



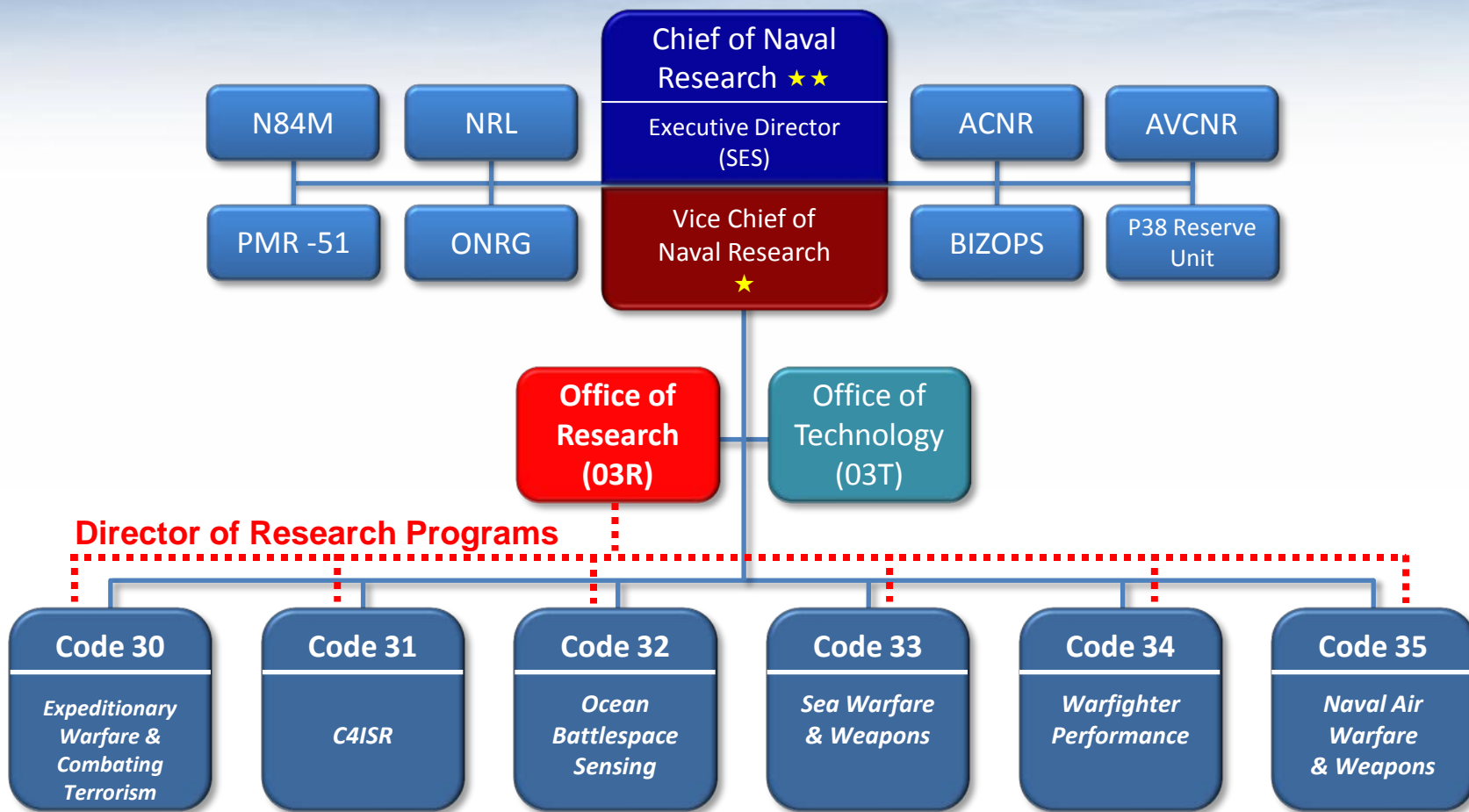
# ***ONR Research Directorate (03R)***

***Mr. Craig A. Hughes***  
***Deputy Director of Research***  
***21 September 2016***

Distribution Statement A: Approved for public release

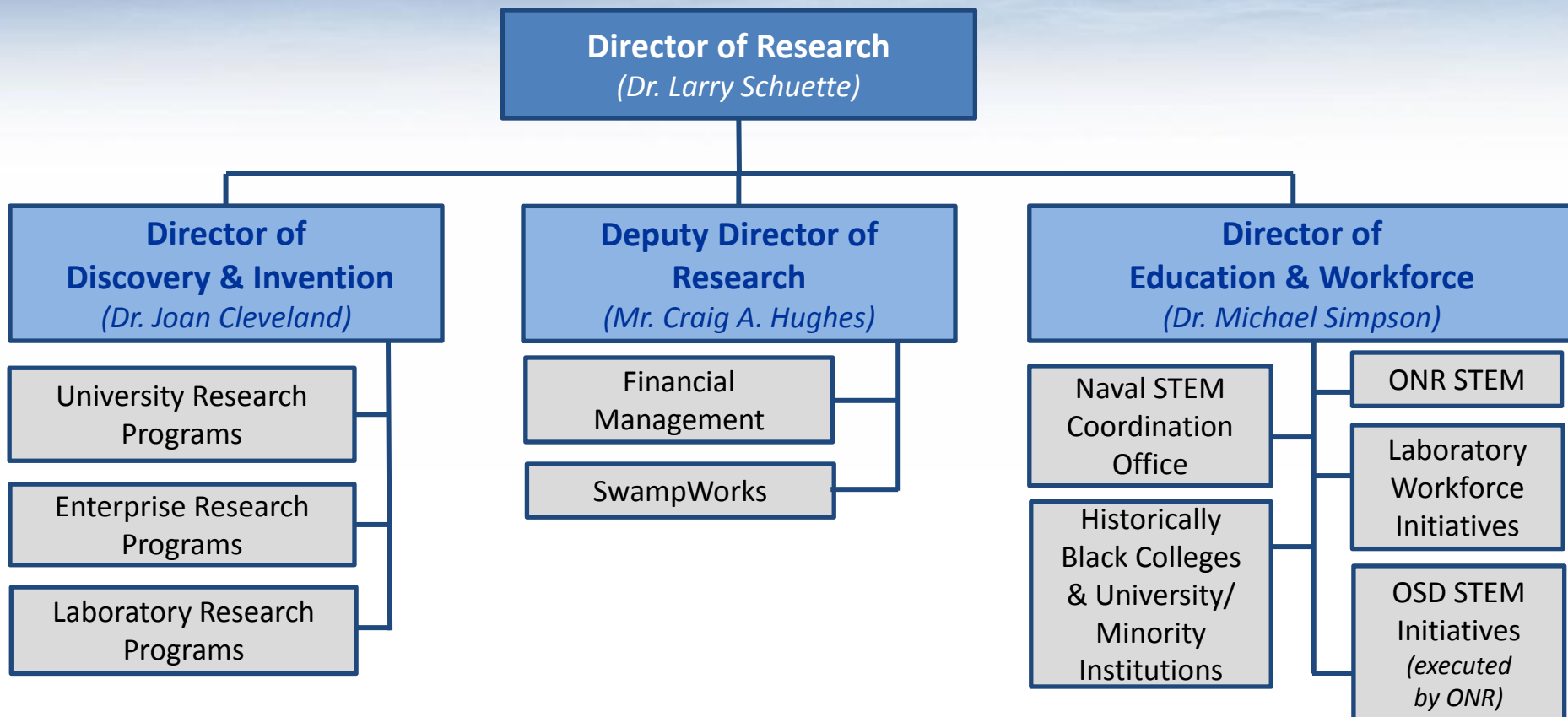


# 03R Portfolio Oversight





# Management Structure

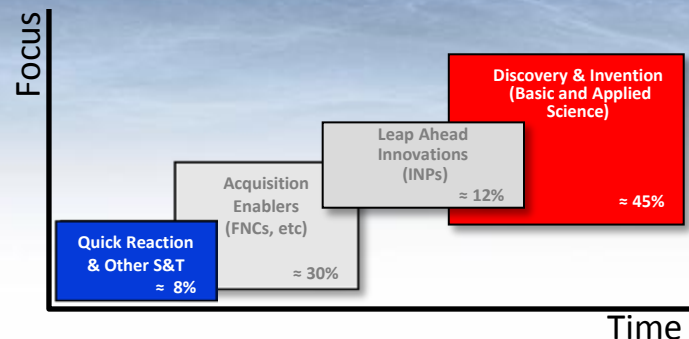




# 03R Opportunity Space

***The Director of Research portfolio makes broad investments that will increase fundamental knowledge, foster opportunities for breakthroughs and provide technology options for future naval capabilities and systems***

- Includes Basic Research and early Applied Research as well as Quick Reaction and Other Science and Technology (S&T) programs
- Committed to maintaining the health of the defense scientist and engineering workforce
- 03R Research portfolio maps to the Naval S&T Strategic Plan and National Naval Responsibilities



Dr. Larry Schuette (SES) serves as Director of Research (DOR). Previously, he served as ONR's Director of Innovation.

