ASN (RDA) Research Needs

Jessica Delgado
Technical Workforce Strategy
DASN (RDT&E)

ASN (RDA)

- Responsible for Research, Development, and Acquisition of Navy and Marine Corps platforms an warfare systems

- Oversight of more than 100,000 people

DASN (RDT&E)

- principal advisor and policy coordinator for the ASN (RDA), on all matters pertaining to Navy science, technology, advanced research and development programs; system prototype programs; and management of science and engineering
- Coordination with Senior Naval and DoD officials at USD (AT&L), ASD (R&E), ASD (R&E, Director of DoD Labs), DOT&E, DoD DT&E, Office of Naval Research (ONR), Naval and Marine Corps Systems Commands (SYSCOMs), Naval Laboratory, Naval Warfare/Systems Centers, Program Executive Offices (PEOs) and Program Managers to facilitate advancement of technology systems into the Fleet and/or development programs.
- Acts as liaison with industry, academia, Federally Funded Research and Development Centers (FFRDCs), University Affiliated Research Centers (UARCs) and outside agencies, both foreign and domestic

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  - C4I
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  - Integrated Warfare Systems
  - Strategic Systems Program (DRPM)
  - Submarines
  - Aircraft Carriers
  - Air ASW Assault & Special Mission
  - Tactical Air
  - Unmanned Aviation & Strike Weapons
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ASN(RD&A) 15 Jan 2014

Research Topics

Thrust Area: Identification, dissuasion, and defeat of irregular, subsurface, and surface threats

- This thrust area includes research topics for potential tactics, techniques, procedures, and tools to detect, classify, track, engage, and defeat surface and subsurface threats necessary to enable the Navy to control the battle space and to carry out the missions required to achieve command objectives, to include naval forces employing indirect and asymmetric approaches, as well as the full range of military capabilities, to erode an adversary’s power, influence, and will.

Counter-Influence of Islamic Female Terrorism

Topic Description:

Research will combine many aspects of influence operations with the intent to preclude an adversarial attitude and align attitudes with a more positive influence; Islamic women are as susceptible to Jihadi rhetoric and misinformation as their male counterparts; these women will have enormous impact on successive generations in the years to come and on our ability to negotiate peace

Topic Classification/Restrictions: None

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No):

Topic Key Words:
Communication modeling, culture/gender models, influence, counter-influence, situational awareness, social-psychology, culture, cyber influence, social media, recruiting

Topic POC and information:

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San Antonio, TX
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Insider Threat Social Media Indicators

Topic Description:

The Naval Criminal Investigative Service (NCIS) needs automated methods to assist in determining potential for insider threat and/or criminal activity based on behavior in social media. The goal of this research is to provide non-obvious directions for further investigation or to help filter/prioritize potential investigation directions.

Research would involve a combine aspects of social identity (related to insider threat , the propensity for terrorism or esponiage, and criminal tendencies) with data mining, natural language processing, and/or social network analysis to identify potential indicators of threats or dangerous actions from open source intelligence (OSINT).

Topic Classification/Restrictions: Unclassified

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No):
Information Dominance-Cyber
Data science involving the use of analytics and reducing information down to its critical element

Topic Key Words:
Social media analysis, insider threat, counterterrorism, data mining

Topic POC and information:

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Research and Applied Sciences (71000)
Space and Naval Warfare Systems Center Atlantic
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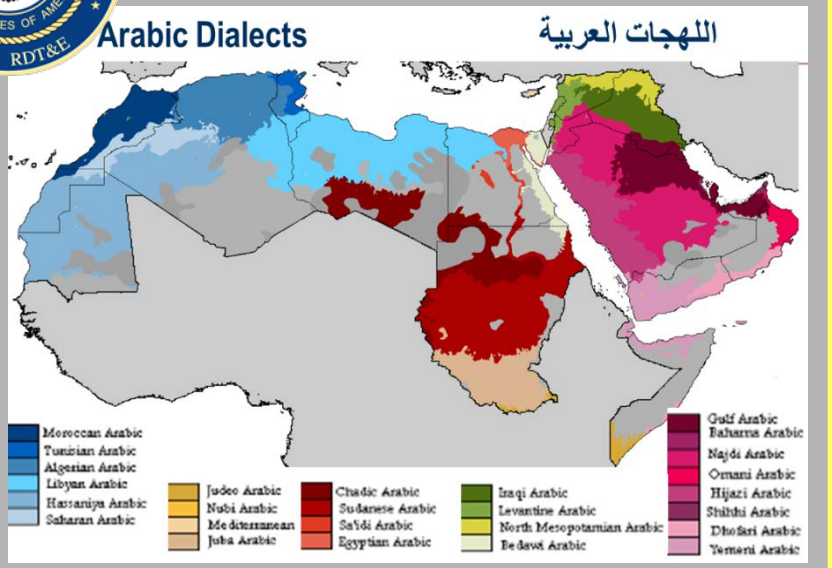
Dialectal Arabic Translation



Topic Description:

Throughout different regions of the Arab League of countries, there are many distinct spoken dialects of Arabic. The combination of these distinctions and the informality of written language in certain contexts such as social media makes translation of such text extremely difficult. Research needs to be conducted into different means to extract the meaning of dialectal Arabic text from informal sources such as social media. Research directions can include:

- ❑ Identification of the type of dialect being used in a document
- ❑ Automated translation for a specific Arabic dialect
- ❑ Methods to identify and extract meaning from text that switches between languages (e.g. Arabic, French, English, and transliterations)

Topic Classification/Restrictions: Unclassified

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No):
Information Dominance-Cyber
Machine reasoning and intelligence
Data science involving the use of analyticsd

Topic Key Words:
Computational linguistics, natural language processing, machine learning and translation

Topic POC and information:

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Lead, Analytics Research Center
Research and Applied Sciences (71000)
Space and Naval Warfare Systems Center Atlantic
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Countering the Unmanned Underwater Vehicle (UUV) Threat

Topic Description:

- Fully autonomous, long-endurance, unmanned undersea vehicles capable of operating for months in littoral or deep ocean environment will become serious maritime threats in the very near future. UUV detection and neutralization is difficult and capabilities are limited.
- This proposed research includes a study of UUV proliferation, UUV vulnerabilities and recommendations for countermeasure concepts such as:
  - Specialized scanning sonar
  - Adapting UUVs for the CUUV mission
  - Adapting existing mine hunting capabilities for the CUUV mission

Topic Classification/Restrictions:

Unclassified/Secret/Top Secret (depending on level of research)

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words:

Airborne, ASW, MCM, UUV, acoustics, mid-frequency sonar, sonobuoy, deep basin oceanography, deep ocean water operations

Topic POC and Information:

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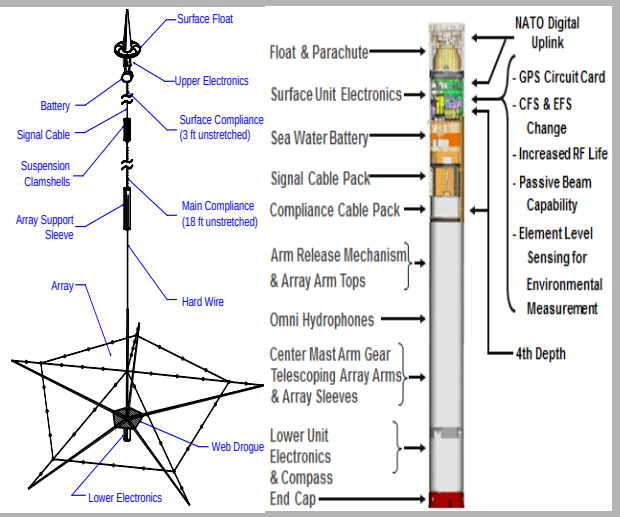
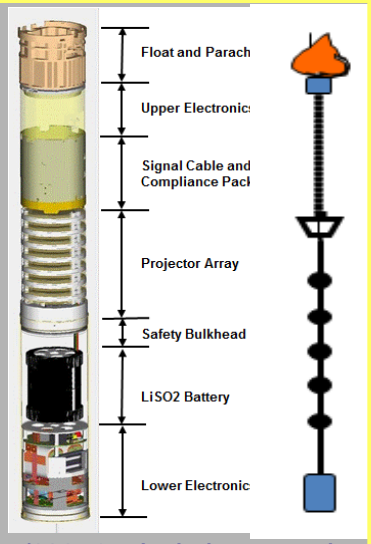
  Arne.anderson@navy.mil
  NAVAIR, PMA-264, Air ASW Systems Program Office

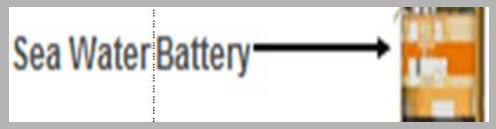
Longer Life Sonobuoy Design



AN/SSQ-101 Physical Layout and Deployed



AN/SSQ-125 Physical Layout and Deployed



AN/SSQ-101 Sea Water Battery

AN/SSQ-125 $LISO_2$ Battery

Topic Description: Navy sonobuoys are designed to meet a 5 year service life requirement (service life defined as up to 5 years of storage in addition to operating life). The Navy is pursuing increased service life while meeting sonobuoy performance, safety, and affordability requirements. While battery performance is typically the primary driver for service life (in the non-rechargeable paradigm), other life limited components need to be identified and addressed to support extending sonobuoy service life. This topic should assess various battery solutions, including rechargeable, as well as, other component redesign as necessary. Potential solutions that employ a battery replacement scheme or a rechargeable battery technology must address producibility and O-level replacement and/or charging CONOPS to minimize impact to normal fleet storage and operations. Promising S&T solutions near Technology Readiness Level 8 should be favored. The study should recommend any required redesign, logistics and infrastructure investments and potential CONOPS.

Topic Classification/Restrictions: Unclassified/Secret (depending on level of research)
NROC Supported (Yes/No): No
Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: ASW, acoustics, sonobuoy, MAC, AN/SSQ-101, AN/SSQ-125, Seawater Activated Batteries, Thermal Batteries, A-size sonobuoy form factor, Lithium Sulfur Dioxide ($LiSO_2$), Lithium Manganese Dioxide ($LiMnO_2$);

Topic POC and Information:

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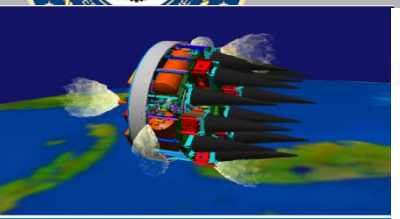
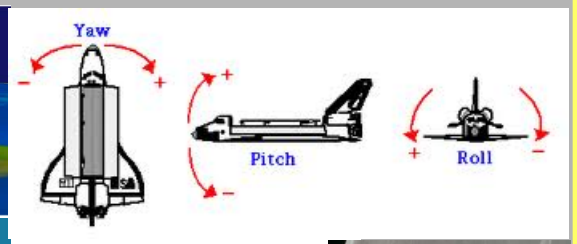
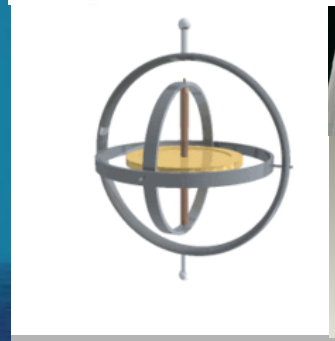
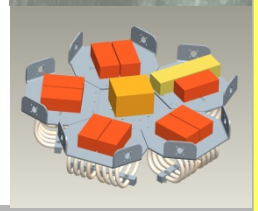
  Arne.anderson@navy.mil
  NAVAIR, PMA-264, Air ASW Systems Program Office
- Viktor Goben, 301-995-7016
  Viktor.goben@navy.mil
  NAWCAD 4.5.14

Enhancing the Fidelity of Rigid Body Motion Simulations in DoD HPC Software Applications Utilizing a New Software Algorithm Based on Parallel Transport Theory









<u>Topic Description:</u> The primary objective of this proposed research project will be to develop DoD-owned High Performance Computing (HPC) software applications for high-fidelity, physics-based M&S of certain aspects of missile and spacecraft dynamics including various phases of flight of Submarine Launched Ballistic Missiles (SLBMs). A key ingredient in this proposed work is a newly developed software algorithm for simulating rigid body motion based on *Levi-Civita-Riemannian transport*. Included in this proposed project will be the Verification and Validation (V&V) of new enhanced fidelity HPC software tools for the M&S of:

1. Under Water Launch (UWL) of current and future designs of SLBMs.
2. Suborbital flight of the Equipment Section (ES) of current and future SLBM designs during the deployment and ballistic phases of flight including reentry body separation and trajectories.

<u>Topic Classification/Restrictions</u>: Unclassified

<u>NROC Supported</u>: No

<u>Formal Navy S&T Objective</u>: Yes. Hardware in the Loop Modeling and Simulation (M&S)

Topic Key Words: Modeling and Simulation, Flight Simulation, Rigid Body Mechanics Computational Structural Mechanics, Computational Fluid Dynamics, Inertial Measurement and Navigation Systems, DoD HPCMP, Software Development

<u>Topic POC and information</u>:

PI: Michael Newman, NSWC Crane Division (812)854-4417, michael.g.newman1@navy.mil

Co-PI: William Szymczak, Naval Research Laboratory (NRL), (202)767-7212, szymczak@nrl.navy.mil

Customer: Theodore Serbinski, Strategic Systems Programs (SSP), (202)433-8563, theodore.serbinski@ssp.navy.mil

Rolling Airframe Missile (RAM) – Vertical Launch

RAM Block 2

Topic Description:

- Investigate methods to deploy RAM Block 2 in a MK 41 Vertical Launch System (VLS)
  - Thrust Vector Control (TVC)
  - No TVC; angled launch
  - Booster / no Booster
- Investigate resulting change in Probability of Raid Annihilation (Pra) with a vertically launched RAM Block 2 deployed on a AEGIS equipped ship for a variety of threats to include:
  - Subsonic, low-g, high IR, high RF
  - Subsonic, low-g, low IR, low RF
  - Supersonic, high-g, high IR, low RF
  - Supersonic, mid-g, high IR, low RF

Topic Classification/Restrictions: **Secret/US Only**

NROC Supported (Yes/No): **No**

Formal Navy S&T Objective (Yes/No): **No**

Topic Key Words: **Rolling Airframe Missile, RAM, Vertical Launch System, VLS, Raid Annihilation, Pra, Thrust Vector Control, TVC, Booster**

Topic POC and information:

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FAC/FIAC Measures of Effectiveness: Communication Strategies for FAC/FIAC Defense Mission

Topic Description:

- Propose methods/procedures to simplify communicating the progress of FAC/FIAC Defense missions.
- Recommend measures of effectiveness (MOEs) for FAC/FIAC Defense missions onboard Carriers and AMPHIBS.
- Recommend methods for Command, Control, Communications, Computers, Combat System, & Intelligence (C5I) ICS Capability Gap Closure, to include Common Operational Picture (COP) and Command and Control (C2) enhancements.
- Determine if recognition technology can assist in detecting FAC/FIAC.
- Recommend methods for defeating FAC/FIAC scenarios.

