2012
ONR Naval
S&T Partnership
Conference & ASNE Expo

Future Naval Capabilities (FNC) Portfolio

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Director of Transition
ONR 03T
Oct 2012

The Office of Naval Research

The **Office of Naval Research** invests in innovative operational concepts to develop the science and technology (S&T) that ensures our warfighters always have the **technological edge**.

ONR Mission — "to plan, foster, and encourage scientific research in recognition of its paramount importance to future Naval power and national security."
- Public Law 588 of 1946

Transition Directorate (ONR 03T)

Future Naval Capabilities

(Steve Smolinski)

- Management oversight of the FNC program to ensure that all FNC investments are executed in accordance with TOG/CNR priorities.

Transition Initiatives

(Bob Smith)

- Coordination and Execution Monitoring of DoN Programs: RTT/TIPS/RDD/Tech Transfer/Rapid Innovation Fund
- Coordinate OSD Programs: DAC/FCT/JCTD/QRF-RRF/DPSI

SBIR/STTR

(John Williams)

- Management control of DON SBIR/STTR and Execution Oversight of ONR SBIR/STTR

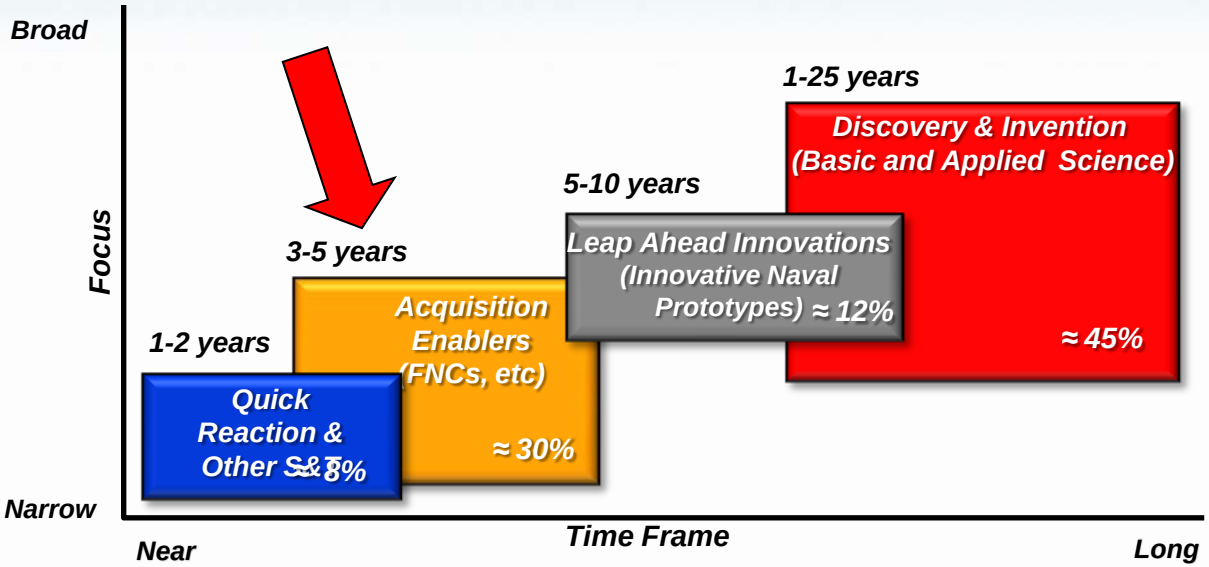
Manufacturing Technology

(John Carney)

- Execute Manufacturing Technology and Affordability Initiatives

S&T Strategic Plan

- *Cascades from National, DoD and Service Guidance*
- *Vetted by Fleet/Force Stakeholders*
- *Approved by VCNO, ACMC and ASN (RDA)*



S&T Plan Focus Areas:

- *Assure Access to Maritime Battlespace*
- *Autonomy & Unmanned Systems*
- *Expeditionary & Irregular Warfare*
- *Power Projection/Integrated Defense*
- *Information Dominance*
- *Power & Energy*
- *Platform Design & Survivability*
- *Total Ownership Cost*
- *Warfighter Performance*

QR S&T

FNCs

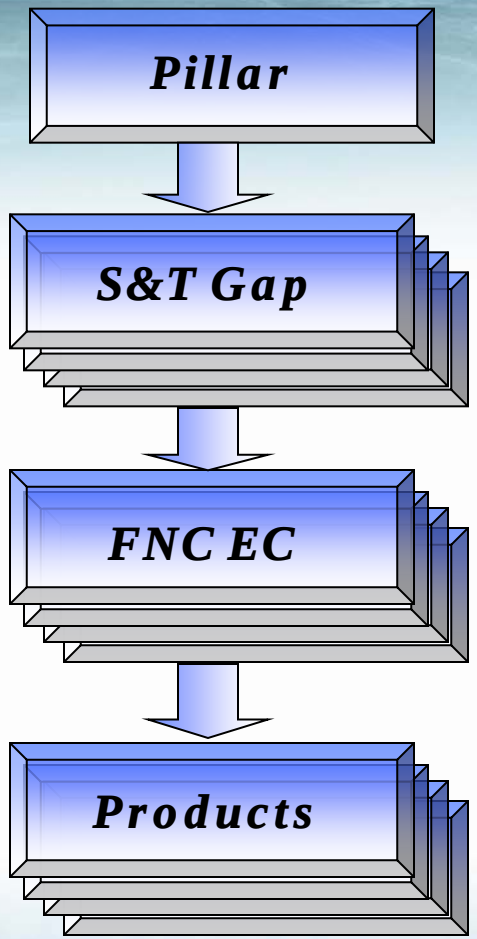
INPs

D&I

Future Naval Capabilities Program

The FNC Program:

- ***Aligns to warfighting and supporting Pillars***
- ***Responds to validated Naval requirements (S&T Capability Gaps)***
- ***Consists of Enabling Capabilities (ECs)***
- ***Delivers FNC Products (prototype systems, knowledge products, technology improvements) after meeting pre-negotiated exit criteria***



Transitions FNC Products to Acquisition PORs (or other valid paths) within 5 years

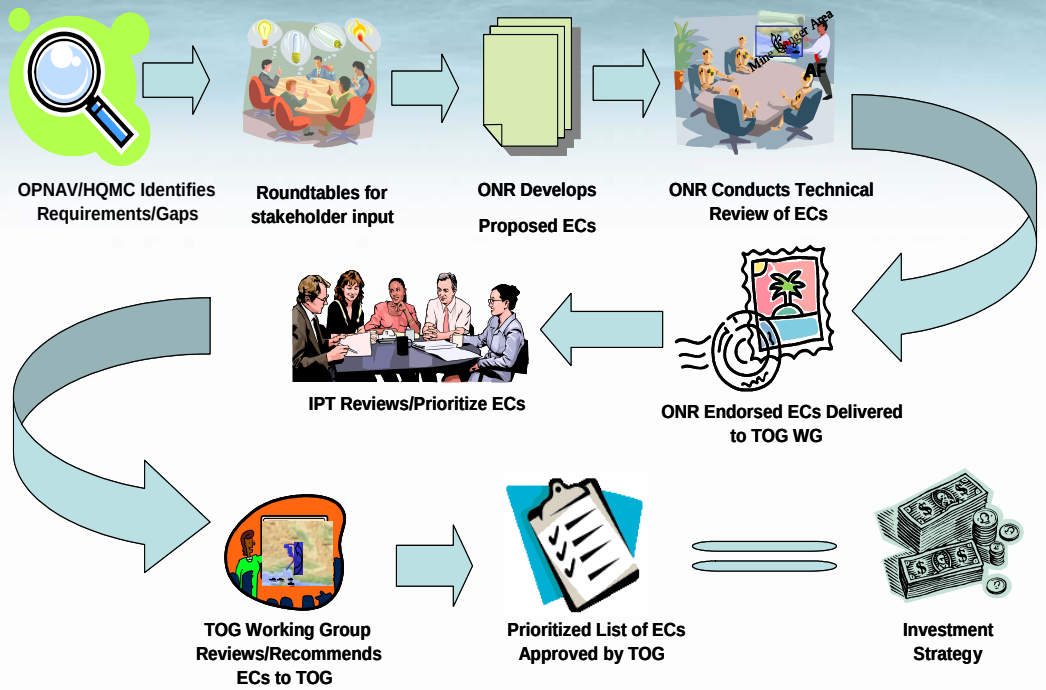
FNC Program Process

Objective/Goal:

- *The FNC program is composed of Enabling Capabilities (ECs) that develop and deliver quantifiable products in response to validated requirements (Naval S&T Gaps) for insertion into acquisition programs of record after meeting agreed upon exit criteria within five years.*

Typical Performers:

- *DoD Labs/Warfare Centers*
- *Industry*



FNC Annual Cycle

Basic Process:

- *FNC investments are refreshed by an established process that begins when OPNAV delivers its annual Naval Capability Gaps*
- *The ECs that do get funded represent the highest priorities of the Navy and Marine Corps*

FNC Oversight Structure

- ***Co-Chairs*: N8 / MCCDC** ★★★
- ***Permanent Members*: PMD ASN (RDA), DCOM USFF, CNR, N2/N6, N9**
- ***Equity Members*: N1, N4, N093, Deputy CNOs and Deputy Commandants**

N84 – Executive Secretary

TOG

TOG Working Group

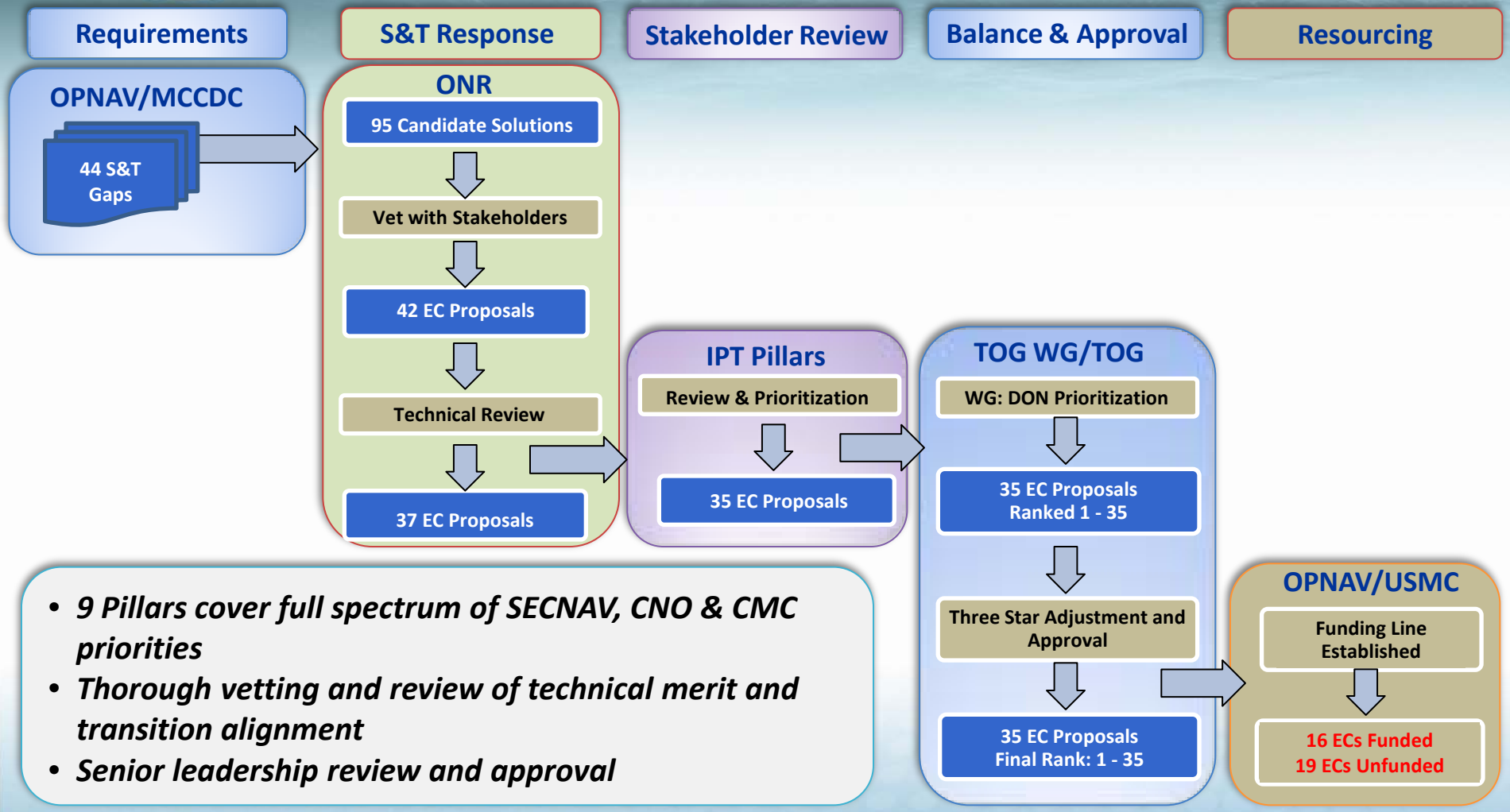
- *0-6/GS-15 Level Representatives of Each TOG Member*
- *Interacts with IPTs and makes recommendations to TOG*