***Creativity Thrives in Discovery and Invention***



# Lines of Business & Fiscal Year Calendar

- 03R typically conducts business using:
  - **Long Range Broad Agency Announcements (BAA)** for the Discovery and Invention (D&I) portfolio
  - **Funding Opportunity Announcements (FOA)** for the ONR STEM portfolio
  - Rolling **white paper** schedule for the SwampWorks portfolio
- For specialized projects or requests, 03R will also utilize:
  - **Requests for Information (RFI)** and **Requests for Proposals (RFP)**
  - **Special Notices**

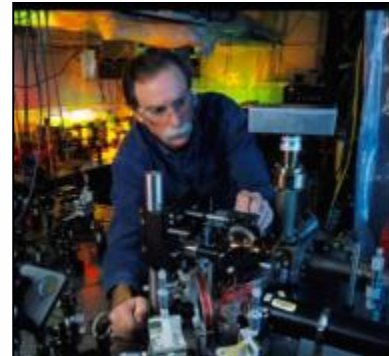




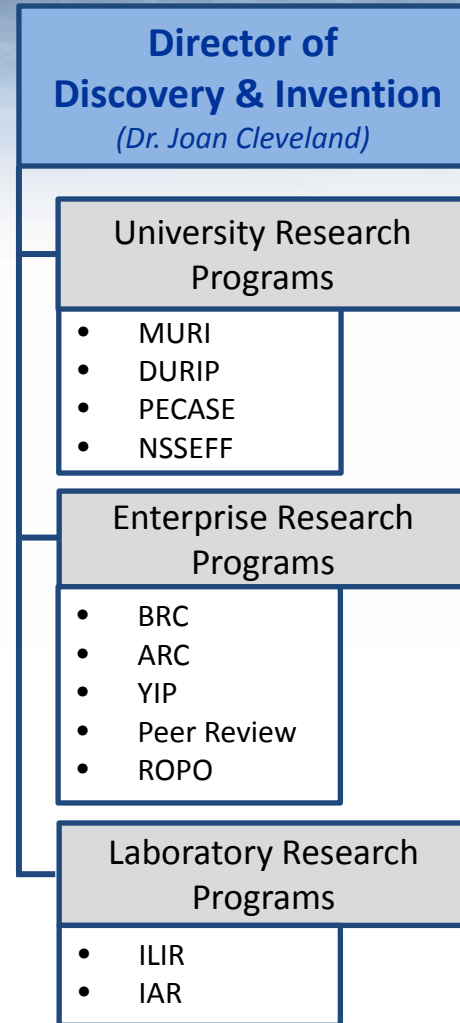
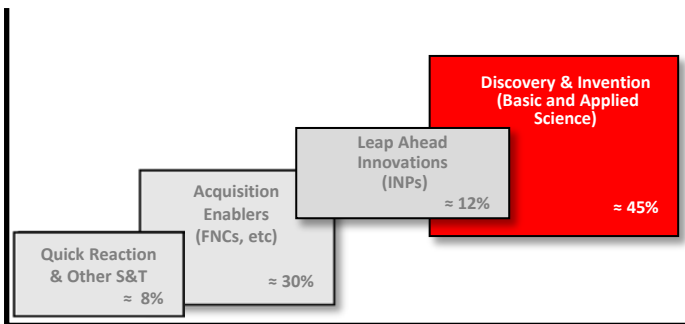
# Discovery & Invention

## *Discovery & Invention S&T is the essential foundation required for advanced technology*

- Focused on 5-20 years out
- Basic Research and early Applied Research
- All research maps to the Naval S&T Strategic Plan; the projects are the building blocks for Future Naval Capabilities (FNCs) and Innovative Naval Prototypes (INPs)



Dr. David Wineland won the 2012 Nobel Prize in Physics for his work in quantum computing. He is the 60<sup>th</sup> ONR funded Nobel Prize winner.