Topic Classification/Restrictions:

- Unclassified preferred (higher if required)

Topic POC and information:

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Integrated Warfare Systems (PEO IWS)
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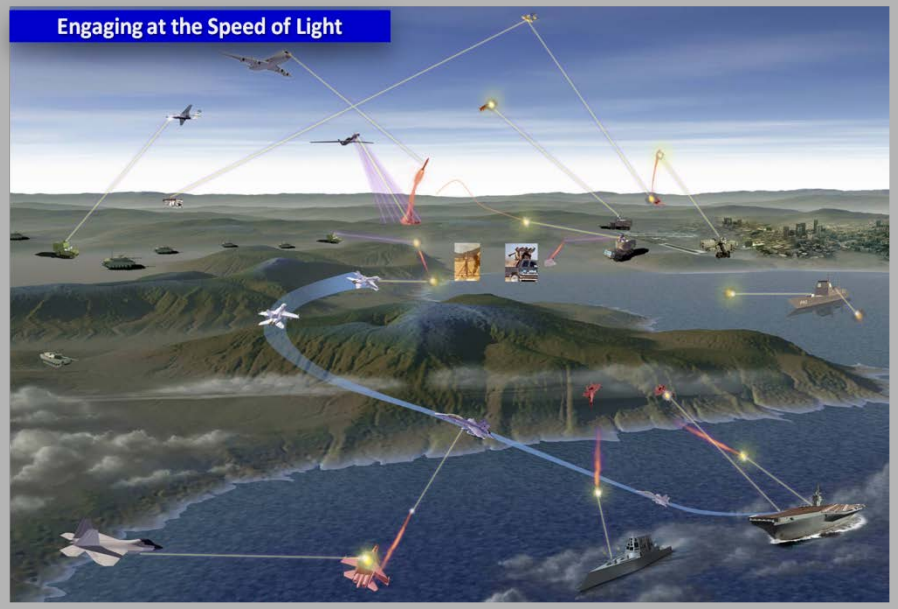
scott.bewley@navy.mil

High Energy Laser Weapon Viability (PMA242)



Topic Description:

Investigate the viability of Airborne High Energy Laser Weapons Systems (AHELWS) by conducting research in:

- Laser effectiveness as a function of peak output power (assumed at 1.06-micron wavelength), beam quality, efficiency, scalability, power required, etc.
- Beam combination techniques: coherent, incoherent, spectral, and phased array
- Lethality of relevant target materials: fiberglass, aluminum, steel
- Beam transmission in a maritime environment
- Studies of aero-optic effects and beam control mitigation techniques
- Constraints/limiting factors to increasing laser energy in an airborne laser pod

Topic Classification/Restrictions:

Unclassified

NROC Supported (Yes/No):

No

Formal Navy S&T Objective (Yes/No):

Yes (NAE2014 EPE STO-4, ONR Naval S&T Focus Area Power Projection & Integrated Defense (Future Naval Fires))

Topic Key Words:

Deep Magazine, Multi-engagement

Topic POC and information:

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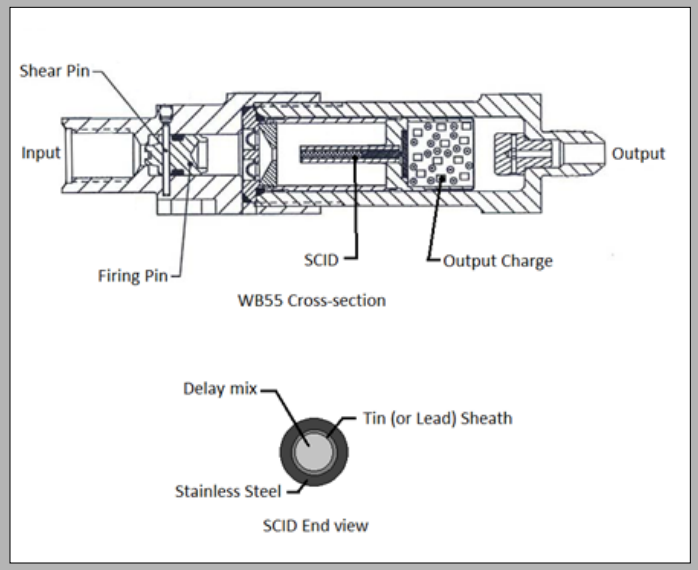
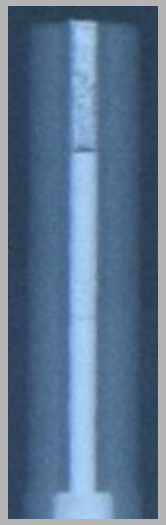
Alternative to Time Delay CAD (PMA201)





Topic Description:

Investigate and propose a viable alternative to current time delay devices that are dependent on the propagation characteristics and design of energetic materials to achieve tight timing tolerances for ejection seats and canopies. Solution should have predictable and repeatable performance characteristics, provide a long (multi-year) service life, and be capable of operating reliably over a large temperature and vibration spectrum with little to no need for periodic maintenance/inspection.

Topic Classification/Restrictions:

Unclassified

NROC Supported (Yes/No):

No

Formal Navy S&T Objective (Yes/No):

No

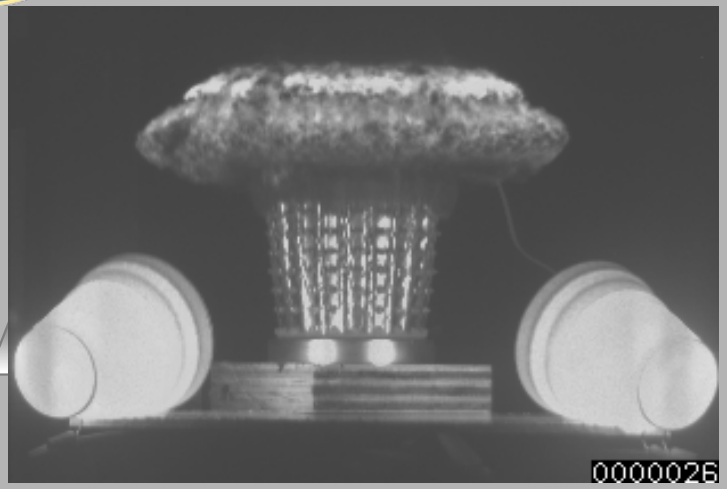
Topic Key Words:

CAD, Time Delay

Topic POC and information:

Bobby Cornelius PMA-201
(301) 757-7441 (W)

Modeling Dynamic Response of Reactive Materials



Topic Description:

Modelling the material response of pressed composites upon the application of shock or shear .

Pressed reactive materials fracture and release energy upon impact or through the passage of a shock from an adjacent explosive. The time domains of the material processes of fracturing and chemical energy release are unknown. The governing factors that control the phenomenon are also unknown. There are available experimental data, that can be used to evaluate models of material response from these physical stimuli. Such models are critical in the development of next generation reactive materials.

Topic Classification/Restrictions: See Distribution Statement

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words:

Reactive Materials, Fracture, Shock, energy Release Rates, Detonation, Blast

Topic POC and information:

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NSWC IHEODTD
301 744 4413
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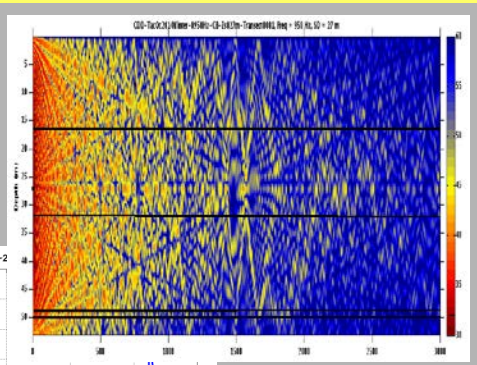
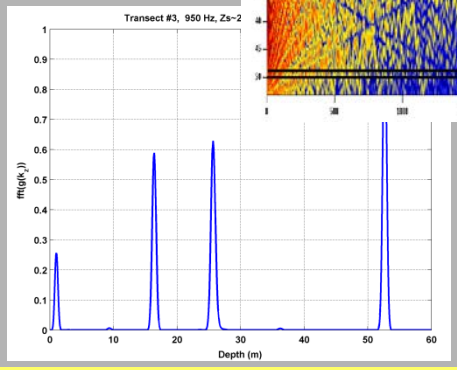
Distribution Statement C: US government agencies and their US government contractors only

ONR 32.9 – Exploration of depth discrimination techniques



TL vs range and depth of a 950 Hz signal from an acoustic source at 27m in a downward-refracting shallow water waveguide



Relative magnitude of the Green's function vs. depth for the simulated acoustic waveguide shown above. Depths of the surface, source (27 m), receiver (17 m) and seabed are identified.

Topic Description:

Depth is a potentially powerful classification feature in active and passive sonar systems for anti-submarine warfare (ASW). Algorithms to estimate depth from sonar measurements have been proposed but need further research, development, and testing on real data from a variety of operationally relevant environments.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Depth discrimination; Active and Passive Sonar Systems; ASW; Algorithms; Operationally Relevant Environments

Topic POC and Information:

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Office of Naval Research
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Arlington, VA 22203
703-696-0811

ONR 35.5 – Modeling and simulation of high density reactive materials

Topic Description:
Computational models of energy release and energy release rates for a range of high density reactive materials interacting with solid and hollow structures. Multi-scale modeling and simulations and the damage initiated. Physics and engineering based models predicting the complex material interactions.

Topic Classification/Restrictions: TBD

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: High Density Reactive Materials; Material Composition; Energy Release

Topic POC and information:
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(703) 696-0437

ONR Global.1 – Hydroballistic study for precision and standoff aerial mining

Topic Description:

U.S. Pacific Command (USPACOM), U.S. Pacific Fleet (PACFLT), U.S. Pacific Air Forces (PACAF), the Navy Mine and Anti-Submarine Warfare Center (NMAWC), Commander Mobile Mine Assembly Group (COMOMAG), the PMS 495 Maritime Mine Program, and Naval Surface Warfare Center Panama City (NSWC PC) are collaborating to develop new precision and aerial mining standoff methods. The project will adapt existing aerial Quickstrike maritime mines with precision capability using Joint Direct Attack Munition (JDAM) kits and standoff with Australian developed wing kits. The hydroballistic profiles of these new weapons configurations following water entry are not well understood and require modeling. A current NPS project effort led by CDR Michael Szczerbinski studying JDAM hydroballistic profiles for ASW and MIW is closely related work that could be significantly leveraged. The project would determine optimal entry angle profile, angle of attack, and velocity to minimize damage to the weapon, prevent hard impact on the bottom, ensure proper placement, and maximize the predictability of bottom placement.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Hydroballistic: Precision and Standoff; Aerial Mining; Maritime Mines; Quickstrike; ASW; MIW

Topic POC and Information:

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808-477-8127

ONR Global.9 – Corruption and connections between PRC military and oil industries

Topic Description:

Thesis: "Guanxi", or "connections", is China's most valuable currency. A recent slew of corruption scandals has cracked open the door to understanding the connections between the oil industry and the country's top military and civilian leaders. A comprehensive look at connections between these entities is necessary to understand the true motivations behind China's military and diplomatic strategy. The PRC links with China's oil industry explains the increase in China's challenge of the contested islands in the China Sea. **Research Questions:** a) Who is connected to whom? b) Is Xi Jinping lessening corruption within the PRC, or mainly angling to take out his adversaries? c) Are these connections influencing strategy? d) What is the history of the entanglement between the connections? e) How are the connections and actions impacting China's neighbors?

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Corruption; Oil Industry; PRC; Entanglement; Diplomatic Strategy

Topic POC and Information:

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Office: 808-477-9409

ONR Global.10 – Integration of AWC into a maritime amphibious domain

Topic Description:

USPACOM maritime domain west of the international dateline includes significant amphibious capabilities; III MEF. The TJFLCC operates AWC both west and east of the IDL, with an ongoing effort to develop a 10 year strategy for total force (Army) AWC utilization in the PACOM AOR. Central to this strategy is the stationing of additional AWC and optimization of AWS west of the IDL and the subsequent support to the JLEnt; Phase 0 and transition into crisis. We are looking to better serve the joint community in the Pacific with Army Watercraft Systems (AWS). Believe CG would like to solicit from the maritime / amphib community where they see additional opportunities to use AWS or incorporate AWS into amphibious mission sets (Exercise Culebra Koa, support to MRF-D in Australia, support to JLOTS operations, etc.). **Research Question:** How can PACOM better utilize both current and future AWC assets to support Joint Missions.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

AWC; Maritime Amphibious Domain; TJFLCC;

Topic POC and Information:

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COL Jim Bogart (808-438-1137) (connected to ONRG Science Advisor at PACOM – Mr. Greg Vandiver – via the PACOM S&T Board)
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All above are US Army members of RDECOM at PACOM location

Thrust Area: Unmanned Systems and Autonomy

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools to develop, improve, or maintain autonomous capabilities and incorporate them into systems to enable operations across all domains and multiple mission sets, to include warfare capabilities for unmanned vehicles.

Analysis of LCS and Future Ship Class for Optimized MH-60, MQ-8C, and Future UAV Aircraft Operations (PMA266)

Topic Description: Capstone event to study the current/planned inventory of air capable ships (LCS, DDG, JHSV, etc.) to determine how the Navy could support longer endurance ISR missions (12hr~24hr) with it's MH-60 and MQ-8C helicopter fleet. Additionally, the study should include consideration for future long endurance/larger sized UAVs that are under development as concept demonstrators. Some operational and logistics attributes to consider include # of orbits, operational coverage/time on station, hangar sizing, fuel considerations (ship and aircraft), manpower increases (ships crew and Air-Det), ship quarters (more bunks), etc. Also, variation of the MH-60/MQ-8C aircraft mix and variation of number of ships for conducting ISR missions is of interest.
Background: Current LCS hangar space, ship sizing, ship quarters, and manpower ***constrain*** the deployment mix of MH-60 and MQ-8C aircraft. Both platforms share the same pilots and maintenance crew. Additionally, aircraft availability is optimized when 2 A/C of one type/model are on the ship to ensure there is always 1 A/C that is "UP" and ready to conduct the mission. The current LCS/DDG/JHSV ship configurations prevents this optimized MH-60R/MQ-8C aircraft deployment mix from a single ship.

Topic Classification/Restrictions:
Unclassified – Distro D

Topic POC and information:
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Autonomous Asset Optimization

Topic Description:

The objective will be to determine the number, types and allocation of detection, neutralization and proofing assets required to optimize performance in an explosive hazard defeat environment. Assets will be modular, and deployable from various types of autonomous platforms such as unmanned surface vehicles (USVs), unmanned air vehicles (UAVs) and unmanned ground vehicles (UGVs). The operational focus will be USMC Marine Expeditionary Unit (MEU) amphibious operations, and the optimal asset allocation will need to provide stand-off detection, neutralization and proofing at operational tempo against a wide range of threats.

Topic Classification/Restrictions:
Unclassified/FOUO
NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Autonomy, optimization, modeling, Counter-IED

Topic POC and information:

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Coordination of Heterogeneous Autonomy Systems in a Littoral Explosive Hazard Defeat Environment

Topic Description:

The objective will be to determine the architecture for communications and command/control of multiple types of autonomous systems in a littoral explosive hazard defeat environment. The various types of autonomous platforms will include unmanned surface vehicles (USVs), unmanned underwater vehicles (UUVs), unmanned air vehicles (UAVs) and unmanned ground vehicles (UGVs). The operational focus will be USMC Marine Expeditionary Unit (MEU) amphibious operations, and the optimal C2 structure will provide the commander and operators with the appropriate levels of information and controls through a Common Operating Picture.

Topic Classification/Restrictions:
Unclassified/FOUO

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Autonomous, Command/Control (C2), Communications, Common Operating Picture, Littoral

Topic POC and information:

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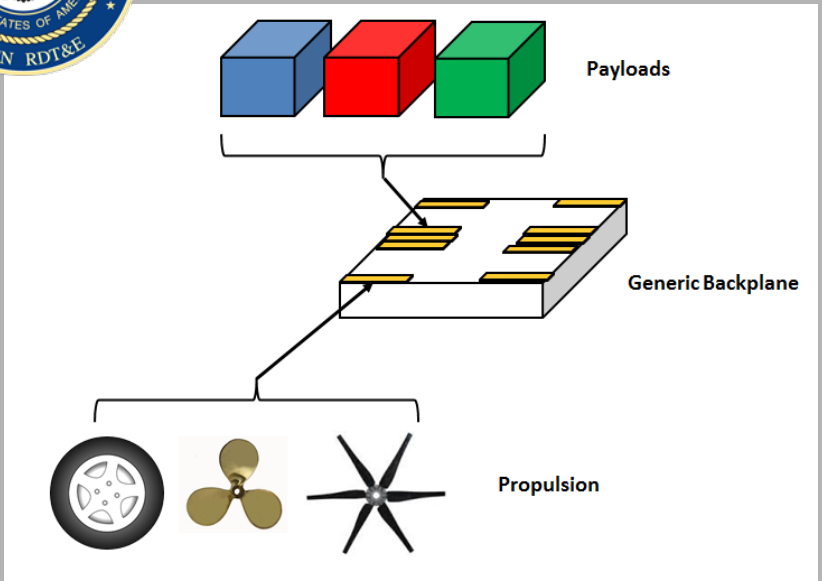
Adaptable Multipurpose Unmanned Vehicle



Topic Description:
An open source (3D printable if needed) unmanned vehicle design with swappable payloads, propulsion types (land, air, sea), and sensor suites. Systems engineering approach to UV allowing the miniature vehicle to be adapted to many uses. Example: Quad rotor with battery pack to visually inspect top of AEMS mast, PCMS, etc. (LPD): Tanks & voids autonomous maintenance inspection in liquid using LIDAR, powered by tether.

Topic Classification/Restrictions: **None, unclassified**

NROC Supported (Yes/No): **Unsure**

Formal Navy S&T Objective (Yes/No): **Yes, autonomous and unmanned systems**

Topic Key Words: **unmanned vehicle, maintenance, ISR, systems engineering, open systems architecture**

Topic POC and information:

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High Performance Control of Agile Undersea Vehicles

IMAGE
(Not Available)

Topic Description:

Conventional propeller driven unmanned underwater vehicles (UUVs) have difficulty operating in some environments, particularly in highly dynamic, unstable regimes. These traditionally controlled vehicles may not support emerging mission requirements that will need precise maneuverability and multi-axis control employing new control surface topologies and hydrodynamic characteristics. Research areas include non-traditional control surfaces, vehicle topologies and next generation control algorithms and hardware to enable real time maneuvering and stability control in these challenging applications.

Topic Classification/Restrictions: N/A

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Unmanned Undersea Vehicles - USW-.AUS-03: Develop capability to enable rapid and reliable targeting of multiple contacts via improved sensor exploitation

Topic Key Words: Autonomous Underwater Vehicles, Oscillating Foils, Vehicle Dynamics and Control

Topic POC and information:

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From SeaPerch to Autonomous UUV

Topic Description:

The SeaPerch underwater robotics program is a great way to introduce middle school and high school students to robotics, naval engineering, and science topics. The frame is made from PVC pipe. Three thrusters—propellers driven by electric motors encased in film canisters with wax—provide propulsion in three dimensions. Motor control is via CAT5 tether cable connected to a simple remote control unit using toggle & push-button switches to change direction & provide power from external source. Many upgrades/ modifications are possible that could take this to the next level.

