Naval Innovation and Disruptive Technology

Lawrence Schuette
Office of Naval Research
Director of Innovation
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larry.schuette@navy.mil

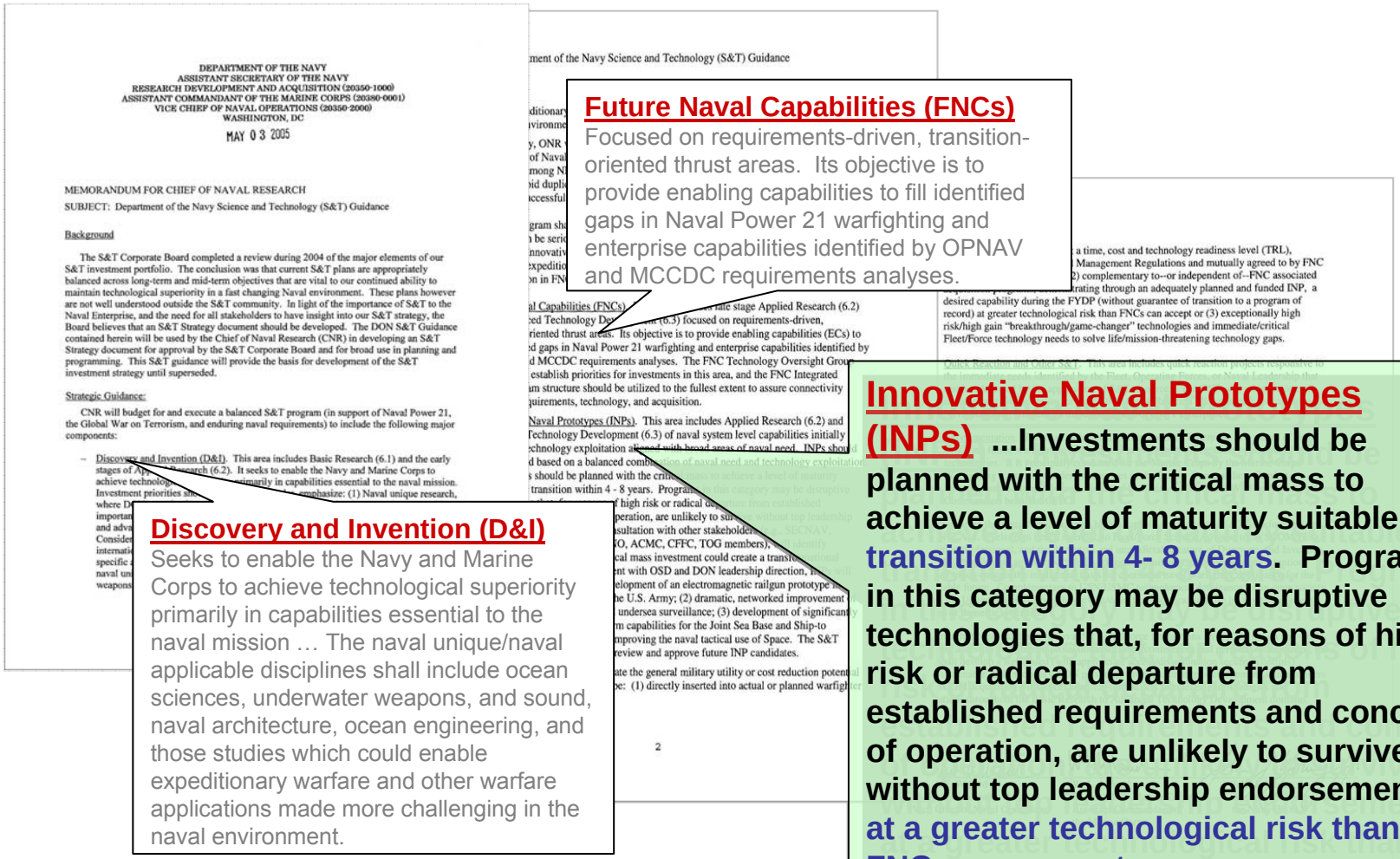
INNOVATIVE NAVAL PROTOTYPES
Disruptive Innovations

Overview

- "This Conference seeks to exploit the unique and often contrasting nature of commercial industry and military sponsored science and technology efforts.
- Many of the rapidly evolving disruptive technologies will most likely be developed by agile commercial marketplace attributes.
- Larger and longer to develop disruptive technologies will probably be championed by the DoD for application as pure national security capabilities.
- The Conference seeks to exploit the hybrid situation. Specifically the identification and adaptation of technology products that result in a high end military capability."

This talk will explain the range of Navy S&T Innovative Technology Programs.

