ONR Technology Strategy: Today and Tomorrow for PEO-IWS

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Revolutionary Research . . . Relevant Results

OFFICE OF NAVAL RESEARCH

Agenda

- **Opening thoughts**
- **ONR 101**
- **Funding Levels and Opportunities**
- **Code 31, C4ISR:**
  - Electronic Warfare (EW)
  - Integrated Topside (InTop) Innovative Naval Prototype
- **Code 33, Ocean Battlespace Sensing:**
  - Asymmetric Warfare (ASW)
- **Final thoughts**
- **Save the Date**

Bottom Line Up Front: ONR & PEO IWS

- **ONR and PEO IWS must be tightly coupled**
  - ONR develops S&T, PEO delivers Programs of Record (PoR)
- **ONR & PEO IWS have a great transition record (82%)**
- **Some great relationships/success stories, working to make them all great**
- **Key is communication and trust**
- **Processes (FNC & INP) formalize communication but trust is important**
- **Typically ONR is "one deep". There is usually only one (possibly two) Program Managers in any research area. We'll look at a few.**

You Want the Truth?

Bottom Line Up Front: ONR & PEO IWS

- **Great people at ONR and IWS are required for a chance at success**

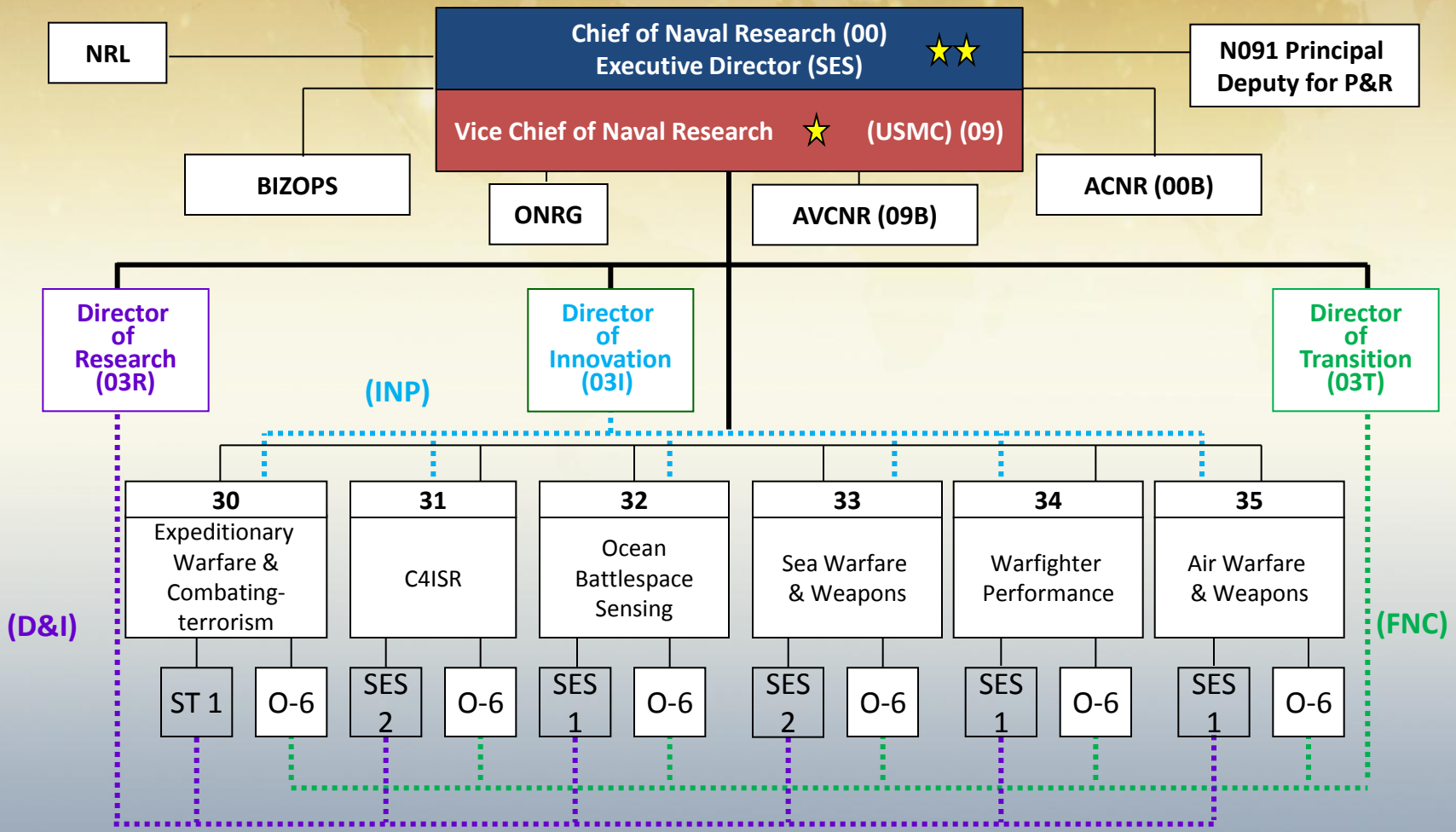
- **Details matter but communication is vital**

Failure to Communicate

"The effort will begin in FY08 and continue with the initial demonstration of the integrated sensor occurring in the second quarter of FY10 followed by complete system testing in FY11."