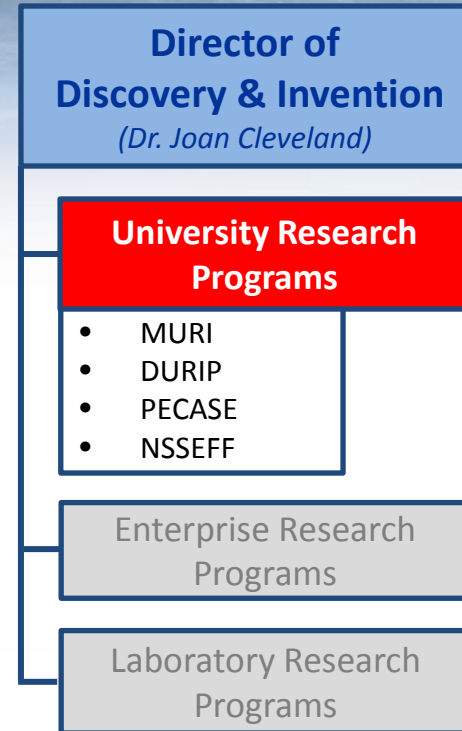
***Basic Research is the Foundation of the Navy's Newest Technologies***



# Discovery & Invention University Research Programs

**University Research Programs** fund promising new research, stimulate innovation, and attract outstanding researchers to naval-relevant research projects

- The **Multidisciplinary University Research Initiative (MURI)** involves teams of researchers investigating high priority topics and opportunities that intersect more than one traditional technical discipline
- The **Defense University Research Instrumentation Program (DURIP)** supports university research infrastructure essential to high-quality naval-relevant research
- The **Presidential Early Career Award for Scientists & Engineers (PECASE)** recognizes and honors extraordinary achievements of young professionals at the outset of their independent research careers in S&T
- The **National Security Science & Engineering Faculty Fellowship (NSSEFF)** provides extensive, long-term financial support to distinguished university faculty and staff scientists and engineers to conduct unclassified, basic research on topics of interest to DoD

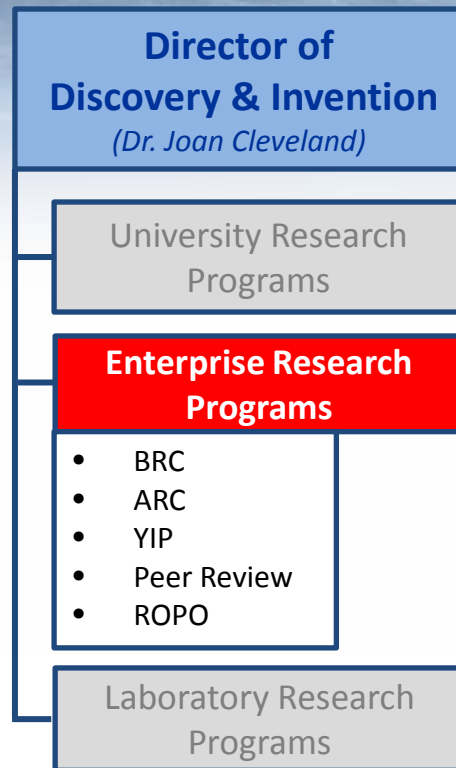




# Discovery & Invention Enterprise Research Programs

**Enterprise Research Programs** develop scientific and fundamental knowledge, provide the basis for future Naval systems, and maintain the health of the defense scientist and engineer workforce

- The **Basic Research Challenge (BRC)** competitively selects and funds promising research programs in new areas not addressed by the current basic research program
- The **Applied Research Challenge (ARC)** stimulates new applied research projects in areas not currently addressed by the departmental core applied research programs and explores feasibility of basic research with high risk and significant potential naval payoffs
- The **Young Investigator Program (YIP)** supports academic science and engineering faculty who been on tenure track within the last five years and show exceptional promise for doing creative research
- The **Peer Review** provides an independent assessment of the scientific merit of the ONR D&I research portfolios being reviewed to ensure the merit, performance, and relevancy of research activities
- **Research Opportunities for Program Officers (ROPO)** provide ONR Program Officers with opportunities and support to conduct research of interest



2014 YIP recipient Dr. Laura L. Colgin, University of Texas, Austin 8





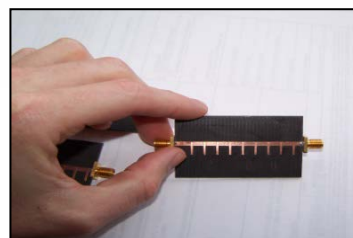
# Discovery & Invention Laboratory Research Programs

**Laboratory Research Programs** provide naval laboratories the ability to invest in basic research of technical interest to meet laboratory mission elements

- **In-house Laboratory Independent Research (ILIR)** enables laboratories to sponsor focused, high-risk research with potential high payoffs to the Navy and Marine Corps on a discretionary basis



Physiologic/  
Cognitive Response



Metamaterials



Accelerated Life  
Testing Model



Traumatic  
Brain Injury  
Modeling

- **Independent Applied Research (IAR)** focuses on performing innovative, promising applied research consistent with the mission of the claimant organizations and the current DON S&T strategy

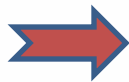




# From Basic Science to the Fleet!

## Basic Research

- **Cavitation Erosion Resistant Coating and Matrix Materials**
- **Hydro-Elasticity Effects of Composite Materials**
- **Large-Eddy Simulation of Crashback loads**



