

Topic: N05-053

SimVentions, Inc.

Modeling the Impact of Technology Transition on Ship Operational Capabilities

SimVentions has substantial expertise and capabilities in a wide range of technologies built by providing advanced development and solution-based application services to the government. Our InformedDB technology is an enterprise solution moving programs from document centric to data centric collaboration, offering improved methods and tools to optimize platform lifecycle management. Understanding the complete system of systems integration issues and coupling it with the other key challenges of a program's tradeoff decisions is critical in proactively aligning and coordinate numerous new capabilities from the R&D through shipboard integration. Stakeholders can now manage, track, report and visualize dependencies based on a real-time authoritative data. SimVentions seeks relationships with defense program offices and primes for application of Informeddb to Projects and Programs of Record.

Technology Category Alignment:

Human Computer Interfaces (HCI) for Decision Making

Information Collection/Management

Synthesis/Analytics/Decision Tools

Maintainability/Sustainability

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SYSCOM: NAVSEA

Contract: N00024-17-C-4025

Booth: 504

Room: Club Room East

Presenting: Apr 11th at 2:10 PM

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00024-17-C-4025

WHO

SYSCOM: NAVSEA

Sponsoring Program: N96

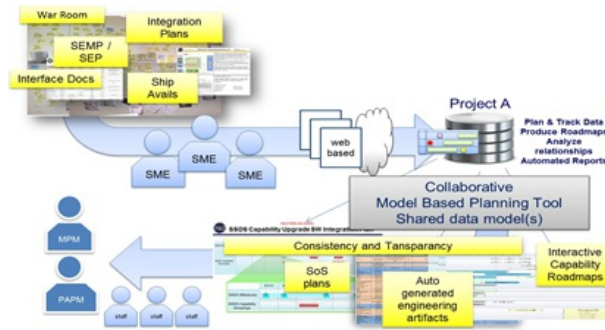
Transition Target: PEO IWS 1 AEGIS

TPOC:

(540)653-0980

Other transition opportunities: IWS 6 CEC, IFF Mode 5, IWS 2 Sensors, IWS 5 Subs, IWS 10 SSDS, IWS 12 Missiles, MDA BMD, PEO LCS, NSWCDD (WSPO, V10)

Notes: Modernization timelines have been driven by several independent processes, (i.e. availability schedules, budget cycles, programmatic planning & milestones). Current process will not support the Fleet's requirements for integrated, capable weapon systems; there is a gap between programming, planning, and acquisition and training & certification processes. Informedb facilitates the linking of modernization planning and deployment schedules streamlining intelligent changes to the plan, provides informed decisions affecting capability and capacity of deploying forces, and offers a real-time authoritative programmatic data available to Fleets and OPNAV for planning discussions.



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WHAT

Operational Need and Improvement: InformeDB is an enterprise solution moving programs from document centric to data centric collaboration, offering improved methods and tools to optimize platform lifecycle management. Understanding the complete system of systems integration issues and coupling it with the other key challenges of a program's tradeoff decisions is critical in proactively aligning and coordinate numerous new capabilities from the R&D through shipboard integration. Stakeholders can now manage, track, report and visualize dependencies based on a real-time authoritative data.

Specifications Required: With the expected service life of U.S. Navy ships is 30 to 50 years and beyond, NAVSEA needs creative and innovative approaches to reduce Total Ownership Costs (TOC). SimVentions' InformeDB technology helps the engineering community to proactively align and coordinate numerous new capabilities from the Research and Development (R&D) stage through shipboard integration to meet operational needs. InformeDB enables TOC reduction and program cost savings by also providing the basis for better communication and analysis.

Technology Developed: Historically, modernization timelines have been driven by several independent processes; availability schedules, budget cycles, programmatic and planning milestones. The current processes will not support the fleet's requirements for integrated capability and weapon systems. InformeDB will enable effective planning and execution of surface and expeditionary warfare maintenance and modernization to ensure fleet reliability, sustainability and relevance against modern and evolving threats.

Warfighter Value: InformeDB enables multi-program/project data collaboration. Creating a semi-automated exchange of data among data sets within InformeDB breaks down the stove-piped program walls reducing the risk of system of system failure based on the lack of collaborative program management and planning. Enabling collaboration across Fleet, SYSCOMs and PEOs facilitates the intelligent mitigation of risk while providing a digital War Room and reports for information sharing. Finally, InformeDB enables significant cost savings in the development and generation of engineering artifacts currently built by hand.

