

Topic: N151-053

Bodkin Design & Engineering LLC

Coastal Battlefield Reconnaissance and Analysis (COBRA) Multi-Spectral Illuminator

The Navy has added mine-detecting capability, called Coastal Battlefield Reconnaissance & Analysis (COBRA), to its MQ-8B Fire Scout UAV. Bodkin Design & Engineering (BD&E) has developed a gimbaled, multispectral, small Size, Weight & Power (SWaP) illumination source to be evaluated in conjunction with the COBRA camera to demonstrate its ability to meet COBRA program requirements for Night Time Detection to enhance 24-hour surveillance capability. This illumination source utilizes flashlamp technology that can be used with any multispectral or broadband sensor. BD&E is an innovative engineering company with a 25+ year history of designing successful electro-optical systems for government & commercial applications. Our goal is for our illumination technology to become the COBRA program illuminator system of choice for Night Time Detection. We seek teaming arrangements with government organizations and primes to test and validate system capabilities and integrate the technology.

Technology Category Alignment:

EO/IR Components for sensing, transmission and communication

Advanced Electronic Protection Techniques and Technology

Unmanned Ground and Sea Vehicles

Electro-Optical/Infrared (EO/IR)

Sensors, Electronics and Photonics

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SYSCOM: NAVSEA

Contract: N00024-17-C-4034

Booth: 600

Room: Club Room West

Presenting: Apr 11th at 3:20 PM

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00024-17-C-4034

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2018-0562

Topic # N151-053

Coastal Battlefield Reconnaissance and Analysis (COBRA) Multi-Spectral Illuminator
Bodkin Design & Engineering LLC

WHO

SYSCOM: NAVSEA

Sponsoring Program: PMS 495, Mine Warfare Program Office

Transition Target: Coastal Battlefield Reconnaissance and Analysis (COBRA) BLOCK II

TPOC:

(850)234-4994

Other transition opportunities: Multi-spectral imaging capabilities and the associated illumination will be utilized to expand current terrestrial sensing to be operational 24 hours a day. This technology developed for the Navy can also find application in Army mine-detection programs.

The illuminator can be matched to any airborne or shipborne surveillance equipment, providing maximum range with minimal power. It can also serve to improve sustainability by using common hardware with the COBRA system.

Commercial applications include farm and crop monitoring, geological mapping, terrestrial imaging, ocean sensing and research, as well as numerous law enforcement applications.

The stabilized gimbal developed under this contract has applications in commercial cinematography for both lighting and filming outdoor scenes.



Image Courtesy PEO (PMS 495). Used by permission.

WHAT

Operational Need and Improvement: This technology was developed for the AN/DVS-1 Coastal Battlefield Reconnaissance & Analysis (COBRA) airborne payload, which will be carried on the MQ-8 Fire Scout UAS (PE 0305231N/MQ-8 UAV) operating from a Littoral Combat Ship (LCS) as part of the Mine Countermeasures (MCM) mission package (MP) under PMS 495 to allow 24-hour operation.

Specifications Required: The Navy required a small form factor, light weight, low power, and medium repetition rate broadband illuminator, robust enough to be integrated onto MQ-8 Fire Scout. Additionally, the illuminator needs to supply the required light levels in a short duration to minimize image blur.

Technology Developed: A robust, low SWaP, UAV compatible, long-range searchlight illuminator operating on a stabilized gimbal, which provides the ability to scan and illuminate targets at ranges greater than 1km.

BROADBAND LIGHT SOURCE-Illumination from UV to NIR for various types of surveillance equipment. High radiance in the peak sensitivity bands of the sensors. Permits nighttime operation.
FOCUSED BEAM-Illumination matched to field-of-view of the telescope. Reduces power consumption.
STABILIZED GIMBALS-Eliminate fluctuation in image brightness due to platform wobble
SCANNING GIMBALS-Precisely track imaging telescope to provide light in field-of-view of telescope
FLASH ILLUMINATION-Very bright, reduces power requirement, freezes motion

Warfighter Value: The multispectral illuminator developed by Bodkin Design & Engineering will increase survivability by permitting nighttime operations. It will also reduce operational costs by allowing the sensor to be used 24 hours a day, which will reduce deployment time.

