ONR Electronic Warfare S&T Industry Day

Revolutionary Research . . . Relevant Results

7 January 2010

Dr. Peter Craig

Electronic Warfare Program Manager

C4ISR Department

Office of Naval Research

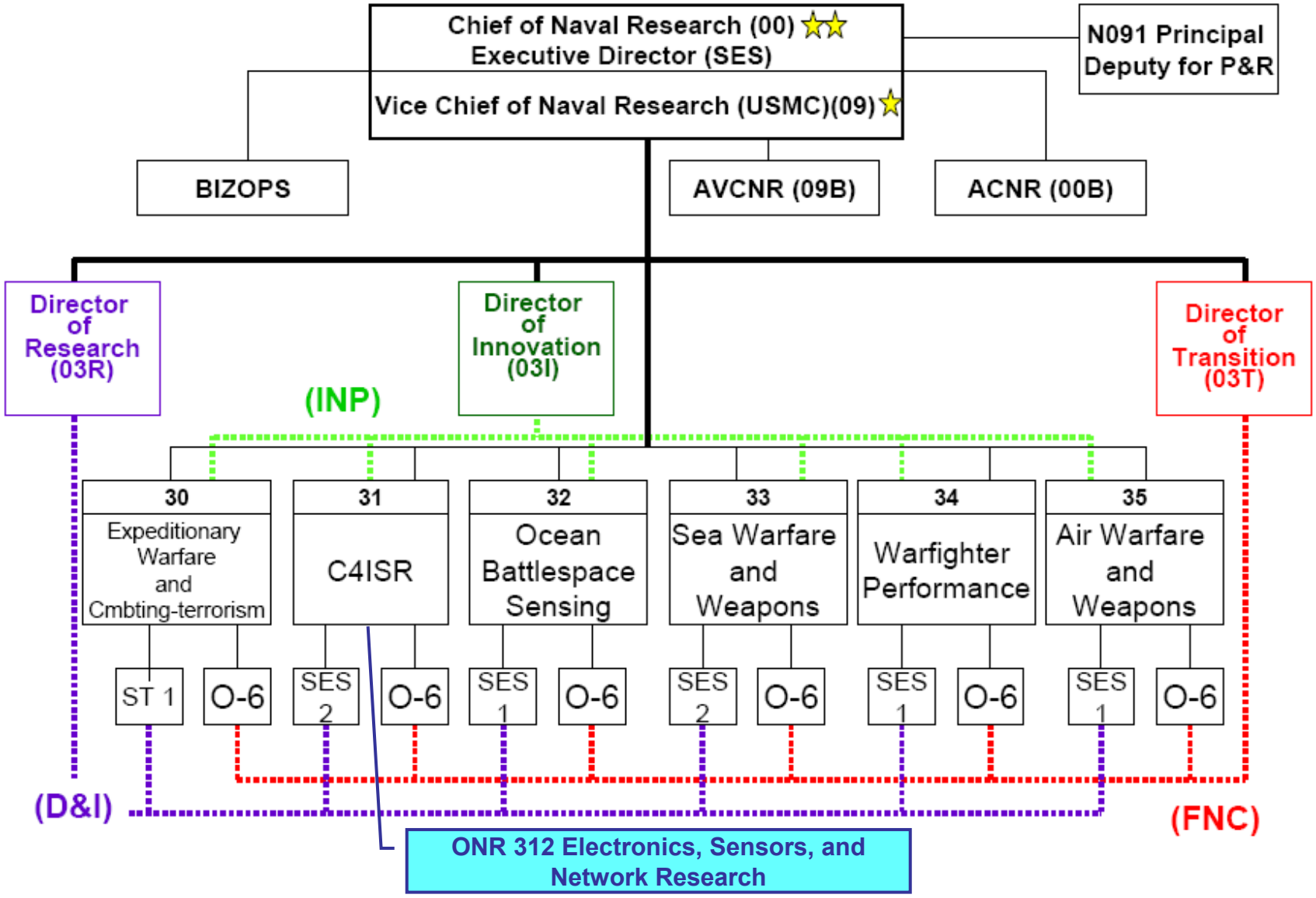
Office of Naval Research
Science & Technology

ONR Mission: ***To plan, foster, and encourage scientific research in recognition of its paramount importance as related to the maintenance of future naval power, and the preservation of national security; and to manage the Navy's basic, applied, and advanced research to foster transition from science and technology to higher levels of research, development, test, and evaluation.***

