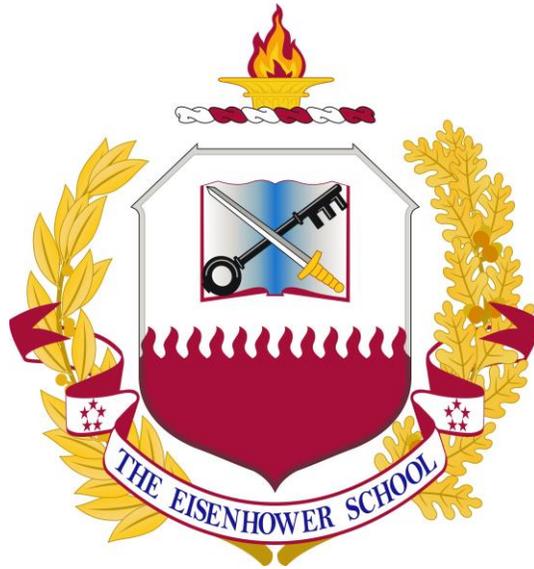


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Final Report
Shipbuilding Industry



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ABSTRACT

The shipbuilding industry in the United States is uncompetitive globally and clings to life based on a law from 1920 and the government paying a premium for state of the art military vessels. Asian shipyards dominate the commercial market with United States facilities accounting for less than one percent of the world's order book. Although the likelihood of another World War II type effort to mobilize the industrial capacity of the country to churn out thousands of ships is remote, it is in the strategic interests of the United States to enact policies to strengthen domestic shipbuilding capability and ensure a technological advantage is maintained in military shipbuilding. China, South Korea and Japan became world leaders in shipbuilding based on strategic decisions to execute a national strategy to have the industry become a pillar of their economic prosperity. The absence of a United States National Maritime Strategy has resulted in a gradual decline in commercial shipbuilding that is woefully uncompetitive on the international market. A robust effort to prioritize the shipping industry in the United States has potential for positive ripple effects that would benefit the country for generations. Most importantly, increased activity would make the purchase of government vessels more affordable, ensuring the country is able to field the maritime capability required to execute national objectives.

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Domestic

United States Coast Guard Yard, Baltimore, MD
Carnival Cruise Lines, Miami, FL
Electric Boat Quonset Point, RI
Bath Iron Works, Bath, ME
USS NIMITZ (CVN 68), Everett, WA
Guido Perla and Associates, Inc., Naval Architects, Seattle, WA
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EXECUTIVE SUMMARY

Is the United States on a path where it will no longer build ships domestically? As far-fetched as that scenario may seem, that question would have been greeted by a resounding “NO” if posed to Great Britain 100 years ago. However, BAE Systems announced recently that after 500 years, the famed Portsmouth Shipyard would cease shipbuilding, meaning Royal Navy ships would no longer be built end to end in Great Britain.¹ Future ships of the Royal Navy are being built in Scotland and even South Korea for their next generation of tankers.² Complicating the situation further, aside from the loss of jobs, technical expertise and national pride, Scotland is tracking for an independence vote from the United Kingdom on September 18th, 2014.³ Therefore, there is a possibility that the once mighty Royal Navy, the strength of the British Empire, would be built in other countries. How did they arrive at this point and is the United States in danger of being in the same situation in the future?

Although the devastating effects of World War I and World War II were major factors in the rapid decline of the British Empire and the Royal Navy, the shipbuilding industry in the United States faces its own unique challenges. First, commercial shipbuilders in the United States are uncompetitive globally and cling to life based on a law from 1920 and the government paying a premium for state of the art military vessels. Second, with the United States entering a period of fiscal austerity, the nation is at a crossroads and needs to determine how to strike a balance between capability, capacity and cost in constituting the fleet to carry out national security objectives and promote global economic stability. As the cost of ships increase steeply and budget pressure mounts, the nation may be forced to scale back initiatives such as the “rebalance to the Pacific”, where a rising and emboldened China has already tested the resolve of the United States and the international community by making numerous territorial claims in the South China Sea. And third, any prolonged disruption to shipyard workflow risks industry extinction where the U.S. would be dependent on other countries to provide critical platforms and systems that are no longer built domestically. Allies such as the United Kingdom and Norway have contracted with a shipyard in South Korea to build their next generation of military replenishment vessels. Although providing great value, relying on the stability of the Korean Peninsula is a calculated risk. A recent cautionary tale is the sanctions standoff with Russia over the Ukraine situation where Russia is denying sale of rocket engines that launch U.S. satellites (including military) into orbit.

The United States shipbuilding industry can be fortified with a handful of policy and programmatic changes that would bolster the economy, provide citizens with enhanced quality of life, stimulate manufacturing job growth, and increase affordability of naval ships. Specific recommendations include:

- 1) Create a National Maritime Strategy – Inter-agency driven process to promote the revitalization of the Industrial base for commercial and DoD benefit.
- 2) Ignite awareness of the Maritime Highway through creation of a National Transportation Infrastructure Strategy



- 3) Stabilize the Industrial Base by introducing predictability in Navy Shipbuilding by constructing proven platforms at a set rate until new technology is mature, tested, and ready to be incorporated
- 4) Increase investment in Research and Development and testing to maintain military technological edge
- 5) Fund Title XI Loan Guarantee Program
- 6) Incentivize the pursuit of opportunities in emerging markets
- 7) Invest in the workforce

As the U.S. Navy states in recruiting commercials, 70 percent of world is covered by water, 80 percent of people live within 200 miles of an ocean, and 90 percent of international trade travels by sea, and those numbers are expected to increase.⁴ In an ever more unpredictable world, and one more interdependent on trade, the maritime environment will be critical. It has proved to be the most economic method of distributing goods and provides the most expeditious way to address national security and stability issues; therefore, the United States has a vital interest in maintaining dominance of the seas. Therefore, enacting the above policies would stimulate demand for ships. The ripple effect of increased activity would positively affect the economy, the environment, congestion on the roads, and cumulatively bolster the shipbuilding industry for the long-term prosperity of the nation. Most importantly, it would halt the decay of the shipbuilding industry ensuring the domestic capability to build ships is maintained for generations.



INTRODUCTION

At its peak, the British Empire exerted influence over one-fifth of the world's population and almost one-quarter of the earth's land. This global reach can be attributed to the unquestioned dominance of the seas enjoyed by the Royal Navy. In November 2013, BAE Systems announced Portsmouth Shipyard would shutter shipbuilding operations after 500 years of building the bulk of the British Fleet. Future ships of the Royal Navy are being built in Scotland and even South Korea for their next generation of tankers. Complicating the situation further, aside from the loss of jobs, technical expertise and national pride, Scotland is tracking for an independence vote from the United Kingdom on September 18th, 2014. Therefore, there is a possibility that the once mighty Royal Navy, the strength of the British Empire, would be built in other countries. How did Great Britain arrive at this point, and is the United States in danger of being in the same situation in the future?

The cost to build warships continues to skyrocket. For example, the USS GEORGE H.W. BUSH (CVN 77), the last Nimitz Class Aircraft Carrier (and 10th overall), was commissioned on January 10, 2009 at a cost of \$6.2 billion dollars.⁵ In comparison, the USS GERALD R. FORD (CVN 78), the first of the next generation of aircraft carriers infused with new technology under development, is projected to commission in 2016 with a price tag of at least \$14 billion dollars.⁶ During World War II, the Emergency Shipbuilding Program resulted in 53 shipyards across the country churning out over 6,000 vessels in less than five years.⁷ In the years since, numerous consolidations, closures and high barriers to enter the military shipbuilding market have resulted in the industry being dominated by two large corporations: General Dynamics and Huntington Ingalls Industries.⁸ The challenge facing Navy leaders and the nation is with a lack of competition, how to achieve a viable force while ships become increasingly more expensive in a time of budget austerity.

In March 2012, Vice Admiral Bill Burke stated, "It would take a Navy of over 500 ships to meet the Combatant Commander (validated) requests."⁹ As of May 16, 2014, the fleet numbered 289 ships.¹⁰ This is part of a concerning downward trend where the fleet is well below half the size it achieved in 1987, when it peaked at 568.¹¹ In February 2006, the Navy 30-Year Shipbuilding Plan revealed a target of 313 ships to carry out this task while assuming a certain level of risk.¹² However, the Navy has maintained a force well below stated goals for years. In fact, fleet totals have fluctuated between 278 and 291 ships since establishment of that mark, while the target fleet size has been reduced to 306.¹³ Complicating the calculations further is maintaining the desired mix of capability versus capacity. Failure to build at the rate demanded by the 30-Year Shipbuilding Plan, combined with budget austerity has left the nation at great risk of fielding a force inadequate to meet national security objectives.