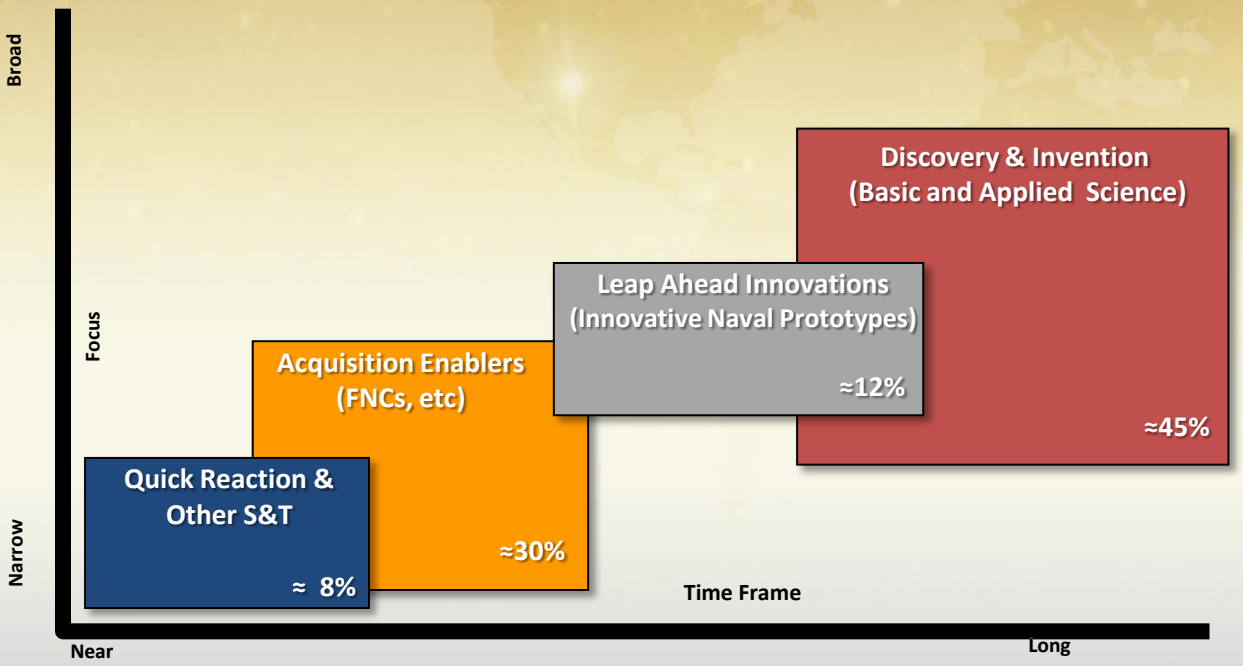
"This development will take place of a four-year period culminating with a system testing in FY11, product transiton/product orders in FY12, and introduction into the Fleet in FY13."

ONR Organization



Naval Science and Technology

Revolutionary Research . . . Relevant Results



Focus Areas:

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

Science, Technology, Engineering & Math (STEM)

Quick Reaction

Fleet Driven Material Solutions

1-2 yrs

Acquisition Enablers

Evolutionary POR component improvements

3-5 yrs

Leap Ahead Innovations

Disruptive Technologies

5-7 yrs

Discovery & Invention

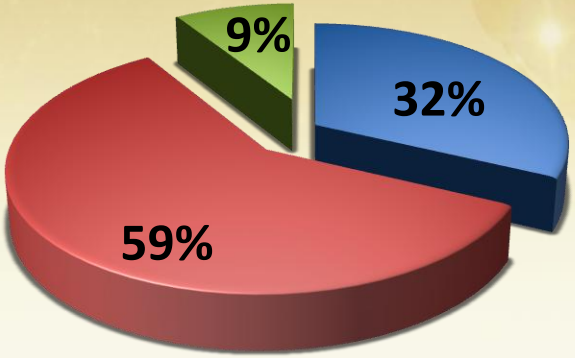
Fundamental Science focused on naval problems

