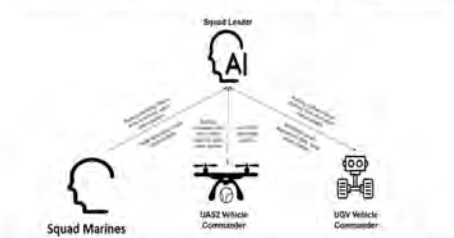
Machine-to-Human Order and COA Translation

Squad Leader: HEARTLESS 03

Squad Marines

Image courtesy of MCT (2022)

WHAT

Operational Need and Improvement: The State-based Machine Aided Real Time Strategy (SMARTS) Translation system will enable the two-way conversion between military doctrine-based and formatted communication and machine-understandable messages and control. For example, the SMARTS Translation engine will be capable of receiving a 5-Line Close Air Support request and convert it into a complete tasking package for an Autonomous Unmanned Air System Controller. An example of the reverse process will include an Autonomous Squad Commander's machine-understandable order for a reconnaissance mission being translated into a Fragmentary Order for a Marine to execute.

Specifications Required: N/A

Technology Developed: The SMARTS Translation system includes a Natural Language Processing (NLP) pipeline and Semantic Reasoning capability built upon Machine Learning models, an Unstated Knowledge Model including support for speaker personality/military role models, a Socio-Pragmatic Knowledge Repository based on military operations, an Implicature and Presupposition Detection Engine based on the Gricean Cooperative Principle of Communication, a Natural Language Generation (NLG) engine for order creation, and a User Interface (UI) for aiding military personnel in generating well-orchestrated and understandable doctrine-based documents. Through these components, the SMARTS system will have the added functionality of extrapolating unstated tasks, conditions, and criteria on human-generated operations and communications to ensure the tasking packages provided to autonomous systems are able to meet the Commander's Intent. In addition, the system will focus on ensuring the translation accounts for the ascription of mental state for the human side of the order (whether publisher or recipient).

Warfighter Value: The SMARTS Translation System enables Autonomous Forces to operate alongside Human Forces in combat situations with full transparency and clear communication pathways for both Orders and Courses of Action. In addition, it provides Warfighter training in developing military doctrine-based documents.

WHEN

Contract Number: N68335-22-C-0087   **Ending on:** Oct 13, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Participation in Marine Corps Force on Force Exercise	Low	Successful Integration and Translation of Platoon Level Operational Orders	3	2nd QTR FY22
Integration and Demonstration within Marine Systems Exercise	Medium	Successful Demonstration of Autonomous Decision Makers providing leadership of Marine Squads and Marine Squad Leaders directing autonomous systems using military doctrine based communication.	5	2nd QTR FY23
Demonstration to Transition Partner Leadership	Medium	Transition Partner Agreement on Relevancy and Operability of System	6	4th QTR FY23
Technology Transition Plan Signed	Medium	Technology Transition Plan Signed	6	1st QTR FY24

HOW

Projected Business Model: The SMARTS Translation System will be made available for sale to commercial companies as a REST API that can be integrated into their systems. In addition, MCT will offer our services to specialize the software for a given application within both commerical offerings and military solutions. Finally, MCT will offer support services for any fielded applications of the SMARTS System.

Company Objectives: Machina Cognita Technologies (MCT) is a Service Disabled, Veteran-Owned Small Business (SDVOSB) focused on researching and developing machine learning technologies for use in human-machine teaming environments. Our overall objective is to design, build, and field a wide-array of solutions that help humans and autonomous systems work together effectively to achieve more optimal results than either could accomplish alone.

Potential Commercial Applications: Commercial Autonomous-Human Teams including surgical teams, transportation solutions, and security operations. In addition, we are developing an Esports Training system on top of the SMARTS Translation engine to aid in the training of Esports athletes. Finally, the system can be used to help train any writer to help avoid miscommunications through the removal and replacement of ambiguous text, clarifications of implications and presuppositions, and minimization of the negative impact of writer personality on the message delivered to readers.

Contact: Jonathan Day, CEO/President
jonathan.day@machinacognita.com (703) 597-9686

C4I
(Navy STP Booth: 14 February)

Company	Topic	Project Title	SYSCOM
Innovative Defense Technologies	N191-020	Target Identification Interrogation Data Stream Analytics System	NAVSEA
Physical Sciences Inc.	N141-053	Compact High Speed Signal Processor	NAVSEA
McCormick Stevenson Corp.	N192-102	Blind Mating Connection for 19-inch Electronic Industries Alliance Racks in AEGIS Computing Infrastructure	NAVSEA
Mayachitra, Inc.	N20A-T007	Cross Platform Reinforcement and Transfer Learning for Periscope Imagery	NAVSEA
Makai Ocean Engineering, Inc.	N192-109	Undersea Sensor Network Performance Modeling and Cost Tool	NAVSEA
Calabazas Creek Research, Inc.	N20A-T015	Compact and Efficient Magnetron Source for Continuous Wave Microwave Power Generation	NAVSEA

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NAVSEA #2022-0387

Topic # N191-020
Target Identification Interrogation Data Stream Analytics System
Innovative Defense Technologies

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS 1.0

Transition Target: AEGIS

TPOC: (540) 653-1240

Other Transition Opportunities: Integration to numerous platforms.

Notes: IDT is positioned to provide distributed testing of platform capabilities.

https://media.defense.gov/2021/Nov/10/2002891576/-1/-1/0/211109-N-YS413-1002.JPG

WHAT

Operational Need and Improvement: IDT stands ready to support the evolution of capability.

Specifications Required: The technology will support portability to other combat systems and aid the warfighter.

Technology Developed: The Real-Time Streaming Analytics Platform (RT-SAP) enables the assessment of functional capabilities in-line.

Warfighter Value: The RT-SAP provides value by reducing the operator workload.

WHEN

Contract Number: N68335-21-C-0199   **Ending on:** Feb 25, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Test Event	Low	RT-SAP performance in simulated environment	7	TBD

HOW

Projected Business Model: Execution of real-time analytics for combat systems.

Company Objectives: Accelerate the delivery of capabilities to the battlespace.

Potential Commercial Applications: Commercial aviation, real-time data processing.

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NAVSEA #2022-0337

Topic # N141-053
Compact High Speed Signal Processor
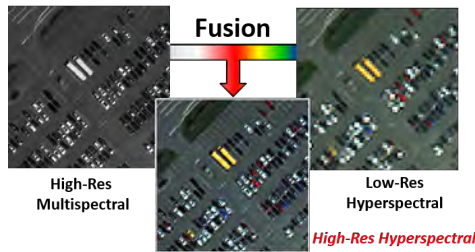Physical Sciences Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 495

Transition Target: Coastal Battlefield Reconnaissance and Analysis (COBRA)

Other Transition Opportunities: The COBRA program has been the focus to date. One of our objectives in participating in the STP program is to identify other transition opportunities within the Navy.

Notes: Current program focus is algorithm development and definition of data processing pipeline. Follow-on program to implement on real-time processor. Prior related work: Contract no. W911NF-09-C-0099, High-Throughput Processing for Hyperspectral Imaging Sensors, Period of performance: 9/18/2009-12/18/2011.

Fusion

High-Res Multispectral

Low-Res Hyperspectral

High-Res Hyperspectral

Copyright 2022 [Physical Sciences Inc.]

WHAT

Operational Need and Improvement: Need to detect and localize minefields and obstacles in the surf zone and beach zone prior to amphibious assault. Solution must support operationally-relevant speeds of advance, e.g., reconnaissance from unmanned aerial vehicle (UAV). Optically-based sensors are well-suited for deployment on UAVs but difficult to detect mines with at operationally-relevant false positive rates: High-spatial resolution conventional imagery has insufficient spectral content, Spectral sensors have insufficient spatial resolution. Methods are needed to enhance the effectiveness of optically-based sensing.

Specifications Required: Compatible with integration into sensor pod on MQ-8C Fire Scout UAV. Supports operationally-relevant speed of advance.

Technology Developed: Image fusion and analysis algorithms to support small target detection. Algorithms compatible with implementation on real-time processor.

Warfighter Value: High quality detection maps of mines and minefields. Eliminate post-mission analysis. Support operationally-relevant speed of advance during amphibious landing/assault.

WHEN

Contract Number: N68335-21-C-0302   **Ending on:** Mar 20, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Image fusion algorithms implemented	Low	Create resolution-enhance imagery	4	4th QTR FY21
Fusion of field data to create resolution-enhanced imagery	Medium	Image quality assessment of resolution-enhanced products, compare with ground truth	4	1st QTR FY22
Object detection algorithm implemented	Low	ROC curves	5	4th QTR FY22
Image fusion algorithm and processing chain complete	Medium	Image quality assessment of resolution-enhanced products, compare with ground truth	5	2nd QTR FY23
Integrated image fusion and target detection processing chain complete	Medium	ROC curves	5	2nd QTR FY23

HOW

Projected Business Model: We envision two business development paths: 1) The developed image fusion and target detection algorithms will be licensed to prime contractors for integration into UAV platforms and/or remotely operated vehicles and 2) PSI develops a signal processor incorporating the image fusion and target detection algorithms and sells the processor to prime contractors.

Company Objectives: The image fusion and spatial-spectral target detection capabilities developed in the current program are a specific application, i.e., i.e., detection of mines and minefields in beach and surf zones, of a more general reconnaissance capability. PSI is using the Forum for SBIR/STTR Transition (FST) event to explore new transition opportunities and to assess potential applicability of the image fusion and target detection algorithms in other markets.

Potential Commercial Applications: Primary commercial market is satellite remote sensing, where the market is project to grow >11% per year through 2026 to reach a value $5.25 billion. The envisioned commercial product is software/software plug-in. Our approach to market entry is to engage providers of imagery products. We anticipate that the image fusion capability will need to be integrated with existing imagery exploitation tools, e.g., ENVI, PCI Geomatics.

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cgittins@psicorp.com (978) 738-8264

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NAVSEA #2022-0357

Topic # N192-102
Blind Mating Connection for 19-inch Electronic Industries Alliance Racks in AEGIS Computing Infrastructure
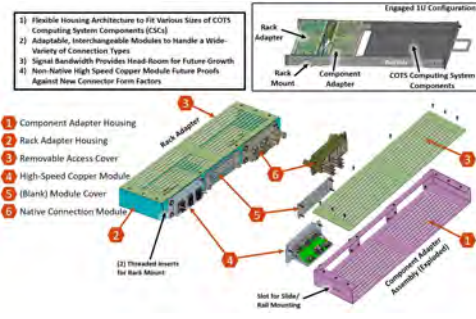McCormick Stevenson Corp.

WHO

SYSCOM: NAVSEA

Sponsoring Program: NAVSEA PEO IWS X

Transition Target: AEGIS Computing Infrastructure, MK6 MOD X

TPOC: (540) 653-2374

Other Transition Opportunities: Program Executive Office Unmanned and Small Combatants (PEO USC) platforms such as unmanned maritime systems, future Frigate (FFG(X)), Multi Mission Surface Combatant (MMSC)

Notes: Reduce Mean Time to Repair (MTTR) for AEGIS computing equipment by 20%
Reduce life cycle and upgrade costs by 50%
Reduce Technology Insertion (TI) upgrade time from a current schedule of 40 weeks to 10 weeks

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WHAT

Operational Need and Improvement: Improving the efficiency and speed of Technology Insertion Upgrades is a priority of the Navy. The Universal Blind Mate System provides improved repair and replacement speeds to 19" Electronic Industries Association (EIA) Racks, decreasing the time required for ships to be docked for repair.

Specifications Required: OPEN19, Versa Module Europa (VME), Advanced Telecommunications Computing Architecture (ATCA), MIL-S-901D (Shock), MIL-STD-461 (EMI), MIL-STD-810 (Temp), MIL-STD-167 (Vibe), MIL-STD-1399-300 (Power), DoD-STD-1399 (Ship Motion)

Technology Developed: Universal Blind Mate System to connect Commercial Off The Shelf (COTS) computing components in 19" rack
Adaptable and Interchangeable Blind Mate Connector modules enable customization for a wide variety of COTS computing components
High Speed, non-native, blind mating architecture is connector agnostic. Provides future proofing against new connection form factors and headroom for faster connections.

