Naval Science and Tech

The Navy and Marine Corps Corporate Laboratory

Naval Research Investment Strategy

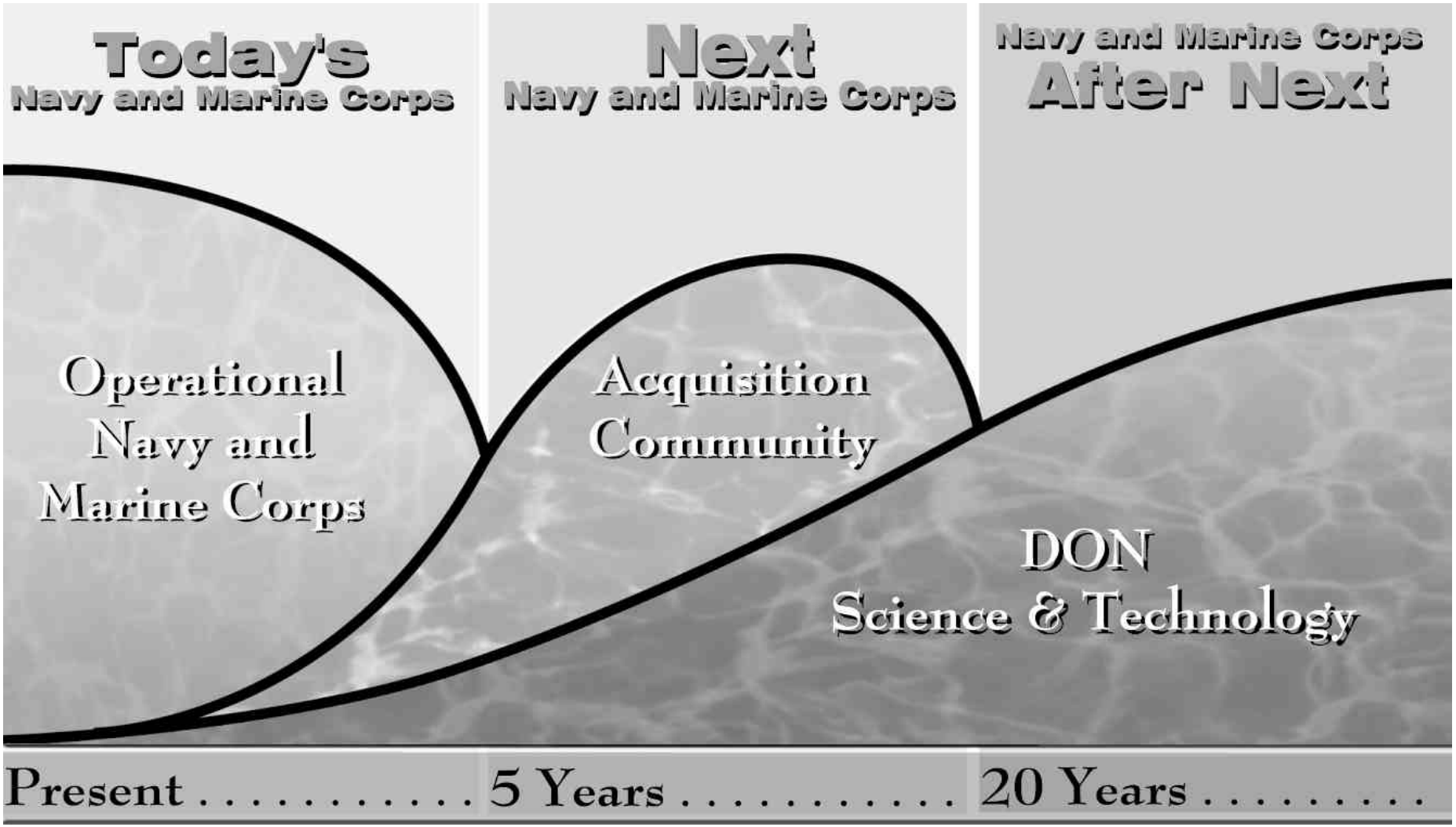
Strategic goal of Naval Science

Provide the foundation for overwhelming and enduring technological superiority for American Naval forces

Investment principles:

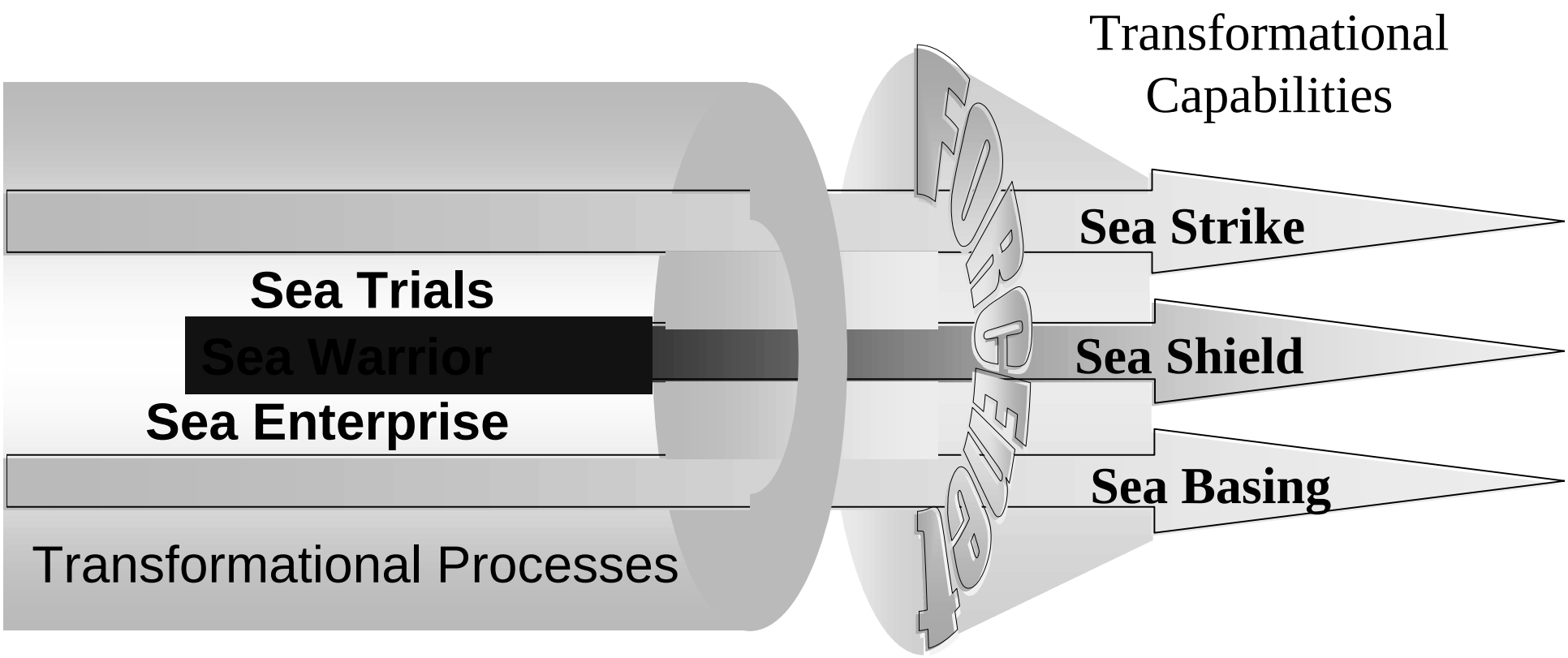
- Invest in high-quality, Naval-unique, and Naval-relevant science
- Balance near-term and long-term investments
- Focus investments to produce capabilities
- Maintain broad S&T connections and awareness to avoid surprise and exploit opportunities
- Leverage other agencies' investments for Naval applications

