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- Portions of the following presentations made were presented at the Office of Naval Research sponsored and Naval Sea Systems Command hosted Solid State Laser Technology Maturation (SSL-TM) Program's Industry Day at the Washington Navy Yard in Washington DC, USA on 16 May 2012.
  - Reference ONR Special Notice **12-SN-0012** released on **FedBizOpps:**  
<https://www.fbo.gov/index?s=opportunity&mode=form&id=19bcca9a4c866cab72573913deb6ec4b>
- Portions presented which were limited distribution or classified have been removed from this release to enable posting on a publically accessible website.
- This version of the presentation is suitable for unclassified, public release.

NOTICE: The briefing provided that follows was shown at the Industry Day held on 16 MAY 2012. The actual BAA as (ONR 12-019) released reflects changes and revisions that occurred as a result of this presentation, and the feedback from Industry. The BAA as released and amended should be used in all matters of developing vendor proposals.

Naval Air Warfare and Weapons



*"In light of the suitability of surface ships to support a solid-state laser weapon based on mature and maturing technologies... the Department of the Navy should be designated as lead service for fielding a 100 to 200 kilowatt-class laser to defend surface ships against unmanned aircraft, cruise missile, and fast attack craft threats; and...the Secretary of the Navy should initiate a program of record to begin fielding a ship-based solid-state laser weapon system...."*

Amendment to H.R. 4310, the National Defense Authorization Act for Fiscal Year 2013, offered by the Honorable James R. Langevin, U.S. Representative for Rhode Island's 2nd Congressional District

**Solid State Laser Technology Maturation Program (SSL-TM)**

The Office of Naval Research's Solid State Laser Technology Maturation program will investigate technologies suitable for inclusion in a laser weapon prototype to be installed on a Naval Surface Combatant, such as a Destroyer, Cruiser, or other combat ship to help Sailors defeat aerial targets or small boat threats without using bullets. This solid-state laser weapon prototype will demonstrate multi-mission capabilities aboard a Navy ship, leveraging its long history of advancing directed-energy technology above current power levels of kilowatt-scale lasers demonstrated to date at sea.

Of importance to the SSL-TM program is the development of a beam director suitable to withstand the marine environment that ships must be stationed in, and propagate the power at just feet above the sea's wave tops. Any Navy laser weapon shall have to maintain constant target pin-point accuracy, not unlike a sniper, while compensating for rolling and pitching in high sea states, and survive months at sea - without any special attention.

RESEARCH

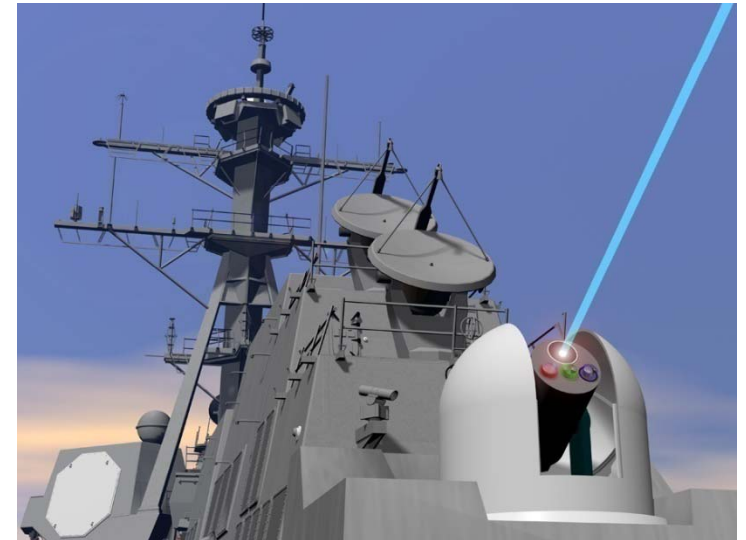
APPLICATION

SYSTEM



# Contents

- Security & Facility Brief
- Introductions
- Approach
  - Components/Subsystems
  - Systems
- System Requirements
- Proposal Requirements
- Evaluation Criteria
- Contractual Information
- Summary, Questions & Discussions





# Safety & Security Protocols

Solid State Laser Technology Maturation

Industry Day

Wednesday, 16<sup>th</sup> May 2012

Washington Navy Yard



# - Safety -

## In the event of an emergency:

- Leave auditorium through either back door.
- Turn **right** and exit front of building
- Exit **right** towards Anacostia river



# Building Exit/Entry

- Personnel may exit via the Employee Entrance (the way you came in, next to the SM-3 Missile)
- Re-entry is only allowed via the Main Entrance (~150' along the building towards the river)
- Smoking area is located out the Employee Entrance, across the street, along the path next to the parking garage
- Cell phones/PEDs can be claimed upon building exit at Employee Entrance between 1600-1700
  - Early departures may pick cell phones up at the desk outside the auditorium, you will be escorted out of the building at that time





# Security Protocols

- ✓ Note taking is NOT PERMITTED at any time during these presentations
- ✓ Electronic Devices of any type ARE NOT PERMITTED in this environment – medical devices are exempt
- ✓ Discussions up to the SECRET level may take place within the Auditorium
- ✓ No Classified discussions are allowed outside the Auditorium





# Q&A Session



- ✓ Following the BAA presentations there will be an opportunity for industry members to caucus and ask written questions
- ✓ Industry members will approach the table at the front of the auditorium and select a green (unclassified) or red (classified) notecard
- ✓ Questions will be written out at the table and immediately handed over to the government representative
- ✓ Government will review and may answer verbally today, answers will be posted on website



# Safety & Security Protocols





**Seating for  
Industry  
Members ONLY  
from this point  
forward**



# Station #1: Building Entry

- Active from 1130-1300
- Supported by:
  - 1 NAVSEA Security Guard
  - 2 ONR/405 Personnel
- Function:
  - Check names against registration list
  - Issue Building Access Passes (Dated Blue Paper NAVSEA Badges) to those on registration list
  - Collect Cell Phones/Computers and store in plastic bin (provided by NAVSEA security)
  - Contact Morrison/Chernesky or Station #2 with discrepancies



# Station #2: Auditorium Entry

- Active from 1130-1700
- Supported by:
  - 3 (or more) ONR/405 Personnel (Staging area for unassigned personnel)
- Function:
  - Check names against security clearance list
  - Issue Event Badges (provided by ONR) for those registered and appropriately cleared
  - Ensure personnel do not have any note-taking equipment or electronics (Collect if necessary)
  - Guard Cell Phone storage box after Station #1 closes
  - Guard entries to Auditorium. Only allow personnel with Event Badges into Auditorium
  - Check clearances via JPAS if required
  - Monitor Chernesky cell phone (Judy/Jeff phones forwarded)
  - Return cell phones to early departures and escort personnel out the employee entrance!
  - Periodically enter conference and monitor for note-taking
  - Contact Morrison/Chernesky with discrepancies or issues



## Station #3: Building Exit

- Active from 1600-1700 (or all participants gone)
  - Station #3 can use the Station #1 table to stage phones
- Supported by:
  - 1 NAVSEA Security Guard (1600-1700)
  - 2 ONR/405 Personnel
- Function:
  - Return cell phones/etc to departing personnel
  - Ensure personnel depart building once they reclaim their electronics!



# Station #4: Q&A Table

- Active from 1430-1530
  - Table & chairs will be set up in front of auditorium following briefings
- Supported by:
  - 2 ONR/405 Personnel
- Function:
  - Issue contractors unclassified/classified note cards and a pen to write down questions
  - Immediately collect questions once written
  - Provide written questions to Morrison/Contracts



SOLID STATE LASER  
TECHNOLOGY  
MATURATION  
INDUSTRY DAY  
16 MAY 2012





ONR BAA Announcement # \_\_\_\_\_

**Briefing to Industry:  
Broad Agency Announcement (BAA)  
Solid State Laser – Technology Maturation (SSL-TM)**



*Mr. Peter A. Morrison, ONR 35 Program Officer  
CAPT Michael Ziv NAVSEA PMS-405  
Mr. Ron “Flats” Flatley, Deputy Program Officer*

**May 16, 2012**



DOCUMENT WHICH FOLLOWS WAS REVISED TO SUPPORT  
UNCLASSIFIED PUBLIC RELEASE, DISTRIBUTION STATEMENT A

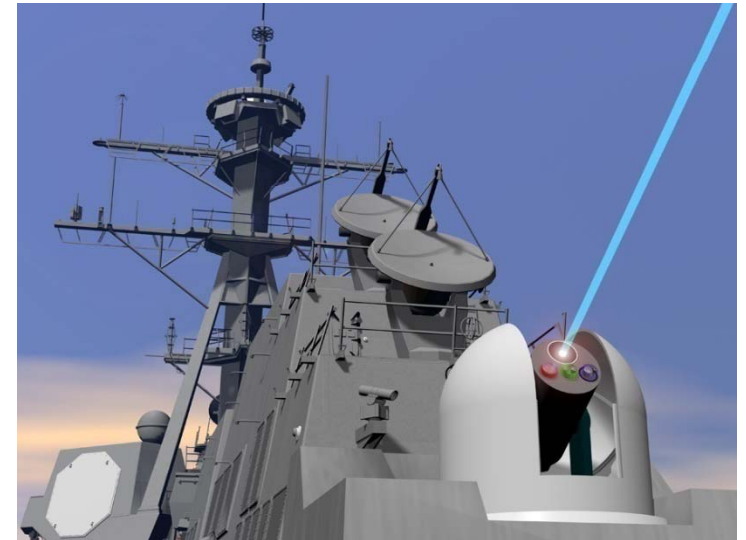
**Office of Naval Research (ONR)**

Code 352 • One Liberty Center • 875 North Randolph Street • Arlington, VA 22203-1995 • [peter.a.morrison@navy.mil](mailto:peter.a.morrison@navy.mil)



# Contents

- Introduction
- Approach
  - Components/Subsystems
  - Systems
- System Requirements
- Proposal Requirements
- Evaluation Criteria
- Contractual Information
- Summary