WHEN

Contract Number: N00024-17-C-4034 **Ending on:** September 15, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Develop & characterize water-cooled Flash lamp	N/A	Meet or exceed COBRA requirements for Night Time Detection Performance	3	October 2017
Develop fast/large/high-stability gimbal	N/A	Obtain data verifying that the BD&E gimbal mitigates platform wobble, reduces fluctuation in image brightness and reduces image blur.	4	January 2018
Mate system to COBRA scanner	Med	Co-boresight camera and lamp; Demonstrate stabilized and synchronized tracking; Achieve high-fidelity imagery during tower testing	5	January 2019
Conduct Flight test & collect data	Low	Demonstrate sufficient illumination for nighttime operation of the COBRA system	6	September 2019

HOW

Projected Business Model: We propose to follow the same successful strategy that we have used in our previous SBIR programs. Under that approach, we designed, developed and patented a unique uncooled infrared camera system. We presented the camera to the market place and demonstrated the viability of the patented technology. Finally, the product line and patent were sold to BAE, who could more effectively market the technology. They continue to produce products under that patent today.

Company Objectives: Our goal is for our illumination technology to become the technology of choice for nighttime target illumination/detection and identification. This technology is intended to be inserted into the COBRA BLOCK II (RFI Sol. No. N00024-16-R-6312). Under that solicitation a 5 year CPIF contract was anticipated for award in 2017 (past). We are teaming with Areté as the integrator. We are both currently funded under SBIR research funds.

BD&E is a product development and engineering firm. Our forte is innovation. We help all of our client companies to more successfully satisfy their markets. We have successfully teamed in the past with primary manufacturers to bring our innovations into the marketplace.

Potential Commercial Applications: BD&E developed a HyperPixel hyperspectral camera under a previous Air Force SBIR. This staring imager has found many applications in agriculture, especially when deployed on UAVs. One of the problems in using this or any system in the field, however, is the variability of natural light. The small Size, Weight and Power of the illumination source developed under this contract is an ideal solution to this problem.

This UAV-deployed stabilized gimbal will also find use in the Cinematography industry. We can use the gimbal with our other imaging instruments to increase our value-added offering.

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Topic: N151-038

Intellisense Systems, Inc.

Submarine-Deployable Weather Sensor

Intellisense Systems Inc (ISI) has developed a new Submarine-Deployable Weather Sensor (SDWS) based on a new design that integrates ISI's miniature weather sensor electronics with proven deployable buoy systems. Specifically, the innovation in ISI's compact and robust weather sensor design integrated through novel packaging within a mature deployable buoy architecture will enable a low-cost, small sensing device. This device will accurately measure weather parameters above the ocean's surface after deployment at depth. ISI has demonstrated the feasibility of SDWS by integrating and packaging a basic sensor buoy prototype that can be deployed from underwater and accurately collect weather data leveraging multiple designs from existing weather sensor products to reduce risk. As a final product, the SDWS will provide a simple means for submerged submarines to measure real-time surface weather parameters to aid in both navigation and to define the current atmospheric state.

Technology Category Alignment:

Information Collection/Management

Survivability

Guidance, Navigation & Control (GN&C) and Data Links

Space and Terrestrial Environmental Monitoring

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SYSCOM: NAVSEA

Contract: N00024-17-C-4035

Booth: 601

Room: Club Room West

Presenting: Apr 11th at 3:10 PM

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO-SUB

Transition Target:

TPOC:

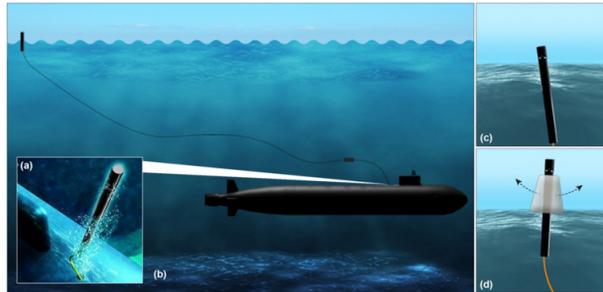
(401)832-7032

Other transition opportunities:

Military applications of the SDWS can include both short and long-term real-time ocean weather monitoring, improving sea vessel and aircraft navigational safety, situational awareness with added imaging capability, and potential monitoring of the ocean environment for bio-chemical and radiological hazards.

