Strategic Investment Plan

NATIONAL SHIPBUILDING RESEARCH PROGRAM™
Taking Shipbuilding and Repair to the Next Level

MISSION

- Employ a unique collaborative framework to research, develop, mature, and implement industry-relevant shipbuilding and sustainment technologies and processes, improving efficiency across the U.S. shipyard industrial base and meeting future demand.

TABLE OF CONTENTS

1. RECORD OF CHANGES

Previous historical changes to the Strategic Investment Plan are identified in the NSRP Organization and Operations Manual.

Version	Date	Sections	Description

Change 5	November 30, 2010	All	• The original plan was divided into two documents:
			  ○ Concise and focused Strategic Investment Plan
			  ○ Program Organization and Operations Manual

Change 6	March 14, 2013	2, 3, 6, 6.1, 7, 7.1-7.4	• Inclusion of new program sponsors
			• Inclusion of new Ship Warfare Systems Integration Panel
			• Updated R&D interest areas
			• Administrative updates, including
			  ○ Expanded Executive Summary
			  ○ Updated graphics
			  ○ Updates to date references

Change 7	June, 2016	6, 6.1, 7, 7.1-7.4	• Updated Strategic Priorities to Strategic Objectives
			• Updated Major Focus Areas and added definitions for each area
			• Moved Areas of Concentration from Major Focus Areas and included these in each Major Initiative
			• Administrative updates, including
			  ○ Updated graphics
			  ○ Updates to date references
			  ○ Updated NSRP Branding

Change 8	February, 2019	All	• Administrative updates, including
			  ○ Inclusion of new program sponsors
			  ○ Updated graphics
			  ○ Updates to date references
			• Updated NSRP Branding

Change 9	February, 2020	All	• Updated Plan

Change 10	February 2022	All	• Administrative update to:
			  ○ Reformat document from four Major Initiatives to three major Initiatives to reflect program reorganization
			  ○ Add Sustainment Working Group
			  ○ Update ECB-approved revised NSRP Mission Statement

Change 11	March 2023	All	• Administrative updates, including
			  ○ Renamed one Major Initiative (Information, Design, and Integration) and one panel (Workforce and Compliance)
			  ○ Updated Graphics
			• Updated "Strategic Priorities" to "Strategic Objectives"

Change 12	February 2024	7, 9	• Administrative updates, consisting of:
			  ○ Updated SPC and WF&C Panel definitions
			  ○ Updated Sub-Initiatives to reflect 2024 TIP update
			  ○ Updated ECB member signature blocks

2. INTRODUCTION

The National Shipbuilding Research Program's mission is to employ a unique collaborative framework to research, develop, mature, and implement industry-relevant shipbuilding and sustainment technologies and processes, improving efficiency across the U.S. shipyard industrial base and meeting future demand. The NSRP's Government impact is primarily on U. S. Navy ships, but the program is also intended to benefit other Federal Government organizations such as the U.S. Coast Guard (USCG), National Oceanic and Atmospheric Administration (NOAA), Maritime Administration (MARAD), Military Sealift Command (MSC), and Army Corps of Engineers (ACoE). The NSRP considers unmanned and optionally-manned vessels to be types of ships fully within the mission scope. The NSRP's mission equally includes reducing the total ownership costs of and delivering capability improvements to U. S.-flag commercial ships

The NSRP is designed to benefit the entire U.S. shipbuilding and ship repair industry. This Strategic Investment Plan (SIP) describes the NSRP's investment strategy for accomplishing its mission over a three to five year period. The SIP is supplemented with an annual Technology Investment Plan (TIP) that provides more detail and describes more specific areas of interest. The SIP and TIP are developed in an annual workshop held with both industry and Government stakeholders. This workshop was held in January 2023 at the NSRP Program Administrator's offices in Summerville, SC. Both documents are approved by the NSRP's industry Executive Control Board (ECB) with Government input.