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# ***Introduction***



# *Solid State Laser – Technology Maturation (SSL-TM)*

## **PROGRAM SPONSOR:**

**ONR Code 35** (Naval Air Warfare and Weapons Department)

Mr. Peter A. Morrison, Program Officer

Mr. Ronald Flatley, Deputy Program Officer

**ONR Code 25;** Mr. Peter Donaghue, Contracting Officer



## **TRANSITION SPONSOR:**

**NAVSEA PMS-405** (Directed Energy & Electric Weapon Systems Program Office)

CAPT Mike Ziv, Program Officer

CDR Vincent Chernesky, Deputy Program Officer

Mr. Ronald Flatley, Assistant Program Officer



**INITIAL FUNDING FOR THE PROGRAM WILL BE S&T (Budget Activity 2 and 3,) with the goal to Transition into a Program of Record (Budget Activity 4)**



# Solid State Laser Technology Maturation ( SSL-TM )



## **PROGRAM GOAL:**

**DESIGN & BUILD OF  
ADVANCED DEVELOPMENT  
MODEL (ADM) PROTOTYPE(S)  
SOLID STATE LASER WEAPON  
SUITABLE FOR INSTALLATION  
ON US NAVAL FLAGGED  
SURFACE COMBATANT, AND  
TESTED AT SEA\* BY 2016  
END TECHNOLOGY READINESS  
LEVEL (TRL) GOAL:**

**6 -AND- HIGHER**

*\* Note: May alternatively be tested on surface test vessel,  
depending on availability and suitability of Prototype for  
installation on Navy Combatant*



**ARTIST CONCEPTUAL IMAGE**

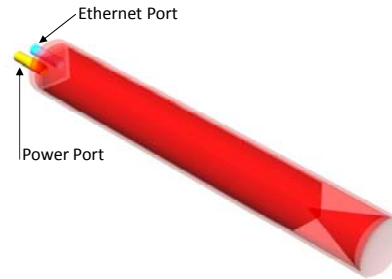
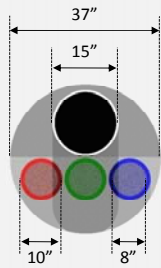
# **SSL-TM VIDEO**

## **(click to run)**

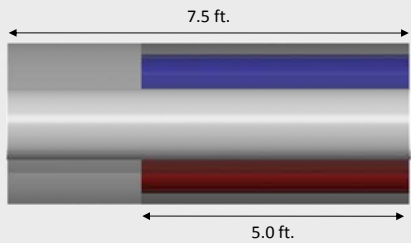
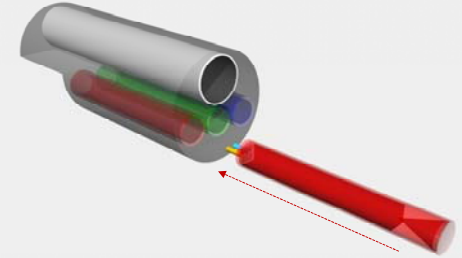
*NOTE: VIDEO NOT SUITABLE TO SUPPORT DISTRIBUTION A.*



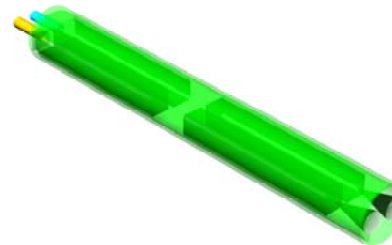
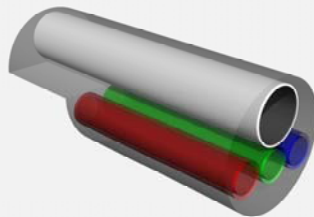
# Notional Beam Director with Removable Modules



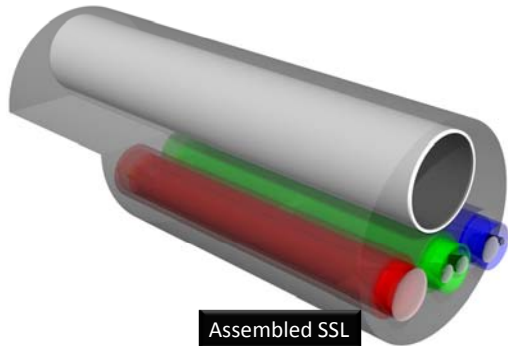
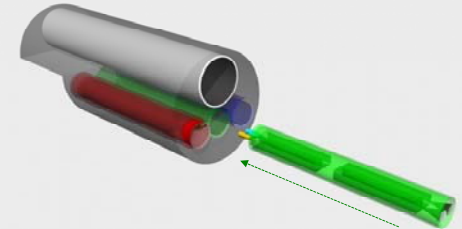
Counter ISR Module



Solid State Laser (SSL) Chassis



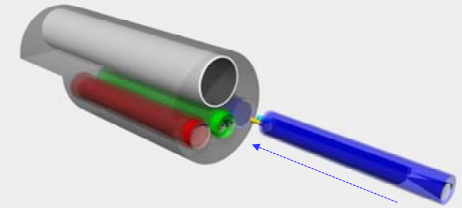
Non-Lethal Module



Assembled SSL



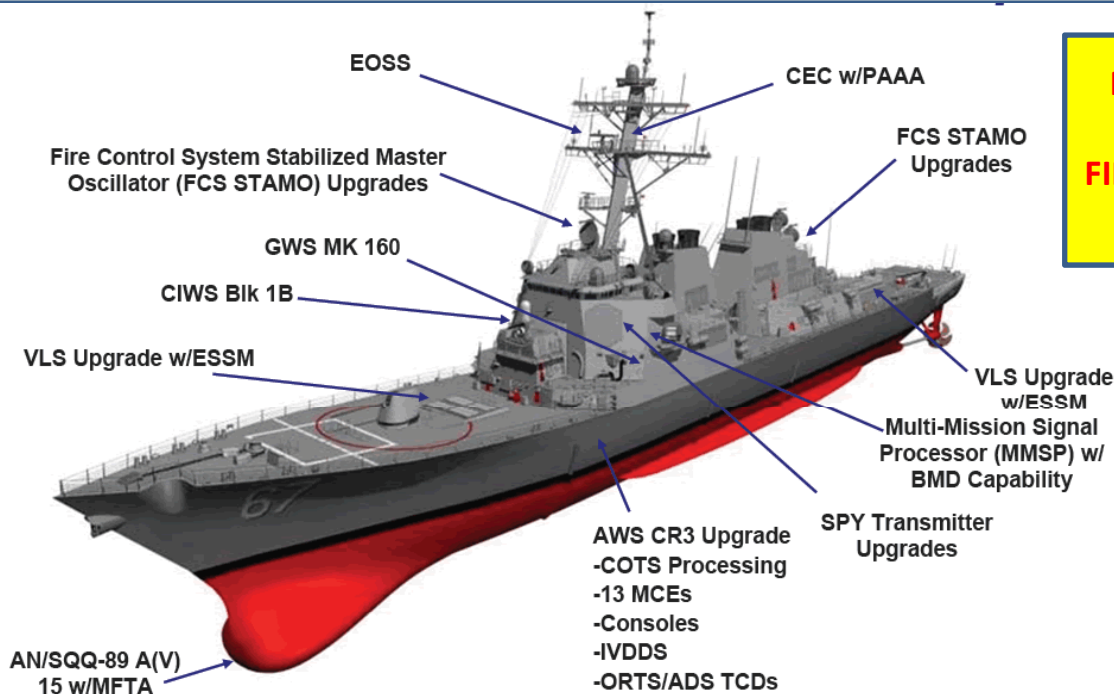
Track/Targeting Module





# Preliminary Navy Ship Integration Study Currently Underway with NAVSEA 05D Preliminary Cutaway Visualization

**NOTICE: SLIDE SHOWN OF NAVY SURFACE COMBATANT CUT AWAY WITH NOTOIONAL LASER WEAPONS REMOVED DUE TO FOR OFFICIAL USE ONLY INFORMATION USED, THAT IMAGE WAS NOT SUITABLE FOR PUBLIC RELEASE AND COULD NOT BE REDACTED IN A SUITABLE TIME**



**NOT SUITABLE FOR USE AS A FINAL DESIGN  
TRADE STUDY PRODUCT  
FINAL TECHNICAL REPORT TO BE PROVIDED TO  
SSL PROGRAM OFFICERS AT END OF STUDY**

# Recent SSL Progress Highlights



US Navy Photograph, APRIL 2011, UNCLASSIFIED - PUBLICALLY RELEASEABLE

**ONR MARITIME LASER DEMO (2011)**

**FIRST NAVY LASER WEAPON DEMO AT SEA**



**NAVSEA Laser Weapon System Test Bed (LaWS)  
Testing**

**Navy Leadership given significant confidence to advance from limited demonstration programs to technical maturation program**



# Navy Investments in SSL-TM

- FY12 Investments in:
  - **Navy SSL-TM WALEX**
    - Warfighting Requirements Analysis Exercise
    - 100+ government attendees, including technologists-SMEs, fleet science advisors, OPNAV, and DE program officers
    - Identified Program Requirements, and notional program goals/timeline
    - Final Report to be released soon
  - **Navy Laser Weapon (LaWS) being converted into Test Bed**
    - Being utilized as basis for developing Predictive Avoidance (PA) Module which will be GFE
    - *[This line redacted to support public release]*
  - **Ship Integration Study underway with NAVSEA 05D**
    - Investigating 4 options: DDG-51 (IIA, III), LCS (4&5)
  - **Government IPT Standing up**
    - Lethality IPT funded at NSWC Dahlgren
    - Test & Evaluation IPT led at NSWC Port Hueneme
    - Conducted Initial Risk Assessment

Ship Power & Cooling  
Availability vs. Limits on Platforms

Establishment of Government TOC  
& Programmatic Guidance





# Program Vision



- **Develop and Test advanced SSL weapon system at the prototype level** to support capability gaps in Surface Navy area self-defense, close-in self-defense, and Anti-Access/ Area Denial (A2/AD).
- **Build two prototypical Beam Directors** suitable for ship installation, test, and evaluation, utilizing laser subsystems which are potentially “heavy weight” and which require additional engineering for optimization
- **Provide close-in defense/defeat protection from long-range counter ISR/counter UAV capability and small boats/FIACs.** Additional capacity for long- range optical tracking and EO/IR ISR from surface combatants to enable KE-DE Improvements
- Advance the Technology Readiness Level of an SSL weapon system (via a competitive development and test arena) to **prepare for a JCIDS POR** (entered at MS B)
- **Conduct technology maturation** in areas of Beam Director Design, Hybrid Predicative Avoidance, Lethality, Modeling & Simulation, T&E and associated areas to support SSL weapon system maturation