FNC IPTs

Sea Shield	Sea Strike	Naval Expeditionary Maneuver Warfare	Sea Basing	Power & Energy
• OPNAV N96 • MCCDC • USFF N87 • PEO LCS • ONR 32	• OPNAV N97 • HQMC Aviation • USFF N88 • PEO U&W • ONR 35	• OPNAV N95 • HQMC PP&O • USFF N85 • MCSC • ONR 30	• OPNAV N95 • Dep.CG MCCDC • USFF N85 • PEO Ships • ONR 33	• OPNAV N45 • USMC HQ E20 • USFF N88 • NAVSEA 05 • ONR 33

FORCEnet	Enterprise & Platform Enablers	Force Health Protection	Capable Manpower
• OPNAV N2/N6F • Dir HQMC C4 • FLTCYBERCOM • SPAWAR 07 • ONR 31	• OPNAV TBD • HQMC I&L • USFF N88 • NAVSEA 05 • ONR 33	• OPNAV N0931 • TMO, USMC • FFC N02H • CDR, NMSC • ONR 34	• N15 • USMC Training/Ed. • USFF N1D • NAVAIR HSD • ONR 34

FNC Investments are Selected by a Collaborative Naval Process



- *9 Pillars cover full spectrum of SECNAV, CNO & CMC priorities*
- *Thorough vetting and review of technical merit and transition alignment*
- *Senior leadership review and approval*

Requirements Driven – Transition Oriented!

FNCs Products Leverage Basic Research to Deliver Mature Products to PORs

Basic Research Leveraged

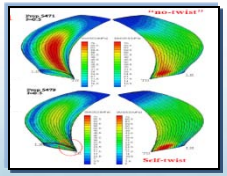
- *Cavitation Erosion Resistant Coating and Matrix Materials*
- *Hydro-Elasticity Effects of Composite Materials*
- *Large-Eddy Simulation of Crashback loads*

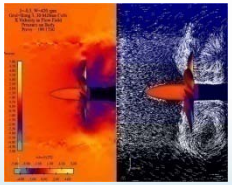
FNC Product

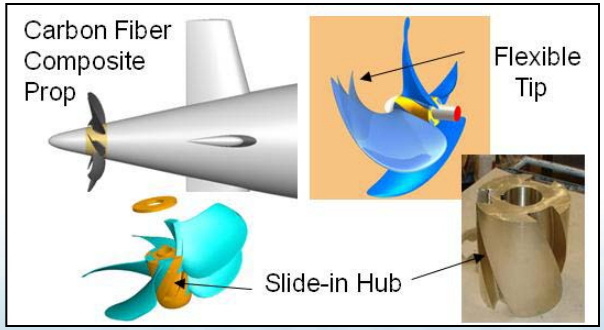
Pitch-adapting composite submarine propeller for enhanced performance with reduced weight, less maintenance and substantial acquisition and life cycle cost savings

Acquisition POR

- *SEA 073R Advanced Submarine Systems Development*
- *PEO SUB Virginia and Follow-on class submarines*