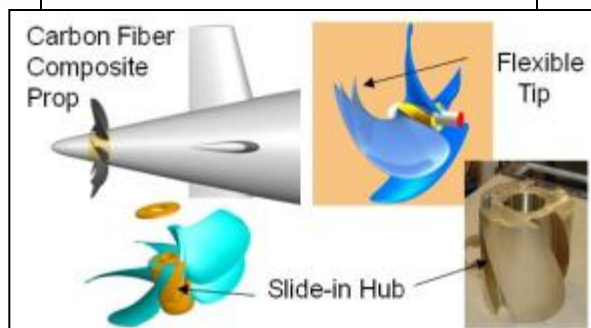
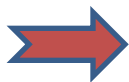
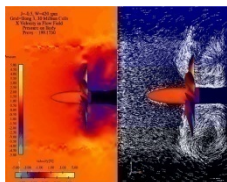
## FNC

**Pitch-adapting composite submarine propeller for enhanced performance with reduced weight, less maintenance and substantial acquisition and life cycle cost savings**



## Acquisition POR

- **SEA 073R Advanced Submarine Systems Development**
- **PEO SUB Virginia and Follow-on class submarines**



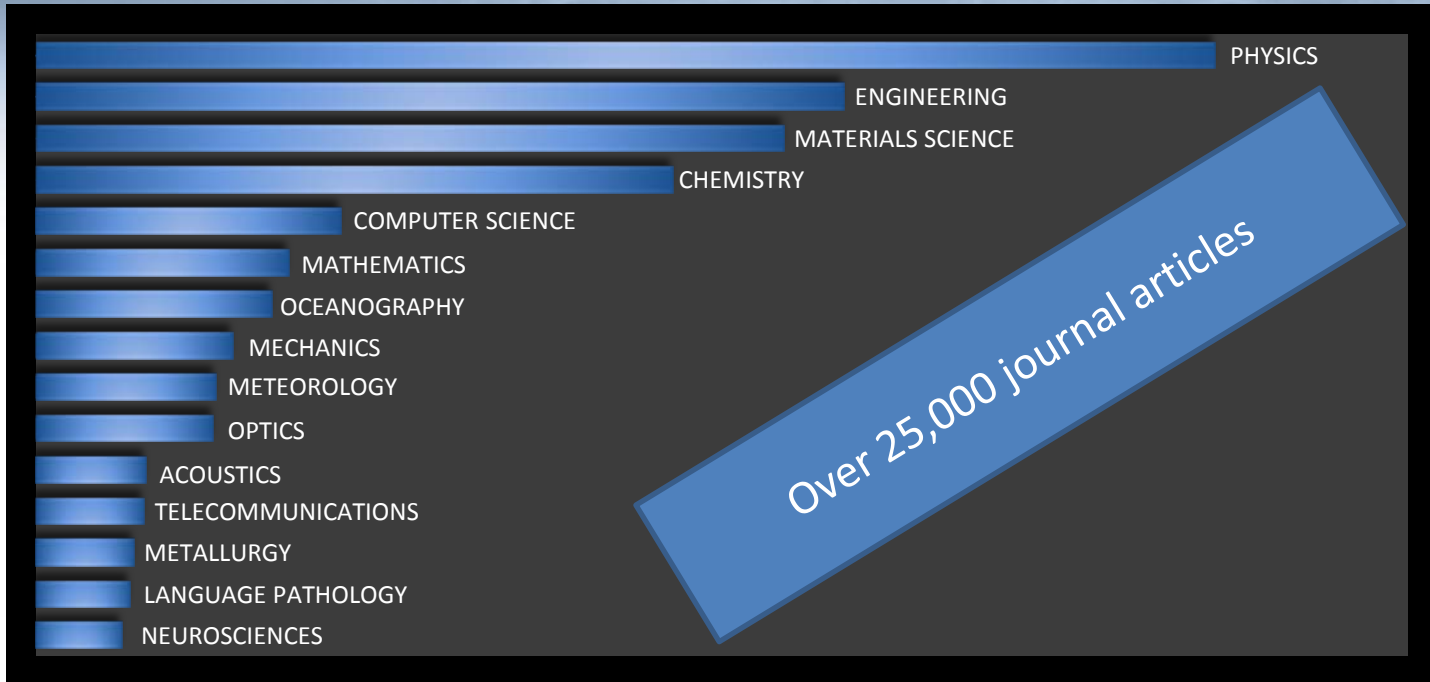
Academia

ONR's Unique Mission

Industry



# Top Research Areas: ONR Publications 2009-2014





# Deputy Director of Research

## Off-the-shelf technology projects with a 12 to 24 month time horizon

- **Financial Management:**
  - Manage portfolio of 6.1 through 6.3 funding in excess of \$790M
- **SwampWorks:**
  - Included newly invented/discovered technologies; Addresses emergent and enduring operational problems; Completed in an accelerated timeframe

Deputy Director of Research

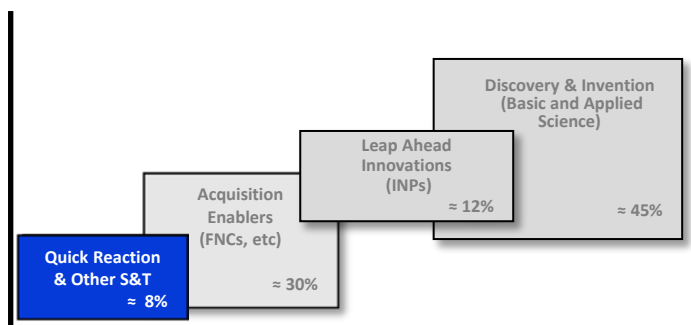
(Mr. Craig A. Hughes)

Financial Management

SwampWorks



The **SwampWorks Advanced Control Effectors** intended to replace a complex hydraulic & mechanical hardware system with a simplified highly reliable system to dramatically reduce maintenance and increase ship maneuverability.