Research will be performed to enhance the capabilities of a SeaPearch (or vehicle of similar construction) in order to come up with a low-cost platform for building an autonomous UUV. Further research to develop autonomous control software for such an enhanced SeaPearch with specific missions in mind is also warranted.

Topic Classification/Restrictions: None

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No): Yes —

Autonomy & Unmanned Systems

- Human/Unmanned Systems Collaboration
- Perception and Intelligent Decision Making
- Intelligence Enablers and Architectures

STEM & Workforce Development

- Science, Technology, Engineering, and Mathematics

Topic Key Words: Autonomous Systems, SeaPerch, UUV

Topic POC and information:

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ONR 33.4 – Collaboration between autonomous systems in a low-bandwidth/intermittent communications environment

Topic Description:

While collaboration between autonomous systems whether homogenous or heterogeneous is reliant on a level communication to maintain common situational awareness, task allocation, and common goals, communication and connectivity can be limited in bandwidth, interrupted by dropouts and often intermittent in nature. The focus of this topic is to discover/define collaboration techniques/approaches that can overcome limitations in connectivity and enable members of the group to reach consensus on individual roles and maintain a common situational awareness. Specific collaboration objectives may include maintaining formations as the group size changes, switching between formations and possibly splitting out into sub-groups.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes; Autonomy and Unmanned Systems

Topic Key Words:

Autonomous Systems; Collaboration; Situational Awareness

Topic POC and Information:

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ONR Global.13 – LF14N005: Assisted closed-loop technologies for neuroscience research, University of Madrid, Spain

This is a current ONR Global NICOPS effort that is proposed for expansion

Topic Description:

The proposed research develops a novel technology termed "Real Time Dynamical Observer and Control" (RTDOC), that interacts with neural systems to systematically observe, manipulate, actively probe and control their function by closing the stimulus-response loop in real-time. In contrast to current open loop approaches to observing and interacting with neural systems, which typically rely on feed forward methodologies and offline analysis, the PI's approach is one of the first to make use of real-time, assisted closed-loop interactions.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Closed Loop; Neuroscience; RTDOC; Neural Systems; Stimulus-Response Loop

Topic POC and Information:

ONRG POC: : Leonard Ferrari
NPS Collaboration: OR Department:
Dr. Nita Shattuck, Dr. Mike McCauley

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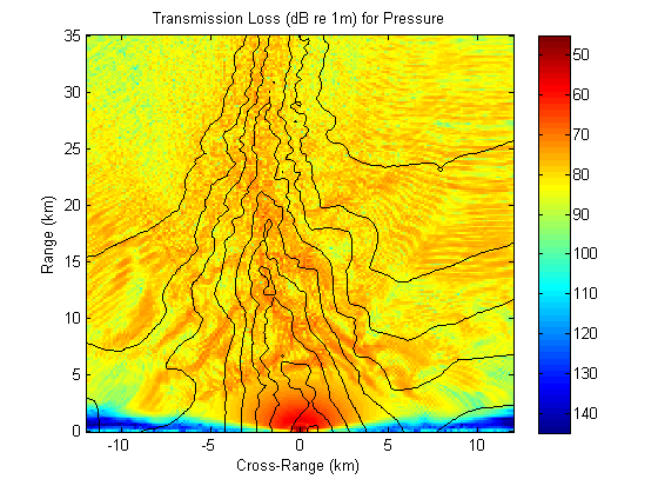
Thrust Area: Battlespace Awareness

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools to develop, improve, or maintain knowledge of the current and predictive physical environment and its impact on naval operations from the bottom of the ocean to space

ONR 32.2 – 3-D Acoustics in shallow water



Transmission loss slice at 50m depth for 100Hz acoustic propagation into Hudson Canyon

Topic Description:

Goals of this topic include improving modeling and understanding of the significance of 3-D propagation effects and quantify their departure from 2D solutions in areas of interest, including horizontal refraction and the impact on horizontal coherence. Particular focus should be placed on propagation in littoral regions in the vicinity of continental shelf canyons and other strong bathymetric influences.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Acoustic Modeling; 3D Acoustic Propagation; Canyon Acoustics

Topic POC and Information:

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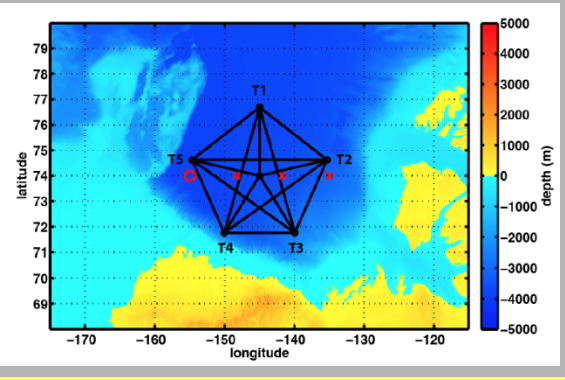
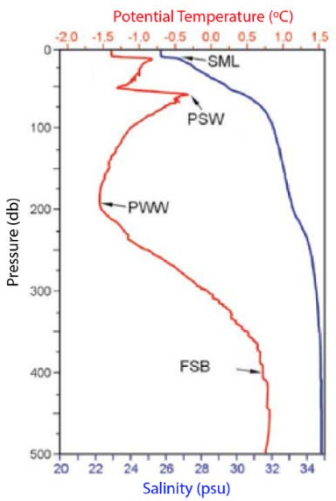
ONR 32.3 – Canada Basin acoustic propagation experiment

2015-2017 Canada Basin
Acoustic Propagation Experiments

(Courtesy P. Worceter, SIO)





Topic Description:

The Canada Basin Acoustic Propagation Experiment (CANAPE) Is an ONR funded gyre-scale acoustic propagation, arctic ocean tomography, and ambient Noise experiment in the Canada Basin, consisting of a yearlong experiment in the Canada Basin of the Arctic Ocean during 2016–2017. CANAPE presents an opportunity for researchers at NPS to participate and perform complimentary efforts in order to understand the effects of changing Arctic conditions on low-frequency, deep-water propagation and on the low - frequency ambient noise field.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Arctic Acoustics and Fluctuations; Sound-Speed Fluctuations

Topic POC and Information:

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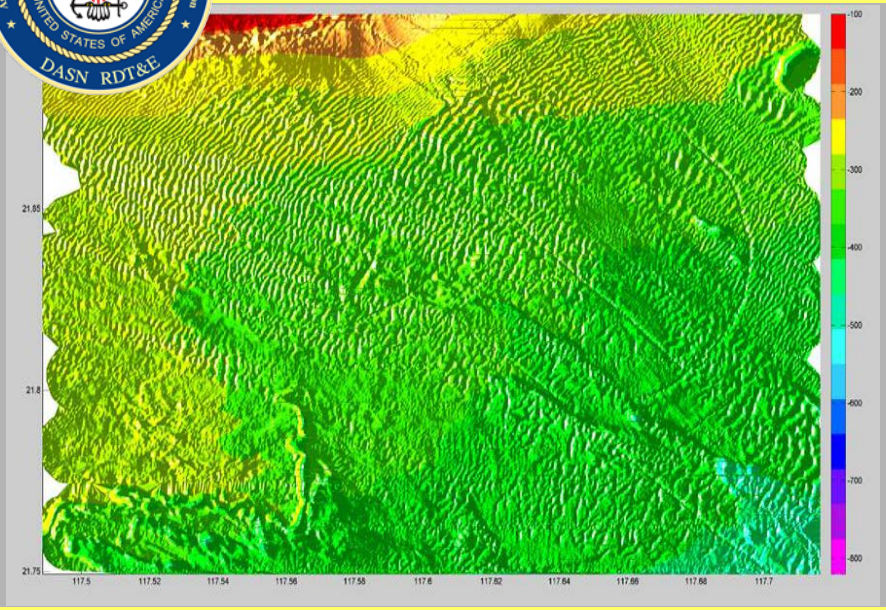
ONR 32.4 – South China Sea sand dunes



Topic Description:

Very large (5-20 m amplitude…7 stories tall) sand dunes have recently been discovered on the upper continental slope of the South China Sea (SCS). These large bedforms have a significant impact on acoustic propagation and reverberation, affecting both passive and active DCLT. Some operational impacts include intermittent TL anomalies and bearing errors, which change with azimuth and depth. Intensive field experimentation, data analysis and acoustic modeling are required to fully comprehend the physics of the propagation over the sand dunes and their impact on operational sonar systems and predictive models.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

South China Sea; Sand Dunes; Acoustic Propagation; Reverberation; Continental Slope

Topic POC and Information:

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ONR 32.10 – SOF Operations in the Megacity environment

Topic Description:

Military strategists are increasingly focused on MEGACITIES [defined as metropolitan areas with a total population in excess of ten million people; a MEGACITY can be a single metropolitan area or multiple metropolitan areas that converge] as areas ripe for extremist fomentation and, therefore, potential future areas of future US DOD / whole-of-government engagement. The MEGACITY constitutes a new and extremely complex operational paradigm and, because the vast majority of MEGACITIES are and will be situated along world's coastlines and major waterways, understanding this environment is of particular interest to US naval special operations. This study will serve a two-fold purpose: [1] develop an analytical framework for use by SOF in developing campaign-to-tactical level planning in the MEGACITY environment and [2] identify areas requiring technological development ISO the warfighter.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Megacity; Military Strategy; Analytical Framework; SOF; Technological Development

Topic POC and Information:

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ONR Global.14 – LFN15001: Tropical Cyclone Genesis, Intensification and Structure, Ludwig Maximilian University (LMU), Munich, GE

This is a current ONR Global NICOPS effort that is proposed for expansion

Topic Description:

Current models for prediction of storm intensity and direction, while improving, have not proven to be as accurate as needed by the civilian and military meteorology community. The PI has offered a new paradigm for intensification that takes into account the intrinsic role of rotating deep convection in the intensification process. This proposal is to carry out calculations to develop and extend new intensification paradigms to environments with a prescribed basic flow and to investigate hitherto unexplored aspects of the earlier calculations such as the evolution of inflow jets that sandwich the upper level outflow layer.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Tropical Cyclone Genesis; Intensification; Structure; Prediction Models; Inflow Jets

Topic POC and Information:

ONRG POC: Leonard Ferrari

NPS Collaboration: The PI, Dr. Roger Smith, at Ludwig Maximillian has an ongoing collaboration with Dr. Michael Montgomery, Meteorology, which would facilitate and extend the NPS collaboration with LMU.

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Thrust Area: Expeditionary Warfare

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools that address the full spectrum of expeditionary kinetic and non-kinetic capabilities required to operate across the entire range of military operations, decisively defeat traditional threats and effectively confront irregular challenges.

CLIC Requisite Equipment

Topic Description:

The Company Landing Team will soon take a larger role in crisis response and may form the GCE component of a SPMAGTF. The Company Level Intelligence Cell will comprise the intelligence effort of operations ashore; and as part of MCISRE the CLIC will change how (tactical) intelligence is gathered, analyzed, and disseminated. This research focuses on determining the necessary equipment and communications capabilities necessary to enable rapid intelligence gathering, assessment, and dissemination by the CLIC while participating in company operations ashore.

Topic Classification/Restrictions: **Secret**

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

Intelligence, Company Landing Team, Company Level Intelligence Cell, MCISRE

Topic POC and information:

MCWL

CLT Communications

Topic Description:

The Company Landing Team will soon take a larger role in crisis response and may form the GCE component of a SPMAGTF. This forward capability will require dispersed operations to secure landing sites, maneuver deep to inland objectives, and massing throughout the littorals. As a self-supported unit the CLT requires better communications capabilities than are currently available. This research would ideally be part of or complementary to ongoing efforts being made by USSOCOM to implement Tactical Networks and / or USMC efforts pertaining to MAGTF DI and could create or implement a (potentially hastily formed and mobile) Company Level Network as well as form the basis of a redundant communications capability.

Topic Classification/Restrictions:

Unclassified / None

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

Tactical Network, Expeditionary Communications, Company Level distributed operations

Topic POC and information:

MCWL

ONR 30.2 – Amphibious combat vehicle (ACV) 2.0 propulsion system research

Topic Description:

The ACV, which may weight upwards of 40 tons, needs the ability to propel itself from ship to shore at high water speeds (greater than 20 knots). This water mode of operation constitutes 10% of its use profile and requires upwards of 2800 horsepower. The platform also needs to traverse land terrain for the remaining 90% of its mission profile which only needs approximately 900 horsepower. The topic is researching propulsion system(s) that can meet the needed water performance without being an undue size, weight, power, and cooling (SWAP-C) burden in the land mode, where the platform spends the predominance of time.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes

Topic Key Words:

Engine; Propulsion; Fuel Efficiency; Power Density

Topic POC and Information:

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ONR 30.3 – Amphibious Combat Vehicle (ACV) 2.0 high water speed sled research

Topic Description:

The ACV, which may weight upwards of 40 tons, needs the ability to traverse from ship to shore expeditiously at speeds greater than 20 knots. This could occur via its own on-board propulsion system or the ACV could be carried on a high water speed sled type of water craft. This topic is researching a lightweight, low burden sled that serves as a type of “slipper” to minimize ship storage, deck space, operator control, and complexity of sled interface.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes

Topic Key Words:

Sled; Connector; High Water Speed

Topic POC and Information:

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Thrust Area: Platform Design and Survivability

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools that address platforms concepts, systems and component technologies that improve the performance of military platforms (air, ground, and sea) to meet operational requirements under all environmental conditions, concentrating in the areas of mobility, survivability, payload optimization, sustainability, and/or life cycle management.

Deployed Ao

IMAGE
(Not Available)

Topic Description:

Current Operational Availability Ao metrics are calculated by system and are based on availability during deployed and non-deployed time periods.

The requirement is to determine a metric calculation and reporting process that will focus in near real time on the strike group and ship ability to perform their mission when deployed.

Initial metrics would be limited to C4I critical systems. This is in support of a COMSPAWARSYSCOM Strategic Goal

Topic Classification/Restrictions:
SECRET

NROC Supported (Yes/No): ?

Formal Navy S&T Objective (Yes/No): ?

Topic Key Words: Mission Capability, Metrics, Operational Availability

Topic POC and information:

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NSWC CORONA – Steve Wann; 951-393-4430' steven.wann@navy.mil

SPY-1 Radar Condition Based Maintenance

Topic Description:

Develop prognostics Algorithms to Improve AEGIS SPY-1 Radar Operational Performance through Condition Based Maintenance primarily based on existing data available through ORTS test points and ADEPT test set data.

Topic Classification/Restrictions: UNCLAS

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Radar, diagnostics, RMA, CBM

Topic POC and information:

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Improved coatings for FCS and EXCOMM equipment

Topic Description:

An Assessment of Corrosive-Resistant Coatings for the MK99 Fire Control Illuminators and Communication Antennas Onboard AEGIS Cruisers and Destroyers
Goal: Reduce the cost of refurbishing MK99 Fire Control Illuminators by extending the longevity of protective coatings in a maritime environment of this radar reflective illuminator and communication antennas

Topic Classification/Restrictions: UNCLAS

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: : nanotechnology coatings, material science, radar theory, fire control, cost benefit, depot level maintenance

Topic POC and information:

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CRES JP-5 Piping Failure Prediction

Relevant photos showing corroded piping are FOUO

Topic Description:

- **Thin wall CRES 316L pipe in JP-5 fuel systems joint design (belled end fitting with inherent crevice) and potential poor weld quality (risk due to thin pipe) causing additional crevices create areas for corrosion to form and result in leaking joints.**
- **Leaks were identified on CVN 77 within the first three years of service with additional failures expected. Predicting corrosion rate and future leaks will allow Program Offices to plan life-cycle maintenance and develop a BCA for new construction requirements to prevent leaks.**

Topic Classification/Restrictions: **FOUO**

NROC Supported (Yes/No): **No**

Formal Navy S&T Objective (Yes/No): **No**

Topic Key Words: **Piping, weld, corrosion, thin-wall, JP-5, fuel systems**

Topic POC and information:

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High Fidelity Helicopter Hostile Fire Indication (HFI)

Topic Description:

Capability to provide high fidelity hostile fire indication (HFI) that delivers potentially life saving performance. This capability helps flight crews locate active shooters by using state-of the-art passive/active hostile fire detection system (e.g. UV,IR RF and Acoustics), computer-based signal processing, and both auditory and visual indications to detect and report relative shooter azimuth, elevation information and types of threat.

Topic Classification/Restrictions: Un-Classified

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No): Yes
SSAA STO-1: System Safety
FP STO-1: Platform Survivability

Topic Key Words: HFI, UV, IR, RF and Acoustics

Topic POC and information:

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Advanced Technology Lead:
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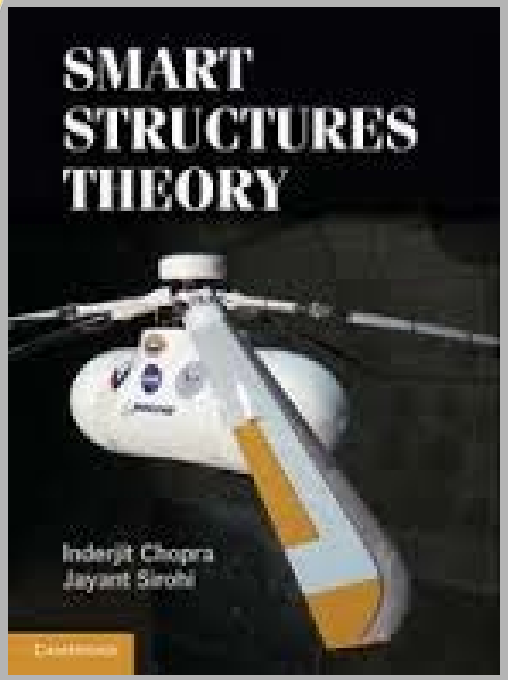
Smart Structures/Materials for Rotocraft



Topic Description:

Capability to improve rotorcraft performances. Potential areas of interest to include, but not limited to: smart structures and materials to improve lift/speed, reduce drag/vibration, reduce rotor noise and improve survivability.