Conflicting legislation also complicates the situation. Laws such as the Budget Control Act caps discretionary spending until fiscal year 2021, while Title 10 United States Code 5062(b) requires the Navy to maintain 11 aircraft carriers (and corresponding ships and aircraft that compromise a battle group). Only one shipyard (Newport News) is



capable of delivering an aircraft carrier, with a lack of competition creating less incentive to make capital yard improvements for process and cost efficiencies. Also, the Congressional Budget Office (CBO) remains highly critical of the Navy's 30-year shipbuilding plan. They assert if the Navy receives the same amount of funding (in constant dollars) for new-ship construction in each of the next 30 years that it has on average over the past three decades, it will not be able to afford all of the purchases in the 2014 plan. CBO's estimate of \$19.3 billion per year for new-ship construction in the Navy's 2014 ship- building plan is 38% above the historical average funding of \$14.0 billion.¹⁴ And CBO's estimate of \$21.2 billion per year for the full cost of the plan is 34% higher than the \$15.8 billion the Navy has spent on average per year for all items in its shipbuilding accounts over the past 30 years.¹⁵ With the Navy facing uncertain final costs for the delivery of both the next generation of aircraft carriers, as well as a new class of ballistic missile submarines, the 30-year shipbuilding plan risks going from optimistic to just plain unrealistic.

As the U.S. Navy states in recruiting commercials, 70 percent of world is covered by water, 80 percent of people live within 200 miles of an ocean, and 90 percent of international trade travels by sea, and those numbers are expected to increase.¹⁶ In an ever more unpredictable world, and one more interdependent on trade, the maritime environment will be critical. It has proved to be the most economical method of distributing goods and provides the most expeditious way to address national security and stability issues; therefore, the United States has a vital interest in maintaining dominance of the seas. This paper examines the current state of the shipbuilding industry, background on how we arrived at this point, and recommendations based on potential opportunities to bolster the industry for the long-term prosperity of the nation.

STATE OF SHIPBUILDING INDUSTRY

The Shipbuilding Industry Defined:

Shipbuilders operate shipyards, which are fixed facilities with dry docks and fabrication equipment capable of building or repairing watercraft intended for other than personal or recreational use. The United States is a relatively small participant in the global shipbuilding market accounting for less than 1% of the world's new construction order book. Within the United States, military shipbuilding and repair constitute nearly 65% of shipyard activity. Two main companies, Huntington Ingalls Industries and General Dynamics, who together hold 58.5% of industry market share, perform the majority of the work.

Trends and Developments:

The shipbuilding industry is not subject to immediate impacts from world economic fluctuation. This is due to a large number of government contracts and long lead times in production. However, profitability for the shipping industry is directly tied to consumer spending on goods and the demand it creates. Contract backlogs that



sustained the industry through the global recession have begun to dwindle and reduced naval budgets have led to a decrease in demand for industry products and services.

The global shipbuilding epicenter is now in Asia. Nearly a century ago, Europe accounted for 80% of the world's new construction order book (with the United Kingdom accounting for 60% individually), today, China, South Korea and Japan dominate the market at over 90%.¹⁷ They reached this position by making strategic decisions and investments to make shipbuilding a cornerstone of their economic growth. Investments in land, infrastructure, process innovation, and often just straight subsidies allowed the countries to produce more vessels. They produced these vessels, to a higher quality standard and in less cost and time than ever witnessed in history. Specialized markets still exist in other parts of the world such as Europe (cruise ships and luxury yachts), and the United States (military vessels). In recent years, India, Vietnam, the Philippines and Brazil entered the market partly due to the shipbuilding boom in the middle of the last decade. This was due partly to Korean and European yards investing in facilities as a means to combine their own high level skills with the relatively low cost labor available in these countries.¹⁸

United States shipyards are spread throughout the country, although there are concentrations particularly in the Southeast and the West. The Southeast accounts for 43.5% of industry establishments due to proximity to the oil market in the Gulf of Mexico and high levels of international trade between Latin America and the Caribbean. The West accounts for 24.8% of industry establishments due mainly to the large volume of commercial shipping companies that handle trade with the Asia-Pacific Rim.¹⁹ Military shipbuilding under General Dynamics occurs at Bath Iron Work in Bath, Maine (Destroyers), Electric Boat in Groton, Connecticut and Quonset Point, Rhode Island (Submarines), and the National Steel and Shipbuilding Company in San Diego, California (Mobile Landing Platforms). Military shipbuilding under Huntington Ingalls Industries occurs at Newport News, Virginia (Aircraft Carriers and Submarines), Pascagoula, Mississippi (Amphibious Ships, Destroyers, Coast Guard Cutters). Other shipyards that deliver to the United States Government are Marinette Marine in Marinette, Wisconsin (Littoral Combat Ship Variant 1), Austal, USA in Mobile, Alabama (Littoral Combat Ship Variant 2), and Bollinger Shipyard in Lockport, Louisiana (Coast Guard Cutters).

The U.S. shipbuilding industry is not short on expertise. This is evident in the capable military vessels it continues to produce. U.S. warships are acknowledged to be the best in the world and maintaining technological dominance has been a key U.S. national security tenet for decades.²⁰ However, due to current budget constraints and the return to sequestration levels of funding in FY16, this will directly impact defense spending. This downturn could put the U.S. at risk of losing the technological advantage we have developed or we will be faced with purchasing exorbitantly expensive vessels unless we put a strategy in place to control costs. Defense shipbuilding is dependent on continued DoD contracts, which at this point are at minimal levels, and according to a senior Navy leader are barely keeping these firms solvent. The firms most at risk are the smaller firms mostly in the Gulf Coast region. In response, these firms must develop



commercial capabilities and identify U.S. or foreign customers to maintain our shipbuilding industrial base. Expansion of the National Maritime Highway system is an example of part of a solution that would drive commercial shipbuilding requirements thereby increasing opportunities for these smaller shipbuilding firms. The sheer volume of ships being built in Asia allows for hedging on essential products and provides predictability for companies allowing them to drive down the cost of ships, increase experiential learning, and expand technology to improve processes. The United States is in jeopardy of losing its technological edge in military shipbuilding unless we can keep our established shipbuilders in business. Furthermore, advancements in technology and materials that separated Asian shipbuilders from the rest of the world have caused defense acquisition programs to shrink further, making diversification of market sectors in the shipbuilding industry an important factor.

Aging infrastructures and inefficient processes over many years widened the gap that led to the U.S shipbuilding industry entering a period of stagnation. This, coupled with a lack of a national strategy has caused the U.S to lose its global competitive advantage in shipbuilding and rendered it unable to compete in the global market. These challenges also include the lack of a comprehensive DoD strategy for managing and maintaining an industrial base, the inconsistent communication that often marks the program office/private industry relationship and the fragmented nature of the industrial base.²¹ In contrast, many European shipbuilders have invested heavily in new production technologies and processes, and countries such as Japan, South Korea and China have considered the shipbuilding industry an essential pillar of their national strategy and have invested significantly in infrastructure, technology and the national workforce. Eighteen shipyards represent 50% of the world's total order book; the top ten shipyard companies are Asian, which again confirms the Asian dominance in terms of market volumes. The 15 largest companies are all located in Asia: eight in Korea, six in China and one in Japan.²² Asia and Western-Europe are the regions with the largest market shares. Furthermore, the global market share of the marine equipment sector in Europe is higher than the share of ship construction, reflecting the strong export position of this sector.²³

The leading shipbuilding countries, China, South Korea, and Japan have the competitive advantage in building commercial ships due to strategic government decisions that led to significant investments. While this competitive advantage has not extended to military shipbuilding as of yet, some attempts are already underway. What these countries are discovering are processes that improve efficiencies and infrastructure that allow them to build ships faster and cheaper – military technology is sure to follow soon behind. Foremost amongst these, China is a country that depends on the sea to sustain its economic life and is clearly developing an improved Navy.²⁴ Less than ten years ago, China's surface force was a mix of imported and domestically built platforms with wildly varying capabilities. Now, China's Navy is shifting entirely to domestic designs with indigenously built sensors and weapon systems with a few licensed from foreign countries. Moreover, it is moving from building destroyers and frigates one or two at a time to a more serial production process, which is boosting their numbers quickly.²⁵