Warfighter Value: Decrease manual rewiring labor
Reduce potential for re-wiring errors
Easier/faster repair/replace of COTS Computing Components

WHEN

Contract Number: N68335-21-C-0424   **Ending on:** Jun 25, 2024

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Final Design Concept	Medium	Identify BMC solution for all required signal types. Guarantee signal pass-through and mechanical blind mate	3	1st QTR FY21
Requirements Specification Document	Medium	Quantify required values for signal performance and mechanical definition for blind mate.	3	1st QTR FY22
First Prototype Build	Medium	Mechanical and electrical components correctly assemble to create BMC solution and identification of improvements to the mechanical solutions.	4	4th QTR FY22
Initial Performance Testing	Medium	Establish baseline signal performance for BMC solution and identify any electrical improvements required.	4	4th QTR FY22
Second Prototype Build	Low	Identify if redesigns improve BMC engagement and meet mechanical requirements.	5	4th QTR FY23
Second Signal Performance Testing	Low	Identify if redesigns improve signal performance to acceptable levels for identified application.	5	3rd QTR FY24

HOW

Projected Business Model: MCCST plans to integrate the developed technology into 19" EIA server racks used in the MCE's for the Navy customer. MCCST aims to adapt the current technology to meet the requirements of the transition target and work with prime contractors to integrate the technology in future designs. MCCST plans to license the developed intellectual property to prime contractors for manufacture and USG use.

Company Objectives: Objective is to partner with system integrator to include this technology in future MCE designs.

Potential Commercial Applications: Commercial applications exist in 19-inch rack server systems that have need for large-scale implementation with the down-stream need for hardware upgrades and replacement efficiency. Specific opportunities include cloud-based computing servers, data processing facilities, cryptocurrency mining operations.

Contact: Matt Montgomery, Director of Technology
matt.montgomery@mccst.com   (727) 735-9633

Department of the Navy SBIR/STTR Transition Program

Topic # N20A-T007
Cross Platform Reinforcement and Transfer Learning for Periscope Imagery
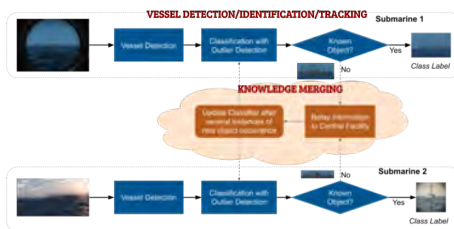Mayachitra, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS 5.0

Transition Target: Integrated Submarine Imaging System (ISIS), AN/BVY-1

TPOC: (760) 939-1440

Other Transition Opportunities: Department of Defense (DoD) agencies, prime contractors and private commercial entities.

Notes: The proposed solution has algorithms that are applicable to a large number of machine learning and/or computer vision tasks that are of interest to the defense customers.

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WHAT

Operational Need and Improvement: As machine learning (ML) and artificial intelligence (AI) become more prevalent in deployed systems, an approach will be needed to update systems with knowledge learned from past missions, sharing knowledge and data across platforms and systems. Innovation is needed to develop effective ML algorithms to process complex video data, as in the case of submarine periscope imagery. From the program office perspective, this is a want to allow learning regarding periscope images on individual submarines so that the data can be shared with other submarines and with periscope imagery software developers, and represents a new capability.

Specifications Required: Develop ML-based methods to process periscope imagery for timely vessel detection, identification and re-acquisition. Develop update strategies to combine the knowledge learned across the fleet for improved decision making.

Technology Developed: Mayachitra has developed technology to automatically detect and recognize objects of potential interest from both ground-level and overhead video imagery which provides object recognition decisions with a high level of confidence. Mayachitra's technology employs state-of-art deep learning and computer vision methods to efficiently and effectively detect such objects, and uses transfer learning-based strategies to address different data modalities such as periscope imagery. In addition, the update strategies are also developed to collaboratively combine the knowledge learned from the different ML models for a distributed learning environment. The software system integrates a suite of support modules that addresses the concerns of catastrophic forgetting and annotator noise, and shows how continual learning can be used across multiple distributed systems.

Warfighter Value: The development of a robust reasoning AI system that handles periscope imagery decreases the overall workload of intelligence officers and their staff looking at such complex data for situational awareness and improved decision making.

WHEN

Contract Number: N68335-22-C-0090   **Ending on:** Nov 09, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Accurate vessel detection	Low	Low rate of false positives (precision > 90%)	7	1st QTR FY24
Accurate vessel class(es) identification using continual learning	Medium	Low rate of missed identifications (recall > 90%)	6	1st QTR FY24
Timely vessel detection, identification, tracking and re-identification	Medium	Low latency of vessel detection, identification and re-acquisition (real-time processing: 30-60 fps)	7	1st QTR FY24

HOW

Projected Business Model: Mayachitra, Inc. is initially focused on the Department of Defense (DoD) U.S. Navy, and other related markets to support technology transfer through sales, support contracts, and licensing agreements. Transitioning the technology is part of the growth strategy and is intended to lead the market in AI/ML technologies.

Company Objectives: Mayachitra's proposed technology uses ML-based methods to process complex image/video data such as periscope imagery for timely vessel detection, identification and re-acquisition. In addition, the model update strategies are also designed to combine the knowledge learned across the fleet for improved decision-making. Currently, no alternative (both ML and non-ML) solutions exist for processing complex periscope imagery and for knowledge update strategies. Mayachitra's proposed solution decreases the overall workload of an analyst looking at such data for situational awareness and decision making. Mayachitra's primary objective is to connect its technology with interested PMAs, NAVSEA Labs, Research Facilities and Ranges to mature capabilities under technology insertion initiatives, adapt the capability to meet the needs of the greater Undersea Warfare (USW) community, and deploy the capability through Navy program of record to support theater operations.

Potential Commercial Applications: The technology would be useful for the United States Coast Guard (USCG), Department of Homeland Security (DHS), Department of Energy (DOE), and other federal agencies for which automation in regards to learning information about the vehicles/objects of interest is important. Commercial security entities could likewise benefit from the automated processing of complex data. Federal, state and commercial rescue organizations could also benefit from the ability to learn and track objects. All organizations, for which merging knowledge from different ML models is valuable, could potentially benefit from this technology.

Contact: Tajuddin Manhar Mohammed (PI), Senior Research Engineer
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NAVSEA #2022-0338

Topic # N192-109
Undersea Sensor Network Performance Modeling and Cost Tool
Makai Ocean Engineering, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO Undersea Warfare Systems (UWS)

Transition Target: Maritime Test Bed

TPOC: (619) 524-7990

Other Transition Opportunities: This tool will be used to plan future subsea cable infrastructure projects for the Navy and other federal customers.

Notes:
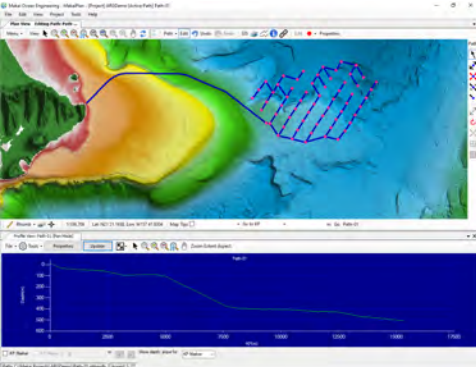
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WHAT

Operational Need and Improvement: The existing methods used to design and plan seafloor cable networks are a labor-heavy, lengthy, and a highly iterative process that takes up to several weeks. Current methods of evaluating performance and estimating project costs requires hundreds of hours of a skilled network designer's time. A demand exists to develop a software tool to increase automation in the design and optimization of these systems in order to reduce the time and costs to get to commissioning.

Specifications Required: The Specifications required include the ability to automatically generate the most efficient and lowest cost cable route while conforming to all installation rules of thumb for system installation.

Technology Developed: The Planning Tool will use the core MakaiPlan Geographic Information System (GIS) interface and tools, with the additional libraries and functions required to accurately predict the costs of subsea cabled systems in real-time. This tool will not only increase the effectiveness of cabled systems by optimizing their design and laydown for install-ability and expected lifespan, but decrease the time and cost to plan these systems.

Warfighter Value: This system would minimize manpower required to plan and budget installations, thus allowing for shorter time to commissioning and reduced project costs. The software can be optimized for different hardware systems depending on the application, and has the potential to become the industry standard for subsea infrastructure planning, much like Makai's subsea cable modeling software has become the industry standard planning and laying submarine cables.

WHEN

Contract Number: N68335-22-C-0113   **Ending on:** Dec 07, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Software prototype developed and tested on operational subsea cable test bed	Medium	Software develops cable route similar to that developed manually by a cable engineer.	5	1st QTR FY23
Software prototype developed and tested as maritime test bed digital twin	Low	Software integrated effectively into digital twin environment	6	1st QTR FY24
Protoype software demonstrated in operational digital twin environment	High	Software successfully demonstrated in the MTB digital twin environment	7	1st QTR FY25

HOW

Projected Business Model: Makai anticipates a business model like that used for our commercial subsea cable software suite, where licenses to use the software are sold, and a subscription model is used to upgrade and maintain the software. Makai estimates the commercial variant of this software tool will have a market size similar to that of our existing software, MakaiPlan. In addition to the 400 MakaiPlan licenses sold worldwide since its creation, Makai also receives annual maintenance revenues for those customers that opt in for this service. The maintenance allows the customers to receive routine software updates. There are currently 88 MakaiPlan licenses under active maintenance, and Makai will actively market a commercial version of the Planning Tool to this segment of the market.

Company Objectives: While Makai is already known worldwide for our subsea cable modeling software, this program and the tool being developed will allow Makai to maintain our position as the #1 software for subsea cable planning. The new software tool should also help bring in new customers and potential applications beyond our standard telecommunications applications.

Potential Commercial Applications: In addition to U.S. Navy other Federal subsea cabled applications, this tool will be used to optimize planning and design of commercial subsea telecom systems and other subsea infrastructure. In addition to telecom cables, this type of tool could benefit the growing subsea infrastructure market to optimize planning for communications, battery recharge stations, marine renewable energy systems, or other systems.

Contact: Hermann Kugeler, Vice President of Business Development
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NAVSEA #2022-0364

Topic # N20A-T015
Compact and Efficient Magnetron Source for Continuous Wave Microwave Power Generation
Calabazas Creek Research, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: Naval Sea Systems Command

Transition Target: Advanced Radar Illuminators

TPOC: (703) 696-5054

Other Transition Opportunities: radio beacons, target emulators, which mimic threat, and simple "fire and forget" jammers.

Notes:
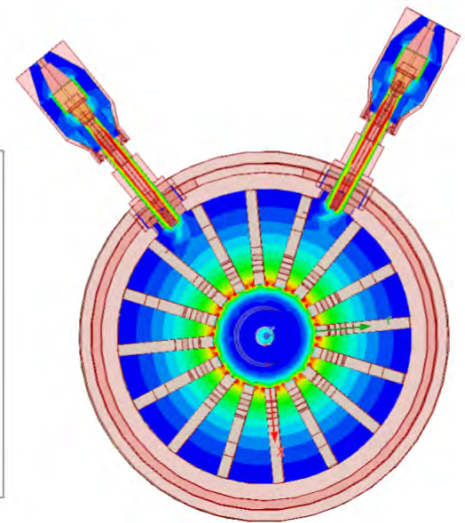
Model of magnetron circuit with varactor diodes for frequency and phase control

WHAT

Operational Need and Improvement: The Navy needs a novel magnetron source for high power CW microwave generation at S-band frequencies. The source must be compact, efficient, and affordable. The source must be capable of fast tuning across a narrow band with a locked frequency response sufficient to support a data transmission. The program is integrating varactor diodes into the magnetron circuit to provide fast control of output frequency and phase. Also developing hardware and software for the control system.

Specifications Required: Minimum output power of 5 kW (CW)
2.45 GHz operation in Industrial-Scientific-Medical band to leverage industrial microwave heating equipment
Fast tuning over at least 5 MHz
Support 2 MB/sec data transmission rate using simple frequency shift keying
Use only forced air-cooling

Technology Developed: Integrating varactor diodes into magnetron circuit to modify capacitance for frequency and phase control
Developing hardware and software for feedback control system

Warfighter Value: New RF source with reduced size, weight, and power requirements

WHEN

Contract Number: N68335-22-C-0116   **Ending on:** Nov 25, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Software for phase-locking feedback loop	Low	Bench test	6	1st QTR FY23
Modulate magnetron cavity to achieve locking	High	Calculations and tests with commercial varactor diodes	6	1st QTR FY23
Demonstrate 5 MHz frequency shift in customized magnetron	Medium	Test magnetron with HV function generator driving varactor	5	2nd QTR FY23
Develop locking circuitry	Low	Test circuitry with magnetron	5	3rd QTR FY23
Demonstrate phase locked magnetron	Medium	Assemble system and test	6	1st QTR FY24

HOW

Projected Business Model: CCR will team with magnetron manufacture Communications & Power Industries, LLC (CPI) to produce the system. CPI will manufacture magnetrons with varactor inputs, and CCR will assemble and package the electronics and software.