5-20 yrs

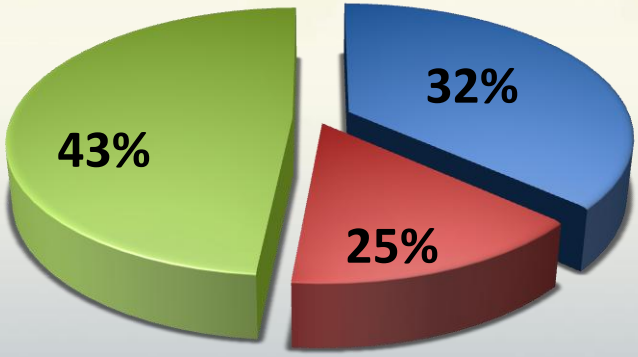
ONR Investment Balance

Revolutionary Research . . . Relevant Results

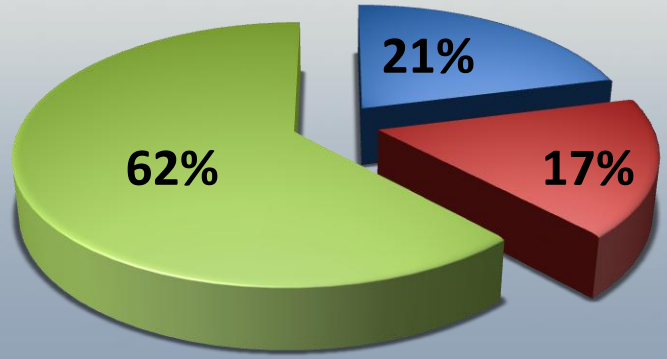
6.1: Basic Research



6.2: Applied Research



6.3: Advanced Tech Development



Naval Labs and Centers
University & Nonprofit
Industry

Obligations During FY10

Director of Research

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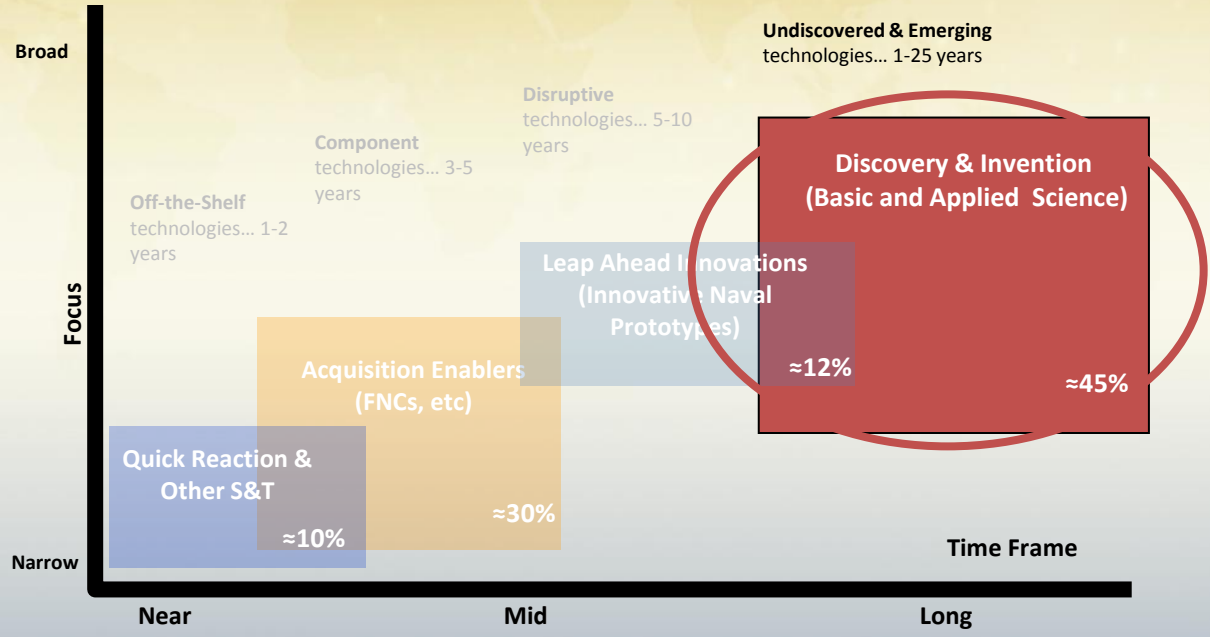

- **6.1-6.2 funding**
- **Grants, Academia, UARCS, Labs**

Director of Transition

Dr. Joseph Lawrence

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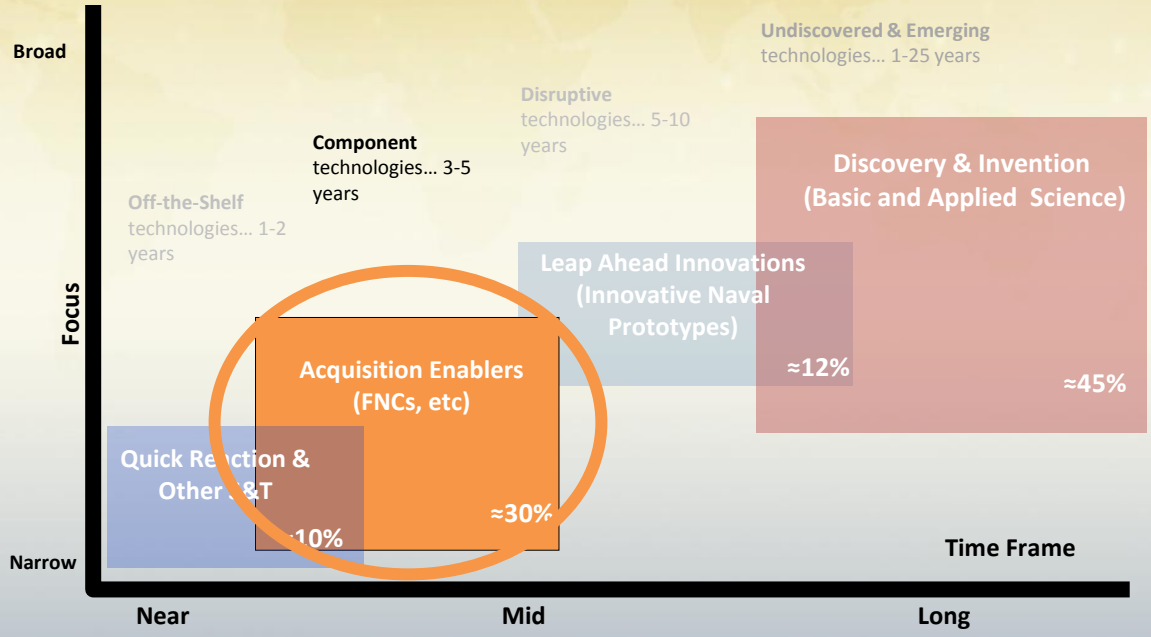

- **FNC, PEOs, Industry**
- **ManTech**
- **SBIR**

Director of Innovation

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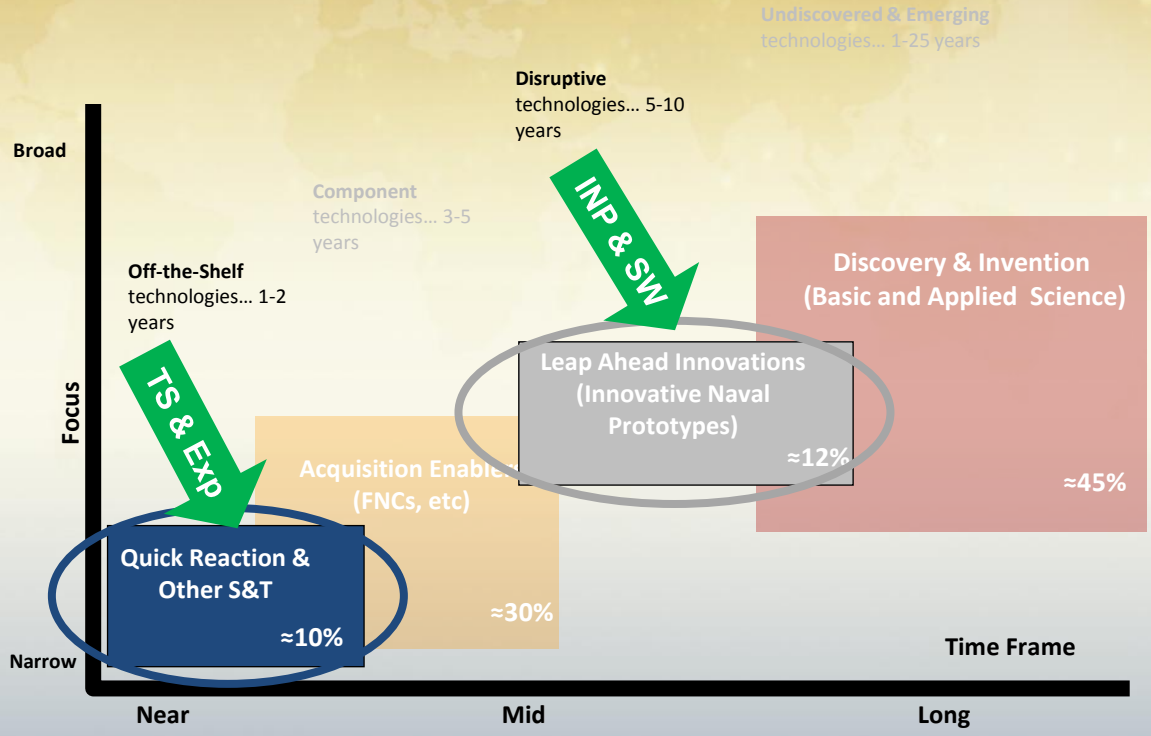