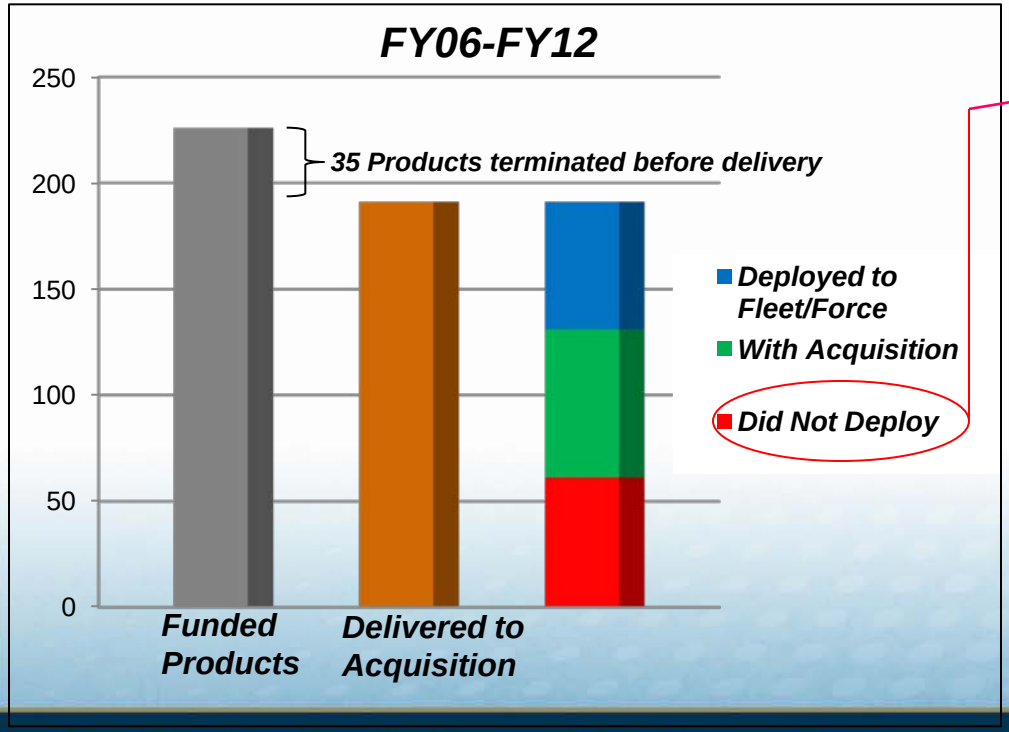


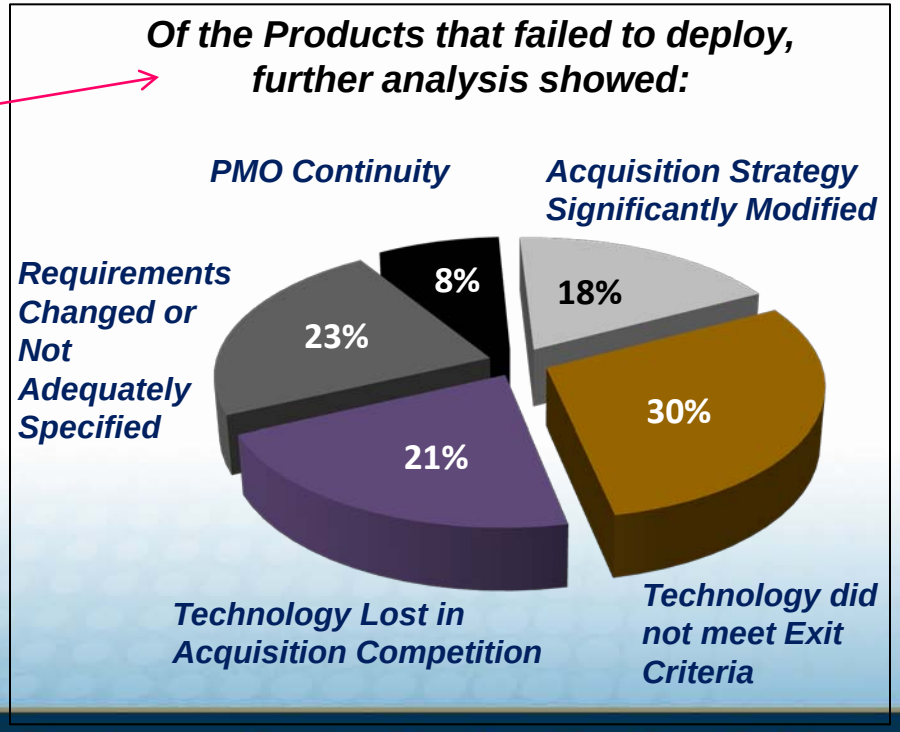
Advanced Material Propeller

FNC Transitions

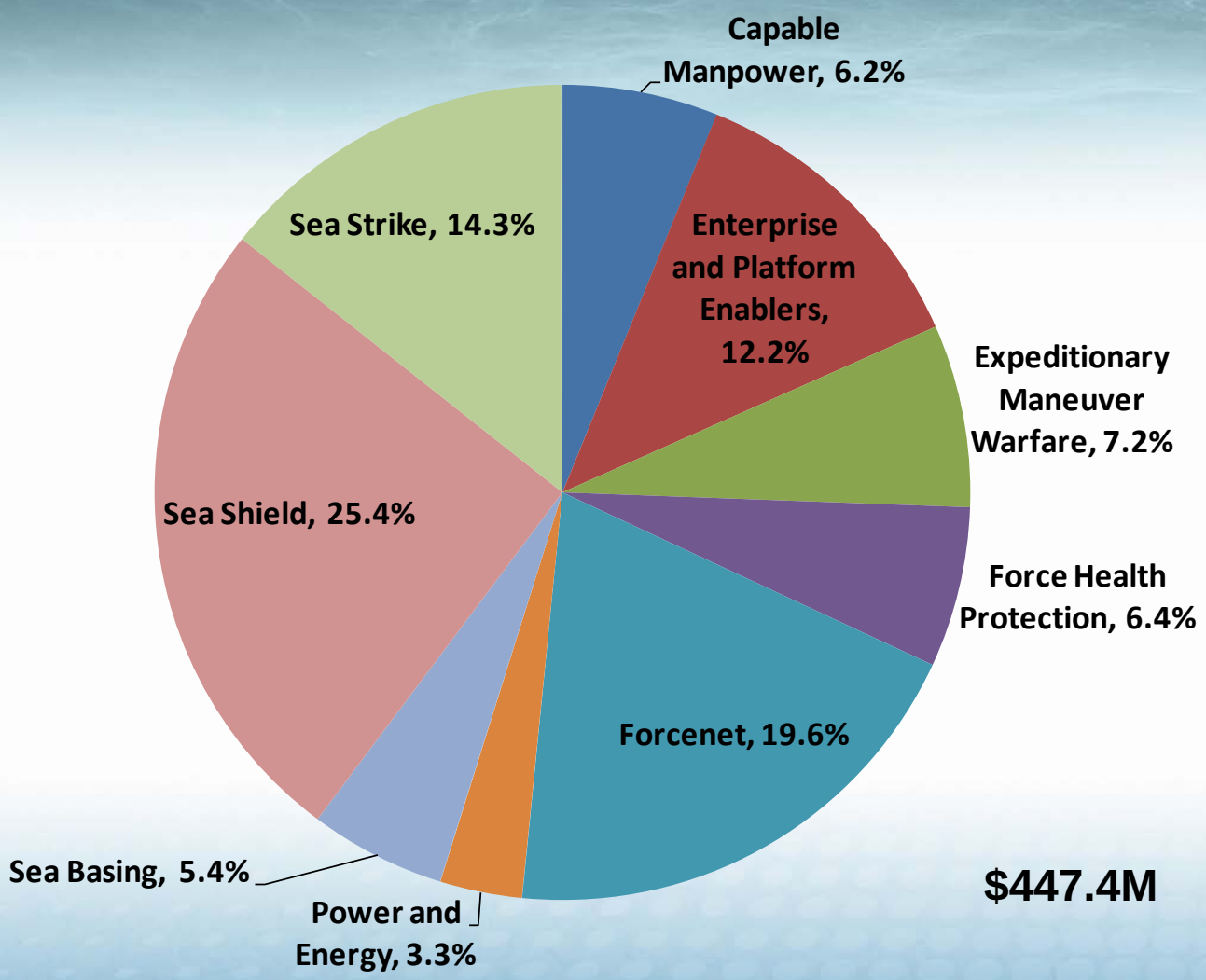
Status through 2012

- ONR successfully delivered 85% of funded FNC Products to Acquisition
- An Independent Transition Review Board determines status after delivery
- Of the 191 Products delivered through FY12:
  - 31% Deployed
  - 37% With Acquisition
  - 32% Did Not Deploy





FNC Funding by Pillar (PB-13, FY13)



$447.4M

FY14 FNC Enabling Capabilities

Enabling Capability Title	EC Descriptive Summary
Acute Care Cover for Severely Injured Limbs (ACCSIL)	Manage blast injured extremities with a gel wound cover in the forward and far-forward settings. Also can be used to deliver pharmacological interventions.
Blast Load Assessment : Sense and Test (BLAST)	Address TBI through 1) in-situ and real-time detection of blast load experienced by the warfighter, 2) an assessment tool to gauge the resulting effect s on cognitive functions, and 3) provide a go/no go recommendation.
Advanced Undersea Weapon System (AUWS)	Position and remotely control sensor and weapon nodes to autonomously DCL and neutralize surface and subsurface threats in shallow/intermediate water depths.
Aluminum Alloy Corrosion Control and Prevention	Assess, control, and prevent corrosion of aluminum alloys via 1) a corrosion prediction tool, and 2) lightweight coating systems to prevent corrosion and cracking.
Exchange of Actionable Information at the Tactical Edge (EAITE)	Provide efficient and timely automated production and dissemination of information products for the Company and below in austere environments.
Spectral and Reconnaissance Imagery for Tactical Exploitation (SPRITE)	Hyperspectral and wide area reconnaissance ISR capability for MCTUAS/STUAS. Complements EO wide area airborne surveillance and autonomously detects IED precursors, hidden targets, etc.