Recent visits by the Eisenhower School Shipbuilding Industry Study Seminar to a number of U.S. shipbuilding facilities revealed a concerted effort being made to modernize infrastructure, but the lack of predictable work results in a reluctance to invest more heavily in capital improvements. Lack of periodic capital investment leads to inefficiency. Dated technology can cause delays in production and quality issues. Additionally, old infrastructure prevents a controlled environment that is required for many production processes and does not facilitate the efficient implementation of new production concepts such as the proven modular construction model. The overall situation has left the industry unable to compete and thus, the industrial base must rely heavily on government acquisition programs and protection. This makes defense Naval acquisitions less affordable. Illustrating the lack of incentive for companies to create shipbuilding facilities in the United States is Austal, USA. This Australian based shipbuilding company decided to open a ship construction facility in Mobile, Alabama in 1999 based on the potential to make Jones Act ships. When they won a contract to build a variant of the Littoral Combat Ship, they abandoned commercial endeavors to focus on government contracts. They are pioneers in aluminum hull construction and they incorporated the principles of aircraft manufacturing while designing the facility. One could easily assume that the main reason for Austal's efficiency is in processes and the way production is orchestrated because of their work with aluminum, but, there is no reason why steel platform production facilities cannot incorporate similar layout, technology and processes. There are many examples in Europe and Asia of similar facilities that produce steel platforms.

BACKGROUND

During the Spring 2014 semester, the Eisenhower School Shipbuilding Industry Study executed a course curriculum that included face-to-face access to leaders in the North American shipbuilding industry. Using core study material, guest lecturers, independent research, and site visits to military and commercial facilities, both in the United States and Canada, we analyzed the overall health of the shipbuilding industry in North America and the challenges it faces in the future. We also examined the Nation's transportation infrastructure, potential opportunities in emerging markets, the profile of the shipbuilding workforce, the perceived priority and level of support maritime issues receive at the national and state levels, and the overall political environment. Two major assumptions were made: First, the United States will remain a global power, with a robust and capable Navy. Second, the American people will not accept the loss of jobs and prestige if it were proposed to outsource the building of U.S. Navy ships, even at exorbitant cost. Of main concern is any prolonged disruption to shipyard workflow risks industry extinction where the U.S. would be dependent on other countries to provide critical platforms and systems that are no longer built domestically. Allies such as the United Kingdom and Norway have contracted with a shipyard in South Korea to build their next generation of military replenishment vessels. Although providing great value, relying on the stability of the Korean Peninsula is a calculated risk. In addition, a foreign supplier of ships could potentially be more vulnerable to targeted supply chain interdiction or coercion in the event of hostilities. A recent cautionary tale is the sanctions standoff with Russia over the Ukraine situation where Russia is denying sale of



rocket engines that launch U.S. satellites (including military) into orbit. Therefore, in order to maintain affordability and realize the plethora of positive externalities, we determined it is in the strategic interest of the United States to fortify and bolster the shipbuilding industry. Below are a series of recommendations followed by essays that go deeper into overarching industry issues.

RECOMMENDATIONS

Develop and Fund a National Maritime Strategy

Problem: There is a low demand requirement for the domestic shipbuilding industry. The increasing cost of building ships coupled with an austere budget environment has led to a concern that the United States cannot afford the Navy it needs to meet the Nation's commitments and provide for the Nation's future security. While the increasing cost is most likely not attributable to one single factor, one reason for the increasing cost could be attributed to the shrinking industrial base. Similar to rising cost, there is not a single factor that is causing a shrinking industrial base, however, a significant factor is certainly the low demand signal for the industry.

Recommendation: U.S. Government form a Cross Departmental Team to develop a National Maritime Strategy that aligns with the National Security Strategy, accounts for current trends, incorporates all elements of National Power, and uses a whole of government approach.

Outcome: This team would produce an overarching and strategic document (National Maritime Strategy) that would be co-signed across all government departments or agencies that could have an impact on the Maritime environment. These Departments and agencies would include at a minimum; Department of Transportation, Maritime Administration, Department of Education, Department of Energy, Department of Defense, Department of Education, Department of Homeland Security, Department of Labor, Department of State, and the Environmental Protection Agency. The National Maritime Strategy, would not solely focus on security, but instead would be a Strategic Document that would cut across all elements of National Power to include Diplomatic, Information, Military, and Economic. It would develop a consolidated set of objectives of which each department has agreed upon and that would be directly linked to the National Security Strategy. In development of these objectives the National Maritime Strategy would be informed by current trends that could have an effect on the health of the Maritime Industry. Some examples of these trends are the impact of globalization, technology improvements such as "fracking" and the advancements being made in LNG, the increasing age of current Jones Act ships, and the deterioration of the current road infrastructure. Lastly, the National Maritime Strategy would consider and consolidate all current initiatives from each department that would have an effect on the health of the Maritime Industry. Examples of these initiatives would include regulations that are being developed for environmental protection or safety, as well as initiatives such as the Title XI program.



Benefits: One of the key benefits to the publication of this National Maritime Strategy is that the government/ administration would speak with a single voice advocating for the Maritime Industry and the Nation. While the industry may not agree with all objectives that come out of the strategy, it would at a minimum provide the Maritime Industry insight to long-term plan that the government is beneficial for the government. This provides the industry with predictability as to what actions the government is going to take from a tax and regulations aspect. It will also provide the much needed emphasis on the benefits of the Maritime Highway System – cheaper transportation costs, reduced fossil fuel emissions, and reduced wear and tear on the highway system. Additionally it would increase use of ships in the U.S. and be a catalyst for increased commercial shipbuilding. Furthermore, this would give the government an opportunity to consolidate efforts thereby eliminate duplication of efforts and reduce government costs. By taking a whole of government approach it also identifies if any two initiatives are counterproductive. It would also provide each initiative that goes forward with a direct link to the National Security Strategy. Finally, it would have the benefit of focusing each of the initiatives on the health of the Maritime Industry.

Ignite awareness of the Maritime Highway through creation of a National Transportation Infrastructure Strategy

Problem: The U.S. does not currently have a national transportation infrastructure strategy upon which to base any infrastructure policy or investment decisions.

Recommendation: The Departments of Commerce and Transportation should immediately commission an objective study to determine the optimal transportation system mix between highway, air, sea and pipeline. We recommend this study incorporate criteria such as a transportations system component’s contribution to GDP, environmental impact, cost to implement, technical feasibility and other relevant criteria as determined by the study.

Outcome: The outcome of this study would be a holistic, “best case” transportation system for the nation as well as a set of alternatives representing less than ideal solutions, to include a “do nothing” alternative.

Benefit: The benefit of such a study is the creation of a framework for evaluation and candidate evaluation criteria for policymakers to use when assessing various infrastructure investment and policy decisions as well as to support these decisions and defend them against special interest groups that seek to optimize subcomponents of the transportation system at the expense of the whole. It would also help guide development of individual maritime, rail and highway improvement strategies.

Continuously Build Proven Platforms Until New Technology Matures

Problem: Unpredictable shipyard work creates higher costs resulting in the U.S. government unable to buy sufficient quantities of ships to execute national tasking based



on finite budgets. The U.S. Navy states a fleet of 306 ships is the target size required to execute tasking. If an average ship service life is assumed to be 30 years, then the Navy needs to commission 10 ships per year to reach 300. (Note: the Navy uses a 35 year service life planning figure in the 30 Year Shipbuilding Plan, but in classes introduced after World War II, type averages have been 26.3 years for cruisers, 25.4 years for destroyers, and 19.8 years for frigates.²⁶) The U.S. Navy has commissioned an average of XX ships per year since 2000. The 30 year plan uses commissioning an average of 8.7 ships per year to reach desired force levels.