# SSL-TM MISSION FOCUS

- **Primary:** Address mission gaps and trade-space in the cost exchanges related to **Counter-UAV and Counter-Intelligence, Surveillance, and Reconnaissance (C-ISR)**
- **Secondary:** Address Self Defense Mission for **Small Boat Swarm Disruption and Defeat**
- **Tertiary:**
  - Augment tracking for precision kinetic engagement
  - Long-range real-time ISR capability
  - Long-range Battle Damage Assessment
  - Exploratory research into Counter ASCM tracking, engagement, and lethality predictions
  - C-ISR gaps that currently have no organic solution

## ANTICIPATED COST STUDIES



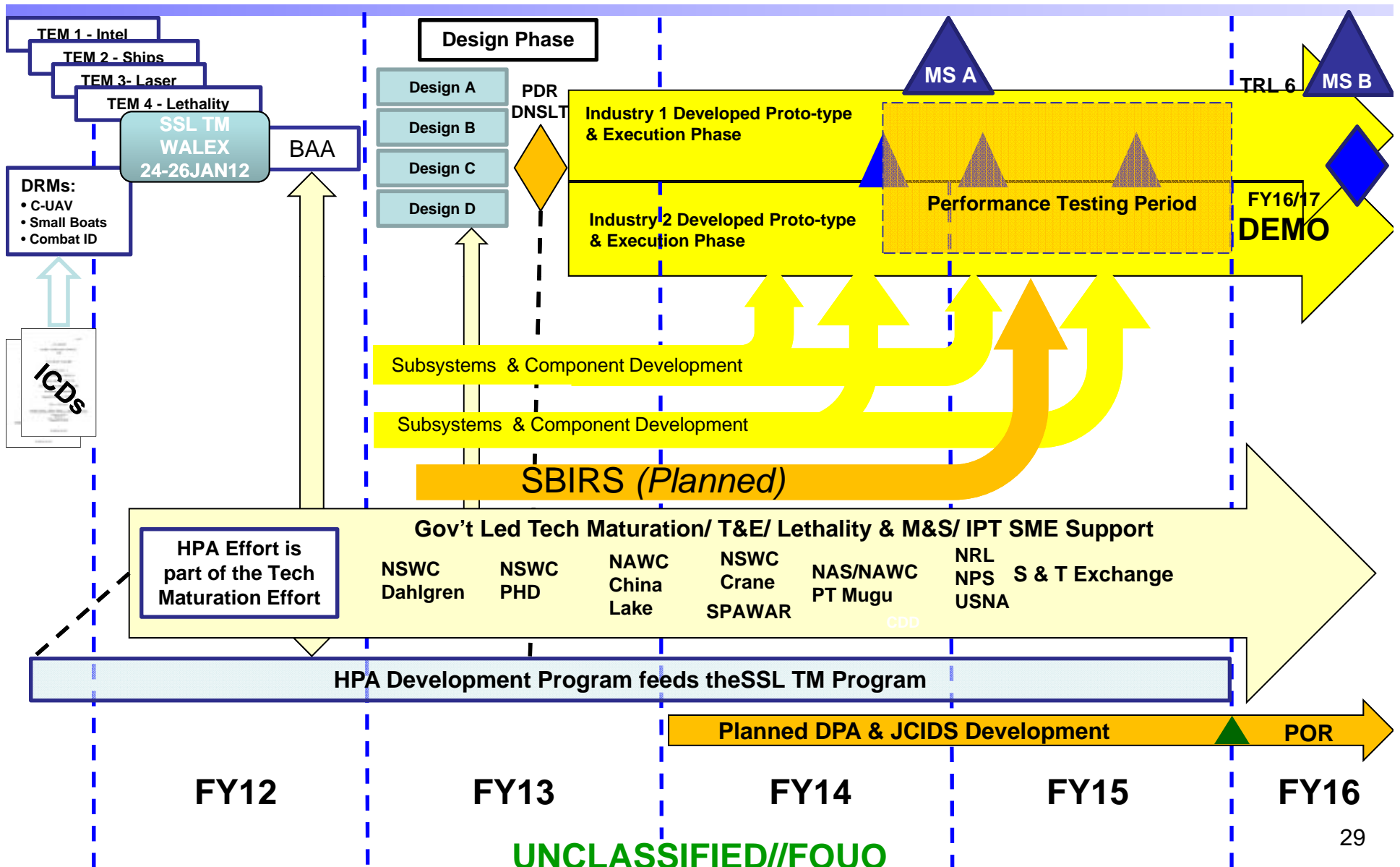
- TOTAL OWNERSHIP COST
- PROTOTYPE COST
- INITIAL SYSTEM UNIT COST
- LRIP COSTS
- COST PER SHOT

Limited investments as opportunities permit, leverage SBIR and other areas of collaborative testing (Modular subsystems)



# UNCLASSIFIED//FOUO

## NOTIONAL SSL-TM PROGRAM DECISION TIMELINE





***PLACEHOLDER FOR  
CLASSIFIED SLIDES  
INSERT HERE***

**NOTICE: CLASSIFIED SLIDES CAN NOT BE REDACTED TO  
SUPPORT UNCLASSIFIED PUBLIC RELEASE**

# Solid State Laser Technology Maturation ( SSL-TM )

## Recent Progress Highlights

**Why SSL-TM:** An SSL weapon uses ship's power and cooling instead of costly expendable propellants to provide a near term capability for:

- Speed of Light Time of Engagement, with
- Very Precise, Real Time Targeting & BDA, for
- Measured Weapon Effects, with
- Extremely Deep Magazines

to defend against threats posed against Naval Surface Combatant from :

- ISR UAVs, lethal UAVs, and light aircraft
- Small boats and asymmetric surface targets
- Small diameter anti-ship cruise missiles (C-RAM)

Additionally, SSLs offer additional utility in:

- precision discrimination of targets system for KE Weapons
- non-lethal to lethal capabilities (*"From Discern to Deter to Defeat"*)

**Partnerships:** NAVSEA PEO Ships, IWS, PMS405, NSWC, NAVAIR, NRL & Industry (Commercial partners TBD through competitive procurement)

**Why is SSL-TM Hard:** Laser transmission through the atmosphere near sea level reduces output power and targeting accuracy, due to atmospheric absorption and maritime turbulent mixing. Critical, high precision optics must survive very high laser irradiation, & compensate for ship vibration roll, pitch & yaw in high sea states.

**Accomplishments:** Demo C-UAV/C-ISR (2010) , Demo Ship Install & Radar Hand-off (2011), Demo against small boats (2011), Fire Zone Control & Static PA (2011), At Sea Life Fire Testing (2011), Swarming Combat ID and Targeting (2011)

**Upcoming Major Milestones:** Sea Tests of [redacted] capabilities (2012), Competitive Awards (2013)



US Navy Photograph, APRIL 2011, UNCLASSIFIED - PUBLICALLY RELEASEABLE

**ONR MARITIME LASER DEMO (2011)  
FIRST NAVY LASER WEAPON DEMO AT SEA**

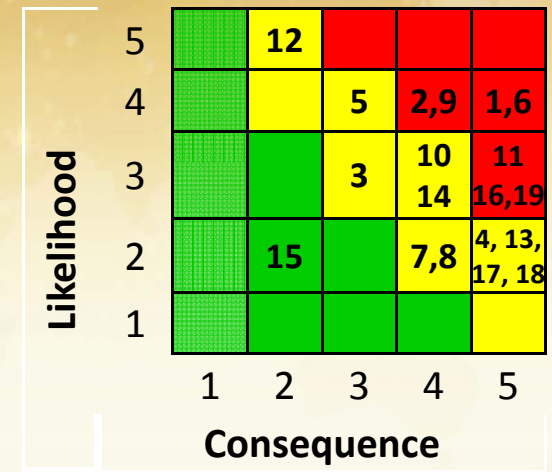


**NAVSEA Laser Weapon System Test Bed (LaWS)**

# SSL Technical Risk Assessment

No	Risk Area	L/H*	Mitigation	Post TM Goal
1	Beam Director Marinization	L, H	1	
2	Ruggedization (Shock & Vibe)	L, H	1	
3	Dynamic Atmospheric Characterization	L, H	2	
4	Blue/Gray/White Forces Predictive Avoidance	L, H	3	
5	Dynamic Battle Damage Assessment	L, H	3	
6	Aimpoint Selection and Maintenance	L, H	1	
7	Reliability, Maintainability, Sustainability	L, H	2	
8	Optical Coatings	L, H	1	
9	Beam Efficiency and Quality	L, H	1	
10	Thermal Management	L, H	2	
11	Systems Integration (Fire Control & C4ISR Interfaces)	L, H	2	
12	Battle Damage Assessment Signatures Database	L, H	3	
13	Power Delivery and Management	H	3	
14	Thermal Dissipation	H	3	
15	Ability to Adjust Power of Main Beam to Support Graduated Lethality	H	1	
16	Satellite Predictive Avoidance	L, H	4, 5	
17	Biological Effects Testing	L, H	6	
18	Shipboard Integration	L, H	7	
19	Beam Director Exit Aperture Survival	LH	1	

\* L = Low power laser (30 kW) H = High power laser (125 kW)