DoN S&T Guidance



DEPARTMENT OF THE NAVY
ASSISTANT SECRETARY OF THE NAVY
RESEARCH DEVELOPMENT AND ACQUISITION (20350-1000)
ASSISTANT COMMANDANT OF THE MARINE CORPS (20380-0001)
VICE CHIEF OF NAVAL OPERATIONS (20350-2000)
WASHINGTON, DC

MAY 03 2005

MEMORANDUM FOR CHIEF OF NAVAL RESEARCH

SUBJECT: Department of the Navy Science and Technology (S&T) Guidance

Background

The S&T Corporate Board completed a review during 2004 of the major elements of our S&T investment portfolio. The conclusion was that current S&T plans are appropriately balanced across long-term and mid-term objectives that are vital to our continued ability to maintain technological superiority in a fast changing Naval environment. These plans however are not well understood outside the S&T community. In light of the importance of S&T to the Naval Enterprise, and the need for all stakeholders to have insight into our S&T strategy, the Board believes that an S&T Strategy document should be developed. The DON S&T Guidance contained herein will be used by the Chief of Naval Research (CNR) in developing an S&T Strategy document for approval by the S&T Corporate Board and for broad use in planning and programming. This S&T guidance will provide the basis for development of the S&T investment strategy until superseded.

Strategic Guidance:

CNR will budget for and execute a balanced S&T program (in support of Naval Power 21, the Global War on Terrorism, and enduring naval requirements) to include the following major components:

– Discovery and Invention (D&I). This area includes Basic Research (6.1) and the early stages of Applied Research (6.2). It seeks to enable the Navy and Marine Corps to achieve technological superiority primarily in capabilities essential to the naval mission. Investment priorities shall emphasize: (1) Naval unique research, where D… important… and adva… Consider… internati… specific … naval un… weapons…

…ment of the Navy Science and Technology (S&T) Guidance

…ditionary …vironme… …y, ONR … …of Naval … …mong N… …id dupli… …ccessful… …gram sha… …be seri… …nnovativ… …xpeditio… …n in FN…

…al Capabilities (FNCs) … late stage Applied Research (6.2) …ed Technology Dev… …n (6.3) focused on requirements-driven, …riented thrust areas. Its objective is to provide enabling capabilities (ECs) to …d gaps in Naval Power 21 warfighting and enterprise capabilities identified by …d MCCDC requirements analyses. The FNC Technology Oversight Grou… …establish priorities for investments in this area, and the FNC Integrated …m structure should be utilized to the fullest extent to assure connectivity …uirements, technology, and acquisition.

Naval Prototypes (INPs). This area includes Applied Research (6.2) and Technology Development (6.3) of naval system level capabilities initially …chnology exploitation a… …d based on a balanced combi… …s should be planned with the criti… …transition within 4 - 8 years. Progra… …f high risk or radical de… …peration, are unlikely to su… …sultation with other stakeholder… …O, ACMC, CFFC, TOG members); …cal mass investment could create a transi… …nt with OSD and DON leadership direction, … …elopment of an electromagnetic railgun prototype … …he U.S. Army; (2) dramatic, networked improvement … undersea surveillance; (3) development of significant … …m capabilities for the Joint Sea Base and Ship-to …mproving the naval tactical use of Space. The S&T …review and approve future INP candidates.

…ate the general military utility or cost reduction potent… …e: (1) directly inserted into actual or planned warfigh…

2

…a time, cost and technology readiness level (TRL), … Management Regulations and mutually agreed to by FNC …2) complementary to--or independent of--FNC associated …trating through an adequately planned and funded INP, a desired capability during the FYDP (without guarantee of transition to a program of record) at greater technological risk than FNCs can accept or (3) exceptionally high risk/high gain "breakthrough/game-changer" technologies and immediate/critical Fleet/Force technology needs to solve life/mission-threatening technology gaps.

Quick Reaction and Other S&T. This area includes quick reaction projects responsive to …

Future Naval Capabilities (FNCs)