WHEN

Contract Number: N00024-17-C-4025 **Ending on:** January 18, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Multi Project Data Collaboration	Low	GUIs for Managing Data Exchange	8	January 2019
What If Capability	Low	Interactive Sandbox for Estimating	8	January 2019
Quality Report	Low	Generated Word Documents	8	January 2019
Deploy Secure	Low	Low to High Data Exchange	8	January 2019

HOW

Projected Business Model: SimVentions will deliver software of the technologies developed for customer. SimVentions will deliver briefings/presentations on the tools developed, taxonomy schema, roadmaps and reports generated, report templates, as well as a walkthrough of methodologies and demonstration of user navigation. SimVentions will also deliver and provide training materials for all prototype systems developed for customer use, and provide training to customers on how to make use of the new features. SimVentions staff will provide program management, engineering, and training for successful implementation. These functional areas assist in establishing the data taxonomy with attributes, validating the data structure, inputting legacy data, customizing view profiles to display appealing data views that simplify understanding, and performing any required software tailoring. Potential risks are mitigated by constant stakeholder collaboration and via agile software development.

Company Objectives: The upgrades of SimVentions' InformeDB Enterprise technology will provide capabilities to help understand and assess complex development efforts to identify issue and gap requirements. The scope of this effort will be focused on improving system engineering and planning capabilities in a complex decision space that includes engineering considerations, time, risks, technical interfaces, and operational needs. One objective will be to allow decision makers the capability to model plans and quickly determine the impact of issues and risks across program lines and plans. Additionally, the improvements in data sharing and data metrics will allow the use of the tool across and between programs.

Potential Commercial Applications: InformeDB is an enterprise solution moving programs from document centric to data centric collaboration. InformeDB is deployed on a .com and .mil with a TRL 8 and can be used under mission conditions suitable for DoD and commercial operations.

Topic: N153-131

Innoveering LLC

Non-Invasive Measurement of Fluid/Gas Characteristics in Harsh Environments

Innoveering is developing a non-invasive, portable sensing system that can measure and accurately quantify the flow characteristics (pressure, temperature, density, void-fraction, and/or velocity) of a multi-phase fluid within a 2-inch thick metal structure that is multi-species, compressible, highly turbulent, and highly transient. Advanced signal processing methodology and spatially distributed pitch-catch multi-frequency ultrasonics are adapted to measure and convert signals to engineering properties of interest. The methodology for velocity, pressure and void fraction measurement of the key physics associated with the real transient fluid flow event has been demonstrated. The targeted program is Strategic Systems Programs, which aligns well with Innoveering's mission of developing revolutionary technologies that address sensing and control challenges in the aerospace, defense and energy markets.

Technology Category Alignment:

Electronics Integration

Survivability

Acoustic, Seismic and Magnetic

Sensors, Electronics and Photonics

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SYSCOM: SSP

Contract: N00030-17-C-0025

Booth: 502

Room: Club Room East

Presenting: Apr 11th at 2:40 PM

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00030-17-C-0025

Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

SSP: 29 Nov 2018

Topic # N153-131

Non-Invasive Measurement of Fluid/Gas Characteristics in Harsh Environments
Innoveering LLC

WHO

SYSCOM: SSP

Sponsoring Program: Strategic Systems Programs

Transition Target: Strategic Systems Programs

TPOC:

SSP.SBIR@ssp.navy.mil

Other transition opportunities: The ability to sense and measure fluid or particle interactions with surfaces for airborne high speed system is a current need for the Navy. In support of flight testing such platforms, there is a need to improve mission assurance and data capture through the incorporation of sensors that can report on the environmental conditions external to high speed systems (erosion effects). In-situ, real-time measurements of recession rate of heat shield ablative materials is still of interest, both for NASA and AF high speed applications.



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WHAT

Operational Need and Improvement: The AMPS system is developed for a specific Strategic Systems Program (SSP) office need. This involves providing test data on fluid dynamic properties during an underwater launch event. The data will support modeling and simulation (M&S) efforts for SSP. The AMPS system will be used during various test campaigns for experimental data to enhance M&S routine performance assessments of Navy hardware systems.

Specifications Required: The system in question creates a high-pressure, high temperature water/gas/steam mixture during a launch event. Time from beginning of the event to the end of the event lasts about one second. The flow within the system is multi-phase (i.e., water, steam, gas), compressible, non-homogeneous, turbulent, and highly transient with the potential of shock waves.