Topic Classification/Restrictions: Un-Classified

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No): Yes
EPE STO-1: Enterprise Enablers
EPE STO-3: Vertical Lift Platform Enablers

Topic Key Words: Smart Structures, Smart Materials, Rotorcraft

Topic POC and information:

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Rotorcraft Lightweight De-icing/Anti-Ice Capability

Topic Description:

Capability to predict and detect ice formation and provide a lightweight de-icing/anti-ice system for both rotor blades and fuselage that reduces both weight and electrical power requirements. Current de-ice/anti-ice capabilities are heavy due to power requirements for heating and wiring.

Topic Classification/Restrictions: Un-Classified

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No): Yes
SSAA STO-1: System Safety
FP STO-1: Platform Survivability

Topic Key Words: Icing prediction, Ice Detection, De-icing, Anti-icing, Rotorcraft

Topic POC and information:

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Additive Manufacturing (AM) for Naval Applications

Topic Description:

This capability promises applications ranging from on-site repair and refurbish high-value damaged parts to manufacture new and replacement components for Naval weapon systems. While promising, additional researches are needed: develop additive manufacturing fundamentals for production of complex systems such as, multi-functional materials and structures, development of AM-capable materials (both metals and composites), innovative AM manufacturing systems with hybrid processes, and develop methods for rapid certification of AM fabricated components.

Topic Classification/Restrictions: Un-Classified

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No): Yes
SSAA STO-2: Total Ownership Cost (TOC)
ILS STO -2: Improved Maintenance Capability

Topic Key Words: Additive Manufacturing, 3-D printing, AM capable Materials, rapid certification

Topic POC and information:

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Metrology, Calibration (METCAL), Standardization, & Measurement Traceability for U.S. Navy's Directed Energy Weapons (DEW)

Topic Description:

Directed Energy Weapons (DEW), e.g., High Energy Lasers (HEL), Electro-Magnetic Rail-Gun (EMRG), etc. are being developed and experimentally deployed by the U.S. Navy and Marine Corps as defensive and offensive weapon systems for their various crafts on ground, water, and in air. Metrology and Calibration (METCAL) standards to support Research & Development (R&D), production, Test & Evaluation (T&E), and sustainment of these DEW systems do not exist.

Basic research needs to be conducted to identify and define the METCAL technical requirements, to understand and employ new methods and technologies for development of measurement standards (and traceability to such standards) to support U.S. Navy's DEW systems and sub-systems.

Topic Classification/Restrictions: N/A

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Platform Design & Survivability - Affordable Fleet/Force Modernization (Manufacturing Science)

Power Projection & Integrated Defense – Future Navy Fires (DE & EM Guns)

Topic Key Words:

Directed Energy Weapons (DEW), High Energy Lasers (HEL), Electro-Magnetic Rail-Gun (EMRG), Metrology & Calibration (METCAL)

Topic POC and information:

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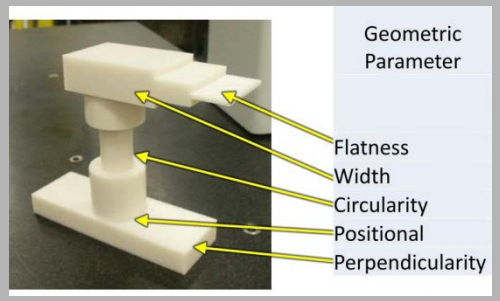
U.S. Navy's Additive Manufacturing (AM) Systems & Subsystems: Metrology, Calibration (METCAL), Standardization, & Traceability



Accuracy?
Drift?

Topic Description:

Additive Manufacturing (AM) is being utilized in an ever-increasing number of applications in the Navy and throughout the world. When parts manufactured by 3D printers, using AM processes, are used in critical applications, the dimensional accuracy of the produced parts is a key concern. Can the 3D printer consistently manufacture accurate parts over time? Metrology and Calibration (METCAL) standards to support Research & Development (R&D), production, Testing & Evaluation (T&E), and sustainment of these AM systems, and the parts produced using such systems, do not exist.

To support U.S. Navy's AM initiatives, basic research needs to be conducted to identify components of measurement error and measurement drift over time for various printer designs, and where possible, development of appropriate measurement standards .

Topic Classification/Restrictions: N/A

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes
Platform Design and Survivability

Topic Key Words: Additive Manufacturing (AM), 3D printers, Metrology and Calibration (METCAL), measurement traceability, measurement standards

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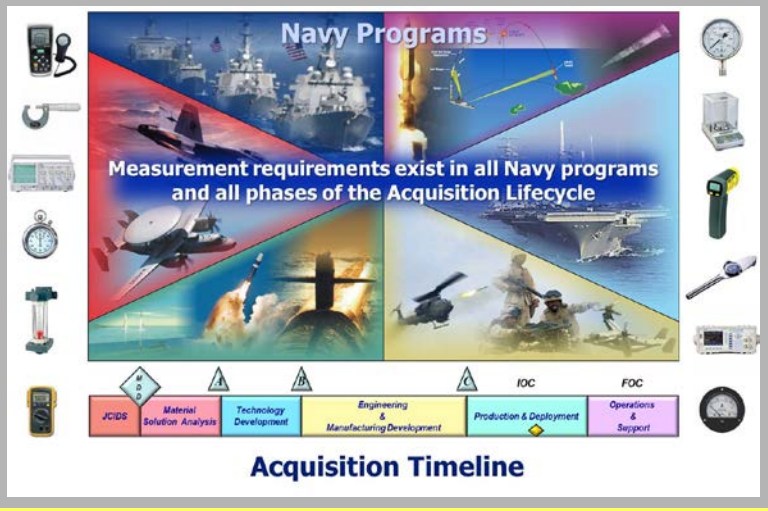
Assessment of Metrology and Calibration Requirements Early in the Acquisition Lifecycle



Topic Description:

The development of calibration and measurement capabilities for new and operational weapon system measurement requirements can often take years. If not planned early in the acquisition process, the lack of an appropriate calibration or measurement system can result in significant costs, delays, and technical risk.

An independent study is needed to assess the cost, schedule, and financial impact of identifying critical weapon system measurement requirements late in the acquisition lifecycle or not at all. The results of the study would be used to influence Navy acquisition policy.

Topic Classification/Restrictions: **None**

NROC Supported (Yes/No): **No**

Formal Navy S&T Objective (Yes/No): **Yes**
Platform Design & Affordability – Affordable Fleet/Force Modernization (Manufacturing Science)

Topic Key Words:
Metrology, Calibration, METCAL, measurement, standard, traceability, acquisition lifecycle

Topic POC and information:

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ONR 33.1 – Metallurgical studies on factors that control Beta' and Beta Phase formation of AA5456 and AA5083

Topic Description:

The chemistry, microstructural orientation, and formation kinetics of beta phase drive sensitization on Aluminum 5XXX alloys. However, there is little quantitative information available related to these issues that is amenable to use in predictive models. The objective is to study the roles of grain misorientation and intergranular dislocation density in the formation of grain boundary beta phases.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes; Platform Design and Survivability (Affordability/Reduced Platform Life-Cycle Cost)

Topic Key Words:

Alloys; Aluminum; Metallurgical

Topic POC and information:

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ONR 33.2 – Multifunctional corrosion inhibiting coatings

Topic Description:

It is postulated that the heterocyclic conducting polymers with cationic backbones can incorporate counter anions. The other hand, upon reduction of the backbone, the anions are released to the environment. This provides the basis for the development of smart corrosion inhibiting coatings that can release corrosion inhibitors upon galvanic coupling to a defect, i.e., the defect drives the release of an inhibitor. The objective is to explore coating systems that can absorb anions of interest or release them in response to an electric current.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes; Platform Design and Survivability (Affordability/Reduced Platform Life-Cycle Cost)

Topic Key Words:

Coatings; Corrosion; Wear Resistance

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ONR 33.3 – Surface microstructure optimization to enhance corrosion and wear resistance of Navy marine alloys

Topic Description:

The modification of surface properties has historically been to enhance the structural properties of the materials without significant regards on the corrosion properties. While most navy alloys meet structural strength, enhancement of surface related parameters, by either microstructural enhancement or modification by coherent coatings can significantly reduce the corrosion wear of the systems. The objective is to develop near-surface modification technologies for increased corrosion and wear resistant surfaces for critical component applications, such as piping and mechanical systems in all ship classes.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes; Platform Design and Survivability (Affordability/Reduced Platform Life-Cycle Cost)

Topic Key Words:

Alloys; Corrosion; Wear Resistance

Topic POC and Information:

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ONR 33.5 – Marine composites in extreme environments

Topic Description:
Establish the response and failure characteristics of marine composites and sandwich structures, subjected to dynamic loading (impact, shock, blast), in extreme cold (Arctic) temperatures.

Topic Classification/Restrictions:
Unclassified/None

NROC Supported (Yes/No):
Unknown

Formal Navy S&T Objective (Yes/No):
Yes; Platform Design and Survivability

Topic Key Words:
Marine; Composites; Extreme Environments

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ONR 33.7 – Maneuvering simulation of a UUV

Topic Description:

Coupled RANS (Reynolds-Averaged Navier-Stokes) and rigid-body motion solutions will be obtained to simulate maneuvering motions of a UUV. Propulsor(s) and control surface(s) will be modeled either by using surrogate models or by real geometries (depending upon available time and the ability of the researcher). The desired outputs are the vehicle's trajectories and velocities. (Note: NavyFOAM, a general purpose CFD code developed by NSWC Carderock Division under the OpenFOAM framework, can be made available for the researcher).

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes; Autonomy and Unmanned Systems; Platform Design and Survivability

Topic Key Words:

CFD; Hydrodynamic; Maneuvering; Simulation; Undersea Unmanned Vehicle

Topic POC and Information:

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ONR 33.8 – Computation of slamming impact

Topic Description:

A computational study will be carried out using NavyFOAM (a general purpose CFD code developed by NSWC Carderock Division under the OpenFOAM framework) to simulate a "drop test" where a two-dimensional hull section hits water surface with a number of speeds. The desired outputs include the time histories of hydrodynamic pressure at a selected number of points on the hull surface. Of interest are effects of compressibility of air and bulk modulus of water. (Note: NavyFOAM can be made available for the researcher).

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes; Platform Design and Survivability

Topic Key Words:

CFD; Hydrodynamic; Simulation; Slamming

Topic POC and Information:

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ONR 35.1 – Air combat analyses

Topic Description:
A first order air combat model is sought that provides qualitative indications combat losses and degradation in capability as a function of the number of aircraft in the engagements and their salient characteristics such as sensor/detection ranges, speed, range, weapons number/quality, etc.

Topic Classification/Restrictions: None

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Air Combat Modeling; Quality Versus Quantity; Attrition Warfare

Topic POC and information:
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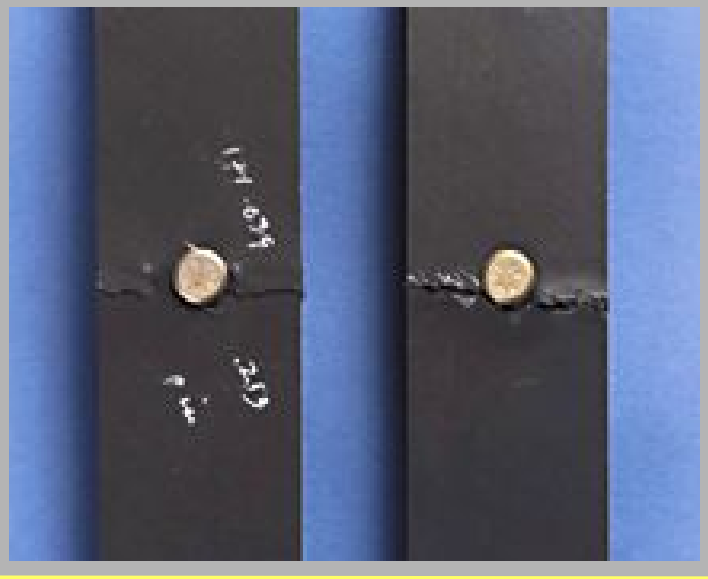
ONR 35.2 – Prediction of composite patch effectiveness



Topic Description:
Static and cyclic fracture and strength of patched composite aircraft structures at the coupon level and testing bounding environmental specification parameters of adhesively bonded composite assemblies. Coupon level bonded joint analysis, and initial development of element level test configuration concepts are sought. Develop a bondline integrity monitoring system that can assess capability and service life.

Topic Classification/Restrictions: None

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Composite Patches; Remaining Life; Aircraft Structures

Topic POC and information:
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ONR 35.3 – Optimal trajectories for carrier landing

Topic Description:
Techniques and simulations are sought for trajectory optimization of a fixed or rotary wing aircraft on a moving landing surface (ship). Methods that integrate predicted future states of the ship position and velocity relative to the aircraft and bound the error estimates in sink rate, etc.

Topic Classification/Restrictions: None

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Automated Landing; Optimal Control; Landing Simulations; Ship Motion Prediction

Topic POC and information:
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ONR 35.4 – Advanced controls for carrier landing

Topic Description:
Advanced control methods for fixed wing unmanned air vehicles are sought to exploit automated carrier landing capability to reduced sink rate at touchdown, reduction in approach speed by flying closer to stall, and reduced altitude loss during wave-off by flying a reduced sink rate approach near the ship.

Topic Classification/Restrictions: None

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Automated Landing; Optimal Control; Deck Relative Navigation

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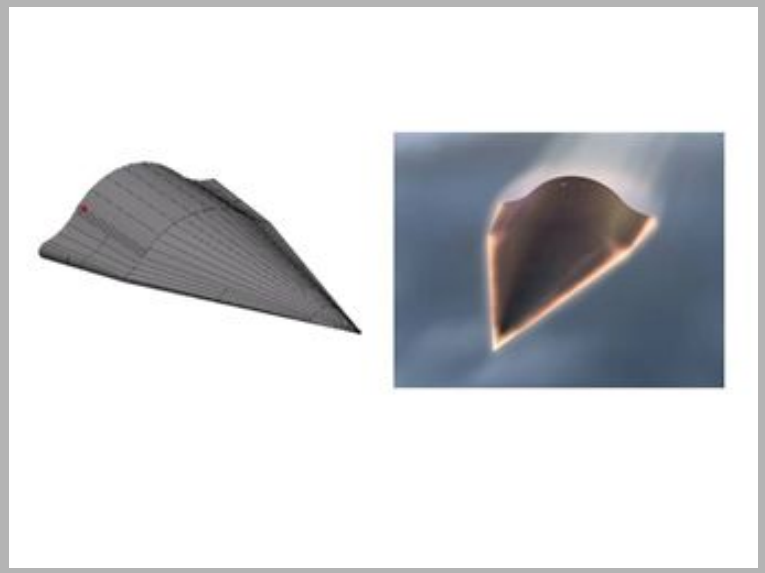
ONR 35.6 – Aero-thermal optimized hypersonic bodies



Topic Description:
Maximum lift to drag and minimum leading edge heat loads of supersonic and hypersonic lifting bodies are sought. Computational predictions and/or experimental validations of optimized high Mach number (5-8) shapes are sought for long-range, time-critical situations. Methods may include multi-disciplinary optimization with CFD , etc.

Topic Classification/Restrictions: None

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Hypersonic; Optimized L/D; Leading Edge Heating

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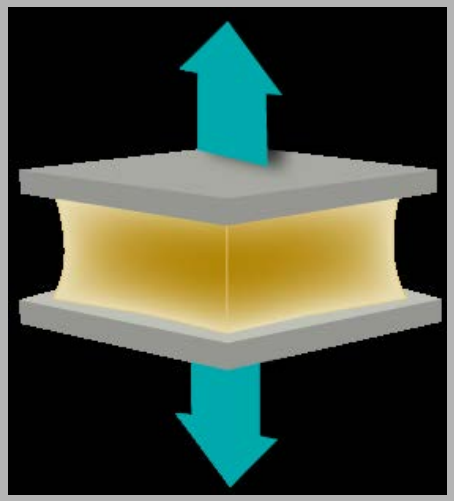
Tactical Adhesives



Topic Description:

DoD tactical applications encounter a unique set of requirements presently served, although inefficiently, by a single commercially available solution. Adhesive solution options desired to meet present and near-term practical field applications would be required to satisfy a set of criteria that includes:

- Reversibility and fast response, (bonding/debonding on demand);
- Bonding on wet substrates;
- Adhesion to substrates having variable physical/chemical surface properties, i.e. oily, dirty, etc.
- A wide operational temperature range

Possible alternative approaches to consider in the implementation of a viable material solution may lie in the use of hybrids of bio-inspired solution principles of mechanical interlocking, van der Waals interactions, chemical bonds, as well as viscous and capillary forces. The challenge here is to develop, discover or adapt adhesive technologies that are capable of satisfying these tactical needs with minimal compromises.