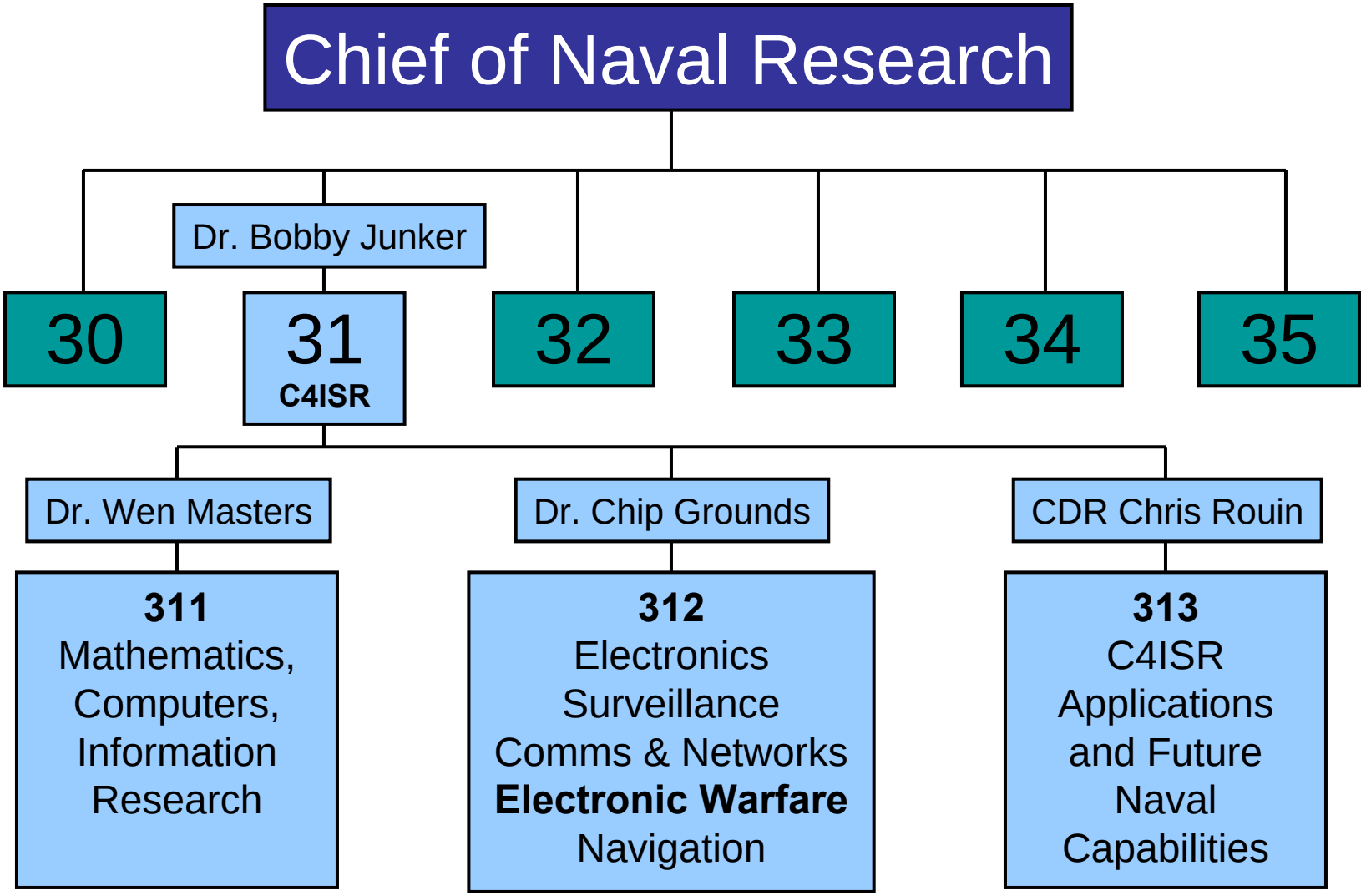
Naval S&T Vision: ***Sponsor scientific research and technology to:***

- ***Pursue revolutionary capabilities for Naval forces of the future,***
- ***Mature and transition S&T advances to improve naval capabilities,***
- ***Respond to current critical needs,***
- ***Maintain broad technology investments to anticipate and counter potential technology surprise.***

Office of Naval Research
Organization (S&T)



ONR Organization - S&T



ONR 312 Electronic Warfare

Revolutionary Research . . . Relevant Results

Electronic Warfare Technology Program

Dr. Peter Craig
EW Program Manager

Mr. Dave Tremper
EW Program Officer

Mr. Mike Garcia
EW Program Officer

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CACI

Mr. Tom Jesswein
CACI

6.2 Discovery & Invention

- EW Receivers & Transmitters
- Countermeasures for Emerging Threats
- Electro-optic and Infrared Countermeasures
- EW Signal Processing
- Antennas and Components
- Multi-band Lasers
- EW Modeling & Simulation
- Network Centric EW
- Multi-mode Countermeasures Techniques

Future Naval Capabilities (Sea Strike & Sea Shield)

Surface/Subsurface
- Enhanced SEWIP
- Enhanced NULKA
- Next Generation CM Techniques for Ship Missile Defense

Air
- Next Generation Airborne EW
- CM for Advanced Imaging IR Seekers
- CM for Millimeter Wave Seekers
- Identification and Defeat of EA Systems

Marine Corps
- Multifunction Capabilities for MWS

SBIR/STTR EW Technologies

Doing Business with ONR

Business Opportunities

- Broad Agency Announcements (BAA)
- Small Business Innovative Research / Small Business Technology Transfer (SBIR/STTR)
- Multidisciplinary Research Program of the University Research Initiative (MURI)
- Defense University Research Instrumentation Program (DURIP)
- DoD Experimental Program to Stimulate Competitive Research (DEPSCOR)

Detailed information can be found on the ONR website

http://www.onr.navy.mil/en/Contracts-Grants.aspx

What is Electronic Warfare?
Joint Service Definition

Revolutionary Research . . . Relevant Results

Development of technologies that maximize the operational use of the electromagnetic (EM) spectrum by U.S. forces, ...while denying same from the enemy, ...by using EM means to detect and attack enemy sensor, weapon and command infrastructure systems

