



NAVAL AIR WARFARE CENTER TRAINING SYSTEMS DIVISION (NAWCTSD) ORLANDO

TECHNOLOGY TRANSFER OPPORTUNITIES

March 31, 2015

The technologies/products/services described in this document offer opportunities for partnerships with NAWCTSD through CRADAs or licensing agreements.

**For more information, please send an email to:
ORLO_Orlando_Tech_Transfer@navy.mil.**

<http://www.navair.navy.mil/nawctsd>

TABLE OF CONTENTS

TECHNOLOGY TRANSFER.....	1
• Cooperative Research and Development Agreement (CRADA)	1
• Patent Licensing Agreement (PLA)	1
• Commercial Services Agreement (CSA).....	1
MODULAR ADVANCED TECHNOLOGIES - MARKSMANSHIP PROFICIENCY (MAT-MP) TOOLKIT.....	2
SCENARIO PLANNING AND EFFECTS CONTROL SYSTEM (SPECS) WITH AFTER ACTION REVIEW CAPABILITIES	3
NETWORK EFFECTS EMULATION SYSTEM (CYBERSPACE ATTACK EMULATION)	4
LIVE – VIRTUAL COMMUNICATIONS TECHNOLOGIES	5
• Joint Virtual Tactical Radio (JVTR)	5
• Live To Virtual Communications (LVC) Bridge	5
SMART ANTENNA ALGORITHM	6
VIRTUAL INTERACTIVE SHIPBOARD INSTRUCTIONAL TOUR.....	6
CONTEXT-DRIVEN SPEECH RECOGNITION SOFTWARE.....	7
TEAM DIMENSIONAL TRAINING™ (TDT™).....	8
CNIC SFTC EMERGENCY MANAGEMENT COURSES.....	9
CBRNE ENHANCED RESPONSE FORCE PACKAGES (CERFP)	10
ADVANCED USE OF FORCE TRAINING SYSTEM	11

TECHNOLOGY TRANSFER

Federal Technology Transfer (T2) legislation has been in place since 1980 to facilitate the transfer of federally developed technologies to the private sector as well as academic institutions and state & local governments. Federal and non-federal partners have the opportunity to work together on mutually beneficial research using instruments called “cooperative research and development agreements” (CRADAs). T2 legislation also promotes the licensing of patented technologies developed in the federal laboratories for commercial applications.

NAWCTSD predominantly uses CRADAs in transferring technologies to non-Federal organizations. Licensing Agreements and Commercial Services Agreements are also vehicles for T2. Sometimes, partnerships with Federal organizations and other Department of Defense (DOD) entities facilitate dual-use and transfer of NAWCTSD developed technologies.

- **Cooperative Research and Development Agreement (CRADA)**

A CRADA is a legal instrument that allows NAWCTSD, a federal laboratory, to engage in collaborative efforts with a non-federal partner. Research and development performed under a CRADA must be collaborative and consistent with the mission of the federal laboratory. CRADA partners may contribute personnel, services, and property. The federal partner cannot contribute funds to the non-federal partner, but the non-federal partner may contribute funds. The non-federal partner may receive a non-exclusive license to inventions made during the performance of the CRADA effort. The non-federal partner may obtain an exclusive license to any inventions made during the performance of the CRADA effort; license should be for reasonable consideration. Data generated under a CRADA may be protected from public disclosure for up to five years.

- **Patent Licensing Agreement (PLA)**

Research performed at NAWCTSD may produce patented, innovative discoveries of commercial value. These patents are available for licensing to the private sector. PLAs can be non-exclusive, exclusive or partially exclusive. Navy and Marine Corps licenses are subject to an irrevocable, royalty-free right of government to practice the licensed invention. The licensee must have a plan for commercializing the invention.

- **Commercial Services Agreement (CSA)**

Through a CSA industry can leverage NAWCTSD’s research, development, test & evaluation capabilities. This Agreement is a type of contract (non-FAR based) whereby NAWCTSD can be directly paid by industry to perform services that are unique to the laboratory and not commercially available elsewhere. NAWCTSD can provide facilities and technical expertise to allow industry to capitalize on public investments of unique capabilities.

