



**Preparing for the future....
Never forgetting the past!**

**16th Annual Expeditionary Warfare
Conference
“Integrating Future and Present
Capabilities”
ONR/Advance Technology**

Presented by
Mr. George W. Solhan, SES
Deputy Chief of Naval Research
26 October 2011

**Expeditionary
Maneuver Warfare
& Combating Terrorism
S&T Department**

Code 30

DEVELOPING FUTURE NAVAL COMBAT CAPABILITIES


USMC USN

SMALL UNIT EXCELLENCE
LETHALITY, SUSTAINMENT,
HUMAN PERFORMANCE, AND
COMBAT LOAD REDUCTION
TECHNOLOGIES FOR NAVAL
WARRIORS

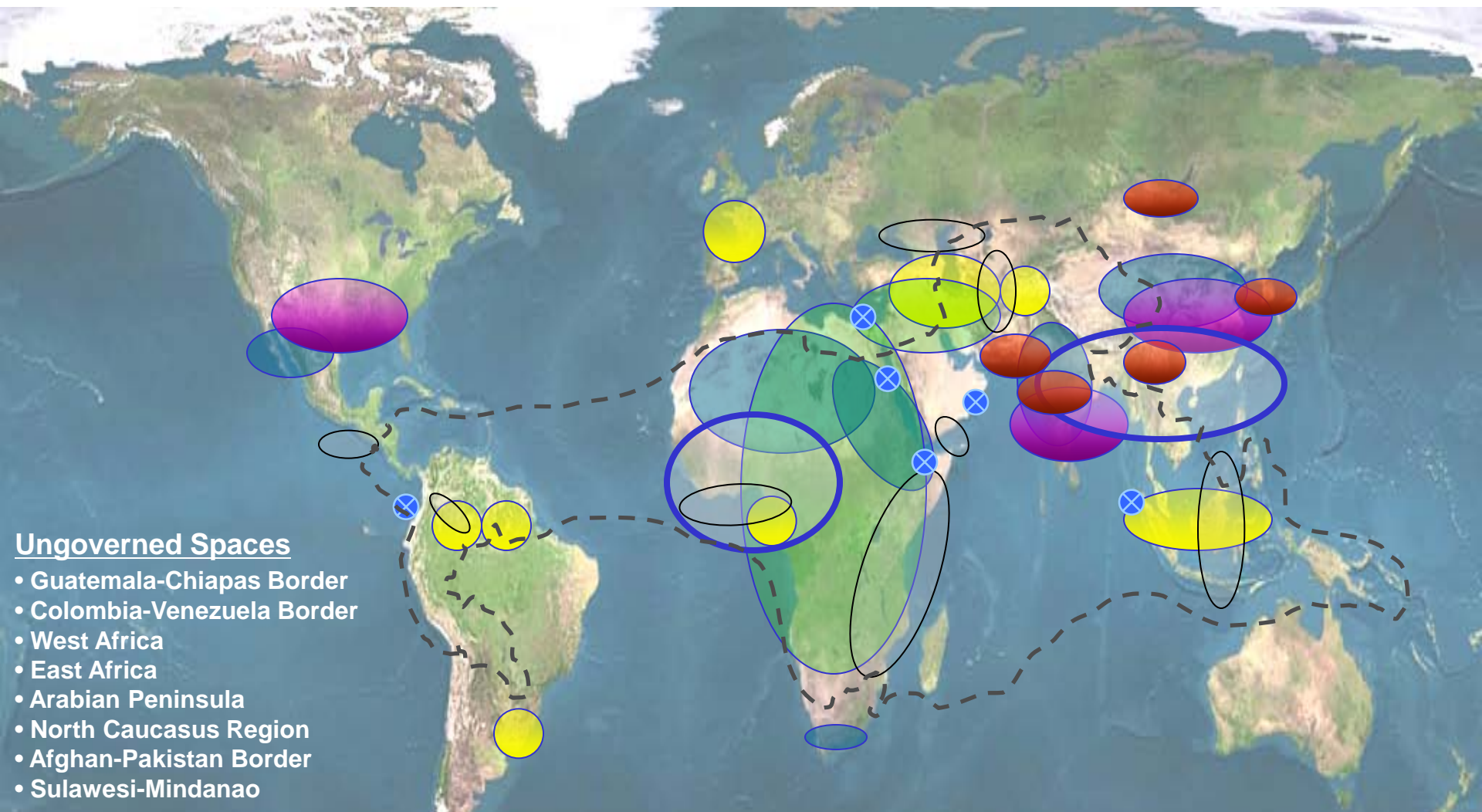
MARITIME IRREGULAR WARFARE
NAVAL EXPEDITIONARY
COMBAT TECHNOLOGIES FOR
COMBATING TERRORISM AND
DEFENDING THE HOMELAND

COMBAT TACTICAL VEHICLES
ADVANCED MOBILITY AND
ARMOR TECHNOLOGIES FOR
ENHANCED MANEUVER AND
SURVIVABILITY

DISTRIBUTED OPERATIONS
INTELLIGENCE, SURVEILLANCE,
AND CP TECHNOLOGIES FOR
LITTORAL DOMAIN AWARENESS

 **ONR**
OFFICE OF NAVAL RESEARCH

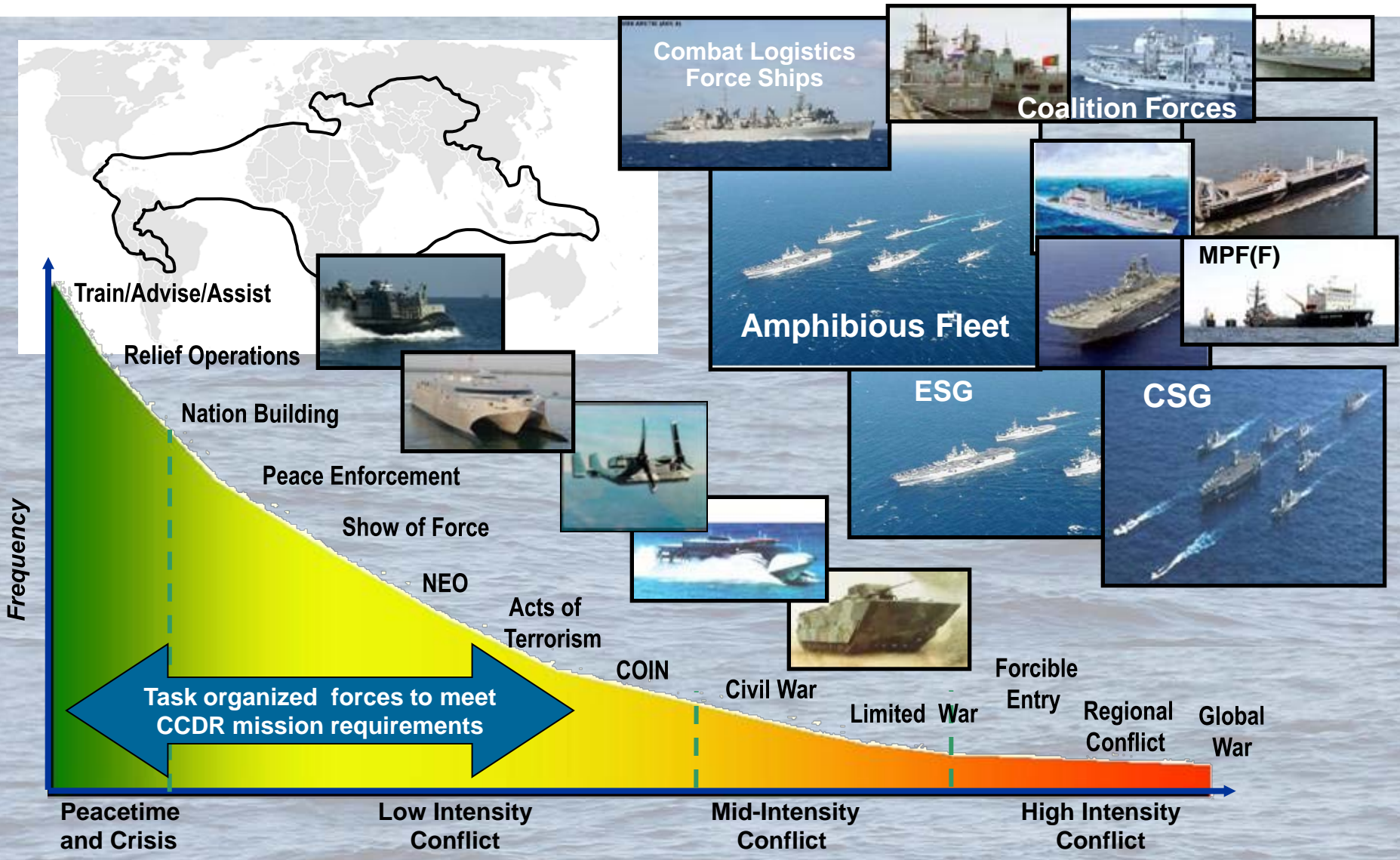
Sources of Stress, Instability & Conflict