Technology Developed: Data is collected by non-invasively instrumenting the system. The sensor suite provides spatially resolved, time-dependent flow data to understand the underlying flow physics phenomena, and support flow performance assessments with CFD M&S tools. The ultrasound-based sensor probes through a 2-inch thick metal structure to yield flow properties from the internal surface of the system. The acoustic multi-property sensor (AMPS) system uses multiple sensor heads on the external surface, with power, control and data acquisition electronics. Key properties will be fluid flow velocity and internal pressure, while attempting to resolve temperature and relative density.

Warfighter Value: The AMPS system will be used with other sensors to yield experimental data during field tests for SSP.

WHEN

Contract Number: N00030-17-C-0025 **Ending on:** June 27, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Systems/Subsystems Specifications	N/A	Submission and Review	3	TBD
Preliminary Design Review (PDR)	Med	Validation of acquisition/control architecture	3	TBD
Critical Design Review (CDR)	High	Detailed design validated against requirements	4	TBD
Prototype Hardware Delivery	Med	Detailed design validated against requirements	5	TBD

HOW

Projected Business Model: Innoveering business model for the acoustic multiple property sensing (AMPS) system is to fabricate and assemble a prototype unit for use by the Navy during field trials in support of their validation activities. We will be available to support additional enhancements as needed as part of our engineering services strategy. Additionally, we will pursue transition opportunities of the technology within the DoD and NASA to address critical needs for in-situ, real-time measurement of vehicle protection system erosion and ablation, leveraging the IP generated.

Company Objectives: Innoveering is focused on providing innovative sensing and control solutions for high pressure and high temperature applications, within the aerospace, defense, power and energy markets. We specialize in formulating practical solutions that can transition on-board vehicle platforms and are interested in expanding our role as a go-to organization through custom solutions and niche product offerings.

Potential Commercial Applications: The AMPS technology offers additional opportunities within the DOD, specifically for the Air Force and/or the Test Resources Management Center (TRMC). The ability to sense and measure fluid or particle interactions with surfaces for airborne high speed systems is a current need. In support of flight testing such platforms, there is a need to improve mission assurance and data capture through the incorporation of sensors that can report on external environmental conditions. Erosion effects due to rain or other particulates in the air become significantly important at high speeds, and thus test technologies are needed for accurate assessment, in ground test facilities and in flight, of the thermo-mechanical responses of high speed system thermal protection system materials, support structures and aerodynamic control surfaces in natural environments to include rain, snow, ice, dust, and volcanic ash.

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Topic: N15A-T002

Continuum Dynamics, Inc.

Advanced Wake Turbulence Modeling for Naval CFD Applications

Computational Fluid Dynamics (CFD) is critical to supporting current and future air vehicle design and, shipboard/dynamic interface operations. Unfortunately, current CFD software is too time consuming for many applications. Continuum Dynamics, Inc. (CDI) is developing a CFD solver library for increasing the accuracy and reducing the cost of CFD. CDI specializes in developing highly efficient analysis software and software libraries to support analysis of, most notably, rotorcraft and dynamic interface applications. CDI's CFD solver library has demonstrated several orders of magnitude cost reduction over contemporary approaches, and our goal is to integrate the solver with DOD CREATE-AV software and transition the technology to engineers within the government and industry to reduce the cost of supporting operations and platform development.

Technology Category Alignment:

Fixed Wing Vehicles (includes UAS)

Aircraft Propulsion, Power and Thermal

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SYSCOM: NAVAIR

Contract: N68335-17-C-0158

Booth: 505

Room: Club Room East

Presenting: Apr 11th at 3:00 PM

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-17-C-0158

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-274 The Presidential Helicopters Program Office

Transition Target: Navy and industry engineers supporting current operations, air vehicle platforms, future systems and mission developments.

TPOC:
(301)342-8548

Other transition opportunities:

Engineers within Department of Defense and industry supporting current operations, air vehicle platforms, future systems and mission developments.

Notes: Image shows a prediction of the ship airwake behind an amphibious transport dock.