- **– Immediate battlespace recognition of hostile scenario/intent and optimized, automated response decisions**
- **– Electronic denial, degradation, disruption or destruction of enemy C4ISR, IADS, acquisition and associated targeting/weapon systems**
- **– Timely EM control over the entire battlespace: temporal, spectral, spatial**

Electronic Warfare in Perspective

Revolutionary Research . . . Relevant Results

The RED Kill Chain…

Detect	ID	Track	Decide	Engage	Assess

… and the Electronic Warfare Response Chain…

Detect	ID	Track	Decide	Engage	Assess

Situational Awareness/Threat Warning

Requires capability to:

- **Continuously monitor all critical portions of the spectrum**
- **Quickly and accurately classify emitters/emitter function**
- **Provide specific emitter identification**
- **Precisely and rapidly locate platforms, events**
- **Conduct accurate long term monitoring/tracking**
- **Share key info in near real time**

Counter Targeting/Jamming/ Self-Protection

Requires capability to selectively:

- **Limit/deny access (jamming)**
- **Provide false/misleading information (countertargeting, decoys)**
- **Counter communications and networks**
- **Damage/degrade threat sensor capability**

EW Networked Capabilities, Analysis & Assessment, Electronic Protection

Battlespace Awareness **Spectrum Control**

Information Dominance

Electronic Warfare Terminology
DoD / JCS Definitions

Electronic Warfare (EW): "Any military action involving the use of EM radiation … to control the EM spectrum or to attack the enemy."

- **Electronic Warfare Support (ES): Actions to search for, intercept, ID & locate intentional / unintentional EM sources for the purpose of immediate threat recognition**
  - **Provides information/data for immediate decisions regarding operations & tactical actions (avoidance, targeting, cueing)**
- **Electronic Attack (EA): Use of EM … to attack with the intent of degrading, neutralizing or destroying enemy combat capability**
  - **Includes jamming, EM deception, decoys/expendables**
- **Electronic Protection (EP): Actions taken to protect ... from any effects of friendly or enemy employment of EW that degrade, neutralize, or destroy friendly combat capability**

ONR Electronic Warfare
S&T Area Objectives

Revolutionary Research . . . Relevant Results

Own the Spectrum

Provide Battlespace Awareness - Know who is out there, where they are, and what they are doing…

Requires capability to:

ES

- Continuously monitor all critical portions of the spectrum (RF/EO/IR)
- Quickly and accurately classify emitters/emitter function
- Provide Specific Emitter Identification (SEI)
- Precisely and rapidly locate platforms, people, things, events
- Conduct accurate long term monitoring/tracking
- Network sensors and share key info in near-real time

Provide Effective Spectrum Control - Determine who sees what…

Requires capability to selectively:

EA

- Limit/deny access (jamming) (RF/EO/IR)
- Provide false/misleading information (countertargeting, decoys)
- Damage/degrade threat sensor capability (RF/EO/IR)

Provide Unrestricted Spectrum Access to Blue Forces – Protect our own ISR capabilities…

Requires capability to:

EP

- Negate the impact of hostile jamming on U.S. and allied sensors (RF/EO/IR)
- Preserve the integrity of critical networks and data links
- Precisely navigate and target weapons in a GPS-denied environment

ONR EW S&T Investment Goals

Alignment to Naval and Joint S&T Needs

Revolutionary Research . . . Relevant Results

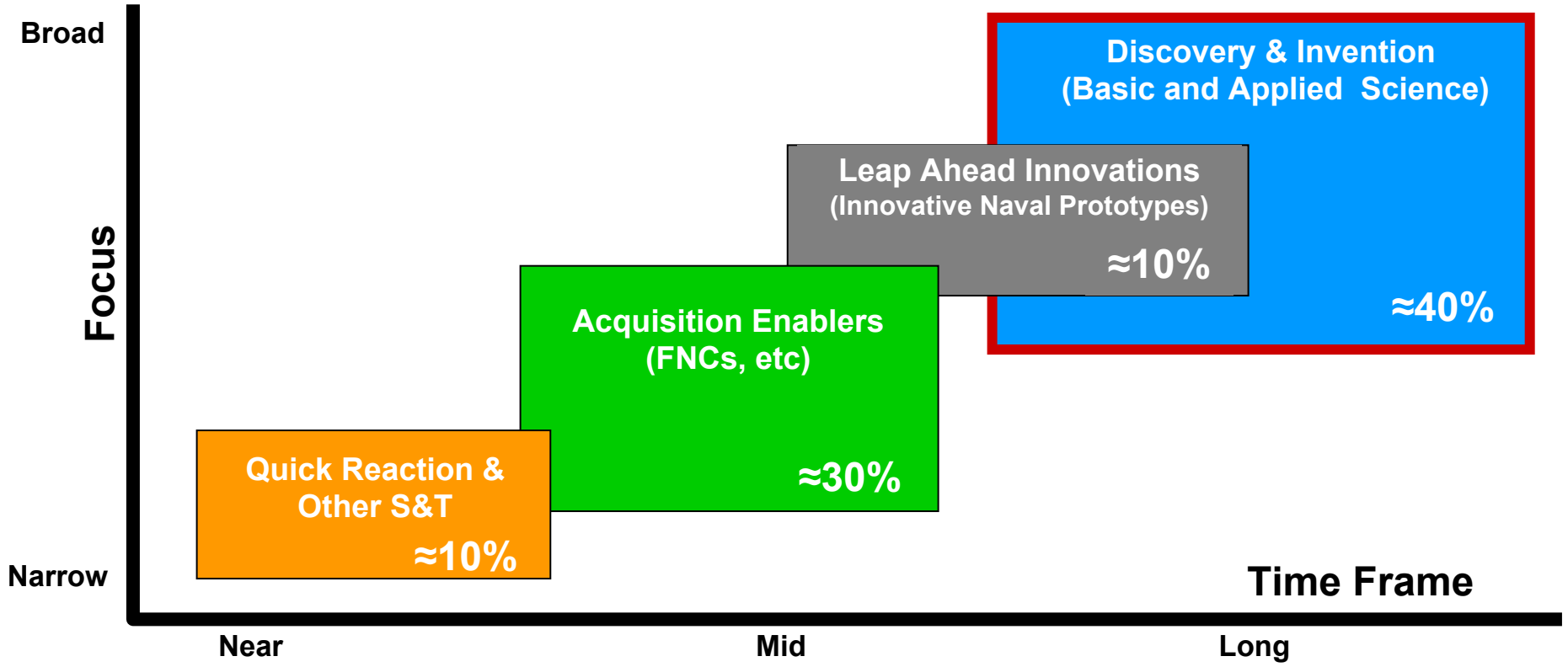
EW Technology & Techniques for Current and Future Warfighter Needs:

	SWE	NAE	USE	USMC	Joint
• Extend the EW Spectrum into New Domains (Wavelength/Frequency/Modulation)	✓	✓	✓	✓	✓
• Exploit Non-Traditional and Unintentional Signals	✓	✓	✓	✓	✓
• Detect and Counter Passive Detection Systems	✓	✓		✓	✓
• Explore Network-Enabled Electronic Warfare Cooperative Methods and Solutions	✓	✓	✓	✓	✓
• Develop Tools and Techniques to Provide Real-Time Assessment of EW Effectiveness		✓			✓
• Reduce Size/Weight/Power/Cost of EW Hardware and Systems	✓	✓	✓		
• Counter Hostile Use of Advanced EW Technology against US Forces		✓		✓	✓

Future EW Vision

Elements of Future EW Systems	Objective Capability (What?)	Enabling Technology (How?)
Distributed	Maximize EW spatial coverage with a minimum of resources without permitting single point failures	Small, lightweight, power efficient ES / EA payloads for manned and unmanned vehicles (UAV, USV, UUV, UGV)
Coordinated	Maximize effectiveness of EW across on-/off-board assets, manned / unmanned platforms, kinetic / non-kinetic resources	Multi-asset, coordinated kinetic / non-kinetic M&S; multi-platform ID / targeting / tracking / EA techniques and algorithms
Multispectral	Maximize EW spectral coverage (EO-IR-mmW-RF) and minimize spectral gaps that can be exploited by hostile forces	EO/IR/RF receiver / transmitter sub-systems and components with extended spectral coverage and ultra-wide bandwidth
Fused ES/EA	Maximize flexibility in dynamically responding to time critical, frequency agile emitters	Embedded ES / EA architectures with high-speed reactive ES processing and dynamic EA techniques generation
Robust EP	Maximize operational availability of ISRT sensor assets and preserve situational awareness in the presence of hostile EA	Dynamic / reactive / adaptive signal processing, hardened EO/IR/RF apertures and components
Increased Combat Effectiveness		

ONR S&T Portfolio Balance



Quick Reaction

- Tech Solutions
- Experimentation
- MC S&T (MCWL, JNLW, etc.)

Acquisition Enablers

- Future Naval Capabilities
- Warfighter Protection
- Capable Manpower
- LO/CLO

Leap-Ahead Innovations

- Innovative Naval Prototypes
- NSPs
- Swampworks

Discovery & Invention

- Basic & Early Applied Research
- National Naval Responsibilities
- Education Outreach HBCU/MI

ONR Portfolio Characteristics

	Direct Fleet Support / Quick Reaction	Future Naval Capability (FNC)	Innovative Naval Prototype	Discovery and Invention (D&I)
% of Portfolio	~10	>30	~10	>40
Focus	Solving emergent fleet / force needs	Transitioning mature S&T to acquisition program of record	Demonstrating Leap-ahead technology	Expanding frontiers of knowledge in areas of naval interest
Motivation	Fleet-identified need	OPNAV-identified capability gap	Significant military advantage	General Naval needs and opportunities
Example	IED Jammer	Enhanced NULKA Payload	Integrated Topside (INTOP)	Real-time EW Effectiveness Monitor
Type of Innovation	Disruptive or sustaining.	Sustaining - makes an existing capability better	Disruptive - makes an existing capability obsolete	Disruptive or sustaining.
Time frame	1-2 years	3-5 years	4-8 years	continuing
Typical TRL entry point	TRL-4 to TRL-5	TRL-3	TRL-2 to TRL-3	TRL-0 to TRL-2
Typical TRL end point	TRL-7	TRL-6	TRL-6	TRL-3 to TRL-4
Technical Difficulty	Medium	Medium	High	High
Operational Integration Complexity	Medium	Usually straightforward	High	N/A
Approval Level to start a program	ONR Corporate	Technology Oversight Group (3-Star)	DON Corporate Board (4-Star)	ONR Department