- **INPs – PEO, Industry, Labs**
- **SwampWorks – COCOMs, Labs**
- **TechSolutions – Sailor, Marines**

03I Contact Information

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Innovative Naval Prototypes (INPs)

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ONR Business Processes

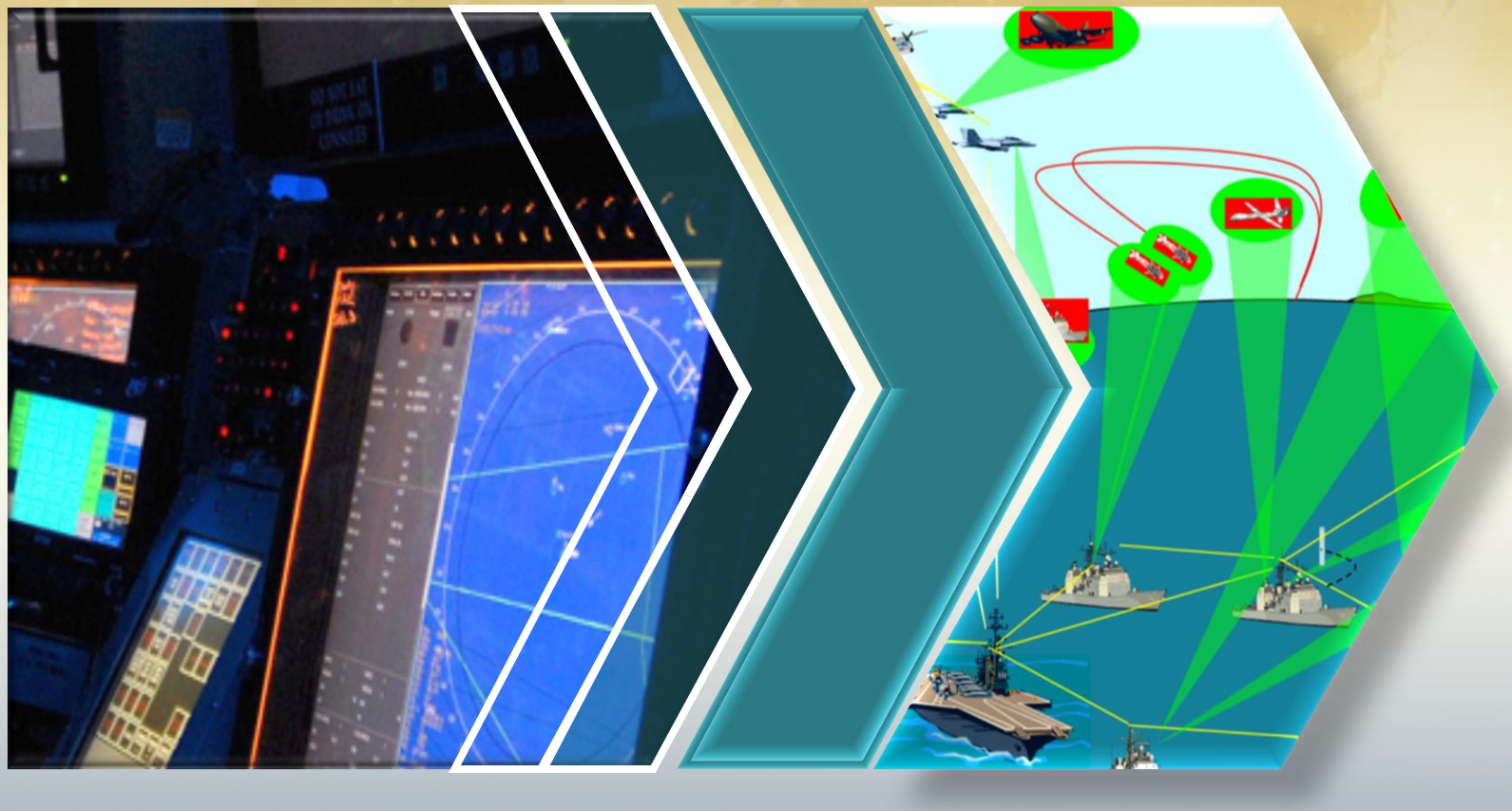
- **More than 80% of ONR-sponsored S&T is awarded to external performers in academia, industry and the NRE:**
  - Efficient and effective business processes are vital to achieving S&T objectives

- **Types of business operations:**
  - Grant and contract administration
  - Contracting activities and policy
  - Acquisition and research business policy
  - Information and statistical reporting processes
  - Stakeholder communication and engagement

Funding Opportunities

- Visit our website: ***www.onr.navy.mil/contracts-grants.aspx***
- Funding Opportunities
  - **Broad Agency Announcements (BAAs)**
    - **FOA12-002:** Fiscal Year 2012 Funding Opportunity Announcement (FOA) for Navy and Marine Corps STEM Programs
    - **12-001:** Long-Range BAA for Navy and Marine S&T
    - **11-030:** Fiscal Year 2012 ONR Young Investigator Program
    - **11-032:** Department of the Navy Rapid Innovation Fund
    - **11-031:** Simulation Toolset for Analysis of Mission, Personnel Systems (STAMPS)
    - **11-027:** Navigation and Timekeeping Technology
  - **Requests for Information (RFIs)**
  - **Requests for Proposals (RFPs)**
  - **Requests for Quotes (RFQs)**
  - **Special Notices**
    - **11-SN-0025:** DARPA/ONR Field-Reversible Thermal Connector (RevCon Challenge)
    - **12-SN-0001:** Energetics Materials Program (2012 ONR Opportunity)