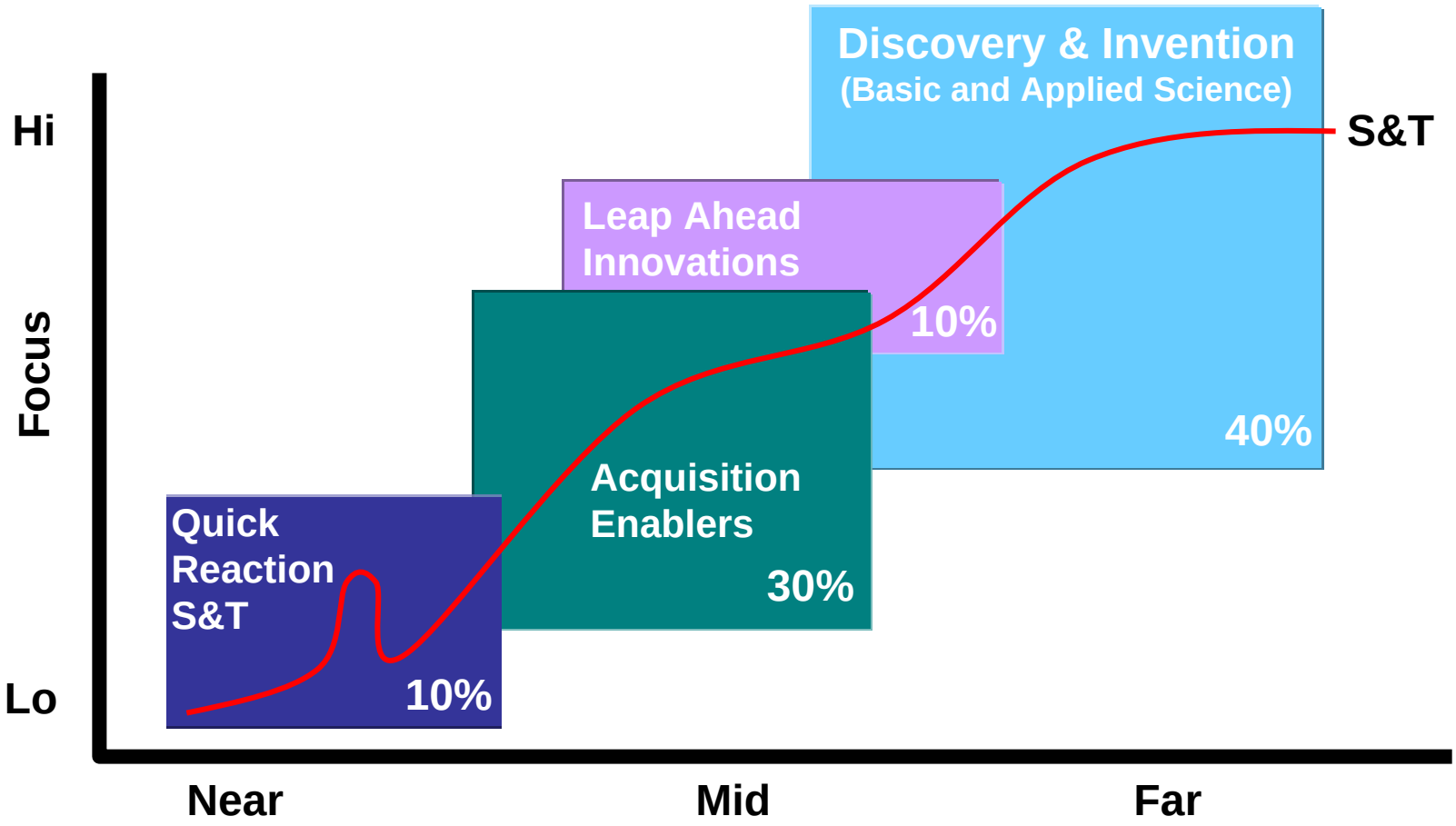
Focused on requirements-driven, transition-oriented thrust areas. Its objective is to provide enabling capabilities to fill identified gaps in Naval Power 21 warfighting and enterprise capabilities identified by OPNAV and MCCDC requirements analyses.

Discovery and Invention (D&I)

Seeks to enable the Navy and Marine Corps to achieve technological superiority primarily in capabilities essential to the naval mission … The naval unique/naval applicable disciplines shall include ocean sciences, underwater weapons, and sound, naval architecture, ocean engineering, and those studies which could enable expeditionary warfare and other warfare applications made more challenging in the naval environment.

Innovative Naval Prototypes (INPs) **...Investments should be planned with the critical mass to achieve a level of maturity suitable for transition within 4- 8 years. Programs in this category may be disruptive technologies that, for reasons of high risk or radical departure from established requirements and concepts of operation, are unlikely to survive without top leadership endorsement ... at a greater technological risk than FNCs can accept ...**