- Ungoverned Spaces**
- Guatemala-Chiapas Border
 - Colombia-Venezuela Border
 - West Africa
 - East Africa
 - Arabian Peninsula
 - North Caucasus Region
 - Afghan-Pakistan Border
 - Sulawesi-Mindanao

Urban Stress	Youth Bulge	Terrorism/Crime	Ungoverned	Energy Demand	Nuclear	Water Stress	Choke points

Naval Expeditionary Operations



Technological Dominance

Today, Marines and Sailors have at their disposal the world's most sophisticated military technology

But....., our adversaries do, as well.



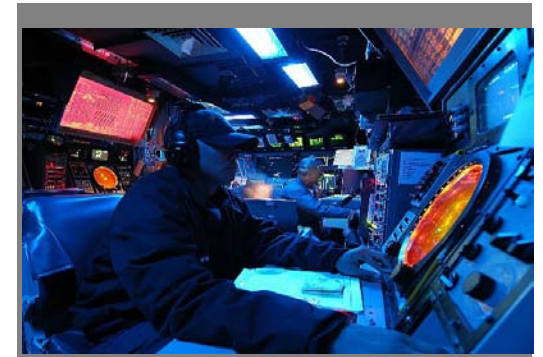
Laser-Guided Munitions



Mobile Communications



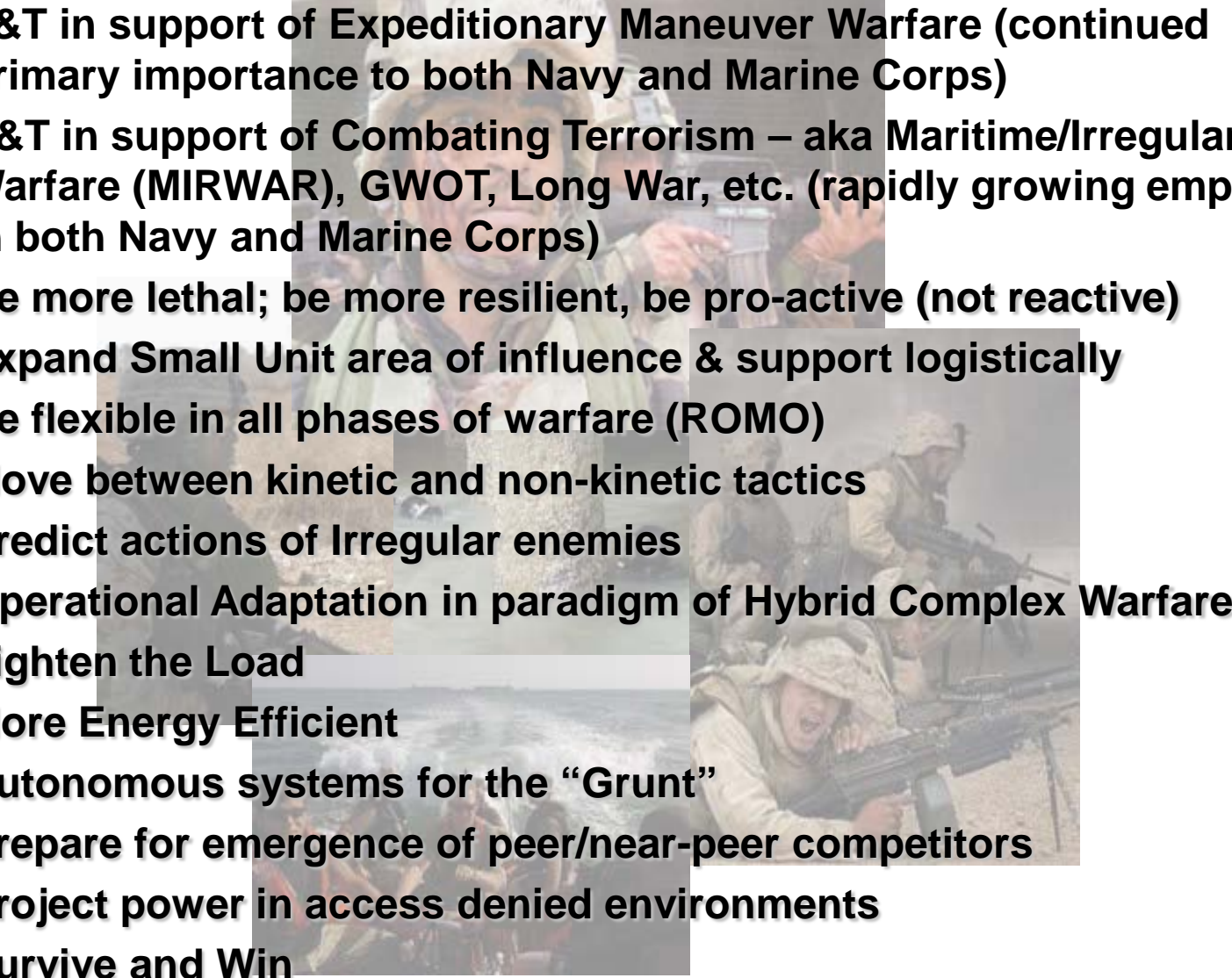
GPS Navigation and Targeting



Network-Centricity, Information Warfare, and Intelligence

The Ultimate Customer – The Warfighter!

ONR S&T enables Sailors and Marines!