The technologies/products/services described in this document offer opportunities for partnerships with NAWCTSD through licensing agreements or CRADAs.

MODULAR ADVANCED TECHNOLOGIES - MARKSMANSHIP PROFICIENCY (MAT-MP) TOOLKIT

The MAT-MP toolkit is a reconfigurable small arms instrumentation kit of patent-pending assessment and diagnostic tools for use on the live-fire range by marksmanship instructors/coaches.



- The toolkit provides instructors with additional direct measures to assess problem shooter performance.
- Toolkit sensors are temporarily attached to a live-fire weapon in less than five minutes.
- A miniature camera and beam splitting assembly are attached to the rear of the rifle's combat optic.
- Data and video are wirelessly transmitted to the instructor's portable computer.
- The instructor assistant software displays through optic video and sensor data for each shot or series of shots.
- Performance summary data is displayed for key fundamental metrics.
- Data is stored for each shooter for replay as necessary.
- One instructor can simultaneously monitor up to four shooters.
- MAT-MP sensors are currently compatible with the M16/M4/M27 platforms.
- These sensors provide data on basic weapon handling including trigger squeeze, trigger follow through, cant angle, buttstock pressure and steadiness.

SCENARIO PLANNING AND EFFECTS CONTROL SYSTEM (SPECS) WITH AFTER ACTION REVIEW CAPABILITIES

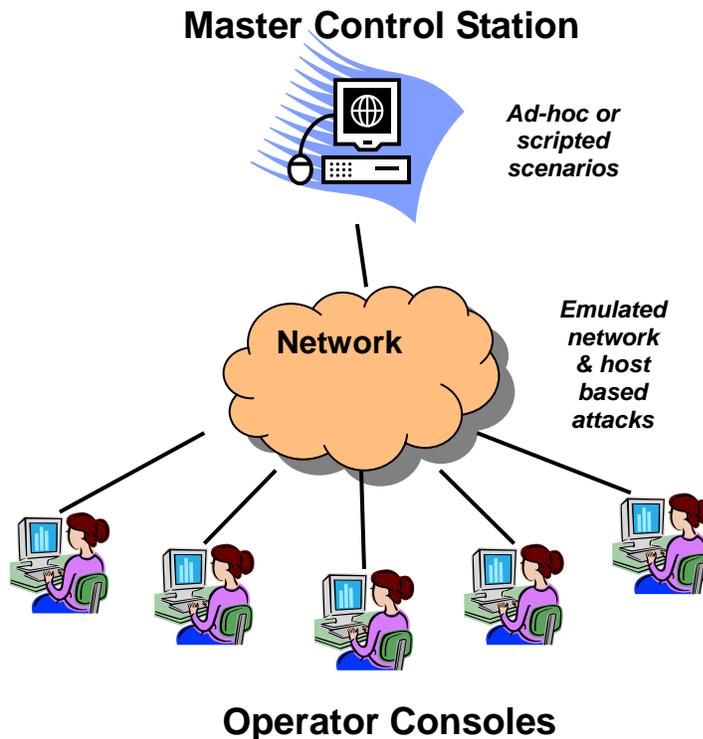


The NAWCTSD Scenario Planning and Effects Control System enables instructor/operators to provide highly detailed and repeatable immersive training scenarios by defining combinations of cause/effect, time, and manual trigger actions between various types of sensor and environmental stimuli for increased training effectiveness, trainee immersion, and reduced instructor/operator workload.

- The system's audio distribution engine is capable of simultaneous streaming of sound effects to any user defined speaker location or time synchronized group of speaker locations within the training environment utilizing real-time mixing of source files.
- The RaidFX special effects device and training stimuli control architecture is fully extensible and capable of integrating numerous devices and training aids based on common control and communication standards.
- The client Graphical User Interface (GUI) is designed around the concept of the instructor as the operator, and provides for the authoring and control of scenarios within the distributed system architecture.
- The architecture utilizes a combination of Government and Commercial-Off-the-Shelf components providing for a high degree of flexibility and sustainability.
- Data integration with commercially available digital video management and debriefing systems enables event-based navigation and remediation support during after-action-review.
- The SPECS architecture has been successfully installed and is operational within a number of immersive and mixed-reality training environments.
- SPECS is installed within a number of US Navy and US Marine Corps training facilities, at the Federal Law Enforcement Training Center, and at the Northeast Counterdrug Training Center.