Topic Classification/Restrictions: none

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): No

Topic Key Words: adhesive(s), polymer chemistry, sealants, caulk, tape

Topic POCs and information:

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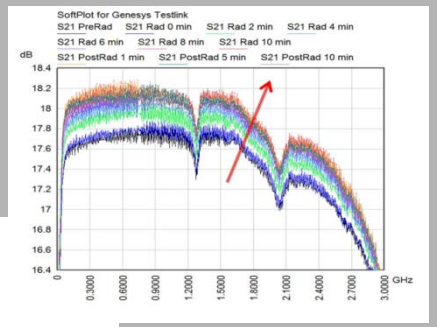
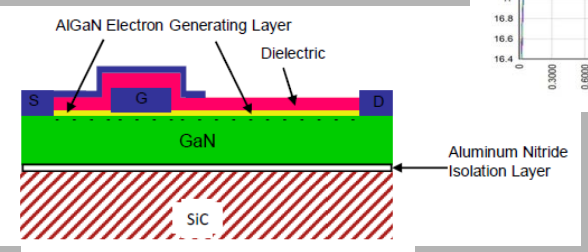
Radiation Effects in GaN Devices





Typical GaN Device
Harris, REDW 2011

Topic Description:

The objective of this work is to explore radiation effects in Gallium nitride (GaN), a material relatively insensitive to most radiation environments and able to handle high-power density applications--ideal for DoD applications. This work will explore the impact of total-dose and neutron radiation degradation on the matching between High Electron Mobility Transistors (HEMTs) and passive matching networks and the resulting power and performance consequences. In addition, the current state of and possibilities of at-speed radiation testing at accelerator test facilities will be explored.

Topic Classification/Restrictions: none

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: GaN, Radiation Effects, microelectronics

Topic POC and information:

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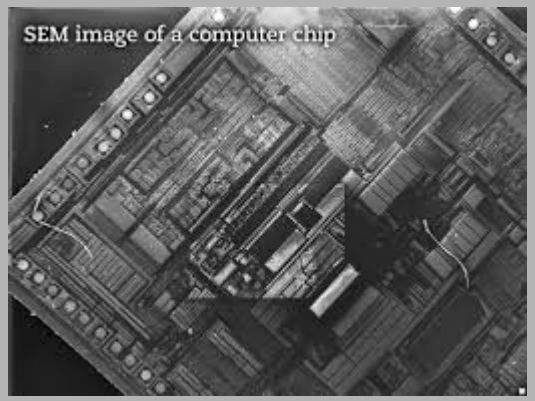
STEM R&D for Trusted Electronics



Topic Description:

Trusted electronics is of vital importance for DoD applications. New and more efficient methods of detecting counterfeit electronics must be explored. Research TEM applications to the areas of counterfeit, trust, and reliability in microelectronics as they pertain to Flight Systems Division is a novel approach. The desired outcome of this research is to develop microscopy techniques to assist in exploration of trust and reliability issues in microelectronics and other areas of interest to Flight Systems Division

Topic Classification/Restrictions: none

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Trusted electronics, scanning transmission electron microscopy

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Optimization of Seabasing S&T

IMAGE
(Not Available)

Topic Description:

The overarching goal for seabasing Science and Technology (S&T) efforts is to ensure that the various components of the seabase are interoperable and optimized to support the range of military operations (ROMO) in the most cost-effective manner possible. A review of past seabasing efforts and an examination of future requirements will inform investment decisions and optimize technology solutions.

Topic Classification/Restrictions:

Unclass

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Yes

Topic Key Words:

Seabasing, Expeditionary Operations, MLP, Alternative Platforms, Advanced Mooring System, Flexible Seabased Force Projection

Topic POC and information:

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Thrust Area: Power and Energy

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools that address power and energy as they relate to tactical systems, platforms, operations, and shore-based infrastructure in terms of security, capability, cost, conservation, and environmental impact.

Company Level Energy Usage

Topic Description:

In 2009, the Commandant of the Marine Corps declared energy a top priority and created the U.S. Marine Corps (USMC) Expeditionary Energy Office to develop an energy strategy to reduce and optimize energy usage throughout the Marine Corps. Previous research has been conducted to determine energy usage at the platoon level. This research focuses on energy usage at the company (specifically Company Landing Team) level and will determine the means to reduce energy usage, determine water reduction energy requirements, and examine alternative energy sources (solar, wind, biometric etc.) as a means of energy usage improvement.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Yes

Topic Key Words:

Company Landing Team, Energy Requirements, alternative energy sources, water reduction

Topic POC and information:

MCWL

ONR Global.5 – Defining energy security program performance measurements

Topic Description:

Thesis: The hypothesis is that energy security will improve stability in the USPACOM area of responsibility by enhancing partnerships, improving energy system resiliency, and reducing energy system vulnerabilities through incorporation of energy security in the Command's strategy, policies, plans and programs. **Key Research Questions:** a) What is the appropriate logic model to measure the performance of the Energy Security Program for the Department of Defense? b) How do you metric Energy Security Programs? c) How do you metric Energy Security Training event performance? d) How do you measure the effectiveness of DoDD Number 4180.01 dated 16 April 2014: DoD Energy Policy?

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Program Performance; Logic Models; Energy Security Program; Metrics; Energy Policy

Topic POC and Information:

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ONR Global.6 – Energy security and overseas basing resiliency

Topic Description:

Thesis: Established overseas basing requirements rely on the interface between the military requirements and the host nation infrastructure. Establishing standardized requirements documents will enhance interoperability among partner nations. **Key Research Questions:** a) How are the energy requirements for overseas basing determined? Planned? b) What are the technology requirements to share requirements between partners? c) How can the US Military capitalize on existing Logistics Service agreements to enhance interoperability? d) How do we measure the effectiveness of DoDD Number 3000.10 dated 10 Jan 2013: Contingency Basing outside the United States?

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Energy Security; Overseas Basing; Resiliency; Host Nation Infrastructure; Logistics Service Agreements; Interoperability; Contingency Basing

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ONR Global.7 – Critical resource security: The effects between energy, food and water security

Topic Description:

Thesis Statement: The hydroelectric systems in China are causing changes in the agricultural growth, fisheries, and available resources to both its own land but also downstream nations. To understand the effects of China's hydroelectric power systems effects down river locations, more second and third order affects need to be studied.

Research Questions: a) Is there evidence to support the impact of hydroelectric power systems on the environment? b) What are methods or actions can China participate in in order to assist its neighbors with disaster mitigation because of the growth in China's hydroelectric power system? c) What are the responsibilities for disaster mitigation of the downstream countries in relationship to China's hydroelectric power system? d) What are the obligations of the international community to assist the downstream countries? e) What US organization provides the best tools to assist management of this program? How can the US Military support this organization?

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Resource Security; Hydroelectric; Down River; Environment; Disaster Mitigation; Down Stream; Power System

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ONR Global.8 – Single battlefield fuel

Topic Description:

Thesis: Multiple types of military grade fuel clog the logistics systems by competing for transportation assets and systems. The United Kingdom is no longer managing the NATO fuel standards. Developing a fuels standard program in the USPACOM area of responsibility will improve interoperability, reduce clogs in the logistics systems, and improve logistics management functions. **Research Questions:** a) What is the best type of single battle field fuel for the Pacific AOR? b) What management programs are available to assist with managing the single battle field fuel across Combatant Commands? Coalition operations? c) What are the economic considerations when considering non-military specification fuels? d) What will be the impact on the fuel additives program within the Department of Defense?

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Battlefield Fuel; Logistics Systems; NATO Fuel Standards; Logistics Management; Specification Fuels; Fuel Additives

Topic POC and Information:

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Thrust Area: Warfighter Performance

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools that can facilitate the readiness of naval forces at the individual, team, and fleet level to meet the operational requirements in uncertain environments ranging from the most austere to highly complex with a focus on efficient manpower selection and assignment, training, education, and human-systems integration.

Knowledge Management

IMAGE
(Not Available)

Topic Description:

Knowledge management is increasingly important in a information intensive environment. The Marine Corps Warfighting Laboratory conducts extensive experimentation efforts with potentially far-reaching results. However, the laboratory's information and knowledge management are not yet ideal. This research focuses on determining current information flow weak points, and a means of improvement in order to better integrate MCWL experimentation data with USMC knowledge management efforts.

Topic Classification/Restrictions:
Unclassified / None

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:
Knowledge Management, Information Management

Topic POC and information:
MCWL

Validation of Cleanliness Requirement for Closed-End Bourdon Tube Oxygen Pressure Gages

Oxygen Pressure Gages

Cleanliness Requirement:
≤ 5 ppm hydrocarbon contamination

Topic Description:

The Navy utilizes closed-end, bourdon tube pressure gages on many oxygen systems. A cleanliness requirement of ≤5 ppm hydrocarbon contamination exists for most of the applications, however, no common technical foundation is available to support the requirement. A study is needed to determine the true requirement for maximum permissible hydrocarbon contamination limits, for various applications and conditions, as related to closed-end oxygen pressure gages. Further, the technical rationale for the cleanliness level must be explained and supported on a technical basis.

Topic Classification/Restrictions: **None**

NROC Supported (Yes/No): **No**

Formal Navy S&T Objective (Yes/No): **Yes**
Warfighter Performance, Human Systems Design & Decision Support (reduced workload requirement)

Topic Key Words:
Pressure gage, hydrocarbon contamination, oxygen, cleanliness requirement

Topic POC and information:

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Forward Presence Optimization

IMAGE
(Not Available)

Topic Description:
The ability to operate simultaneously and seamlessly on the seas, ashore, in the air, in space, and in cyberspace while operating across the range of military operations is a keystone of the Navy/Marine Corps team. Naval Expeditionary Forces, a combination of MAGTFs and Navy Ships, enable us to move seamlessly through these domains providing a uniquely capable, and persistent forward presence critical to respond to crises in a dynamic threat environment. Optimizing those forces is key to consistently providing the right force in the right place at the right time.

Topic Classification/Restrictions:
Unclass

NROC Supported (Yes/No):
No

Formal Navy S&T Objective (Yes/No):
No

Topic Key Words:
MAGTF, Forward Presence, Amphibious Ships

Topic POC and information:

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ONR 30.5 – HPT&E - Assessment

Topic Description:
Training assessment in the USMC is very subjective. Explore assessment in the classroom, lab, and field. Review how assessment is done outside of the USMC- in higher education, other military services, and other country's militaries. How can that be applied to the USMC curriculum? How can improved assessment methodologies improve USMC training and readiness? Review and assess existing training assessment. Deliver a technical report/thesis summarizing the processes, findings, and recommendations of this research.

Topic Classification/Restrictions:
Unclassified/None

NROC Supported (Yes/No):
Unknown

Formal Marine Corps S&T Objective (Yes/No):
Yes; T&E STO-2: Small unit learning and performance assessment

Topic Key Words:
HPT&E; Assessment; Training; USMC Curriculum

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ONR 30.6 – HPT&E – MAGTF simulation

Topic Description:

While simulation is widely used by the Air component for training, it's use by the rest of the MAGTF is fairly limited. A survey of existing training simulations with a focus on how they can be better used to support T&R training. How can simulation be used to satisfy significantly more T&R tasks? How can existing simulations be improved to support this goal? Review and assess existing training simulations. Deliver a technical report/thesis summarizing the processes, findings, and recommendations of this research.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Marine Corps S&T Objective (Yes/No):

Yes; T&E STO-6: Warrior simulation

Topic Key Words:

HPT&E; MAGTF; Simulation; T&R; Training

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ONR 30.7 – HPT&E – Live, virtual, and constructive

Topic Description:

There is a desire to increase the use of Live, Virtual, and Constructive (LVC) simulation within the MAGTF. There are currently no USMC standards for interoperability, terrain databases, or simulation fidelity. This thesis should examine which simulations should intemperate and in what context to improve MAGTF training. How can LVC simulation be used to satisfy significantly more T&R tasks? How can existing simulations be improved to support this goal? What are the challenges with implementing and LVC architecture? Review and assess existing LVC training simulations. Deliver a technical report/thesis summarizing the processes, findings, and recommendations of this research.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Marine Corps S&T Objective (Yes/No):

Yes; T&E STO-6: Warrior simulation

Topic Key Words:

Live, Virtual, and Constructive; Simulation; MAGTF; USMC Standards; Interoperate

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ONR 30.8 – Operations research on mission task measure of effectiveness

Topic Description:

Operations research is needed to quantify measures of effectiveness for mission tasks based on available information about the physical, military and civil environment in support of decision making. See http;//www. mccdc.marines. mil/Portals/172/Docs/MCTL/MCTL%201%20FEB%202015%20(Update).docx0 for a list of tasks and measures of effectiveness. Quantitative techniques for the calculation of MOEs is, however, lacking. Exercise data should be relevant and available to at least validate models of MOEs as a function of conditions for some mission tasks. This work would be an important enabler of information in support of operations.

Topic Classification/Restrictions:

Unclassified to Secret/None

NROC Supported (Yes/No):

Unknown

Formal Marine Corps S&T Objective (Yes/No):

Yes; Capability is needed by ongoing research projects

Topic Key Words:

Operations Research; Logistics Regression; Deep Learning

Topic POC and Information:

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ONR 31.3 – Use of head mounted displays in displaying panoramic imaging EO/IR sensors

Topic Description:

Recent progress in EO/IR sensing has made it possible to achieve panoramic imaging at video frame rates. Indeed recent and future FNCs are aimed at providing such capabilities for submarine photonic masts and various surface ships. Displaying such panoramic data to sailors on traditional flat panel monitors may not be a practical solution especially on board submarines with its severe constraint on space. Head mounted displays have recently seen very significant technological progress and investment in commercial sector. This research project will investigate human factors, display control and processing aspects of utilizing head mounted displays in Navy systems.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Head Mounted Displays; Panoramic Imaging; EO/IR Sensors; Video Frame Rates

Topic POC and Information:

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ONR 34.1 – The role of the human in future counter-mine operations performed by unmanned vehicle systems

Topic Description:

The Littoral Combat Ship Mine Countermeasures mission package takes a step forward by proposing to remove the sailor from the minefield. These operations will rely on a number of unmanned systems, e.g., Organic Airborne and Surface Influence Sweep; Airborne Mine Neutralization System; Remote Multi-Mission Vehicle; and the Unmanned Influence Sweep System. Tremendous progress has been made in technology such as vehicle endurance, sensors and data throughput. System autonomy will be the next great technological challenge. Given these successes, a major question becomes what will the sailor do once out of the minefield? The development of this package comes with issues of command and control, knowledge management, and human-system interaction. In addition, the new operational model raises questions of how manpower, assessment and training will be addressed.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Role of the Human; Counter-Mine Operations; LCS Mission Package; System Autonomy

Topic POC and Information:

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ONR 34.2 – Physiological monitoring of aviators to maximize performance, sustain/improve situational awareness under hypoxia during flight, and prevent aviation mishaps

Topic Description:

Key questions for the research would include:
1) How does one employ/design such a device? What is the appropriate mitigation in flight?
2) Should we analyze or dump the data post-flight (policy issues)?
3) Does a person-worn monitor provide a meaningful option to planned engineering solutions for aviator hypoxia?
4) Does this increase the operational envelope for some missions?
5) In what aircraft would this be most beneficial?

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Physiological Monitoring; Aviators; Maximize Performance; Situational Awareness; Mishaps

Topic POC and Information:

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Thrust Area: Information transport, infrastructure, security, and assurance

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools that address the move, management, and maintainability of an increasingly large and diverse array of mission-critical data and the reduction of vulnerabilities of operational networks and information technologies, including risks due to the proliferation of dual-use, commercial solutions and supply chains to support effective tactical, operational, and strategic decision-making at sea and ashore.

NetOps SA for Crypto, Comms Systems, & Networks

Topic Description:

Develop an enterprise solution(s) to monitor and manage integrated crypto systems. The technology should provide consolidated network SA from the tactical edge, to include status of each network enclave and options for combined utilization. The technology should follow DoD/NSA crypto standards for management and have a feasible path to accreditation.

Topic Classification/Restrictions:

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

Topic POC and information:

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CDS Network Management Services

Topic Description:

Develop/leverage a gateway technology that will enable existing Cross-Domain Solutions (CDSs) to pass “proxied” network management protocols such as SNMP. The technology should enable a single Network Management System suite to easily extend cross-domain management and provide a single management tool for all security domains.

Topic Classification/Restrictions:

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

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Bandwidth-Efficient Data Synch

Topic Description:

Develop/leverage capabilities to enable scalable, bandwidth-efficient, mission-prioritized, node-to-node synchronization of: 1) directory information supporting services such as enterprise email & Identity & Access Mgt (IdAM); 2) data files/stores supporting mission apps; & 3) core apps data such as enterprise email boxes. The technologies should be adaptable to provide more data for nodes with higher bandwidth but throttle back for nodes with lower bandwidth or in Disrupted, Disconnected, Intermittent, & Limited (D-DIL) b/w environments

Topic Classification/Restrictions:

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

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NOC Convergence/Optimization Infrastructure Services

Topic Description:

Leverage and tailor industry best-of-breed tools for the Fleet NOC to implement a cost-effective, modular, converged computing (e.g. IaaS, PaaS, DaaS) with the agility to scale with increasing capacity demands. The technology would be agile and scalable to enable new services to be provisioned on demand and/or increased in a repeatable, building block fashion, reducing fielding timelines and resiliency from network attack.