Code 31: C4ISR
ONR Electronic Warfare (EW) S&T



ONR EW S&T Points of Contact

EW Program Manager

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EW LO/CLO Liaison

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ONR EW FNC Products
Surface EW Product Transition Alignment

Revolutionary Research . . . Relevant Results

FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17

EO/IR ES/EA

Shipboard EO/IR (SHIELDS)

EO/IR ES/EA Technology Demonstrator Test Bed → SEWIP Block 4 (EOIRCM)

EO/MWIR EA → SHIELDS Plus

LWIR EA
EO/IR ES

RF ES/EA

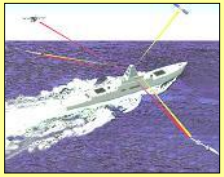
Advanced Techniques Generator (ATG) → SEWIP Block 3 (EA)

EA Architect

EA Counter Adv Threats

ATG → Integrated Topside INP - EA

Solid-State Transmit Array



Enhanced SEWIP Transmitter

MMIC Power Amplifiers

BLQ10

SEWIP Block 2 (ES)

SEWIP RCIP

LPI Radar Detection

ES Architect

Onboard / Off-Board EA Collaboration

MFEW - ES

Advanced Off-Board EW

Hi-Gain ES

EW Payload

Off-Board EA Modular Payload

SEWIP Block 1A/1B1/1B2

TEWM

Next Generation CM for ASMD

Hi-Gain / Hi-Sense (HGHS)

ES - LPI Detection

Enhanced Nulka Payload

MMIC Power Amplifiers

Solid-State Nulka Payload

ONR/DARPA WBG (GaN)

Enhanced Nulka Decoy

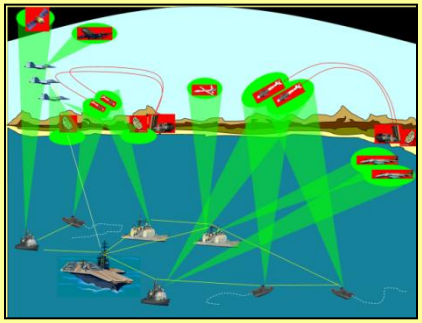
ONR FNC | ONR INP | IWS2 | Other

ONR EW FNC Products
Surface EW Product Transition Alignment

Revolutionary Research . . . Relevant Results

FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17

Networked ES/EA/EP



Advanced Off-Board EW

Tactical Data Link

Off-Board EA Modular Payload

Demo Payloads

EW Payloads & Control Architecture

SEWIP RCIP

Onboard / Off-Board EA Collaboration

EWBM Architecture

HK/SK Integration (Single Platform)

Integrated Distributed EW INP

EW Battle Management for Surf Def

Tactical Data Link

Integrated Topside INP - TDL

Modular Off-Board Coordinated EA

Modular EA Payload

EA Counter Adv Threats

TEWM

Next Generation CM for ASMD

Payloads & Collaborative Techniques

HK/SK Integration (Multi Platform)