Recommendation: The government commits to build proven platforms continuously and commission 10 ships per year. New technology is inserted only when systems reach Technology Readiness Level 7 (successful system prototype demonstration in an operational environment²⁷) and detailed designs are complete. The ship type mix would be based on working the handful of domestic shipyards remaining capable of producing military vessels at a steady state to deliver to required mix of vessels. For example, 1 aircraft carrier every 5 years (planned 50 year service life), 1 ballistic missile submarine every 3 years, 2 attack submarines, 4 or 5 surface combatants, 1 amphibious ship, and 1 supply ship per year.

Outcome: Shipyards have predictable work at a steady rate and the Navy reaches and maintains fleet size to meet requirements.

Benefit: More affordable ships. The remaining domestic shipyards capable of producing military vessels have consistent and predictable work. Predictable work allows companies to make capital investments in their facilities, processes and workforce to gain efficiencies. Additionally, producing the same ship takes advantage of learning curves and lessons traditional “first in class” issues and more fixed price contracts. All of these factors translate into lower cost for the customer.

Increase RDT&E Funding

Problem: The funding of Research, Development, Testing and Evaluation (RDT&E) for warships has started to become constant or decline. The funding of RDT&E has been focused on systems development, prototypes and final product integration. This is important, but it has resulted in neglect of basic research, applied research, and advanced technology development. This funding shortfall has not truly manifested itself yet because the basic and applied research areas are demonstrated in 15-25 years when new weapon systems are acquired and fielded. If appropriate funding levels are not maintained, the technology for advanced warships will not be available to the US naval forces to maintain the US dominance in the maritime domain.

Recommendation: In the next Program Objectives Memorandum (POM) cycle and in future POMs, restore funding for basic research, applied research and advanced technology development to protect the future force. The technology found and developed in the basic and applied research today is the basis for advanced technology used to design and build the U.S. warships of the future. This increase in funding is only part of



the solution. The funding must be employed in an intelligent and responsible manner to spur growth and progress in technologies that show promise in delivering gains.

Desired Outcome: The objective is to increase and stabilize RDT&E funding across all forms of R&D, from basic to operational systems development. This consistent effort will ensure that at all times, now and in the future, the R&D community is producing advancements in warship design, systems and construction that is ready for production without interruption or gaps in development.

Benefit: With properly funded RDT&E accounts, the acquisition system will be able to field the most technologically advanced warships that can dominate the battle space when ever and where ever the nation's requires it. This will ensure U.S. forces have the necessary maritime domain to maneuver on and from in order to project power and secure the nations interests.

Title XI Funding

Problem: The Federal government approach to investment in domestic shipyard infrastructure and shipbuilding initiatives has been moderate, but not consistent. There is an apparent lack of consensus on how best to support the industry and the pendulum swings between administrations on the appropriate level of financial commitment. There is a philosophical difference of opinion among some in government, whether to request funding in their budget to support Title XI or if free market forces will sort out the need on its own. In the absence of a comprehensive strategy on what the federal government should do to support this vital industry, the status quo is maintained and seldom are new funds committed. The problem with an industry like shipbuilding is that the margins are relatively low and the return on investment is much longer than your typical investor is willing to accept. We believe Honorable Gene Taylor, Former Chairman of the Seapower and Expeditionary Forces Subcommittee, addresses the need for federal funding and legislative preservation of this industry:

“I for one--and I think I can speak for my ranking member--remain concerned that a nation that can produce the world's greatest military, the world's largest economy and a nation that imports such a huge percentage of the world's goods continues to do so on foreign flag vessels. And we have taken what was once the world's greatest fleet and now become a nation that rarely builds a commercial ship. I am also reminded that we are a nation that is spending anywhere from \$6 to \$10 billion a month in another country helping them to build their infrastructure but gets amazingly stingy when it comes to taking care of our own.”

Once again, we are at a crossroads – maintain the status quo or really push to redevelop the domestic shipbuilding capability. The President's annual budget request does not include additional monies to further fund the Title XI loan guarantee account. The Title XI program is currently self-sustaining, but not growing. The current Title XI subsidy balance for new loan applicants is \$73 million. This will support approximately \$735 million in shipyard projects assuming average risk category subsidy rates.²⁸ There has



not been a request for additional funding to be appropriated into this account for several years and without additional funding, the Title XI program cannot grow.

Recommendation: The President's annual budget should request funding for additional Title XI appropriations to promote and enhance the domestic shipbuilding industry. In order to redevelop the shipbuilding industry, the Title XI program needs presidential and further congressional support. Their support and annual funding for the program will allow for the renewal of investment in the shipbuilding industry. A modest commitment of \$25 to \$50 million per year would be a significant statement of backing to the industry. These investments are desperately needed to recharge the private sector and will offer them a guarantee that the U.S. values this industry and that we recognize the national security benefits that are realized from a strong shipbuilding sector. Additionally, this program should be streamlined to allow for the freer flow of capital to recharge commercial shipbuilding.

Desired Outcome: By funding the Title XI loan guarantee program, the domestic shipbuilding industry will be in a better position to meet future anticipated demands created by the increase in LNG tanker opportunities and create potential for the recapitalization of the Jones Act fleet. The shipbuilding industry would greatly benefit from a revival of the National Shipbuilding Initiative launched in 1994 by the Clinton administration, "the National Shipbuilding Initiative, which was a five part shipbuilding initiative aimed at revitalizing the commercial shipbuilding industry in the country. The major tool that was contained in that act was an expansion of the Title XI program, an expansion in funding and an expansion in authority to fund shipyard modernization."²⁹ The Title XI program provided federal guaranteed loans that were critical to reviving the shipbuilding industry from 1994 to 1999.³⁰ Until funding for the program (aside from administrative expenses) was discontinued a few years ago, U.S. ship owners used the program to gain access to low-cost capital. Hundreds of vessels of all types were built. According to government studies, the program generated \$20 of economic activity for every dollar invested in it.³¹

Benefit: The Shipbuilding industry will once again experience a period of growth, prosperity and dependable employment. This is dependent on adequate and inexpensive capital that shipbuilders can access to invest in their yards and futures. Title XI funding provides that guarantee to shipyards and demonstrates National support for this vital industry. The DoD benefits from this revival greatly as commercial and oceangoing ships built for American ship owners are available to the DoD in times of war and National emergencies.



Incentivize the Pursuit of Opportunities in Emerging Markets

Problem: The cost of building Jones Act compliant tankers in U.S. shipyards is three to five times higher than in foreign shipyards. This is causing hesitancy on the part of U.S. transportation companies to build new Jones Act ships that would support a rapidly growing domestic energy market. This hesitancy is resulting in higher fuel prices for consumers and the DoD. The cost of new ships is causing the pursuit of Jones Act waivers, which have a low probability of being granted. The scarcity of Jones Act ships also causes increased use of foreign energy products as the only economic source of supply.

Recommendation: Provide immediate corporate and payroll tax incentives for companies that construct new Jones Act compliant ships and for companies that build or operate Jones Act compliant ships on non-Jones act routes such as export of Liquefied Natural Gas (LNG).

Outcome: Avoided tax payments could provide sufficient incentive to ship operators to undertake new construction to meet the immediate need for transportation of energy products developed in the booming domestic energy market.

Benefit: Potential to increase domestic commercial shipbuilding with obvious benefit to domestic ship builders and their suppliers as well as reducing the cost of domestically produced energy for U.S. consumers. It could also reduce the need for imported crude and LNG to meet domestic demand that cannot be met by domestic supply due to cost or absence of Jones Act ships.

Invest in the Workforce

#1: High School Vocational Workforce Training Investment

Problem: According to the National Center for Educational Statistics, the 1990 Perkins Act defines vocational education as "organized educational programs offering a sequence of courses which are directly related to the preparation of individuals in paid or unpaid employment in current or emerging occupations requiring other than a baccalaureate or advanced degree."³² Vocational credits for graduating high school students reached record lows in the early 1990s with less than 16% of National high school workload providing credits for vocational professions. Additionally a 1999 Survey of Vocational Programs in Secondary Schools conducted by the U.S. Department of education, determined that only 11 percent of schools offered area or regional vocational schools (which typically serve students on a part-time basis) and full-time vocational high schools.³³ While attendance at four year universities continues to reach record numbers each year, industrial manufacturers are finding it more and more difficult to find qualified personnel to hire or even finding potential employees to train within their own industry.