- 
- **S&T in support of Expeditionary Maneuver Warfare (continued primary importance to both Navy and Marine Corps)**
 - **S&T in support of Combating Terrorism – aka Maritime/Irregular Warfare (MIRWAR), GWOT, Long War, etc. (rapidly growing emphasis in both Navy and Marine Corps)**
 - **Be more lethal; be more resilient, be pro-active (not reactive)**
 - **Expand Small Unit area of influence & support logistically**
 - **Be flexible in all phases of warfare (ROMO)**
 - **Move between kinetic and non-kinetic tactics**
 - **Predict actions of Irregular enemies**
 - **Operational Adaptation in paradigm of Hybrid Complex Warfare**
 - **Lighten the Load**
 - **More Energy Efficient**
 - **Autonomous systems for the “Grunt”**
 - **Prepare for emergence of peer/near-peer competitors**
 - **Project power in access denied environments**
 - **Survive and Win**

ONR S&T Departments

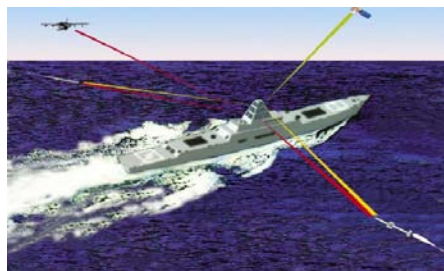
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Expeditionary Maneuver Warfare & Combating Terrorism

Code 31

C4ISR



Code 32

Ocean Battlespace Sensing



Sea Warfare and Weapons



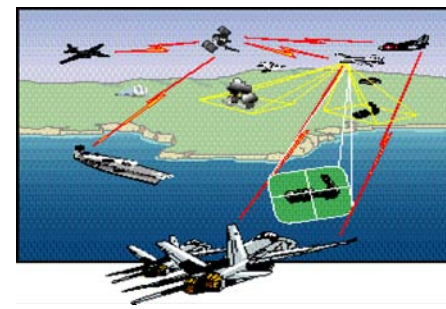
Code 33

Warfighter Performance



Code 34

Air Warfare and Weapons

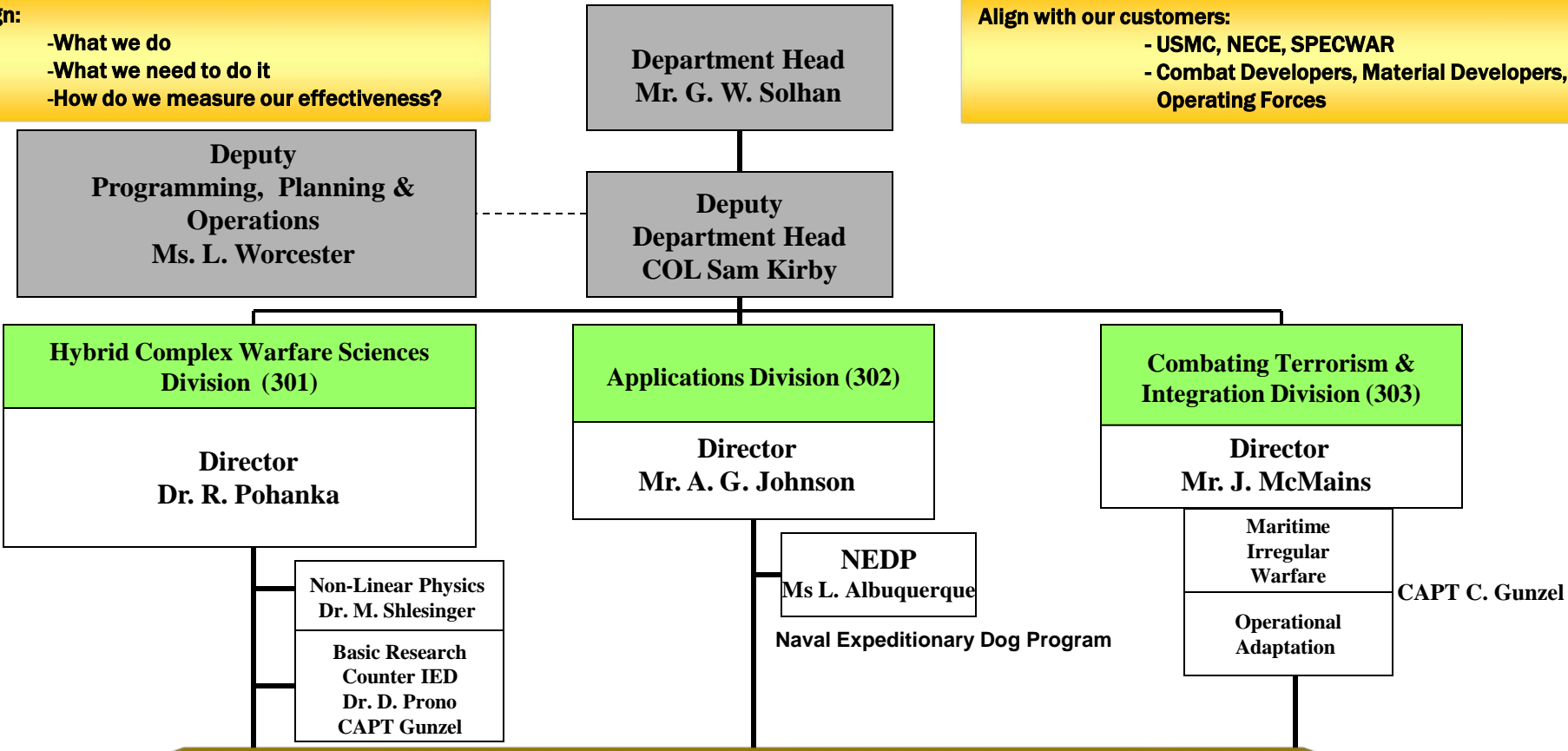


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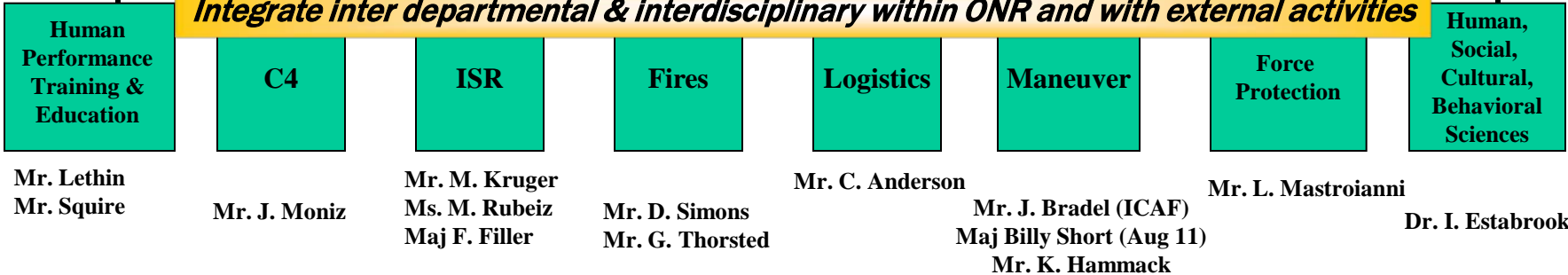
**Focus on the warrior as a system,
rather than the platform!**

Align:
 -What we do
 -What we need to do it
 -How do we measure our effectiveness?

