Bob Seltzer

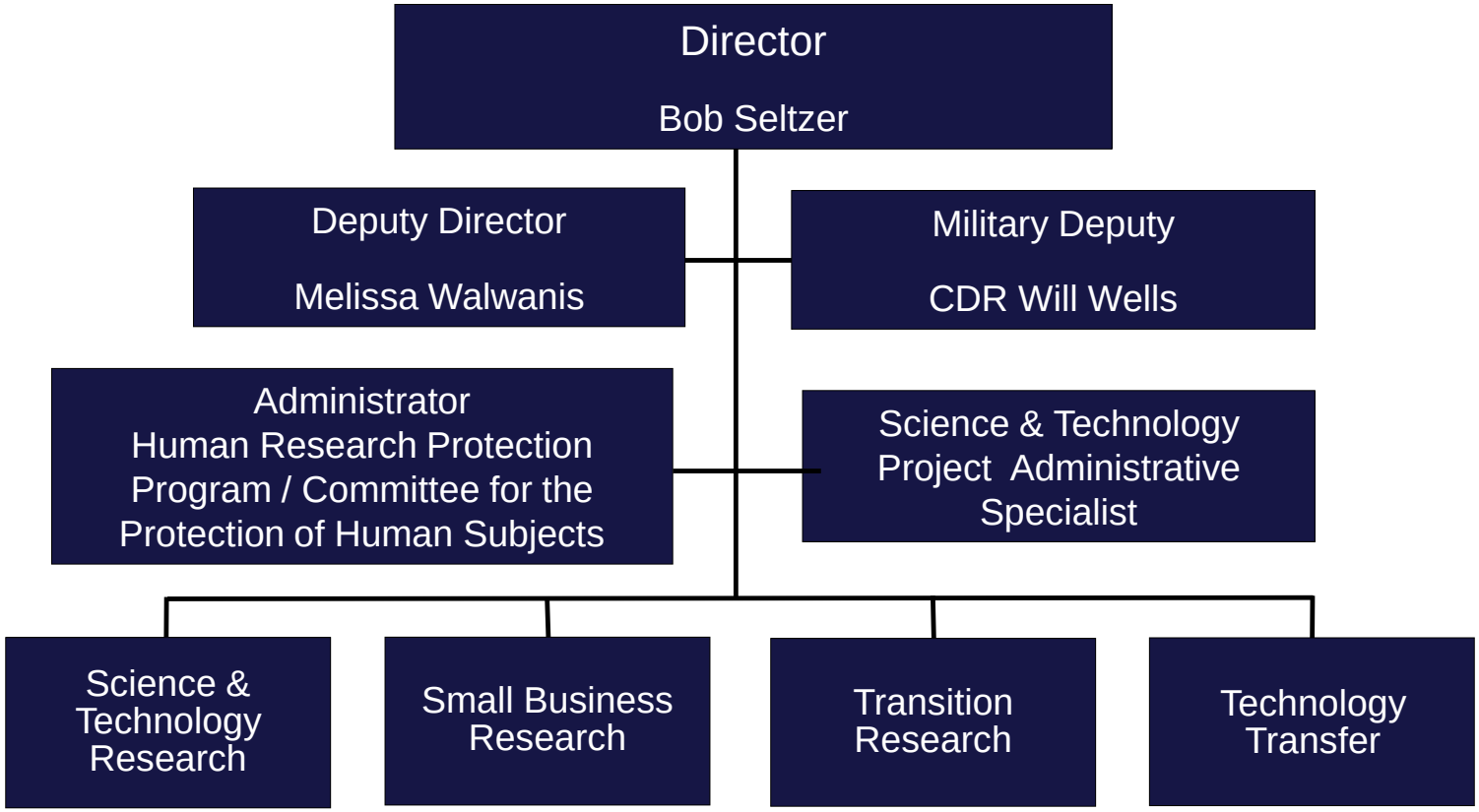
Director, Research and Technology Programs