## MITIGATION

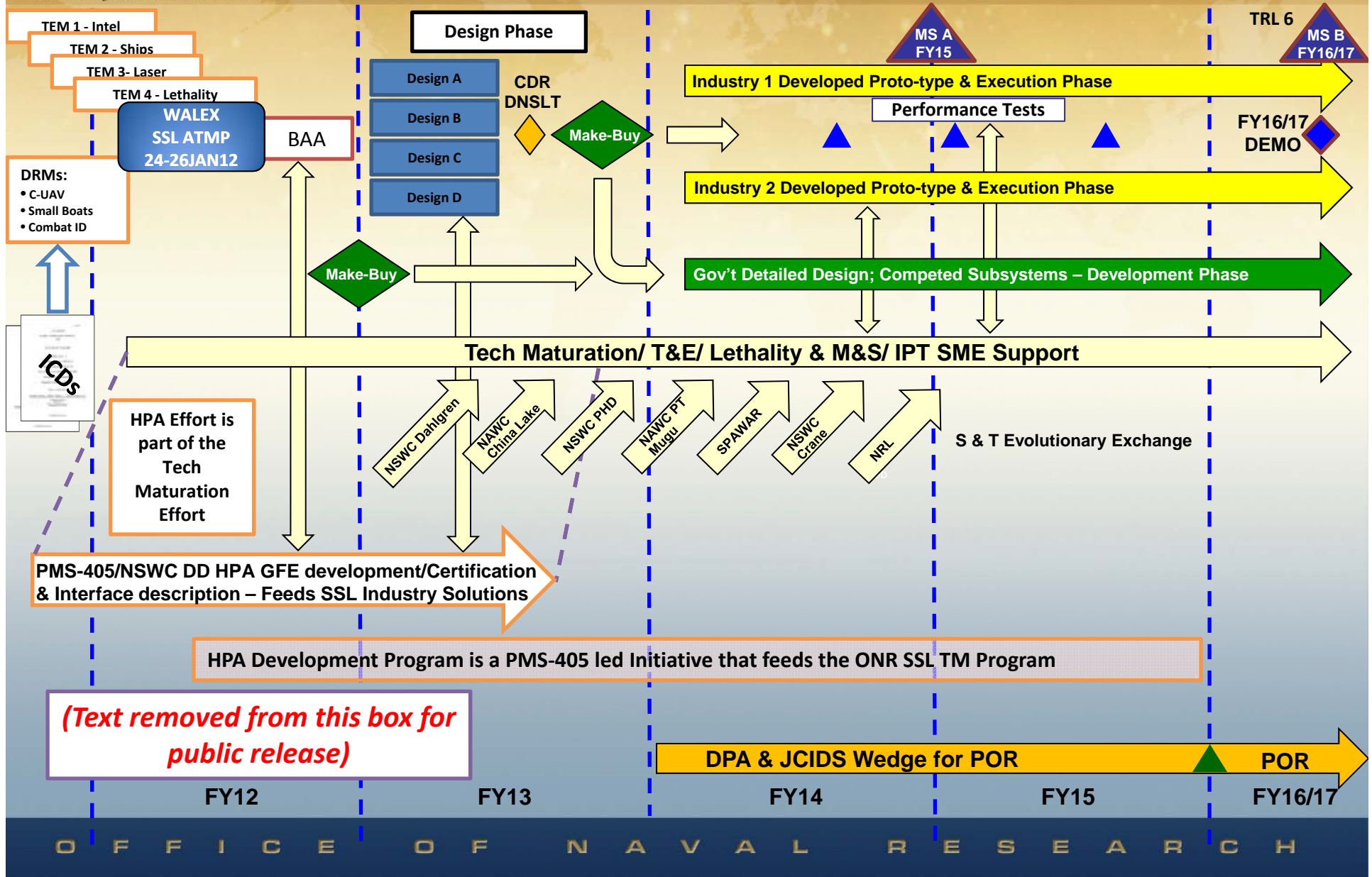
1. Reduced by ONR SSL-TM Effort
2. Partially Reduced by SSL-TM, need VA-4 funds to continue mitigation efforts
3. Risk requires BA-4 funds to mitigate
4. Pursuing policy change with OSD(P) – to allow for Operational and Tactical Combat
5. Alternative will require development of TS/SCI Multi-level security solution for each laser unit
6. Funding required to support Review board (1-2 year effort)
7. Studies underway (NAVSEA 05D): 30kW & 150kW laser systems for DDG-51 (Flights IIA & III) and LCS Hulls 3&4



# *Introduction*



# DRAFT SSL-TM Timeline







# Overview

- **Goal:** Technology maturation (TM) to develop/demo advanced, ship-based High Energy Solid State Laser (SSL) weapon system to address Surface Navy capability gaps for area and close-in self-defense and Combat ID/C4ISR
- Soliciting proposals
  - **Full Systems:** Develop/demo advanced development model (ADM) TRL 6 or 7 (preferred) SSL weapon system by FY16/17
    - Meet temporary shipboard installation constraints/req'ts. (6 months on ship)
    - Partnering is encouraged – Preferred Partnering may be directed
  - **Components/Subsystems:** Develop/demo components, subsystems, or innovative S&T ideas to support SSL weapon system within 2-3 years
  - **System Engineering and Integration Service Support:** *for support of integration efforts* led by the Government Directed Design Path. Proposals should fully qualify and quantify expertise and LOE for system design, engineering, development, and integration support.
- Managing Organizations
  - ONR Code 35 (Naval Air & Weapons Department) (Sponsor)
  - NAVSEA PMS-405 (Directed Energy & Electric Weapon Systems Program Office)
- More Info. on ONR BAA Website
  - <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx>



# *Eligibility*

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- Eligible
  - Industry
  - Academia
  - UARCs (unless precluded by UARC contract)
- Ineligible
  - FFRDCs (unless teamed w/eligible principal bidder and permitted by sponsoring agreement)
  - Navy labs and warfare centers
  - DoD and civilian Gov't organizations
- Full & open competition (No set-aside)
- Must be willing to cooperate/exchange software, data, and other information in integrated program w/other contractors and system integrators, as selected by ONR



# Approach – Program





# Program Potential Paths

- **Gov't “make or buy” decision based on quality of Offeror integration designs, cost, risk and schedule**
  - **Path 1 (Industry Designs):** Proposals from industry for competitive design, development of a prototype SSL system
    - Partner with subsystem/component vendors encouraged - Possibility of directed preferred partnering
    - *System integration should contain: MOSA and standard interfaces to accommodate other subsystems*
  - **Path 2 (Gov't Directed Design):** SSL prototype design conducted under supervision and direction of Gov't Design Agent
    - Vendors provide subsystems/components
      - Conduct design studies and competitive procurement of multiple subsystems/components
      - Competitive review of system integration tasks and support elements
    - Integration & critical design elements responsibility of Design Agent

- ✓ ***Development of subsystems/components of critical interest to Navy, regardless of path***
- ✓ ***Offerors encouraged to submit separate proposals for (1) System & Engineering Integration Support Services, (2) Subsystems/Components/S&T ideas and LOE for System Integration support, and (3) Full System Design Approaches***
- ✓ ***Subsystem designs have same evaluation weight as full system designs***



# *Additional Information to BAA Offerors*

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- BAA (to be published soon)
- Upon request and with proper facility clearances
  - BAA Addendum 1 (Top Level SSL Weapon System Requirements)<sup>1</sup>
    - Classified: will require request and special handling
  - High Energy Laser Decentralized Propagation Fire Control System Paper<sup>2</sup>
  - DON CIO Memo on Information Assurance Policy for Platform Information Technology<sup>3</sup>

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1 - Addendum 1 to Broad Agency Announcement (BAA) Solid State Laser – Technology Maturation (SSL-TM) Top Level Weapon System Mission Descriptions/Requirements (U). Arlington, VA: Office of Naval Research (ONR). (SECRET//NOFORN)

2 - Stoudt, Dr. David C. *Development Approach for a High Energy Laser Decentralized Propagation Fire Control System*. Technical White Paper. Washington, DC: Naval Sea Systems Command (NAVSEA). 8 May 2011. (UNCLASSIFIED//FOUO)

3 – “Department of the Navy Chief Information Officer Memorandum 02-10, Information Assurance Policy Update for Platform Information Technology.” DON CIO Memo 02-10 from Robert J. Carey to Distribution. Washington, DC: Department of the Navy. 26 April 2010. (UNCLASSIFIED)



# Approach (Program)

Notice: This Phase I/II notation was changed as a result of the Industry Day and the BAA as published (ONR 12-019) accurately reflects that what is requested is proposals for Phase I, II and III, and that Phase III as shown here, is now Phase IV in the ONR BAA. Refer to the current BAA (ONR 12-019) for up to date information on approach.

- Multiple contract awards possible
- *Proposals for Phase I/II contract due at close of BAA*
  - *Full cost proposals for Phase II expected in response*
  - **Phase I (Base Period):** 4 BAA proposals may be selected to develop design/detailed proposal
    - \$1.5M FFP award, 9 months PoP (FY13)
      - Subsystems, Components and S&T ideas may also be selected for funding
    - Deliverables
      - Written cost and technical proposal
      - 4-day Critical Design Review (CDR) to tech. experts, Fleet reps, resource sponsors; 8 copies of CDR pkg.
      - SSL prototype Level III Technical Data Package (TDP) (3 copies)
      - System Development T&E Master Plan (Factory tests thru Final demo)



# Approach (Program)

- **Phase II (Option 1+)**: 2 proposals/designs may be selected to build/demo a prototype (i.e., Option 1 is exercised to *begin* Phase II)
  - Deliverables
    - SSL weapon system prototype
    - Complete Technical Data Package (TDP) (Government-use rights to design)
    - Successful static/dynamic factory, land, & sea demonstrations with verification req'ts met
    - Supporting test data
  - ONR may, during contract period, add contract line item or option (limited by Section 819 of Nat'l Defense Authorization Act for FY10)
    - For provision of advanced component development
    - For delivery of additional prototype units.
- **Phase IIA**: awarded, if selected, to prepare for Phase III
- **Phase III**: potential for 1 Phase II proposal selected to build, integrate, demo, and accept EDM for production in a Program of Record

Notice: This Phase I/II notation was changed as a result of the Industry Day and the BAA as published (ONR 12-019) accurately reflects that what is requested is proposals for Phase I, II and III, and that Phase III as shown here, is now Phase IV in the ONR BAA. Refer to the current BAA (ONR 12-019) for up to date information on approach.



# Schedule (System/SS/Comp) (1 of 2)

Event	Date <sup>†,**</sup>	Time (Eastern)
Pre-Proposal Conference / Industry Day	May 16, 2012	1230
SSL BAA Industry Day Briefing Slides Available from ONR	May 30, 2012	
SSL BAA Posted on FEDBIZOPS	TBD	
Full Proposals Due Date: (Phase I/II System; System ENG & Integration Support; Sub-Systems & Component)	BAA Posting + 60 days	1700
Notification of Initial Navy Evaluations of Full Proposals	BAA Posting + 90 days	
Proposal Reviews	Up to 45 days after proposal received	
Notification of Initial Selections for Award	<b>BAA Posting + 100 days</b>	
Contract Awards	Notification of Navy Eval. + 120 days	
<b>Phase I Oral Presentations*</b>	<b>Phase I Award + 9 months</b>	
Phase II Kickoff Meeting	Phase II Option 1 Exercised + 14 days	
System Build and Test, Period of Performance (PoP)	~31 months	
Demonstration (Dynamic Land)	Phase II Award + 31 months	
Demonstration (Dynamic Sea)	Phase II Award + 31 months	

\* - Four (4) days for each of the Offerors selected to provide a detailed design Presentation at ONR in Arlington, VA, or at Dahlgren, VA

\*\* - If sending by certified mail, ensure delivery and receipt time based on the proposal due dates and times.