3. OVERVIEW

The NSRP team typically considers a wide range of national, Navy, and Naval Sea Systems Command strategies and plans (see Section 10, Bibliography) to determine the NSRP's role within these higher level strategies. The NSRP's role is to support the Nation's plan to increase its maritime capability by increasing the overall number of vessels, improving the combat capability of military vessels, increasing the operational availability of all vessels, and improving the ability to rapidly upgrade mission systems, all while reducing the total ownership costs of these vessels. The NSRP mission statement (located on the cover page) was updated in February 2022 to reflect the Program's commitment to achieving these goals and to strategically align the program to the three major phases of the ship/mission system lifecycle (design, build, sustain).

The NSRP will support the national strategy by collaborating with other government organizations, other shipyards, industry, and academia to research, develop, and implement process and technology improvements for ship acquisition and sustainment. The strategic objectives that promote the NSRP mission consist of funding R&D projects that affect total ownership cost as follows:

- Insertion of relevant technologies that reduce design, acquisition, construction, testing or delivered ship operations and sustainment (maintenance/repair/conversion) costs
- Development of improved processes that reduce design, acquisition, construction, testing or delivered ship operations and sustainment (maintenance/repair/conversion) costs

Under the leadership of the industry Executive Control Board (ECB), this collaborative effort operates under the framework of three Major Initiative areas, which are further divided into nine Panels. The ECB meets with Navy representatives to investigate how the NSRP could support both the current and strategic needs of the U. S. fleet. To improve alignment with the Navy perspective and priorities, the ECB and its Extended Team leadership formulated a new structure that was more relevant and capable of delivering improvements to strategic areas within the life cycle of any ship, namely: Design, Build, Sustain.

For this reason, the new Major Initiative architecture, shown in Figure 1, is comprised of three areas: Information, Design, and Integration (Design); Ship Production Technologies (Build); and Infrastructure, Logistics, & Sustainment (Sustain). The new organizational alignment of the Panels to these Major Initiative areas provides more targeted focus on topics that reinforce the overall mission of the NSRP, consolidating some panels where coverage was too thin to support the overall Major Initiative. To complete the areas covered, the Sustainment panel was created to support improvements and innovation in the realm of fleet sustainment.