Efficient and Power Dense Architecture and Components	Increased electric system power density to enable higher power weapons and sensors (EMRG, FEL).
Unmanned Aerial Systems Interface, Selection & Training Technologies (U-ASiSTT)	Streamlines UAS interface design and the processes by which UAS personnel are selected and trained to use them.

Additional information for these ECs is available at: http://www.onr.navy.mil/Science-Technology/Directorates/Transition/Future-Naval-Capabilities-FNC.aspx

FY14 FNC Enabling Capabilities

Enabling Capability Title	EC Descriptive Summary
Silk Thread	Not Available
Tier 3 High Value Unit (HVU) Self-Defense	Improve HVU ASBM self-defense capabilities in A2/AD environments with advanced tracking, fire control, and homing guidance algorithms for existing ES and weapon systems.
Intelligent Collaborative Engagement	Destroy well-defended surface vessels conducting area denial ops by autonomously coordinating stand-in EW and kinetic weapons.
Passive Sensor Surveillance	Develop passive sensor surveillance system to provides “fire control quality” targeting data in RF-denied or -degraded theaters.
Adaptive Tasking, Collection, Processing, Exploilation and Dissemination Services	Assure network connectivity for low latency data sharing, and provides for autonomous and adaptive C2 services for coordinating TCPED for ASW.
Anti-Surface Warfare (ASuW) Weapon Upgrade	Provides a new ASuW homing capability for the submarine launched MK-48 Mod 6/7 Advanced Capability (ADCAP) heavyweight torpedo.
Long Range RF Find, Fix and ID	Improve ASuW capabilities to classify maritime targets at range, day/night, all-wx.
Full Sector Torpedo Defense	Increase the probability of survival of HVUs vs. single torpedo or a salvo of up to four torpedoes via a bow-mounted sonar, countermeasures, and engagement timeline compression.