NAWC
Training Systems Division
NAVAL AIR WARFARE CENTER

Research & Technology Program Directorate

MISSION

Plan & Perform a Full Range of Directed Research and Development in Support of Naval and Other DOD Training Systems for All Warfare Areas and Platforms, to Maintain a Naval Critical Technology Base and Transition Technology Results to the Fleet and Other Customers



NAWCTSD Research Portfolio

- NAWCAD/Office of Naval Research Science & Technology (*BA1-3)
  - Basic Research
  - Applied Research
  - Advanced Development
- DoD Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) program
- Navy Demonstrations and Validation Research (BA4-7)
- DoD Research
  - Joint/OSD/DARPA
  - Army/USAF/USMC Research
- Technology Transfer (Gov/Non-DoD Research)

NAWCTSD is a R&D Performer and Partners with Industry and Academia on Proposals and Subsequent Research Efforts

*BA = Budget Activity

Small Business Innovation Research (SBIR) Opportunities

Description/Summary of Program Requirements

- Process (2-3 SBIR Broad Agency Announcements per year)
- Phase I (1st yr): Scope problem & detail innovative solution ($140K/$100K option)
- Phase II (2nd-3rd yrs): Develop prototype, test & evaluate (up to $1.5M)
- Phase III (thereafter): Further R&D development / acquisition transition (Government sole source)

Next Broad Agency Announcement (navysbir.com):

➔ (20.2) Pre-release: 6 May 2020 Opens: 3 Jun 2020 Closes: 2 Jul 2020

ACQUISITION STRATEGY

- SBIR Phase I

Competitive

SBSA

All Contracts Processed at NAWCAD, Lakehurst

PERIOD OF PERFORMANCE

- Phase I: 6 Month w/6 month Option
- Phase II: Up to 24 Months
- Phase III: Open

MILESTONES

6 May 2020 — RFP Released

2 Jul 2020 — Contract Award

POINT OF CONTACT

Name: Mr. Robert Seltzer

Organization: R&T Program Office

Phone: 407-380-4115

Email: Robert.seltzer@navy.mil

FUNDING

- Year 1 RDT&E $140K/$100K
- Year 2-3 RDT&E $1.5M
- Year 4+ Non-SBIR $s; No Limit/ No Competition Required

CURRENT CONTRACT/ORIGINAL DEVELOPER/OEM (IF RECOMPETE)

- TBD-Up to 3 awards planned per topic

Small Business Technology Transfer (STTR) Opportunities

Description/Summary of Program Requirements

- Small business required to team with research or academic institution (non-Government)
- Phase 1(1st yr): Scope problem & detail innovative solution ($140K/$100K option)
- Phase II (2nd-3rd yrs): Develop prototype, test & evaluate ($1.5M)
- Phase III (thereafter): Further R&D development/acquisition transition (Government sole source)
- Large businesses can partner with small businesses (for Phase III)

Next Broad Agency Announcement (navysbir.com):

➔ (20.B) Pre-release: 6 May 2020 Opens: 3 Jun 2020 Closes: 2 Jul 2020

ACQUISITION STRATEGY

- STTR Phase I

Competitive

SBSA

All Contracts Processed at NAWCAD, Lakehurst

PERIOD OF PERFORMANCE

- Phase I: 6 Month w/6 month Option
- Phase II: up to 24 Months
- Phase III: Open

MILESTONES

6 May 20 — RFP Released

2 Jul 20 — Contract Award

POINT OF CONTACT

Name: Mr. Robert Seltzer

Organization: R&T Program Office

Phone: 407-380-4115

Email: Robert.Seltzer@navy.mil

FUNDING

- Year 1 R&D $140K/$100K Option
- Year 2-3 R&D $1.5M (Total)
- Year 4+ Non-SBIR/STTR $s; No Limit No Competition Required

CURRENT CONTRACT/ORIGINAL DEVELOPER/OEM (IF RECOMPETE)

- TBD-Up to 3 awards planned per topic

NAVAIR SBIR/STTR Proposal Solicitation Topics

- **N202-091: AI for Anti-Submarine Warfare (ASW) Training**

  ➔ PHASE I: Design, develop, and demonstrate feasibility of AI techniques, methods, and models, to augment the Navy ASW capability via the addition of an artificial intelligence (AI) training aid that can also assist as an operational decision-support tool. Demonstrate the feasibility of the proposed training capability within an undersea (or relevant) domain with publicly available training data. The early system should demonstrate a form of explainability and confidence values in outputs provided. Outline future concepts for the inclusion of self-tuning algorithm parameters.