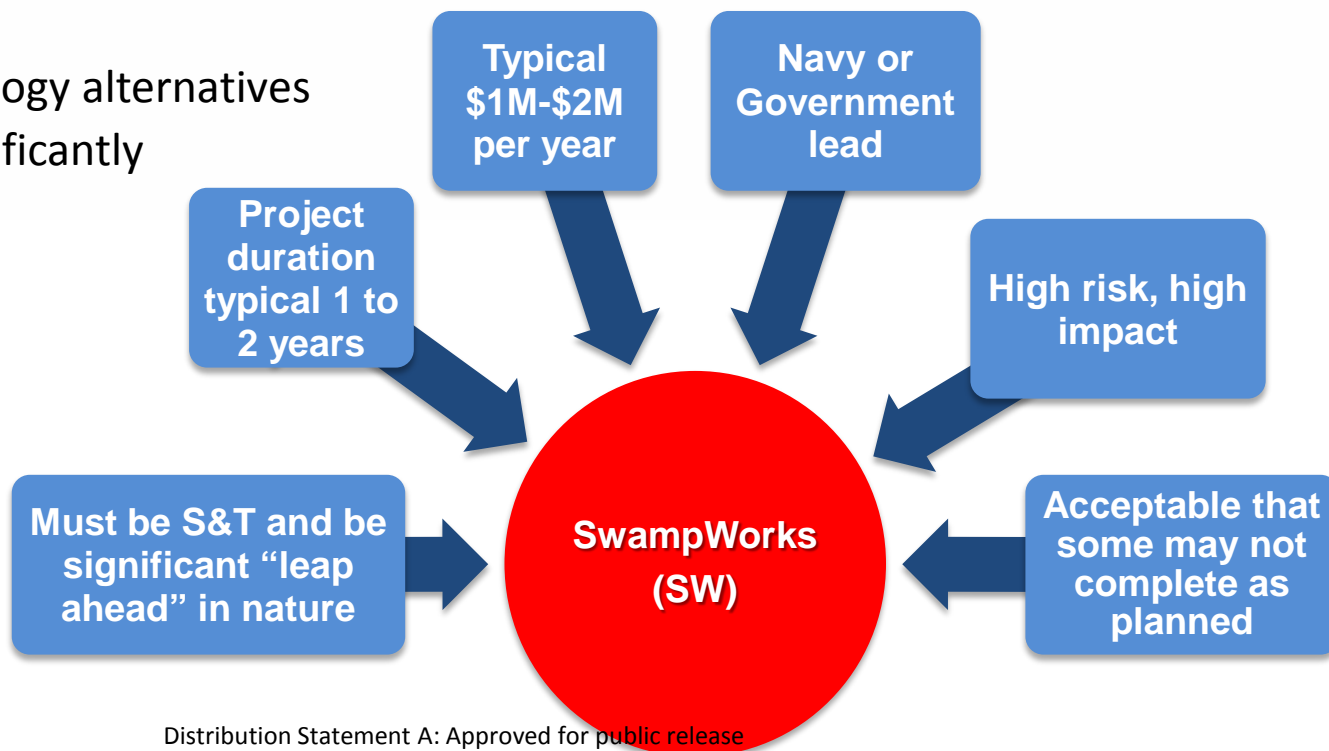
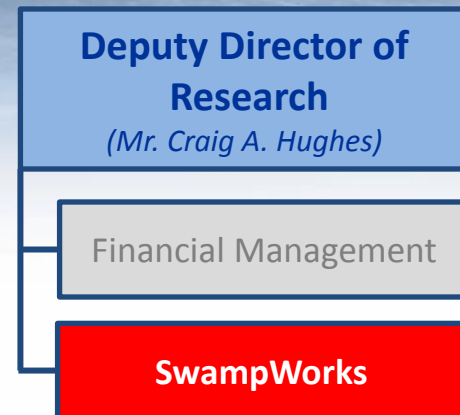
**Rapidly Responding to Fleet Issues**



# Deputy Director of Research SwampWorks

The **SwampWorks** portfolio funds S&T-based technical efforts that:

- Accelerate technical development
- Respond rapidly to Fleet issues and satisfy Warfighter need
- Validate (or invalidate) proof of concept
- Explore usefulness of an existing technology in a new application
- Evaluate technology alternatives
- Reduce risk significantly



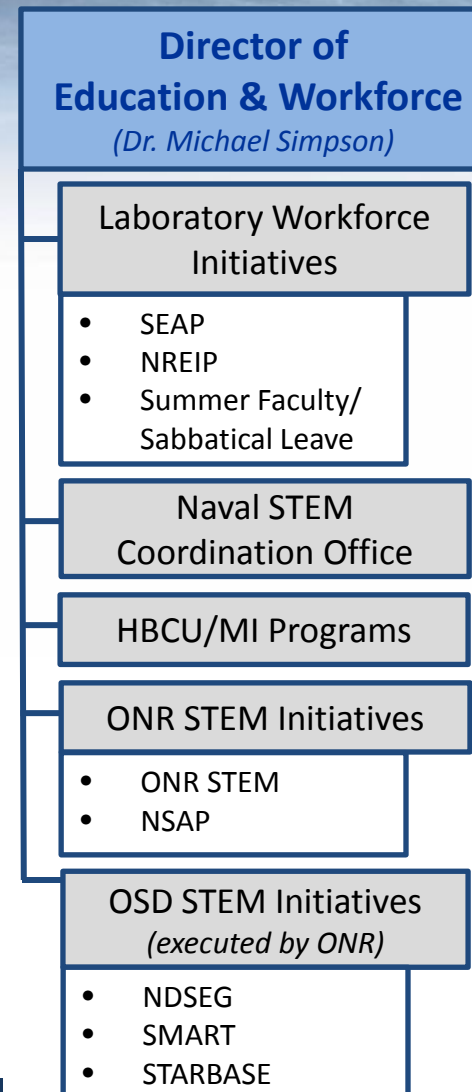


# Education & Workforce

***The Education & Workforce portfolio raises awareness of naval career opportunities, attracts and nurtures the future talent pool, and fosters the continued development of the current naval science, technology, engineering, and mathematics (STEM) workforce***

- Develop the workforce and capabilities needed today and in the future
- Emphasize Total Force approach to workforce development
- Align DON STEM portfolio with Federal and Office of the Secretary of Defense (OSD) directives in order to foster a highly competent and diverse DON STEM talent pipeline