Summary

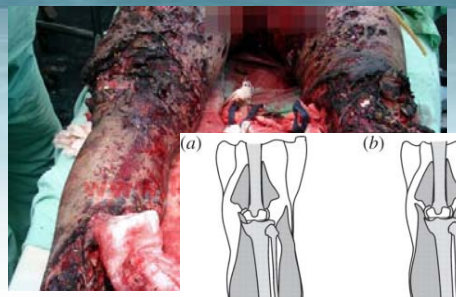
- ***New ECs will be starting next year (FY14).***
- ***Industry participation is typically 66%.***
- ***BAAs or RFPs will be released 2nd/3rd Quarter FY13 for contract award prior to FY14.***
- ***Your early engagement can help us refine our plans, prior to BAA/RFP release.***

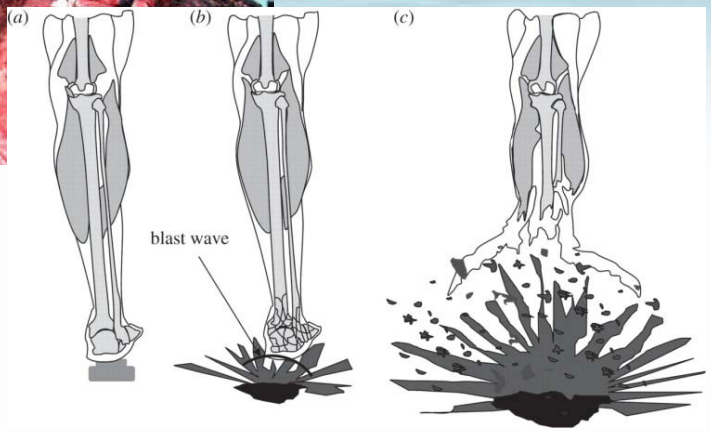
Backup

Acute Care Cover for Severely Injured Limbs (ACCSIL)

Technical Description

This EC will deliver a wound cover for the management of injured extremities in the forward and far forward setting. The product will include a physical barrier to contain and protect the remaining tissue of the injured limb, and a powder or gel based internal coating to deliver pharmacological intervention to mitigate progressive injury. These materials will be non-interfering with each other and applicable with or without the presence of the conformal cover. Successfull development of these capabilities will prevent morbidity and mortality associated with secondary damage that ensues after the onset of the initial physical trauma.





S&T Focus

The proposed device will provide containment and protection to an injured limb or stump in the form of a conformal coating that is internally coated in molecules that promote hemostasis, stave off infection, and inhibit pain.

Warfighter Payoff

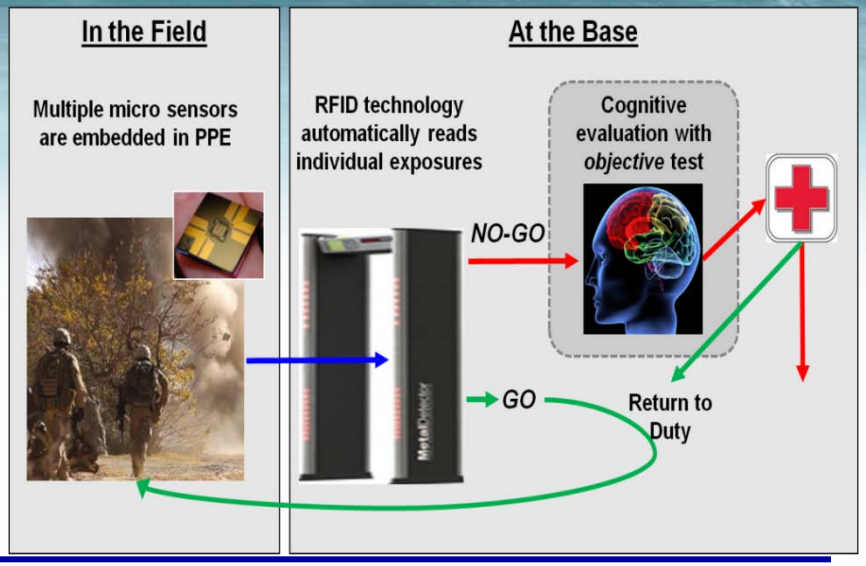
- Mitigate risk of infection
- Prevent further penetration of debris
- Improve functional outcome by reducing tissue loss

Pillar: Force Health Protection
EC Manager: Dr. Tim Bentley (Timothy.B.Bentley@navy.mil)
Room: Code 34 break-out room
Availability: Conf. hours

Blast Load Assessment: Sense and Test (BLAST)

Technical Description

This EC will provide 3 products addressing Traumatic Brain Injury (TBI): (1) fieldable device (head-mounted sensor, also body/PPE mountable) that will record blast pressure, acceleration and impulse; (2) mTBI assessment tool that is forward deployable – the deliverable is a quantitative cognitive testing platform that uses non-invasive neurophysiological measures; (3) algorithm that incorporates blast exposure(s) and cognitive data in order to provide a "Go/No Go" output in response to blast events.



S&T Focus

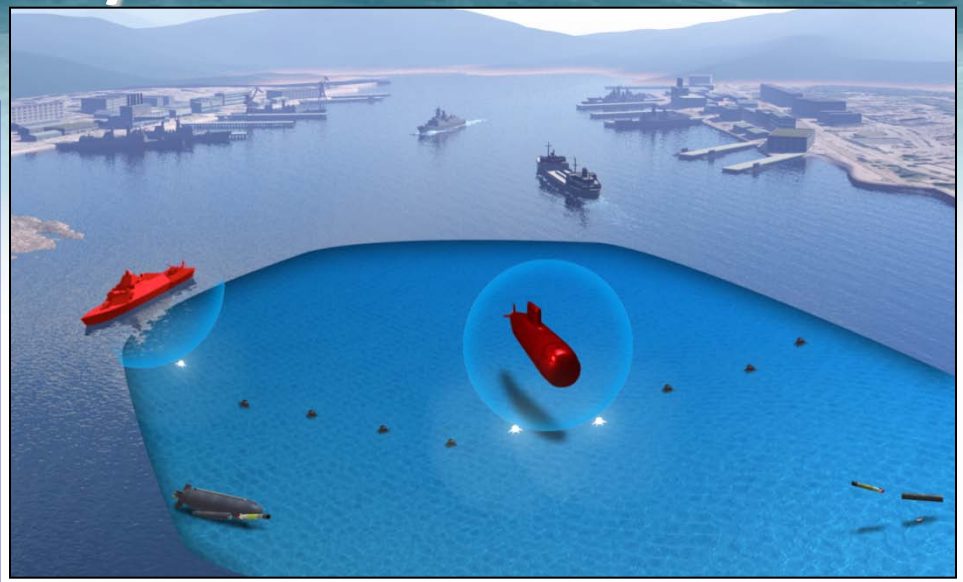
This project will develop the software and hardware for *in situ* and real-time detection of a blast load as experienced by the warfighter, and the effect of that load on the individual's cognitive functions.