Align with our customers:
 - USMC, NECE, SPECWAR
 - Combat Developers, Material Developers, Operating Forces



Integrate inter departmental & interdisciplinary within ONR and with external activities



Aligning to Strategic Guidance

CNO

Priorities and Guidance

- Build the Future Force
- Maintain Warfighting readiness
- Leverage Science and Technology (S&T) initiatives to ensure Warfighting benefits accrue to future Sailors
- Develop & Support Our Sailors, Civilians and Families
- Lead STEM education and outreach to grow top technical talent to lead tomorrow's Navy and double the Navy's STEM investment within five years

Commandant

Priorities and Guidance

- Provide the best trained and equipped Marine units to Afghanistan
- Rebalance and posture the Corps for the future and aggressively experiment with and implement new capabilities and organizations
- Better educate and train Marines to succeed in distributed operations and increasingly complex environments
- Keep faith with our Marines, our Sailors and our families

SECNAV Priorities

- Taking care of our Sailors, Marines, Civilians, and their Families
- Treating energy in DON as an issue of national security
- Creating acquisitions excellence
- Optimizing unmanned systems

CNR Naval S&T Strategic Plan

9 S&T Focus Areas

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

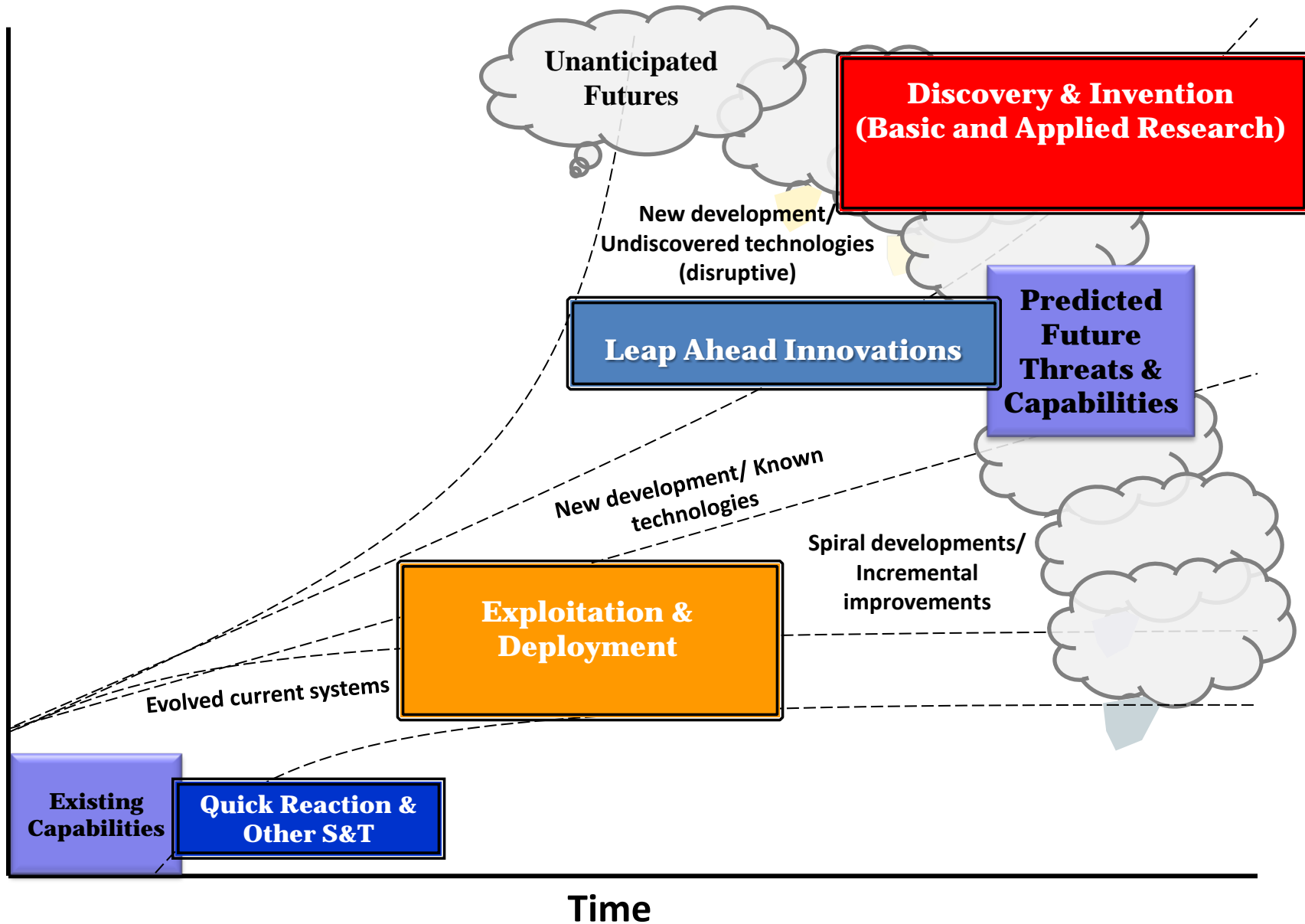
Science, Technology, Engineering, & Mathematics (STEM)

Science and Technology (S&T), and Experimentation for the Future Middle Weight Force

- *“A **middleweight force**, we are light enough to get there quickly, but heavy enough to carry the day upon arrival, and capable of operating independent of local infrastructure.”*
- *“We will rebalance our Corps, posture it for the future and **aggressively experiment** with and **implement new capabilities** and organizations.”*
- *“We will better educate and train our Marines to **succeed in distributed operations** and increasingly complex environments.”*