- **N202-098: Voice Recognition to Support Assessment of Cross Platform Situational Awareness and Decision Making**

  ➔ PHASE I: Develop a concept for standalone, voice assessment capability for a single Air Defense platform. Demonstrate feasibility of application into the larger, integrated training system. The concept should include a plan for integration into the NGTS ART to allow voice feedback/assessment to be aligned with unclassified performance data from NGTS and include assessment visualizations to support diagnosis and feedback. The Phase I effort will include prototype plans to be developed under Phase II.

DoD 20.2(SBIR) / B (STTR) Solicitation Opens: 6 May 20 Closes: 2 Jul 20 (www.navysbir.com)

NAVAIR SBIR/STTR Proposal Solicitation Topics

- **N202-111: Desktop Tactics Trainer for Maritime Patrol Aircraft**

  ➔ PHASE I: Develop an innovative approach for a computer-based tactical trainer in the maritime patrol domain, or a similar domain for feasibility demonstration. This topic seeks to fill the gap between learning tactics from a book, and utilizing those tactics in a simulator event by providing a low-cost, computer based, simulated environment where students can try out what they learned and practice tactics in advance of discussions, as well as simulator and flight events. Low cost should be considered as a solution that is capable of running on a typical mid-range Windows computer.

- **N202-112: Multi-Domain Data Fusion Instructional Strategies Methods**

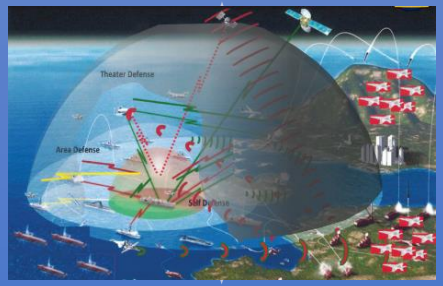
  ➔ PHASE I: Research and develop training objectives for the multi-domain environment and instructional strategies for manned-unmanned data fusion tactical decision making. Identify training technology to assist instructors with training and/or technologies to support instructorless training (e.g., scaffolding) that might provide beneficial uses in operational contexts for operator job aids when leveraging manned-unmanned data fusion for tactical decision making. Research and develop recommendations for automation transparency to support operator tactical decision making when leveraging manned-unmanned data fusion technology in multi-domain environments.

DoD 20.2(SBIR) / B (STTR) Solicitation Opens: 6 May 20 Closes: 2 Jul 20 (www.navysbir.com)

Continuing Areas of Research

Emerging Instructional Methods

- Adaptive Training Techniques
- AI Enabled Instructor/Crew
- Scenario Based Trg Methods
- Multi-level Performance Measurement & Assessment
- Human Performance Measurement Approaches