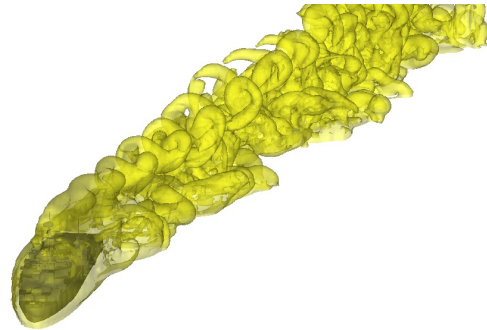


Image Courtesy of Continuum Dynamics, Inc. 2018

WHAT

Operational Need and Improvement: Predicting the viscous, turbulent flows around naval vessels and ship-suitable rotorcraft/aircraft with Computational Fluid Dynamics (CFD) is necessary to support current and future operations, testing and the development of new systems. Unfortunately, current CFD tools are too expensive for many routine design and analysis tasks that involve vorticity dominated flows. Continuum Dynamics, Inc. (CDI) is developing an innovative CFD solver software library that can be coupled to current CFD tools to reduce the cost of unsteady predictions by several orders of magnitude.

Specifications Required: The CFD solver library will be physics-based, be portable between computer platforms and engineering analysis tools, and demonstrate reductions in computational cost compared to contemporary CFD tools.

Technology Developed: CDI is developing a high fidelity CFD library integrated with DOD software for increasing the accuracy and reducing the cost of undertaking engineering analysis of current and future air vehicles and ship board/dynamic interface operations. The CFD flow solver library has demonstrated several orders of magnitude cost reduction over contemporary approaches, and has been coupled to numerous CFD solvers. Integration with DOD CREATE-AV CFD solvers used by the Navy is ongoing. CDI has an extensive history developing innovative numerical algorithms and CFD methods. The modular nature of the software library makes extensions and upgrades seamless to the end-user and enables it to be integrated into numerous analysis tools used by the Navy, DOD and industry. The first-principles formulation makes the software applicable to a wide variety of applications.

Warfighter Value: CFD is critical to supporting current and future air vehicle design and, shipboard/dynamic interface operations. Unfortunately, current CFD software is too time consuming for many applications. Improved CFD software directly reduces the cost of supporting operations; improves the safety and capabilities of current and future platforms; and reduces the cost and risk of platform development and aircraft-ship compatibility testing.

WHEN

Contract Number: N68335-17-C-0158 **Ending on:** March 31, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Alpha prototype software delivery	Med	Software successfully integrates with CFD analysis tools used by the Navy	4	April 2018
Beta prototype software delivery	Med	Software successfully integrates with CFD analysis used by the Navy and shows improved performance	6	October 2018
Final software delivery	Med	Software successfully integrates with CFD analysis used by the Navy and shows improved performance	7	April 2019

HOW

Projected Business Model: Continuum Dynamics, Inc., specializes in predicting unsteady fluid-structure interactions, most notably for rotorcraft and dynamic interface applications, and in developing highly efficient analysis software and software libraries to support engineering design and analysis. Our primary business model is to license analysis software and provide support and research and development services to the Government and industry.

Company Objectives: CDI anticipates that the Forum for SBIR/STTR Transition event will provide an opportunity to make connections with Government and industry personnel that are involved in supporting operations and platform development and have a need for improved CFD prediction. Our goal is to broaden our CFD software market share and to expand the level of support that we can provide our customers in Government and industry.

Potential Commercial Applications: Understanding unsteady fluid dynamics is critical to many applications, and thus an improved CFD solver would have application to numerous industries. Potential commercial applications include fixed and rotary-wing aircraft development, electric power generation (wind turbine design, gas turbines and flows in heat exchangers), automobile design, architectural engineering and heating, ventilation and air conditioning.

Topic: N15A-T002

Kord Technologies, Inc.

Vortex Preserving and Consistent Large Eddy Simulations for Naval Applications

Temporal loads resulting from wind eddies on aerial vehicles during flight-deck launch and recovery cannot be accurately estimated from current flight test data. To better predict these loads and enhance operations, our simulation tools provide software components for computationally efficient but accurate prediction of disparate scale turbulence interactions. The resulting digital-simulator allows the coarser mesh use without the undesired excessive dissipation and grid-dependency, resulting in an enhanced cost-effective predictive simulation. Kord specializes in aerospace and defense technology software/hardware prototyping, including the DoD simulation tools: Kestrel and Helios. The system has been successfully integrated in naval relevant applications. Our goal is to integrate and transition this technology to DoD acquisition tools and pilot training simulators as well as adoption to the commercial sector.