Notes: The buoy is ejected from the existing launch tube (a) of a submerged submarine (b) and the buoy rapidly floats to the surface as the tether uncoils. The buoy sensor compartment remains closed during ascent (c) and opens automatically upon reaching the surface (d) to inflate a float and allow for real-time weather measurements above the water surface.

*Intellisense Systems Inc (ISI) is a wholly-owned subsidiary of Physical Optics Corporation



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WHAT

Operational Need and Improvement: The Navy is developing tools requiring access to meteorological data, such as humidity, wind, and temperature, for use aboard submergible vessels. The capability proposed would be part of a command tool that would improve targeting, command and control of mission payloads, and situational awareness while reducing submarine exposure and detection risk.

Specifications Required: The Navy desires an innovative approach to obtain the following weather information in real time – humidity, wind speed and direction, atmospheric pressure, and sea/air temperature. Any sensors used have to be survivable on a deep-diving vessel, although data could be collected on the surface. Current state-of-the-art sensors are not able to survive deep submergence. Cost-effective disposable buoys, which make use of the existing ability to launch expendable buoys, are a viable solution.

Technology Developed: The Submarine-Deployable Weather Sensor (SDWS) is based on ground-breaking micro-integration of a wide range of ISI-developed and commercial off-the-shelf (COTS) sensor technologies into a buoy platform. The sensor will consist of a compact buoy that can be deployed using existing submarine launching systems with a full solid-state (no moving parts) weather sensing suite on board, including a humidity sensor, sea and air temperature sensors, a barometric pressure sensor, a wind velocity and direction sensor, and sea state sensors. All sensors are either ISI-developed mature components or commercial off-the-shelf (COTS) components with proven reliability and accuracy.

Warfighter Value: The innovative SDWS device will directly meet the needs of military, defense, and commercial contractors in a variety of ways beneficial to their operational abilities. The SDWS will provide a simple means for submerged submarines to measure real-time surface weather parameters to aid in both navigation and to define the current atmospheric state. The buoy provides a cost-effective, maintenance-free, on-demand solution that only needs to be deployed when the need arises.

WHEN

Contract Number: N00024-17-C-4035 **Ending on:** April 6, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Benchmark sensor demonstrated	N/A	Sensors reporting to laptop	TRL-3	February 2016
Sensor prototype tested	Low	Accurate weather reporting	TRL-5	September 2018
Fully assembled buoy demonstrated	Med	Accurate reporting in ocean environment	TRL-6	October 2018
TEMPALT testing completed	Med	TEMPALT certification	TRL-7	January 2020

HOW

Projected Business Model: Intellisense System Inc's (ISI's) technical, business development, and corporate teams will determine the best course of action for manufacturing the SDWS product with the assistance of a buoy OEM subcontractor. The sensor module, with precise electronics and mechanical sensor assembly, aligns well with ISI's internal production capabilities which include multiple weather sensing products. ISI envisions building, testing, and qualifying the weather sensors and supplying them to a buoy OEM who will integrate them into the buoy for final assembly and distribution. With this clear division between ISI's weather sensor experience and the specialized experience of an established buoy manufacturer, product quality is ensured and production cost is minimized.

Company Objectives: With ISI's critical involvement in weather sensing technologies, as well as our track record of transitioning prototype technologies into production-level hardware for military and commercial applications, we are uniquely positioned to successfully develop and commercialize the SDWS technology. The proposed buoy design heavily leverages ISI's specific experience in developing and integrating a vast array of miniature sensor components for our ruggedized micro weather sensor (MWS). The MWS is a fully autonomous, highly integrated sensor device that possesses measurement capabilities greater than that of the highly capable TMQ-53, a \$250k, 250 lb device currently used as the "portable" weather station by the military. At ~3 lb, the MWS is packaged in a ~5.5 in. long x 5.5 in. wide x 6.5 in. tall housing, contains no moving parts, and has a production cost an order of magnitude less. The MWS was initially developed through a Phase I/II AF-SOCOM SBIR program beginning in 2010 and is now in production as an Air Force program of record.