NETWORK EFFECTS EMULATION SYSTEM (CYBERSPACE ATTACK EMULATION)

The Network Effects Emulation System (NE2S) provides realistic emulation of network and host based Cyberspace attacks. NE2S integrates traditional test and training environments with Cyber attack scenarios. A Master Control Station provides centralized control of real-time Instructor/Operator initiated effects or scripted scheduled scenarios. NE2S employs a network centric architecture and is operating system and application agnostic. The system uses encrypted communications using standard network protocols (e.g. SSL, HTTPS, SSH). Authentication credentials are encrypted at rest. NE2S was demonstrated at Ulchi Freedom Guardian (UFG) 2014.



LIVE – VIRTUAL COMMUNICATIONS TECHNOLOGIES

The Concept Development and Integration Laboratory of NAWCTSD provides live and virtual communications technologies compliant with standard Modeling and Simulation (M&S) protocols. These technologies can bridge the gap between live and virtual training environments.

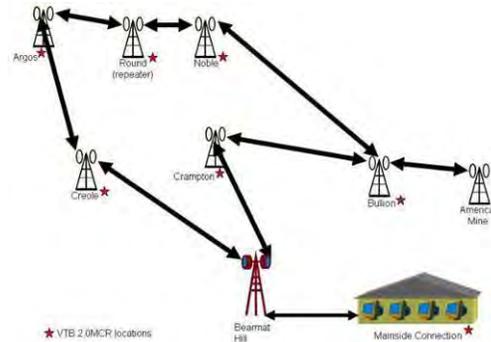
- **Joint Virtual Tactical Radio (JVTR)**

Functionally accurate graphical faceplates of operational radios can be developed using this application. Similar faceplates can be created for a variety of communications devices (e.g., military radios, ICOM radios, other service specific radios, telephones, etc.). These faceplates can be used in distributed training or live tactical operations (e.g., a PC-based, photo-realistic, functionally accurate radio faceplate can be utilized to train a newly deployed first-responder how to operate the radio, while in the field). When multiple units are connected via a computer network they can provide radio protocol training.



- **Live To Virtual Communications (LVC) Bridge**

The LVC Bridge provides distributed control of operational communications equipment (i.e., service radios) and relays the communications between different networks (e.g., communications between a simulation/training network to/from a live communications network). This allows for adjustments of radio settings (i.e., frequency, presets, power, etc.), to be changed on a remote live radio from a local virtual radio interface. An example of this technology, is utilizing the JVTR radio faceplate or trainer, as described above, during an emergency operations scenario. The PC-based virtual radio can be operated from a laptop or portable device, and connected via the LVC Bridge to an operational communications network. The virtual radio could then communicate seamlessly with live operational RF radios (i.e., ICOM) in the field.



This technology also connects virtual radios to operational radios and switching systems (i.e., line-of-sight equipment, satellite communications equipment) to allow for seamless live and virtual training and tactical operations. For example, virtual and live RF radios can be utilized in communications training exercises. Similarly, this technology can provide the interface between operational satellite communications systems with encryption, and other live RF radios in the field. A “make-shift” command center can utilize this technology to “link” multiple services (i.e., Fire, Police, EMT) during an emergency operations scenario.

SMART ANTENNA ALGORITHM



The Smart Antenna Algorithm (SAA) provides frequency management capabilities across a spectrum of networked Radio Frequency (RF) communication devices. The tool determines the susceptibility of multiple radios to interference by mathematically modeling radio noise, nonlinearities, and image frequency. The Smart Antenna Algorithm method then uses antenna isolation, which varies between antenna elements, to map problem frequency nets to antenna pairs having greater isolation. The overall result is a boost to radio performance in order to balance and meet range coverage requirements. Even though the number of possible combinations for assigning frequency nets to antenna elements may be exhaustive, the algorithm runs in real time with accurate results. In addition, the assignment algorithm/model may be used for automatic, intelligent, configuration and setup of distant, remote radios when incorporated into the Remote Interface Control (RIC) tool, an existing, fielded, radio-control baseline.