***Promote and Develop STEM Workforce & Capabilities***



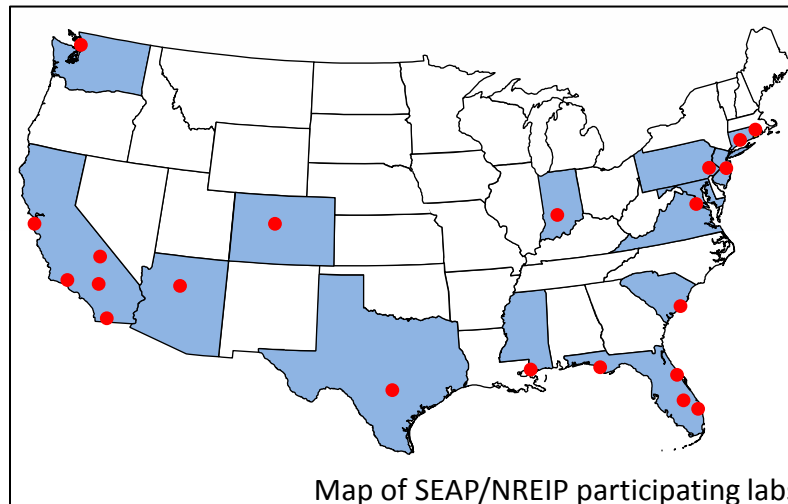


# Education & Workforce Laboratory Workforce Initiatives

**Laboratory Workforce Initiatives** provide students and faculty members opportunities to participate in research programs at DON labs

- The **Scientist and Engineering Apprenticeship Program (SEAP)** provides opportunities for high school students to participate in research at a DON lab during the summer

- The **Naval Research Enterprise Internship Program (NREIP)** provides opportunities for undergraduate and graduate students to participate in research at DONs lab during the summer



- The **Summer Faculty/Sabbatical Leave Program** provides science and engineering faculty members the opportunity to participate in research at DON labs

**Director of  
Education & Workforce**  
*(Dr. Michael Simpson)*

## Laboratory Workforce Initiatives

- SEAP
- NREIP
- Summer Faculty/  
Sabbatical Leave

Naval STEM  
Coordination Office

HBCU/MI Programs

ONR STEM Initiatives

OSD STEM Initiatives  
*(executed by ONR)*

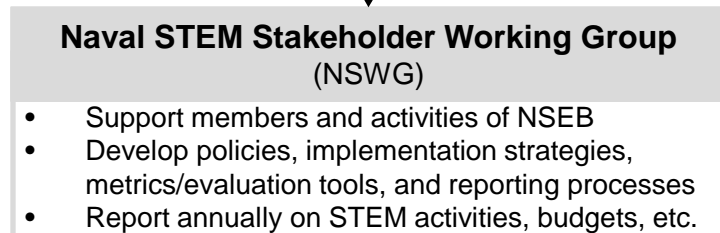
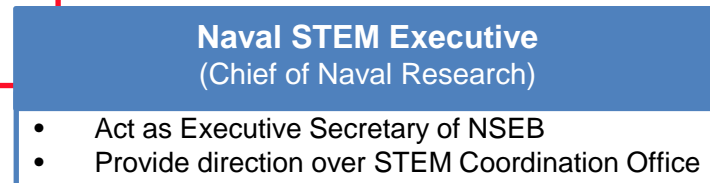
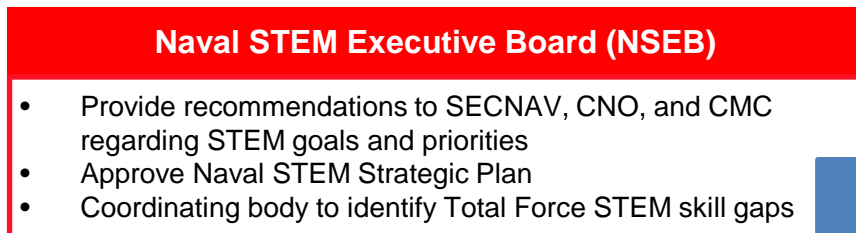
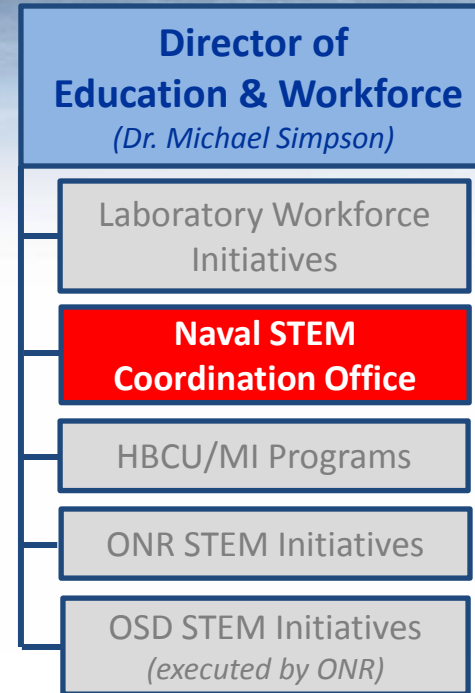


# Education & Workforce

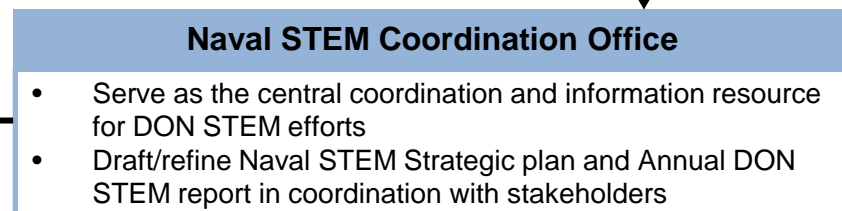
## Naval STEM Coordination Office

The **Naval STEM Coordination Office** supports the CNR in his role as the Naval STEM Executive

- Acts as the central coordination and information resource for DON STEM efforts
- Executes Department of Defense (DoD) STEM funding
- Reports on DON STEM
- Drafts the Naval STEM Strategy
- Coordinates SECNAV STEM Instruction establishing an organizational structure for coordinating and aligning DON STEM education and outreach programs