ONR S&T Portfolio Balance

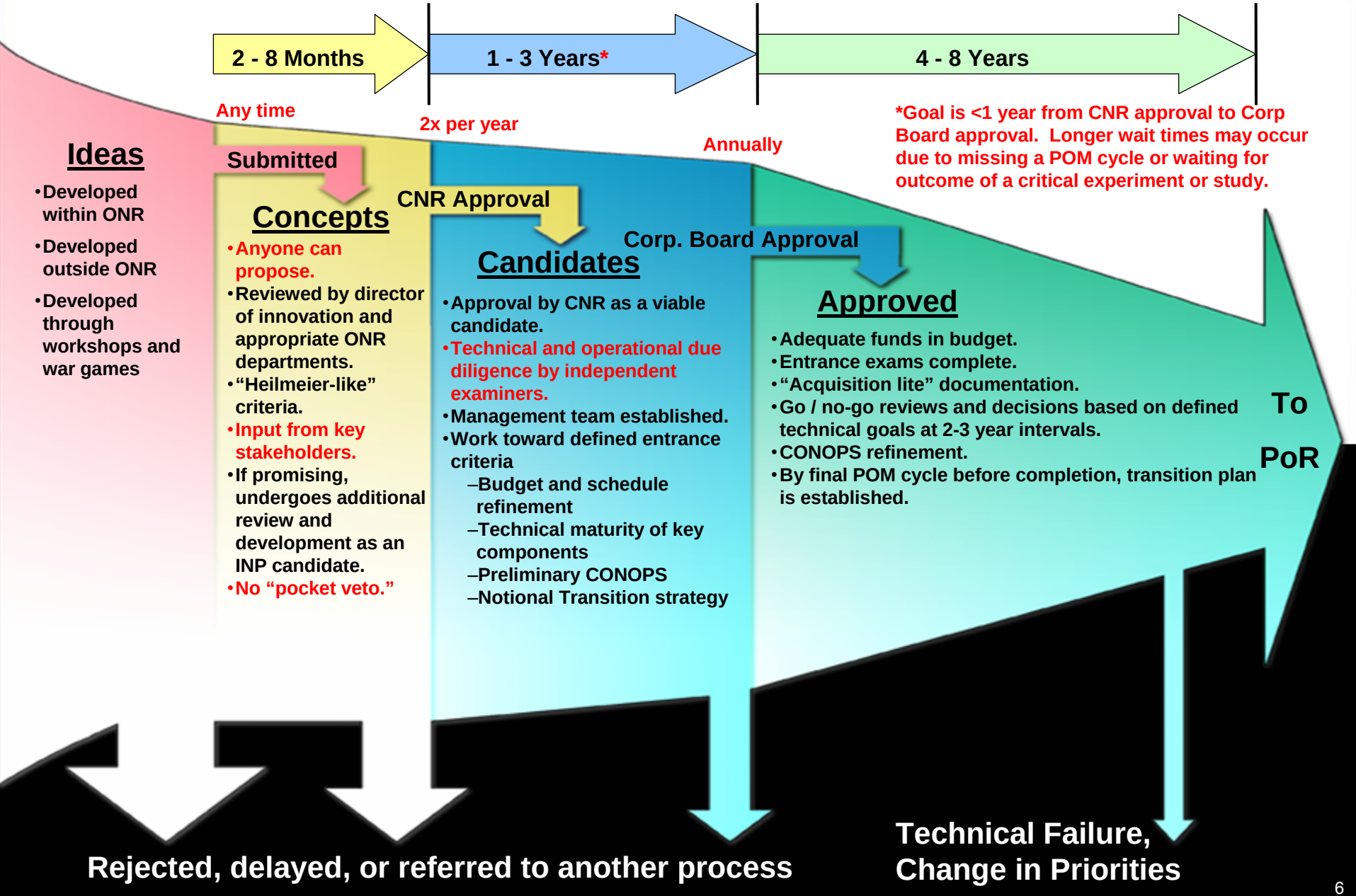


Navy S&T has a long-term focus but is responsive to near - term Naval needs

INPs Compared to Other ONR Programs

	Discovery and Invention	Future Naval Capability	Direct Fleet Support / Quick Reaction	Innovative Naval Prototype
% of Portfolio	>40	>30	~10	~10
Focus	Expanding frontiers of knowledge in areas of naval interest	Transitioning mature S&T to acquisition program of record	Solving emergent fleet / force needs	Demonstrating Leap-ahead technology
Motivation	General Naval needs and opportunities	OPNAV-identified capability gap	Fleet-identified need	Significant military advantage
Example	Ocean Acoustics	38 MW water jet for JHSV	IED Jammer	Electromagnetic Railgun
Type of Innovation	Disruptive or sustaining.	**Sustaining -** makes an existing capability better	Disruptive or sustaining.	**Disruptive -** makes an existing capability obsolete
Time frame	continuing	3-5 years	1-2 years	4-8 years
Typical TRL entry point	TRL-0	TRL-3	TRL-4 to TRL-5	TRL-2 to TRL-3
Typical TRL end point	TRL-3 to TRL-4	TRL-6	TRL-7	TRL-6
Technical Difficulty	High	Medium	Medium	High
Operational Integration Complexity	N/A	Usually straightforward	Medium	High
Approval Level to start a program	ONR Department	Technology Oversight Group (3-Star)	ONR Corporate	DON Corporate Board (4-Star)

Going From Idea to INP



Business Rules

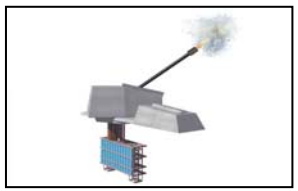
- ***Preserve*** **competition as long as possible within budget, time, and milestone constraints of INP**
- **Ensure open architecture enables continued competition in acquisition and life cycle phases**
- **Provide incentive to contractors where possible**
- **Reduce system and platform costs**
- **Reduce system and platform life cycle costs**
  - Ensure open architecture facilitates future technology insertion and innovation
  - Reduced manning
- **Ensure innovation by enabling participation by small and start-up businesses**

INP Program Snapshot

$991M
Planned / Proposed
FY08-13

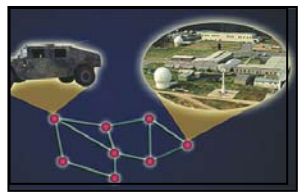
- Guidance
  - Innovative and game-changing.
  - High risk, high payoff.
  - Useable prototype available at completion.
  - Deputy PMs from Acquisition PEOs to facilitate transition.