† - Dates are best estimates at this time and are subject to change.

**Notice: The schedule shown was changed as a result of the Industry Day and the BAA as published (ONR 12-019) accurately reflects new schedule dates for Phases I, II and III, and that Phase III as shown here, is now Phase IV in the ONR BAA. Refer to the current BAA (ONR 12-019) for up to date information on schedule.**





# Schedule (2 of 2)

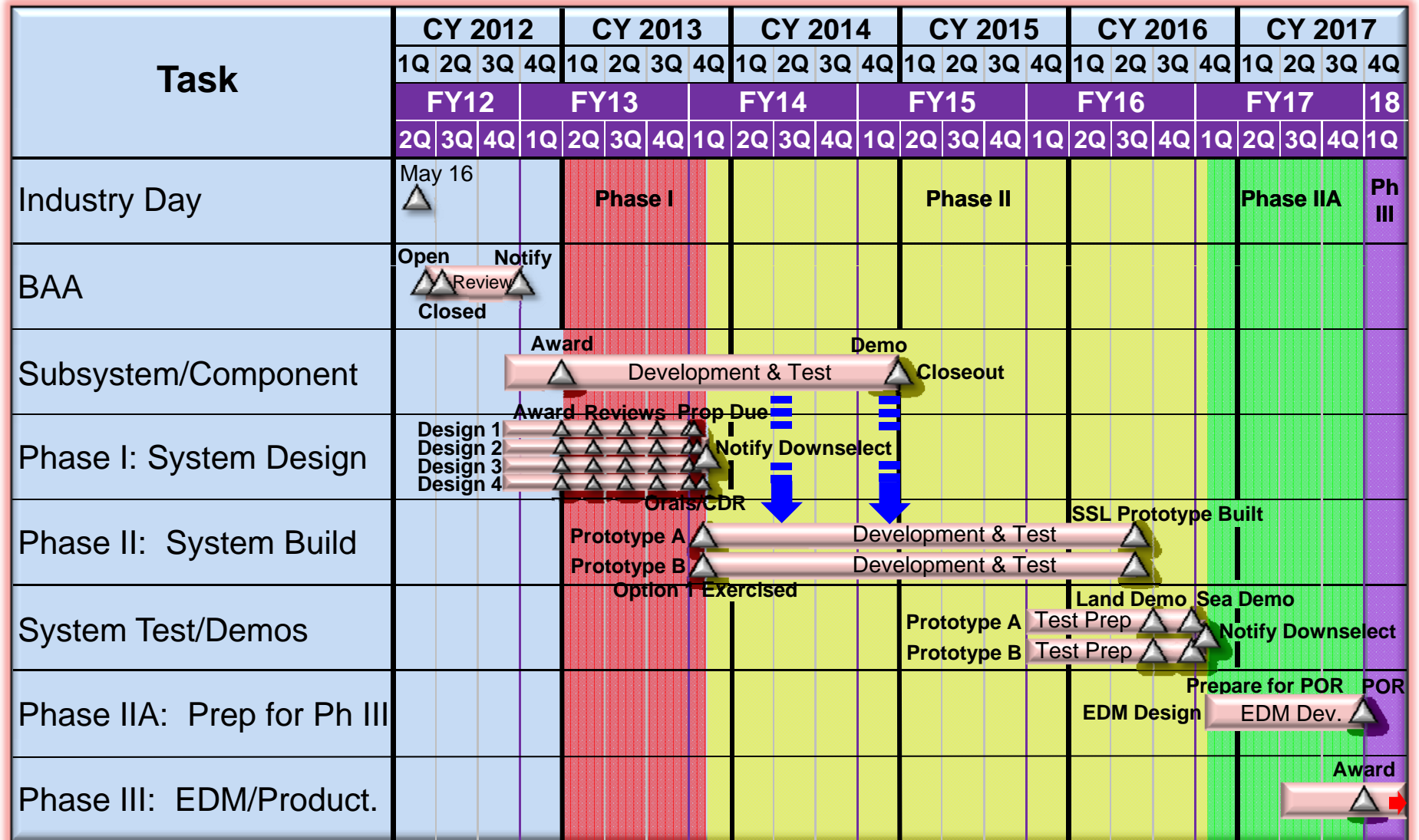
Event	Date <sup>†</sup>	Time (Eastern)
<b>Phase IIA</b>		
Program of Record Process (FY17)	FY17	
<b>Phase III</b>		
Program of Record Established (FY 18)	FY18	

† - Dates are best estimates at this time and are subject to change.

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# SSL Schedule\*



\* - Preliminary. Subject to change. Path 1 shown.

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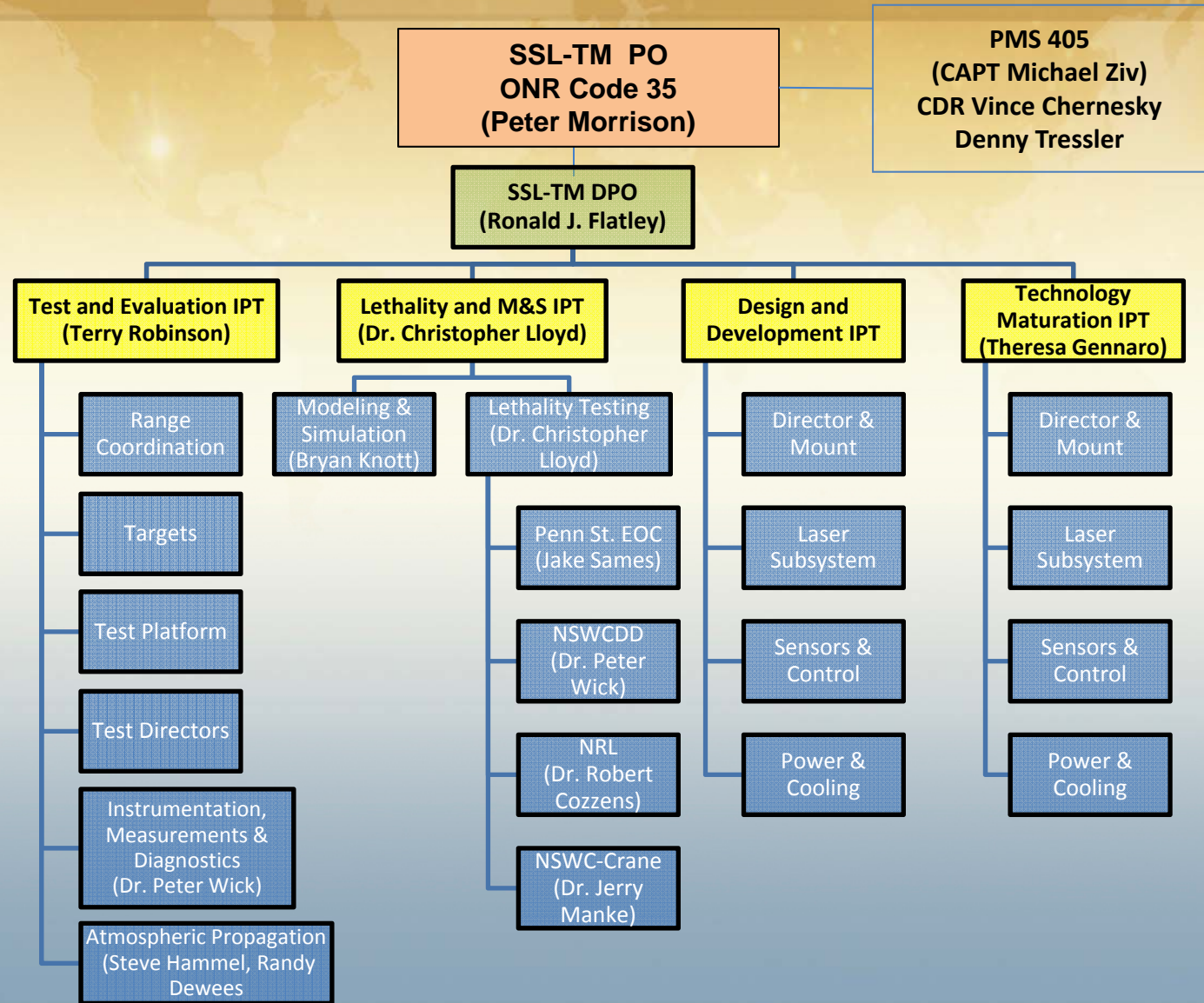
# Operation of Phases I & II

- Run by Gov't. Design/Develop IPT
  - Provide SME input to design
  - IPT w/Program Office may direct parts of design
    - Use of specific components/subsystems
    - Directed preferred partnering
    - Design changes
    - Similar guidance to all development teams
    - Reporting
      - Phase I: Weekly telecons/VTCs; monthly reports on financial, technical, schedule status; quarterly on-site 2-day reviews; final 4-day presentation of detailed proposal
      - Phase II: To be provided in Addendum 2 of BAA
- Lethality and M&S IPT – feeds T&E and metrics
- Test & Eval IPT provide performance metrics/measuring
- TECH MAT IPT – develops and tests 6.1-6.3 subsystems, components, and ideas

Notice: This Phase I/II notation was changed as a result of the Industry Day and the BAA as published (ONR 12-019) accurately reflects that what is requested is proposals for Phase I, II and III, and that Phase III as shown here, is now Phase IV in the ONR BAA. Refer to the current BAA (ONR 12-019) for up to date information on approach.

# Draft SSL IPT Structure

- NSWC Dahlgren
- NSWC Crane
- NAWC PT Mugu
- NSWC PT Hueneme
- NAWC China Lake
- NRL
- SPAWAR
- NSWC Carderock





# Additional Information to Phase I Awardees

- Upon request and with proper facility clearances:
  - Hybrid Predictive Avoidance Interface Control Document (HPA ICD)\*
  - Detailed SSL Weapon System Design Requirements & Specifications - **Classified**
  - Ship Installation Size, Weight, and Power (SWaP) guidance based on ongoing NAVSEA 05D SSL Ship Integration Study
  - BAA Addendum 2: Phase II Detailed Proposal Requirements (w/Evaluation Criteria) -  
**Technical Design Package**
    - Block diagrams
    - Schematics
    - Mechanical drawings
    - Parts lists and descriptions
    - Dimensions, materials, and vendors
    - Explanations of how the system will work

Notice: This Phase I/II notation was changed as a result of the Industry Day and the BAA as published (ONR 12-019) accurately reflects that what is requested is proposals for Phase I, II and III, and that Phase III as shown here, is now Phase IV in the ONR BAA. Refer to the current BAA (ONR 12-019) for up to date information on approach.