Coordinate



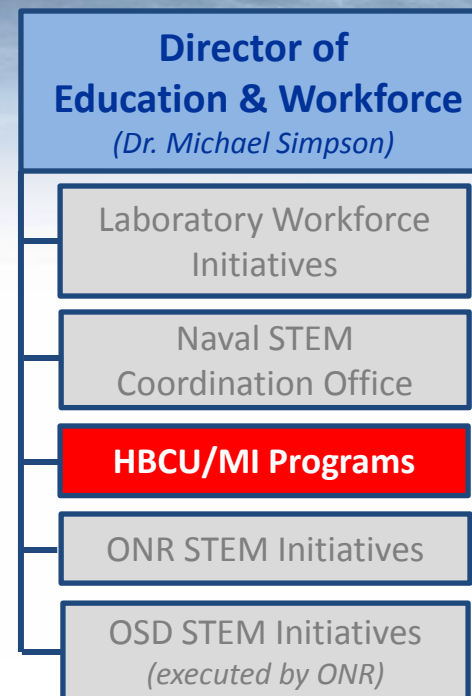




# Education & Workforce HBCU/MI Programs

**The Historically Black Colleges and Universities and Minority Institutions programs** increase the quantity and quality of minority scientists and engineers

- Enhance the research and educational capabilities of HBCU/MIs in areas of importance to national defense
- Encourage the participation of HBCU/MIs in the research, development, testing, and evaluation programs and activities of DoD
- Increase the number of graduates from such institutions engaged in disciplines important to the national security functions of DoD
- Encourage research and educational collaborations between such institutions and other institutions of higher education, government defense organizations, and the defense industry



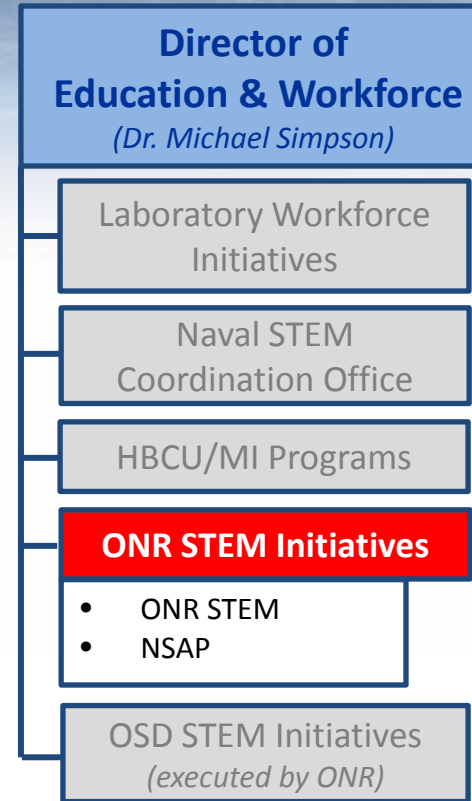


# Education & Workforce

## ONR STEM Initiatives

**ONR STEM Initiatives** encourage, promote and coordinate naval S&T

- **ONR STEM grants** develop innovative solutions that directly support the development and maintenance of a robust DON STEM workforce (budgets are starting to include proposal-based ONR support to other naval activities for quality STEM grants)
- The **Naval High School Science Awards Program (NSAP)** recognizes accomplishments of students at science and engineering fairs in producing and presenting quality science and engineering projects

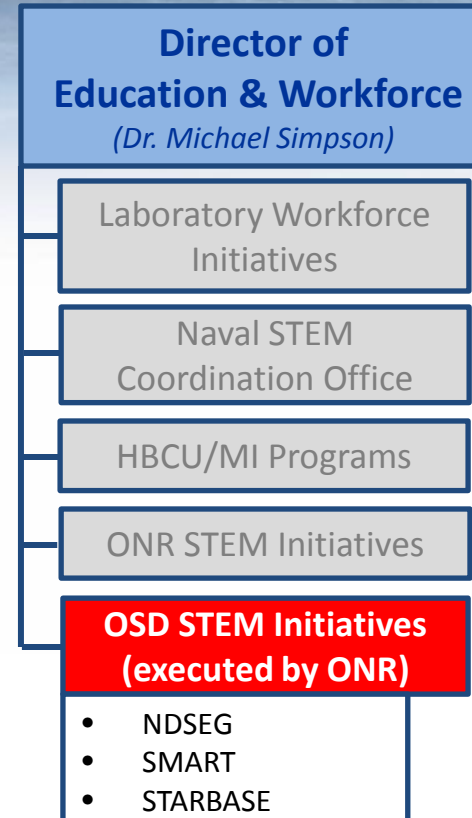




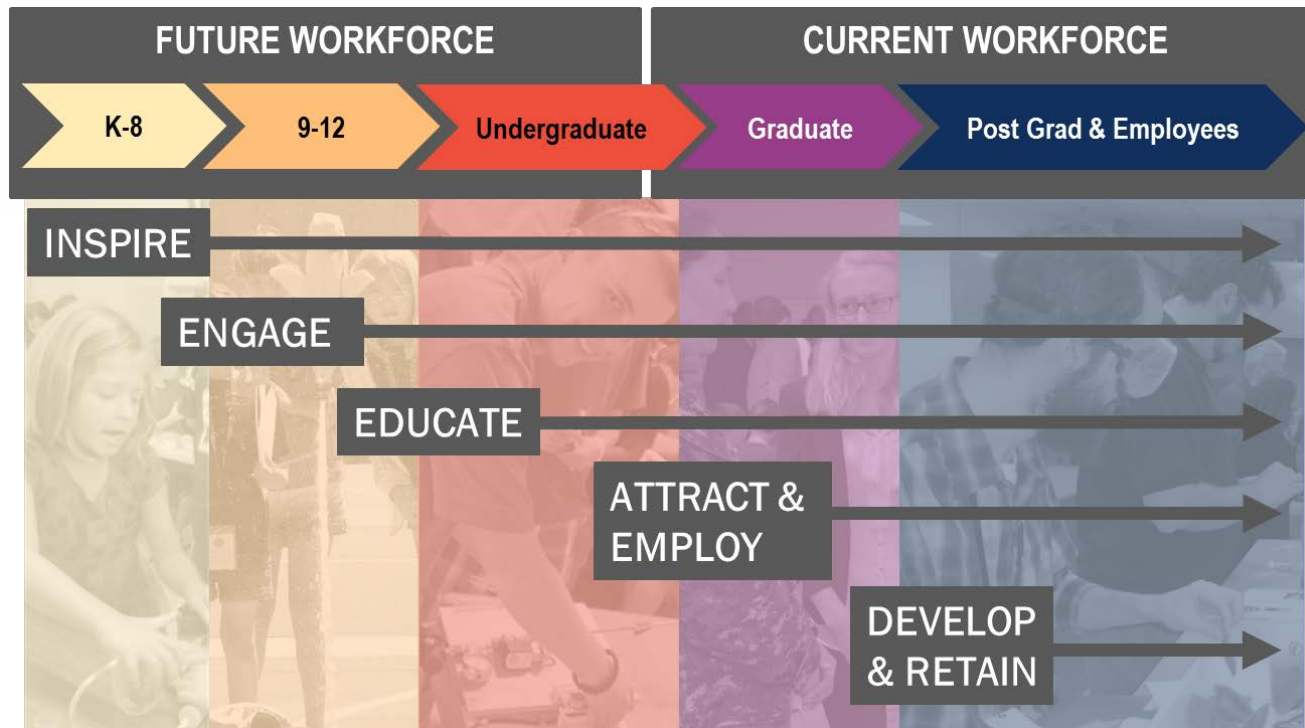
# Education & Workforce OSD STEM Initiatives