Potential Commercial Applications: The SDWS will bring to market a low-cost, compact sensing device that can accurately measure meteorological and oceanographic (METOC) data. Governmental, commercial, and nonprofit organizations will benefit from SDWS by having the ability to perform ocean-based weather forecasting, enhanced navigation, air pollution monitoring, air quality control, security, and surveillance with a single, integrated, relatively low-cost sensing device.

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Topic: N11A-T021

Intelligent Automation, Inc.

Cognitive Ultra-Low Power Sensor System (CUPSS)

Intrusion detection and extended surveillance are important to all levels of security from monitoring high valued assets in transit to providing perimeter security at a Forward Operating Base. IAI - a R&D company with extensive experience in RF sensing has developed a comprehensive, low-cost, low-power sensor field and cognitive sensor manager that can discover and task other sensors and supporting analytical services to enable area and container situational awareness for extended periods of time. Using a variety of sensing modalities, the Cognitive Ultra-low Power Sensor System (CUPSS) improves perimeter security, provides integrated surveillance, reduces false alarms, and integrates all modalities of sensors.

Technology Category Alignment:

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SYSCOM: SSP

Contract: N00030-17-C-0019

Booth: 303

Room: Club Room West

Presenting: Apr 11th at 3:00 PM

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00030-17-C-0019

WHO

SYSCOM: SSP

Sponsoring Program: Not Specified

Transition Target: Base Protection

TPOC:

SSP.SBIR@ssp.navy.mil

Other transition opportunities:

ISR, Perimeter Security, Border Security, Airport and Other Critical Infrastructure Security

Notes:

ARGUS - The RF sensing modality of CUPSS

CUPSS - Cognitive Ultra-low Power Sensor System

PIR - Passive Infrared



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WHAT

Operational Need and Improvement:

The Navy wants to increase the use of minimal infrastructure, rapidly deployable security solutions at its bases and facilities.

Specifications Required:

- To enable area and container situational awareness for extended periods of time
- Algorithm, firmware, and software improvements to detection performance and reduction in false and nuisance alarms
- Sensors should be able to function alone or in collaboration with other multimodal sensors and image analytics to produce actionable intelligence

Technology Developed:

Intelligent Automation Inc. (IAI) is developing an ISR sensing system called Cognitive Ultra-low Power Sensor System (CUPSS) that provides long-term unattended perimeter security and intrusion detection to protect sensitive areas and assets. CUPSS supports rapid deployment and can reliably interface with existing infrastructure or operate as standalone system. It can be used as a temporary stand-in fix for perimeter breaches. Once a trigger occurs, additional sensors (such as PIR, EO, and infrared) and analytic services (sensor fusion) are activated as required to develop situational understanding. Improvements will be made to the system which will reduce the number of false and nuisance alarms. We will investigate: higher transmit power, polarization diversity, sensor height, overlapping detection zones, and enhanced detection algorithms.

Warfighter Value:

- Power efficient – reduces maintenance and logistic support
- Scalable – several nodes can form a mesh network
- Variety of sensing modalities – including radio, thermal, and vision-based sensors
- Comprehensive physical security – provides early threat warning and continued surveillance for long periods of time

WHEN

Contract Number: N00030-17-C-0019 **Ending on:** December 4, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
System Characterization	Low	Data collection and analysis completed; Enhanced system design completed	3-4	December 2017
System Enhancements, Hardware Development and Lab Testing	Low	Prototype system fabricated	4	December 2018
System Enhancements, Hardware Development and Lab Testing (Option1)	Low	Production system fabricated and FCC certification completed	5	July 2019
Demonstration in Relevant Environment (Option 2)	Low	The enhanced CUPSS system will be assessed/demonstrated in one or more relevant environments	6	March 2020

HOW

Projected Business Model: This technology will be integrated into IAI's Argus product line which includes direct sales model to commercial and government entities as well as establishing subcontracting relationships with prime security equipment vendors to supply CUPSS equipment, and support system integration.