Technology Category Alignment:

Advanced Computing/Software Development

Conceptual, Computational, and World-Wide Environmental Representation

Simulation Information Technology

Test, Evaluation, Validation, and Verification

Electronics Integration

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SYSCOM: NAVAIR

Contract: N68335-17-C-0159

Booth: 500

Room: Club Room East

Presenting: Apr 11th at 2:50 PM

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-17-C-0159

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2018-783

Topic # N15A-T002

Vortex Preserving and Consistent Large Eddy Simulations for Naval Applications

Kord Technologies, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: Naval Air Warfare Center Aircraft Division (NAWCAD)

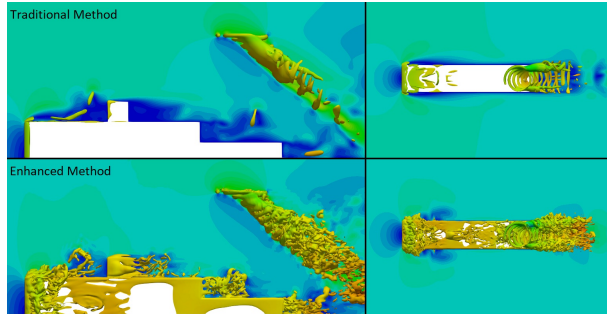
Transition Target: PEO(A)

TPOC:
(301)342-8548

Other transition opportunities:
NAWCAD IBST (Integrated Battlespace Simulation and Test), Pax River, and Training Systems Division, Orlando

Notes: Existing compressible and incompressible CFD technologies include a form of artificial dissipation or numerical dissipation for stability purposes. In addition, commonly used turbulence models add a significant amount of dissipation in their formulation. This dissipation compounds on top of physical dissipation due to turbulence transport and consequently causes larger unphysical dissipation. This deficiency leads to inadequate simulations and results for transient phenomena such as rotorcraft. Our methods maintain stability while reducing artificial dissipation to preserve vorticity and utilize a physical turbulence model to model dissipation to effectively simulate turbulence and consequently system performance.

Image depicts a snapshot of a 3D Computational Fluid Dynamic (CFD) simulation of a rotorcraft-ship airwake using traditional methods (top) and our enhanced methods (bottom). Contours are colored by Mach number and vorticity iso-surfaces are colored by pressure.



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WHAT

Operational Need and Improvement: Highly unsteady vorticity-dominated turbulent flows are significant drivers of aircraft performance; moreover, operating in the naval environment adds additional complexities that are truly unique and directly impact safety and mission success. For example, approaching and landing on the back of a pitching and heaving small-deck ship is one of the most challenging tasks faced by rotary-wing naval aviators. The interaction of this ship airwake with the approaching aircraft directly impacts aircraft aeromechanics through complicated fluid dynamics and fluid-structural dynamics interactions. Recent advancements in Computational Fluid Dynamics (CFD) have demonstrated their ability to predict rotorcraft and ship airwakes independently. Due to the vastly different time and length scales, predicting fully-resolved rotorcraft-ship airwake interactions using these existing CFD methods will be unlikely for many years to come without major relaxation of the mesh resolution requirement.

Specifications Required: Innovative turbulence models for addressing these disparate length scales and maintaining the necessary accuracy and computational efficiency are desired.

Technology Developed: We have developed state of the art vorticity preserving and turbulence models that accurately and effectively simulate turbulence using existing computational resources. The method counteracts artificial dissipation in areas where it is not necessary and instead utilizes a physics-based turbulence model to model turbulence decay. In addition, the formulation is grid spacing independent which allows for grid refinement studies to be performed (i.e. as grid is refined, simulation converges to a solution).

Warfighter Value: The technology combined with existing CFD tools can be used to enhance, accelerate, and reduce the costs of development, analysis, and upkeep of current and next generation rotorcraft. The module simulates turbulence more accurately which in turn leads to higher accuracy and better prediction of temporal loads on the vehicles. Our models enable coarser and computationally cheaper simulations to have higher accuracy than before which will speed up time to solution for analysis. The module already interfaces with DoD CREATE-AV Kestrel and Helios CFD platforms currently in use by many DoD employees and contractors. In addition, the module can be integrated into existing flight simulators to train current and future personnel in more realistic rotorcraft-ship scenarios.