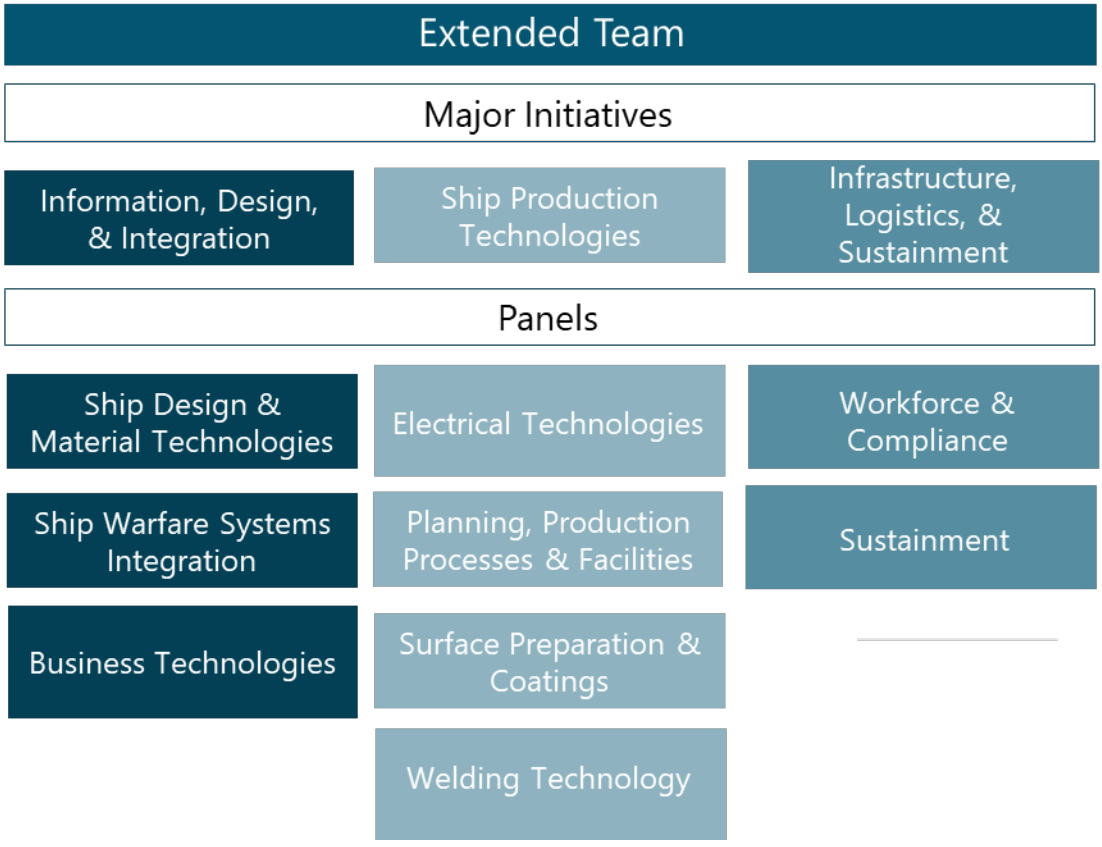

Figure 1. New Major Initiatives and Panels Structure

Augmenting this structure, the NSRP also collaborates with industry, other Navy, and other federal organizations to most efficiently accomplish its mission by leveraging other programs' work and minimizing duplication.

4. PROGRAM POLICY INFLUENCES

Since the U. S. Navy is the principal government sponsor and currently the largest beneficiary of NSRP activities, the priorities of the Department of Defense (DoD) and Department of the Navy (DoN) influence this industry-led R&D program. It is difficult to keep this SIP aligned with higher-level DoD and DoN strategic and policy documents, as these strategies and policies are influenced by changing worldwide geo-political events, changes in the U.S. federal Executive Branch from the President, to the Cabinet, the Navy Department, and subordinate reporting commands like NAVSEA, other federal Executive Branch agencies, and Congress.

Rather, this Strategic Investment Plan references these overarching documents in the Bibliography at the end of this document. All parties interested in NSRP should consult the U.S. Navy Strategic Library website for the latest versions of many of these documents[1]. NSRP participants should review the content within these documents, especially as they formulate potential responses to the annual NSRP Research Announcement and Panel Project solicitations.

5. STRATEGIC ENVIRONMENT

For this update of the SIP, the emphasis of each Major Initiative and its associated Panels is to review and streamline their specific areas of interest for a 3-5 year time frame. Over this 3-5 year horizon, the following enduring themes should be present:

- The United States will find itself in a renewed great power competition with potential adversaries.
- Actual conflict in Ukraine has created general instability in the European continent with geo-political, economic, and other impacts across the globe.
- The Navy plans to increase the fleet size very significantly over the next two decades. There is a general acknowledgement that the Navy will not be able to solely build itself to its fleet size objective.
- The Navy will need to extend ship service lives and reduce the time that ships are in maintenance and unavailable for fleet operations.
- Unmanned and autonomous vessels will play an increasing role in fleet operations.

[1] As the other federal agencies with operational fleets become more involved in NSRP, their equivalent strategic documents will be added to the Bibliography.

- There has been a perceived general decline in availability of current and future shipbuilding and ship repair talent, concurrent with potentially increasing workforce demand required to achieve a larger Navy fleet.
- A strong and vibrant industrial base is essential for a dominant US Navy fleet, the fleets of other federal agencies, and the US commercial fleet, but the maritime industrial base of the United States continues to erode. The supplier base of the major shipbuilding and ship repair shipyards is, in many cases, "one deep". Any effort to sustain and increase the number of qualified and willing vendors to supply the fleet is an imperative.
- The industrial base must consider total ship cost when looking for reductions in production or design cost for current or future platforms. In the past, the industry has focused on technology stove pipes without looking at the platform as a whole. Going forward, investment decisions should consider total platform benefit not just individual technology areas.

6. TECHNOLOGY INVESTMENT PLAN

NSRP conducts an annual workshop to develop a shorter-term, more-focused, and tactical Technology Investment Plan (TIP). The workshop participants include the NSRP's ECB and Extended Team, the NAVSEA NSRP Program Manager, and other government stakeholders. The TIP provides the more specific, annual, combined industry and government R&D priorities for the program. All R&D priorities in the TIP should clearly align with one or more requirements from the SIP, without being so generic as to apply to any emphasis area in the SIP. The annual TIP is approved by the ECB, after comment from the government.