Company Objectives: Goal is to team with a major prime manufacture requiring this source in an RF system. The prime would develop the complete system package, including RF source, power supplies, transmitter, and overall control system for deployment in a Navy vehicle or system.

Potential Commercial Applications: There are limited commercial applications. Precise frequency and phase control are not required for commercial radar or heating applications, and the output power is likely below that required for accelerator applications.

Contact: R. Lawrence Ives, President
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Electronic Warfare (EW)
(Navy STP Booth: 14 February)

Company	Topic	Project Title	SYSCOM
Metamagnetics, Inc.	N192-078	Network Retention During Jamming Mission	NAVAIR

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NAVAIR SPR Number: 2022-767

Topic # N192-078
Network Retention During Jamming Mission
Metamagnetics, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-234 Airborne Electronic Attack Systems

Transition Target: EA-18G Growler (PMA-265)

TPOC: (805) 989-3443

Other Transition Opportunities: The frequency selective canceller (FSC) module can be adapted to various applications beyond the Growler including shipside and dismounted solider handheld receivers.

Notes: The FSC technology is an extension of Metamagnetics' Auto-tune Filter (AtF) technology which is being transitioned into major platforms. Metamagnetics now boasts a direct to the US Navy program through NIWC-PAC that supplies a modular bank of AtFs directly to the Navy as the central sub-system in the Real-Time Spectral Operations (RTSO) system. This transition has placed Metamagnetics products directly on 10 U.S. Navy ships, with a target of 100+ Navy surface vessels being equipped by the end of 2024.

https://media.defense.gov/2022/Jul/11/2003033379/-1/-1/0/220707-N-DW158-1008.JPG & Copyright Metamagnetics 2022

WHAT

Operational Need and Improvement: Tactical, Targeting, Network, Technology (TTNT) is a new operational technology which operates across the 1300- 2100 MHz band being installed on the EA-18G aircraft. During a typical jamming mission, the TTNT unit (upper/lower antennas) operation will receive interference from the on-board jammer units. This interference will not allow the EA-18G to receive external TTNT units.

Specifications Required: A new technical approach is sought that will allow the TTNT to operate fully while in the presence of the interference. This new device will allow the TTNT unit to receive RF successfully with multiple TTNT units, and should include a tunable notch filter, nulling antenna, co-site interference reduction. A unit is less than 6in X 6in X 13in, less than 30 lbs, and the EA-18G will provide a maximum of 150W (+28Vdc). A unit must be designed in accordance with the following Military Spec/Standards/Handbook. MIL-N- 18307G (2) - SSOW 3.1.5.2; MIL-HDBK-217F (2) 28-Feb 1998 – SSOW 3.4.2; MIL-HDBK-781A 01 April 1996 – SSOW 3.4.11.

Technology Developed: Metamagnetics is developing a custom frequency selective canceller (FSC) module, based on their proven Auto-tune Filter (AtF) technology, to enable continuous connectivity to the network during jamming missions. The FSC module, which has already been demonstrated in a laboratory environment at these frequencies, automatically and selectivity cancels high-power interferers while minimally impacting lower-power signals of interest. The FSC module is capable of selectively rejecting a threat by >50 dB, whether it is in-band/near-band, modulated, or CW, without the need for a sense antenna or any complicated digital signal processing.

Warfighter Value: The canceller would allow aircrews to receive information from aircraft/ground-based signals without getting interference. It has potential to be a major disruptive interference excision technology because it 1) does not require a sense antenna, 2) supports multiple simultaneous dynamic threats, and 3) can be made on a board that is the size of a small text book.

WHEN

Contract Number: N68936-22-C-0014   **Ending on:** Feb 09, 2024

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstrate Matched AtFs	Low	AtFs perform across TTNT frequencies meeting system required specifications	4	4th QTR FY22
Demonstrate Engineered Phase Dispersion on FSC	Low	FSC selectively cancels high-power interferers while minimally impacting lower-power signals of interest.	4	2nd QTR FY23
Demonstrate Automatic Tuning via Feedback Control Loop	Low	FSC module will offer closed-loop tuning and be fully integrated	4	4th QTR FY23
Demonstrate Reception of TTNT under Relevant Jamming Signals	Low	FSC successfully tested with Collins Aerospace	5	2nd QTR FY23

HOW

Projected Business Model: The first entry point of the FSC will be on the EA-18G Growler, where the device will be placed right in front of the MIDS terminal in the antenna receive path to protect the radio from incoming RF jamming signals. The MIDS terminal will be adapted to various applications beyond the Growler including shipside and dismounted solider handheld receivers. In fact, TTNT has already been tested in AWACS, E-2C, F/A-18, F-15, F-16, Predator, GlobalHawk, Apache, Aircraft Carriers and more. Metamagnetics has worked diligently with ViaSat and Collins Aerospace on the Link 16 application and has setup a working relationship to collaborate on the TTNT upgrade. Metamagnetics is predicting 100 device per year in low-rate initial production (LRIP) and then 500 devices per year for indefinite delivery/indefinite quantity (IDIQ) for the TTNT opportunity. Metamagnetics will be expecting between $1M and $2M to transition the product, of which Metamagnetics plans to absorb most of these costs internally. This can be done for two reasons. One, the company has an established revenue stream for other Auto-tune Filters products that can be reinvested across the product line and marketing costs to be shared among the family of solutions. Two, Metamagnetics has recently received a $3M+ MANTECH grant from the Army to establish large scale manufacturing for other Auto-tune Filter products.

Company Objectives: The plan is initially to work with Primes such as ViaSat and Collins Aerospace to work on terminal updates in the antenna receive path. Metamagnetics has recently expanded its original business model of selling AtF-based products nearly exclusively to primes for integration into mission systems.

Potential Commercial Applications: Successful development of a canceler could be used by commercial aircraft receiving communication interference; therefore, private and commercial airlines could also benefit from this technology development.

Contact: Reena Dahle, Senior RF Scientist, Team Lead, Advanced Technology Group
rdahle@mtmgx.com (508) 948-5030

Company	Topic	Project Title	SYSCOM
BANC3, Inc	N201-024	Augmented Reality Headset for Maintainers	NAVAIR
Knowledge Based Systems, Inc.	N202-098	Voice Recognition to Support Assessment of Cross Platform Situational Awareness and Decision Making	NAVAIR

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NAVAIR SPR 2022-713

Topic # N201-024
Augmented Reality Headset for Maintainers
BANC3, Inc

WHO

SYSCOM: NAVAIR

Sponsoring Program: NAVAIR PMA-260 (Common Aviation Support Equipment program office)

Transition Target: Our Navy and Marine Corps customers are maintainers: Augmented Reality (AR) headsets that meet Navy and Marine Corps maintainence requirements for cybersecurity, data infrastructure, and environmental requirements are critical; hardware that can run PMA-260's AR-remote support / assistance software to support various aircraft maintenance tasks is equally important.

TPOC: (732) 323-1833

Other Transition Opportunities: Banc3 would like to build and expand upon existing relationships with Department of Defense customers needing AR in aerospace, sea, ground combat and logistics fields, as well as other government agencies such as DHA, VA, and DHS. Commercial markets with applicable use cases include Healthcare, Automotive, Education, and Telecommunications.

Notes:

BANC3-owned & developed graphic (2021).

WHAT

Operational Need and Improvement: To increase Navy and Marine Corps aircraft maintainer capabilities & efficiency, NAVAIR is seeking an Augmented Reality headset for remote assistance capable of connecting two users from any location worldwide through a virtual environment. The AR headset also needs to meet cybersecurity, data infrastructure, and environmental requirements at the Organizational (O-), Intermediate (I-), and Depot (D-) levels of maintenance aviation activities for Navy and Marine corps.

Specifications Required: - Cybersecurity & data infrastructure that meets applicable DISA Security Technical Implementation Guides (STIGs) requirements
- Common Access Card (CAC) integration to provide multi-factor authentication
MIL-STD-810G Environmental Conditions, Methods 501.5, 502.5, 509.5, 516.6
- Display viewable in direct sunlight and during night operations
- EMI Compliance: MIL-STD-461E
- HERO Compliance: OD 30393 HERO Design Guide

Technology Developed: BANC3 is developing an Augmented Reality headset to meet Navy and Marine cybersecurity, data infrastructure, and environmental requirements and with the needed capabilities for integration with PMA 260's software in development, Augmented Reality Remote Maintenance Support Service (ARRMSS), for AR/MR remote assistance for complex and irregular maintenance actions.

Warfighter Value: Enhances efficiency and effectiveness of Navy and Marine corps maintainers by connecting them to SMEs / specialized personnel to assist through a virtual environment.

WHEN

Contract Number: N68335-21-C-0599   **Ending on:** Jan 12, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Display Hardware	Low	Contain a display that is viewable in different maintenance locations (i.e., restricted data areas, weather conditions, and lighting conditions including direct sunlight).	9	4th QTR FY20
DISA Android STIG Requirements	Low	Developed and tested the DISA STIG. Created a version of the Android OS to cater to AR STIG for DOD	6	1st QTR FY22
Software Architecture enabling two-factor authentication	Low	Securely accessing the devices	6	2nd QTR FY22
Offline Functionality	Low	Eliminate the need for a wireless connection to the internet (to access applications and to enable several features) or having location information available.	6	3rd QTR FY22
Headset Functionality	Low	Allow all functionality within the headset (i.e., spatial cognition, displaying indications, sensor input, etc.)	9	4th QTR FY22

HOW

Projected Business Model: Short-term development still requires DoD support, with SBIR Phase 2 enhancement and follow-on funding from a Program of Record.
Transition / Longer Term strategy involves broadening our commercial customer base by applying core AR headset technology in Healthcare, Automotive, and Telecommunications markets.

Company Objectives: Beyond successful transition of our AR headset to primary target application for NAVAIR, we are seeking corporate partnerships to enhance depth and breadth of capabilities across a variety of industries, particularly Healthcare, Automotive, and Telecommunications as well as new government, enterprise, and commercial customers seeking to engage and scale use of our technology to meet their needs / use cases.

Potential Commercial Applications: Healthcare (remote assistance to First Responders, Telehealth / Telemedicine), Automotive / Factories (maintenance of complex equipment), Education (trade/technical schools, other distance learning), Telecommunications (field support), Field Services Industries.

Contact: Pam Puttagunta, President
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NAVAIR #2022-715

Topic # N202-098
Voice Recognition to Support Assessment of Cross Platform Situational Awareness and Decision Making
Knowledge Based Systems, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: Naval Air Warfare Center Training Systems Division (NAWCTSD)

Transition Target: Next Generation Threat System Analysis and Reporting Tool (NGTS ART)

TPOC: (407) 380-8130

Other Transition Opportunities: KBSI's Maestro Application
Air Force Advanced Training Systems Center

Notes: KBSI is currently working with the Navy's Maritime ISR cell to improve after action reviews and student brevity course activities with the ReVoice technoloy.

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WHAT

Operational Need and Improvement: Inefficient use of voice data for training performance measurement
Lack of contextual understanding for voice and text
Cognitive overload for Training Instructors
Limited support for persistent data capture, reach-back, and re-use
Increasing training life cycle costs

Specifications Required: Seamless integration into existing Naval training systems
Improved after action report capability

Technology Developed: Noise-robust speech recognition with voice profiling
Natural language processing engine with advanced semantic analysis
Context-specific performance measurement with integrated voice data
'Instructor in a box' solution for BREVITY term training and assessment
Intuitive AAR / Debrief visualization
Open architecture based implementation for affordable integration with NGTS ART and other Navy training systems

Warfighter Value: Improved Air Defense Integrated training effectiveness through the use of efficient methods in performance measurement through exploiting information in voice data
Significant reduction in instructor workload through automated analysis and objective assessment of voice data
Enhanced diagnostic feedback by correlating voice data and tactical execution data in near real-time
Significant reduction on time to prepare AAR debrief
Reduced training life cycle costs
Contextual understanding for military audio files

WHEN

Contract Number: N68335-21-C-0709 **Ending on:** Aug 31, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Initial prototype demo	Medium	Sponsor Review	4	1st QTR FY23
Updated prototype demo	Medium	End User Review	5	3rd QTR FY23
Hardened prototype demo	Low	End User Evaluation and Review	5	1st QTR FY24
Validated prototype demo	Low	End User Provisional Acceptance	6	3rd QTR FY24

HOW

Projected Business Model: KBSI is currently pursuing a Software as a Service or SAAS business model for the ReVoice technology.