Topic Classification/Restrictions:

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

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Tactical Mission Partner Gateway

Topic Description:

Develop/leverage technologies to enable and protect the flow of critical warfighting tactical information or intelligence in support of combatant commander priorities, to include capability to exchange information with mission partners. It should be able to support both enduring and episodic/tactical mission partner networks and be resilient in a Delayed, Disruptive, Intermittent, and Limited (D-DIL) environment.

Topic Classification/Restrictions:

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

Topic POC and information:

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Tiered Enterprise Patch Management Solution

Topic Description:

Field a distributed, tiered patch management solution (including automated IA security patch management) that provides 2 key capabilities:

(1) Maintain top-tier software baselines; obtain, stage, and approve software patches for automated global distribution.

(2) control the timing of approved patch installations at the local level and quickly obtain the overall patch status of assets.

Topic Classification/Restrictions:

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

Topic POC and information:

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Multi-Level Security (MLS) Single Sign On

Topic Description:

Singular/integrated Identity & Access Management (IdAM) solution for tactical use, supporting authentication and access across Joint, coalition, and Mission Partner Environments.

Topic Classification/Restrictions:

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

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Advanced Signal Analysis

Topic Description:

Advanced signal analysis using Hierarchical Temporal Memory (HTM) methodology. Potential use includes detection / discrimination of targets in an EA environment, intrusion detection of IT systems, and optimal operations and maintenance of IT systems

Topic Classification/Restrictions: UNCLAS

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): No

Topic Key Words: Radar, Cyber, Computing Infrastructure, diagnostics, RMA, anomaly detection

Topic POC and information:

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Physical-Layer Security

Topic Description:

Physical-layer security enables the exchange of confidential data over a medium in the presence of an eavesdropper without the need of encryption. It may be used in instances where communicating devices lack the computational resources invovled in the encryption of data (i.e. prime number generation). Confidentiality is achieved by exploiting the physical layer properties of the communication system, such as interference and noise. Realizing such a capability could significantly improve security of Naval systems without the maintenance and disadvantages (i.e. compromised keys)' of high-level encryption. Because of its infancy in implementation in large-scale networks, S&T efforts should be concentrated on first developing a prototype of such a capability appropriate for tactical Navy networks.

Topic Classification/Restrictions: Unknown at this time.

NROC Supported (Yes/No): None

Formal Navy S&T Objective (Yes/No): None

Topic Key Words:
Physical-layer security, information theory, wireless network security

Topic POC and information:

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Predictive Computer Network Defense (CND)

Topic Description:

Predictive computer network defense (CND) injects more intelligence than proactive or preventative CND techniques and relies on a greater understanding of an adversary's operational tactics. Proactive CND techniques may require long-term statistics to assess a baseline for normal operations, whereas predictive CND should only utilize short-term observations and adversarial knowledge to discover such anomalies. This could be aided by advanced modeling and simulation techniques as well as exploiting Big Data. S&T efforts should be directed to determine effective predictive CND mechanisms that can extend from currently deployed ones and a minimum behavior variable set (i.e. large networks, mobile networks, limited-bandwidth networks) unique to Navy operations that allows for defensive prediction.

Topic Classification/Restrictions: Unknown at this time.

NROC Supported (Yes/No): None

Formal Navy S&T Objective (Yes/No): None

Topic Key Words:
Predictive computer network defense, modeling, simulation, Big Data

Topic POC and information:

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Smart Antenna / Link 16 Controller

Topic Description:

- The US Navy currently lacks a directional antenna capability for Link 16. Currently, steering an antenna at 1kW is a significant S&T challenge since Link 16 is a fast hopping, high speed, multi-platform network.
- The effort will demonstrate improved interference mitigation for Link 16 shipboard terminals and new smart antenna controller functionality. The adaptive antenna with controller will direct transmitted and received energy for optimal Link 16 performance. The Smart Antenna controller for Link 16 will be implemented by combining directional antennas, advanced signal processing, and situational awareness data.
- Technology development must not require changes to the existing Link 16 terminal design.

Topic Classification/Restrictions: UNCLASS

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): No

Topic Key Words: Smart Antenna, Link 16, Tactical Data Link, directional antenna, multi-platform network, beam shape, beam direction, null jammer, null steering, network performance, receive range, transmit range, interference mitigation, effective transmit power

Topic POC and information:

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ONR Global.11 – LF15N002: Wireless access infrastructures expansions through opportunistic networks of moving access points, U of Piraeus, Greece

This is a current ONR Global NICOPS effort that is proposed for expansion

Topic Description:

The concept of this project is to design, develop and validate mechanisms for deciding on the creation and set-up of opportunistic networks based on moving access points (MAPs) for mobile client nodes. Mobile client nodes can be smart/connected cars in civilian use cases, or any kind of operational vehicles and/or robots/drones in military cases.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Wireless Access Infrastructure; Opportunistic Networks; Access Points; Moving Access Points

Topic POC and Information:

ONRG POC: Leonard Ferrari
NPS Collaboration: Center for Network Innovation and Experimentation (CENETIX): Dr. Alex Bordetsky & Center for Infrastructure Defense: Dr. Dave Alderson

Forwarded by CAPT Kevin "Q" Quarderer
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ONR Global.12 – LF15N003: Fast transmission of analog information over wireless, U of La Coruna, Spain

This is a current ONR Global NICOPS effort that is proposed for expansion

Topic Description:

The purpose of this research is to improve reliable transmission of the relevant data from a source node to one or several destinations within specified power and bandwidth constraints, and specific quality parameters using discrete analog coding. For defense applications, the rapid, accurate and efficient communication of vital information is critically important in conflict, ISR, autonomous systems and C2 applications.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Fast Transmission; Analog Information; Power and Bandwidth Constraints

Topic POC and Information:

ONRG POC: Leonard Ferrari

NPS Collaboration: Center for Network Innovation and Experimentation (CENETIX): Dr. Alex Bordetsky

Forwarded by CAPT Kevin "Q" Quarderer
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Advanced Persistent Thread Anomaly Detection

Topic Description:

Research focused on developing pattern detection methods and models which can identify/classify cyber attack vectors and methods based on data collected through network traffic and load monitoring software. This research is the prerequisite to developing a viable automated cyber defense system.

Topic Classification/Restrictions: UNCLAS

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Pattern matching, cyber attack and information assurance

Topic POC and information:

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Self-Healing Systems from Cyber Attack

Topic Description:

Research system architectures that can recover seamlessly from cyber-attack with no impact on combat systems effectiveness. This work could be coupled with research into real time capable virtual machine based combat system architectural models.

Topic Classification/Restrictions: UNCLAS

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Cyber attack and information assurance

Topic POC and information:

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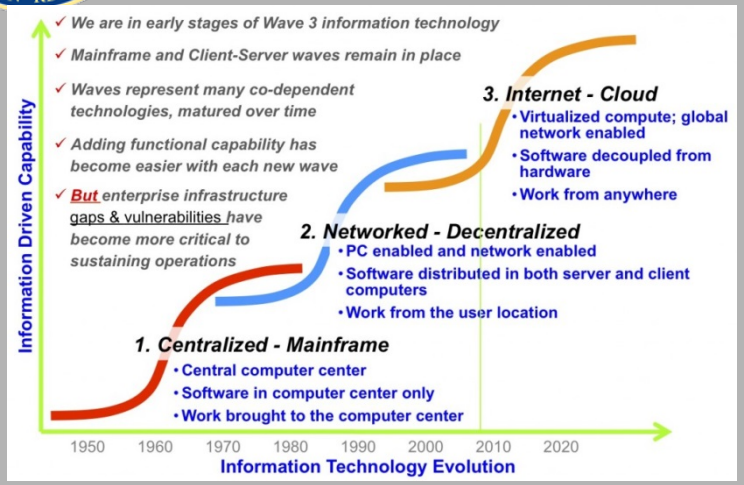
"Wave 3", Thin-Client, C4I Acquisition



From a 2009 Blog by Marv Langston: http://smart-future.org/wave-3-dilemma/

Topic Description:

- Analyze positive and negative factors, across DOTMLPF domains, which influence Navy's ability to fully transition C4I acquisition into Information Technology "Wave 3"
- Expand on recent Defense Science Board (DSB) and Naval Studies Board (NSB) Reports articulating the cyber risks of large, insufficiently maintained and defended, networks.
- Evaluate recent developments in thin-client technology/research to inform Navy/DoD decision to employ distributed multi-enclave, thin-client architecture on a grand scale.

Topic Classification/Restrictions:

None

NROC Supported (Yes/No):

?

Formal Navy S&T Objective (Yes/No):

?

Topic Key Words:

thin client; multi-enclave; architecture; wave 3; acquisition; cyber; security; defense; C4I flexibility; joint; combined; coalition; mission partner environment; functional component; command and control;

Topic POC and information:

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Internet Cyber Terrorism

Topic Description:

Ascertain, measure and validate terrorist use of internet, blogs, websites, (social media sites) propaganda, audio/visual, semantics, phraseology, political, religious intensity, culture and reach of the terrorist venue to counter terrorist influences and supporter behaviors; identify potential for hidden enemy messaging, counter messaging and tracking

Topic Classification/Restrictions: None

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No):

Topic Key Words:
Internet, media characteristics, cyber, terrorism, cyber forensics, behavior, influence, social-psychology, culture

Topic POC and information:

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ONR 31.4 – Dynamic spectrum optimization

Topic Description:

The U.S. Navy currently operates with relatively static frequency assignments that are limited by the capabilities of its current RF systems. As new software programmable, wideband and multi-function RF systems are developed the ability to be agile in frequency, waveform and functionality demands that the Navy develop methodologies to optimize the utilization of the electromagnetic (EM) spectrum. This effort will take advantage of the Naval Postgraduate School's unique combination of expertise and military experience to develop these EM optimization methods.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Dynamic Spectrum Optimization; Static Frequency; RF Systems; Software Programmable; Wideband; Multi-Function

Topic POC and Information:

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Thrust Area: Advance Sensing

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools that support employment of diverse, persistent, and robustly networked sensors to achieve sufficient battlespace awareness in support of operational planning, tactical execution, and operational assessment.

2.75 inch Rocket Infrared Imaging Seeker

Topic Description:

Fast Attack Craft / Fast In-Shore Attack Craft (FAC/FIAC) swarm attacks require rapid, fire-and-forget weapons capability

Develop an architecture and concept for a strapdown uncooled infrared imaging seeker for a 2.75 inch rocket

Deployment will be on MH-60R/S with LAU-61G/A Digital Rocket Launcher

Pre-launch targeting to be provided by FLIR laser designation, to be turned off after launch

Research should identify:

- *Mature off-the-shelf detectors*
- *Mature scene context tracking algorithms*
- *Seeker flight control mechanisms*
- *Physical packaging concept*

Topic Classification/Restrictions:

Unclassified

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

FAC/FIAC
Infrared guidance
Helicopter launched weapons
2.75 inch rocket

Topic POC and information:

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Advanced Imaging Sensor for Degraded/Obstructed Visual Environments

Topic Description:

Capability to provide improvement to helicopter operations under degraded / obstructed visual environments. Advanced imaging sensors to enable all-weather, day and night landing capability in unprepared landing zones with zero visual ground reference. Situational awareness will also be enhanced by rapid updates to include surface feature mapping and obstacle detection.

Compact, high resolution EO/IR and/or RF imaging sensor for degraded visual: brown-out, white-out, low light, and for obstructed visual: wall and tree line see-through.

Topic Classification/Restrictions: Un-Classified

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No): Yes
SSAA STO-1: System Safety
FP STO-1 Platform Survivability

Topic Key Words: DVE/OVE, EO/IR, RF Imager

Topic POC and information:

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Advanced Technology Lead:
Dr. Michael Yu
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Error Budget Considerations for Remote Optical Weapon Direction

IMAGE
(Not Available)

Topic Description:

Error budget analysis based on the initial work from Remote Optical Weapon Direction (ROWD) project. The initial effort was developed by Dr. Kiron Mateti at NSWC Crane. This is a continuation of the ROWD project to include further error budget analysis for sensors, weapons, and combinations thereof for naval engagements. The error analysis should consider surface platforms such as the DDG-1000 and rotary-wing platforms such as the MH-60S. The results will help drive requirements for all aspects of the engagement chain and provide insight into when a remotely located sensor is sufficient or a weapon mounted sensor is required.

Topic Classification/Restrictions:

Unclassified

NROC Supported (Yes/No):

No

Formal Navy S&T Objective (Yes/No):

No

Topic Key Words:

Error budget, optical weapon direction, EO/IR, small arms, remote weapons station

Topic POC and information:

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Real-Time Auto-Tracking Requirements Analysis

IMAGE
(Not Available)

Topic Description:
Development of real-time auto-tracker requirements for small arms weapon systems through a systems engineering analysis. Identify requirements for an effective auto-tracker for small arms mounts on Navy platforms (surface ships, small craft and rotary-wing aircraft). The goal is to determine the performance requirements for the auto-tracker within the weapon's effective range and to identify how to test against those requirements. The analysis should investigate the trade-offs between the use of weapon-mounted sensors and integrating to existing platform-based sensors.

Topic Classification/Restrictions:
Unclassified

NROC Supported (Yes/No):
No

Formal Navy S&T Objective (Yes/No):
No

Topic Key Words: **Auto-tracking, image analysis, small arms, remote weapons station, requirements analysis**

Topic POC and information:

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Bio-inspired broadband sonar design

IMAGE
(Not Available)

Topic Description:

The development of next-generation, bio-inspired broadband sonar technology supports the Navy's mission by exploiting acoustic information that current sonar approaches either ignore or do not fully exploit. While Navy systems and biological sonar operate on the same fundamental principles, the systems which occur in nature frequently deal with vastly complex environments, and do so with performance levels that greatly exceed what would be possible with traditional sonars. The ability of biological sonar to perform at such high levels with greatly reduced numbers of sensors and small apertures implies that there are physics available to researchers that can capture some, if not all, of these performance gains. Areas for research include biological sonar principles, emulation algorithms and advanced neural inspired hardware implementations.

Topic Classification/Restrictions: N/A

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

USW-.AA-02: Improve detection, classification and contact management capabilities for undersea targets across all projected operational environmental

Topic Key Words:

, Broadband Sonar, Autonomous Underwater Vehicles, Acoustic Baffle Structures, Broadband Signal Processing

Topic POC and information:

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Wave-Based Analysis of Distributed Acoustic Sensor Networks

IMAGE
(Not Available)

Topic Description:

The Navy's vision in Undersea Distributed Network Systems requires innovative and robust methods for detecting and tracking surface and subsurface objects utilizing data from a potentially broad range of sensors, both fixed and mobile. Technologies and algorithms for obtaining, transferring, fusing and evaluating these complex data sets are necessary to maximize sensor field performance. Relevant technical efforts can range from new sensors which enable distributed fields, telemetry solutions for data transfer and sharing, advanced data fusion techniques and improved large scale ocean acoustics modeling to evaluate the relevant acoustic channel for efficient exploitation.

Topic Classification/Restrictions: N/A

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

❑Unmanned Undersea Vehicles - USW-.AUS-03: Develop capability to enable rapid and reliable targeting of multiple contacts via improved sensor exploitation

Topic Key Words:

Distributed Netted Systems, Autonomous Underwater Vehicles, Acoustic Fields, Acoustic Imaging

Topic POC and information:

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Safe Anti-fouling System for Marine Sensors

Topic Description:

Marine sensors are subject to fouling by organisms such as algae, barnacles, and molluscs. Keeping marine sensors operational can require frequent maintenance (brushing, chemical treatment, replacement) if the sensors do not have an effective anti-fouling system. Unfortunately, certain anti-fouling approaches use highly toxic chemicals (such as TBT) that cause concern for safety of operators, marine life, and the food chain.

Research will be performed to find an effective anti-fouling system for sensors that is also safe for the environment. Possible directions include the use of less toxic chemicals, automated mechanical anti-fouling, materials less susceptible to fouling, bio-inspired methods (e.g., Sharklet coating), energy methods.

