

Strategic Investment Plan

MISSION

- ❖ Manage and focus national shipbuilding and ship repair research and development funding on technologies that will reduce the cost of ships to the U.S. Navy, other national security customers and the commercial sector, and develop and leverage best commercial and naval practices to improve the efficiency of the U.S. shipbuilding and ship repair industry.
- ❖ Provide a collaborative framework to improve shipbuilding-related technical and business processes.



TABLE OF CONTENTS

1.	RECORD OF CHANGES	2
2.	FOREWORD	3
3.	ENDORSEMENTS	4
4.	EXECUTIVE SUMMARY	6
4.1	Program Organization	6
4.2	Leadership, Management, and Extended Team.....	7
4.3	Sponsors	8
4.4	Core Program Activities.....	8
5.	STRATEGIC INVESTMENT PLAN 2016 METHODOLOGY	8
6.	CURRENT STRATEGIC OBJECTIVES	9
6.1	Focus Areas	10
6.1	Focus Areas (Continued)	11
7.	MAJOR INITIATIVES	12
7.1	Ship Design and Material Technologies	13
7.2	Ship Production Technologies	14
7.3	Business Processes and Information Technologies	15
7.4	Infrastructure and Support	16
8.	TECHNOLOGY TRANSFER AND IMPLEMENTATION	18

1. RECORD OF CHANGES

**Previous 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	<ul style="list-style-type: none"> • The original plan was divided into two documents: <ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> • Inclusion of new program sponsors • Inclusion of new Ship Warfare Systems Integration Panel • Updated R&D interest areas • Administrative updates, including <ul style="list-style-type: none"> ○ Expanded Executive Summary ○ Updated graphics ○ Updates to date references
Change 7	June, 2016	6, 6.1, 7, 7.1-7.4	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> ○ Updated graphics ○ Updates to date references ○ Updated NSRP Branding
Change 8	February, 2019	All	<ul style="list-style-type: none"> • Administrative updates, including <ul style="list-style-type: none"> ○ Inclusion of new program sponsors ○ Updated graphics ○ Updates to date references • Updated NSRP Branding

2. FOREWORD

The National Shipbuilding Research Program Advanced Shipbuilding Enterprise (NSRP ASE) is a collaboration of U.S. shipyards working together to reduce the cost of building, operating and repairing Navy ships. The shipbuilding industry will achieve this by improving productivity and quality through advanced technology and processes. NSRP ASE leverages public/private cooperation to manage cost-shared R&D based on a consensus Strategic Investment Plan.

At its core, the program is built upon the following elements, all of which are critical to the continued success of the NSRP ASE.

Breakthrough technologies and processes – the catalyst for innovation and cost reduction

Collaboration – creating a neutral climate for R&D teams to share ideas with their peers and support emerging technologies

Implementation Solutions – creating a sound plan that allows technologies to be easily transferred and implemented across the industry

Human and capital investment – the more capital and human investment that is allocated for R&D at the outset, proportionally greater are the long-term results.

The Strategic Investment Plan serves as the foundation for the National Shipbuilding Research Program and provides the direction for moving forward to all participants.

The plan aims to meet the nation's sea power needs at the lowest attainable ownership cost while maintaining a cost effective, responsive industrial base. To achieve this, the plan targets industry-wide technology and process improvements that have the highest potential to achieve gains in Navy ship affordability.

These focus areas have been developed by industry and Navy leaders from the input of seasoned industry experts and the results of numerous benchmarking studies. This document should be used to guide collaborative research and development among all segments of the U.S. ship construction and repair industry, including educational research and government institutions. The collaboration's organizational structure promotes teaming and collaboration within and across all sectors and calls for investment by both government and industry over several years.



3. ENDORSEMENTS

The U.S. shipbuilding industry is committed to improving productivity and quality to reduce the total ownership costs of the nation's defense. 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 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 and other national security customers. 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 competitors.

We support and endorse the goals of NSRP ASE and the Strategic Investment Plan:

AUSTAL USA

By: _____
Tom Perrine

Title: _____

Date: _____

BAE SYSTEMS - JACKSONVILLE SHIP REPAIR

By: _____
Todd Hooks

Title: _____

Date: _____

CONRAD SHIPYARD

By: _____
René Leonard

Title: _____

Date: _____

FINCANTIERI MARINETTE MARINE

By: _____
Robert Watkins

Title: _____

Date: _____

ENDORSEMENTS (CONTINUED)

GENERAL DYNAMICS – BATH IRON WORKS

By: _____
Tim Glinatsis

Title: _____

Date: _____

GENERAL DYNAMICS – ELECTRIC BOAT

By: _____
Matt Olander

Title: _____

Date: _____

GENERAL DYNAMICS – NASSCO

By: _____
Steve Davison

Title: _____

Date: _____

HII - INGALLS SHIPBUILDNG

By: _____
Rick Spaulding

Title: _____

Date: _____

HII - NEWPORT NEWS SHIPBUILDING

By: _____
Don Hamadyk

Title: _____

Date: _____

VT HALTER MARINE

By: _____
Buck Younger

Title: _____

Date: _____

4. EXECUTIVE SUMMARY

4.1 PROGRAM ORGANIZATION

The NSRP is a collaboration of U.S. shipyards that focuses on common issues with a goal of reducing the cost of acquiring, operating and maintaining Navy ships.