Company Objectives: KBSI's company objective is to make the ReVoice service available to the greater public as well as additional government entities who might have interest in audio to text conversion.

Potential Commercial Applications: Commercial aviation communication translation services
Enhance commercial aviation training systems after action reports and documentation

Contact: Byon Williams, Director of Sales and Marketing
bwilliams@kbsi.com (979) 575-7158

Company	Topic	Project Title	SYSCOM
WindBorne Systems Inc.	AF193-CSO1	Long Duration Global Sounding Balloon for In Situ Weather Observations in Remote Areas	ONR

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ONR Approval #DCN# 43-10534-22

Topic # AF193-CSO1
Long Duration Global Sounding Balloon for In Situ Weather Observations in Remote Areas
WindBorne Systems Inc.

WHO

SYSCOM: ONR

Sponsoring Program: Office of Naval Research

Transition Target: Navy Meteorology and Oceanography Command (NMOC)

TPOC: Daniel Eleuterio
daniel.eleuterio@navy.mil

Other Transition Opportunities: NOAA, USAF, commercial weather markets.

Notes: Image of WindBorne Systems' proprietary balloon and radiosonde technology after launch, recording weather data.

WHAT

Operational Need and Improvement: Weather affects the operation of every piece of military equipment that is deployed in the field. Knowing the current weather conditions in a remote location, and having accurate weather forecasts is critical to all military operations. Forecasting the weather in advance requires numerical weather prediction, which relies on a wide range of observations from surface, atmospheric, and space-borne sensors to accurately model the state of the atmosphere. One very significant component of the global observational system consists of in situ measurements of the atmosphere obtained, primarily, from radiosondes and aircraft. These measurements, however, are distributed very non-uniformly over the globe, with a high density over developed countries but few to none over oceans and developing countries. Furthermore, while a higher density of observations would be advantageous almost anywhere, the high cost of radiosonde launches and the inflexible nature of commercial airline flights makes it prohibitive to expand these observing capabilities.

Specifications Required: There is a long standing requirement and a national Defense-related mission need for targeted in-situ weather observations. Collection of weather data in data sparse regions and in strategic areas that are DDIL (denied, degraded, intermittent, or limited) is aligned with Joint All-Domain Command and Control (JADC2). A platform that can collect in situ observations with radiosonde grade quality over large and remote areas without putting personelle at risk is required to fulfill this need

Technology Developed: WindBorne has developed and operationalized a transformative balloon technology with the capability to collect global in-atmosphere observations at orders of magnitude lower cost than any existing technology. WindBorne's Global Sounding Balloon (GSB) is a controllable, long duration radiosonde optimized for repeated vertical profiling of the atmosphere. A single GSB flight is capable of remaining aloft for weeks and collecting dozens of vertical sounding profiles while traveling thousands of miles from the launch location. The resulting data most closely resembles radiosonde (weather balloons) or dropsonde profiles, but with the hardware costs amortized over dozens of soundings and without the need for a separate delivery vehicle to reach any point on Earth. With near real-time bidirectional satellite communications and fully flexible altitude control, a GSB can be actively navigated to target regions by selecting varying winds at different altitudes, allowing for targeted observations despite the balloons lacking active propulsion

Warfighter Value: The WindBorne Global Sounding Balloons brings the Warfighter accurate, timely, and reliable weather intelligence. They allow for situation awareness of contested areas without putting personnel at risk or tying up significant resources.

WHEN

Contract Number: N68335-22-C-0102   **Ending on:** May 31, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
MST-4: 85 Launches Over Arctic 2 Launch Sites	Low	Amount and quality of data collected	8	4th QTR FY22
MST-5: 155 Launches Over Atlantic 3 Launch Sites	Medium	Amount and quality of data collected	8	4th QTR FY22
New York permanent launch site setup	Low	Operational reliability	8	2nd QTR FY23
3 months of 25 balloons / month launch operations from NY	Low	Operational reliability, amount and quality of data collected	9	2nd QTR FY23
South Korea permanent launch site setup	Medium	Operational reliability	9	3rd QTR FY23
Svalbard permanent launch site setup	Medium	Operational reliability	9	3rd QTR FY23
Continous launch operations from all	Medium	Operational reliability, amount and	9	3rd QTR

HOW

Projected Business Model: WindBorne's primary business model is Data-as-a-Service. We launch and operate our Global Sounding Balloons, collecting data over remote areas of interest to our customers. This model allows us to optimize and refine our operations using our internal resources, while proving a simple, low-overhead solution for weather data collection to the end user.

Company Objectives: WindBorne is covering the globe in aerial sensors to enhance environmental monitoring, improve forecasts, and help humanity adapt to climate change. We will eliminate all observation gaps in the ocean-atmosphere system, enabling a new level of planetary understanding.

Potential Commercial Applications: Energy futures trading is our beachhead commercial market. Weather accounts for much of the variability in the price of energy, effecting both the supply and demand side. If an energy trader knows the weather with higher accuracy further in advance, they can predict prices and make trades to net billions of dollars. Given the large trade volumes on energy prices, this a market estimated to be worth over $1B. WindBorne will purse additional weather markets after energy trading, such as shipping and aviation, insurance, and logistics.

Contact: John Dean, CEO
john@windbornesystems.com   (518) 728-2953

Ground and Sea Platforms
(Navy STP Booth: 15 February)

Company	Topic	Project Title	SYSCOM
Trident Systems Incorporated	N192-103	Field Serviceable Non-Acoustic Data Logging Sensor Module for Towed Arrays	NAVSEA
Altron, Inc.	N19A-T012	Unified Logging Architecture for Performance and Cybersecurity Monitoring	NAVSEA
Colorado Engineering Inc.	N141-053	Compact High Speed Signal Processor	NAVSEA
Spectral Energies, LLC	N20A-T020	Non-intrusive Diagnostics to Quantify Interactions between High-speed Flows and Hydrometeors	ONR
Caliola Engineering LLC	N193-149	Satellite Communications Antenna Pointing for Positioning (SCAPP)	NAVWAR

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NAVSEA #2022-0370

Topic # N192-103
Field Serviceable Non-Acoustic Data Logging Sensor Module for Towed Arrays
Trident Systems Incorporated

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS, PMS-401

Transition Target: Thin-line Towed Array Programs of Record

TPOC: (401) 832-8229

Other Transition Opportunities: Fat-line towed arrays, Unmanned Underwater Vehicles (UUVs), and Remotely Operated Vehicles (ROVs).

Notes: Built to the mechanical constraints of thin-line arrays, VISTA can transition to other thin-line and fat-line arrays with minimal mechanical changes.

US Navy Photo:
https://www.dvidshub.net/image/6418017/uss-roosevelt-ddg-80

WHAT

Operational Need and Improvement: Much of the information on the ocean depths in which towed arrays are used has been drawn from limited sampling and studies. Long-term collection of data about the operational environment for towed arrays is necessary to improve future requirements and understanding the impacts to towed array systems.

To address this need, the VISTA system is designed to be an integrated data logger, conforming to thin-line towed array mechanical constraints, able to collect data as a self-contained unit for over one year. This will greatly increase the body of knowledge around the towed array deployment environment and support root cause analysis if an array fails while in use.

Specifications Required: The VISTA System meets the following requirements:
* Self-contained power source for > 12 months of operation.
* Collects internal sensor data for the operational environment including shock/vibration, temperature, and pressure
* Built to thin-line array mechanical constraints
* Stores data from over 12 months of operation through data compression and decimation techniques

Technology Developed: The Versatile Integrated Sensors for Towed Arrays (VISTA) system is a self-contained data logger for towed array, consisting of multiple small modules that can provide power, sensing, processing, and offload capabilities. Off-platform software supports data export, translation, and review.

Warfighter Value: The VISTA system increases the operational knowledge of the towed array environment, supports root cause analysis of failures, informs future towed array requirements and employment techniques, and provides a path to condition-based maintenance of arrays and array components.

WHEN

Contract Number: N68335-21-C-0259   **Ending on:** Apr 07, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Hardware-in-the-Loop Testing	N/A	Verification of Key performance indicators and circuit design	4	3rd QTR FY22
Prototype Delivery	Low	Functional prototype delivered for testing	5	1st QTR FY23
In-Water Testing	Low	Functional prototype testing in a relevant environment.	6	2nd QTR FY23
Mechanical Testing	Low	Test and Demonstration with handling equipment	7	3rd QTR FY23

HOW

Projected Business Model: Trident's established business model for successful commercialization of SBIR technology would both sell directly to the government and to Prime contractors. The direct to government route would be employed for retrofits of fielded towed arrays. In these cases Trident would handle any test and evaluation (T&E), low rate initial production (LRIP), and full production as the Prime utilizing existing vendor relationships, delivering directly to the program office for retrofit during maintenance activities.

To integrate within the production of towed arrays, Trident is prepared to perform as a subcontractor under the Program of Record Prime contractor(s). The same capabilities are brought to bear on the contract and Trident is able to work with existing technical data packages (TDPs) and technologies to integrate the VISTA effort across towed array portfolios.

Company Objectives: As a world-class team that delivers technology solutions that make a difference, Trident's goal for VISTA is to integrate it directly into Program of Record arrays to collect new data points about the towed array environment, increase analytics capabilities for new array development, and support root cause analysis for any failures experienced during deployment. This would be achieved both as new platforms are produced and to augment existing towed arrays.

Potential Commercial Applications: The novel application of small form-factor electronics, power handling, and sensor integration supports many undersea environmental applications including remotely operated or unmanned platforms used by the oil and gas industry, long term academic monitoring of marine life and ecosystems, and the growing "Ocean of Things" movement.

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NAVSEA #2022-0353

Topic # N19A-T012
Unified Logging Architecture for Performance and Cybersecurity Monitoring
Altron, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS (IWS-5)

Transition Target: AN/SQQ-89 A(V) 15

TPOC: (202) 781-4233

Other Transition Opportunities: Government, prime contractors, and commercial partners seeking a solution to rapidly build a data foundation to enable monitoring, cybersecurity, machine learning and artificial intelligence capabilities. The architecture supports extensibility with mobile device and IoT systems and leads to future research in this area. This product also fills a major market gap in residential network/device data collection to enable home automation applications to present homeowners with a simplified understanding of their home network security posture.

Notes: UnifyRT™ can be used as a unified logging framework for integration with combat control systems, health systems, connected vehicle systems, autonomous vehicles, home networks, and home automation systems. We have recently started working with the Army to develop a novel portable and pluggable data collection hardware device targeted for the Army's armament usage data collection using UnifyRT™.

U.S. Navy photo by Mass Communication Specialist 2nd Class Anderson W. Branch/Released, Public domain, via Wikimedia Commons

WHAT

Operational Need and Improvement: The U.S. Navy has an operational need for a unified logging architecture that supports collection, aggregation, storage, and analysis of system performance and cybersecurity logs, events, and alerts produced by Naval Control Systems (NCS). The challenge is that NCSs are comprised of systems of systems divided into enclaves (e.g., Hull Mechanical and Electrical, Combat System, etc.). NCS enclaves generally collect logs at an individual node level, with the log file specific to the events on that node only. Logs are not shared among the enclave or across enclaves. Across enclaves, analysis of NCS performance and cybersecurity monitoring is typically conducted at the system or sub-system level, resulting in implementation differences, incompatibility between monitoring systems, and the inability to produce a full view of the NCS status. UnifyRT™ improves upon existing capabilities providing a flexible, extensible, and platform agnostic unified logging architecture that addresses these needs.

Specifications Required: This novel technology provides a data foundation to build a Security Information and Event Management (SIEM) compliant data architecture that enables the ability to perform correlation, visualization, monitoring, and workflows. This includes collection and storage of data for network traffic to provide the ability to track network activity and visualize network gaps. It collects all data needed to construct a performance and cybersecurity monitoring dashboard that displays who is logged in to the system, file and executable access, connected devices as well as any other security use cases.