Topic Classification/Restrictions: None

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No): Yes —

Autonomy & Unmanned Systems
- Novel Platforms and Integration

Platform Design & Survivability
- Affordable Fleet/Force Modernization
- At-Sea Sustainment

Topic Key Words: Marine sensors, biofouling, anti-fouling systems, robotic cleaning systems, marine growth inhibitors, biomimicry

Topic POC and information:

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ONR 30.1 – C4/Cyber – Wideband compressive sensing

Topic Description:

Compressive sensing is an alternative to Shannon/Nyquist sampling for the acquisition of sparse or compressible signals. This technique is particularly useful for wideband receivers which sample large segments of spectrum in order to detect and extract information from signals of interest. However, reconstruction of the signal is computationally expensive and requires fast processing and large power consumption for near real-time analysis. What is the relationship between sub-Shannon/Nyquist sampling over a 1 GHz bandwidth and processing requirements for real time signal reconstruction? Conduct survey of existing compressive sensing techniques to characterize the relationship between achievable sampling reduction over a 1 GHz bandwidth and the corresponding processing requirements for real time signal reconstruction. Deliver a technical report/thesis summarizing the processes, findings, and recommendations of this research.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Marine Corps S&T Objective (Yes/No):

Yes; C2 STO-3: Improved situational awareness for warfighter at all echelons

Topic Key Words:

C4; Cyber; Wideband Compressive Sensing; Signals; Spectrum; Shannon/Nyquist

Topic POC and Information:

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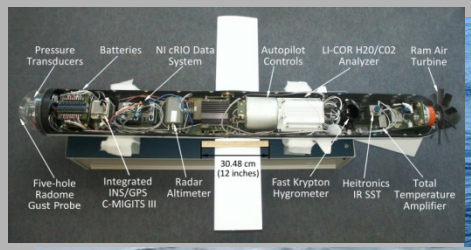
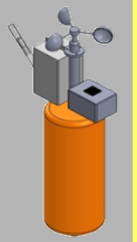
ONR 32.5 – Battle space characterization of the environment for tactical systems (BSCETS)





Topic Description:

Many sea trial and other RDT&E events in the maritime environment are limited by a lack of in situ observations characterizing the environmental conditions affecting system performance. This is becoming an even more critical limitation with the advent of sophisticated networked and autonomous systems that rely on the EM, EO, and acoustic environment for C2. Inexpensive, autonomous, and accurate payloads are needed for expendable sensing.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Yes

Formal Navy S&T Objective (Yes/No):

Yes

Topic Key Words:

METOC Sensing; Battle Space Characterization; EMMW; Air-Sea Interaction; Meteorology; Oceanography; Acoustics; EM/EO; CRUSER; Autonomous

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ONR 32.6 – Acoustic propagation in rivers and estuaries

Topic Description:

The unique hazards of the riverine environment demand that we understand the fine-scale environmental dynamics in order to support comprehensive environmental assessments that inform strategic planning and tactical decisions. When correlated to conventional riverine and estuarine parameters, acoustic parameters have the potential to provide a new capability for persistent monitoring of activities of interest in denied areas, and will inform planning and operations. In-situ data collection, analysis and modeling at low-to-mid frequencies are required to understand the riverine and estuarine environments and translate their impacts on acoustic propagation into operationally relevant parameters.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

River; Estuary; Acoustic Propagation; Ambient Noise

Topic POC and Information:

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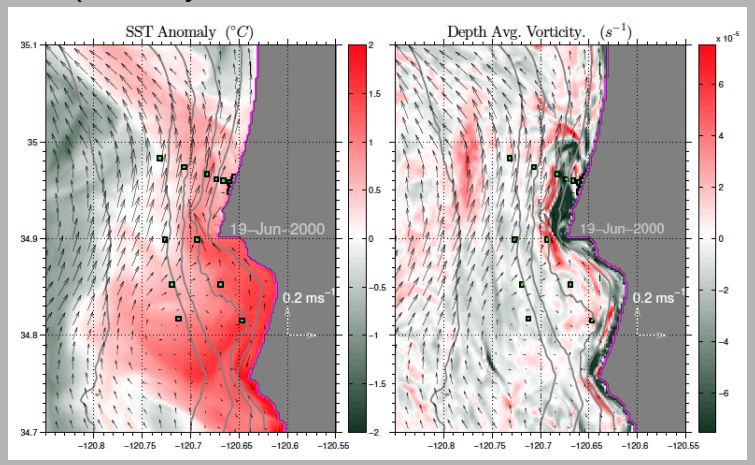
ONR 32.7 – Ocean dynamics and acoustics of the inner shelf and surf zone

A Numerical Model of Pt. Sal, CA

(Courtesy, Nirnimesh Kumar and Suanda Sutara, SIO)



Topic Description:

The inner shelf, connecting the surf zone to the broader continental shelf region is a dynamic environment of great ecological, economic, and military importance. With many interrelated dynamical processes in the water column and on the boundaries, this region poses several challenges for ocean forecasting. A critical consideration in this region is the acoustical environment since acoustics provides an important tool for ocean remote sensing, communication, and navigation. Using observations, modeling, and theory, researchers and students at NPS seek to provide a better understanding of the critical inner shelf dynamical process at work in shaping the acoustical environment and ambient noise. Fundamental ocean processes of interest include shelf eddies, filaments and fronts, mixing and boundary processes, wind driven circulation, linear and nonlinear internal waves and tides, surface and infragravity waves, edge waves, and rip currents.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Inner Shelf; Surf Zone; Acoustics

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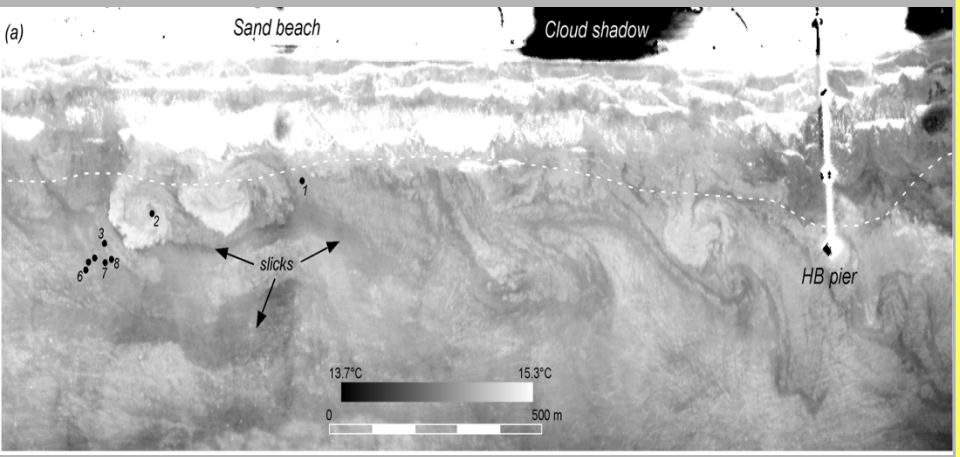
ONR 32.8 – Is the surf zone water saltier than the inner shelf water?



Aerial infrared temperature image identifying different water masses associated with the surf and inner shelf off a southern California beach (Marmorino et al., 2013)

Topic Description:

It has recently been observed that the shallow surf zone water is warmer than its neighboring deeper inner shelf water. The identity of the water masses are useful in understanding the dynamics responsible for cross-shore exchange and mixing. In addition to temperature differences, it is hypothesized that the surf zone can be saltier. It is believed that there are concomitant mechanisms responsible for the increase in surf zone salt content. One suggested mechanism is that diurnal sea breezes transport droplets from depth-limited breaking to the dry part of the sandy beach, which evaporates leaving residue of salt that will accumulate. Tidal variations in water elevation move the surf zone across the sandy beach allowing for the accumulated salt to re-enter the surf zone during higher tides increasing its relative salinity. Temporal variations of surf zone salinity are believed to be correlated with spring/neap tidal cycles and variations of wave energy. Cross-shore hydrodynamic mixing rates will influence the magnitude of the density differences, which are also tidal and wave dependent. These density differences are important to acoustic propagation.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Surf Zone; Salinity; Density; Inner Shelf

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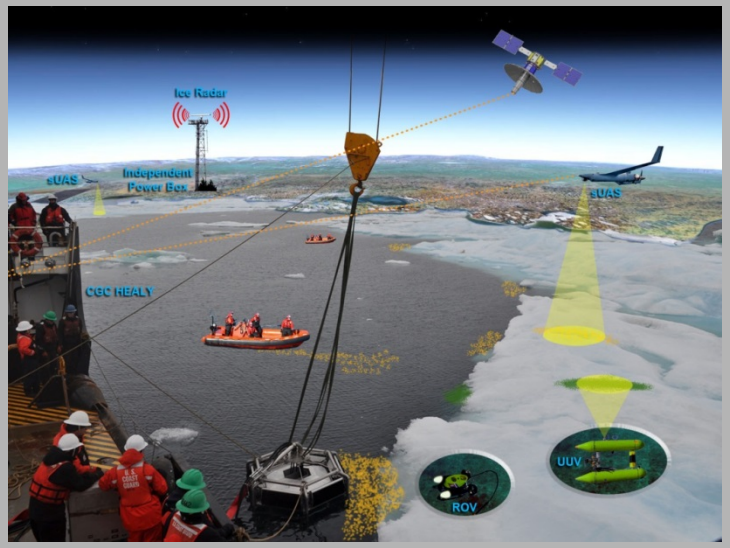
ONR 32.11 – Arctic environmental sensing for improved ocean prediction (AESOP)



Topic Description:
The lengthening summer and sea-ice diminished conditions in the Arctic has greatly increased maritime civilian traffic leading to potential Navy and USCG increased operations. Interest in the science behind these trends and the christening of a new research icebreaker has resulted in numerous field campaigns with 2015 reaching a historical peak. Research is needed in partnering these activities with NPS students and faculty for improved DoD arctic prediction.

Topic Classification/Restrictions:
Unclassified/None

NROC Supported (Yes/No): Yes

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: Arctic; METOC Sensing; Battle Space Characterization; Air-Sea Interaction; Meteorology; Oceanography; Assured Access; MDA; Acoustics; CRUSER; Autonomous

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ONR 33.6 – MEMS acoustic sensor development

Topic Description:

Acoustic sensors based on Micro-electro-mechanical system (MEMS) can provide accurate sensing with dimensions much smaller than the detection sound wavelength. Research is needed to assess their performance both in air and underwater applications.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Yes; Assure Access to the Maritime Battlespace

Topic Key Words:

Acoustic; Detection; Sensors

Topic POC and Information:

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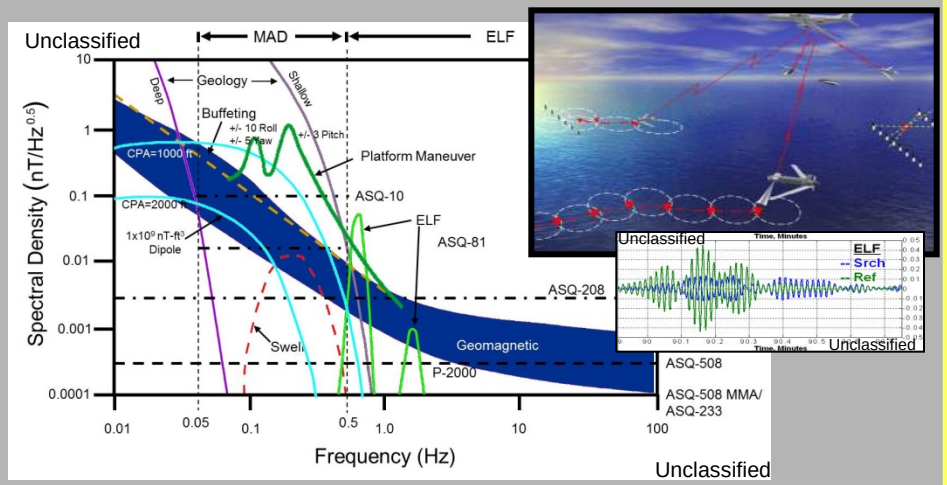
Characterization of ELF Signal Propagation



Topic Description:

The Extremely Low Frequency (ELF) electromagnetic field is an alternating current electromagnetic field created by submarine corrosion current modulated by shaft rotation. This NPS research would analyze NAVAIR data collected on a cooperative 209 class submarine. Research results would impact ongoing S&T detection algorithms and mission planning software development that have the potential for future transition to P-8A sensor systems.

Topic Classification/Restrictions: Secret

Per OPNAVINST S5513.13 ID 13-02.1 NON_ACOUSTIC ANTI-SUBMARINE WARFARE (NAASW)

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes

Naval Aviation Under Sea Warfare S&T Objectives (USW STO)
-2014 USW STO-2 Wide Area Search
-2014 USW STO-3 Precision Localization & Identification

Topic Key Words:

Electromagnetic Field, Extremely Low Frequency, ELF, Magnetic Anomaly Detector, MAD, Air ASW, P-8A

Topic POC and information:

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EO/IR System Performance Assessment

The Afloat Forward Staging Base (Interim) USS Ponce (ASB(I) 15) conducts an operational demonstration of the Office of Naval Research (ONR)-sponsored Laser Weapon System (LaWS) while deployed to the Arabian Gulf. Ref: Naval S&T Strategy 20 Jan 2015

Topic Description: Assess performance of electro-optical (EO) & infrared (IR) systems and sensors in a marine environment. Quantification of the effects of the marine boundary layer on the performance of Navy systems. Develop next generation EO-IR decision support software capability to transition in NITES-Next Program of Record.

Topic Classification/Restrictions:
Environmental components Unclassified and sensor system components classified secret level

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): Yes. EO/IR Sensors and Sensor Processing Program ONR Code 31 - Advance Development under Future METOC Capabilities Project, PMW120

Topic Key Words: Electro-Optical & Infrared Systems Performance Assessment, Naval Integrated Tactical Environmental System Next Generation (NITES-Next) program

Topic POC and information:
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Ref: Naval S&T Strategy 20 Jan 2015 Naval S&T Focus Area: Electromagnetic Maneuver Warfare (EMW);

Objective Categories: Spectrum Dominance; and Advanced Electronics, sensing and response techniques.

Thrust Area: Data Integration and decision support

- This thrust area includes research topics for potential tactics, techniques, procedures, technologies, and tools that support effective decision-making and the ability to rapidly and confidently move from data to options to informed decisions and the development of improved capabilities to collect data from multiple sources, fuse it, and make it available to all relevant users in the right form, to enable better and faster decisions in any environment.

Advanced Display Systems

Topic Description:

Development of data fusion methodologies and applications for future Combat Information Centers (CIC) to process the tremendous amounts of data provided from existing and future sensors. Leverage current training and human centered design efforts based on the latest data fusion and visualization efforts, as well as modeling and simulation capabilities.

Topic Classification/Restrictions: UNCLAS

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No): Yes

Topic Key Words: : data fusion, advance display, future CIC, advanced visualization tools, sensor data integration

Topic POC and information:

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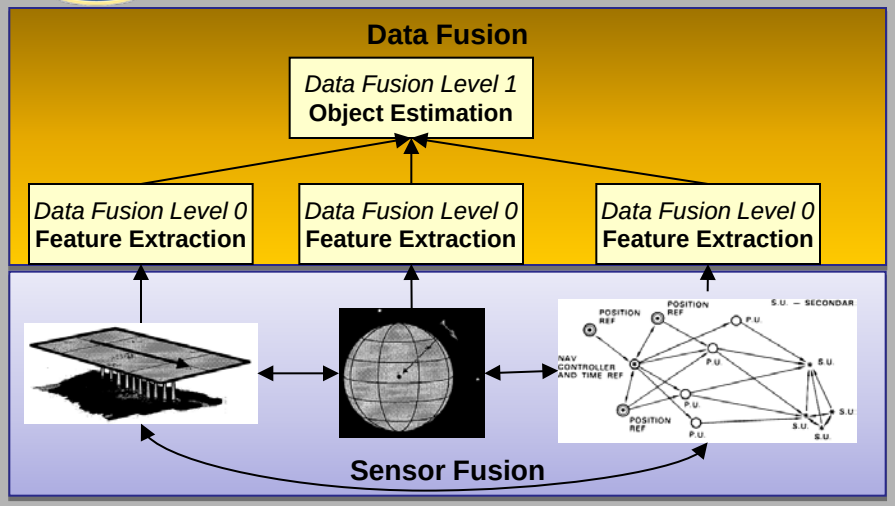
Sensor and Data Fusion for Ship and Submarine Positioning



Topic Description:

Navy ships and submarines can employ many types of sensors and techniques to estimate position, velocity, attitude, and attitude rates. Sensors include GPS and INS; techniques include Lines of Position (LoP) and stellar map matching. Multiple sensors and techniques are required because no single sensor or technique meets all data and performance needs in all operational environments. Sensor fusion is the integration of sensor data prior to state estimation while data fusion is post estimation. Ultra tight coupling between GPS and INS is an example of sensor fusion while speed damping inputs to INS is an example of data fusion. All are challenging because of unknown errors and aberrancies in the sensors and techniques.

Topic Classification/Restrictions: none

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No): Yes

- *Focus Area Electromagnetic Maneuver Warfare, Precision Time and Navigation*
- *Focus Area Assure Access to Maritime Battlespace, Precision Time and Navigation*
- *Focus Area Information Dominance–Cyber, Precision Time and Navigation*

Topic Key Words:

positioning, navigation, sensor fusion, data fusion

Topic POC and information:

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Intelligent Decision Support Software

Topic Description:

The rapid increase in the use of unmanned vehicles as well as the tremendous growth in data acquisition means that reliance on computer-based systems to provide various levels of autonomy and assist in intelligent decision-making is imperative to the modern military. The ability for such systems to function well in different environments and in accordance with changing policies is a challenge requiring flexibility in operational and reasoning capabilities to avoid quickly becoming obsolete.

Research will be performed to investigate software systems that can efficiently analyze data and make/recommend decisions for various purposes. Suggested areas to explore include hybrid systems that use logic program & non-monotonic reasoning.