Challenge Areas Supported

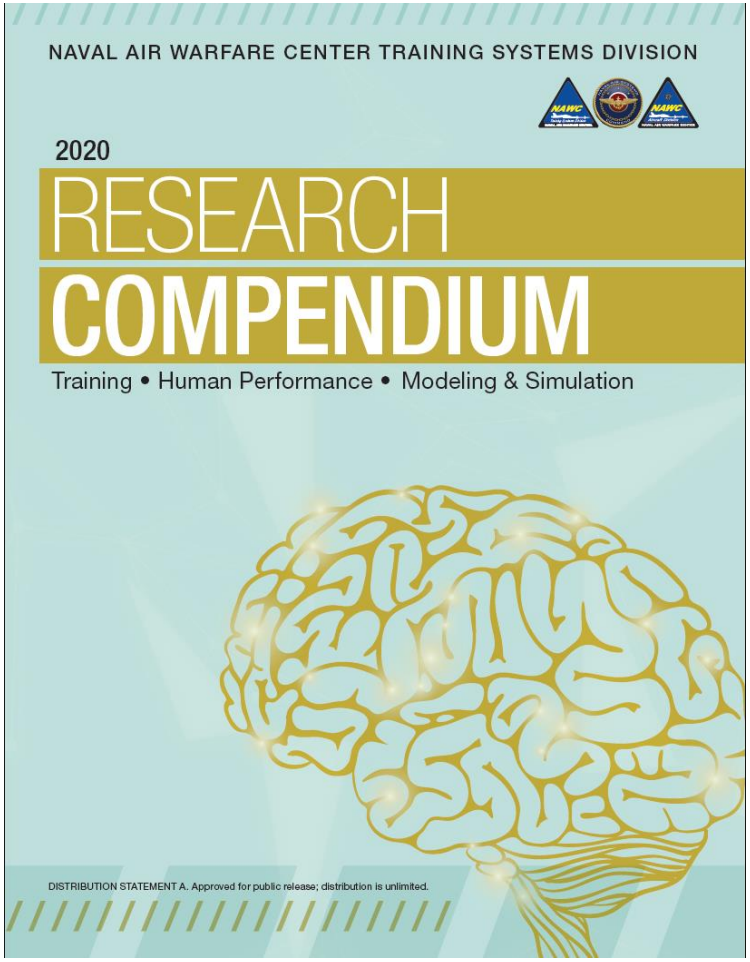
- Denied & Degraded Environments
- Electronic Maneuver Warfare
- Integrated Warfighting Capability
- Cyber Warfare
- Manned-Unmanned Teaming

Training Technology & Environments

- Data Science (AI/ML)
- eXtended Reality Visual & Input Enhancements
- Live, Virtual, Constructive
- Distributed Mission Training
- Effects Modeling
- Mobile Learning/Deployable
- Cybersecurity & Cloud-based

Instructional Strategy

NAWCTSD Research Compendium



EXAMINING THE EFFECTS OF GAME FEATURES ON LEARNING IN SCENARIO-BASED TRAINING

OBJECTIVE

The objective of this research is to systematically test the impact of two game features on performance and motivation: score/performance gauges and competition. To date, there is no previous research that suggests adding game gauges increases motivation or enhances performance, and likewise, little research has examined the effect of competition on learner performance and motivation in game-based training.

The Periscope Operator Adaptive Trainer (POAT) user interface with game gauges included (bottom left).

PROJECT DURATION
OCT 2015 - SEP 2018

FUNDING SPONSOR
Naval Air Systems Command (NAVAIR) | Section 219

POINTS OF CONTACT
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CDR Will Wells (PM)
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DESCRIPTION

Previous research has shown mixed results on the efficacy of game features to promote learning outcomes and motivation, and the majority of these studies have not systematically investigated game features to determine which ones are most effective. Based on Cognitive Load Theory, we hypothesized that adding both competition and game features would increase motivation and enhance performance in a simulation-based training task. In a set of experiments, we explored whether the presence of game features (performance gauges and score) and competition features (a leaderboard) affected motivation and learning outcomes within the Periscope Operator Adaptive Trainer (POAT).

BENEFITS

Game-based training may be well-suited to meet the Navy's education objectives, given the popularity of computer games with today's young adults. This research seeks to examine the effects of incorporating game features into simulation-based training, a topic that has not been systematically investigated in the training literature. Previous studies have assessed the value of game-based training over traditional methods of instruction, but few have investigated individual game features and their impact on performance and motivation. The findings of these experiments may have a broad impact on future training systems by offering empirically-based guidance for designing game features to enhance effectiveness.

NEED

In light of budget declines, there has been a strong push across the DoD for low-cost training techniques that are engaging, realistic, and can be delivered anytime, anywhere. Game-based training techniques hold promise to meet this demand as they are purported to enhance player motivation. However, existing research on the effectiveness of game-based training is mixed and often nonsystematic, resulting in a failure to identify specific game features that lead to better learning and performance outcomes.

STATUS

In FY18, the research team conducted two experiments. Experiment 1 was conducted with approximately 120 college students, and the results showed that incorporating game features into training did not improve trainee performance on the task or their motivation to play the game. Experiment 2 was conducted with approximately 70 submarine officer students at NAVSUBASE New London, utilizing a simpler experimental design. Experiment 2 replicated the results of Experiment 1.