Technology Developed: UnifyRT™ provides robust data ingestion, enrichment, transport, aggregation, and storage of system log data across enclaves into a central repository. UnifyRT™ simplifies the ability to seamlessly create a data foundation to enable performance monitoring, cybersecurity, machine learning and artificial intelligence capabilities. This technology equips NCS Engineers with the ability to identify, analyze, and correct system-wide problems during development, integration and production events. UnifyRT™ serves as a distributed streaming platform providing publish and subscribe to streams of data, storage of data in a fault-tolerant manner, and processing of streams of data as they occur.

Warfighter Value: This novel real-time plug and play unified logging system reduces staffing required to manage the logging stack, reduces product training costs, supports developer subsystem debug and analysis, makes adding and managing data sources extremely easy, and supports performance/cybersecurity data retention.

WHEN

Contract Number: N68335-21-C-0268   **Ending on:** Feb 24, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Integration and Test of technology prototype in relevant environment	Low	Successful prototype validation in an AN/SQQ-89 lab environment	4	3rd QTR FY20
Integration and Test of technology prototype in lab environment	Low	Successful prototype validation in an AN/SQQ-89 relevant environment	5	3rd QTR FY22
Prototype Demonstration	Low	Successful Demonstration and test in an AN/SQQ-89 lab environment	5	4th QTR FY22
Integration and Test of technology prototype in operational environment	Low	Successful prototype demonstration of more mature technology in AN/SQQ-89 lab environment	6	1st QTR FY23
Technology Seminal Transition Event	Medium	Logger deployment, data aggregation and test conducted in an operational environment	7	3rd QTR FY23
Seminal Transition Event	Medium	Successful integration and qualified test event	8	3rd QTR FY24

HOW

Projected Business Model: Our core business strategy is based on selling technology & services to support Automated Testing, Integration, and Monitoring (ATIM™). A foundational part of this model is data collection and aggregation using UnifyRT™. UnifyRT™ is the core of a suite of products being developed to support our ATIM™ model. We are in the process of developing two other products, UnifyRT™ Insight™ and UnifyRT™ Hive™. UnifyRT™ Insight provides an interactive user interface that employs rule-based and machine learning analytics to automate root cause identification and monitoring of system issues. UnifyRT™ Hive™ is a novel portable and pluggable data collection hardware device targeted for the Army's armament usage data collection for AI applications and targets commercial markets such as vehicle health management and monitoring of connected vehicles and transportation edge devices.

Company Objectives: Expand the deployment of the UnifyRT™ suite of products to other government systems, prime contractors and commercial entities to deliver ATIM™ solutions.

Potential Commercial Applications: UnifyRT™ is a flexible logging framework that can be integrated with any type of system from autonomous vehicles to home automation. UnifyRT™'s innovative administration tool provides an intuitive user interface that eliminates the complexity of the underlying logging stack so that government users, commercial users, or even homeowners can easily perform aggregate logging of devices and services associated with their systems or on their network.

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NAVSEA #2022-0331

Topic # N141-053
Compact High Speed Signal Processor
Colorado Engineering Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO Undersea Weapons Systems (UWS)

Transition Target: Acoustic Underwater Countermeasures

TPOC: (401) 832-3838

Other Transition Opportunities: Potential applications include oil and gas exploration, bathymetry, harbor, and coastal surveillance for homeland defense.

Notes: Other SWaP constrained cylindrical applications like torpedoes and missiles. There is potential opportunities to expand the developed technology across other DoD platforms such as Unmanned Surface Vehicles (USVs), Unmanned Underwater Vehicles (UUVs), and Unmanned Arial Vehicles (UAVs).

Image provided by CAES AT&E

WHAT

Operational Need and Improvement: The Navy requires a compact high speed signal processor capable of supporting data fusion for torpedo defense applications.

Specifications Required: DoN has a narrow diameter platform requiring a strict SWaP constraint to support the current and future needs of this platform

Technology Developed: CAES AT&E has designed a system of four SWaP constrained Digital Signal Processing boards that exceed current DoN requirements. This technology offers a 64 channels of high-performance digital signal processing while meeting small form factor and power constraints.

Warfighter Value: This technology provides the warfighter data fusion capabilities, improved situational awareness, real-time processing capabilities equivalent to those of UAV applications, and addresses the need to combat future growth. Each system is modular and upgradable through upgradable sensor cards and performance improvement through software algorithm updates.

WHEN

Contract Number: N68335-21-C-0349   **Ending on:** May 24, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Hardware Prototype Operation	Low	Board operates as intended	6	3rd QTR FY23
Hardware Delivery to NUWC	Low	Board Successfully operating in NUWC Lab Environment	6	1st QTR FY24
System integration into Field test environment	Medium	Board operates as intended in field test environment	7	3rd QTR FY24

HOW

Projected Business Model: CAES recently acquired Ultra Electronics which has a significant footprint within the DoN and specifically the underwater community. CAES intends to leverage both this internal division as well as external OEM partners which include Leidos and L3Harris who are pervasive with this community too.

Company Objectives: CAES is a Tier 3 DoD Defense Supplier, we will apply our Mil-Std manufacturing practices to product the card to support the DoN in this initial platform and potential alternative platforms with a similar mission

Potential Commercial Applications: This is a customer digital signal processing board for a SWaP constrained platform. Potential commercial applications may include underwater ROV

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ONR Approval #DCN# 43-10522-22

Topic # N20A-T020
Non-intrusive Diagnostics to Quantify Interactions between High-speed Flows and Hydrometeors
Spectral Energies, LLC

WHO

SYSCOM: ONR

Sponsoring Program: ONR

**Transition Target:** High-speed imaging, material processing, and directed energy applications

TPOC: Eric Marineau
eric.c.marineau.civ@us.navy.mil

Other Transition Opportunities: High Energy Physics, material processing, directed energy applications, tunable RF frequency generation

Notes: Directed Energy - Transition opportunities include building upon current pulsed ablation efforts underway at SE, which aim to improve ablation rate/efficiency by combining hybrid pulse formats with continuous wave (CW) effects enabling sub-second shoot-down times. Pulsed ablation is also useful for exploiting nonlinear ablation mechanisms that are effective against highly thermally resistant materials (hypersonic cone tips) where CW lasers are ineffective. Additional pulsed directed energy effects include secondary acoustic, RF, and microwave emission useful for disrupting flight sensors or surveillance equipment. Pulsed sources operating in the infrared are also needed for target illumination in infrared counter measures (IRCM) applications.

Material Processing - Pulsed sources are much more well-suited for precision manufacturing compared to CW systems. This is extremely important for emerging additive manufacturing and 3D printing applications, particularly when novel materials are required. The massive displays market also requires pulsed material processing when working with transparent substrates. Increasing the energy and pulse agility of these systems will improve throughput and precision.

High Energy Physics - Compact high energy pulsed sources are essential for the advancement of table-top high energy physics including attosecond generation and plasma wakefield acceleration; they may also be integrated into larges systems performing fusion research or as photocathodes for large particle accelerators.
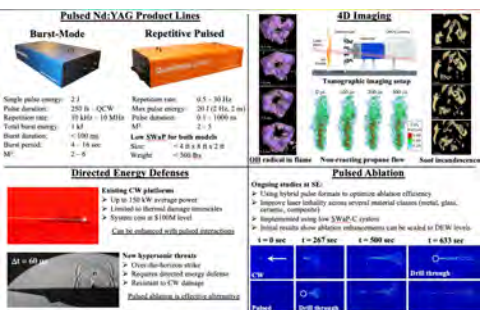
Versatile Burst-mode Laser System for Defense and non-Defense Applications

WHAT

Operational Need and Improvement: For Spectroscopy and Imaging: Turn-key system without requiring significant optical access. Camera view optical pathways must be simplified, which will be achieved using imaging fibers. This will greatly simplify the size and complexity of the imaging system and allow robust measurements to be made even in hard-to-access measurement scenarios.

For Directed-Energy Applications: Low-SWaP source delivering new levels of pulsed laser energy and enabling a transition to military deployment.

Non Defense Applications: Compact turn-key operation suitable for integration within industrial laser manufacturing systems or complex high energy laser laboratories.

Specifications Required: Hypersonic Imaging: 3D imaging of primary hydrometeor particles between 0.3 and 3 mm in Mach >3 conditions.

At least 100-200mJ/pulse @ 532nm operating at 1 MHz operation

Technology Developed: 3D imaging of ~1 mm particles in Mach 5 conditions at up to 1 MHz.

Warfighter Value: Hypersonics: The data this product will provide will be critical to hypersonic design and modeling efforts, allowing hypersonic defenses to be used more effectively and reliably.

Laser source: The source developed for this program has alternative applications within the directed energy field that will supplement warfighter defenses against rockets, artilerary, & mortars (RAMs), drones, and large aircraft using advanced pulsed ablation concepts, interdiction via secondary emission, and improved infrared countermeasures.

WHEN

Contract Number: N68335-21-C-0721   **Ending on:** Aug 03, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Complete Application of the Imaging System at Southwest Research Institute Rig	Low	Provide data sets to ONR on droplet interactions with ballistic objects	5	4th QTR FY23
Develop fiber-coupled 4D imaging system for technology transition to larger operationally relevant facilities	Medium	Successful implementation of the technology acquiring data at relevant conditions	6	4th QTR FY25

HOW

Projected Business Model: The hypersonic measurement capabilities developed here are not available with commercial or defense industries. The developed system will be commercialized and sold to government and academic laboratories (Navy, Air Force, NASA, universities) studying hypersonic events and developing related applications. Industrial partners developing commercial supersonic aircraft (Boom) and hypersonic defense vehicles (Lookheed, Beoing, Raytheon) will also be targeted. An expected 3-6 products are expected to be delivered each year totaling $6-30M in gross revenue.

Company Objectives: Fully develop the exiting technology into a commercial package and sell to academic, government, and industrial partners while transitioning the pulsed laser technology to support new pulsed directed energy effects.

Potential Commercial Applications: Aircraft companies are pursuing commercial supersonic and hypersonic flight, similar to the Concorde of the 1970s and '80s, and will directly benefit from the improved measurements of the interaction between hypersonic projectiles and hydrometeors. This knowledge is essential to ensure passenger safety.

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NAVWAR HQCA-2022-A-008

Topic # N193-149
Satellite Communications Antenna Pointing for Positioning (SCAPP)
Caliola Engineering LLC

WHO

SYSCOM: NAVWAR

Sponsoring Program: NAVWAR, Program Executive Office Command, Control, Communications, Computers, and Intelligence (PEO C4I)

Transition Target: Global Positioning System (GPS)-Based Positioning, Navigation, and Timing System (GPNTS)

TPOC: (619) 524-2510

Other Transition Opportunities: Defense Advanced GPS Receivers (DAGR), Mounted Assured Positioning, Navigation, and Timing System (MAPS), Naval Computer and Telecommunication Station (NCTS)

Notes: SATCOM Antenna Pointing for Positioning (SCAPP) as alternative to GPS

Image Courtesy of Caliola 2022

WHAT

Operational Need and Improvement: Alternative Position, Navigation, and Timing (A-PNT) for GPS denied environment

Specifications Required: Provide accurate position and timing estimate to enable navigation in GPS denied environment consistent to the platform performance requirement.

Technology Developed: Caliola developed Satellite Communications (SATCOM) Antenna Pointing for Positioning (SCAPP) to use existing satellite communication infrastructure for position determination in GPS denied environment.

Alternative technologies to provide equivalent solution require extensive hardware and software development. The associated cost and time required for new hardware & software development is substantially higher than the software only solution provided by SCAPP. The unique approach of using existing communication satellite infrastructure for positioning when GPS is denied address a critical need to provide alternative solution for navigation.

Warfighter Value: SCAPP is a software solution that enables navigation without GPS using existing SATCOM and Position, Navigation, and Timing (PNT) infrastructure

WHEN

Contract Number: N68335-21-C-0771   **Ending on:** Oct 07, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Risk Reduction Demonstration	Low	Successfully demonstrated functional software prototype in lab	4	4th QTR FY22
Real-Time Demonstration	Low	Successfully demonstrated functional software prototype in relevant environment	5	4th QTR FY23
Integrated Demonstration	Medium	Successfully demonstrated functional software prototype in an operational environment	6	4th QTR FY24

HOW

Projected Business Model: SCAPP is an alternative PNT source which can be integrated with enterprise PNT engines to provide robust and resilient PNT solution when GPS is not available. Caliola intends to integrate SCAPP technology with the Navy GPNTS with a goal of establishing presence in the alternative PNT market.