Naval Research - Driving Navy Technology Transformation



Naval Transformation Roadmap

Power and Access . . . From the Sea



S&T: enables <u>both</u> Processes and <u>new</u> Capabilities

Naval Transformation Roadmap

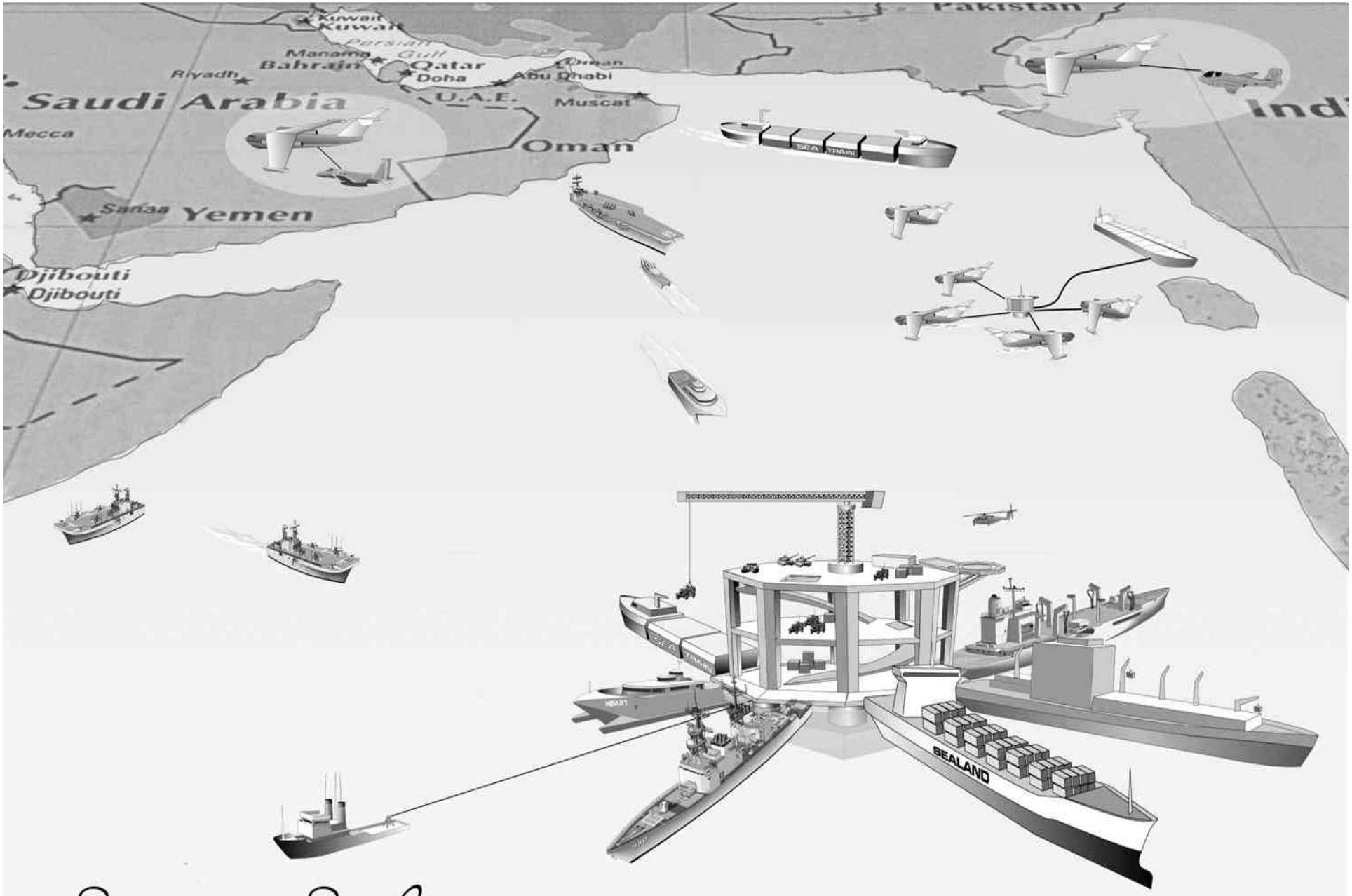
- **Sea Strike**
  - Persistent Intelligence Surveillance and Reconnaissance
  - Time sensitive Strike
  - Information Operations
  - Ship-to-Objective Maneuver
- **Sea Shield**
  - Theater Air and Missile Defense
  - Littoral Sea Control
  - Anti-Submarine warfare
  - Mine Countermeasures
  - Homeland Defense
- **Sea Basing**
  - Accelerated Employment and Deployment Times
  - Enhanced Sea-borne Positioning of Joint Assets
- **FORCEnet**
  - Fully integrated and shared tactical pictures
  - Integration of Force element