MILESTONES

- Completed data collections for Experiment 1 with a college student population and Experiment 2 with Submarine Officer Basic Course (SOBC) students.
- Developed experimental testbed for systematically evaluating game features, such as scores, leaderboards, and performance gauges in the Periscope Operator Adaptive Trainer (POAT).
- Presentation: Mercado, A. D., Johnson, C. I., Landsberg, C. R., & Bailey, S. K. T. (2018, August). A systematic evaluation of game features in simulation-based training. Poster presented at the International Ergonomic Association conference.
  - Analyzed data and wrote report of results from SOBC experiment, concluding that game features do not increase motivation nor improve the accuracy of periscope calls. Adaptive training increased call accuracy regardless of inclusion of game features.

BASIC AND APPLIED RESEARCH • CORE CAPABILITY 2 41

Research Compendium can be found at the bottom of the NAWCTSD Web site Home page: https://www.navair.navy.mil/nawctsd/node/536

New in 2020
NavalX Central Florida Tech Bridge

- **NavalX** was established in Feb 2019 as an initiative of the Assistant Secretary of the Navy for Research, Development, and Acquisition
- Serves as the Dept. of Navy (DON) workforce "super-connector," focused on scaling non-traditional agility methods across the DON workforce.
- **Central Florida Tech bridge** will facilitate collaboration, innovation and exploration between, Small Businesses, Entrepreneurs, Labs, Academia Team Orlando and Government Stakeholders.
- **Tech Grove** will be the public facing entity platform forged through a partnership between NAWCTSD and the University of Central Florida Research Foundation to solve challenging Warfighter problems.
- **The big why** – be more agile and innovate with problem solvers that we traditionally work work as well as with non-traditional entities

NavalX - Take a Tour and get connected:
https://www.secnav.navy.mil/agility/Pages/default.aspx