Topic Classification/Restrictions: None

NROC Supported (Yes/No): Unknown

Formal Navy S&T Objective (Yes/No): Yes — Autonomy & Unmanned Systems

- Human/Unmanned Systems Collaboration
- Perception and Intelligent Decision Making
- Intelligence Enablers and Architectures

Information Dominance-Cyber

- Decision-Making Superiority

Topic Key Words: Computational Methods in Decision-Making, Autonomous Systems, Logic Programming, Non-monotonic Reasoning

Topic POC and information:

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ONR 31.1 – Advanced digital processing

Topic Description:
Description 1: development of generic digital signal processing software to handle high sample rate ADC for use in wideband receivers via channelization and mixed time/frequency domain methods Description 2: Adaptation of commercial virtualized server software to produce methods of implementing Commander's shifting priorities/ intentions in BW and processing resource starved communications environments

Topic Classification/Restrictions:
Unclassified/None

NROC Supported (Yes/No):
Unknown

Formal Navy S&T Objective (Yes/No):
Unknown

Topic Key Words:
Advanced Digital Processing; Software; ADC; Wideband Receivers; Channelization

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ONR 31.2 – Handling big data afloat

Topic Description:

As our Warfighters are facing the "new asymmetric threats" the systems that support the Warfighter today can't deal with the variety an volume of the data that is required to answer the questions the Warfighter is asking. For Example: How has the adversary reacted to our moving into an area? The "Big Data" needed to support the Warfighter is high-volume, high-velocity, and comes from various sources and assets in order to enhanced the Warfighter's insight and decision making. This "Big Data" is of massive volume of both structured and unstructured data that is so large that it's difficult to process using traditional database and software techniques. As an example of how big "Big Data" is, it might be petabytes or exabytes of data consisting of billions to trillions of records of millions of entities- all from different sources (e.g. Web, White Pages, social media, mobile data, FMV, National Sensors, tactical sensors, and so on). This data is typically loosely structured data that is often incomplete and inaccessible.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Big Data; Afloat; Asymmetric Threats; Database and Software Techniques

Topic POC and Information:

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ONR Global.4 – Architecture optimization of scalable, multi-domain ground station for operational small-satellite based ISR

Topic Description:

Several defense and national intelligence entities are doing development work in providing militarily relevant space force enhancement capabilities via small-satellite architectures. Envisioned constellation sizes range from 10's to 1000's of small satellites. Similarly, several efforts intend to use the global persistence provided by these large constellations to provide information directly to tactical users, e.g. individual ships at sea, SOF, small ground units, aircraft. An ability to optimize the TCPED architecture across potentially hundreds of satellites and certainly thousands of ground stations is necessary to allow operational dependence on these ISR sources, robustly address user prioritization issues and minimize the life cycle costs of the system(s) built from this architecture. Proposed work for NPS would be to develop and optimization methodology to address this problem and apply it to one or more current small-satellite development efforts.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Architecture Optimization; Ground Station: Operational Small Satellite; ISR; Constellation; TCPED

Topic POC and Information:

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Thrust Area:
Overarching Enablers

- This thrust area includes research topics for potential, techniques, procedures, technologies, and tools for programs and the technical community in support of the acquisition life-cycle framework.

Supply Chain Risk (SCR) Detection/Mitigation

Topic Description:

Detect and/or mitigate a SCR to provide assurances that systems components were not ‘tampered with‘ for malicious intent or is not counterfeit/grey market components at some point during the manufacturing to installation chain, including spare or replacement part. This includes solid state devices, software, computer hardware and structural elements (e.g. racks, chassis, covers, radomes, pedestals), which may have unintended, embedded technologies.

Topic Classification/Restrictions:

NROC Supported (Yes/No):

Formal Navy S&T Objective (Yes/No):

Topic Key Words:

Topic POC and information:

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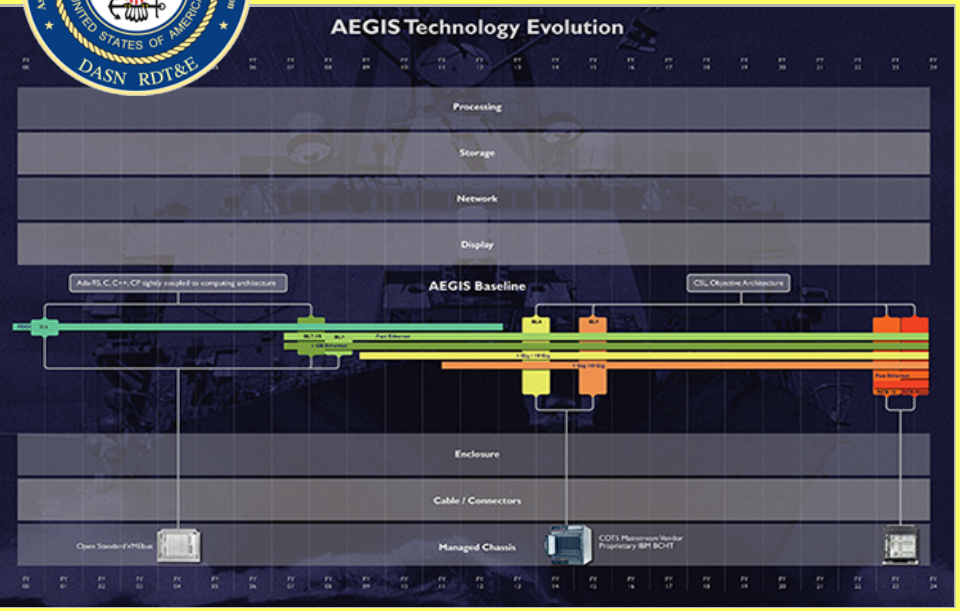
Future Technology Roadmaps



Topic Description:

Provide technology roadmaps to assist AEGIS Weapons System (AWS) program office in selecting COTS computing equipment with the appropriate technology readiness level (TRL), widest industry acceptance, and greatest longevity. Technologies areas analyzed should include processors, storage, networks, displays, enclosures, cables/connectors and managed chassis (e.g., VME, ATCA). Analysis for each candidate technology should include TRL, performance, summary of industry acceptance, number and location (country) of vendors offering products, percent of market (if applicable) and estimate of long-term viability of the technology. There should be a report for each technology area listing all candidate implementations and a recommendation.

Topic Classification/Restrictions: UNCLAS

NROC Supported (Yes/No): No

Formal Navy S&T Objective (Yes/No): No

Topic Key Words: AEGIS Technology Roadmap

Topic POC and information:

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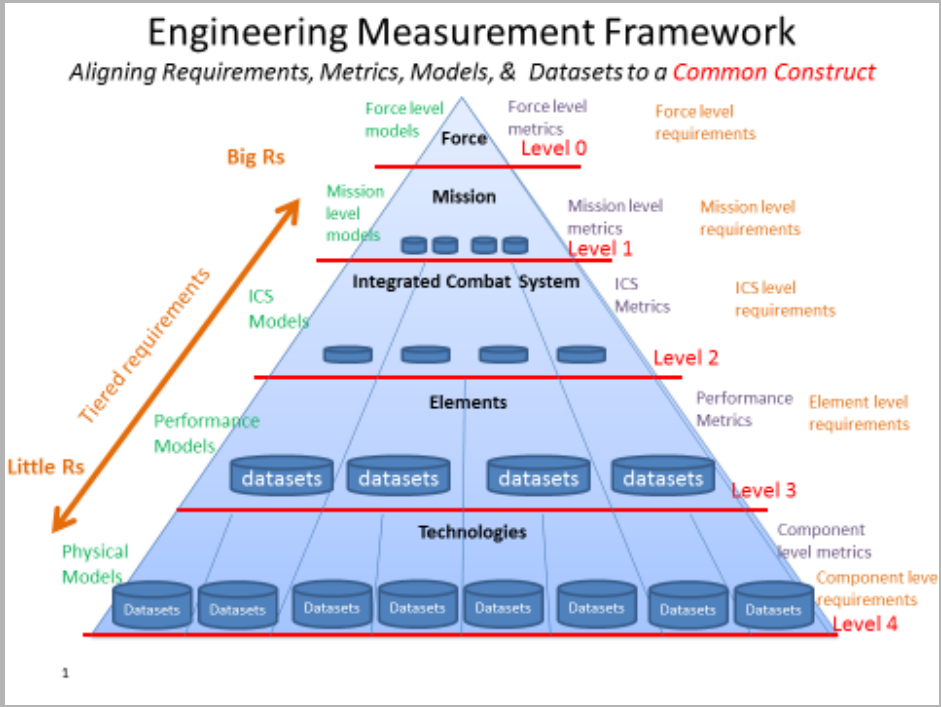
M&S Strategy to Enable Acquisition



Topic Description:

- Establish an environment by which Modeling and Simulation (M&S) is formally conducted throughout the SSDS Command, Control, Communications, Computers, Combat System, & Intelligence (C5I) stakeholder community within a common framework and where stakeholders are able to interface with other appropriate models or architectures as appropriate and cost-effective.
- Develop credible models and simulations of system behaviors, environmental effects, and entity interactions.
- Facilitate a forum for mission areas stakeholders to deposit and exchange information utilizing standards and conventions to make improvements, alterations, and enhancements that benefit the user community.
- Enable a model-supported, data-driven approach to technology investments through better understanding of trade-offs.
- Expand the capability and reduce the cost of training, development of doctrine and tactics, formulation of operational plans, and assessment of warfighting situations.
- Provide capability to generate high fidelity data to provide recommendations to system developers and the fleet on potential shortfalls in subsystem capabilities.

Topic Classification/Restrictions:

- Unclassified preferred (higher if required)

Topic POC and information:

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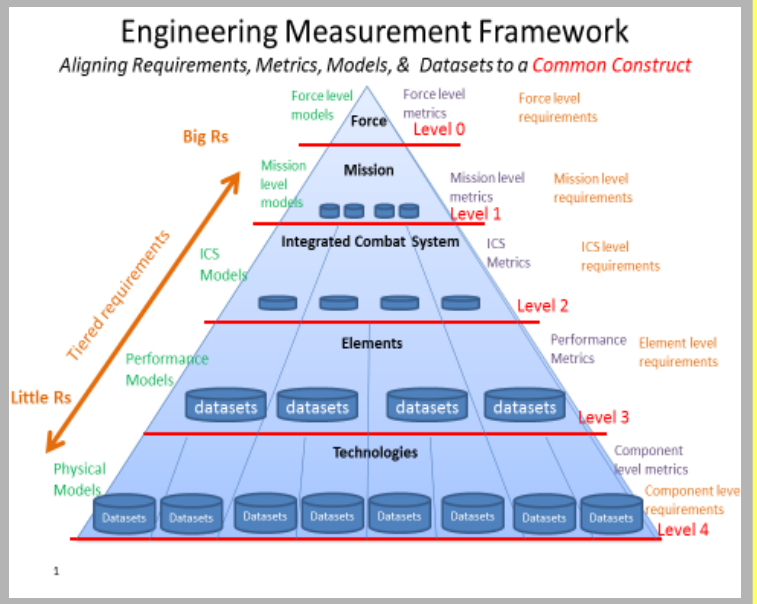
Data Management Strategy to Ensure Maximum Utility of Collected Data



Topic Description:

SSDS ICS Program Office is developing a data management plan to establish guidelines by which the SSDS ICS Program Office will control the access, distribution and configuration of relevant performance data. A research project to support implementation of the plan would be to assess and recommend strategies for collecting and formatting data to ensure that data is useable by the widest community. An alternative project would be to assess and recommend efficient strategies for managing and enabling access to data that has already been gathered by the technical community.

Topic Classification/Restrictions:

- Unclassified preferred (higher if required)

Topic POC and information:

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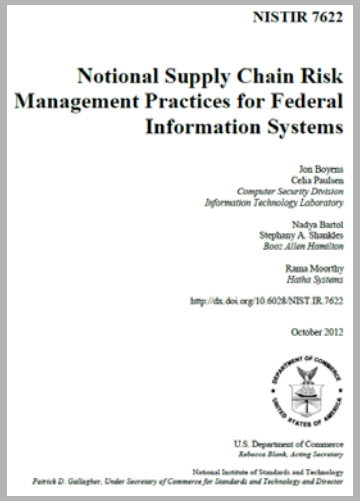
Supply Chain Risk Management (SCRM)



NISTIR 7622

Notional Supply Chain Risk Management Practices for Federal Information Systems

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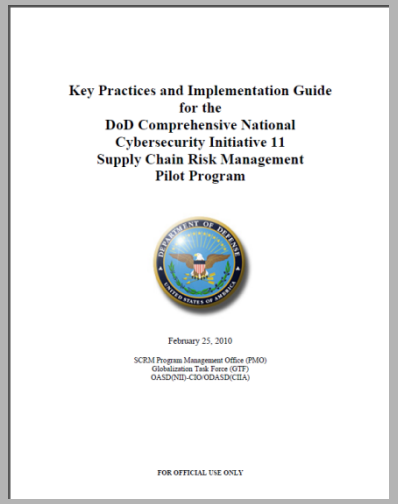
http://dx.doi.org/10.6028/NIST.IR.7622

October 2012

U.S. Department of Commerce
Rebecca Blank, Acting Secretary

National Institute of Standards and Technology
Patrick D. Gallagher, Under Secretary of Commerce for Standards and Technology and Director



Key Practices and Implementation Guide for the DoD Comprehensive National Cybersecurity Initiative 11 Supply Chain Risk Management Pilot Program

February 25, 2010

SCRM Program Management Office (PMO)
Globalization Task Force (GTF)
OASD(NII)-CIO/ODASD(CIA)

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Topic Description:

Supply Chain Risk Management (SCRM):

- "Federal agency information systems2 are increasingly at risk of both intentional and unintentional supply chain compromise due to the growing sophistication of the information and communications technology (ICT) supply chain and the growing speed and scale of a complex, distributed global supply chain."
  - NISTIR 7622, October 2012

Topic Classification/Restrictions:

Can be classified depending on sources and sensitivity

NROC Supported (Yes/No):

No

Formal Navy S&T Objective (Yes/No):

Yes: ID-ISA-STO-02

Topic Key Words:

Logistics, Supply, Cyber

Topic POC and information:

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Supply Chain Risk Management (SCRM)

IMAGE
(Not Available)

Topic Description:

The lack of SCRM technological solutions is a widely known shortfall, at least within the technology protection community. There are three core issues:
--lack of policy
--lack of capability
Detection & Mitigation
--lack of skillset

Topic Classification/Restrictions:
UNK
NROC Supported (Yes/No):
UNK
Formal Navy S&T Objective (Yes/No):
UNK
Topic Key Words:
Supply Chain Risk Management (SCRM)

Topic POC and information:

Grant Merkel 619-553-2800

ONR Global.2 – Fleet experimentation certification, accreditation, and installation

Topic Description:

Excessive cost and process time to bring technology on a Fleet asset for experimentation is a common complaint and has even been professed as prohibitive. However, there is limited consolidated data to support this claim and therefore requests for improvements have had no effect. Additionally the few attempts to investigate the processes and sub-processes have been stifled and limited for various reasons. The advantages to Fleet experimentation are well documented and form a current DoD and Naval strategic objective to provide better, faster capability to the warfighter. Research is required to understand the processes, costs, organization, and labor involved with recommendations for improvements, should the costs and time prove to be prohibitive

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Fleet Experimentation; Certification; Accreditation; Installation; Processes; Consolidated Data

Topic POC and Information:

Forwarded by CAPT Kevin "Q" Quarderer
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ONR Global.3 – Fleet experimentation measures of effectiveness and ROI

Topic Description:

There is a need to evaluate the effectiveness of Fleet Experimentation to meet current Naval strategic goals and to be able to answer questions like: what is the right amount of experimentation? Should all programs require Fleet experimentation? At what phases of development should Fleet experimentation be executed (note Fleet experimentation includes Fleet operators executing a tabletop wargame or simulated event, not just live events.) The Navy needs to be able to optimize the funding available for Experimentation and/or even determine if the current funds are the right amount. To answer these and the many other important questions required to make fiscally responsible decisions on the use of Fleet Experimentation, good metrics and data are required.

Topic Classification/Restrictions:

Unclassified/None

NROC Supported (Yes/No):

Unknown

Formal Navy S&T Objective (Yes/No):

Unknown

Topic Key Words:

Fleet Experimentation; Effectiveness; ROI; Optimize Funding Available; Metrics

Topic POC and Information:

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Acquisition

Topic Description:

Acquisition Planning documentation has become a resource intensive document to generate. A best of breed across the Military Services and a revised process to updates Acquisition Strategies and Acquisition Plans could serve to reduce the acquisition cycle time and save significant resources.

Topic Classification/Restrictions: **UNCLAS**

NROC Supported (Yes/No): **Unknown**

Formal Navy S&T Objective (Yes/No): **No**

Topic Key Words: **Acquisition, Contracting, cycle time, acquisition planning**

Topic POC and information:

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Open Systems Architecture

Naval Open Systems Architecture

Topic Classification/Restrictions: None

NROC Supported (Yes/No): Yes

Formal Navy S&T Objective (Yes/No):

Topic Key Words:
Testing, Affordability, Effectiveness, Cost Reduction, Risk Reduction

Topic Description:

Research practices of affordable design that will improve testing. The research will answer the following: 1. Can quality engineering using robust design be applied to software testing? How do software related practices differ from hardware quality assurance? 2. Can the application of robust design improve cost effectiveness of software testing? How can this be measured and demonstrated? 3. What other approaches exist for developing affordable sets of test cases with effective coverage of large and complex input spaces? Which approaches are most suitable for testing complex Navy systems?

Topic POC and information:

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