ONR EW S&T Development Process
Annual D&I Refresh

Oct - Nov

ONR EW S&T Future Vision
- Capability gaps (OPNAV guidance, NARG's)
- Roadmaps (S&T, Acquisition)
- Emerging threats (intell reporting)
- Technology trends (to avoid surprise)

Dec - Jan

D&I BAA
- Industry
- Academia

D&I Solicitation
- NRL
- Warfare Centers
- FFRDC / UARC

February

Review White Paper Submissions
- Evaluate technical merits/innovation, Naval relevance, prior experience, cost realism
- Down-select 4-10 ($$ available)

March

EW S&T Review (Gathering) – Invitation Only

Agenda:
- Threat briefing (ONI)
- EW Requirements view (OPNAV, HQMC)
- EW Acquisition view (NAVSEA, NAVAIR, MCCDC)
- Briefings of current D&I, SBIR, FNC efforts
- Briefings of proposed D&I new starts for following FY

Actions:
- Invited reviewers advise on D&I new start selection
- Begin dialog regarding new FNC needs
- De-conflict with other service reps (Army, Air Force)

April

Select new D&I projects
- Request full proposals

Jun - Aug
- Initiate contract actions
- Prepare FM documentation

October
- Award Contracts
- Send Funding Documents

ONR Discovery & Invention
Last year: ONR BAA 09-014

Revolutionary Research . . . Relevant Results

Detect and Defeat Imaging Infrared Threats

Increase capabilities to detect and/or counter tracking, targeting or guidance systems employing Imaging Infrared (IIR) sensors.

- **Passive or active detection methods that cover all potential infrared spectral bands**
- **Infrared emitting decoys that will spectrally, temporally, and spatially mimic the infrared signatures of naval platforms with sufficient fidelity and intensity to deny the targeting and/or tracking of IIR sensors**
- **Highly efficient, compact, and multi-band infrared emitting laser sources with sufficient power to effectively jam IIR sensors**
- **Airborne obscurants that can block the infrared signature of naval platforms for a sufficient duration to negate the effective targeting and/or tracking of IIR guidance**

Detect and Defeat Multi-Mode Threats

Increase capabilities to detect and/or counter threats employing multiple modes of tracking and guidance

- **Passive or active detection methods that are not reliant upon particular mode or spectral band**
- **Decoys that mimic multiple signatures of naval platforms across the EMS with sufficient fidelity and intensity to deny the targeting and/or tracking of multi-mode sensors and guidance methods**
- **Sources of directed energy with sufficient power and spectral diversity to effectively jam multi-mode tracking and guidance systems operating across the EMS**
- **Airborne obscurants that block the full electromagnetic signature of naval platforms for sufficient duration to negate the effective targeting / tracking of multi-mode sensors and guidance methods**

ONR Discovery & Invention
ONR BAA 09-014 Funded Efforts

Revolutionary Research . . . Relevant Results

Detect and Defeat Imaging Infrared Threats

- Multi-Wavelength Laser with Broad Spectral Coverage (Daylight Solutions, Inc.)
- High-Power LWIR QC Lasers for Shipboard IRCM (AdTech Optics, Inc.)

Detect and Defeat Multi-Mode Threats

- Layered Multi-band Obscurant (Naval Research Laboratory)
- Directed Energy Defeat of Multi-Mode Threats (Naval Research Laboratory)

ONR Discovery & Invention
This year: ONR BAA 10-007

ONR BAA Announcement # ONR 10-007

- **Posted:** *1 December 2009*
- **Agency Name:** *Office of Naval Research*
- **Research Opportunity Title:** *Electronic Warfare Technology*
- **Program Name:** *Electronic Warfare Discovery & Invention (D&I)*
- **Response Dates:**
  - **White Papers:** *2 February 2010*
  - **Full Proposals:** *11 May 2010*

ONR Discovery & Invention
This year: ONR BAA 10-007

ONR 312 Electronic Warfare (EW) seeks white papers for efforts that shall develop and demonstrate technologies for the next generation components and systems in Electronic Warfare. The primary emphasis of this BAA is on technologies towards Distributed ES Concepts; Components and Architectures for Small, Unmanned/Unattended ES Systems; ES Adaptive Signal Processing; Detecting and Defeating Passive Sensing Systems; and Innovative EW Concepts.

1. **Distributed ES Concepts**

   The objective is to develop and demonstrate the capability of a spatially distributed set of ES systems to provide broader area coverage and improve naval (Navy and Marine Corps) battlespace awareness, which includes continuously monitoring all critical portions of the EMS (including the Radio Frequency (RF) Electro-Optical (EO), and InfraRed (IR) spectral bands); quickly and accurately classifying emitters and emitter functions; precisely and rapidly locating platforms, people, things, and events; and conducting accurate long term monitoring and tracking of hostile forces. Potential areas of investigation include:

   a. **Unconventional coordinated ES techniques that cooperatively increase situational awareness across a distributed battlespace;**
   b. **Network-enabled coherent ES methods;**
   c. **Data-link requirements and methodologies for distributed ES systems; and**
   d. **Efficient information management of distributed ES systems.**

2. **Components and Architectures for Small, Unmanned/Unattended ES Systems**

The objective is to provide broader area coverage for naval (Navy and Marine Corps) EW operations while increasing operational flexibility and combat efficiency and decreasing warfighter workload.