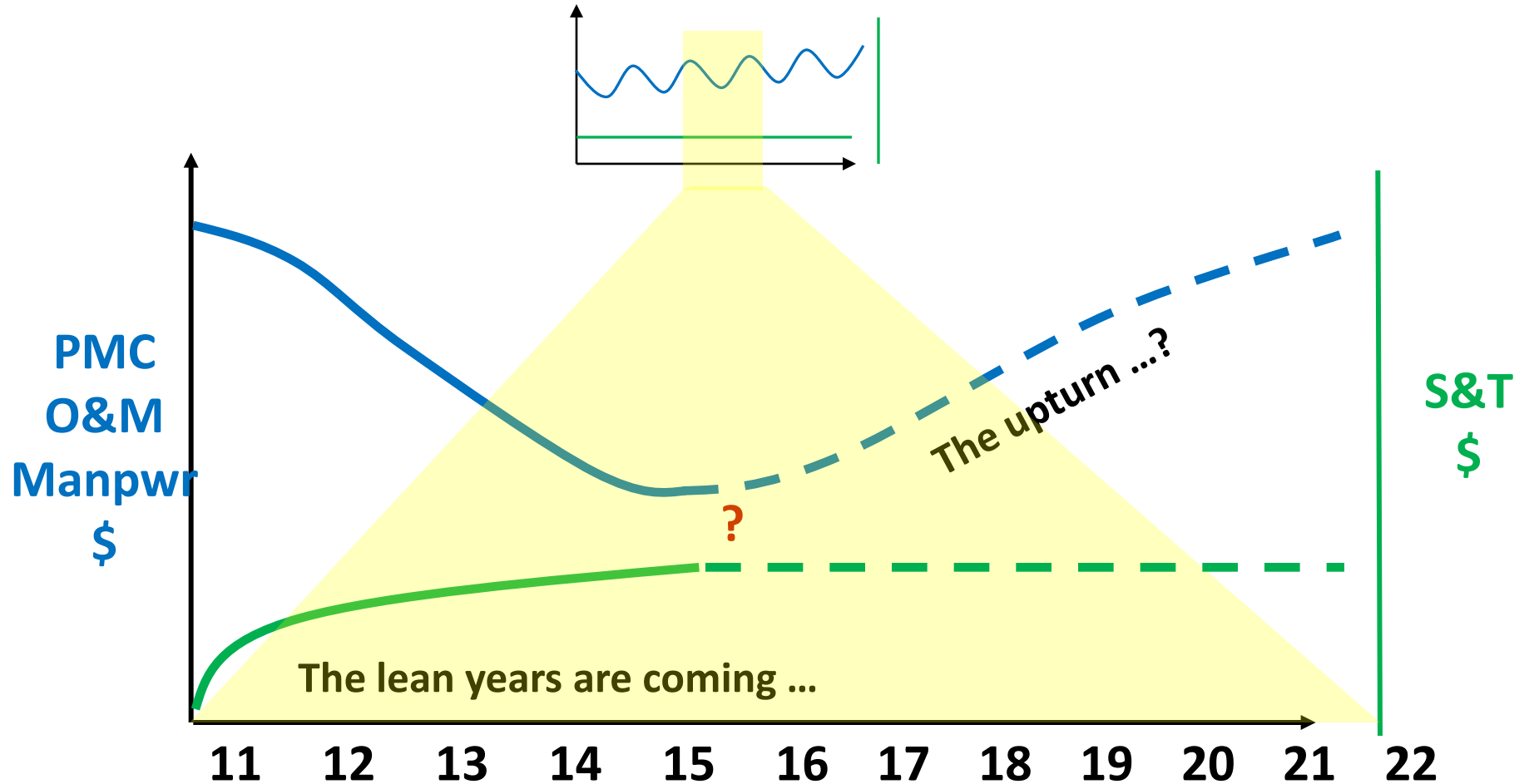
Portfolio Alignment with Futures

Complexity...Uncertainty...Wartighting Capability



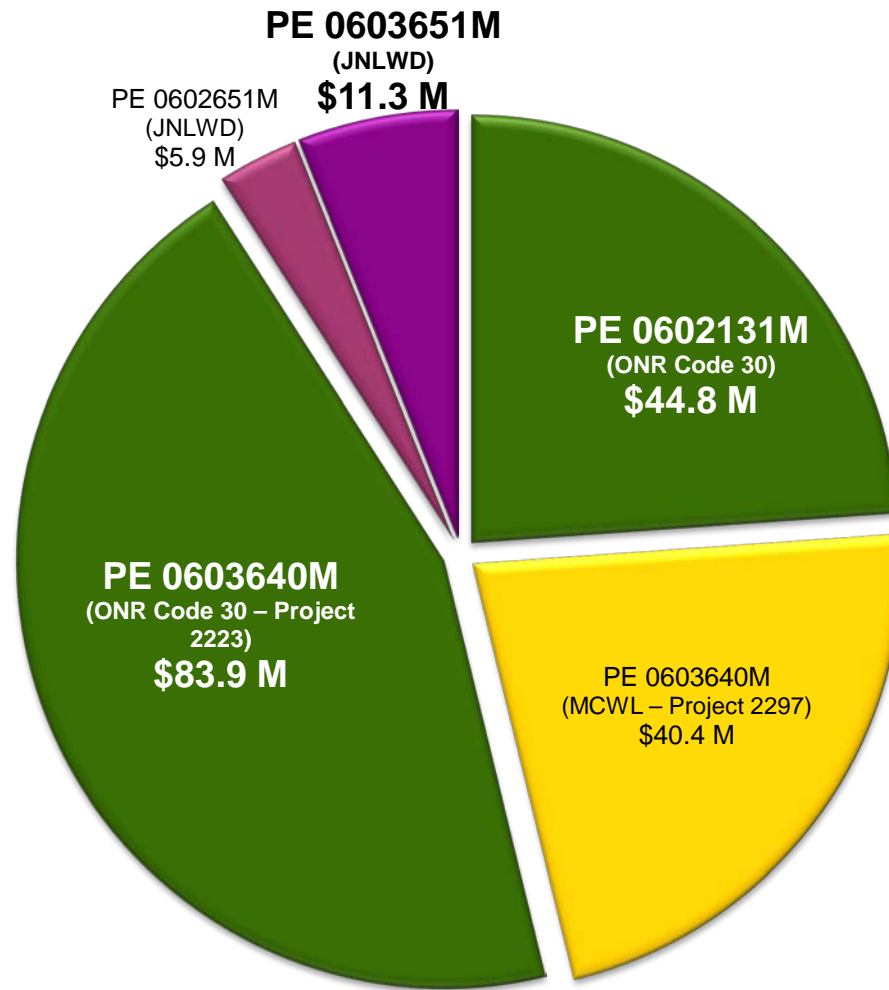
S&T/Experimentation Opportunity

“When you have no money, THINK”



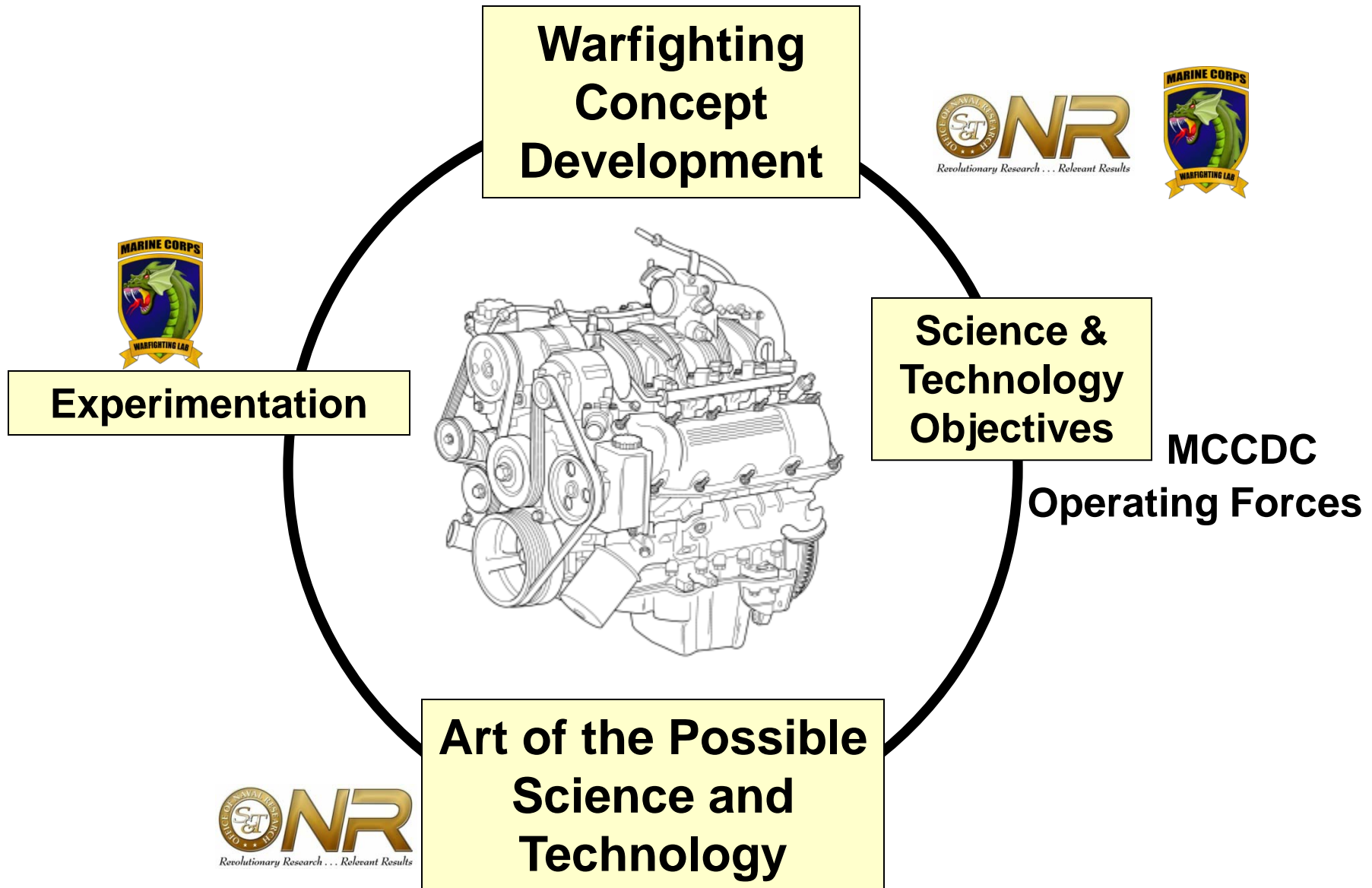
- When procurement funding is plentiful, S&T/Exp is important
- Shape the nature of the buy When procurement funding is scarce, S&T/Exp is more important
- Mitigate Risk with the Creative Engine – Know What is Possible... and When
- Shape future capability – be prepared to take advantage of opportunities when the upturn comes