WHEN

Contract Number: N68335-17-C-0159 **Ending on:** December 31, 1969

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Proof of concept in canonical cases	Med	Physically sound theory and analysis. Successful validation compared to literature/experiments on canonical cases of vortex interactions.	4	June 2017
Applied to rotorcraft relevant cases	Low	Application of the turbulence models in rotors and rotorcraft-ship airwake interactions using prototype research code. Successful validation compared to literature/experiments.	5	December 2017
Module development	Low	Correct, usable, and fast algorithms that can be incorporated easily into existing CFD solvers. Successful validation and verification of methods on previous cases.	5	September 2018
Integration into DoD CFD solvers	Med	Successful incorporation of the module into DoD CREATE-AV Kestrel and Helios CFD platforms. Successful verification and validation based on previous results.	6	December 2018
Test on system prototype	Low	Testing of the module using Kestrel and Helios on a more realistic scenario of rotorcraft-ship airwake interaction.	7	June 2019

HOW

Projected Business Model: Our business model is to market software licenses and engineering services to the Government and Primes. Software licenses of the module for Kestrel and Helios are available for Primes who wish to utilize our enhanced methods. We can also implement the methods directly into existing customer software through consulting. In addition, we offer engineering consulting in the form of running simulations and performing analysis of vehicles and scenarios for design and development purposes.

Company Objectives: As computational resources become faster, more abundant, and more parallel, accurate simulations of complex vehicles are starting to become more prevalent in their design and analysis. We envision the technology being used to increase simulation fidelity to further enable this trend for next generation vehicles. We anticipate the Navy Forum for SBIR/STTR Transition (FST) will facilitate connections with Government and industry decision-makers that seek to improve the use of computational simulations in their design and analysis process for aerial vehicles. Our short-term plans are to integrate our innovative turbulence model into other existing CFD solvers.

Potential Commercial Applications: The technology would be applicable and useful for other complex wake interactions. Improvement to CFD solvers resulting from the work would be applicable to interactions ranging from wind gust interactions between city buildings to the complex flow field emanating from the nose of a race car and interacting with the rear wing. The method can also improve weather forecasting simulations. Anything that CFD is used in problems involving vortex or circulation dominated flows could benefit from this work.

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Topic: N08-225

Scalable Network Technologies, Inc.

Application Traffic Injection into Live Virtual Constructive Link-16 Models

SCALABLE provides network design and analysis tools that enable customers to develop, plan, test and deploy wired, wireless, acoustic and optical networks in a high fidelity, physics-based simulation environment from undersea-to-space. SCALABLE is working with the Multifunctional Information Distribution System (MIDS) Program office to deliver a live/virtual/constructive Link-16 network environment that combines a Joint Range Extension Applications Protocol Version C (JREAP-C) application layer model, standards-compliant external interfaces to live radio hardware, J-series message generation and consumption capability, and functional interfaces to external simulation systems such as the Network Enabled Weapons Control Interface Module (NEWCIM). This will provide a robust, scalable Link-16 network system-in-the-loop capability as part of the Joint Network Emulator (JNE) library of military waveforms to enable predictable communications in all physical and cyber warfighting domains.

Technology Category Alignment:

RF Components for sensing, transmission and communication

Synthesis/Analytics/Decision Tools

Collaborative Analysis and Decision-making

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SYSCOM: SPAWAR

Contract: N68335-18-C-0224

Booth: 503

Room: Club Room East

Presenting: Apr 11th at 2:20 PM

Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

SPAWAR SR-2018-261

Topic # N08-225

Application Traffic Injection into Live Virtual Constructive Link-16 Models

Scalable Network Technologies, Inc.

WHO

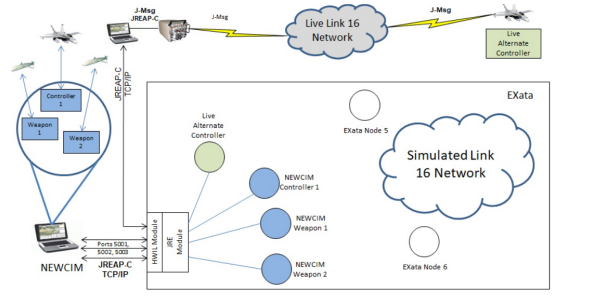
SYSCOM: SPAWAR

Sponsoring Program: Multifunctional Information Distribution System (MIDS)

Transition Target: Multifunctional Information Distribution System (MIDS)

TPOC:
(619)524-1582

Other transition opportunities:
NAVAIR, PMA-298, US Air Force, MDA



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WHAT

Operational Need and Improvement: Scalable Network Technologies is working with the Multifunctional Information Distribution System (MIDS) Program office to provide a robust, scalable Link-16 network system-in-the-loop capability as part of the Joint Network Emulator (JNE) library of military waveforms to enable predictable communications in all physical and cyber warfighting domains. This effort addresses an operational need for a scalable application level simulator that can accurately model Link-16 application traffic over existing protocol standards such as the Joint Range Extension Application Protocol Version C (JREAP-C).