Current INPs



EMRG

SBE



TACSAT

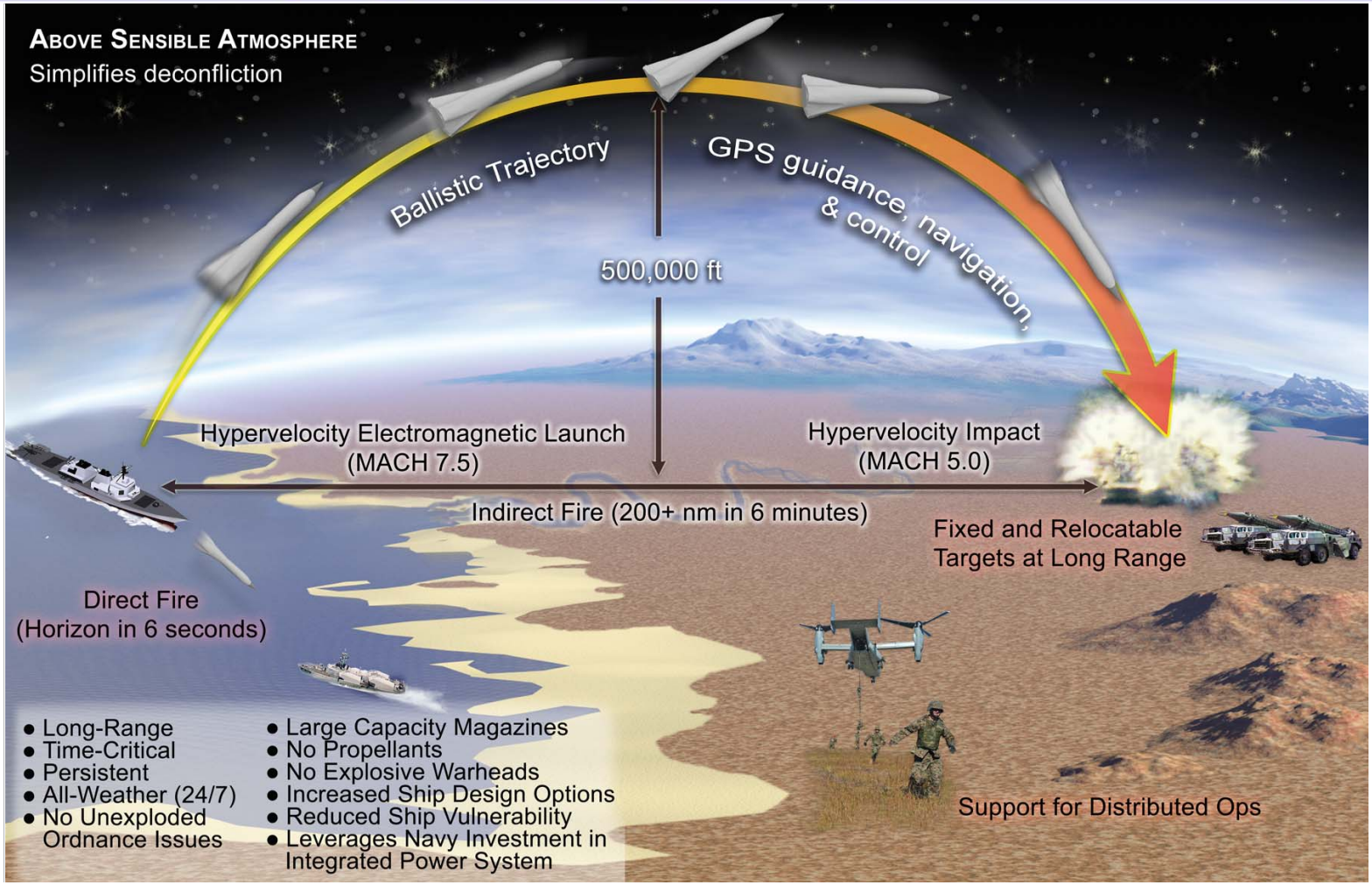
PLUS

FY-10 INPs

FEL

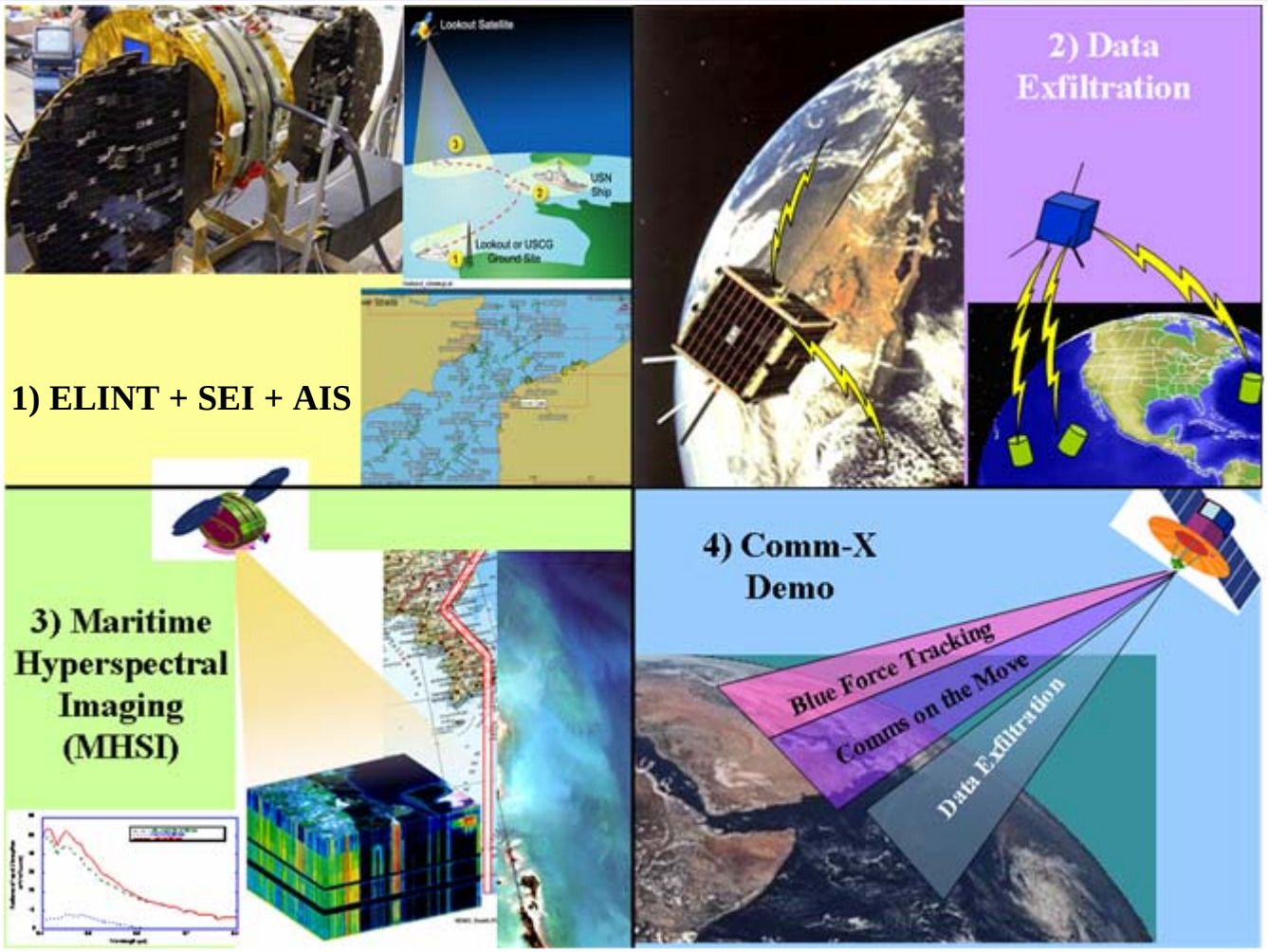
INT TOPSIDE

EM Railgun INP



EMRG	Relationship to Strategic Plan	"Leap Ahead" Characteristics
	Power Projection − Future Naval Fires	•2 orders of magnitude increase in surface combatant lethality against land targets. •Replace propellants and energetics with electric power and kinetic energy

Tactical Satellite (TACSAT) INP



TACSAT	Relationship to Strategic Plan	"Leap Ahead" Characteristics
	•Maritime Domain Awareness − Vessel tracking •Information, Analysis, and Communications	•Low cost and responsive access to space. •Control and tasking by tactical users. •Advanced sensors and comms