The TIP is referenced in the annual NSRP Research Announcement and the Panel Project solicitations. Therefore, parties interested in applying for NSRP program funding during these solicitations should be familiar with the TIP, as it represents specific, short-term, research and development emphasis areas for the program.

7. MAJOR INITIATIVES

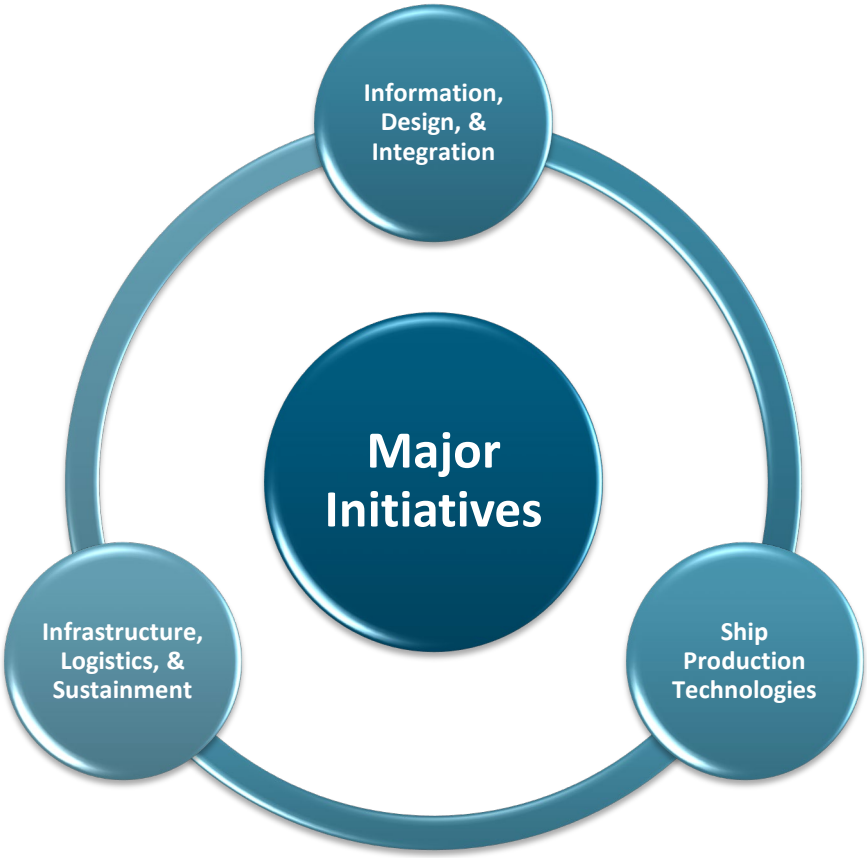

Figure 2 Revised Major Initiative Structure

NSRP has identified three overarching, integrally-connected Major Initiatives that tie the program's vision to proposed industry research and are derived from the basic organizational structure of a shipyard. The term "Major Initiative," as used in this document, constitutes operationally-aligned groups of functional topics. The three Major Initiatives shown in Figure 2 above align with the traditional ship lifecycle phases of "Design, Build, and Sustain." The nine NSRP panels each align to one of these Major Initiative areas. Each panel conducts research and development that is targeted on implementation and focused on specific technology areas of practice. Each Major Initiative group has identified technology development and improvement areas (sub-initiatives). Each of these Major Initiatives and constituent panels will be discussed in greater detail in the following sub-sections.

7.1 INFORMATION, DESIGN, & INTEGRATION (ID&I)

7.1.1 DEFINITION

The Information, Design, & Integration (ID&I) Major Initiative focuses on the research of emerging technology and the management of information to design and develop advanced solutions that support the full product lifecycle.

The ID&I Major Initiative consist of three Panels as follows:

- Business Technologies (BT)
    - The Business Technologies Panel focuses on emerging digital capabilities, blending process and information to develop advanced solutions that support product lifecycles from concept to disposal.
- Ship Design and Material Technologies (SDMT)
    - The SDMT Panel focuses on providing increased capabilities and cost reduction initiatives across the complete spectrum of design processes and the identification of materials to support rapid and efficient development, construction, sustainment, and disposal.
- Ship Warfare Systems Integration (SWSI)
    - The SWSI Panel focuses on the cost of integration and test for warfare and communication systems in ship construction and maintenance/modernization. The Panel improves coordination across programs, warfare and communication integrators, ship designers, and shipbuilders.