Specifications Required: This project will result in a Link-16 application layer model that conforms to the JREAP-C standard with respect to the subset of data transfer functionality needed to transmit J-messages over live/virtual/constructive simulation networks. It will also ensure that the Link-16 emulation provided is compatible and interoperable with the Network Enabled Weapon Controller Interface Module (NEWCIM). Additionally, this effort will enhance the JNE external interface module to enable capture and injection of live Link-16 application traffic that conforms to JREAP-C and NEWCIM standards into a constructive Link-16 simulation environment.

Technology Developed: Scalable Network Technologies provides network design and analysis tools that enable customers to develop, plan, test and deploy wired, wireless, acoustic and optical networks in a high fidelity, physics-based simulation environment from undersea-to-space. This project will deliver a live/virtual/constructive Link-16 network environment that combines a JREAP-C application layer model, standards-compliant external interfaces to live radio hardware, J-series message generation and consumption capability, and functional interfaces to external simulation systems such as NEWCIM.

Warfighter Value: The robust, scalable Link-16 network system-in-the-loop capability delivered by this project will enable predictable communications in all physical and cyber warfighting domains, enhancing future integrated fires and cooperative engagement capabilities for all Link-16 network capable platforms including tactical aircraft, ships and submarines. At the conclusion of this project, warfighters will directly benefit through significantly improved command, control and communications enabled by greatly enhanced Link-16 network training, planning, analysis and operations.

WHEN

Contract Number: N68335-18-C-0224

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Hardware-in-the-Loop (HitL) Interface	Low	Integration Testing/Demonstration	TRL 5	March 2018
Joint Range Extension (JRE) Module	Med	Integration Testing/Demonstration	TRL 5	May 2018
J-Series Message Application Model	Med	Integration Testing/Demonstration	TRL 5	July 2018
NEWCIM Integration	Med	Integration Testing/Demonstration	TRL 5	September 2018
Graphical User Interface Support	Low	Integration Testing/Demonstration	TRL 5	November 2018

HOW

Projected Business Model: Analysis of Link-16 networks under realistic operational conditions and identifying and resolving potential performance issues which may adversely affect mission assurance will provide significant value to mission and network planners. The Link-16 network system-in-the-loop capability developed by this project will allow current and future customers to plan and deploy reliable Link-16 networks with minimal expenditure in terms of time and resources.

Company Objectives: Scalable Network Technologies will use the results of this project to develop a Link-16 Network Planner (LNP) capability that can be used to plan and debug Link-16 network deployments, in the laboratory, prior to deployment. A capability such as the LNP will help to significantly reduce cost of deploying an effective Link-16 network that makes efficient use of available Link-16 resources.

Potential Commercial Applications: Scalable Network Technologies has a well-established technology transition path via incorporation of the enhanced capability to simulate/emulate Link-16 networks and applications into the Joint Network Emulator (JNE), which is already being used by a broad swath of DoD customers. Current JNE users include SPAWAR, PEO C3T, CERDEC, AMRDEC, CDID, Ft. Gordon and the Army Operational Test Command. Additionally, many other DoD customers, such as Naval Air System Command (NAVAIR) China Lake, use Scalable's communications and networking modeling and simulation software. Many of these DoD customers require a high fidelity capability to analyze the end-to-end performance of applications running on Link-16 networks.

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Topic: N111-054

Real-Time Innovations, Inc.

DDS System Designer and Emulator

RTI System Designer is a computer software development tool that allows software engineers to graphically construct a Data Distribution Service (DDS) based computer network. DDS is used extensively throughout the DoD in general, and the Surface Navy in particular. RTI, a 20-year old 185-employee Silicon Valley company, is the world's largest embedded middleware provider and was named "The Most Influential Industrial Internet of Things (IIoT) Company." RTI successfully delivered multiple prototype versions of the RTI System Designer to the US Navy AN/SPY-6 (AMDR) Program. This tool is helping RTI maintain its industry-leading DDS market position by providing great value for our existing RTI Connex DDS customers. RTI is now seeking other DDS users to evaluate and provide feedback on the RTI System Designer tool.