Potential areas of investigation include:

a. **Low cost ES receivers, particularly with highly-integrated and chip-scale components and sub-systems;**
b. **Wideband apertures that combine compact size with high gain for ES applications (the ability to share these apertures with EA systems to allow for multiple simultaneous receive/transmit beams is also of great interest);**
c. **Improving isolation between emitting and receiving apertures on small platforms;**
d. **Reducing size, weight, and power (SWAP) of ES components and sub-systems;**
e. **Common signal processing protocols and database techniques that support seamless information exchange between platforms; and**
f. **Electronic Warfare Battle Management (EWBM) and control of a distributed EW System of Systems (SoS).**

3. **ES Adaptive Signal Processing**

The objective is to improve the capability of naval (Navy and Marine Corps) ES systems in detecting and processing signals in a complex EM environment. Specific challenges to achieving this objective include the increasing density and diversity of signals that span broad frequency bands of the EMS. Potential areas of investigation include:

a. **Deinterleaving (i.e. isolating and associating signals from a single emitter in a complex signal environment containing two or more emitters) arbitrary waveforms;**
b. **Detecting and identifying weak signals of interest (SOI) in the presence of strong interfering signals with similar characteristics (frequency, modulation);**
c. **Extracting signal parameter to uniquely identify emitters with arbitrary waveforms;**
d. **Unconventional methods for passively locating, geo-locating, or precisely determining range to signal emitters, particularly from a single ES platform/sensor; and**
e. **ES digital beam-forming to achieve improved signal sensitivity, angle accuracy/tracking and "nulling" of interfering signals.**

4. **Detect and Defeat Passive Sensing Systems**

The objective is to provide naval (Navy and Marine Corps) forces capabilities to detect and counter passive detection technologies which do not rely on RF or EO/IR emissions from the controlling platform. Examples of these technologies include Passive Coherent Location (PCL) systems, Anti-Radiation Homing (ARH) sensors, Infrared Search and Track (IRST) systems, adversary ES systems, and acoustic detection sensors. Potential areas of investigation include:

a. **Remotely detecting and identifying passive detection systems;**
b. **Obscuration waveforms and techniques to prevent passive sensing systems from operating effectively, preferably without alerting the sensor operator to the disruption; and**
c. **Deception techniques, including the generation and control of realistic false targets.**

5. **Innovative EW Concepts**

   The objective is to explore truly innovative concepts in the EW areas of ES, EA, or EP, which could fundamentally change the way naval (Navy and Marine Corps) forces conduct EW Operations.

ONR Discovery & Invention
ONR BAA 10-007 Award Info

- ONR anticipates a budget of $3,000,000.00 per annum for the period FY11-FY13 for this program. ONR plans to fund individual awards of $100,000.00 to $750,000.00 per year, using Discovery and Invention (D&I) (Budget Category 6.2) funds. However, lower and higher cost proposals will be considered.
- The period of performance for projects may be from one to three years. Projects will have an estimated start date of 04 January 2011, subject to date of final award and availability of new fiscal year funds.
- Some portion of this budget may fund research requests in this program area received from Government entities outside of this BAA.

ONR Discovery & Invention
ONR BAA 10-007 Eligibility

- All responsible sources from academia and industry may submit proposals under this BAA.
- There will be no set asides for Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs).
- Some topics cover export controlled technologies. Research in these areas is limited to "U.S. persons" as defined in the International Traffic in Arms Regulations (ITAR) - 22 CFR § 1201.1 et seq.

ONR Discovery & Invention
ONR BAA 10-007 Eligibility

- **Navy laboratories and warfare centers, as well as other Department of Defense and civilian agency laboratories, and Federally Funded Research & Development Centers (FFRDCs), including Department of Energy National Laboratories, are not eligible to receive awards under this BAA and should not directly submit either white papers or full proposals in response to this BAA.**
- **NOTE: Responses from these organizations are being solicited separately, though with the same guidance regarding research areas of interest, white paper format and deadlines.**

ONR Discovery & Invention
ONR BAA 10-007 Eligibility

- **Bottom line: All civilian, industry, government, and military organizations are encouraged to submit white paper responses to the five ONR EW research areas as solicited.**
- **Once a proposed effort has been chosen for funding, ONR will determine the best method to proceed.**
- **If a contract or grant is required, then the guidance, clauses, and limitations of this BAA are applicable.**
- **If other means are more appropriate (direct funds transfer to DoD laboratory or warfare center, use of existing contract vehicle, etc.) then separate guidance and limitations may apply.**

ONR Discovery & Invention
ONR BAA 10-007 White Papers

- **The due date for white papers is no later than 4:00 PM (EST) on Tuesday, 2 February 2010. White papers received after the published due date and time are not eligible to participate in the remaining Full Proposal submission process and are not eligible for Fiscal Year (FY) 2011 funding. Each white paper should state that it is submitted in response to this BAA and cite the particular sub-section of the Research Opportunity Description that the white paper is primarily addressing.**
- **The only acceptable method for submission of white papers sent in response to the BAA is via electronic mail (email) to *312_EC@onr.navy.mil.***

White Paper Format

- Paper Size – 8.5 x 11 inch paper
- Margins – 1” inch
- Spacing – single spaced
- Font – Times New Roman, 12 point
- Number of Pages – No more than two (2) pages (excluding cover page, resumes, bibliographies, and table of contents). White Papers exceeding the page limit may not be evaluated.
- Format – one (1) electronic copy in Adobe PDF delivered by email.