7.1.2 SUB-INITIATIVES

1. Reduce time for qualification and application of systems, materials, components and manufacturing technologies.
2. Advance and leverage digital shipbuilding.
3. Identify and implement flexibility, modularity, and scalability across platforms.
4. Investigate and apply solutions and best practices to support enterprise business processes and information management.
5. Develop design guidance to support, maintain, and sustain manned and unmanned platforms.
6. Advance design, materials and processes that reduce sustainment/modernization costs and schedule.
7. Incorporate autonomy in design processes and decision support tools.
8. Define, integrate and implement innovative approaches to cybersecurity compliance, solutions, education & awareness.

7.2 SHIP PRODUCTION TECHNOLOGIES (SPT)

7.2.1 DEFINITION

The Ship Production Technologies (SPT) Major Initiative addresses the fabrication, assembly, and testing phases of ship production, and the disassembly, repair/conversion, reassembly and testing phases of maintenance and modernization activities.

The SPT Major Initiative consist of the following four panels:

- Electrical Technologies (ET)
    - Research, develop and implement technologies and processes focused on improvements to installation, testing and operation of shipboard electrical systems.
- Planning, Production Processes, and Facilities (PPPF)
    - Discover and disseminate best practices focused on the principal manufacturing processes, equipment, planning, and facilities required to support the fabrication, assembly, and testing phases of ship production, repair and maintenance.
- Surface Preparation and Coatings (SPC)
    - Research, evaluate, and develop new and existing technologies in surface prep, coatings, corrosion control, and inspection that will reduce cost and improve quality in shipbuilding and repair applications.
- Welding Technology (WT)
    - Research, develop and implement technologies and efficiencies focused on welding and allied processes, including weld joint preparation, forming, post-weld heat treatment and inspection methods.

7.2.2 SUB-INITIATIVES

1. Improve Manufacturing Processes, Planning and Facilities for construction, fabrication, and assembly.
2. Improve Manufacturing Processes, Planning and Facilities for outfitting, installation, and testing.
3. Improve shipyards' sub-tier supplier performance with respect to quality, cost and schedule.
4. Increase use of Automation, Robotics and Mechanization in product fabrication, processes and testing including enablers such as standardization of design.
5. Increase knowledge and proficiency of overall workforce.
6. Develop and qualify emerging technologies.

7. Develop and implement digital shipbuilding tools for improved construction and sustainment activities.
8. Investigate consolidation of standards, and improvements to Standardization, Commonalities and Modularity.
9. Improve quality, level of detail, and automation of job planning and work instructions.
10. Incorporate additive manufacturing (AM) into shipbuilding and repair.
11. Develop solutions to improve installation, maintenance and efficiency of shipboard networks.
12. Develop warehousing, scheduling and logistics improvements to facilitate equipment delivery.

7.3 INFRASTRUCTURE, LOGISTICS, AND SUSTAINMENT (IL&S)

7.3.1 DEFINITION

The Infrastructure, Logistics and Sustainment (IL&S) Major Initiative focuses on improving shipbuilding and sustainment processes for manned and unmanned vessels. This includes attracting and developing a skilled workforce, while maintaining and advancing shipbuilding, modernization, and repair capabilities. A focus remains on compliance with environmental, occupational safety, and health requirements. It also includes logistics and sustainment processes associated with post-delivery, life cycle support of Navy, other Federal government agency, and commercial vessels.

The IL&S Major Initiative consist of the following two Panels:

- Workforce & Compliance
    - The Workforce & Compliance Panel will focus on improving the industry's workforce development ecosystem, recruiting, maximizing training efficiency and effectiveness, and developing technologies to solve workforce challenges. It also includes researching and addressing current and emerging environmental, health and safety issues to ensure stewardship of industry and communities.
- Sustainment
    - The Sustainment Panel has the mission of reducing the cost of ship logistics and sustainment activities to include repair, maintenance and modernization while increasing operational availability for manned and unmanned vessels. Panel focus will be placed on advancing technologies, materials, processes, and procedures that realize greater efficiencies in lifecycle sustainment. The Panel also includes researching and evaluating opportunities for implementation of digital tools, new technology, and processes to increase operational availability.