Warfighter Payoff

- Prevent further damage from non-treatment or repeat exposure
- Reduce manpower and operational fluctuations caused by subjective mandatory stand-down requirements.

Pillar: Force Health Protection
EC Manager: Dr. Tim Bentley (Timothy.B.Bentley@navy.mil)
Room: Code 34 break-out room
Availability: Conf. hours

Advanced Undersea Weapon System



Technical Description

- Unmanned sensors, communications, & engagement nodes delivered clandestinely
- Key elements include:
  - Tactical Positioning of Nodes
  - Remote Command and Control (RECO) of system
  - Autonomous Threat Discrimination & Localization

S&T Focus

- Mission planning, Tactical Decision Aid, autonomy, and engagement algorithms.
- Long range, clandestine deployment capability
- Communications packages for undersea and gateway nodes, including processing and encryption algorithms
- Low-power sensors and processing to detect and localize targets

Warfighter Payoff

- This EC provides operational commanders with clandestinely delivered, autonomous and remotely controlled, cost effective battle space shaping system. It will provide a tactically flexible asymmetric capability to deter and restrict the mobility and access of adversary forces that threaten our ability to maneuver at sea.

Pillar: Sea Shield
EC Manager: Dr. Tom Swean
Contact info: tom.swean@navy.mil

Aluminum Alloy Corrosion Control and Prevention

Technical Description

The EC will develop, demonstrate and transition technologies to assess, control, and prevent marine grade aluminum alloys corrosion and cracking caused by sensitization; thus, providing capabilities for reduced maintenance and improved operational availability. This EC will develop a tool to detect and monitor sensitization, and to predict damage propagation to assist in prioritizing maintenance actions. The EC will focus on the novel coatings and surface treatment technologies that can reduce sensitization, prevent alloy corrosion, and decrease the propensity of alloys to be sensitized.

S&T Focus

- Probability of Degree of Sensitization (DoS) Detection, 90+%, with >75% prediction capability for sensitization over time
- Capability to repair affected areas with DoS>50mg/cm^2
- 30% reduction in aluminum ship corrosion related maintenance cost

Warfighter Payoff

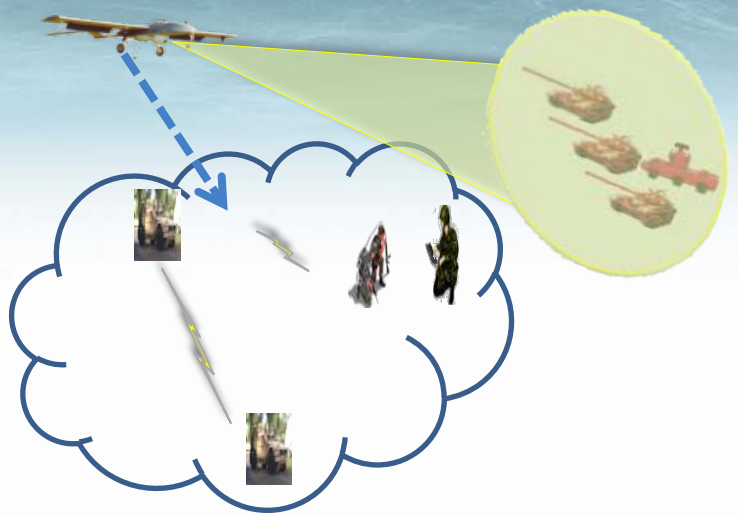
- Reduce maintenance costs associated with removing and replacing sensitized aluminum
- Provide prediction, prevention, and mitigation technologies

Pillar: Enterprise & Platform Enablers
EC Manager: Dr. Airan Perez (Airan.Perez@navy.mil)
Room: Code 3X break-out room
Availability: Conf. hours

Exchange of Actionable Information at the Tactical Edge (EAITE)

Technical Description

This EC addresses the efficient and timely creation and dissemination of information products for the Company and below in austere environments. This includes efficient management of data distribution through disconnected, intermittent, and limited (DIL) Communications Networks. This EC will also provide automated preprocessed information at the source of the data and from multiple sources at the C2 nodes.



S&T Focus

- Timeliness and correctness (90%) of conditioned products.
- Timely delivery of 90% accurate and 80% complete production of information requirements
- Increase reliability and reduce delay in delivery of information content; increase the number of concurrent users