White Paper Content

Cover Page

- BAA number
- Proposed title
- Technical points of contact (telephone and facsimile number e-mail address

Technical Content

White papers must address the following without exceeding the two (2) page limit:

1. Project Manager and/or Principal Investigator
2. Relevance to BAA Research Opportunity Description and specific sub-section being addressed
3. Technical Objective
4. Technical Approach
5. Deliverables
6. Recent technical breakthroughs that will reduce risk
7. Funding plan showing requested funding per fiscal year

ONR Discovery & Invention
ONR BAA 10-007 Schedule

Revolutionary Research . . . Relevant Results

The following schedule has been established to facilitate the submission of white papers and their follow-on review and possible selection for FY 2011 funding.

02 Feb 2010	White paper responses to EW research areas due to ONR
19 Feb 2010	ONR notify selected parties to prepare briefing for EW Review
08 Mar 2010	Quad Chart due to ONR
11 Mar 2010	Briefings due to ONR
18 Mar 2010	Oral presentations at the ONR EW S&T Review
26 Mar 2010	ONR notify selected parties to prepare/submit full proposal
11 May 2010	Full technical/cost proposal due to ONR
06 Jun 2010	ONR notify selected parties of intent to fund efforts
31 Dec 2010	ONR issues awards

ONR Discovery & Invention

ONR BAA 10-007 Evaluation Criteria

1. Overall scientific and technical merits of the submission
   a. The degree of innovation
   b. The soundness of technical concept
   c. The Offeror's awareness of the state of the art and understanding of the scope of the problem and the technical effort needed to address it

2. The qualifications, capabilities and experience of the proposed Principal Investigator (PI), team leader and key personnel who are critical in achieving the proposal objectives
   a. The Offeror's experience in relevant efforts with similar resources
   b. The ability to manage the proposed effort

3. The Offeror's capabilities, related experience, facilities, techniques or unique combinations of these which are integral factors for achieving the proposal objectives

4. Naval relevance, transition potential and anticipated contributions of the proposed technology to Electronic Warfare operations.

5. The realism of the proposed cost and availability of funds

ONR Discovery & Invention
ONR BAA 10-007 Deliverables

The following is a sample of reporting deliverables that could be required under a research effort. The following deliverables, primarily in contractor format, are anticipated as necessary. However, specific deliverables should be proposed by each Offeror and finalized with the contracting agent:

- **Detailed Technical Data**
- **Technical and Financial Progress Reports**
- **Presentation Material(s)**
- **Other Documentation or Reports, as required**
- **Final Report**

Research performed under contracts may also include the delivery of software, prototypes, and other hardware deliverables.

ONR Discovery & Invention
ONR BAA 10-007 Facilities / GFE

- Offerors are expected to provide all facilities (equipment and/or real property) necessary for the performance of the proposed effort. Any direct charge of facilities, not including deliverable items, must be specifically identified in the Offeror's proposal and approved by the Government prior to purchase.
- Any request to use Government owned facilities or Government Furnished Equipment (GFE) must be included in the Offeror's proposal and approved in advance by the cognizant Government official. After contract award, requests to use Government integration, test, and experiment facilities will be considered on a case by case basis based on availability and justification of need.

ONR Discovery & Invention
ONR BAA 10-007 Classification

- All white papers and proposals are expected to be unclassified. However, confidential/classified white papers and proposals are permitted.
- In order to facilitate intra-program collaboration and technology transfer, the Government will attempt to enable awardees to work at the unclassified level to the maximum extent possible.
- If awardees use unclassified data in their deliveries and demonstrations regarding a potentially classified project, they should use methods and conventions consistent with those used in classified environments. Such conventions will permit the various subsystems and the final system to be more adaptable in accommodating classified data in the transition system.

ONR Discovery & Invention
ONR BAA 10-007 Summary

Revolutionary Research . . . Relevant Results

Things ONR will look for in white paper submissions

- An understanding of Electronic Warfare principles and needs
- Innovative applications of cutting edge science and technology to address Electronic Warfare priorities
- Efforts that focus on Electronic Support (ES) concentrating on distributed concepts, small unmanned component technology, adaptive signal processing, defeat of passive systems and innovative EW concepts
- Clear statements of the effort's objectives, applicability to Electronic Warfare, anticipated end state, and deliverables.
- Clear and concise schedule including intermediate milestones to objectively measure progress toward goals
- Funding request broken out by performing organization and Government fiscal year.