The program organization is outlined below:

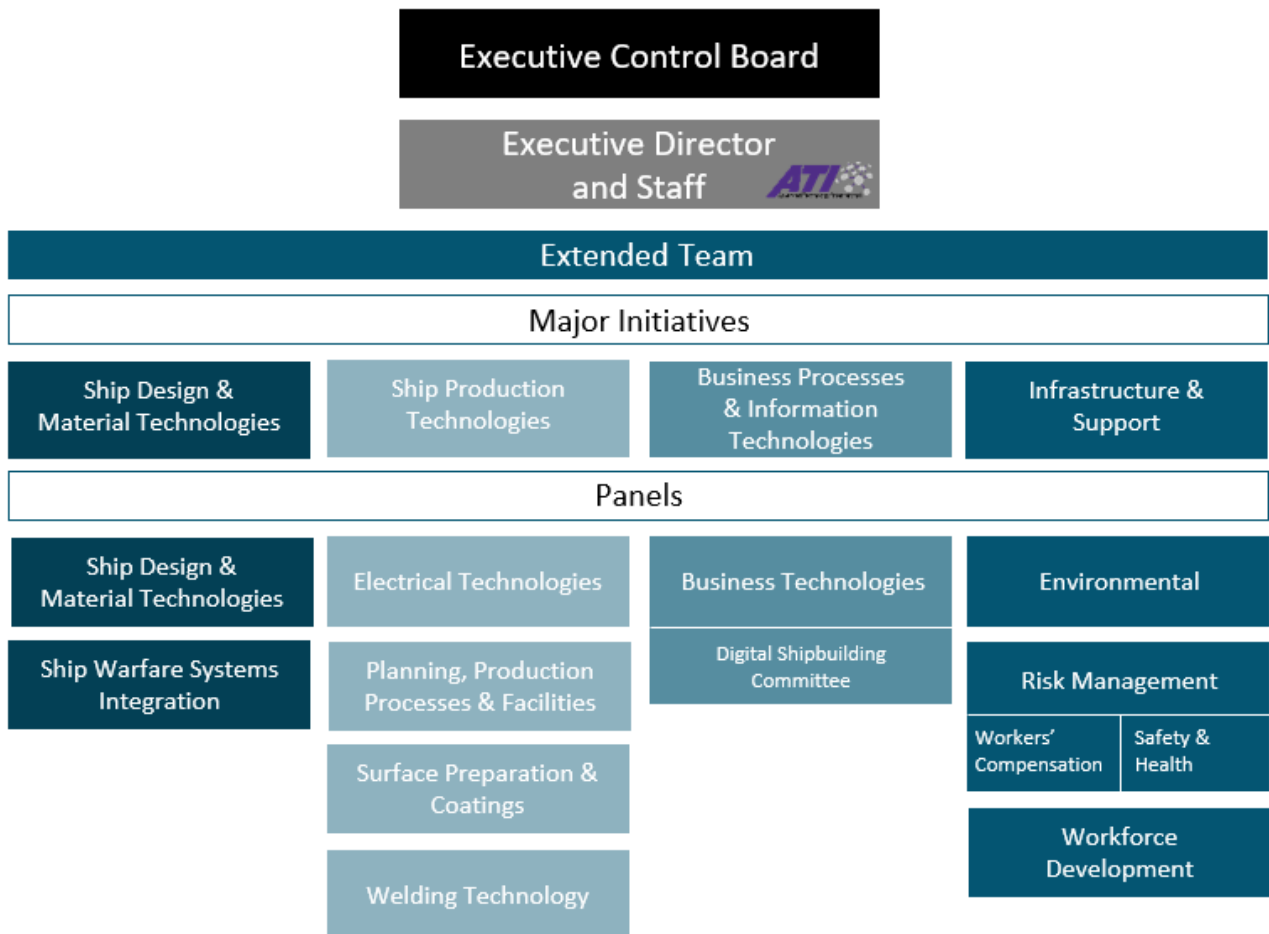


Figure 1 – NSRP Structure

4.2 LEADERSHIP, MANAGEMENT, AND EXTENDED TEAM

Executive Control Board: NSRP is governed by an Executive Control Board (ECB) that consists of a senior management representative from each of the member shipyards.

Executive Director: The ECB has selected ATI as Program Administrator, who, acting with guidance from the ECB, shall be responsible for the overall management of the Collaboration, including technical, programmatic, reporting, financial and administrative matters. The Program Administrator employs the program's Executive Director, who will provide a single point of contact to the Collaboration, the Government and the respective designees.