Warfighter Payoff

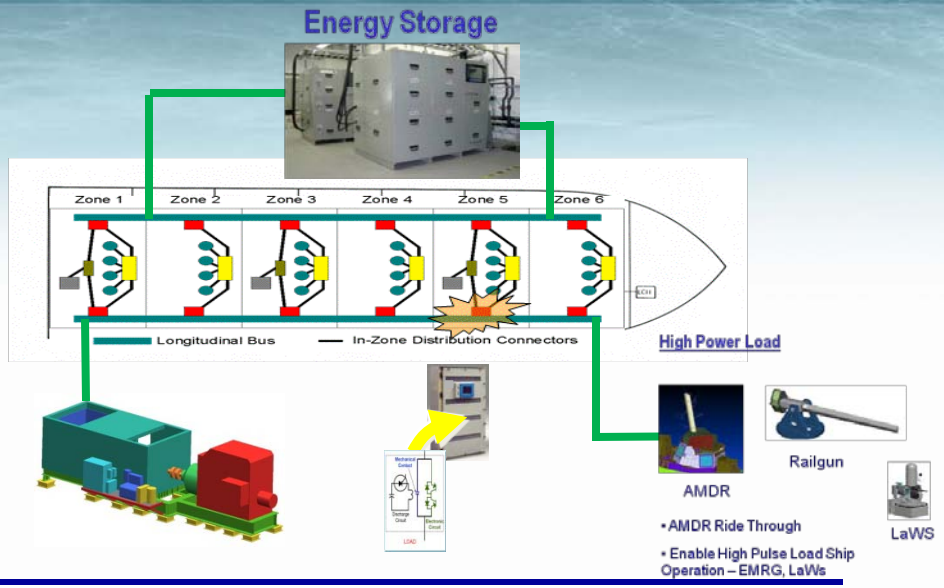
Conditioned C4 and ISR data that is aggregated and made useable/actionable to the commander/small unit leader at the tactical edge. Provide the information content of IERs in an automated manner to aid decision making and increase time to action tempo.

Pillar: FORCEnet
EC Manager: Mr. John Moniz (John.Moniz@navy.mil)
Room: Code 3X break-out room
Availability: Conf. hours

Efficient and Power Dense Architecture and Components

Technical Description

This EC will develop electrical architecture, component and control methods to increase shipboard electrical system power density 2X over baseline while also enabling energy storage products to meet volumetric and gravimetric energy density goals.



S&T Focus

- High speed electrical fault detection and isolation
  - Reduce fault detect/clear time by 100x
  - Reduce fault energy to enable switchboard size reduction by 2x
  - Reduce Energy Storage Module (ESM) fault containment to enable ESM to meet Gap FY14-27

Warfighter Payoff

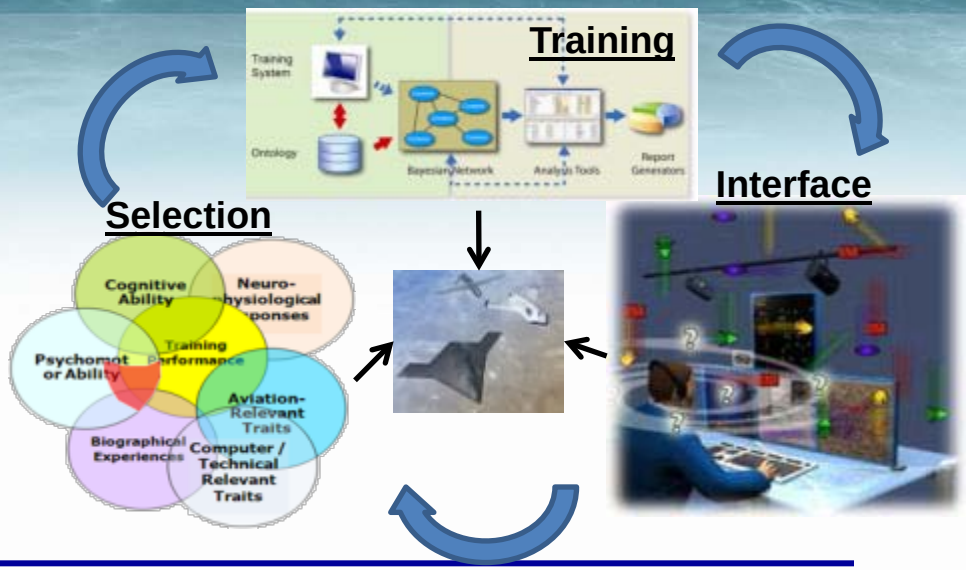
- Increases Electrical System Power Density
- Enables High Power Mission Loads

Pillar: Power and Energy
EC Manager: Mr. Joe Borraccini (joseph.borraccini@navy.mil)
Room: Code 3X break-out room
Availability: Conf. hours

Unmanned Aerial Systems Interface, Selection & Training Technologies (U-ASiSTT)

Technical Description

This EC streamlines UAS interface design and the processes by which UAS personnel are selected and trained to use them. UASs continue to grow in complexity, blending automation with dynamic, decentralized control of multiple platforms. Effective UAS operations require selecting a new kind of Air Warrior, more efficiently trained to effectively process information using better-designed interfaces. U-ASISTT will create technology products and development guidelines for DoN's UAS efforts – extensible to other UxS domains reducing UAS total ownership costs.



S&T Focus

Selection for UAS Personnel (SUPer): Algorithms to assess candidates' capabilities & forecast future performance. Deliverables include: hardware, software, & UAS personnel selection / classification guidelines.

Dynamic, Adaptive & Modular agents for UAS (DyAdaM): Use sensor data to generate synthetic entity behavior, that can adjust & evolve in support of specified training objectives. Deliverables include: development guidelines & standards (for meta data, sensor data, interoperability, live/synthetic data feeds and entity behaviors), & synthetic entity behavior development toolkit.

Control Station Human Machine Interface (CaSHMI): Interface design(s) enabling presentation of information for controlling multiple and different UASs, making manned-unmanned system integration and transfer of control with other operator teams safe & effective. Deliverables include: software, and design guidelines.

Warfighter Payoff

- Selection of UAS operator candidates with right capabilities
- Reduce cost, increased flexibility for training UAS personnel
- Safe manned/unmanned integration and transfer of control

Pillar: Capable Manpower
EC Manager: CDR Joseph Cohn (Joseph.Cohn@navy.mil)
Room: Code 3X break-out room
Availability: Conf. hours