Supported by Naval Transformation Process

Sea Warrior –Maximizing human capital

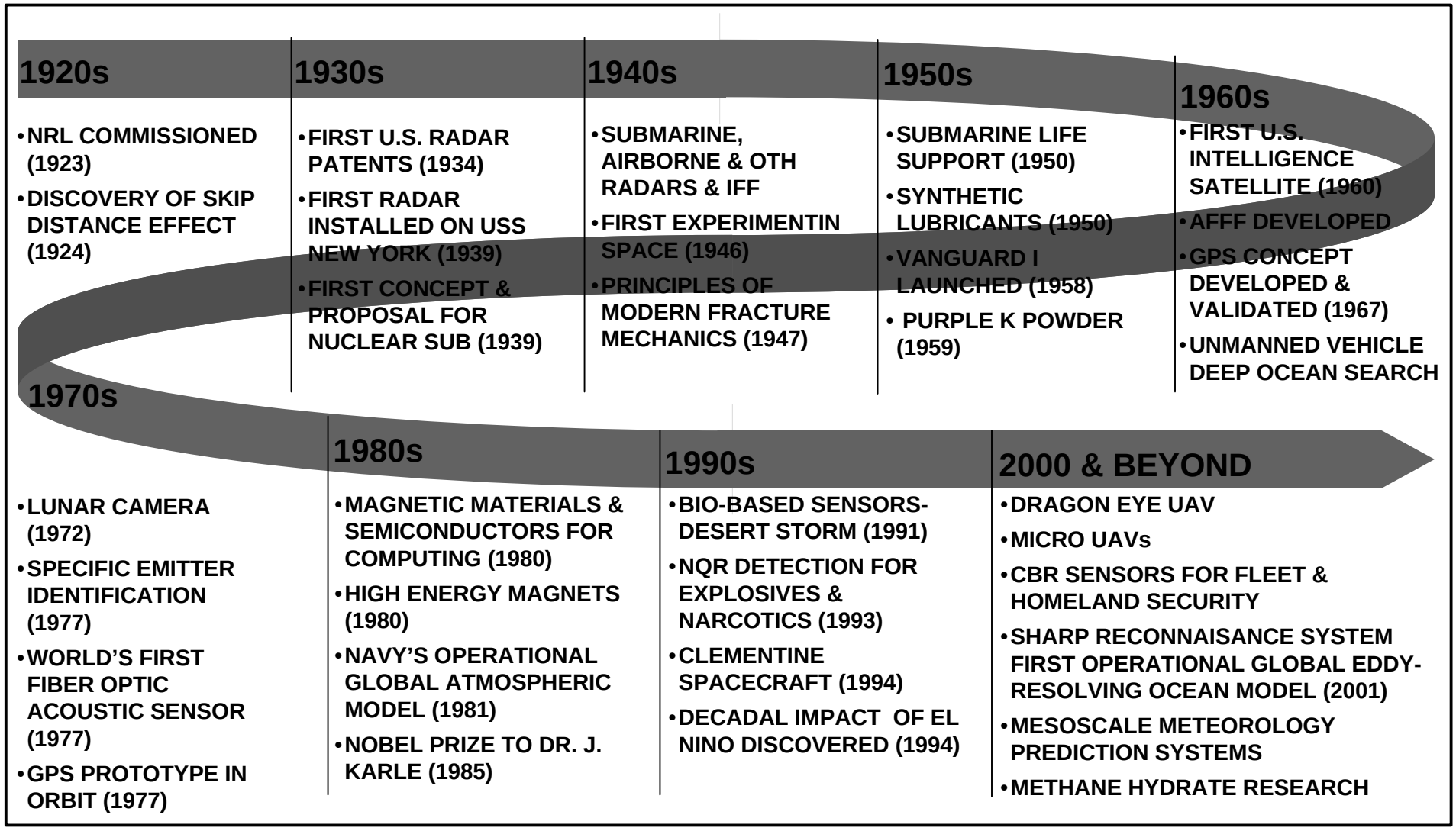
Sea Trial – Process for innovation

Sea Enterprise: Maximizing Business efficiencies



"Sovereign SeaBase"

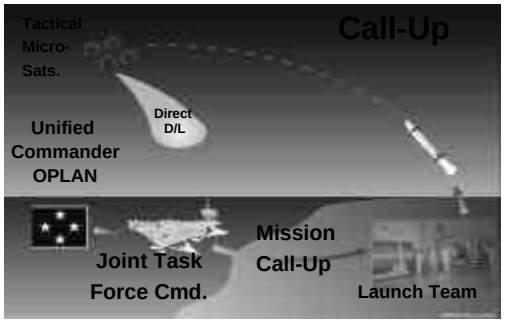
NRL Accomplish

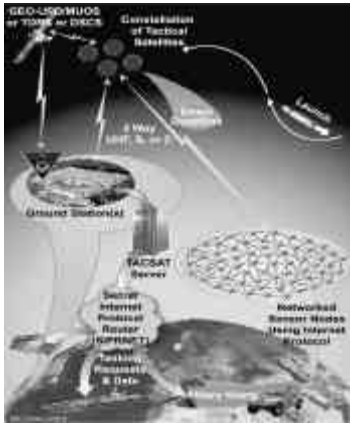


MicroSat Demonstration of On-Demand Tactical Payloads

System Description:

- Expands FORCEnet for Naval Fires Decisions
- Enabled by Micro-Sat Tech. and Tactical Launch
- MDA Modified C4 Missile





SEA POWER 21 Warfighting Capabilities

Transformational Aspects:

- Enhance FORCEnet Capability
  - On Demand Payloads for Conflict of Interest
  - Mission Call-Up in 1-2 Weeks
- Asset Controlled by Forces
  - Sensor Data and Tasking Broadly Available to Joint Forces via SIPRNET
  - Reduces O&M Costs by Order of Magnitude
  - Direct Tasking and Data Access by Forces

Missions:

- Provide Tactical Sensors
- Network Expeditionary Sensor Grid

Description

- Very Small, Low Cost, Tactical Payloads
  - SIGINT, Imaging, Communications
- Quick to Orbit
  - Using New Tactical Launch Techniques
  - Orbit Selected by Region of Conflict
- On the Shelf Payload Inventory
  - Select From Several different Capabilities, Determined by Need
  - Autonomous Check Out and Calibration
  - Highly Automated for Tactical Operations
- Enabled Through Micro-Satellite Technologies