Major Initiative Team Leaders and Assistants: The technical leadership of NSRP is provided by the Major Initiative Team Leaders (MITL) and Assistant MITLs. The MITLs and Asst MITLs are volunteers selected from member shipyards by the ECB. Each MITL/Asst MITL team oversees one of the four major initiatives, providing input and recommendations on key elements of the program, such as the Strategic Investment Plan, project solicitations, and project execution. The MITLs/Asst MITLs are also the primary pool from which program technical representatives are selected. At times, there may also be one or more MITLs-At-Large not affiliated with any one initiative, but positioned to support the program, as do the other MITLs.

NSRP Shipyard Delegates: To provide a single point of contact and "subject matter expert" for program activities at each member shipyard, an NSRP Shipyard Delegate (NSD) is selected by each shipyard's ECB representative. The NSD acts as a conduit of information into and out of the shipyard for program activities, project implementations, and other topics of interest to the program. Their role is similar to that of a MITL with the exception of program technical representative duties. An existing MITL/Asst MITL may serve as NSD at the shipyard's discretion.

Panel Chairs: The panels are the working groups of the program. Each panel elects a chair and vice-chair who lead and coordinate the panel activities, which include open industry meetings and execution of smaller-scale projects. As with the MITLs, the Panel Chairs also provide input and recommendations on key elements of the program. However, the core focus of the panels is open interaction with the industry at large, as well as with government representatives and members of academia engaged in their respective functional areas. This interaction is accomplished primarily through two to three open meetings per panel per year.

4.3 SPONSORS

As a joint industry/government program, the U.S. Navy is actively engaged with NSRP. Naval Sea Systems Command, with the Program Executive Offices, and the U.S. Coast Guard are key stakeholders.

- [Naval Sea Systems Command](#) (NAVSEA):
- [Program Executive Offices](#)
 - Carriers
 - Integrated Warfare Systems (IWS)
 - Ships
 - Subs
 - Unmanned and Small Combatants
- [PEO C4I \(SPAWAR\)](#)



Figure 2 - Program Sponsors

4.4 CORE PROGRAM ACTIVITIES

Projects: The greatest portion of industry and government funding for this program is invested in R&D projects. Projects selected and executed fall into two categories: Panel Projects and Research Announcement (RA) projects. Panel projects are lower cost and shorter duration (\$150K, 12 months or less). RA projects can run into the millions of dollars, last up to three years, and involve much more stringent cost share requirements for project participants.

Technology Transfer and Industry Networking: One of the goals of NSRP is the sharing of project results to the maximum extent practicable to the U.S. shipbuilding and repair industry, both throughout the project lifecycle as well as after project completion. This is achieved through panel meetings, which serve a crucial role within the program by providing a neutral, public forum for industry-wide networking, technology transfer and discussion of current Navy and industry areas of interest. Panels typically meet two to three times a year at different locations throughout the country. Other opportunities for transferring the technologies developed under NSRP are industry conferences, project demonstrations and training workshops.

Ad Hoc Groups: Periodically, at the request of Navy or industry, ad hoc groups are established to focus efforts on specific target areas in the shipbuilding and ship repair industry. These ad hoc groups are quickly instituted to include key stakeholders of the target area, and then they carry out their task and are disbanded when required actions are complete.

5. STRATEGIC INVESTMENT PLAN 2016 METHODOLOGY

The Strategic Investment Plan has undergone several revisions throughout the life of the current program to address and incorporate changes within the industry. Earlier versions of the Plan were designed to be a comprehensive document that combined the program's strategic outlook, business plan, investment portfolio, and R&D roadmap. After extensive discussions with key industry and Navy stakeholders in 2010, consensus was reached that, although all of these components are essential in providing program guidance and direction, including them in one document created a Plan that was too cumbersome, making

it difficult to use, update and disseminate. As a result, the Strategic Investment Plan was segregated into two documents to allow flexibility and adaptability to future Navy/Industry focus areas:

Strategic Investment Plan: high-level synopsis, including the mission of the program, overarching Navy and industry areas of interest, specific focus areas and recommendations on possible paths for implementation

Organization and Operations Manual: in-depth description of the history of the program, its organization, structure and the project selection process.

That revised format has proved successful and will be continued with this 2016 revision.

6. CURRENT STRATEGIC OBJECTIVES

Strategic Investment Plan 2016 is focused on the following priorities established by key industry and Navy stakeholders and concurred with by the program's ECB:

- Reduced Total Ownership Cost of ships
- Improved quality in ship design, construction and repair through continuous improvement of advanced technologies, processes and data management applications
- Enhanced workforce excellence
 - Improved safety, wellness and environmental stewardship for shipyards and shipboard personnel
 - Recruitment, training, engagement and retention of shipbuilders through collaboration, knowledge sharing and attitude management during change
- Reduced cost associated with ship systems integration during ship design, construction, modernization and maintenance
- Increased materials and process commonality across the shipbuilding and ship repair enterprise to reduce cost
- Identification of best practices from all sources regarding cybersecurity technologies and their appropriate application to shipbuilding and repair systems and equipment

6.1 FOCUS AREAS

The following focus areas and their definitions provide the avenues through which research and development of improved technology and processes will advance the industry and positively influence the Strategic Objectives:

Focus Areas	
Advanced Modular Design and Construction	Development of technologies and processes that support modular design and construction. This includes efforts to increase shop-based work, preassembly, and more complete early outfitting to enhance ship construction and testing (pre-erection) schedules.
Improving Quality, Reducing Re-work	Reduced construction cost and improved schedule adherence by implementing processes and technologies that achieve first time quality. Providing or promoting the availability of accurate information through single authoritative sources for data delivery through tools, processes and technologies to improve quality and reduce re-work.
Production Engineering	Development and implementation of best practices and tools related to process technologies, build strategy and design for affordability to reduce inherent work content, improve the efficiency of production, lower cost, and reduce cycle time. This includes integration of design and production.
Improving Specifications and Standards	Working with the Navy/regulatory authorities to develop and revise specifications and standards impacting the shipbuilding and ship repair industry.
Improving Manufacturing Processes	Effective improvements to all of the fundamental processes involved in shipbuilding, including electrical, welding, surface preparation and coatings, and metalworking. This would also include innovative processes, application of lean manufacturing principles, and use of advanced material not presently used in shipbuilding or repair.
Improving Production Planning	Development and implementation of new tools and processes that support optimized build strategy and manufacturing process efficiency in advance of those events occurring. Focus areas include activities such as optimal sequencing and work package development, and the use of advanced information deployment methods.

Table 1 - Major Focus Areas

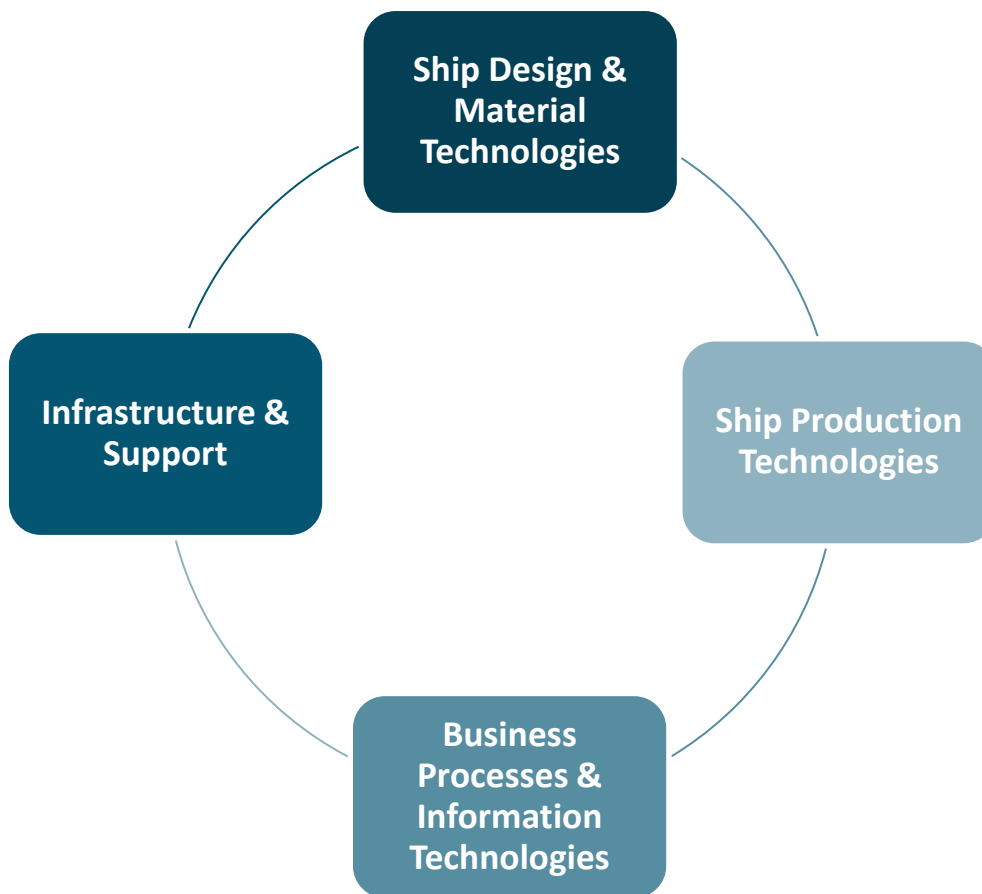
6.1 FOCUS AREAS (CONTINUED)