PBR FY-12 S&T Funding (Total \$186.3M)



Data derived from PBR FY-12

Creative Engine for Combat Development



Expeditionary Maneuver "Whitman's Sampler"

Technology Investment Areas

Thrust Areas

Maneuver

Survivability – Armored Materials
Active Pulsed Power Protection
Crew Protection

Active / Pulsed Power Protection

Advanced Requirements for Crew Safety (ARCS)

Advanced Electromagnetic Armor (AEMA)

Advanced Blast Mitigation

Maneuver Enablers –SA & Unmanned Autonomous Systems



Advanced Perception System



Autonomous Wingman - Resupply Vehicle

Advanced Mobility – Advanced Suspension & Drive Train Technologies
Fuel Efficiency & Battlefield Power

Infinitely Variable Transmission



Fuel Efficient MTRV & Advanced LAV Suspension System (FNCs)

Future Fuel Alternatives

Detection (Point/Standoff/Area)

GPR Syntactic Landmine Detection

Suicide Bomber Detection

Shearography Detection

Multi-Mode & Remote Standoff Explosive Detection

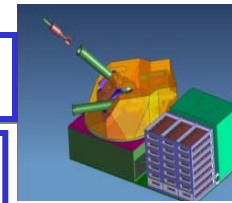
Multi-Modal Pre-Shot Sniper Detection

EMW-FY08-01 Demo/Transition

Neutralization (Point/Standoff/Area)

Neutralization of IEDs with RF

Spot / Scalable Explosive Hazard Neutralization



Laser –Based Air & CRAM Defense

Smart Mine Sensor Counter Measures



Mitigation



EMW-FY09-01 Indiv. Warfighter Protection



Blast/Trauma Mitigation For Combat Helmets

Ultra High Strength & Performance Ballistic Materials

Blast Mitigation Technologies



Enhanced Physical Readiness

Nutritional Modulators of Physiological Adaptation & Performance

Enhanced Technologies for Optimization of Warfighter Load



Integrated Models for Warfighter Performance Enhancement

Mental Resilience & Cognitive Agility

UGV Man-Machine Interface & Workload, Stress & Performance in IIT



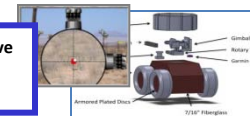
Neural Mechanisms of Mental Skills Resilience & Expressive Interactions for Desktop VE