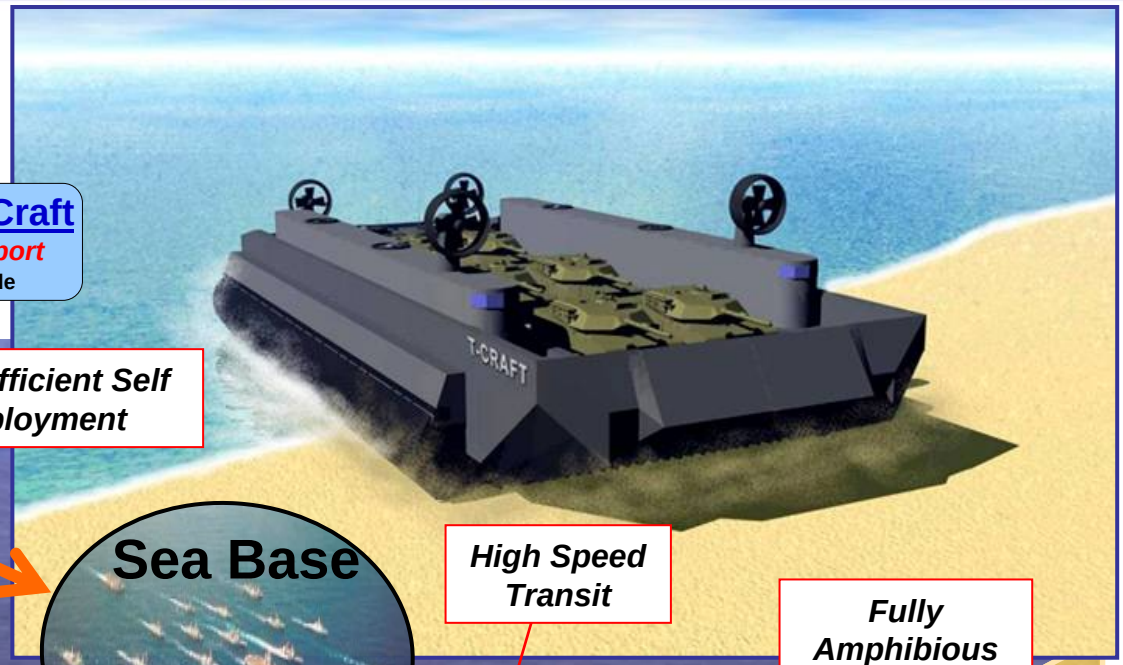
Seabase Enablers INP

T-Craft

Multi-Mode Vehicle Delivery Craft

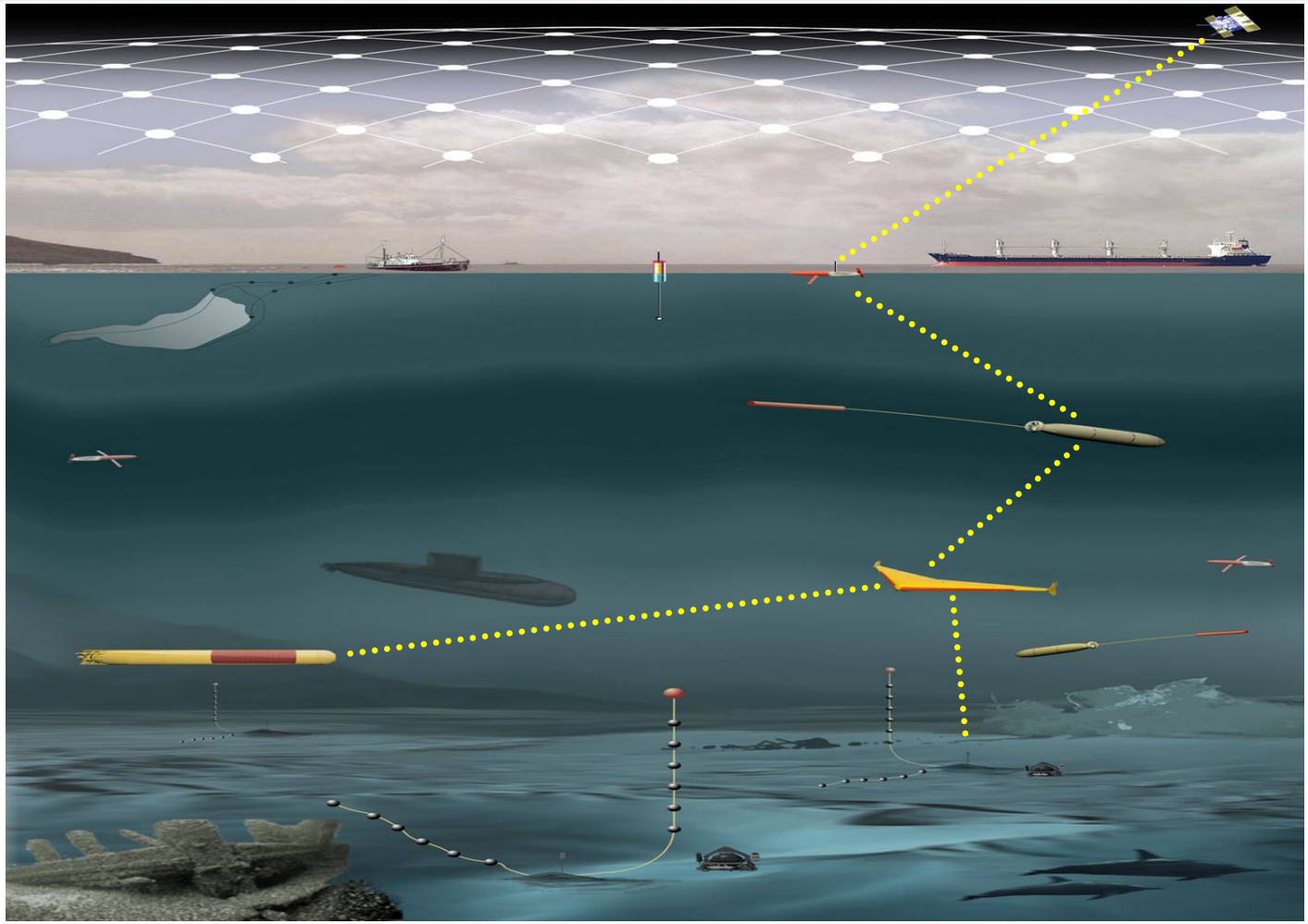
T-Craft: High Speed Beach-able Transport

40kt in SS-4 with beaching & amphibious mode



SBE	Relationship to Strategic Plan	"Leap Ahead" Characteristics
	Fleet and Force Sustainment – Advanced Sea Platforms	Radical new approach to amphibious delivery. Combines JHSV and JMAC-like characteristics in one vehicle.