Recommendation: Commission a study on the Cost Benefit Analysis of including half day, high school vocational training programs in areas with unemployment rates greater than two points higher than the national average:

Desired Outcome: Implementation of mandatory vocational training programs in areas with unemployment rates greater than two points higher than the national unemployment average offers higher numbers of high school graduates partially or completely trained for employment in technical vocations that don't require a four year college degree. Along with increased vocational training in these areas, a national and local campaign plan must be implemented to inform students and parents of the benefits of vocational training. While many of these areas may not appear to directly impact shipbuilding, the actual construction of a ship is only part of the process. Many industries that feed into shipbuilding would benefit from this increased pool of vocational trained high school graduates. Every shipyard our class visited indicated that they could hire more employees immediately if they were already trained.

Benefit: Increased trained workforce available to begin work immediately in industrial vocations.

#2: Industry Partnership for Vocational Training

Problem: Shipyards are short qualified tradesman and are facing an ever increasing age gap in employees resulting in experienced employees retiring before the younger employees are able to obtain the experience level and the ability to conduct the same quality of work as the aging workforce.

Recommendation: Incentivize the development of partnerships between industry and community colleges / vocational training programs. During our shipyard visits, we saw great promise with industry cooperation with local community colleges. Huntington Ingalls Industry's (HII) Apprenticeship School program has been graduating tradesmen for almost a century and is a model of industry, state, and local/city government cooperation. Recognizing the financial impact the shipyard brings to the Newport News region during recent construction of a new campus, the city provided area for parking and apartments with storefronts for students while the state provided some financial support of the construction. HII received some financial assistance but in return was able to finance the construction of a state of the art facility adjacent to the shipyard instead of inside the shipyard. This new location allowed not only for expansion but also for visits by local businesses and potential students. Federal incentives to local and state governments supporting similar programs could make the difference in the establishment of new programs resulting in generation of higher output of qualified tradesmen.

Desired Outcome: Development of a partnership program with local community colleges or creation or independent apprenticeship programs at each DoD shipbuilding facility as well as marine engine, communications, and navigation manufacturers.



Benefit: Increased workforce to satisfy shipbuilding industry demands with employees with the ability to work independently within two or three years and with close supervision immediately.

#3: DoD Service Member Vocational Certification

Problem: While military members receive valuable training in critical shipbuilding skills while in the service, they often do not receive certification recognized by civilian trade employers.

Recommendation: Establish certification programs in common industrial trades. With minimum changes in training requirements, military members could receive journeyman or master tradesman certification by the time they finish either an initial enlistment or a career with the military. The Army's Training and Doctrine Command is currently investigating this concept. This method could be utilized by the U.S. Coast Guard and Navy who have the majority of occupational specialties that relate directly to the ship building industry.

Desired Outcome: This program would increase employability of veterans and provides the industrial base with a volume of certified employees with dependability based on their military training and experience. According to the Bureau of Labor Statistics May 2014 unemployment report, the average unemployment rate in the U.S. for the month of April, 2014 was 6.3% for non-veterans and 5.6% for veterans.³⁴ While not substantially different, providing veterans with certification in industrial trades would certainly greatly benefit them and provide valuable, skilled and highly disciplined employees into many industrial fields, shipbuilding included.

Benefit: Increased trained workforce available to begin work immediately in industrial vocations.

CONCLUSION

As this paper addressed, the United States is at a critical juncture regarding the shipbuilding industry. The overwhelming concern for the Department of Defense is the cost of ships and availability of skilled labor to build these platforms affordably to provide required capability and capacity to execute national tasking for the foreseeable future. With legislation in place such as the Budget Control Act (capping discretionary spending) and Title 10 United States Code 5062(b) (requiring the Navy to maintain 11 aircraft carriers), there is enormous pressure for the shipbuilding industry to remain competitive or risk the fate of Portsmouth Shipyard. With the Navy facing uncertain final costs for the delivery of both the next generation of aircraft carriers, as well as a new class of ballistic missile submarines, the 30-year shipbuilding plan risks going from optimistic to just plain unrealistic. As the cost of ships increase, we are able to buy less, decreasing forward presence, and as a result, have reduced influence in the world. We strongly advocate for investing the time to get whole of government buy-in on the importance of a National Maritime Strategy. A critical piece that would appeal to the



American public is less wear and tear on their vehicles, less congestion on the highways, less dependence on foreign oil, and a cleaner environment. In addition, a full exploration of the potential of Liquefied Natural Gas (LNG) especially in the wake of the fracking boom presents a rare opportunity to become a world-wide leader in an emerging market. Finally, investing more heavily in vocational education would strengthen not just the shipbuilding industry, but also the entire manufacturing capability of the country. In summary, Great Britain was the United States 100 years ago as the unquestioned global superpower with the world's preeminent Navy. The world is much different today, but many parallels are applicable. Dominance of the seas does not only ensure maritime power, it ensures economic power. The United States is a maritime nation with a strategic imperative to continue to use water as maneuver space to maintain access to all parts of the globe in order to support the goals of national security and global stability. The Nation has a strategic interest in preserving and strengthening the country's shipbuilding capacity and maintaining a military technological edge. With modest legislative initiatives and proper inter-agency support, the United States will be able to stimulate demand that spurn growth in the shipbuilding industry. Growth promotes competition and capital investments that would result in ships built affordably and domestically for many years to come to provide for the defense and economic prosperity of the nation.



ESSAYS

Essay 1: The Need For a Comprehensive Maritime Strategy

Strategy means different things to different people. Webster's dictionary defines strategy as "1) the science of planning and directing military operations 2) skill in managing or planning."³⁵ In defining a National Maritime Strategy (NMS) the more general definition is applicable and since this is a national strategy it would not be limited to military operations. As Colonel Michael Guillot explains, "Today, strategic is used more often in its broader sense (e.g., strategic planning, decisions, bombing, and even leadership). Thus, we use it to relate something's primary importance or its quintessential aspect."³⁶ Therefore, when one combines these definitions of strategy with national and maritime you get the basic understanding of what is meant when National Maritime Strategy is discussed as the nation's plan for the quintessential aspects of the maritime environment. This implies that there is more to a strategic plan than simply security or economic impact. A National Maritime Strategy would include those as well as all elements of National Power. While one can find a National Strategy for Maritime Security, a plan for America's Marine Highway, and even a study by the Maritime Administration discussing, "The Economic Importance of the U.S. Shipbuilding and Repairing Industry"³⁷, what is lacking is a comprehensive and overarching National Maritime Strategy. The essential elements of an effective National Maritime Strategy are the alignment with the National Security Strategy, the accounting for current global trends, the incorporation of all elements of national power, and the use of a whole of government approach.

An effective overarching strategy must start at the top. The National Security Strategy is a reflection of how the President of the United States plans to advance the security and prosperity of the American people. Since the top strategic document for the United States is the National Security Strategy, this is where a National Maritime Strategy should take its initial guidance. The National Security Strategy establishes the following four categories of interest: Security, Prosperity, Values, and International Order.³⁸ In each of these categories the National Security Strategy goes into more detail of what interests are included. Being a top level document not everything in the National Security Strategy will be relevant, however, one will find upon review that each area of the National Security Strategy has some relevancy to a National Maritime Strategy. Security is the first area that is addressed and it has become somewhat apparent that a maritime strategy would need to address security. The National Strategy for Maritime Security is the current government document that addresses the issue of maritime security. The next area addressed, Prosperity, is also an area that one would expect a maritime strategy to address. Considering "99 percent of the volume of overseas trade (62 percent by value) enters or leaves the US by ship"³⁹, it is not hard to understand that the prosperity of the nation is significantly affected by a maritime strategy. The Maritime Administration (MARAD) supports this area, which is under the Department of Transportation (DOT). While the DOT works diligently to promote the economic issues, the lack of cohesiveness between maritime security and economic strategies is where the



way the United States does strategy begins to breakdown. Security issues and economic issues are hard to separate and not having them in one document leaves either strategy wanting. This issue of stove piping will be further explored in a following section of the paper.

Although security and economic maritime issues are not being addressed together, they are at least being addressed. Even worse than not being addressed comprehensively is not being addressed at all. An example of this would be when considering Values and International Order from a maritime perspective. There is little evidence that Values (promoting democracy and human rights) and International Order (Strong Alliances, Sustaining Broad Cooperation on Global Challenges) are being looked at from a maritime perspective. This is where the value of a National Maritime Strategy becomes even more visible. By aligning with the National Security Strategy, the National Maritime Strategy could include items to promote Values and International Order. Examples of maritime issues that promote Values and International Order that could be included in the strategy are the US policy towards environmental agreements, free trade agreements, and safety measures. Including these, among others, in the initial National Maritime Strategy would help de-conflict ideas and improve the overall value of the document, however, this is done most effectively if it is done in the development of the strategy and not as an after thought.