Things that will cause ONR to reject white papers

- **Proposed effort is <u>not</u> Electronic Warfare**
  - Electronics or components (outside an EW system/sub-system)
  - Communications or navigation systems (counter comms/nav is okay)
  - Intel, reconn, surveillance (ISR) systems (counter ISR is okay)
- **Proposed effort is <u>not</u> Discovery & Invention (6.2)**
  - Off-the-shelf solutions without any clear innovation
  - Demonstrations and field testing of existing systems or components to show military application
- **Reliance on GFE/GFI without prior arrangement/agreement**
- **Poor program planning**
  - No explanation or understanding of underlying S&T
  - Scattershot approaches with little methodology
  - Lack of intermediate milestones to gauge progress
  - No substantiation for requested budget

ONR Discovery & Invention
ONR BAA 10-007 Final Comments

- ONR 312 EW will not entertain requests for individual meetings with industry representatives to discuss potential white paper submissions
  - No pre-selection of ideas or concepts
  - If in doubt, write the white paper and submit it
- This is your opportunity to ask questions
  - Written questions are permitted, but all questions and answers will be posted to the ONR BAA website
- White paper questions of a business nature can be submitted by e-mail through Tuesday, 19 January 2010
  - All questions and answers will be posted to the ONR BAA website

ONR Discovery & Invention
Questions From Previous BAA (1)

Question: Can a University Affiliated Research Center (UARC) submit white papers?

Answer: The BAA excludes submissions from Federally Funded Research & Development Centers (FFRDCs), which could include UARCs. However, a UARC can still submit a white paper in response to the internal (Government laboratory and warfare centers) solicitation. The same white paper guidance and deadlines apply to both, so it really makes no difference to the white paper selection process.

Question: Is it feasible for industry to work in conjunction with a Navy Lab?

Answer: Yes, but ONR will not act as a facilitator in establishing a teaming relationship.

Question: If industry teamed with a Navy lab, what would be the process for funding the team members?

Answer: The preferred method would be for ONR to split the funding between a direct contract to the industry partner and a separate funding transfer to the lab. If a contract already exists between the industry partner and the lab then that could be used as a vehicle, but would need to be carefully managed. The program plan in the proposal should clearly indicate which method would be advised or preferred.

ONR Discovery & Invention
Questions From Previous BAA (2)

Question: Does industry compete with the Navy labs for the same resources?

Answer: Yes. There is no set-aside for either industry or Navy labs; all submissions are considered solely on their own merits in accordance with the evaluation criteria.

Question: Will ONR request more full proposals to be submitted than there are resources to fund?

Answer: No, ONR will request full proposals from only those entities whose efforts they intend to fund starting in fiscal year 2010. However, if the final approved DoD budget for fiscal year 2010 includes less funding for ONR EW D&I efforts than is currently anticipated, it may be necessary to limit the awards to match the funding available.

Question: Will the briefing slides shown today be posted on the ONR website?

Answer: Yes.

Question: What happens to white papers that are not selected for further consideration? Is the information destroyed?

Answer: Yes.

ONR Discovery & Invention
Questions From Previous BAA (3)

Question: Regarding program funding, is there a profile that is considered more desirable than others?

Answer: Not necessarily, but the profile should make sense with respect to the effort being proposed. One would normally not expect the funding to be front-loaded but rather spread out over the life of the program, possibly with a slightly higher profile in the final year as testing and other more costly events occur. But whatever profile is proposed it must be justified by the program plan.

Question: Would you have any interest in receiving white papers that are outside the area of Electronic Warfare but still of great interest to the U.S. Navy?

Answer: No, the focus of this BAA is on Electronic Warfare so other responses would be inappropriate. For other topics of interest to the U.S. Navy, BAA ONR 10-001 may be more appropriate. However, you are encouraged to seek out the appropriate Program Officer within ONR that handles the technology area of interest and discuss the matter with him or her before submitting any white paper or proposal in response to BAA ONR 10-001. Consult the ONR website to determine the best point of contact.

ONR Discovery & Invention

ONR BAA 10-0007 Points of Contact

Technical

Dr. Peter Craig
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Questions?

Revolutionary Research . . . Relevant Results

ONR Discovery & Invention
This year: ONR BAA 10-007

Revolutionary Research . . . Relevant Results

Distributed ES Concepts
Investigate concept of a spatially distributed set of ES systems to provide broader area coverage and improve naval battlespace awareness:
- Unconventional coordinated ES techniques that cooperatively increase situational awareness across a distributed battlespace
- Network-enabled coherent ES methods
- Data-link requirements and methodologies for distributed ES systems
- Efficient information management of distributed ES systems

Components of Unmanned ES Systems
Investigate components and architectures that will support a spatially dispersed array of ES systems, many of which will be on unmanned vehicles or in unattended locations:
- Low cost ES receivers
- Wideband, compact, high gain ES apertures
- Improving transmitter/receiver isolation
- Reduced SWAP ES components/sub-systems
- Methods of seamless ES data exchange
- Electronic Warfare Battle Management (EWBM) and control of distributed EW assets

ES Adaptive Signal Processing
Investigate methods to improve ES systems in detecting and processing signals in a complex (dense background, broadband) EM environment:
- Deinterleaving arbitrary waveforms;
- Weak signals detection and ID in the presence of strong interfering signals
- Signal parameter extraction for unique ID
- Passive, single point emitter location/ranging
- ES digital beam-forming

Detect/Defeat Passive Sensing Systems
Investigate capabilities to detect and counter passive detection technologies, including RF Passive Coherent Location (PCL), Anti-Radiation Homing (ARH), Infrared Search & Track (IRST):
- Methods to remotely detect and ID passive detection systems
- Obscuration waveforms and techniques
- Deception techniques including false target generation and control