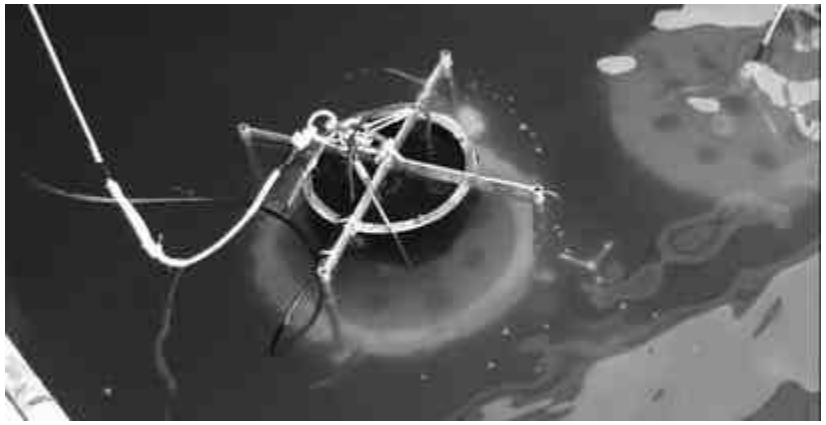
Programmatics

- Develop Payloads for Sea Trial
- Could Transition to Operational System in FY09
- Leverage Non-Traditional Launch Alternatives in Development by Other Agencies (DARPA, MDA, Air Force)
- $30 – 50 Million/yr

Ocean Floor Bio-Fuel Cell

Objective:
Harvest energy at seafloor to indefinitely operate autonomous marine deployed sensors and Instrumentation.

Approach:
2-electrode device sits on ocean floor and generates electrical power by oxidizing marine sediment organic matter with seawater oxygen



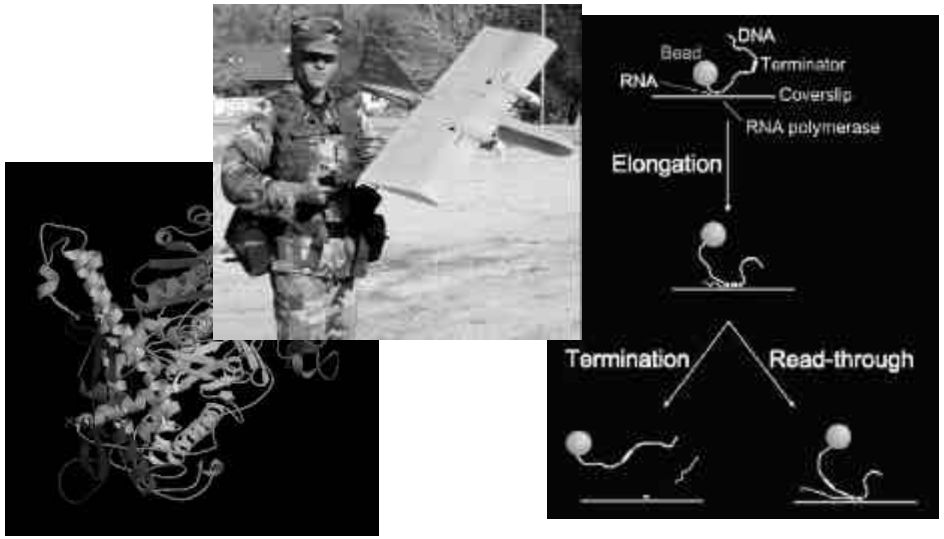
Results:
- Prototype deployed devices generate 300 mWatt/meter^2 continuous power indefinitely.
- Does not foul after 2.5 years continuous operation (ongoing)
- Optimization underway

Impact:
- Long-term uninterrupted instrument operation
- Approach may be scaled up and and used in methane rich environments for kWatt generation

Combating Terrorism Technology Task Force (CT^{3}F-"Team Tango")

Background:
DDR&E established *Team Tango* to produce DoD integrated plan for technology against terrorism (17 Sep 01):

- Detection, Indications & Warnings
- Survivability & Denial
- Consequence Management & Recovery
- Attribution & Retaliation