Focus Areas	
Integration of Shipboard Warfare Systems	<p>Promoting standardization of physical interfaces between IWS, GFE, CFE, and shipboard spaces. Minimizing impact of information supplied late to the shipyard by an external supplier or subcontractor to minimize delays, disruptions, and ship design re-work associated with late arrival. Exploring the design of self-contained warfare system modules that facilitate on-site testing and rapid install/removal resulting in:</p> <ul style="list-style-type: none"> • Improved efficiency of ship design/warfare system integration • Incorporation of most current warfare system technologies • More frequent and efficient capability insertion
Integration of Enterprise Processes and Tools	Development and implementation of enterprise wide architecture, processes and tools to control, manage, and deliver data throughout the product life cycle.
Improving Safety & Health / Reducing Environmental Impacts	Preventing injuries, reducing energy consumption and environmental impacts, ensuring compliance excellence, enhancing ergonomic features and employee wellness utilizing the latest technology and analytics.
Improving Training and Development	Attracting talent, developing skills and empowering employees to foster innovation in shipbuilding through collaboration, best practices, and the use of analytics.
Commonality	Application of lean practices and product standardization to enterprise processes and tools to enable material and process commonality, interoperability, and intra-operability across all facets of shipyard, Navy and supplier operations.
Model-Based Enterprise (MBE)	Facilitating the development of a fully integrated and collaborative environment founded on 3D model-based product definition developed and shared across the enterprise to enable the rapid deployment of products throughout the ship's lifecycle to reduce total ownership costs.
Improving Design and Analysis	<p>Investigating, integrating, and promoting new tools, processes and technologies to support design and analysis activities to improve efficiencies and reduce costs, specifically:</p> <ul style="list-style-type: none"> • Reduced design and engineering costs • Optimized production performance while satisfying functional requirements • Opportunity for increased commonality • Improved basis for determining acquisition and lifecycle costs

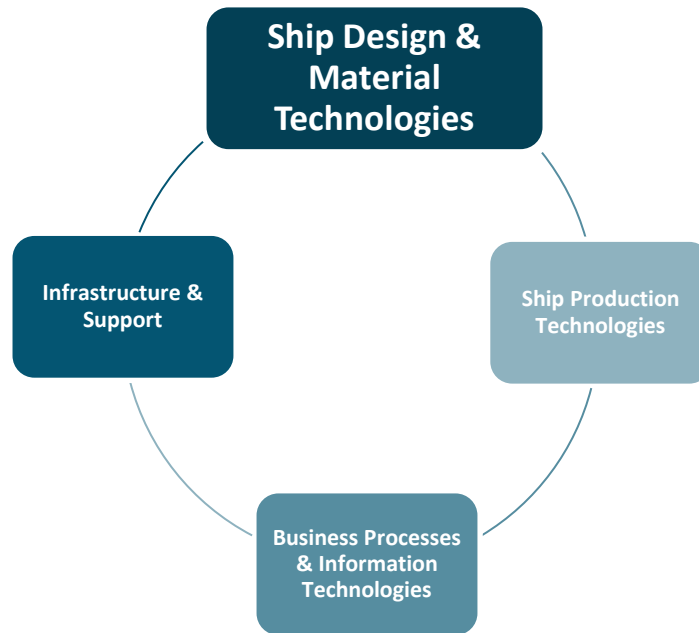
Table 1- Major Focus Areas (cont.)

7. MAJOR INITIATIVES

A group of leaders and seasoned professionals reviewed the focus areas listed in Table 1, the existing benchmarking data, emerging trends and the projects completed in the past. This resulted in the identification of four overarching, integrally connected major initiatives that tie the strategic 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. Each Major Initiative group has identified technology development and improvement areas (sub-initiatives) that are mapped to the focus areas in Section 6 of this document.



7.1 SHIP DESIGN AND MATERIAL TECHNOLOGIES

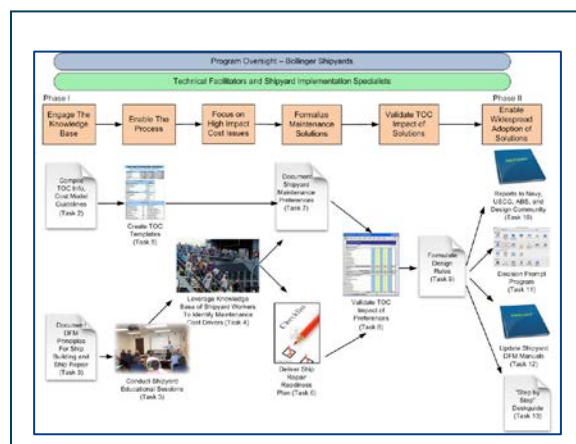


7.1.1 DEFINITION

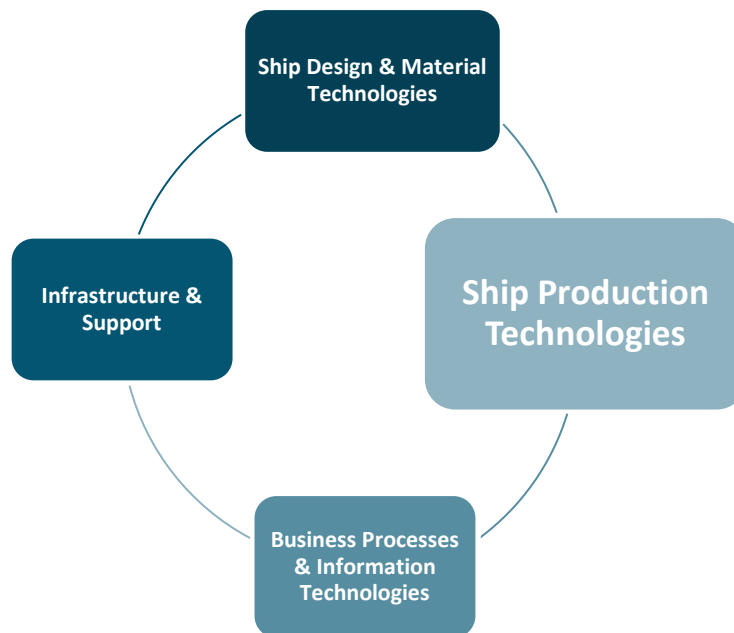
Implement cost reduction initiatives across the complete spectrum of design processes (conceptual to detail) and the use of advanced materials to support the rapid and efficient development, construction, sustainment, and disposal of the next generation of vessels.