\* - HPA system will be Government Furnished Equipment (GFE) to Phase II Awardees.





# *Phase II Performance Tests*

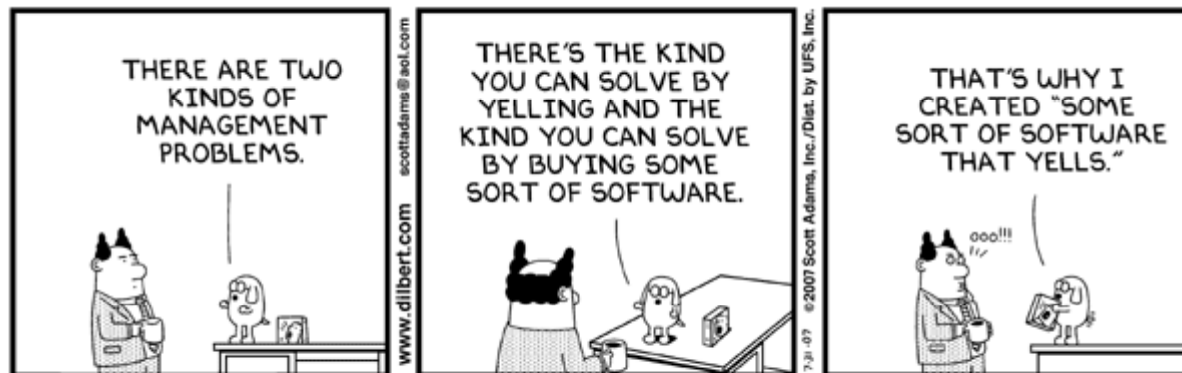
- Gov't evaluated performance tests required
  - Factory tests
  - Land-based system tests (end-to-end engagement/diagnostics)
  - Sea-based system tests (end-to-end engagement/diagnostics)
  - Gov't is sole evaluator
    - Using Gov't systems , models, & experts
  - Down select possible after any system performance test or milestone reviews

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# *System & Engineering Integration & Support Services (SEISS)*



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# *Systems Engineering & Integration*

- Two options – depending on Gov't Make-Buy decision
  1. Industry Led and Developed (Offeror provides full SSL weapon system design and development)
    - Demonstrate competence as Industry Led with in full system proposal per BAA
  2. Gov't Directed Design Led Team – Industry supports
    - If submitting proposal to provide System Engineering and Integration Support Services to a Gov't Led Directed Design Team
      - Show understanding/experience in systems engineering and system integration
      - Explain systems engineering and integration approach and how it will result in a better product at lower cost
        - Requirements identification, analysis, and flowdown
        - Test and evaluation (T&E)
        - Modeling & simulation
        - Risk identification and mitigation
        - Maximize subsystem interchangeability
        - Open architecture
        - HW and S/W integration



# *Approach - Components/ Subsystems*



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# Approach (Components/Subsystems)

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- BAA proposals of interest may be selected to design, develop, demonstrate, & deliver **prototype component and/or subsystem** applicable to SSL
  - 1-2 years PoP (FY13-FY14)
  - Deliverables
    - Demonstrated prototype component/subsystem of interest to SSL
    - Prototype Technical Data Package (TDP)
- If successful and Gov't. interest
  - Gov't may direct partnering with SSL system developers
  - Gov't may use in Gov't design
  - Mitigates system design risk and/or increases capability



# Components/Subsystems of Interest

- Solid State Laser(s)
  - High Energy (Fiber, Slab, Thin Disk, etc.)
  - EO/IR Dazzlers
  - Illuminators (Tracking and Beacon)
- Optics
  - Salt water resistant coating
  - Permeable optical coating
  - Designs to combine laser beams to meet requisite power densities on target and beam quality
  - Fast steering mirror & associated control S/W
  - Adaptive optics for atmospheric and on-optical bench wave-front correction (state advantages)
  - High power density optical coatings
- Beam Director and associated control S/W
- Power
  - Power conditioning for shipboard use
  - Alternative energy storage technologies and configurations for ship applications (e.g., battery, capacitor-based, fuel cell, fly wheel, superconducting energy storage, etc.)
- Cooling / Thermal Management
- Trackers (Course and Fine)
- Precision, low drift inertial reference solutions that provide precise inertial attitude knowledge
- Sensors
- Stabilization
- Isolation
- Tracking
- Targeting
- Software
  - Target ID algorithms and techniques
  - Tracking algorithms
  - Aimpoint Acquisition/Selection
  - Aimpoint Maintenance
  - Interface Development
- Controls
- Mount

*(List not exhaustive.  
Other applicable items  
will be considered.)*



# *Other Areas of Interest*

- Reliability/Maintainability
  - Fault isolation/tolerance
  - Built-In test
- Ship Integration/Environmental
  - Shipboard laser packaging
  - Beam director marinization
  - Shock/vibration mounting of sensitive components/optics
  - Combat system and C4ISR system integration
- System Efficiency (increased wall-plug efficiency, esp. the laser)
- Data Acquisition
  - Secure onboard data recording for laser events, video, and still photographs
  - Novel approaches for instrumentation and data collection/transmission of on-board target(s) systems
- In-situ atmospheric characterization for shipboard use in tactical shoot/don't shoot situations





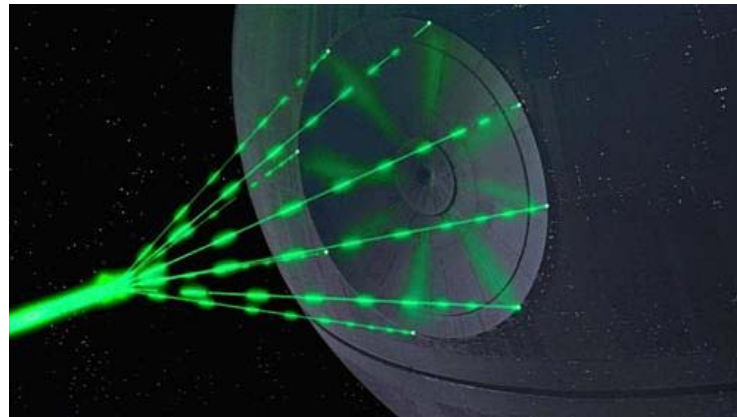
# *Design Considerations*

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- If awarded, Government must have government use rights to final design
  - Proprietary items clearly marked and justified
- Desired design characteristics
  - Open systems architecture (MOSA)
  - Modularity
  - Agnostic (system-independent)
  - Ease of ability to integrate with systems
- State expected TRL and technology advantage
  - Especially if long term development



# *Full System Design Requirements*



What we want.....



# *Understanding the Requirement*

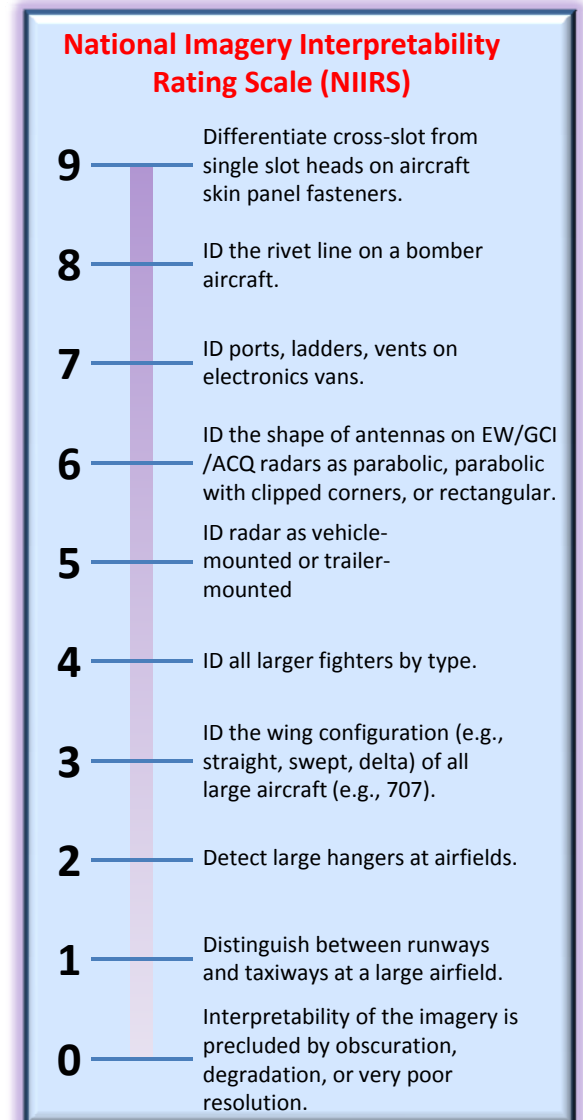
- Proposers must demonstrate:
  - technical approach is comprehensive, systematic, and sound
  - understanding of critical technical issues and risks both at the system and subsystem functional levels;
  - plan for mitigation of those risks
  - technical elements are well integrated into a cohesive program
  - Clear and concise conceptual design with enough developmental detail and rigor - to convince the review panel that the design has merit
  - quantitative understanding and descriptive discussion, with detailed drawings/illustrations, of the system design and program technical objectives/metrics
- Must Provide:
  - Risk trades between cost, gain, potential gain and any substantial size, weight, and power requirements (displayed in a table )
  - Any analysis techniques or codes/equations for system level modeling and performance – exceptions are HELEEOS and HELCOMES
  - Detailed technical discussion is required for any innovative or breakthrough approaches proposed.