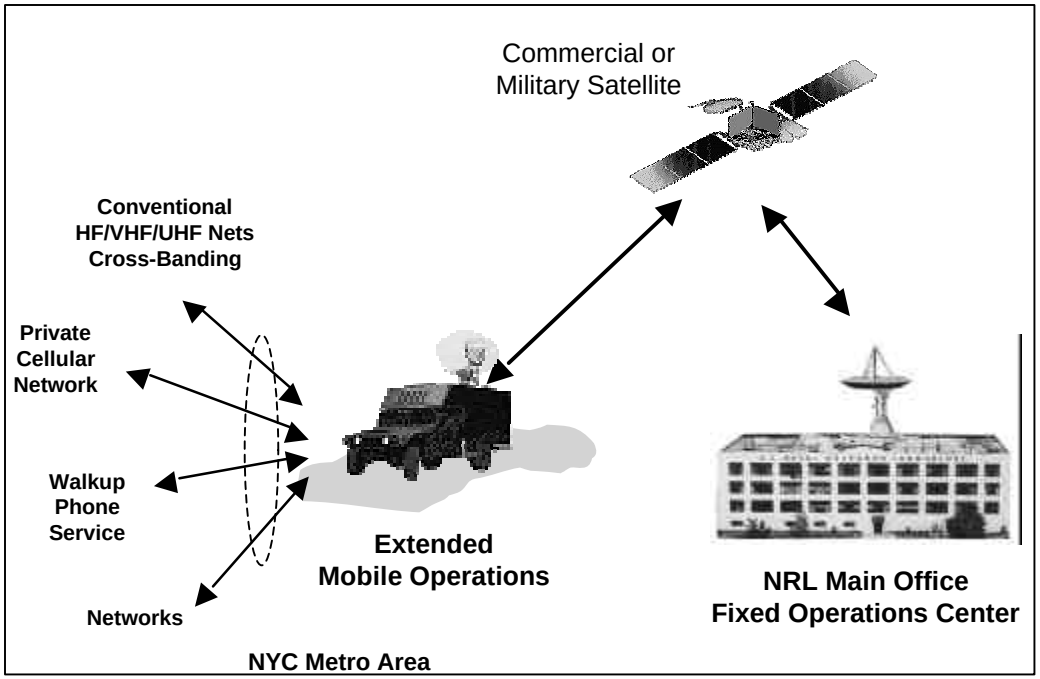
Full Naval participation in collaboration with other Services and Defense agencies. Deliverables have included (in partnership with USAF and DTRA) thermobaric weapons used in Gardez, Afghanistan.

ONR/NRL/MCWL Rapid Execution:

- Advanced Sensors for Tactical Naval UAV
- Chemical Agent Detection and Biological Agent Collection using small UAVs
- ***Deployed to Southwest Asia for maritime interdiction service, January 2002.***

InfraLynx

Critical Infrastructure Augmentation & Linkage System



To Rapidly Provide Critical Infrastructure Restoration After Terrorist Attack or Natural Disaster**s.** Facilitates Coordinated Civilian/Military Rescue and Recover Efforts.

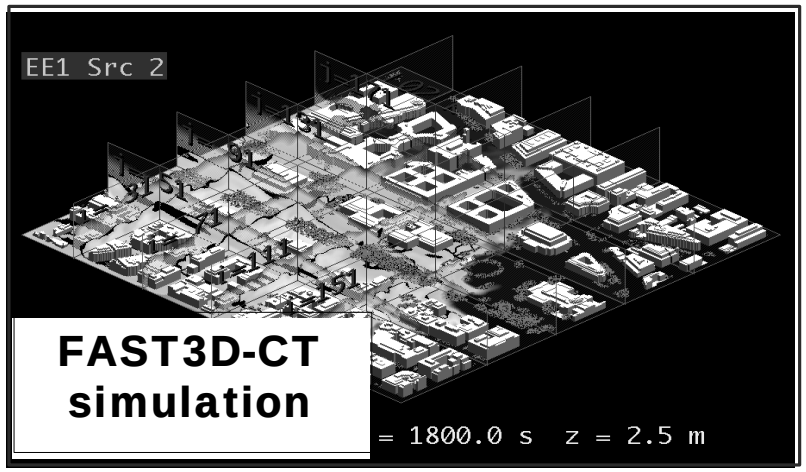
•<u>Mobile Crisis Response System:</u>
• Phone Service (POTS)
• Private Cellular Network
• Conventional Comms (VHF/UHF/800)
• VOIP Connectivity (VTC, Comms)
• Comms Crossband & Gateway
• Networks (VPN, NIPR, SIPRNET)
• Secure Voice (STU)
• Fax

CT_ANALYST

Hand Held CBR Dispersion Prediction System with Zero Delay and High Fidelity

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

DC EMA GIS merged with CT_Analyst



FAST3D-CT simulation

Enabling Capabilities

- Can provide instantaneous predictions of urban and facility contaminant transport **before it happens.**
- Designed for use by the military, police, firemen, and other emergency managers for contaminant releases from accidents, natural disasters and terrorist attacks.