Integ Active & Electronic Def

HK/SK Coordination Tech/Algorithms

Ext Distrib Wep Coordination

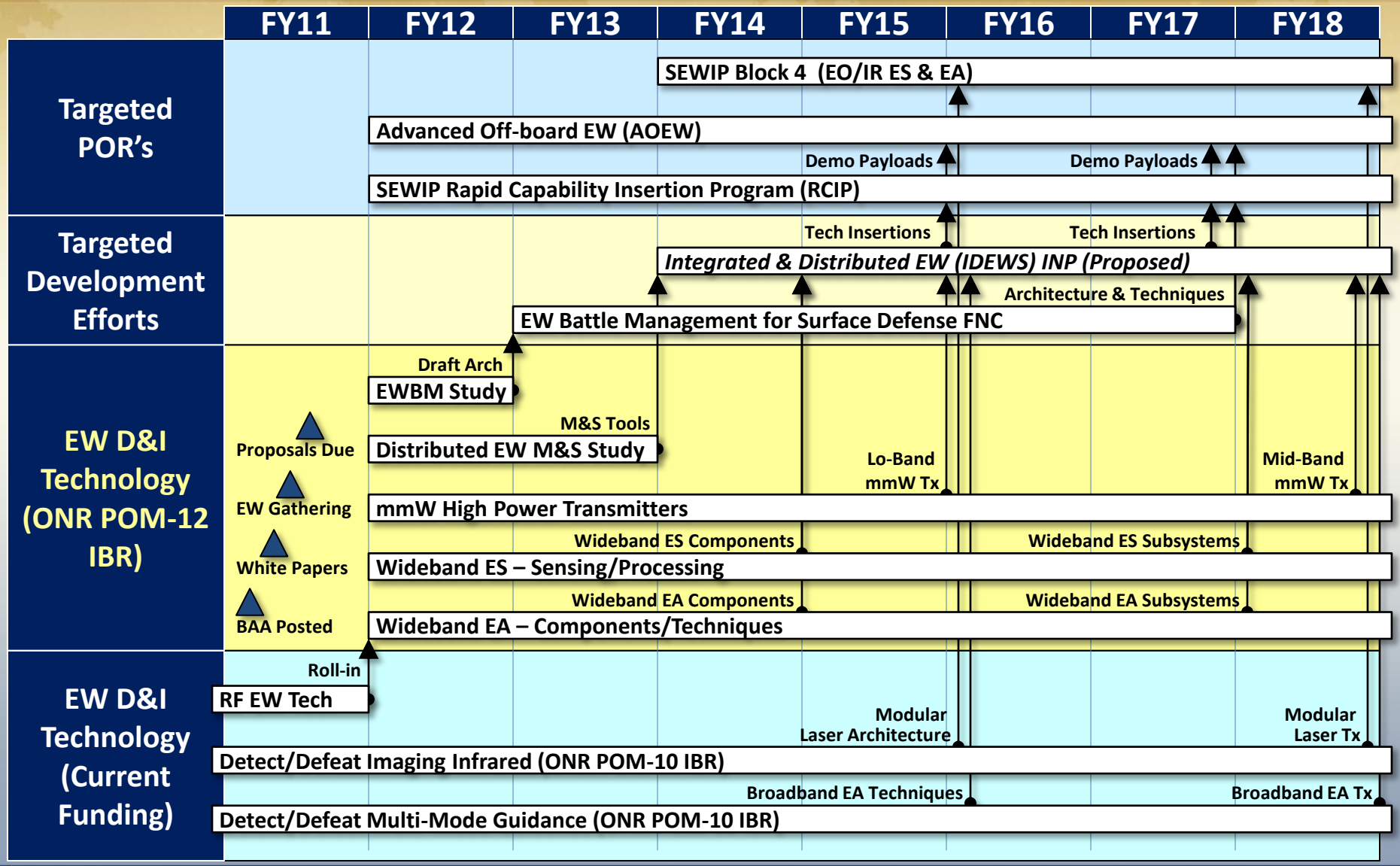
Hardkill Coordination

Combat Coord Projects (DSC, DWC)

PMR51 | Code 31 | ONR INP | IWS2

D&I Plan for Surface EW
Applied Research for Enhanced EW Capabilities

Revolutionary Research . . . Relevant Results



Code 31: C4ISR
Integrated Topside (InTop) INP

Point of Contact:

Betsy DeLong,Code 31

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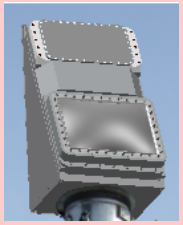
InTop Prototypes

Revolutionary Research . . . Relevant Results

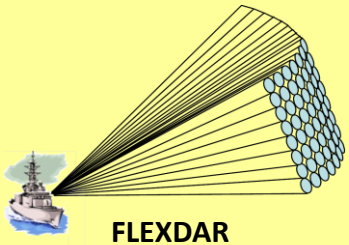


Consolidated SatCom for Submarines and Ships

Primary functions:
- All (ex. UHF) SatCom
- 4 to 8+ Simul. Links

Secondary Functions:
- IO / EW Support
- LOS Comm Augment

Sub SATCOM - TO 0002
7-22 GHz Rx main focus
TRL-6 goal FY-13
Transition to AdvHDR/ for all Submarines

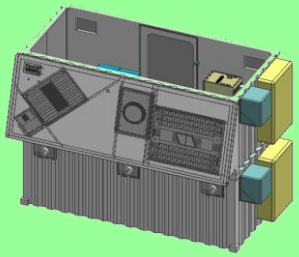


FLEXDAR
Multi-Static Flexible Digital Array Radar

Primary functions:
- S Band Radar
- Volume Search
- Precision Track
- Missile Data Link
- Air Traffic Control
- In-Band ES/EA/EP

Secondary Functions:
- Weather Surveillance
- Navigation
- IO/EW Support

FLEXDAR – TO 000X
TRL-6 goal FY-15/16



Multibeam EW/IO/Comm

Primary functions:
- X thru Ka band EA
- EA Support (Rx)
- Hawklink, CDL-S
- Network Links (HNW)
- SEI/ES Support
- IO Support

Secondary Functions:
- SATCOM Augment

EW/IO/Comms – TO 0003
TRL-6 goal FY-12
Transition to SEWIP Block 3

MFEW ADM (complete)

Primary functions:
- HPOI Acq/PDF ESM
- ASMD
- Sit. Awareness
- SEI Support

Secondary Functions:
- EA Support
- IO Support

MFEW FNC
TRL-6 FY-09
Transitioned to SEWIP Block 2

Transitioned to SEWIP Block 2

Consolidated Low Band IO/Comm/EW

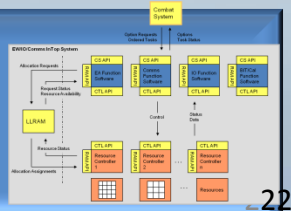
Primary functions:
- VHF to C Band Comm
- IO / SSEE Support
- EW Support

Secondary Functions:
- AIS
- JTIDS
- Other Omni Comm

LB IO/Comms – TO 000X
TRL-6 goal FY-14/16

Resource Allocation Manager (RAM) TO 0004

Handles resource allocation, prioritization, BIT status (re-allocates in case of failures), calibration & frequency de-confliction to optimize platform and/or battlegroup RF performance



InTop S&T Roadmap

(Work in Progress)