7.1.2 SUB-INITIATIVES

- Design for Total Ownership Cost
- Design for Producibility
- Work sequencing
- Design for modular construction
- Modeling and Simulation
- Improved standards and specifications
- Advanced product design
- Commonality and standardization
- Advanced materials



7.2 SHIP PRODUCTION TECHNOLOGIES



7.2.1 DEFINITION

The Ship Production Technologies major initiative addresses the fabrication and assembly phases of ship production including the planning and organizational structure (facilities) that support those phases.

7.2.2 SUB INITIATIVES

The goal is to improve the efficiency (both in man-hours and schedule) and quality of constructing a ship, including the advances in technologies and materials used during the production phase, the optimization of the build strategies and improvements to facilities. Ship Production Technologies also collaborates with the Ship Design and Material Technologies major initiative to implement changes needed to fully realize the benefits of the new technologies, materials and techniques developed by both groups. Sub-initiatives to accomplish these goals include:

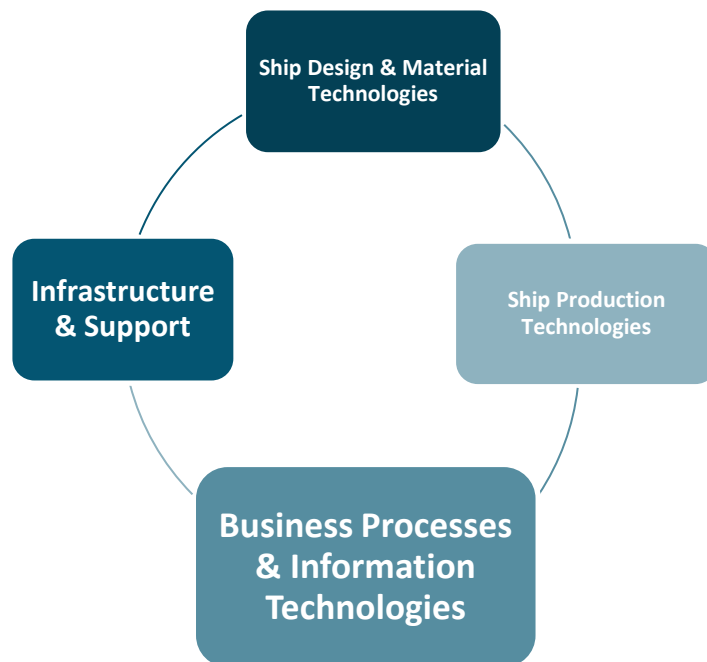
- Steel and aluminum fabrication (steel, composites, and all outfit types)
- Sub-assembly manufacturing
- Assembly and erection
- Outfit fabrication
- Equipment installation and test
- Surface preparation and coatings
- Process control (accuracy control and process management)



- Industrial Engineering
- Production control (in-yard material planning and coordination)
- Manufacturing services (e.g., transportation and rigging, tool rooms, temporary ventilation/lighting, etc.)
- Outfitting Processes
- Structural Processes
- Welding/Joining/Non-Destructive Testing
- Production Planning
- Production Engineering Design for Production
- Digital build data delivery/capture
- Mobile data access
- Additive Manufacturing
- Processes



7.3 BUSINESS PROCESSES AND INFORMATION TECHNOLOGIES



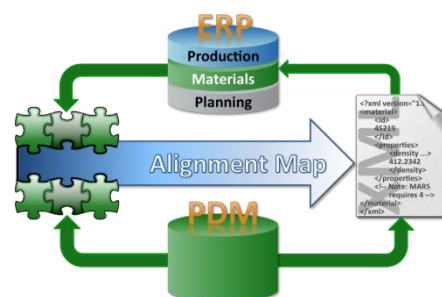
7.3.1 DEFINITION

Address current technologies and processes for improvement as well as emerging technologies that increase value to the Navy.