Company Objectives: Develop technologies to augment the Argus product line that will make IAI more competitive to both commercial and government customers.

Potential Commercial Applications: The technologies developed under this program will be integrated into IAI's Argus product line. The technology will be used to enhance the product line's detection ability and integrate sensor fusion into our Argus enterprise software that is currently being used by commercial customers for physical security and intrusion detection.

Topic: N161-025

Sonalysts, Inc.

Digital Early Warning Receiver (EWR) for the Next Generation Submarine Electronic Warfare (EW)

Sonalysts is developing a reliable, modular, and scalable Digital Early Warning Receiver (DEWR) that will integrate with the digital foundation of submarine Electronic Warfare (EW). The system leverages modern integrated circuit (IC) video detectors and high speed A/D converters to capture real-time pulsed RF data. DEWR implements innovative DSP algorithms for improved pulse characterization and emitter feature extraction. The technology has been developed and matured through multiple SBIR awards, and can be transitioned to the fleet using a low-risk phased implementation plan. DEWR is targeted for undersea warfare platforms, but is easily extensible to surface naval missions. Sonalysts is an employee owned small business with over 40 years of demonstrated performance in a variety of technical disciplines, including electronic warfare and RF systems development.

Technology Category Alignment:

RF Components for sensing, transmission and communication

Advanced Electronic Protection Techniques and Technology

Cognitive/Adaptive Capabilities

Modular/Open/Reconfigurable Architectures

Radio Frequency (RF) (non-EW)

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SYSCOM: NAVSEA

Contract: N00178-18-C-8018

Booth: 104

Room: Club Room West

Presenting: Apr 11th at 3:30 PM

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00178-18-C-8018

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2018-0619

Topic # N161-025

Digital Early Warning Receiver (EWR) for the Next Generation Submarine Electronic Warfare (EW)

Sonalysts, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO Subs

Transition Target: The Digital Early Warning Receiver (DEWR) is targeted for TI-20 TEMPALT integration with the AN/BLQ-10 submarine EW system. The open and modular interfaces make it suitable for fielding on all submarine classes starting in TI-22.

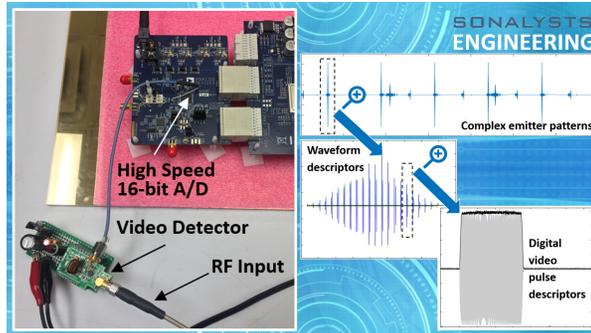
TPOC:

(401)832-4880

Other transition opportunities: The primary target for DEWR transition is submarine electronic warfare

platforms, but the technology is also applicable to any application where real-time capture and characterization of pulsed electromagnetic energy is desired. This creates additional opportunities for transition to non-submarine Navy platforms like surface vessels (PEO Ships), aircraft (NAVAIR), and unmanned vehicles, all of which rely on spectrum situational awareness and decision making.

Notes: Sonalysts produced a bench-top prototype of the DEWR principles during the Phase I award. The prototype consisted of a COTS video detector, high speed analog-to-digital converter, and data extraction over Ethernet. Digital signal processing algorithms were developed to capture complex emitter patterns on macro-time scales, burst waveforms at intermediate time scales, and pulse descriptor words at micro- and nano-time scales.



Sonalysts DEWR Phase I Prototype and Digital Video Data Products

WHAT

Operational Need and Improvement: Modern submarine EW systems are evolving to use digital frameworks that distribute real-time data products to reconfigurable consumers. Legacy submarine Early Warning Receivers (EWRs) are based on crystal video detector technologies, which have not followed the trend to digital architectures. Furthermore, analog EWR techniques are challenged by the intrapulse modulations and complex waveforms typical in today's transmitters. The submarine fleet is in need of a Digital EWR (DEWR) that will perform against modern emitters and provide digital data products to the control room, the Electronic Support (ES) room, and the AN/BLQ-10B (V) system.