7.3.2 SUB-INITIATIVES

1. Recruit, retain and continually develop a skilled and motivated workforce.
2. Improve the effectiveness of training content and delivery to reduce the training time for knowledge capture, dissemination, and retention.
3. Develop and leverage technologies to enhance occupational health, safety, and environmental factors.
4. Explore opportunities to leverage artificial intelligence/machine learning (AI/ML), and emerging technology for shipyard planning, operations, and execution.
5. Incorporate sustainment considerations in the design phase of manned and unmanned vessels and components to support ship maintenance and modernization.
6. Implement new inspection and maintenance processes to support minimal time in availabilities.
7. Explore, develop, and implement processes to address supply chain limitations.
8. Improve early condition assessments and prognostic monitoring tools to support condition-based maintenance and structural health.
9. Develop and implement life cycle cost modeling for flexible, adaptable manned and unmanned systems as compared to traditional shipbuilding practices.

8. CONCLUSION

NSRP is committed to supporting the national defense and maritime strategy by providing a collaborative framework and performing research and development on shipbuilding and ship repair processes and technologies that will reduce the total ownership cost of United States Government and U. S.-flag commercial ships. The NSRP will collaborate with other organizations to execute the strategy described in this SIP to support the nation's plan to increase its maritime capability by increasing the overall number of vessels, increasing the combat capability of military vessels, increasing the operational availability of all vessels, and improving the ability to rapidly upgrade mission systems.

The strategic objectives that promote the NSRP mission consist of funding R&D projects that affect total ownership cost are as follows:

- Insertion of relevant technologies that reduce design, acquisition, testing or delivered ship operations and sustainment (maintenance/repair/conversion) costs
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9. APPROVALS AND ENDORSEMENT

The U.S. shipbuilding and ship repair industry is committed to improving productivity and first-time quality to reduce the total ownership costs of the nation's defense and maritime capability. All stakeholders recognize that continuous improvement is the key to maintaining the industrial capacity and the shipbuilding and repair skills necessary in support of the United States' security. The collaborative framework of the NSRP will allow the industry and government to achieve this commitment. We are encouraged by and applaud the Navy's active engagement with the NSRP.

The NSRP is an important strategic component for the U.S. shipbuilding and repair industry to remain effective as suppliers to the U.S. Navy, other federal agencies with operational fleets, and the commercial sector. In 1998, the CEOs of NSRP member companies stated, "It is the consensus of the industry representatives endorsing this Plan that two vital ingredients are needed to make this happen. First, a cooperative team effort on the part of the government and industry, and second, a strong commitment to finance the development and implementation of needed improvements in processes, systems and technologies." That statement remains true today, and the commitment is evidenced by the participation, matching of funds, assignment of top personnel, and collaboration among otherwise industry competitors.

We support and approve the mission of the NSRP and the Strategic Investment Plan:

AUSTAL USA

By: _____
Chris Orlowski

_____
Title

_____
Date

BAE SYSTEMS SHIP REPAIR

By: _____
Logan Jones

_____
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FINCANTIERI MARINETTE MARINE

By: _____
Scott Wellens

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_____
Date

GENERAL DYNAMICS – BATH IRON WORKS

By: _____
Stephen Nicholson

_____
Title

_____
Date

9. APPROVALS AND ENDORSEMENT (Continued)

GENERAL DYNAMICS – ELECTRIC BOAT

By: _____
Emil Casciano

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_____
Date

GENERAL DYNAMICS – NASSCO

By: _____
Zoe Cawlfield

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HII - INGALLS SHIPBUILDNG

By: _____
John Kooienga

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Date

HII - NEWPORT NEWS SHIPBUILDING

By: _____
Dave Bolcar

_____
Title

_____
Date

ENDORSEMENT
(NAVSEA NSRP PROGRAM –SEA 05T2)

By: _____
Colin Dunlop
Program Manager
Title

_____
Date

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Program Executive Office Science and Technology Plans	Program Executive Offices