Central Florida Tech Bridge

Central Florida Tech Bridge

CENTRAL FLORIDA TECH BRIDGE

GEOGRAPHY MATTERS

DE FLOREZ BUILDING
NAWCTSD
PEO STRI
NSA ORLANDO
DHS FLETC

ANNEX
PEO STRI

TECH POINT I, II
AFAMS
PEO STRI

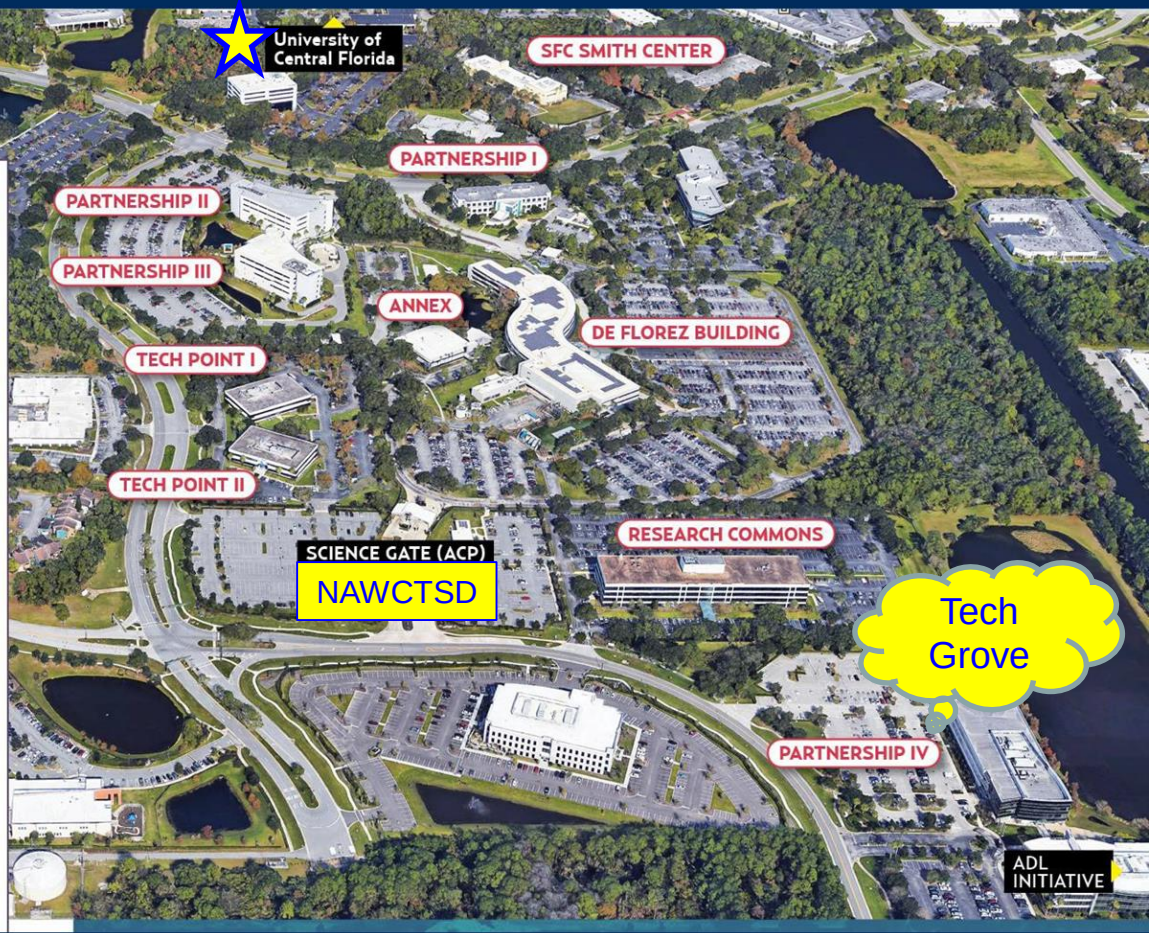
RESEARCH COMMONS
PEO STRI

SFC SMITH CENTER
STTC

PARTNERSHIP I, II, III
NAWCTSD
ACC-ORL
NCS
DHA JPM MMS
PEO STRI
PM TRASYS
UCF

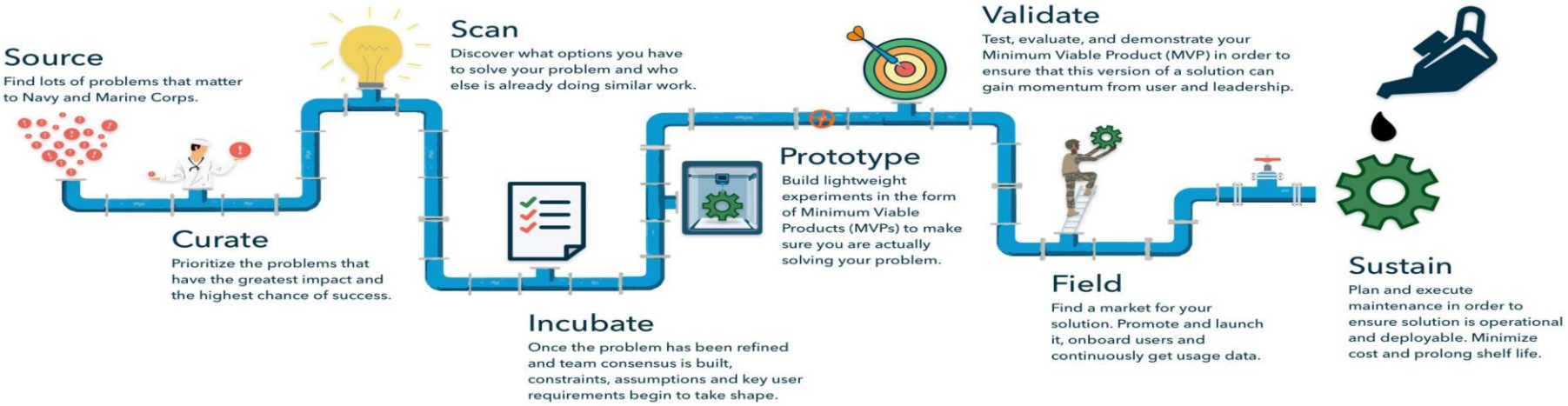
PARTNERSHIP IV
NAWCTSD Meeting Spaces
PEO STRI
STE CFT
STTC
UCF
CENTRAL FL TECH BRIDGE AND THE TECH GROVE
Future Expansion