A characteristic of a good strategy is one that takes into account the current global trends. An example of a trend that has impact across a wide range of subjects and thus should be incorporated in a national strategy is globalization. “In my view, this flattening of the playing field is the most important thing happening in the world today, and those who get caught up in measuring globalization purely by trade statistics – or as a purely economic phenomenon instead of one that affects everything from individual empowerment to culture to how hierarchical institutions operate – are missing the impact of this change”⁴⁰ Strategies that go against these global trends, such as globalization, are destined for failure. Therefore, it is vital that a National Maritime Strategy incorporate these trends. Some other examples of global trends that would influence a maritime strategy are the continued improvement of technology, limited natural resources, and the continued threat of extremists. Each of these trends would have an effect on the maritime environment and can be more effectively addressed by an overarching National Maritime Strategy.

Another advantage of having a comprehensive National Maritime Strategy is that one could leverage all elements of national power. These elements include Diplomacy, Information, Military, and Economic. It is accurate to state that the last two elements are being leveraged, however, a single strategy that combines all elements would be more effective. For instance in determining security requirements for the maritime environment, it is prudent to take into account implications those requirements would have on ongoing diplomacy efforts. Trade policies are also another example of how all elements of national power intersect and should be applied in one cohesive strategy.



A key advantage of having an overarching strategy is the integration of ideas across multiple areas of expertise. Thus far it has been shown that the key elements of creating a National Maritime Strategy include where to start, the National Security Strategy and key areas to consider, world trends and all elements of national power. The final essential element for an effective strategy is one that, due to the size of the US Government, is harder to accomplish than one may expect. The integration of ideas through a whole of government approach is the last and most essential element of the National Maritime Strategy. As has already been shown, the government can publish separate policies from different perspectives. The National Strategy for Maritime Security does an admirable job of addressing maritime security. However, it attacks the issue from a purely security perspective which is its charter. The next step is to develop a National Maritime Strategy that approaches each objective of the National Security Strategy, each global trend, each element of national power, from a maritime perspective. To do so will require an all of government approach. It may require someone to be in charge such as the Maritime Administration; however, it must also include input from across the different government perspectives. The intelligence and military community must be able to raise security concerns. The State department needs to be involved from an international trade and agreements perspective. Even agencies such as the Environmental Protection Agency need to be able to input into the strategy. Only with a truly whole of government approach will the National Maritime Strategy be effective.

While each of these areas requires deeper analysis, it is proposed that a National Maritime Strategy begin development with a review and linkage to the National Security Strategy. From there it should investigate the true impact of global trends and address them with all elements of national power. It is also proposed that this can only be done using a whole of government approach that invites comments and expertise from across government. In the end, an effective National Maritime Strategy is one that aligns with the National Security Strategy, takes into account current global trends, incorporates all elements of national power, and uses a whole of government approach

Essay 2: The Jones Act

The Merchant Marine Act of 1920, also known as the Jones Act, is a U.S. federal statute that provides for the promotion and maintenance of the American merchant marine. The law regulates cabotage maritime commerce and requires all goods transported by water between U.S. ports be carried on vessels that are owned by US companies that are controlled by US citizens with at least seventy-five percent ownership, crewed by at least seventy-five percent U.S. citizens, built (or rebuilt) within the U.S. and registered in the U.S.⁴¹ The Jones Act serves as a cornerstone of U.S. maritime policy that is intended to promote a strong and vibrant maritime industry that possesses the requisite domestic expertise and capability in shipbuilding and waterborne transportation.



As a maritime nation, America's dependence on the seas remains integral to its economic health and survival as a nation. The expansive network of coastal oceans, inland waterways, and lakes provide the infrastructure for efficient transportation of natural resources, food and manufactured goods being shipped from state to state and ultimately to market. The 40,000 Jones Act vessels operating in the domestic trades support nearly 500,000 American jobs and almost \$100 billion in annual economic impact.⁴² Jones Act vessels typically handle a combined total of over one billion tons of cargo annually.⁴³ The health and viability of the US commercial shipyard industry is inextricably linked to the continuation of the provisions of the Jones Act. The U.S. shipbuilding industry is ill-suited to compete with shipbuilding nations across the globe. A combination of higher labor costs, older infrastructure, inefficient building methods, environmental standards and safety regulations affects the U.S. commercial shipbuilding industry from being competitive in a global commercial market in which foreign governments highly subsidize their respective industries. Repeal of the Jones Act would result in the closure of American shipyards and have a ripple effect on the U.S. economy that would extend far beyond the waterfront. The Jones Act guarantees the participation of a country's citizens in its own domestic trade and fostered a strong domestic maritime industry, which can be mobilized rapidly in time of war or national emergency.

Although the US possesses the most formidable deployable battle force ships in the world, the US is not considered a major shipbuilding nation. The US shipbuilding industry cannot solely rely on government contracts to sustain a vibrant industry and it is attributable to the Jones Act that the commercial industry will be preserved and protect American sovereignty over domestic maritime commerce. The current rapidly growing domestic energy production has generated a sizable demand for commercial tanker ships to transport the natural resources intended for domestic consumption resulting in a revitalized commercial shipbuilding industry. Unless waived by the Secretary of Homeland Security, the Jones Act guarantees US shipbuilders the opportunity to construct the vessels required to respond to this demand. Shipbuilding and repair is an important component not only of the nation's defense but also of American's transportation infrastructure. It is essential that the capability and infrastructure needed to build ships remain resident in the US because it provides added assurance that they can be build, repaired and maintained during times of conflict. The Jones Act assures the US mainland and its offshore communities continue to have reliable domestic water transportation service subject to national control in times of emergency.

Essay 3: Legislative Initiatives to Protect Domestic Shipbuilding

Financing Initiatives to Preserve and Protect U.S. Shipbuilding

The Federal government's approach to investment in U.S. shipyard infrastructure upgrades and shipbuilding initiatives has been a moderate to low. The pendulum swings from administration to administration on the level of financial support provided. There is no cohesive thinking on what the federal government should do to support this vital industry. In the absence of private investment capital and if the U.S. considers a domestic shipbuilding capability vital to our national interests, then access to federally



guaranteed, low interest rate loans must be a common platform for subsequent administrations. I believe the below statement from the Honorable Gene Taylor, Former Chairman of the Seapower and Expeditionary Forces Subcommittee, addresses the need for federal funding and legislative preservation of this industry:

“I for one--and I think I can speak for my ranking member--remain concerned that a nation that can produce the world's greatest military, the world's largest economy and a nation that imports such a huge percentage of the world's goods continues to do so on foreign flag vessels. And we have taken what was once the world's greatest fleet and now become a nation that rarely builds a commercial ship. I am also reminded that we are a nation that is spending anywhere from \$6 to \$10 billion a month in another country helping them to build their infrastructure but gets amazingly stingy when it comes to taking care of our own.”