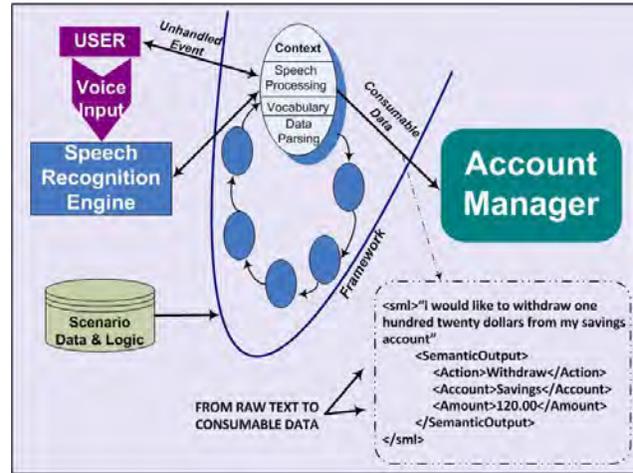
VIRTUAL INTERACTIVE SHIPBOARD INSTRUCTIONAL TOUR (VISIT)



VISIT allows a trainee/user to "wander" through a photo-realistic interactive tour of a real world environment. It provides virtual access to environments or facilities that are unfamiliar, unavailable, or dangerous. While wandering around, a user can click on items of interest to access descriptive or instructional media (e.g., interactive courseware, workstation simulations, or reference documents almost any common media file), as needed. The integrated 360 degree spherical photographic panoramas allow a user to look in any direction, giving a "here-and-now" feeling. This tool enables individual users to explore an environment comprehensively. In addition to unstructured exploration of an environment, the instructor can develop "guided tours" of the environment via a game-like scavenger hunt feature. This feature provides students with performance feedback. Quizzes can also be authored by instructors to be administered to students following their "touring" activities. Current platforms are Navy ships and aircraft, but buildings, cities or other critical environments can be created. A revision of the software is currently underway to make the product run in a browser, negating the need to install software to tour the selected platform. The product will include authoring capabilities to enable customers to integrate their own instructional media inside the tours.

CONTEXT-DRIVEN SPEECH RECOGNITION SOFTWARE

The Context-Driven Speech Recognition Software is a patent-pending software application designed to handle very large complex vocabularies in smaller subsets by logically dividing the vocabulary according appropriate contexts. The divided vocabulary reduces the potential paths in the language model for any given recognition event, thereby reducing the recognition errors produced in the recognition engine. The framework for this software minimizes the size of the vocabulary loaded at any point when it is executing a recognition task against an audio stream. This basic principle alleviates many of the shortcomings related to off-the-shelf speech recognition engines' handling of very large vocabularies. The approach manages speech recognition grammar outside of the compiled software. This application can be used for customer interface systems with large vocabularies, voice command & control applications, mobile applications (such as banking applications), computer gaming, and others.



TEAM DIMENSIONAL TRAINING™ (TDT™)



Team Dimensional Training™ (TDT™) is an empirically-based team strategy that facilitates team self-correction and effective team processes to improve team performance. TDT™ provides instructors with a structured method of evaluating teamwork and guides instructors on effective briefing skills. The TDT™ process has been found to increase team performance by enhancing communication, teammate mentoring and the ability to diagnose performance problems.

NAWCTSD offers a number of TDT™-related products and services to assist in the transition and sustainment of the program. Traditionally, TDT™ has been introduced to organizations through the TDT™ Workshop. The TDT™ workshop is conducted by a NAWCTSD team and a workshop consists of a classroom section and a role-play section. The classroom section is focused on the research and history associated with TDT™, introducing the four teamwork dimensions, as well as training cycle management and facilitation skills. The skills learned and practiced during the classroom are applied and evaluated in high-fidelity role-play scenarios with actual teams-in-training.

Specific aspects of TDT™, such as performance measurement and facilitation skills, can be incorporated into existing training programs. In addition, TDT™ can be integrated into an organization's own leadership development curriculum.

TDT™ is being used as a Navy submarine schoolhouse training tool, and was also recently integrated into the Naval Air System Command's Leadership Development Training Programs.