Technologies Supporting Peak Cognitive Performance

Expertise Development

Small Arms /Marksmanship Training & Smart Tutoring

Naval Next-generation Immersive Technology & Autonomous Robotic Target Systems



Applied Technologies for SITE & Neuroadaptive Training

Near Term

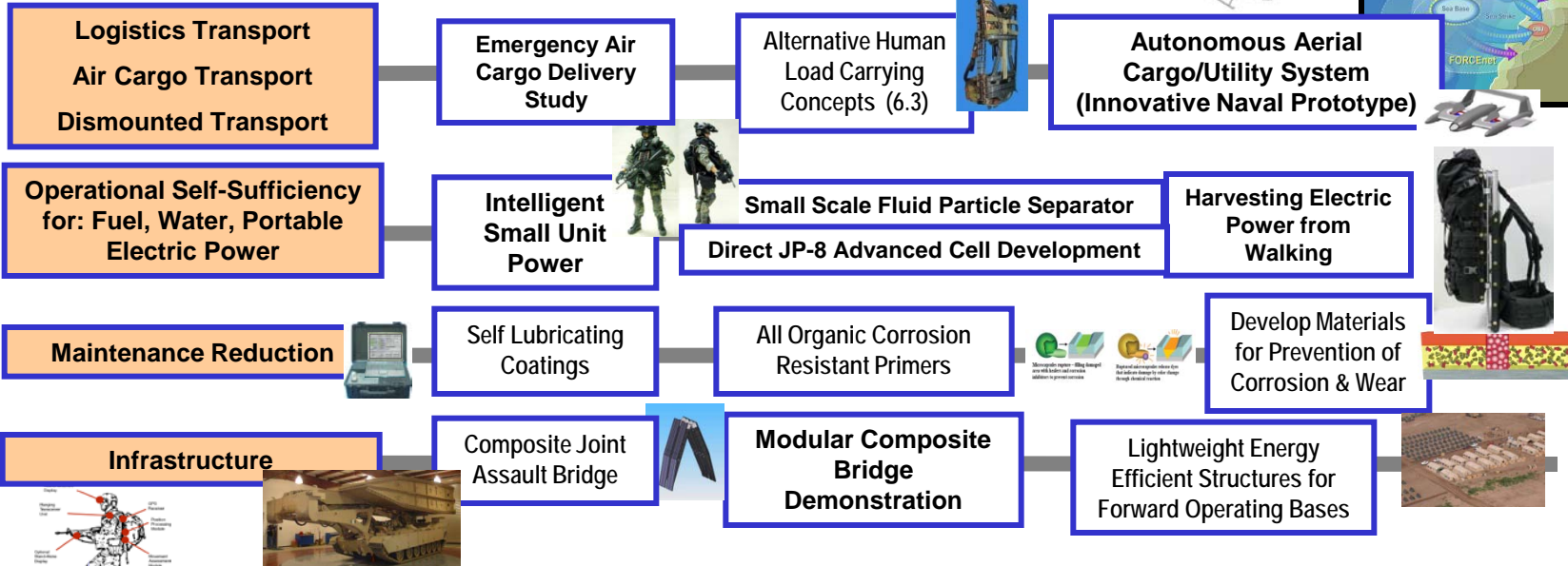
Mid Term

Far Term

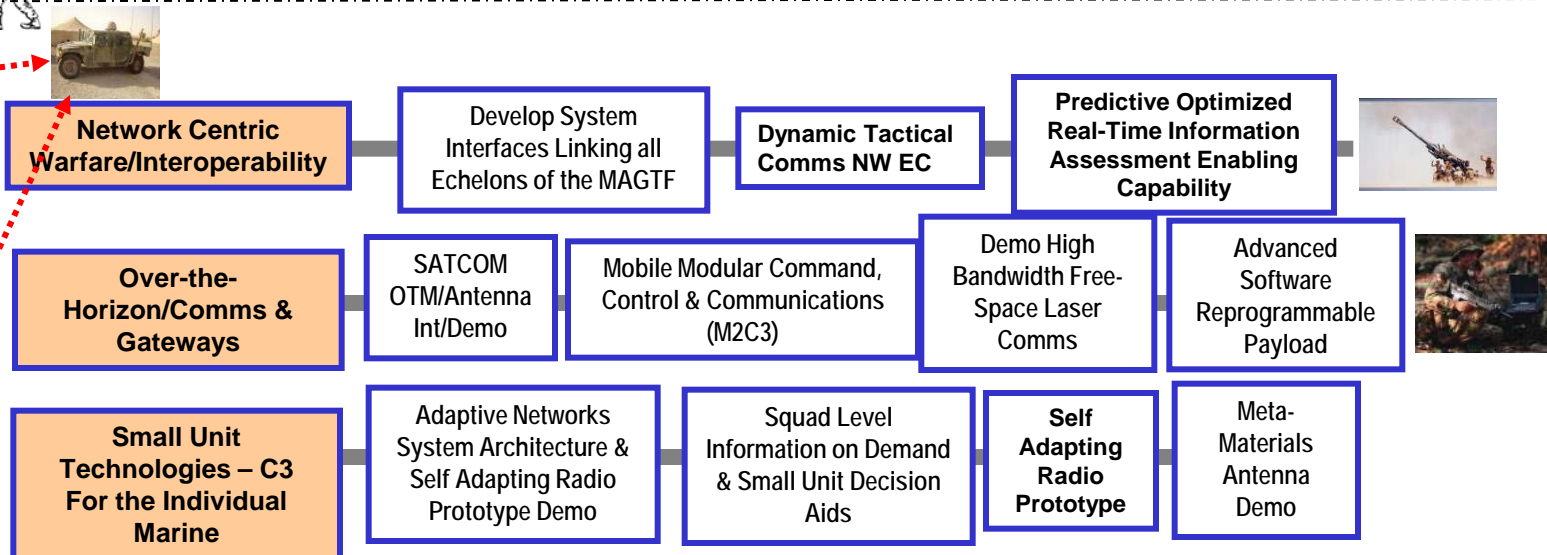
Expeditionary Maneuver "Whitman's Sampler"

Thrust Areas

Technology Investment Areas



Command, Control, Communications, and Computers (C4)

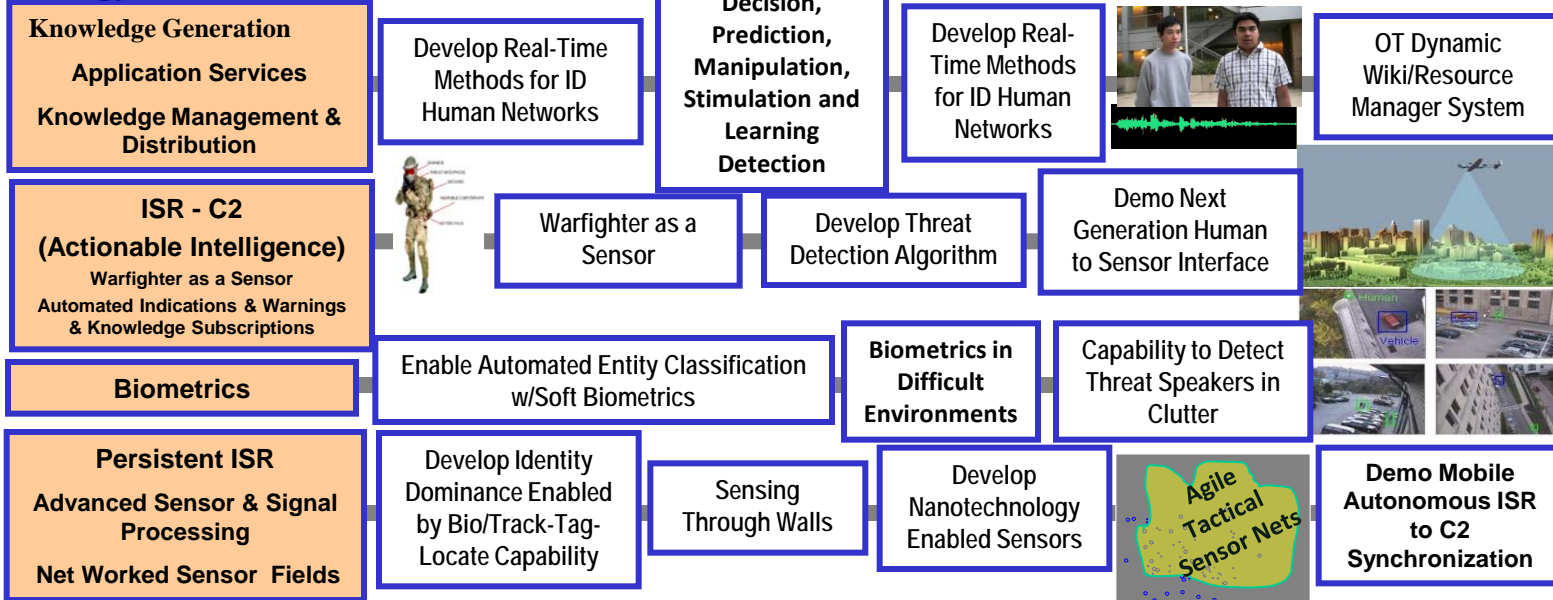


Expeditionary Maneuver “Whitman’s Sampler”

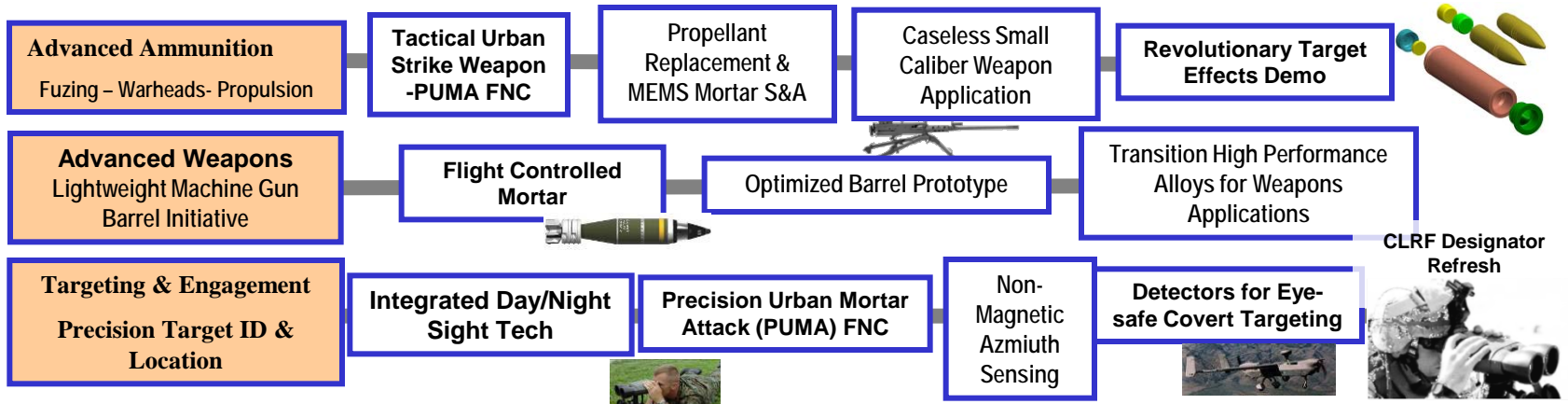
Technology Investment Areas

Thrust Areas

Intelligence, Surveillance & Reconnaissance (ISR)