Company Objectives: SCAPP capability extension to Low Earth Orbit (LEO) satellites and integration with other PNT engines either directly through DoD or prime system integrators.

Focused Research & Development (R&D) in Alternative Position, Navigation, and Timing (A-PNT) algorithm and architecture development for GPS denied environment with systems design and development for functional verification & capability demonstration

Potential Commercial Applications: Trucking and Delivery companies

Contact: Newfel Seman, Product Director
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Company	Topic	Project Title	SYSCOM
Inovati	N07-122	Method and Device for In-Service Repair of Magnesium, Aluminum and High-Strength Steel	NAVAIR
Cornerstone Research Group, Inc.	N192-084	Room Temperature Shelf-Life Pre-Impregnated Carbon Fiber Fabric for use in Out-of-Autoclave Aircraft Repair	NAVAIR

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NAVAIR SPR Number: 2023-12

Topic # N07-122
Method and Device for In-Service Repair of Magnesium, Aluminum and High-Strength Steel
Inovati

WHO

SYSCOM: NAVAIR

Sponsoring Program: AFLCMC/RO and NAVAIR Fleet Readiness Center Southwest

Transition Target: Air Force and Navy Maintenance Depots

TPOC: (312) 674-5791

Other Transition Opportunities: US Marine Corp., NASA, OEM-Lockheed Martin, Commercial Space Industry

Notes: The Kinetic Metallization-High Dynamic Range (KM-HDR) System is low temperature spray-deposition coating tool that has a demonstrated track record for protecting and repairing aging military assets.
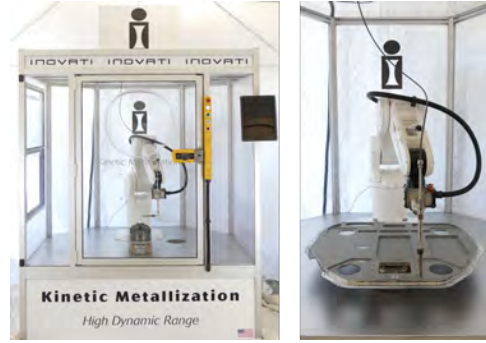
KM-HDR System for Repair and Additive Applications

WHAT

Operational Need and Improvement: Aging military assets and weapon systems require innovative methods of repairing high valued parts that are difficult to procure with long lead times.

Specifications Required: Many of these parts can only be repaired by spray deposition of corrosion and wear resistant coating materials at low temperatures which is uniquely enabled with the advantages of th KM process and equipment. Specifications for these repair coatings are part dependent, but generally require high adhesion strength, corrosion resistance and no fatigue debt.

Technology Developed: Inovati has developed the KM-HDR systems specifically to repair aging aircraft parts used on F/A-18 and F-16 platforms. The KM-HDR process and equipment has been qualified for repair of many F/A-18 aircraft components and is routinely used by FRCSW to perform these repairs.

Warfighter Value: The value to Warfighter has already been demonstrated at FRCSW with return on SBIR research investment and Phase III procurement costs realized within one year after installation of the equipment.

WHEN

Contract Number: N68335-20-C-0168   **Ending on:** Nov 28, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Delivery of KM-HDR System	Low	Operation Training Completed	6	1st QTR FY22
Qualification Test Matrix	Medium	Delivery of Data Package	8	4th QTR FY23
Demonstration of F-16 Wheel Repair	Medium	Successful Completion of Roll Test	8	4th QTR FY23
Delivery of Final Report	Medium	Acceptance of Final Report	8	1st QTR FY24

HOW

Projected Business Model: Inovati's business model is to manufacture and sell the KM-HDR Systems for repair and additive manufacturing applications. Inovati also performs research to develop and qualify new feedstock materials to meet specific requirements for customer applications.

Company Objectives: Inovati provides costumer solutions to specific problems that may be solved with the experience and capabilites of our materials staff and our harmonized approach to using our KM-HDR process and equipment.

Potential Commercial Applications: Commercial applications for the Kinetic Metallization technology have been transitioned with the installation of KM-HDR systems at Navy depots for repairing aging aircraft parts. Application of unique wear and corrosion resistance coatings for the commercial space industry has been demonstrated with this innovative process. New applications are anticipated within other agencies and industries because of the Navy STP program.

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NAVAIR #2022-770

Topic # N192-084
Room Temperature Shelf-Life Pre-Impregnated Carbon Fiber Fabric for use in Out-of-Autoclave Aircraft Repair
Cornerstone Research Group, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-261 H-53 Heavy Lift Helicopters

Transition Target: Primary structures and repairs on the CH-53K

TPOC: (301) 342-9369

Other Transition Opportunities: Any program that supports composite aircraft has similar needs for this technology, which includes but is not limited to JSF, FA/-18, and V-22.

Notes: CRG teamed with Battle Sight Technologies to develop and mass produce a special crayon for warfighters, first responders and disaster relief workers. Dubbed CrayTac, this device allows troops to write messages or draw complex figures on walls, sidewalks and other surfaces. The markings are invisible except to someone wearing night-vision goggles.

https://media.defense.gov/2020/Aug/18/2002479456/-1/-1/0/200619-N-BF209-001.JPG

WHAT

Operational Need and Improvement: The resin pre-impregnated fabrics (pre-pregs) the U.S. Navy currently uses require storage at or below freezing. This requirement drives up sustainment cost and limits the ability to perform certain types of Organizational level (O-level) repairs where freezer storage is not readily available. The fabrics also must be cured in an autoclave or through a Double Vacuum Debulk (DVD) procedure, which drives the need for expensive equipment to support repairs and also limits the location of where repairs can be performed. Only a few commercially available room temperature storage pre-pregs can be cured outside of an autoclave but these materials need to be cured at relatively high temperatures (>250°F) and frequently yield high porosity laminates. The required processing exposes the parent materials to conditions outside their operational temperature windows, which can result in degradation of material properties. Additionally, higher porosity causes poor laminate quality and can result in premature part failure.

Specifications Required: The pre-preg would be expected to meet the following requirements: can be produced as a plain woven and an unidirectional carbon fiber fabric, minimum shelf life of 1 year when stored in a hangar (100°F), reasonably tacky in order to perform repairs on part surfaces oriented vertically or horizontally, reasonably drape-able to form over complex curvatures with as small as a 4 inch radius or less, able to achieve a cure percentage of at least 95% when cured on aircraft, can be cured in an uncontrolled environment, ideally but not limited to 45-65% humidity at 65-75°F, cure time of 2.5 hours or less, cure cannot expose the part to temperatures greater than 200°F, porosity of laminate less than 4% by volume, wet glass transition temperature (Tg) of at least 230°F, but a higher wet Tg is desirable, exposure to common aircraft fluids should not cause degradation of mechanical properties greater than 11% of the original strength.

Technology Developed: CRG will reduce the logistical burden and complexity associated with performing composite aircraft repairs by providing composite prepreg systems with extended shelf-stability and compatibility with out-of-autoclave cure processes commonly used by aircraft maintainers. CRGs approach enables both stable ambient storage and lower-temperature, non-autoclave cure to simplify logistics and repair operations.

Warfighter Value: Long shelf-life prepregs with minimal storage requirements; safe handling and transport to forward repair sites; and reduced logistical and organizational burden to repair composite platforms

WHEN

	Contract Number: N68335-21-C-0779		Ending on: Mar 28, 2023	
Milestone	**Risk Level**	**Measure of Success**	**Ending TRL**	**Date**

HOW

Projected Business Model: CRG is projecting commercializing this technology and bringing it to market via licensing to current aerospace resin and prepreg suppliers and sustainment product providers. CRG currently is in discussion with possible commercial product outlets in the procurement chain and has worked with these organizations previously to supply products to the DoD and commercial market.

Company Objectives: Beyond the foundational NAVAIR development, CRG envisions application of this technology to the breadth of the defense industry currently fielding composite platforms. This includes both the DoD and prime OEMs. Immediate adopters to match the technology to application needs would be airframers such as Sikorsky, Lockheed Martin, and Northrup Grumman.

Potential Commercial Applications: The private aerospace sector, along with any small composite fabrication shops, will also have interest in this technology not only for repair but for primary structures. Room temperature shelf life would eliminate the need for freezer storage thus reducing the logistical footprint. It would also significantly extend the working life of the material, which would allow for the fabrication of larger parts without pushing the materials out time envelope. A capable, out of autoclave material would reduce the cost associated with composites fabrication by eliminating expensive autoclave operation. Materials could be cured using a conventional oven which would open composite fabrication to more companies.

Contact: Benjamin Vining, Research Scientist
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Sensors
(Navy STP Booth: 15 February)

Company	Topic	Project Title	SYSCOM
Voss Scientific, LLC	N181-075	Navy-Electronic Battle Damage Indicator (eBDI) Tool for Non-Kinetic High-Power Radio-Frequency (RF) Engagements	ONR
Physical Sciences Inc.	MDA14-001	Secure and Survivable Electronics and Software	NAVSEA
Hedgefog Research Inc	N193-147	Multi-Band Laser Source for Atom Interferometry	NAVAIR
Applied NanoFemto Technologies LLC	N20A-T012	Electromagnetic Interference (EMI) Resilient, Low Noise Figure, Wide Dynamic Range of Radio Frequency to Photonic (RF Photonic) Link	NAVSEA

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ONR Approval #DCN#43-10579-22

Topic # N181-075
Navy-Electronic Battle Damage Indicator (eBDI) Tool for Non-Kinetic High-Power Radio-Frequency (RF) Engagements
Voss Scientific, LLC

WHO

SYSCOM: ONR

Sponsoring Program: Office of Naval Research, Code 35

Transition Target: DOD Directed Energy and Counter Directed Energy Programs

TPOC: Ryan Hoffman
ryan.hoffman@navy.mil

Other Transition Opportunities: High Power Radio Frequency/ High Power Microwave (HPRF/HPM) field testing.
HPRF/HPM target system characterization.
HPRF/HPM attack detection and geolocation.
Target installation measurement and hardening.

Notes: Photo of the ADAM Gen I during anechoic chamber testing at Voss Scientific. Gen I package is 30 inches tall, 18 inches wide, and 18 inches deep. A large modular package was used for initial development of generation I, to allow testing, evaluation, and optimization of varying options for subsystems, electronics, custom RF sensors, and batteries.
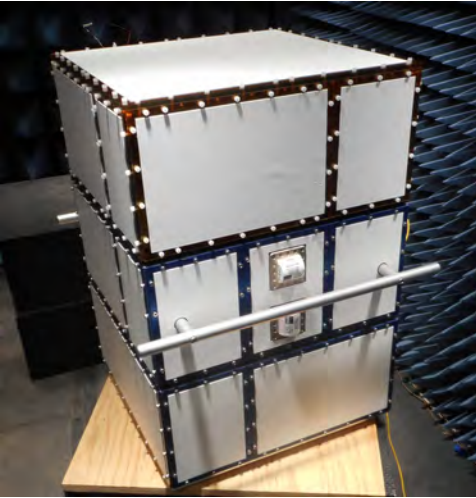

Image of Autonomous Damage Assesment Module (ADAM) Gen I, courtesy of Voss Scientific, LLC

WHAT

Operational Need and Improvement: Currently, evaluations of HPRF/HPM sources and other non-kinetic counter-electronic systems are impeded by a limited ability to accurately assess the level of electronic battle damage inflicted. This is because, in a non-kinetic engagement, there is no observable physical damage after the engagement. This lack of physical evidence requires alternative means to assess these electronic targets.

Specifications Required: What is needed is an Electronic Battle Damage Indicator (eBDI) which is compact, able to discern the target signals in the presence of background noise, have sufficient flexibility to measure a variety of targets, and provide rapid feedback of the effectiveness of the attack. In addition, it must be capable of surviving HPRF/HPM exposure and able to measure the output produced by the attacking source to validate the engagement. Likely sources are:
Wideband HPRF/HPM source detection 100-1000 MHz, pulse width 2 – 200 ns
Narrowband HPRF/HPM source detection 500 MHz – 5 GHz, pulse widths, 1 ns - 5 µs

Target measurement range of unintended emissions: 0.2 – 12 GHz

Technology Developed: The Autonomous Damage Assessment Module (ADAM) will measure and store RF emissions from a targeted facility, record critical parameters of an HPRF/HPM engagement source, measure target RF emissions after the HPRF engagement, determine if significant changes in the RF signature have occurred, and finally, transmit the results to a Remote Control Unit (RCU) within seconds-to-minutes after an engagement. The next generation of the ADAM module will be sufficiently compact, lightweight and inexpensive that its deployment is exceptionally straightforward and its utilization can be on a one-time, even disposable, basis.