PARTNERSHIP V
JTIEC
PEO STRI
PM TRASYS



Innovation Pipeline

NAVAL_X



Hard Problem Solution Space

Fleet Training Req't (Aviation/Surface/Undersea & Ready Relevant Learning)		
Supporting Fleet Training Need		
Current Fleet Training Deficiency/Gap Description		
Related Research		
Government Labs	**Industry**	**Academia**
Navy Air Force Army FFRDCs DHS NASA	IRAD SBIRs S&T	FFRDCs & UARCs STTRs Grant Research

KEY: DHS – Defense Homeland Security
FFRDC – Federally Funded R&D Centers (Navy - Center for Naval Analyses)
IRAD – Independent Research & Development
UARC – University Affiliated Research Ctr (Navy – John Hopkins, Penn State, U. of TX, Washington, & Hawaii)

Example: Hard Problem Solution Space

Fleet Training Requirement: Maintenance Training (*TS ENARG #8)		
Dev. & Integrate a low-cost haptic glove for AR/VR maintenance training applications		
<u>Gap Description</u>: Having the ability to integrate a functional haptic glove brings an added dimension of fidelity realism to certain maintenance tasks that is believed will increase the overall training effectiveness.		
Related Research		
Government Labs	**Industry**	**Academia**
Navy Air Force Army FFRDCs DHS NASA	IRAD SBIRs S&T	FFRDCs & UARCs STTRs Grant Research

***TS ENARG – Training Systems Enabler Navy Aviation Requirements Group**

Technology Transfer: Partnering with Industry, Academia, State/Local

Cooperative Research and Development Agreement (CRADA)

- Allows R&D collaboration between NAWCTSD and non-federal partners.
- Provides the means to offer intellectual property (IP) rights to a non-federal partner.
- NAWCTSD can provide:
  - Personnel
  - Facilities/Equipment
  - Intellectual Property (IP)
  - **NO** funds
- Non-federal party can provide:
  - Personnel
  - Facilities/Equipment
  - Intellectual Property (IP)
  - Funds

Commercial Service Agreements (CSA)

- Allows the sale of defense articles and/or services that are not available from any United States commercial source.
- Makes services of any government laboratory, center, range or other testing facility available for testing purposes on a reimbursable basis.
- Relies on existing capabilities and expertise
- Requires full reimbursement of Government costs
- Cannot compete with United States private industry

Technology Transfer:
Partnering with Industry, Academia, State/Local

Software License Agreement (SLA)

- Agreement between NAWCTSD and an Industry partner which allows them to make, use and sell federally developed software with the assurance that we will not sue for infringement.
- NAWCTSD retains rights to use the software for government purposes.
- Industry partner pays royalties to NAWCTSD.

Patent License Agreement (PLA)

- Agreement between NAWCTSD and an Industry partner which allows them to make, use and sell federally owned inventions with the assurance that we will not sue for infringement.
- NAWCTSD retains rights to use the technology for government purposes.
- Industry partner pays royalties to NAWCTSD.

Search for us on https://www.federallabs.org/flcbusiness for more information on available technologies.

How to Participate in NAWCTSD Research?

- Tell us about your Independent Research and Development (IRAD) efforts
- Respond to SBIR/STTR Solicitations
  - Small Business – Large Business Partnering, Academia can be included
- Pursue Cooperative Research and Development Agreements (CRADAs) with NAWCTSD when we find an area of common interest
- Partner on Joint Proposals (Scientist to Scientist/Engineer to Engineer)
  - If successful w/joint proposals several contract vehicle options available:
    - SBIR Phase III
    - NAWCTSD R&D Broad Agency Announcement (S&T projects only)
    - ONR/DoD/funding agency contracting

      https://www.onr.navy.mil/en/work-with-us/funding-opportunities
- Consider new opportunities coming soon via the Tech Grove

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BACKUP