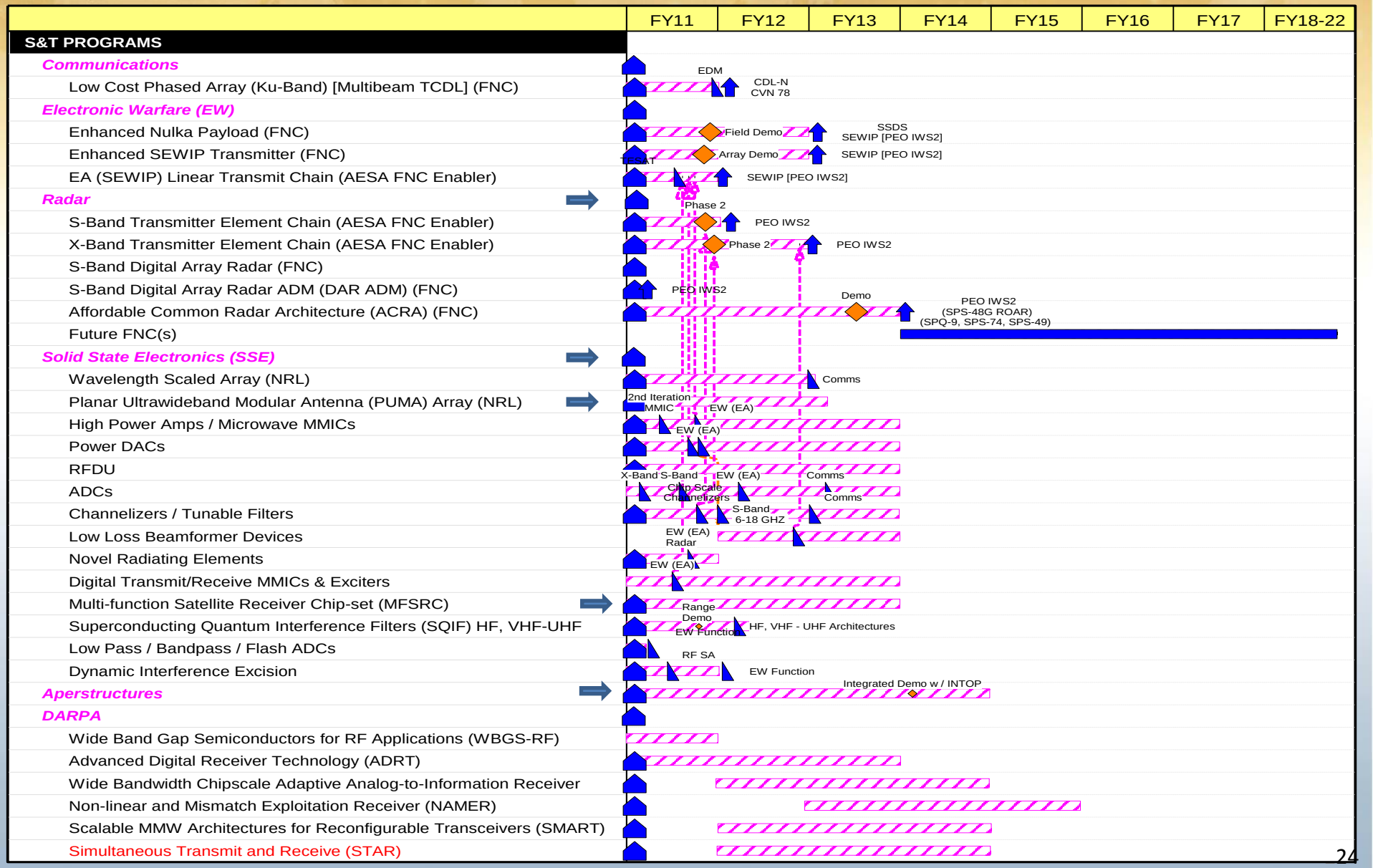
Revolutionary Research . . . Relevant Results

	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18-22
PLATFORMS								
CVN 78 Class					CVN 78 Dlvd		CVN 78 PSA	CVN 79 Dlvd
CVN 74 (RCOH)								RCOH
CVN 75 (RCOH)								RCOH
DDG 122 (Flt III)						122		
DDG 123-4 (Flt III)						123		124
DDG 125 (Flt III)							125	
DDG 126-7 (Flt III)							126	127
DDG 128 (Flt III)								128
DDG 1000			Zumwalt Dlvd		IOC			
DDG 1001								
DDG 1002								
Submarines			779	780	781	782	783	
PROGRAM OF RECORD (POR)								
Advanced Capability Build (ACB)							ACB 16	
SEWIP BLK 3				MS B				To CVN 78
FLEXDAR								
ADV HDR								
Surface SATCOM Improvement								
Low Band Comms / IO								
SSEE Inc. F Upgrade / SSEE Mods				FRP				
NTCDL								
INTEGRATED TOPSIDE (INTOP) INP								
Advanced Development Models (ADMs)								
EW / IO / Comms			Option 1 Award	SEWIP Blk 3	ADM	Full Demo		To Ships
Sub SATCOM				CTE Demo				
Surface SATCOM			Option One Award	ADM to NUWC		To Subs		
Low Band Comms / IO								To Ships
Flexible Expandable Digital Array Radar							TRL6 ADM	To Carriers
Resource Allocation Manager						TRL6 ADM		To Carriers
Integration & Testing (NRL CBD TB)							TRL6 ADM	
Integration & Testing (NUWC)			CA		V 1			
					ADM Test			
				ADM Test				

Combination of existing and potential future PORs

InTop S&T Roadmap
(Continually Updated)

Revolutionary Research . . . Relevant Results



Code 32: Ocean Battlespace Sensing
ONR Asymmetric Warfare (ASW) S&T

Revolutionary Research . . . Relevant Results

ONR ASW S&T Points of Contact

ONR Points of Contact:

- **FNC Programs**
  - LASW: Dr. Dave Johnson
    - *dave.h.johnson@navy.mil*

- **INP Programs**
  - PLUS: Dr. Terri Paluszkiewicz
    - *terri.paluszkiewicz@navy.mil*
  - LDUUV: Mr. Dan Deitz
    - *daniel.deitz@navy.mil*

- **D&I Programs**
  - ASW: CDR Dan Eleuterio
    - *daniel.eleuterio@navy.mil*

FNC Programs

ASW FNC Programs in Execution:

- **High Fidelity Sonar Operator Training**
  - SQQ-89 A(V)15 SAST program
- **High Fidelity ASW Commander Training**
  - CV/TSC program
- **Vector Sensor Towed Array**
  - TB-29 reliability/replacement program
- **Vector Sensor Towed Array Signal Processing**
  - BQQ-10 APB process
- **Active Sonar Automation Project**
  - SQQ-89 A(V)15 ACB process
- **Point of Contact**
  - Dr. David Johnson, Code 32ASW
    - *dave.h.johnson@navy.mil*

PEO IWS 5.0 (Undersea Systems) S&T Program Summary

S&T Initiatives			
	Near	Mid	Far
Theater-Wide Fusion/ Situational Awareness			
DCL/Signal Processing & Automation	• **Active Sonar Automation Technology Project (EC)** • On-going 6.1 and 6.2 Research (D and I) • Advanced Processing Applications for Vector Sensor Arrays • Ultra-Sensitive Energy Detection: Algorithms and Implementation on Advanced Multicore Processors • Multi-Scale Decision Modeling in Complex Systems	• Next Generation Contact Management • **Active Sonar Automation Technology Project (EC)** • On-going 6.1 and 6.2 Research (D and I) • Distributed Optimal Control Approach to Managing Risk and Uncertainty in Multi-Agent Systems • Underwater Tracking	• **Passive & Active Sonar Automation Projects** • DNS for ASW Surveillance • Next Generation Contact Management • On-going 6.1 and 6.2 Research (D and I)