Outside of the Department of the Navy, TDT™ workshops have been conducted for the Federal Law Enforcement Training Center, Volusia County (FL) Fire Services, and both State and Federal Corrections communities. In addition, NAWCTSD's TDT™ team has consulted with NASA's Johnson Space Center on incorporating TDT's performance measurement and facilitation skills as instructor support tools.



CNIC SFTC EMERGENCY MANAGEMENT COURSES



Commander, Navy Installations Command (CNIC) established an emergency management classroom and war gaming center of excellence for the Shore Force Enterprise on Naval Base Coronado to provide emergency preparation and management training.

The Shore Force Training Center (SFTC) opened on September 2008, and is core to CNIC's vision to transform training and readiness by utilizing an on-demand, scalable, repeatable, persistent, and net-centric approach to training. The SFTC supports the Homeland Security Presidential Directive objective requiring that all levels of the government have the capability to work efficiently and effectively together using a national approach to incident management and provides an integrated ashore/afloat training and exercise environment. The cornerstone of the SFTC is the emergency operations "Battle lab" that accurately replicates a Regional or Installation operation center. The Battle lab is scalable to represent a small, five station installation operations center or can simulate a 23 seat regional operations center.

NAWCTSD developed hands-on, instructor facilitated, emergency management training that progressively builds from incident occurrence to operation deactivation. The following courses were developed for delivery in the SFTC:

- The **Emergency Operations Center Incident Management Team** (EOC IMT, CIN S-540-1000) course trains individuals to serve effectively as members of an installation's Emergency Operations Center (EOC). The course introduces the principles, components, and characteristics of an installation's emergency management program and the functions of an EOC. Specific emphasis is placed on the activation and operation of an installation EOC in response to natural or manmade disasters, to include reporting requirements, documentation, and EOC deactivation.
- The **Emergency Managers** (EM, CIN S-540-1001) course prepares an individual to be the EM program manager at the region or installation level. Course emphasis is directed at establishing, implementing, and sustaining a comprehensive, all-hazards EM program.
- The **Installation Training Officer** (ITO, CIN S-540-1002) course is intended for individuals designated as the installation training officer and provides the foundation required to manage and implement an installation's training and readiness program. Training includes methods to properly assess training effectiveness and to improve training quality.
- The **Crisis Action Planning – Team Leader** (CAP TL, CIN S-540-1003) course instructs an individual on how to manage and execute technically the regional command, control, and communications training and exercise programs.

CBRNE ENHANCED RESPONSE FORCE PACKAGES (CERFP)

NAWCTSD was tasked with providing a web-based course that provides the National Guard with Chemical, Biological, Radiological, Nuclear and High-Yield Explosive (CBRNE) Enhanced Response Force Packages (CERFP) training. This course provides training across the four areas of required training to include Shared, Extraction, Decontamination, and Command.

The National Guard (NG) current method of training utilizes mobile training teams that provide training to the 17 CERFP teams across the continental United States (CONUS). This method of training utilizes a variety of training courses to include a mixture of contractors' courses, Service courses, on-line Federal Emergency Management Agency (FEMA) courses, classroom instruction, and hands-on instruction.

The training assessment and culminating event is a collective exercise involving the entire 186-person team and is evaluated by the Government as pass or fail. The collective exercise demonstrates how well the team accomplishes a broad range of challenges. The current training package is derived from the CERFP Concept of Operations. This web-based training seeks to provide training for the NG to successfully execute its individual Department of Homeland Security (DHS) training requirement and to enhance the current course through a reduction of instructor-led, classroom-based training. The course was delivered to the National Guard on 14 Jan 10 via the Joint Knowledge Online (JKO) Learning Management System (LMS) ATLAS PRO.



ADVANCED USE OF FORCE TRAINING SYSTEM



In partnership with the National Institute of Justice and the Federal Law Enforcement Training Center, the Naval Air Warfare Center Training Systems Division developed a use of force training system that supports improved situation awareness and cognitive decision making in use of force scenarios. The system incorporates computer generated imagery with expressive face technology, speech recognition,

multiple wireless force options, scenario generation tools and an after action review capability. Computer generated characters react to speech inputs, weapon position and trigger pull. AUFTS technologies have direct application to law enforcement, force protection and tactical training simulations.