System Includes

- Web broadcast of graphical results to PDAs
- Network transmitted sensor data into CT_Analyst
- Immediate data fusion of anecdotal information, qualitative data and sensor data
- Instantaneous point-and-click computation of exposed and soon-to-be exposed regions
- Situation-based escape routes and building threat doses quickly projected for emergency management use
- Multiple sources, coordination of remotes and automatic backtrack to unknown source locations included

Status

- Potential military and civilian users lining up but no technology insertion program
- CT_Analyst delivered to Chicago OEMC & DC EMA
- Advanced concepts for extended regional /coverage being developed

Dragon Eye

- Small Unit reconnaissance and threat detection capabilities.
- Man-portable, 4lb., hand or bungee launched air vehicle, and a Ground Control Station (GCS) to provide command and control and receive the aircraft's video and GPS position.
- Joint Effort Between NRL and the Marine Corps Warfighting Laboratory.
- Vehicle characteristics will enable an operational capability in adverse weather conditions.
- Autonomous flight capability to allow one-person operation.
- Endurance is 30-60 minutes at 35kt airspeed with an electric propulsion system.
- Interchangeable 1 lb. Modular commercial off-the-shelf components payloads for Dragon Eye include daylight, low light, and infrared imaging systems and robust communications links.

Summary

Balance

- Immediate response to Fleet and Homeland Security emerging requirements
- Balance near-term and long-term investments
  - Near-term focus on next Navy and Marine Corps (FNCs and experimentation, Swamp Works, Tech Solutions)
  - Long-term focus on the Navy and Marine Corps After Next (Grand Challenges and National Naval Responsibilities)