Warfighter Value: ADAM provides post HPRF/HPM attack assessment of the target electronic systems to aid the warfighter in situational awareness and decision making after an engagement.

WHEN

Contract Number: N68335-19-C-0445   **Ending on:** Feb 16, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Proof of conept demonstration	N/A	Measured target signals at relevant range	3	1st QTR FY19
Demonstration of RF data link at 20 km	N/A	Measured full data transfer rate at 20 km equivalent range	5	1st QTR FY21
High power test of receiver system	N/A	No degradation of receiver system after HPRF exposure	5	3rd QTR FY21
Demonstration of temperature tolerance	N/A	Operation of system at temperatures to 130°F ambient	6	3rd QTR FY22
Field demonstration of brassboard system	N/A	Detected target effects during directed energy demonstration	7	1st QTR FY22
If option is fully funded, demonstration of compact system	Medium	Achieve similar performance as Gen I in a compact man portable package	8	4th QTR FY23

HOW

Projected Business Model: Voss Scientific will continue the development of the ADAM system and can meet initial low volume production requirements. We can also deploy and operate the ADAM as a part of Government or prime contractor sponsored directed energy source development / demonstrations. We have identified paths to reduce the SWaP of the existing system and move toward a design which can be covertly deployed if desired. As demand increases a manufacturing partner will be sought to ensure cost effective and timely delivery of high quality products.

Company Objectives: Voss Scientific is committed to the development of the ADAM technology and is seeking opportunities to support HPRF/HPM tests to enhance the ongoing development. At this time there is sufficient unfunded ceiling on the existing Phase II contract to assemble a more compact and covert version of the ADAM and deploy it in a future demonstration.

We are also interested in developing alternative uses of the technology, such as an inexpensive HPRF/HPM attack detection system.

Potential Commercial Applications: As directed energy capabilities become more common, both government and commercial sites can easily be targeted. A mass produced, low cost, ADAM system could be broadly deployed as an advanced warning system and damage assessment tool for HPRF/HPM attacks at a broad range of government and commercial infrastructure sites and data centers. In addition to early detection and identification of the nature of the attack, multiple devices deployed at a single installation will also provide geolocation of the source of the attack. In addition, the capability to detect low level signals can be used to design and evaluate electromagnetic hardening solutions to protect from these types of attacks.

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NAVSEA #2023-0423

Topic # MDA14-001
Secure and Survivable Electronics and Software
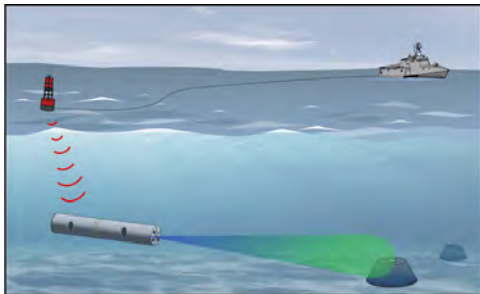Physical Sciences Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 495

Transition Target: Barracuda

Other Transition Opportunities: Potential applicability to PMS406 and PMS 408 UUV fleets (Swordfish, Sandshark; Kingfish, Knifefish, Razorback, Snakehead and Orca). Also seeking to explore application of this sensor architecture for operation in degraded visual environments (DVE).

Notes: The developed flash lidar system was initially designed to produce sharp, range-resolved images in the underwater environment. However, this technology is equally applicable to a wide range of remote autonomous vehicles (e.g. ground or air) operating in DVE (e.g. brown outs). The system has key attributes that improve performance in all these scenarios: rejection of background and near-field scatter, as well as inherent compression and encryption of the data for easier transmission from the remote platform to key decision makers.

Copyright 2022 [Physical Sciences Inc]

WHAT

Operational Need and Improvement: Unmanned underwater vehicles (UUV) require an imaging capability for operation in degraded visual environments (DVE) to detect potential targets and/or obstacles. These platforms further require a ranging capability to determine whether the detected objects are actionable (avoid, engage, or close). Such a capability would address a wide range of applications, including mine neutralization, autonomous docking, pipeline survey, search & rescue and obstacle avoidance.

Specifications Required: In order to address these applications, the sensor needs a wide FOV to retain situational awareness, while providing centimeter scale lateral and range resolution over a range of several meters. This data needs to be updated at video frame rates to support platform motion. The sensor further needs to achieve this capability in a package that is size, weight, power and cost compatible with platform payload requirements.

Technology Developed: The flash LIDAR system flood illuminates the field with a low-cost, pulsed laser diode. The reflected/scattered returns are modulated using a high speed, dynamic spatial filter which encodes the lateral and range information from the scene. The system leverages balanced detection to reject common mode solar background and backscatter while preserving hard target returns; the result is maximized range image contrast and minimized bit-depth requirements. The system records the data in a way that is inherently compressed and encrypted, supporting streamlined data transmission from the remote UUV platform to key decision makers.

Warfighter Value: The sensor platform effectively suppresses scattered and background light to achieve higher image quality in degraded visual environments than conventional flash LIDAR systems. This capability is provided in a package compatible with widespread deployment from small, low-cost autonomous platforms. Using this approach, risky and low visibility missions can be accomplished while allowing the warfighter to maintain a safe distance.

WHEN

Contract Number: N68335-21-C-0078   **Ending on:** Nov 15, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Prototype Build and Integration Complete	Low	In-Air Range cube reconstructions generated at expected update rates	4	4th QTR FY22
In-Water Testing	Medium	Successful integration into pressure housing and successful reconstruction of engineered targets and natural scenes in local waters of varying turbidity	5	1st QTR FY23
Spiral Design Upgrade Complete	Low	All issues identified in prior in-water testing addressed and demonstrated	5	3rd QTR FY23
System Demonstration at Government Sponsored Test Event	Medium	System performance demonstrated on government test range and ID algorithms used to identify target of interest	6	TBD

HOW

Projected Business Model: After successful demonstration of the flash lidar capability, PSI plans to pursue a program to integrate the sensor into a specific platform. Release to manufacturing and low-rate initial production will be performed in PSI's flexible manufacturing area, where PSI will support the platform vendor through integration activities.

Company Objectives: PSI has identified Barracuda as the initial target platform. We are currently looking to identify other platforms and applications for which this technology would be useful, with specific emphasis on DVE.

Potential Commercial Applications: The developed technology has applicability to a wide range of underwater applications including: mine detection, obstacle avoidance, automated UUV docking and pipeline survey. The sensor further has applicability to autonomous ground and air vehicles operating in dusty, foggy, or otherwise degraded visual environments.

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NAVAIR SPR Number: 2022-813

Topic # N193-147
Multi-Band Laser Source for Atom Interferometry
Hedgefog Research Inc

WHO

SYSCOM: NAVAIR

Sponsoring Program: TBD

Transition Target: TBD: Future Navy capabilities

TPOC: (301) 342-2535

Other Transition Opportunities: Military and civilian applications, where positioning, time keeping, and environmental sensing is needed. Our goal is to transition this technology into government and prime contractor systems for Position/Navigation/Timing (PNT) and other applications.

Image courtesy of Ventris / Science Photo Library and Northrop Grumman

Notes: The most challenging system components have already been built and their characteristics verified in the laboratory to conform or exceed the operational requirements. Upon completing the development, we will provide users with a turn-key, all-in-one laser-source solution for atom interferometry operation in field settings. Hedgefog Research specializes in providing innovative optical metrology solutions based on laser and structured light sources.

WHAT

Operational Need and Improvement: New sensors based on quantum technologies are being adopted in applications such as positioning and time keeping. A multi-band laser for atom interferometry is an enabling component of such systems. Currently, no robust, self-contained, turn-key laser source for atom interferometry is available for deployment on various mobile platforms.

Specifications Required: 19"W x 19"D x 3.5"H rack; 5 polarization maintaining, FC/APC fiber coupled outputs; Output optical power in the range of 10 ~ 300 mW out of the fiber, frequency-stabilized to within 10 kHz of the respective atomic transitions; intensity fluctuations below 0.1% of the output intensity; polarization stability to within 0.01 degrees; Locked laser bandwidth: threshold: <200 kHz, goal <100 kHz; weight threshold: <30 lbs, goal: <10 lbs; power threshold: <200W, goal: <50W.

Technology Developed: Multi-line Laser for Quantum Sensing (MuLQS) addresses the need for multi-band laser source for rubidium-based atom interferometry. We offer a compact, rugged, high-performance multi-wavelength laser suitable for deployment on mobile platforms, where a low-SWaP, ruggedized optical amplifier is combined with a stable, low-power master laser. Because the stability of all derived-frequency components primarily depends on the frequency stability of the master laser, this design offers significant benefits in simplicity, ruggedness, and commonality of noise sources. Furthermore, MuLQS reduces the use of free-space optical components in the design, making the system more compact, reliable, and less sensitive to misalignment. Due to its modular design, MuLQS also allows rapid exchange of system components for on-site servicing and maintenance.

Warfighter Value: Neutral atoms are ideal for various quantum sensing applications, serving as identical quantum objects suitable for inertial sensing, time keeping, and gravity sensing. The new generation of sensors based on the quantum technologies will be adopted in various military applications, where positioning, time keeping, and environmental sensing is needed. This technology will deliver an all-in-one solution suitable for integration in mobile platforms such as UAVs and ground vehicles.

WHEN

Contract Number: N68335-21-C-0355   **Ending on:** May 10, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Completion of MuLQS Gen.I prototype design	N/A	Design approved	3	4th QTR FY21
Completion of Gen.I MuLQS prototype assembly and component testing	Low	Prototype powered on in the lab	3	1st QTR FY23
Phase II system demonstration	Low	Prototype performance characterized	4	2nd QTR FY23
Design review of Gen.I prototype	Low	Design signed off	4	3rd QTR FY23
Development of preliminary user interface	Low	Main GUI functions demonstrated	4	2nd QTR FY24
Delivery of Gen.II prototype	Medium	Prototype received by Navy	5	3rd QTR FY24

HOW

Projected Business Model: LRIP in-house. Initial sales to DoD research labs (RDT&E). Collaboration with Primes (Northrop Grumman, Lockheed Martin, Boeing?) will be essential for platform transition. Current internal LRIP capability ~10 units/year. Production ramp-up may require manufacturing partners for full-rate production (FRP).

Company Objectives: HFR needs to establish partnership with a Prime DoD contractor to ensure MuLQS technology transition to the military mobile platforms. Our laser source can be sold as-is to research labs and R&D centers but integrating this technology as part of the platform on-board equipment opens much larger markets for HFR.

Potential Commercial Applications: Academic and industrial labs conducting research in atom interferometry can be the first target for MuLQS sales. This market, however, is limited. There may be much larger opportunity in precision civilian Position/Navigation/Timing applications. Entry to these markets will be enabled by the initial adaptation of MuLQS in military platforms.

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NAVSEA ##2022-0334

Topic # N20A-T012
Electromagnetic Interference (EMI) Resilient, Low Noise Figure, Wide Dynamic Range of Radio Frequency to Photonic (RF Photonic) Link
Applied NanoFemto Technologies LLC

WHO

SYSCOM: NAVSEA

Sponsoring Program:

Transition Target: To replace the bulk coax cable in Naval radar and sensor frontend systems with RF photonics links with lighter weight, higher bandwidth, smaller sizes, as well as less electromagnetic interference (EMI)

TPOC: (401) 832-6887

Other Transition Opportunities: High-performance communications systems in airplanes, satellites, as well as 5G/6G communication systems

Notes:

U.S. Navy image 180614-N-GF511-0020

WHAT

Operational Need and Improvement: US Navy aircraft carriers and ships need high-performance RF antennas and transmission and receiving systems with reduced SWaP, low EMI, and high bandwidth. The technology can significantly reduce the SWaP, EMI, and increase the bandwidth.

Specifications Required: Packaged RF photonic link transmitter < 10x10x30mm; 3dB bandwidth >20GHz; SFDR greater than 114dB·Hz2/3; > 10mA photocurrent generated at the receiver

Technology Developed: Demonstrated the feasibility of the technology
Obtained optimal designs
Optimized the device fabrication parameters
Designed the high-performance PV cells.

Warfighter Value: Reduce the SWaP, EMI, and enhance the bandwidth for warfighters' surveillance and communication systems.