Technology Category Alignment:

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<https://www.rti.com/>

SYSCOM: NAVSEA

Contract: N68335-18-C-0267

Booth: 501

Room: Club Room East

Presenting: Apr 11th at 2:30 PM

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-18-C-0267

Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

NAVSEA #2018-0563

Topic # N111-054

DDS System Designer and Emulator

Real-Time Innovations, Inc.

WHO

SYSCOM: NAVSEA

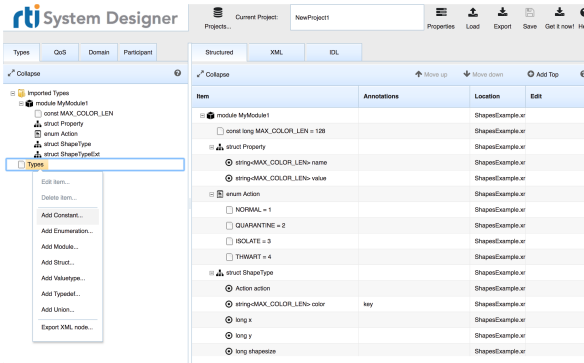
Sponsoring Program: PEO IWS

Transition Target: AN/SPY-6 Air and Missile Defense Radar (AMDR)

TPOC:
(812)854-4804

Other transition opportunities: All current RTI Connex Data Distribution Service (DDS) users, including hundreds of Department of Defense (DoD) customers, are potential users. There are over 1000 projects using RTI Connex DDS worldwide.

Notes: RTI System Designer Product Screenshot



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WHAT

Operational Need and Improvement: Navy distributed software systems are often loosely coupled. Different components are developed at different times and by different teams. Emulated components are necessary to test interfaces not yet available in final implementation. The US Navy needs the ability to rapidly create realistic scenarios in DDS-based command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) and combat management systems to simulate and test functionality. This is currently a manual process. The RTI System Designer automates this process.

Specifications Required: The Navy requires an expedient and generic approach to emulating software system components on the Data Distribution Service (DDS) communications bus for AN/SPY-6 AMDR. Efficient, flexible, and test-driven message traffic emulation allows for the early integration of multiple software components, thus ensuring interoperability and performance while reducing AMDR program cost and risk. The Navy requires integration and testing of multiple and interrelated software components, each with varying development timelines, maturity, and availability. The RTI System Designer and RTI Scenario Editor will provide this message traffic emulation in-place of the missing software components.

Technology Developed: The RTI System Designer software product was partially developed through this SBIR. This product is currently an advanced prototype.

Warfighter Value: The AN/SPY-6 AMDR Program will have a potential \$9M in NRE cost avoidance because of this technology and its companion product, the RTI Scenario Editor. Another non-Navy DoD user asserted that the two products would save man-months of development, integration and testing time.

Full system testing will be possible by executing emulated scenarios for components under development. Automation and regression tests to ensure the correctness of the system under development. Rapid development and faster final integration of system components.

WHEN

Contract Number: N68335-18-C-0267 **Ending on:** March 20, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Scheduler to execute scenarios with 10 ms accuracy.	N/A	Product Released	7	July 2016
Dynamic scripting language (Lua) to support the data types defined in OMG DDS XTypes specification.	N/A	Demonstrated	7	December 2016
Configuration Editor GUI tool to graphically define and edit the system information model.	N/A	Demonstrated	7	June 2017
Support teams of 10+ concurrent users	Low	Demonstrated	7	December 2018
RTI System Designer fully supported as standard product.	Low	Product Released	7	March 2020

HOW

Projected Business Model: RTI will fold the results of this SBIR effort into our standard RTI Connex DDS product offering. RTI has successfully used this business model several times in the past to transition SBIR developed technology. As a result, RTI has an industry leading 100% percentile DoD Commercialization Achievement Index (CAI).

Company Objectives: RTI seeks additional organizations to evaluate RTI System Designer and provide feedback.

Potential Commercial Applications: Nearly all RTI Connex DDS commercial customers can benefit from RTI System Designer. RTI customers span diverse Internet of Things (IoT) markets, including healthcare and medical devices, energy, mining, air traffic control, trading, automotive, unmanned systems, supervisory control and data acquisition (SCADA), ground stations, and big science, scientific research that is expensive and involves large teams of scientists.

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