Firepower



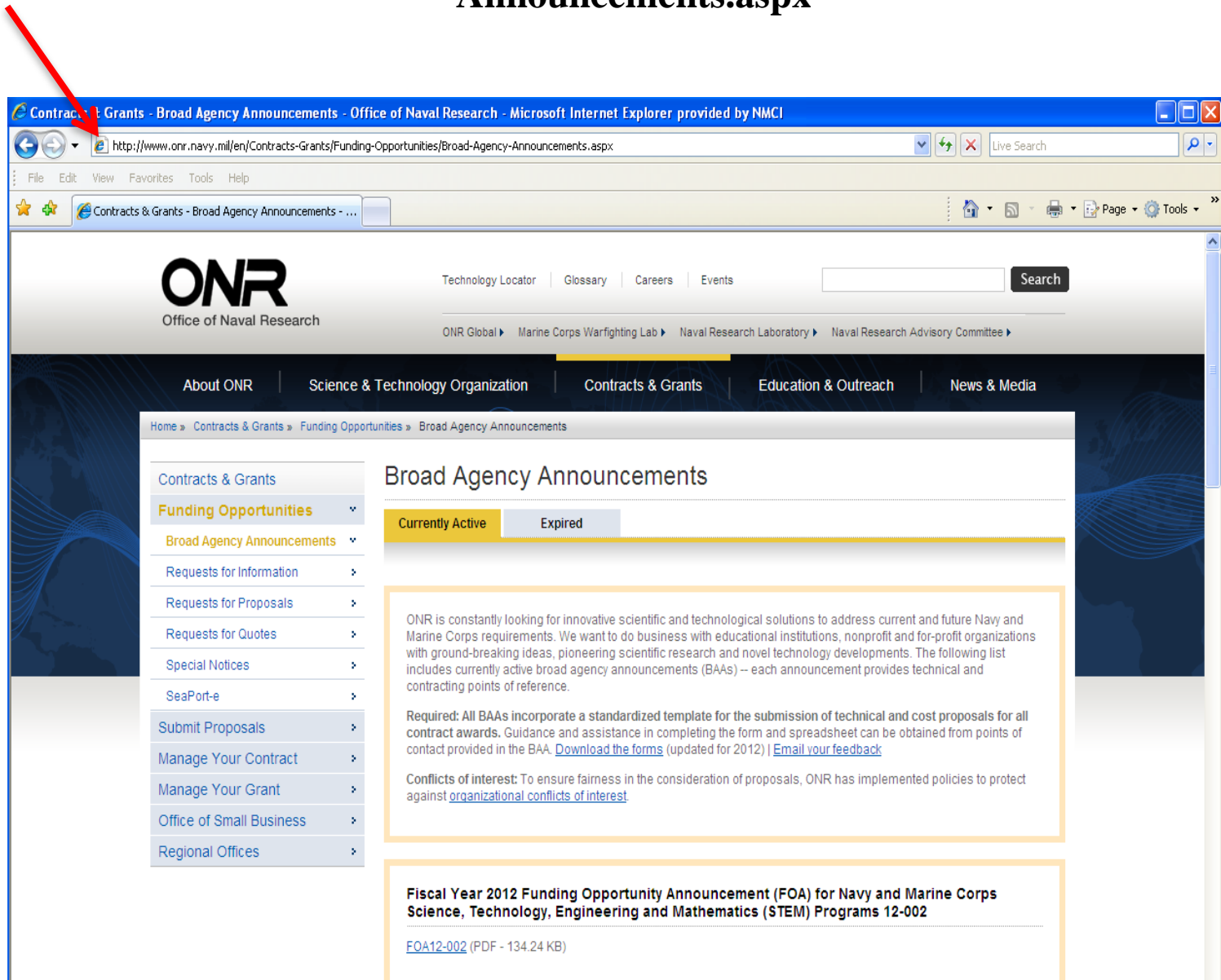
Littoral Combat/ Power Projection

Supports Highest Priority Requirements of the Naval Services → USMC “Bids” ~\$25M Per Year from PE0602131M (~\$9M) and PE0603540M (~\$16M) Resources into the FNC Process. Priorities Established by the Technology Oversight Group (TOG)

Quo Vadis?

- **Risk reduction for an uncertain future.**
- **Lessons Learned from 10 years of irregular warfare.**
- **Must investigate new emerging areas such as autonomy, cyber, spectrum dominance**
- **Return technology focus to Corps' historical mission**
- **Must enhance the Corps' Global Reach and tactical agility through Full Spectrum (ROMO) ops, Energy Efficiency, Distributed Operations, Lightening the Combat Load/footprint, and Naval character.**

http://www.onr.navy.mil/en/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx



The screenshot shows a Microsoft Internet Explorer browser window displaying the ONR website. The address bar contains the URL: <http://www.onr.navy.mil/en/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx>. The page features the ONR logo and navigation menus. The main content area is titled "Broad Agency Announcements" and includes a sidebar with a "Funding Opportunities" dropdown menu. The "Currently Active" tab is selected, showing a text box with information about BAAs and a link to "Fiscal Year 2012 Funding Opportunity Announcement (FOA) for Navy and Marine Corps Science, Technology, Engineering and Mathematics (STEM) Programs 12-002".

ONR
Office of Naval Research

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Contracts & Grants

Funding Opportunities

Broad Agency Announcements

Requests for Information

Requests for Proposals

Requests for Quotes

Special Notices

SeaPort-e

Submit Proposals

Manage Your Contract

Manage Your Grant

Office of Small Business

Regional Offices

Broad Agency Announcements

Currently Active | Expired

ONR is constantly looking for innovative scientific and technological solutions to address current and future Navy and Marine Corps requirements. We want to do business with educational institutions, nonprofit and for-profit organizations with ground-breaking ideas, pioneering scientific research and novel technology developments. The following list includes currently active broad agency announcements (BAAs) – each announcement provides technical and contracting points of reference.

Required: All BAAs incorporate a standardized template for the submission of technical and cost proposals for all contract awards. Guidance and assistance in completing the form and spreadsheet can be obtained from points of contact provided in the BAA. [Download the forms](#) (updated for 2012) | [Email your feedback](#)

Conflicts of interest: To ensure fairness in the consideration of proposals, ONR has implemented policies to protect against [organizational conflicts of interest](#).

Fiscal Year 2012 Funding Opportunity Announcement (FOA) for Navy and Marine Corps Science, Technology, Engineering and Mathematics (STEM) Programs 12-002

[FOA12-002](#) (PDF - 134.24 KB)

The glass is half full!



The glass is half empty.



Half full...No! Wait!
Half empty!..No, half...
What was the question?



Hey!
I ordered a cheeseburger!



Questions or Comments?