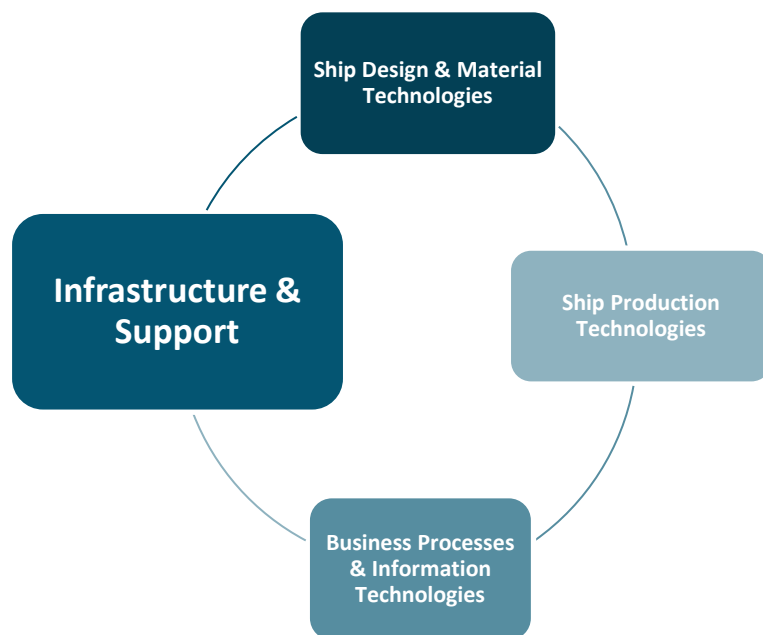
7.3.2 SUB-INITIATIVES

- Data configuration management

- Data access, control, assurance and security
- Digital Design, analysis, manufacturing and sustainment technologies
- Improving shipyard tools, approaches, and processes with data science
- Data: exchange, delivery, interoperability, intra-operability
- Electronic work packaging and digital delivery of data
- Shipbuilding informatics (data analytics, infrastructure, applications, reporting)
- External exchange (Navy-Industry)
- Cybersecurity
- Digital data capture and display
- Expand use of mobile devices
- Facilitate the development of a fully integrated and collaborative environment founded on 3D model-based product



7.4 INFRASTRUCTURE AND SUPPORT



7.4.1 DEFINITION

Drive and support shipbuilding and repair processes to achieve a safe, high-quality, environmentally responsible and productive workforce.

7.4.2 SUB-INITIATIVES

- Ensure compliance excellence for environmental, safety and health

- Prevent injuries through innovation including ergonomic improvements and near miss identification and correction
- Reduce workers compensation costs
- Minimize environmental, safety, and health risks and promote wellness
- Reduce shipbuilding and ship repair energy consumption
- Promote product and service quality to facilitate a culture of continuous improvement
- Gain efficiencies through innovation and continuous improvement ultimately reducing overhead costs
- Advance the incorporation of new tools and technologies to modernize and engage a diverse workforce
- Attract, sustain and improve a competent and motivated workforce through measurable outcomes
- Achieve R&D project knowledge transfer and apply change management to ensure implementation adds delivery, quality, and cost value

8. TECHNOLOGY TRANSFER AND IMPLEMENTATION

The table below was developed by the four major initiative teams; it maps the focus areas across the major initiatives and identifies possible avenues for implementation:

Focus Area	Potential Implementation Avenues by Initiative			
	Ship Design & Material Technologies	Ship Production Technologies	Business Processes & Information Technologies	Infrastructure & Support
Advanced Modular Design and Construction	<ul style="list-style-type: none"> • Design for Producibility <ul style="list-style-type: none"> ○ Work Sequencing ○ Design for Modular Construction • Improved Standards and Specifications • Advanced Product Design • Commonality and Standardization 	<ul style="list-style-type: none"> • Handle Larger Ship Blocks • Greater Use of Connectors • Increase Unit Early Outfitting • Increased Accuracy Control • Improved Equipment Protection • Improved Work Environments 	<ul style="list-style-type: none"> • Data Exchange / Interoperability / Intra-operability • Electronic Work Packaging • Enterprise Resource Planning Systems • Parts Commonality • Supply Chain Management 	<ul style="list-style-type: none"> • N/A
Improving Quality, Reducing Re-work	<ul style="list-style-type: none"> • Design for Producibility <ul style="list-style-type: none"> ○ Work Sequencing ○ Design for Modular Construction • Improved Standards and Specification • Commonality and Standardization • Advanced Materials 	<ul style="list-style-type: none"> • Improve Accuracy Control • Handling Change More Efficiently • Improved Process Control 	<ul style="list-style-type: none"> • Data Exchange / Interoperability / Intra-operability • Electronic Work Packaging • Enterprise Resource Planning Systems • Estimating • Parts Commonality • Supply Chain Management 	<ul style="list-style-type: none"> • Through First-Time Quality and Training
Production Engineering	<ul style="list-style-type: none"> • Design for Producibility <ul style="list-style-type: none"> ○ Work Sequencing ○ Design for Modular Construction • Improved Standards and Specifications • Commonality and Standardization • Advanced Materials 	<ul style="list-style-type: none"> • Definition of Interim Product Standards • Process Lanes • Cellular Manufacturing 	<ul style="list-style-type: none"> • Data Exchange / Interoperability / Intra-operability • Electronic Work Packaging • Enterprise Resource Planning systems • Estimating • Parts Commonality • Supply Chain Management 	<ul style="list-style-type: none"> • Human Systems Integration • Environmentally Compliant