WHEN

Contract Number: N68335-22-C-0196   **Ending on:** Feb 20, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I final report	N/A	Demonstrate the feasibility	3	1st QTR FY22
Phase II base	Low	Demonstrate a prototype	4	2nd QTR FY23
Phase II option I	Low	Package the prototype	5	2nd QTR FY24
Phase II option II	Low	Demonstrate the prototype in a subsystem	6	2nd QTR FY25

HOW

Projected Business Model: Develop prototypes in the STTR Phase II program, perform technology transition, and collaborate with prime contractors and integrate the technology with their systems

Company Objectives: Develop, mature, and commercialize the technology for the defense and commercial communication applications.

Potential Commercial Applications: 5G/6G communication systems;
RF remote sensing
Radio astronomy

Contact: Dr. Xuejun Lu, Co-founder
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Company	Topic	Project Title	SYSCOM
Colvin Run Networks, Inc.	N204-A02	Digital Logistics	ONR

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ONR Approval #DCN# 43-10521-22

Topic # N204-A02
Digital Logistics
Colvin Run Networks, Inc.

WHO

SYSCOM: ONR

Sponsoring Program: Office of Naval Research (ONR)

Transition Target: Director for Surface Ship Maintenance, Modernization and Sustainment (NAVSEA21), Commander Navy Regional Maintenance Centers (CNRMC)

TPOC: Woei-Min Lin
woei-min.lin@navy.mil

Other Transition Opportunities: Public shipyards, NAVAIR PMO's (e.g. PMA 275 V-22 Osprey, PMA 290 P-8A Poseidon), any DOD Maintenance/Logistics/Sustainment Engineering Organizations

Notes: The Secure Hyper-Intelligent Predictive Maintenance Analytics with Technical Enhancement (SHIPMATE) Project Management Decision Aide (PMDA) was developed with multiple RMCs and dozens of active project managers and ship-building specialists. The SBIR prototype was built on the MicroStrategy Business Intelligence (BI) platform, rated #1 for Enterprise Analytics by Gartner in May 2022. That same month, Colvin Run was named the MicroStrategy Federal Partner of the Year for our work in taking BI to CI - Curated Intelligence. Colvin Run is actively developing a potential SBIR Phase III on the success of this work with the Navy and Air Force, in some cases leveraging existing Agency technology investments. Colvin Run was named a Top 10 Startup by the US Air Force, and has used the SBIR program to spin out a new IoT cybersecurity product, currently raising private capital and in several commercial pilots.

As-Is: Legacy Systems
Disparate structured and/or unstructured files and databases, with burdensome "tools" that increase data related workloads.

To-be: Future State
Intuitive, scalable application that eliminates data related workloads.

Colvin Run Networks

WHAT

Operational Need and Improvement: The US Navy is actively investing in ways to improve ship availability from its fleet maintenance and modernization initiatives. The Government Accountability Office (GAO) released a paper in May 2022 stating that overall reporting transparency could address the $1.8 Billion Navy Maintenance Backlog. Data-driven Workflow bottlenecks create unnecessary downtime, waiting, and uncertainty, with opaque data and document issues. The SHIPMATE PMDA supports the Navy maintenance mission to maintain ships and systems reliably, on schedule, and under budget with an affordable, agile software solution built on leading commercial technology. The PMDA empowers PM's to ensure a balance of resources with anticipated workload, focusing on oversight rather than manual data mining, effectively providing situational awareness while eliminating burdensome and repetitive Excel and PowerPoint re-work.

Specifications Required: Software platform deployable to cloud or on-premise IT networks. Per customer discovery interviews and user-centered design work, Project Management maintenance oversight processes include time-intensive manual information supply chains, spending lots of time on manual data preparation and manipulation. SHIPMATE provides data analytics capability to effectively eliminate most if not all data manipulation for the purpose of enhancing the decision-making process for ship availability oversight.

Technology Developed: Colvin Run developed a series of applications, delivered through interactive browser-based dashboards, that answer critical questions PMs need to understand based on ship location and contractual work item information. The data framework enables integration of different data sources and curates them – e.g. varying contractor data formats, maintenance vs. modernization projects in the same ship, and more – such that the PM can address conflicts and have visibility into decisions impacting cost and schedule. SHIPMATE was built on MicroStrategy software, #1 for Enterprise Analytics per Garner, so it can be rapidly deployed with existing Authority to Operate (ATO).

Warfighter Value: Ship availability (AVAIL) delays cost the Navy approximately $300K/day per ship, directly impacting both operations and contingency preparedness. RMC stakeholders estimated they could increase on-time AVAIL completion and significantly reduce Days of Maintenance Delay (DMD), potentially saving the U.S Navy an estimated $264M+ annually across all RMCs.

WHEN

Contract Number: N68335-21-C-0283   **Ending on:** Sep 26, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Colvin Run engages with Southwest Regional Maintenance Centers after meeting at FMMS	Low	Customer engagement	4	4th QTR FY22
Initial SHIPMATE Prototype Delivered	Low	Demonstration	5	1st QTR FY23
SHIPMATE Prototype Iteration	Low	Incorporate Navy data sets	6	2nd QTR FY23
SHIPMATE Prototype developed and delivered with Navy-provided data in a secure cloud environment.	Low	SBIR Phase III Transition underway via SEA21D	7	3rd QTR FY23

HOW

Projected Business Model: For Navy transition, Colvin Run targets direct SBIR Phase III engagement with Navy in a bundled software and services contract. The solution would ideally include the SHIPMATE MicroStrategy embedded software solution, or can be delivered on the software of chouce depending on Program requirements. Colvin Run seeks opportunities for continued use case development and data engineering services support to evolving NAVSEA systems & requirements. We can also license the software to prime contractors if needed. While this is initially a highly tailored build for the Government, the components and IP developed will have applications to many agencies and companies for deployed Decision Aid solutions.

Company Objectives: We will continue to identify avenues to deploy SHIPMATE into later stage developments beyond Phase II, targeting Phase III transition to Navy Programs of Record such as the Ship Maintenance Data Improvement Initiative (SMDII). SHIPMATE has broad Decision Aid applications for Curated Intelligence that are critical in the global trade and commercial shipping security, maintenance, and compliance contexts.

Potential Commercial Applications: SHIPMATE Decision Aides support limitless Use Cases: Ground vehicles, Aerial vehicles, Submarines, Commercial or residential buildings, Manufacturing facilities, Oil and gas wells, Green energy assets, Financial assets, and more. SHIPMATE has applicability anywhere leaders, managers, and their stakeholders seek to modernize Information Technology across the enterprise, contracting, initiative implementation, or advance their business processes.

Contact: Nikhil Shenoy, Chief Executive Officer
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Company	Topic	Project Title	SYSCOM
Gloyer-Taylor Laboratories LLC	N201-048	MK 48 Torpedo Composite Fuel Tank	NAVSEA

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DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.
NAVSEA #2022-0348

Topic # N201-048
MK 48 Torpedo Composite Fuel Tank
Gloyer-Taylor Laboratories INC

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 404, Undersea Weapons Program Office

Transition Target: Mark-48 Torpedo composite fuel tank replacement

TPOC: (401) 832-4241

Other Transition Opportunities:
Any torpedo or submersible; hydrogen electric aircraft, ships, trucks
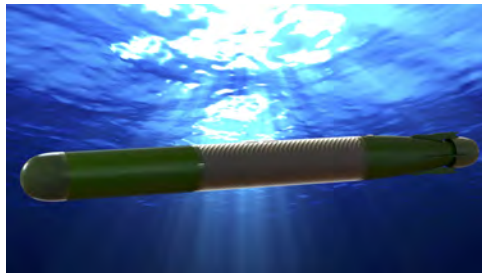
Mark-48 torpedo composite fuel tank replacement delivers 32% greater torpedo range

Notes:
The Mark-48 torpedo composite fuel tank replacement improves fuel utilization via an innovative design that keeps sea water and fuel separate for most of the torpedo operation, delivers significantly greater torpedo range. In addition, the composite fuel tank design is 16.2% lower weight, operates at greater depth, eliminates corrosion, reduces parts count, significantly reduces maintenance costs and life cycle cost and extends operational life at equivalent part cost. This technology can be applied to any torpedo or submersible and provide same/similar benefits.
GTL has also developed a dewar-tank feed system for cryogenic fuels and propellant applications by combining our Ultralight tank technology with our advanced composite fuel tank technology. When used for electric aircraft liquid hydrogen storage, GTL's technology provides 10 times more hydrogen as compared to state-of-the-art metal LH2 dewar-tanks. GTL's Ultralight Dewar-Tank can achieve a gravimetric index of >70%.
When optimized in a VTOL aircraft GTL's LH2 Dewar can provide 48 hours of hover time and when optimized in a Sea Stallion type aircraft 12 hours of flight time and 4X the range of fossil fuel-based helicopters.
A LH2 powered High-Flier communications aircraft drone would be capable of operating at altitude for several weeks without refueling.
In a commercial aircraft application would result in a reduction of 50% of the cost per passenger mile. These endurance performance improvements combined with a significant reduction in parts count and maintenance requirements dramatically reduces operating costs. Added to all of these benefits, a hydrogen electric powertrain's exhaust produces nothing but water.

WHAT

Operational Need and Improvement:
There is a critical need for greater torpedo range at equivalent or lower cost.

Specifications Required:
>1200 ft seawater depth
20% increase in torpedo range
Increase fuel tank volume: >15% Increase useable fuel; 10% increased fuel utilization
10% weight reduction in fuel tank section
Decrease seawater/Otto fuel mixing during maneuvers
Decrease Corrosion
Reduce maintenance by 30%
Reduce need for replacement by 15% over life
Ensure adequate bonding between composite and metal parts
Meet fuel tank requirements (pressure, axial & radial force, temperature, vibration, shock, impact, corrosion resistance, atmospheric control, hazards to electromagnetic radiation on ordnance, etc)

Technology Developed:
High performance Mark 48 Torpedo Fuel Tank Replacement incorporating composite structure design

Warfighter Value:
>>1,200 ft seawater depth
Significant increase in torpedo range
Significant increase in useable fuel
Unique design improves fuel utilization
Composites are insensitive to corrosion. Current design after the phase I base effort reduces maintenance and replacement needs by >50% compared to aluminum design.
Composite design mitigates galvanic corrosion risk to surrounding parts.
Design uses proprietary bonding technology to ensure adequate bonding between composite/metal.
Composite tank design exceeds capabilities of current aluminum design
When used for electric aircraft liquid hydrogen storage, GTL's technology provides 10 times more hydrogen for same weight. Resulting in a dramatic reduction in cost and a significant increase in range and flight time.

WHEN

Contract Number: N68335-22-C-0188   **Ending on:** Jan 26, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Base Effort DVT Unit Fabricated	Low	DVT Unit fabricated with initial fuel flow testing	4	1st QTR FY23
Base Effort DVT Unit Testing	Low	Pressure load testing performed with Navy	5	2nd QTR FY23
Option 1 Prototype Fabricated	Low	Components fabricated with initial checkout testing	5	4th QTR FY23
Option 1 Prototype Testing	Low	Qualification testing performed with Navy	6	2nd QTR FY24
Option 2 Additional Prototypes	Low	Components fabricated with initial checkout testing	6	1st QTR FY25

HOW

Projected Business Model:
Our business model is to sell integrated structures, specialty structures, fuel storage tanks, feed systems, thermal control systems, engines, propulsion systems, high temperature sensors, composite structural nervous systems and subsystems to primes/system integrators for the torpedo, submersibles, sea surface ships and commercial boat markets; Also Hydrogen dewar feed systems for hydrogen electric VTOL and winged aircraft markets; ground transportation markets and to also develop full up aircraft and space systems on our own commercially as we obtain sufficient investment capital and program funding.

Company Objectives:
Develop, validate and productize breakthrough technologies that provide game changing performance capabilities to the war fighters and other customers.

Potential Commercial Applications:
Storable propellant tanks & feed systems. Interceptor & missile Integrated structure/propellant tanks. Liquid hydrogen (LH2) dewar feed systems for boats, ships, aircraft, heavy duty trucks and trains. High-Flier communications LH2 electric powered drones. LH2 infrastructure, distribution, production and liquefaction systems. Cryogenic propellant space launch vehicles, spacecraft propulsion, Near Earth Object landers, Space Tugs, Transfer stages. "Anywhere in the world within One Hour" Point-to-Point transport vehicles.
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