There are a number of **OSD STEM Initiatives** that are **executed by ONR**

- The **National Defense Science and Engineering Graduate (NDSEG) Fellowship program** is a joint program of the Army, Navy and Air Force designed to increase the number of U.S. citizens trained in disciplines important to defense goals
- The **Science, Mathematics and Research for Transformation (SMART) Scholarship for Service Program** supports undergraduate and graduate students pursuing degrees STEM disciplines and aims to increase the number of civilian scientists and engineers working at DoD laboratories
- The **STARBASE program** motivates historically underrepresented elementary students to explore STEM as they continue their education (anticipating renewed funding in FY15)

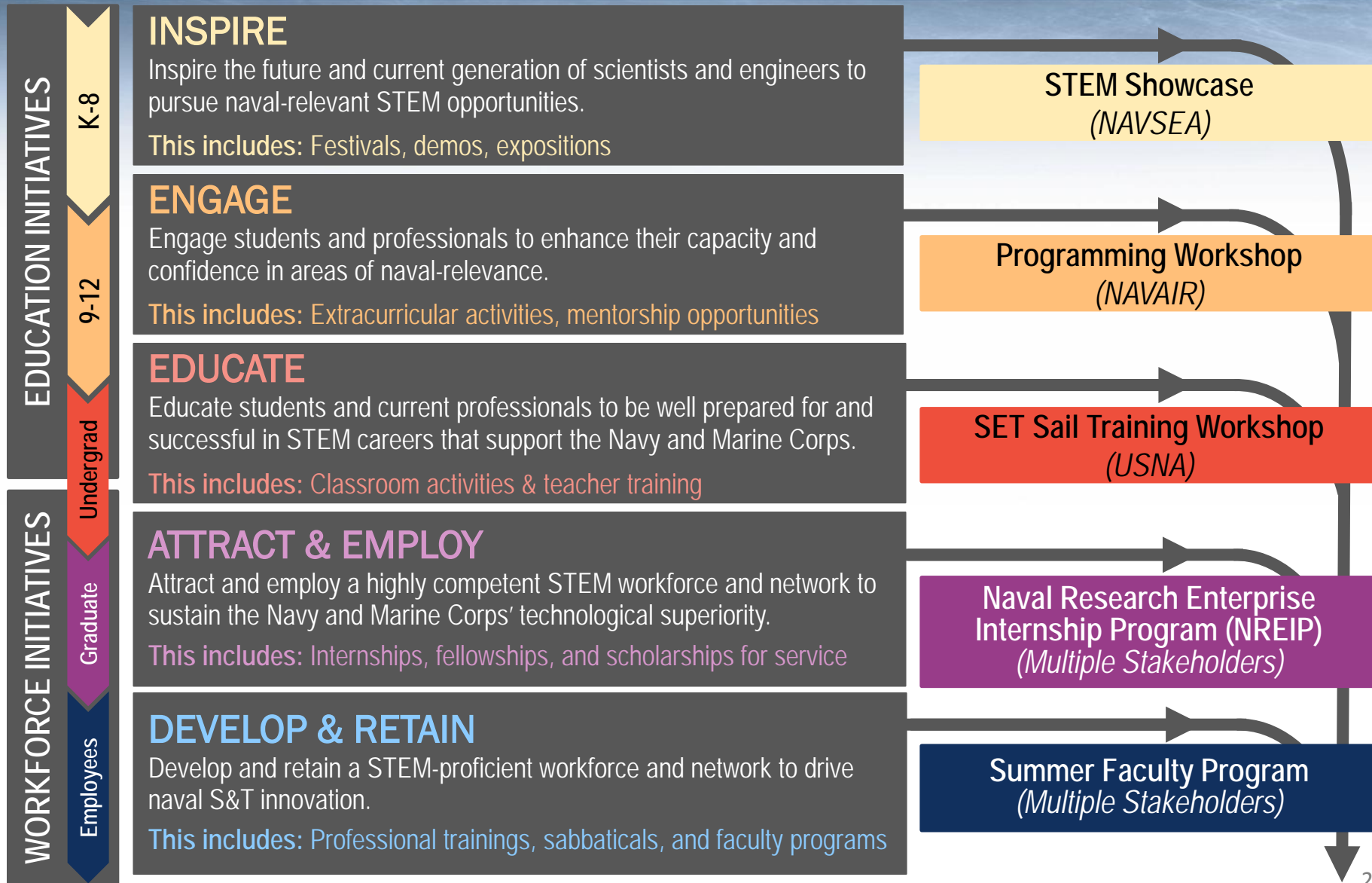


- **Mission:** Foster and cultivate a diverse, world-class STEM workforce in order to maintain the U.S. Navy and Marine Corps' technological superiority
- **Strategy:** To **inspire**, **engage**, and **educate** the next generation of scientists and engineers and to **attract**, **employ**, **retain** and **develop** our diverse technical workforce **through collaboration** across the DON, the Federal government and broad STEM community





# Strategic Priorities: Education & Workforce Initiatives





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21 September 2016***

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