Title XI Background:

A critical piece of legislation that was enacted to provide for shipyard and shipbuilding initiatives is Title XI funding. Title XI of the Merchant Marine Act of 1936, as amended, established the Federal Ship Financing Guarantee Program to assist private companies in obtaining financing for the construction of ships or the modernization of U.S. shipyards. This Program authorizes the Federal Government to guarantee full payment to the lender of the unpaid principal and interest of a mortgage in the event of default by a vessel or shipyard owner. Title XI was amended in 1972 to provide Government guarantees to commercial debt obligations, with the Government holding a mortgage on the equipment or facilities financed. Regulations implementing the Merchant Marine Act of 1936 [Title 46 Code of Federal Regulations (CFR) Section 298] outline the application process for Title XI loan guarantees and require MARAD to assess the economic feasibility and the financial viability of an applicants project. Upon approval of an application, MARAD agrees to guarantee these obligations with the full faith and credit of the U.S. Government through a commitment letter to the applicant.⁴⁴

MARAD's Office of Marine Financing has primary responsibility for administering the Title XI program. The Department of Transportation's (DOT) financial oversight entity, the Credit Council, provides additional supervision. The Office of Marine Financing administers the program's application process and monitors borrowers' financial conditions throughout the terms of their guarantees. It also keeps DOT's Credit Council apprised of the status of the Title XI portfolio, including quarterly Credit Watch Reports on borrowers experiencing financial difficulty. Two additional MARAD offices—the Office of Shipyards and Marine Engineering and the Division of Marine Insurance—monitor certain aspects of the guarantees in the portfolio for compliance with program requirements.⁴⁵

Title XI loans have some different parameters than a private sector loan would. Probably one of the biggest differences is that Title XI loans are for 25 years and that there is only a requirement that 12.5 percent be put up forward by the applicant. So, when you look at the fact that not as much equity is necessary up front, and the fact that the loan itself is actually for a very extensive or an extended period of time, much longer



than most commercial loans in the private market, it makes--it makes it more attractive to utilize the Title XI.⁴⁶

Title XI importance to DoD:

One cannot overlook the important role that Title XI loan guarantees plays for the DoD. As originally enacted in 1938 and as incorporated in the 1970 Act program and redesigned in the Federal Ship Financing Act of 1972, the Title XI program was intended for use in financing vessels employed in essential transportation services in peacetime and that would be available to meet national defense needs in time of war.⁴⁷ Commercial and oceangoing ships built for American ship owners are available to the Department of Defense in time of war and National emergency. For example, the six tankers financed by Title XI in the late 1990's and built by Newport News Shipbuilding were called into service for DoD in the Iraq war to transport jet fuel to our deployed services. Commercial roll-on/roll-off and container ships are also needed by DoD and without American built and owned ships, the U.S. is dependent upon foreign ships for the resupply of our troops.⁴⁸

Title XI Recent History:

At its height, which was up until the early 1990's MARADs portfolio of guaranteed projects exceeded \$5 billion. When the Clinton Administration launched the National Shipbuilding Initiative (NSI) in 1994, it funded the Title XI program with allocations from the U.S. Treasury of \$50 million, the 1996 level, when discounted by a risk factor of approximately 5 per cent, could support nearly \$1 billion of new guarantees.⁴⁹ The NSI allowed for the utilization of Title XI loan guarantees to build ships for export; this was a change to the procedural process of granting Title XI guarantees. The NSI was a success and at the end of the {Clinton} Administration, 80 deals had been completed, generating \$6 billion--\$6 billion in shipyard activity in the country, big vessels, small vessels, barges, tower barges. The money went to all sectors of the country, all shipyards, large and small. Some 400 vessels of all types were built in that time period.⁵⁰

Subsequent administrations have not requested funding in their annual budget request for Title XI loan guarantee funding. That said, some modest appropriations have been made through wartime emergency funds and other appropriations. The lack of an official request in the Presidential budget request does send a signal to the industry that the promotion of domestic shipbuilding is not a priority for their administrations. While there is private funding available for shipbuilding as the Bush administration continually suggested, there is a lack of private funds available

MARAD receives appropriations from both DOT and the Department of Defense to subsidize Title XI loan guarantees. According to MARAD officials, as of February 2010, MARAD had approximately \$196 million to cover defaults and delinquencies on the loan guarantees in its \$2.3 billion Title XI portfolio. It also had \$78 million to use for new loan guarantees and to potentially expand the portfolio by almost \$1.5 billion.⁵¹



Title XI Defaults:

In the 5 years following implementation of [NSI] this act (1993 through 1997), only three MARAD loans defaulted, totaling approximately \$12 million.⁵² In the last 5 years (1998 to 2002), however, this improved performance has faltered. Nine MARAD loans have defaulted, six of which have occurred since December 2001, totaling approximately \$490 million in payouts and \$402 million in net payouts after recoveries. In the period between August 2008 and January 2010, 6 more borrowers defaulted on approximately \$305 million.⁵³

Title XI “The Need”

Companies differentiate themselves based on products, shipyard size, dry dock capacity, geography and service, all of which are factors that require significant capital costs. Companies wishing to enter the industry will incur high capital investment costs associated with acquiring manufacturing equipment and land, particularly waterfront properties.⁵⁴ Today, Title XI is urgently needed for small- and medium-sized U.S. ship owners and operators to secure affordable financing, over 25 years, for the purpose of replacing their aging Jones Act fleets with new ships built in our shipyards. Without Title XI, the majority of the Jones Act owners will not be able to invest in new tonnage, and thus desperately needed commercial shipbuilding work will not materialize for our industry.⁵⁵ This need was expressed from multiple shipyard operators during the shipbuilding seminars visit to the industrial base. Owners are looking for ways to invest, but private investment is more expensive and thus, they are forced to “get by” and survive with the status quo standard of operation.

Essay 4: Emerging Markets

Perhaps the single biggest opportunity for the US commercial shipbuilding is the construction of Jones Act compliant ships to serve the surging US domestically produced energy market. There are two major segments of this market, ships to transport Liquefied Natural Gas (LNG) and tankers to transport extracted shale oil.

According to Isaak Hurst, LNG demand across the globe is surging. There are currently 375 LNG tankers in the global fleet and none of these are Jones Act compliant.⁵⁶ These ships can command a daily rate of nearly \$160,000 and are in short supply.⁵⁷ Further, Hurst points out that none are currently being built or planned to be built in US shipyards.⁵⁸ Hurst also contends that US shipyards are not capable of building a LNG tanker,⁵⁹ however, at least one US shipyard, NASSCO, indicates that they have the capability to build a LNG tanker.⁶⁰ Even if this is the case, however, a Jones Act compliant LNG tanker could cost as much as five times more to build in a US shipyard than in one overseas.⁶¹ In addition to the acquisition cost, a Jones Act compliant tanker is estimated to cost about \$21,000 a day to operate versus \$9,500 per day for a foreign crewed vessel.⁶² As Arnsdorf points out, this only adds about 5% more to the total cost of a voyage.⁶³ The potential of US LNG exports has created interest in Congress to require that LNG exports be transported on Jones Act compliant vessels,⁶⁴ although this interest has not yielded statute as of yet. In a 2011 congressional act, however, three foreign



flagged LNG tankers originally built in the US were allowed to transport LNG domestically⁶⁵ in conjunction with legislation related to the America's Cup race. These three tankers would be the only three vessels able to transport LNG between two US ports. It would seem that there is considerable potential for Jones Act compliant ships to garner revenue if they could be built.

A similar condition exists for domestic port-to-port transport of domestically produced crude oil. As Sussman points out in a July 2013 Article, output in just one Texas oil field has increased dramatically and “abruptly” from near zero to 500,000 barrels per day.⁶⁶ In conjunction with this increase in oil production, demand for Jones Act compliant tankers has grown, as well. The number of tankers serving routes in the Gulf of Mexico has gone from one to six.⁶⁷ The tankers that are in service on the Gulf routes are also commanding daily rates that have jumped over 50% to “historic highs.”⁶⁸ In this case, however, a number of Jones Act tankers are in the build process in US shipyards; however, they will not be delivered immediately.⁶⁹ This shortage of vessels enables shippers to go after the most lucrative shipping market and could result in higher prices for US consumers. Daily rates in these markets have reached as high as \$100,000 on the spot market.⁷⁰ In short, the growth of the crude oil market has caught the transportation system in the Gulf region unprepared; as one market analyst termed it, the Jones Act market in the area is “hot” right now.⁷¹ It would seem that, once again, there could be an immediate market for Jones Act compliant tankers to serve this segment if sufficient numbers could be built.

Given the immediate need for Jones Act compliant LNG and crude carrying vessels as well as the premium daily rates available to owners of such ships, an incentive to spur the building of these ships would seem to be an alternative to the perpetual pursuit of Jones Act waivers, as are being sought by Hawaii right now.⁷² Given the improbability of obtaining Jones Act waivers due to strong support for the Jones Act in maritime circles,⁷³ it is unlikely that these waivers will be granted, barring emergencies. An incentive program to spur shipbuilding, however, might constitute a politically viable option. If ship builders and ship operators were given payroll and corporate tax relief for revenues generated as a result of building new Jones Act ships for these markets as well as Jones Act compliant ships for export markets where Jones Act ships are not currently required, this could provide sufficient incentive for operators to contract with shipyards to build new ships. The loss to the US government would be minimal as these taxes are not being collected now as the ships are not replacing anything in service. Rather, they would supplant Jones Act work-arounds and waivers, such as a state or region importing LNG from abroad on a foreign flagged vessel because it cannot economically receive it from domestic sources due to lack of transportation. In addition, new ship designs could use advances in Naval Human Factors Engineering and Human Systems Integration to help reduce crew size and thus a significant operational cost driver. Up front incentives to build and reduced crew costs to operate could help tip commercial business cases toward new Jones Act ship construction.