***Task descriptions should be complete and in a logical sequence with all proposed deliverables clearly defined, such that a final product such that the final product can be expected to achieve program goals.***



# Design Proposal Instructions

- Demo ability to design, build, integrate, test laser weapon prototype that meets requirements
  - Provide technical discussion/details, with drawings, of system architecture and beam propagation path
    - Illustrate how photons goes from laser to target
    - Include effects from vibration, environment, power, beam forming, beam control, and aimpoint selection/maintenance
    - Describe self-alignment or system alignment mechanisms
    - Discuss aperture size, beam quality, optic train efficiency, any free space optics, laser power combining (passive, coherent, spectral, tiling, etc), contamination control/elimination
  - Discuss engagement process
    - Detection, Track (WFOV-NFOV), Target, & Engagement
    - Describe systems ability to take pictures, record video, perform Combat ID at range
      - Define capability using NIIRS and range
      - Discuss ISR functions of system





# *Design Proposal Instructions*

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- If using a laser or subsystem being developed under another program, include cost of subsystem and any mods in proposal
- May use existing Navy mounts (e.g., CIWS or Mk38). If so, include cost of acquiring or using mount and mods for duration of program
  - If GFE, include any required Gov't costs in using or modifying the mount
  - State mount weight and balance limitations
- **Models and Instrumentation:**
  - Gov't models for base motion disturbance and maritime atmosphere provided in BAA Addendum 1
  - Gov't models and instrumentation will be utilized for system performance measurement and predications.



# Testing Requirements

- Factory and Land-based tests
  - Cover all aspects of development & operational testing
- T&E
  - Gov't led and performed
  - Eval of primary subsystems, full system at NSWC Dahlgren
  - 1 or more tests at Gov't site (e.g., Eglin, WSMR, NAWC Pt Mugu, Port Hueneme, NSWC China Lake, NSWC Dahlgren)
  - Ability to proceed to next level based on performance evaluation by Gov't
- Ship-based test
  - Potential host platforms
    - LCS 4 class, LCS 5 class, DDG 51 Flt IIA class, or DDG 51 Flt III class
    - SDTS from Port Hueneme, CA
    - Design must address the LCS and DDG class platforms
    - Host platform will be directed
    - May remain on ship up to 6 months after demo for further evaluation/testing
  - NAVSEA 05D performing ship integration study to determine host rqts.
    - LCS 4 class, LCS 5 class, DDG 51 Flt IIA class, DDG 51 Flt III class
    - Results published during Phase I will provide SWaP requirements for ship classes





# *SSL Mission and Targets*

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- Targets
  - Primary: UAS
  - Secondary: small boats, patrol-boat-launched rockets & missiles
  - Specifics in BAA Addendum 1
- Mission
  - Design to primary mission
  - Cause target mission defeat (disable or deny EO/IR sensor)
    - Reversible
    - Non-Reversible
  - Cause hard kill of target (disabling platform carrying the sensor)
  - Conduct real-time BDA (desired)
  - Sufficient track capability & aimpoint stability required for secondary missions to include tracking ASCMs



# ***SSL ADM Configurations***

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- Two configurations for shipboard application
  - Stand-Alone (for field test/eval & limited ship integration)
    - Operate w/o ship services (power, cooling)
    - Interface to accept external input for target cueing
  - Partially Integrated
    - Interfaces to ship navigation, fire control, radar, power, and cooling systems (define in detail)
    - Only required to passively receive data from ship navigation, fire control, and radar. Should not inhibit future bidirectional data comms.
    - Allow for flexible integration (may be allowed above & below deck configuration based on ship availability)



# *Laser Output Power and Cooling*

- Laser output power
  - Minimum 30 kW
  - Exception: Min. is 25 kW if JTO RELI or DARPA Excalibur lasers proposed (performance specs in Detailed Req'ts Doc. still apply)
- Weapon system easily/economically scalable to higher power w/minimal change to design
  - e.g., replacing w/higher power laser causes no significant changes to beam director, mount, optics, or interfaces
  - Integration issues (e.g., space, power, cooling, energy storage) for higher power laser upgrade should be account for to minimize re-integration cost
    - Laser design to be power and cooling efficient
  - Efficient optical train; minimize losses
- Discuss max. scalable output power
  - Highlight trade spaces in required optics, power, cooling
  - No requirement to exceed 150 kW optical output power



# *Beam Director Requirements*

- Prototype must meet TRL 6 (7 preferred)
  - Tested in a relevant environment
- Beam director to handle extreme environments aboard Navy ship up to 6 months w/o specialized support
- Address in proposal and design for:
  - Automatic internal alignment
  - Weather resistant apertures
  - Long life optics
  - Weather proofing
  - Shock (Grade A)
  - Vibration
  - Shared aperture tracking
  - Use of shared aperture for Combat ID
- Verified by Gov't M&S and T&E
- Must meet MOSA and modularity requirements

TRL 6 means that the representative model or prototype system is tested in a relevant environment.



# ***IA, Cost, Reliability, Maintainability***

- Must meet all Information Assurance (IA) requirements including DON CIO Memo 02-10, 26 April 2010
- Present and illustrate design decisions that minimize total ownership costs while maximizing reliability, maintainability, and supportability
- Must have a system/process that collects, analyzes, & records all failures to prototype system, subsystems, & components (>\$5K) being developed, integrated, tested
  - For optics, threshold is \$100
  - Also track regardless of cost if component affects subsystem >\$5K
  - Gov't. decides failure items to be tracked and agreement on design solutions to fix
  - Provide status and results of reporting system during periodic technical and programmatic reviews for Gov't



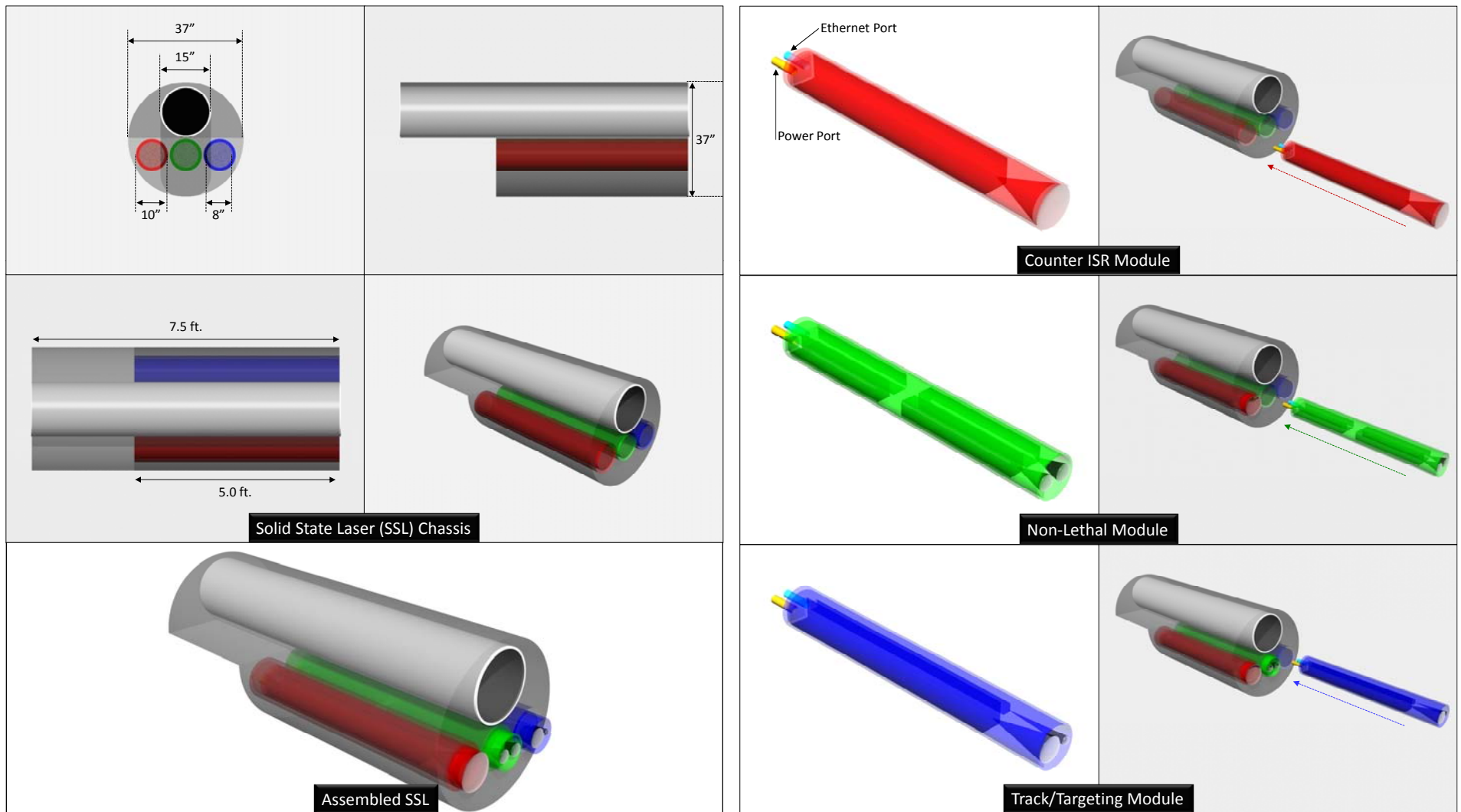
# *Modularity / Open Systems (1 of 2)*

- Use Modular Open System Approach (MOSA)
  - Supports future engineering changes or product improvements regarding laser power upgrades or replacement
  - Ideally, modules are “plug and play” LRUs
- Beam Director design shall support replaceable modules
  - Modular subcomponents to support interchangeability
  - Easily replaced (front loaded) pier side within one hour
  - Modules are “plug and play” w/standard electrical and mechanical interfaces
  - Modular support pods based on the mission
    - Counter ISR
    - Non-Lethal
    - BDA
    - Illuminator
    - Others TBD





# Notional Beam Director with Removable Modules





## *Modularity / Open Systems (2 of 2)*

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- Other options/approaches to modular/LRU concept must be justified via cost/benefit analysis
- Data format & configuration should follow MIL-STD-1553, MIL-STD-1760. Viable alternatives subject to Gov't review/approval.
- All major interfaces to be approved & distributed by Gov't
- If awarded, Government must have full “government use rights” to final design
  - Proprietary items clearly marked and justified
  - Minimize proprietary data



# *Other Requirements*

- See BAA Addendum 1 for additional requirements
- Shared aperture tracking and ISR/BDA capability is encouraged
- Open systems architecture
- Incorporate a GFE Hybrid Predictive Avoidance (HPA) unit
- Final system design to meet MIL-STD 901D Grade A shock requirements (prototype may not be tested to it)
- Comply with standard Navy HAZMAT, OSHA, and Safety standards and regulations
  - If exceeding OSHA and HAZMAT guidelines are recommended for solution, identify/justify in terms of benefits (e.g., size, weight, power, and cost) versus risks.
  - Li-Ion batteries must be safety approved.
  - Provide mitigation techniques/methods as part risk analysis
- Software must be compatible with Aegis Common Processor System (CPS)/Common Display System (CDS) hardware (CPS: NAVSEA 53711-8346930 and GDAIS ICD CDS 4000703)



# ***Common Processing System (CPS)***

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**AN/UYQ-107**

**IMAGE REMOVED FROM SLIDE TO SUPPORT PUBLIC RELEASE**



# Common Display System (CDS)

Variant A: OJ-827

Variant B: OJ-836



***IMAGE REMOVED FROM SLIDE TO SUPPORT PUBLIC RELEASE***



# *Safety Requirements (1 of 4)*

---

- Establish, implement, maintain System Safety Program (IAW MIL-STD-882D, NAVSEAINST 8020.6E, OPNAVINST 5100.24B, NAVSEAINST 9310.1B, NAVSEAINST 8020.7D)
- Environment, Safety and Occupational Health (ESOH)
  - Integrate into systems engineering process and System Engineering Plan (SEP)
  - Integrate into system design, development, test documents/plans
- Ensure system design, development, production, demil, & disposal complies with all applicable local, state, federal, and international environmental protection laws, regulations, treaties, and agreements.