PEO IWS 5.0 (Undersea Systems) S&T Program Summary

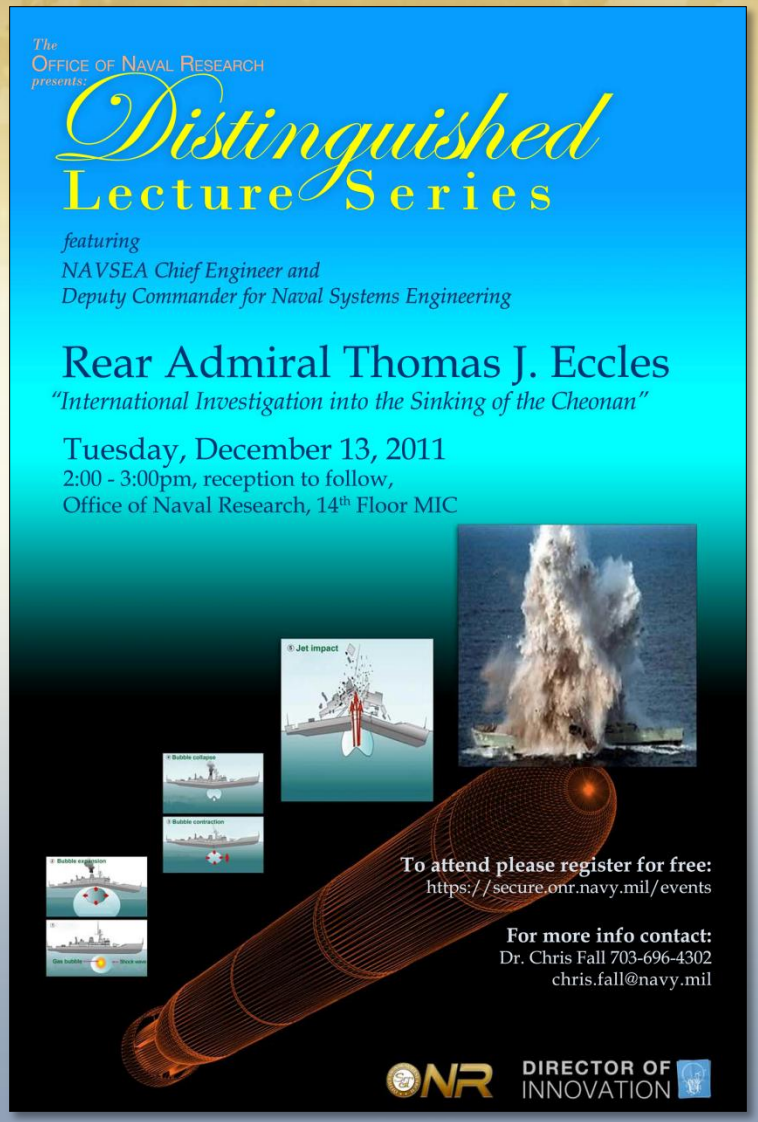
S&T Initiatives			
	Near	Mid	Far
Sensors	• **Vector Sensor Towed Array Technology (EC)** • Seaweb marine Sensor Networks • Glider Acoustic Data Collection System • Development of Vector Sensors for Towed Array Applications • ARAP • Compact Low Frequency Sound Sources • Endeavors (COSINE) • Non-Line-Of-Sight (NLOS) Underwater Optical Imaging • Non-Traditional Optical Sensor	• **Vector Sensor Towed Array Technology (EC)** • Distributed Netted Systems • Fiber Optics Shape Sensing (FOSS) • Intrinsic Gradiometer, Spin Precession Laser Remote and Magnito-Electric Magnetometer Projects • Electroacoustic and Magnitostrictive Transducer Modeling, Development, Technologies and Applications • Domain Engineering: Galfenol and PMN-xPT • Opto-Acoustics	• Distributed Netted Systems Project • Augmented Reliable Acoustic Path • Fabrication of New Biopolymer-Based Piezoelectric Films and Fibers • Biologically Inspired Autonomous Sensor Design with Smart Materials • Shear Transducer • Coherent Optical Sensing in Naval

PEO IWS 5.0 (Undersea Systems) S&T Program Summary

S&T Initiatives			
	Near	Mid	Far
Command Control & Communication & Displays	• Video Sensor Triage: Information Delivery Prospects • **Seaweb**	• Adaptive, RobusT, and Sustainable Networking for Undersea Distributed Sensor Systems • **Seaweb**	• ASW Mission Modules for LDUUV • **Opto-Acoustic Comms** • **Long-Range Comms**
Deployment Power Packaging, Flops and Data Recording	• Structural Magnetostrictive Alloys • Thermal Control of High Power Transducers and Arrays • CMX Hybrid Transducer/Amplifier	• Small Magnetic Generator for Vibration Energy Harvesting • Optically Transparent Self-Cleaning Coatings	• DNS for ASW Surveillance
Training	• **HiFAST Command & HiFAST Operator Training**	• **HiFAST Command & HiFAST Operator Training**	
Extended Range ASW Engagement	• Sensor and Communications Research for Undersea Warfare	• Non-linear Modeling of Acoustic Propagation in the Ocean	

Save the Date

- **Tuesday, December 13, 2011**
- **Distinguished Lecture Series featuring Rear Admiral Thomas J. Eccles**
- **“International Investigation into the Sinking of the Cheonan”**
- **ONR MIC (14th Floor)**
  875 N. Randolph Road
  Arlington, VA 22203
- **Pentagon/NCR Badge**



Thoughts

- **Transition IS a contact sport**
- **We get graded everyday**
- **ONR is only as good as it's last engagement.**
  - **We are a people-centric organization for better or for worse**
- **How are we doing?**

Contact Information

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