Persistent Littoral Underwater Surveillance (PLUS) INP

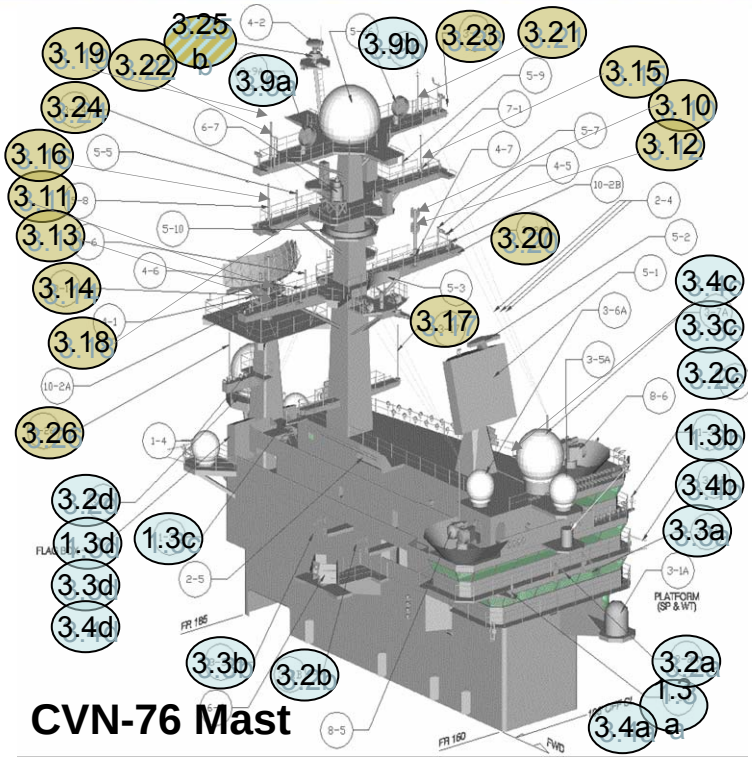


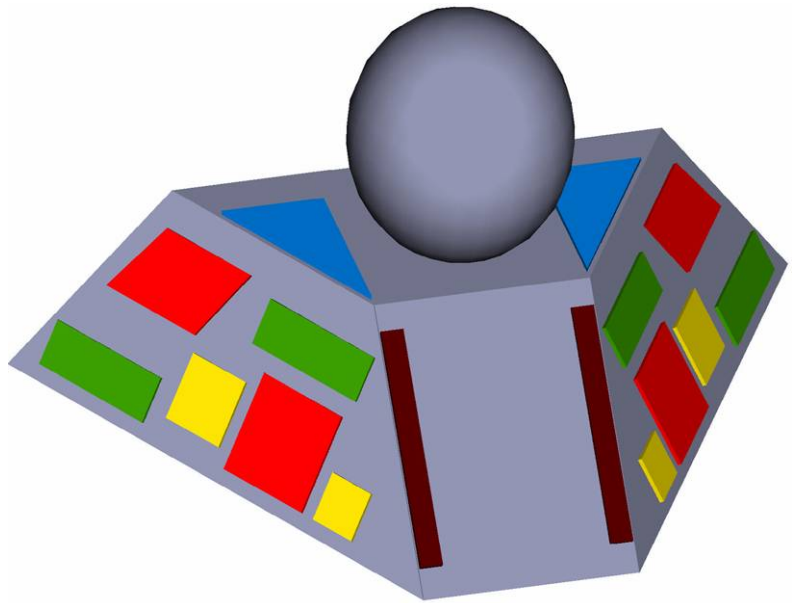
PLUS	Relationship to Strategic Plan	"Leap Ahead" Characteristics
	Assured Access and Hold at Risk − ASW, distributed surveillance	•Find quiet diesel subs without putting high value platforms at risk •High end ASW capability embedded in distributed network of low-cost autonomous mobile nodes.

FY-10 INP – Free Electron Laser

FEL	Relationship to Strategic Plan	"Leap Ahead" Characteristics
	Survivability and Self Defense − Speed of light engagement	•Speed of light weapon trumps speed and maneuverability of threat weapons. •Replace propellants and energetics with directed energy. •Deep magazine.

FY-10 INP – Integrated Topside





46 to 51 antennas		4 panels , 20 meters ^{2}
	NEW	
> 3500 pounds (Ant. Only)		< 1800 pounds

Integrated Topside	Relationship to Strategic Plan	"Leap Ahead" Characteristics
	• Affordability, Maintainability, and Reliability • Information, Analysis, and Communications	•Dominate the EM Spectrum •Multi-function apertures break down barriers between comms, EW, and sensing.

INPs in the Pipeline

	Technology at Appropriate Level	Programmatics Defined	Game Changer	Outreach / Due Dilligence
Air Connector for Distributed Ops	Y	N	Y	N
Compact Directed Energy System for Air Platforms	N	N	Y	N
Free Electron Laser	Y	Y	Y	Y
High bandwidth comms with submerged submarines and UUVs	N	N	Y	N
Integrated Topside	Y	Y	Y	Y
Persistent Air Platform	Y	N	Y	N
Radically Augmented Human Performance	N	N	Y	N
Submarine Advanced Propulsion	Y	N	Y	N
Supercavitating Weapon	Y	N	Y	N
Super Endurance Aircraft Propulsion	N	N	Y	N
UV Sentry System	Y	N	Y	N
WMD Standoff Detection	N	N	Y	N

. . . Your Ideas for new INPs?

Questions?
Ideas?

larry.schuette@navy.mil