Integration

- Focus investments to deliver capabilities

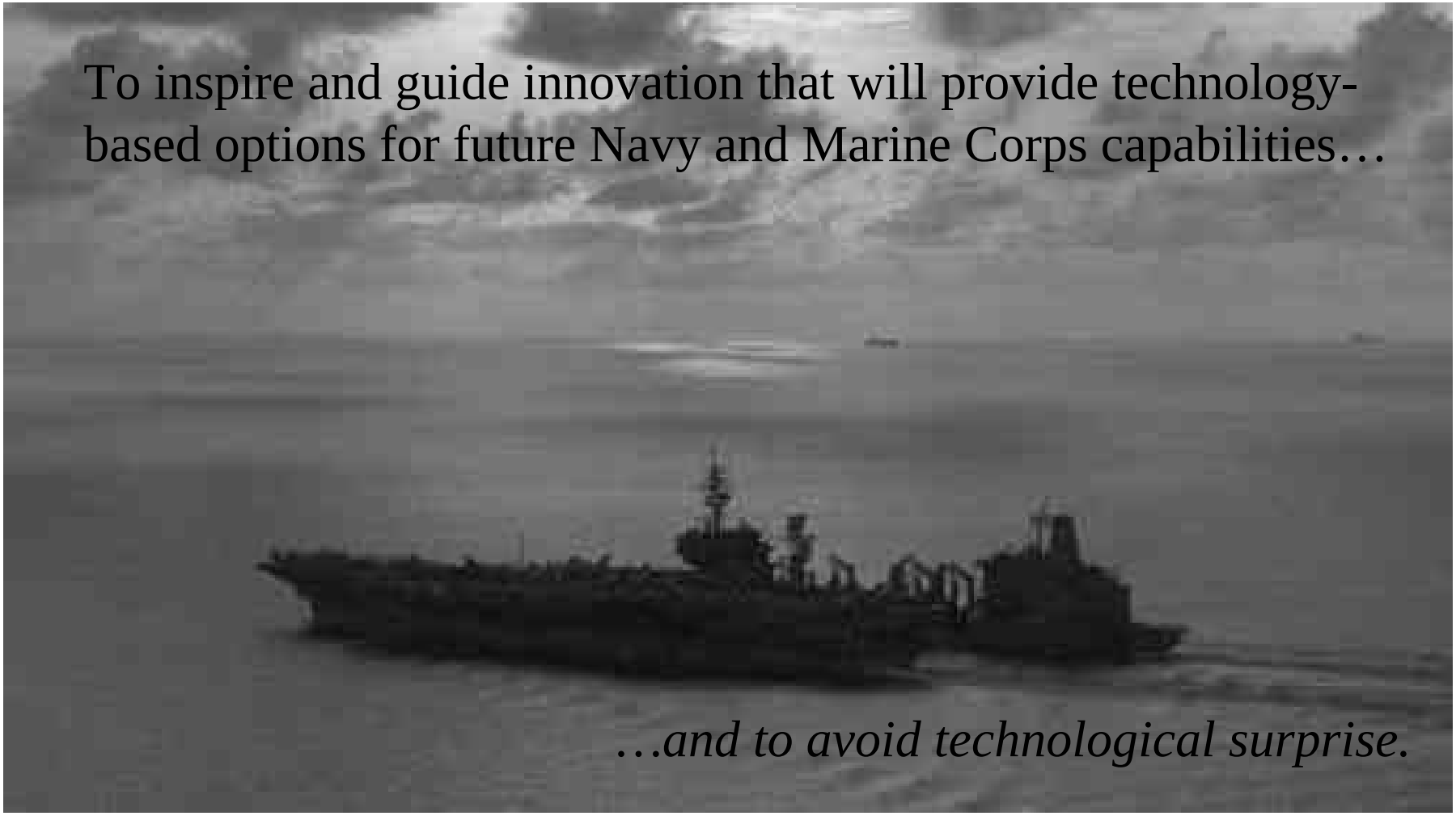
Involvement

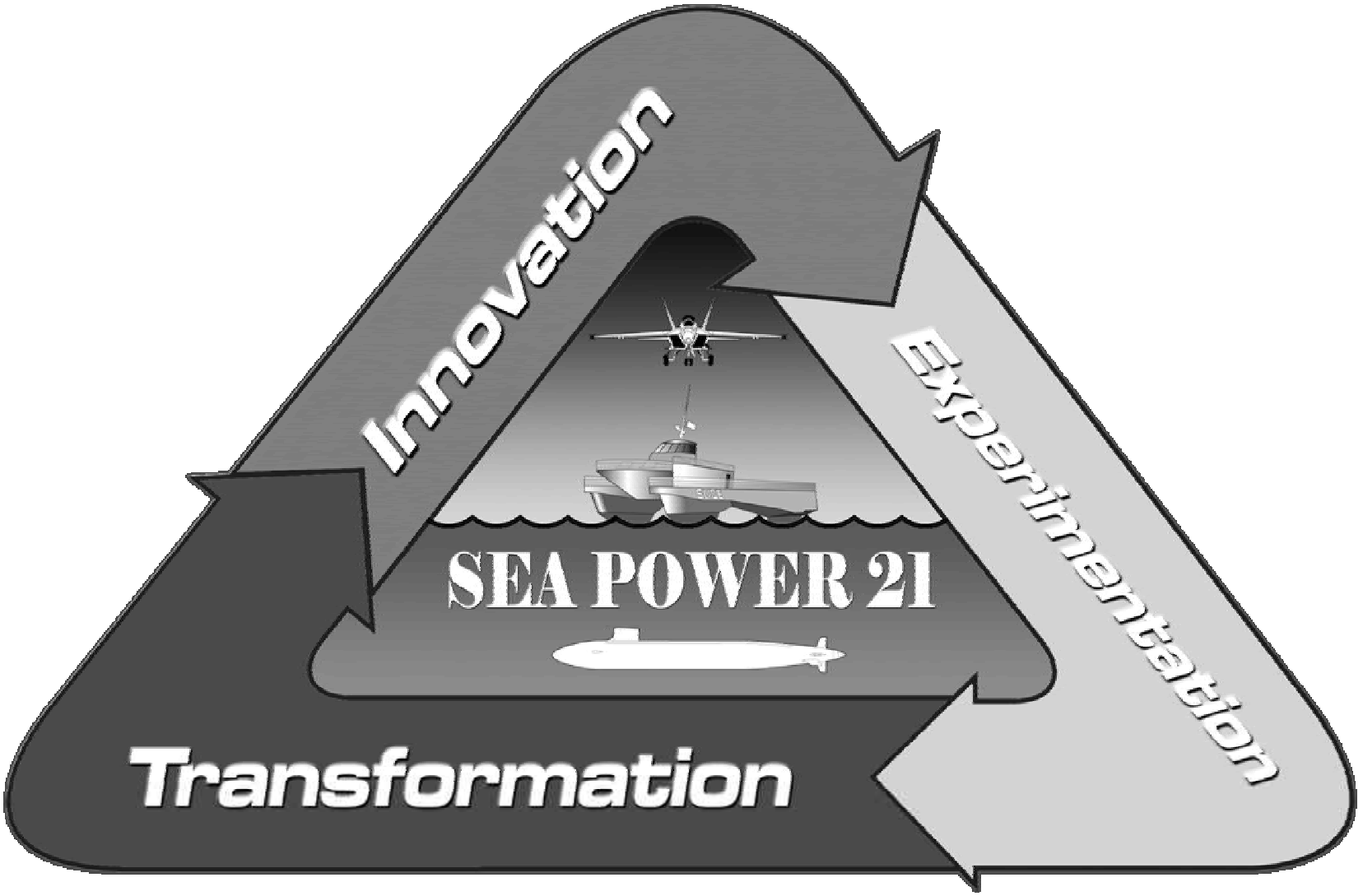
- Maintain broad S&T connections and awareness to avoid surprise and exploit opportunities

Relevance

- Invest in high-quality, Naval-unique, and Naval-relevant science

Naval Science & Technology Vision




Innovation
Experimentation
SEA POWER 21
Transformation