# *Safety Requirements (2 of 4)*

---

- Establish System Safety Program Plan (SSPP)
  - ID & eval safety and health hazards and risk areas and manage risk per MIL-STD-882D
  - Includes fielding environment and designs to enhance safety (e.g., hard stops, predictive avoidance systems, safety power cutoff switches, etc.)
  - ID System Safety Lead
- Support Reviews
  - Boards
    - Weapon System Explosives Safety Review Board (WSESRB)
    - Software System Safety Technical Review Panel (SSSTRP)
    - Laser Safety Review Board (LSRB)
  - Develop environmental & safety analyses w/supporting doc's and presentations sufficient for reviews and addressing review board findings
  - Attend, develop material, and support all presentations to review boards



## *Safety Requirements (3 of 4)*

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- Participate in System Safety Working Groups (SSWG) to be chaired, planned, and coordinated by Gov't
- Establish/maintain electronic Hazard Tracking System
- Support development of
  - Categorical Exclusions (CATEX)
  - Environmental Assessments (EA)
  - Environmental Impact Statements (EIS)
  - Associated documentation, including
    - Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE)
    - National Environmental Policy Act (NEPA) Compliance Assessments
    - Overseas Environmental Assessments (OEAs) IAW Executive Order (EO) 12114
    - Other required environmental documentation and assessments



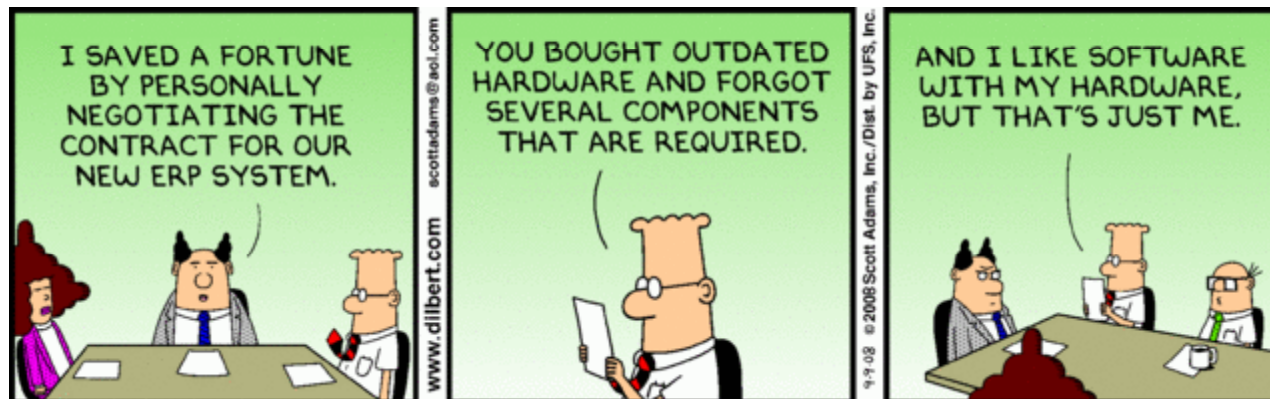
## *Safety Requirements (4 of 4)*

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- Provide assessment that includes all data and doc. necessary to demo full compliance w/all Fed, State, Local environmental laws, including known potential compliance issues
- Implement and document Hazardous Materials Management Program IAW National Aerospace Standard (NAS) 411
  - Provide Material Safety Data Sheets (MSDS) for Government for review.
- If lithium batteries used, get safety approval in accordance with NAVSEA S9310-AQ-SAF-010 of 15 July 2010 and NAVSEAINST 9310.1B of 13 Jun 1991 or current revision
- ID/develop plans to handle the hazards of electromagnetic radiation (EMI/EMC, HERO, HERF, HERP, RADHAZ per MIL-HDBK-240 and NAVSEAINST 8020.7D)



# *Contracts Information*



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# Recap: Contract Type and Eligibility

- Awards will be issued as contracts
  - Phase I – Base Period
    - \$1.5m Phase One Base Period – FFP
    - Anticipated Number of awards: up to Four(4)
    - Period of Performance is Nine (9) months
  - Phase II – Options One through TBD
    - \$TBD for Phase Two
    - Separated into Multiple Options – CPFF and FFP
    - Anticipated Number of awards: Two (2)
    - Period of Performance is approximately thirty six (36) months
- Down select occurs after Phase I work has been completed and Oral Presentations have been given
- Option One on only Two Contracts will be exercised
  - [FAR 52.217-5 Evaluation of Options]

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# Cost Proposal Outline

## Doing Business with the Government

- Proposals
  - Technical and Cost
  - Tech & Cost proposal Templates must be filled out
  - Cost Prop shall be in the Spreadsheet format mentioned in BAA and provided at ONR's website:
    - <http://www.onr.navy.mil/Contracts-Grants/submit-proposal/contracts-proposal/cost-proposal.aspx>
  - Follow BAA instructions
- Process will be more efficient if you follow the guidelines outlined in the BAA instructions and provided in today's briefing
- Stewards of taxpayer funds – requirement taken seriously, requires much detailed information



# Cost Proposal Outline

## Doing Business with the Government (continued)

- Have you done Business with the Government before?
- Has your Accounting System been reviewed by DCAA?
  - If not.....DCAA: “Information for Contractors” FAR Part 31.205
  - Be prepared for an Pre/Post Award Accounting System Review
- Approved Purchasing System?
  - If so, Prime will be required to do cost analysis of subcontractors’ proposals [DFARS 252.244-7001(c)(8-11) and FAR 52.244-2(e)]

# Cost Proposal Outline

- **Direct Labor Rates (Unburdened/Burdened)**
  - Labor Categories and/or Employee Name
  - Labor Hours required to accomplish effort
  - DCAA audited? FPRR? FPRA? If not, provide Paystubs & Job Descrp.
- **Indirect Rates**
  - Identify Fringe, Overhead, G&A, COM, etc. and their bases
  - DCAA audited? If not, may need to submit Pro Forma data
- **Travel**
  - Purpose, origin & destination, duration, number of travelers, estimated cost per trip, etc.
  - GSA Per Diem Rates: [www.gsa.gov](http://www.gsa.gov)
  - Vendor quotes (Expedia, Alamo, Hilton, etc.)

# Cost Proposal Outline

- **Materials**
  - Itemized List: Description, Quantity, Unit Price, Vendor,
  - Basis for Cost of Materials (quotes, invoices, catalog prices, prior purchase orders)
  - All materials >\$10K, must have quotes: invoices, catalog prices, prior purchase orders are acceptable
  - If total material costs >\$100K, provide a sample of quotes, invoices, catalog prices, prior purchase orders for more than 50% of total costs
- **Equipment/Hardware/Facilities (Gov't doesn't pay to facilitate)**
  - Provide Description & Justification for equipment
  - Provide quotes, invoices, catalog prices, prior purchase orders
  - Is Equipment/Hardware part of deliverable?
  - If not part of deliverable, proposed items will be evaluated on a case by case basis
  - Government will own the Equipment at the end of the contract
  - No Fee/Profit will be applied to Equipment costs
- **Other Direct Costs (ODCs)**
  - Detailed itemized list of all ODCs (include quotes, prior purchases, catalog price lists, invoices)

# Cost Proposal Outline

- **Subcontractors (over \$150,000)**
  - Detailed Cost proposal (Direct & Indirect Rates, Materials, Travel, ODCs)
  - Over >\$700K, Certificate of Current Cost & Pricing
  - Has DCAA Audited Sub Accounting System?
  - <\$150K, only a breakout of the cost categories is required
  - DFARS 252.244-7001(c)(8-11) and FAR 52.244-2(e)
- **Consultants**
  - Consultant Agreement, justification for consultant
  - Detail of proposed labor hours and rates and other associated costs (travel, materials, etc)
  - If >\$200 p/hr, greater scrutiny of costs

# Other Proposal Requirements

- **Subcontracting Plan**
  - Required for all actions over \$650K and Contractor is not small business FAR 19.702
  - Must provide detailed explanation for 0% Goals
- **ONR Contract Specific Reps & Certs Section K**
  - <http://www.onr.navy.mil/Contracts-Grants/submit-proposal/~media/Files/Contracts-Grants/Downloadable%20Forms/ONR-Contract-Specific-Representations-Certifications.ashx>
- **CCR Registration** – Is it current?
- **ORCA Registration** – Is it current?
- **Excluded Parties List System (EPLS)**

# Other Proposal Requirements

- **Data Rights Assertion**
  - Are there any? Only assert legitimate rights, GC at ONR scrutinizes very carefully!
  - Only assert Data Rights on data/hardware/software that will be incorporated into deliverables
  - If it's not part of the deliverables, don't assert data rights – unnecessary
  - Be specific and cite source document for data
- **Certificate of Current Cost & Pricing (All Contracts >\$700K)**
  - Truth in Negotiations Act (TINA)
  - Must certify cost and/or pricing data is accurate, complete and current as of date that negotiations are finalized
- **Task-Oriented, Non-Proprietary, Unclassified Statement of Work**
- **Fee/Profit**
  - Not allowed on direct costs for facilities or in cost sharing contracts

# Questions?

- Please write your Contract-related questions on the cards provided.
- ONR will answer all questions and post answers to FedBizOpps.