Specifications Required: The DEWR is considered a "safety of ship" sensor item and must work at all cost. The receiver must exhibit tremendous sensitivity and dynamic range over all operable frequencies. The DEWR must operate dense in emitter environments, process digital data from high PRF waveforms, and be resilient to strong CW interferers. The system must interface with different mast inputs and provide Pulse Descriptor Words (PDWs) to configurable downstream data consumers.

Technology Developed: Sonalysts is developing a reliable, modular, and scalable Digital Early Warning Receiver (DEWR) that aligns with the digital architecture of modern submarine EW. The system leverages modern integrated circuit (IC) video detectors and high speed 16-bit A/D converters to capture real-time pulsed RF data on wide acceptance bandwidths across all frequency bands. This is achieved without compromising the dependability and familiarity of the legacy system. Digital video output is processed on reconfigurable FGPA cards to satisfy legacy safety of ship requirements, generate PDWs, perform pulse feature extraction, and distribute digital data products. The technology has been developed and matured through multiple SBIR awards.

Warfighter Value: The Sonalysts DEWR solution allows the submarine warfighter to fully integrate EWR functions with other digital subsystems and mission areas. The system provides increased frequency resolution, improved sensitivity across major threat bands, and a tunable notch filter to mitigate Continuous Wave (CW) interferers. With Sonalysts' modular architecture, the Navy can also realize growth capabilities such as EWR cueing of narrow band receivers, downstream threat analysis routines, and advanced third party algorithms.

WHEN

Contract Number: N00178-18-C-8018 **Ending on:** February 2, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I Base period proof of concept	N/A	Developed a workign breadboard with video detection, high speed A/D, and digital data recording	TRL 4	January 2017
Phase I Option period algorithm demonstration	N/A	Developed and exercised DSP algorithms on recorded data from real emitters	TRL 4	July 2017
Phase II Base prototype (low frequency)	Low	Development of a single low frequency receiver channel with real-time FPGA data processing	TRL 5	February 2019
Phase II Option prototype (high frequency)	Low	Incorporation of a high frequency receiver channel with real-time FPGA data processing	TRL 5	February 2020
Phase II Test Campaign	Low	Execution of factory acceptance testing (FAT) at a major prime contractor facility and/or government test site	TRL 6	February 2021
Submarine TEMPALT	Med	Fielding of a TEMPALT system on-board a US Navy submarine	TRL 7	June 2021

HOW

Projected Business Model: Sonalysts has a long and successful history of transitioning innovative technology solutions to cost effective fielded programs outside of the SBIR program. Our current Commercialization Achievement Index score is 90%, and we continue to improve our SBIR technology transition to Government agencies, prime defense contractors, and industry customers. Sonalysts has a corporate business development group with more than 20 years of experience in the development and marketing of highly technical products and solutions, and has five Phase III SBIR contracts awarded since 2002. Sonalysts is committed to enhancing both our SBIR commercialization success as a technology generator by forming teams with other small businesses and defense primes to ensure we achieve the transition readiness level goal for this SBIR projects.

Company Objectives: Sonalysts is determined to transition the technology developed under this SBIR by incorporating it within our core business lines and by exploring its inclusion within major Government acquisition programs. Core business areas include operations research, system engineering, test and evaluation, advanced training systems development, and instructional services on major acquisition and ancillary support programs through the DoD laboratories and industry. Sonalysts' annual self-investment in technology initiatives, personnel training, direct marketing, bid and proposal, and other commercialization efforts are extraordinary for a firm of our size.

Potential Commercial Applications: The commercialization strategy for SBIR N161-025 Digital Early Warning Receiver (DEWR) will prioritize naval submarine applications during initial development. However, Sonalysts foresees additional naval applications with surface warfare ships, unmanned vehicles, and ELINT/SIGINT data collection mission. In addition, there may be other opportunities for insertion in electronic warfare system for non-Navy DoD service branches. Furthermore, test ranges and Hardware-In-the-Loop (HWIL) efforts may find also leverage the technology for high fidelity data capture during integration exercises and field tests that use real RF transmissions.

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