Improving Specifications and Standards	<ul style="list-style-type: none"> • Design for Producibility <ul style="list-style-type: none"> ○ Work Sequencing ○ Design for Modular Construction • Improved Standards and Specifications • Commonality and Standardization • Advanced Materials 	<ul style="list-style-type: none"> • Welding Standards • Electrical Standards • Surface Prep and Coat Standards 	<ul style="list-style-type: none"> • Data Exchange / Interoperability / Intra-operability • Parts Commonality • Supply Chain Management 	<ul style="list-style-type: none"> • Skills Standards Per Job
Improving Manufacturing Processes	<ul style="list-style-type: none"> • Design for Producibility <ul style="list-style-type: none"> ○ Work Sequencing ○ Design for Modular Construction • Improved Standards and Specifications • Commonality and Standardization • Advanced Materials 	<ul style="list-style-type: none"> • Improved Welding Processes • Improved Surface Prep and Coating Processes • Improved Electrical Processes • Increased Use of Automation • Improved Material Handling 	<ul style="list-style-type: none"> • Data Exchange / Interoperability / Intra-operability • Electronic Work Packaging • Enterprise Resource Planning Systems • Estimating (Std Times) 	<ul style="list-style-type: none"> • Human Systems Integration • Management and Supervision
Improving Production Planning	<ul style="list-style-type: none"> • Design for Producibility <ul style="list-style-type: none"> ○ Work Sequencing ○ Design for Modular Construction • Modeling and Simulation 	<ul style="list-style-type: none"> • Production Modeling and Simulation • Work Package Content Standards 	<ul style="list-style-type: none"> • Data Exchange / Interoperability / Intra-operability • Electronic Work Packaging • Enterprise Resource Planning Systems • Estimating (Std Times) • Parts Commonality • Supply Chain Mgt 	<ul style="list-style-type: none"> • N/A
Integration of Shipboard Warfare Systems	<ul style="list-style-type: none"> • Design for Producibility <ul style="list-style-type: none"> ○ Work Sequencing ○ Design for Modular Construction • Improved Standards and Specifications • Commonality and Standardization 	<ul style="list-style-type: none"> • Production Modeling and Simulation • Work Package Content Standards 	<ul style="list-style-type: none"> • Data Exchange / Interoperability / Intra-operability • Electronic Work Packaging • Enterprise Resource Planning Systems • Estimating (Std Times) • Parts Commonality • Supply Chain Mgt 	<ul style="list-style-type: none"> • N/A
Integration of Enterprise Processes and Tools	<ul style="list-style-type: none"> • Design for Total Ownership Cost • Modeling and Simulation • Improved Standards and Specifications 	<ul style="list-style-type: none"> • Improved Internal Data Flow (Design to ERP) 	<ul style="list-style-type: none"> • Standards-Based Open Architecture • Shipyard Integration & Collaboration • Shipyard-NAVSEA Collaboration 	<ul style="list-style-type: none"> • N/A

	<ul style="list-style-type: none"> Commonality and Standardization 		<ul style="list-style-type: none"> Data Delivery 	
Improving Safety & Health / Reducing Environmental Impacts	<ul style="list-style-type: none"> Design for Total Ownership Cost Design for Producibility Design for Modular Construction Modeling and Simulation Improved Standards and Specifications Advanced Product Design Advanced Materials 	<ul style="list-style-type: none"> Ergonomic Awareness and Training Improved Material Handling 	<ul style="list-style-type: none"> Supply Chain Management 	<ul style="list-style-type: none"> Through Material Selection, Design and Other Human Factors Continue to Provide Industry Interface w/ OSHA and EPA
Improving Training and Development	Integrated across all initiatives, panels and projects			
Commonality	Integrated across all initiatives, panels and projects			
Model-Based Enterprise (MBE)	<ul style="list-style-type: none"> Design for Total Ownership Cost Design for Producibility Design for Modular Construction Modeling and Simulation Improved Standards and Specifications 	<ul style="list-style-type: none"> Improved Material Handling Production Modeling and Simulation Work Package Content Standards 	<ul style="list-style-type: none"> Electronic Work Packaging Enterprise Resource Planning Systems Estimating (Std Times) Parts Commonality Supply Chain Management 	<ul style="list-style-type: none"> N/A
Improving Design and Analysis	<ul style="list-style-type: none"> Design for Total Ownership Cost Design for Producibility Design for Modular Construction Modeling and Simulation Improved Standards and Specifications 	<ul style="list-style-type: none"> Improved Material Handling Production Modeling and Simulation Work Package Content Standards 	<ul style="list-style-type: none"> Electronic Work Packaging Enterprise Resource Planning Systems Estimating (Std Times) Parts Commonality Supply Chain Management 	<ul style="list-style-type: none"> Human Systems Integration Management and Supervision Skills Standards Per Job