Essay 5: America's Transportation Infrastructure

“The freight transportation system is a complex network... Measured in ton-miles, about one-third of freight within the U.S. moves by truck and another one-third moves by rail... These are followed in importance by pipelines and water transportation. Measured in ton-miles, air transportation is a relatively minor modes.”⁷⁴ One aspect of the US freight transportation system that may significantly contribute to a demand signal for increased waterborne shipping is the state of the US highway system. Approximately 209,000 miles of the 4 million miles of public infrastructure highways are federally designated the National Truck Network capable of accommodating large trucks.⁷⁵ The first issue addressed is the capacity of the current US Highway system. Over the last two decades commercial freight and passenger traffic has doubled. According to the US Federal Highway Administration over 1/5th of the system is significantly congested. In 2003, one decade ago, the estimated costs of travel delays due to congestion were \$63 billion. The congestion delays increase freight costs significantly with the cost of carrying freight on the highway system at \$25 - \$200 per hour with unexpected delays potentially increasing the cost of highway freight by 50 to 250 percent. Additionally the start and stop traffic increases maintenance costs, decreases fuel efficiency, and increases emissions.⁷⁶ According to the Texas Transportation Institute, during the period 1982 to 2005 “total travel delay has increased five-fold and delay per peak-period traveler has nearly tripled.”⁷⁷ The urban congestion is due approximately 40% to real capacity problems, 5% to signal timing, and 55% due to temporary capacity loss: accidents, weather, and maintenance.⁷⁸ Rural traffic congestion has outpaced urban traffic congestion at a rate of 65:41 during the recent 25 years. With this trend, the interurban highway corridors will experience congestion similar to the urban areas by 2035 if nothing changes.⁷⁹

One of the more serious and negative influences affecting “if nothing changes” is the state of the US highway system. While the volume of vehicles is pushing the capacity of the nation's highways, “the highway system is reaching its design age, with increased need for repair and maintenance... There are many reports that point to our nation's overall infrastructure, not just interstate highways, is in a state of decline and requires significant investment.”⁸⁰ Trucking contributes the greatest wear and tear on the highway and bridge degradation, followed next in relevance by weather and finally the low impact of private automobile on highway pavement designs and bridges.⁸¹

Correspondingly, tax revenues generated by trucks pay only 80% of the cost of highway maintenance. Revenues are falling far short of the cost to repair the highways.⁸² Three authoritative studies have estimated the highway cost to improve conditions on the federal highways through 2035 at \$112 billion – US Department of Transportation, \$131 billion – National Surface Transportation Infrastructure Financing Commission, and \$172 billion – National Surface Transportation Policy and Revenue Study Commission, the latter two being congressionally mandated commissions. These estimates result in a growth of current federal expenditures (and one would assume revenues) of 100% to sustain to 250% to alleviate the capacity and design life issues.⁸³



Essay 6: The Marine Highway Program

The American Marine Highway Program was established with the passage of the Energy Independence and Security Act of 2007. The Department of Transportation (DOT) leads the program with the goal of reducing landside congestion through increased use of the Marine Transportation System (MTS) and fully integrating “marine highway” vessels and ports into the surface transportation system.¹ The US land-based transportation infrastructure is increasingly congested and continues to erode. Many in the marine industry and the DOT view the marine highway as a feasible solution to relieve road and rail congestion, reduce air pollution, lessen US dependence on oil and improve the overall cost and efficiency of the transportation system as a whole.

The MTS is comprised of 21 maritime routes operating on more than 29,000 nautical miles of navigable waterways including rivers, bays, channels, the Great Lakes, the Saint Lawrence Seaway, coastal and open-ocean routes.² Currently, the US MTS is significantly underutilized. The United States has no ships and only a few barges that provide coastal feeder service.³ There are numerous potential economic benefits associated with full integration of the marine highway and coastal ports into the surface transportation system. With improved port infrastructure and the addition of modern, US-built coastal container ships, barges, and passenger vessels, increased MTS use integrated with rail could provide an economical method of movement for bulk cargo, oil and gas that prevents stress on America’s roads and bridges, uses less energy and reduces pollution. It’s estimated that 300-500 new vessels would be required over the next 25 years to fully exploit the benefits of the marine highway.⁴ Per requirements of the 1920 Jones Act, these new ships would be constructed in the United States and owned and operated by US companies and mariners. Improvement of coastal ports and infrastructure could lead to the creation of tens of thousands of new jobs that would be directly or indirectly related to the marine and shipbuilding industries.⁵ American expansion and use of the MTS would re-invigorate the US shipbuilding industry and increase its competitiveness worldwide should the government or private industry chose to invest.

Full investment in America’s Marine Highway Program by US, state and local governments to expand the use of the MTS will lead to reduced physical impacts to land infrastructure, less pollution, and increase efficiency of the surface transportations system. This will further lead to increased economic opportunities for the country. Specific benefits of embracing this program are numerous and include:

- Creating and sustaining jobs in U.S. vessels and in U.S. ports and shipyards
- Increasing the state of good repair of the U.S. transportation system by reducing maintenance costs from wear and tear on roads and bridges
- Increasing our nation's economic competitiveness by adding new, cost-effective freight and passenger transportation capacity
- Increasing the environmental sustainability of the U.S. transportation system by using less energy and reducing air emissions (such as greenhouse gases) per passenger or ton-mile of freight moved. Further environmental



sustainability benefits come from the mandatory use of modern engine technology on designated projects

- Increasing public safety and security by providing alternatives for the movement of hazardous materials outside heavily populated areas
- Increasing transportation system resiliency and redundancy by providing transportation alternatives during times of disaster or national emergency
- Increasing national security by adding to the nation's strategic sealift resources⁶

While benefits are numerous, convincing governments to invest in the MTS may be a challenge since the country's limited resources will also be needed for its deteriorating roads, bridges and other national priorities. However, a balance of resources with priority to a Maritime Highway system should be considered for its potential long-term benefits to both the infrastructure and the economy. Prioritization of resources to surface infrastructure puts a short term Band-Aid on symptoms without solving the actual problem for the long term.

Essay 7: Skilled Shipyard Workforce: A Looming Crisis

The United States is emerging from what many have named the Great Recession (2007-2009) with notable increases in the strength of the dollar, the stock market, the housing market, and finally a notable increase in manufacturing. In fact, in June 2011, the President launched the Advanced Manufacturing Partnership (AMP), “a national effort bringing together industry, universities, and the federal government to invest in the emerging technologies and skills that will support a dynamic domestic advanced manufacturing sector that creates high quality jobs and encourages companies to invest in the United States”.⁸⁴ While the increased attention on manufacturing and efforts to increase American produced products is lucrative for the country and for manufacturers, the country faces a major hurdle – finding highly skilled tradesmen to perform the increasingly complex manufacturing processes. Specifically to our study, the shipbuilding industry faces a monumental shortage of qualified tradesmen.

The Problem

Slowly over the past “two or three generations, the focus has been to go to college, get a degree and in doing so you will ensure a brighter future with more access to employment”.⁸⁵ This shift from vocational preparation to college curriculum is decimating vocational training programs in the U.S. and resulting in significant shortages in not only qualified ship builders but technically savvy and trained personal capable of building all of the subcomponents required in ships – engines, generators, navigations systems to mention only a few. Most high school students don't even have an opportunity to take career and technical education courses like various shop classes.

While vocational schools have virtually disappeared, completion of Career and Technical Education (CTE) courses in high school are demonstrating declines as well. These courses prepare high school students for employment with classes focused on a



myriad of programs including business, manufacturing, finance, law, and information technology to mention only a few. Harold Sirkin of Business Week reports that “in 1990 some 41% of U.S. high school students had earned at least two CTE credits on graduation. By 2009, this had declined to 36%” and “those with students with three or more CTE credits fell from 24% to 19% over the same period”.⁸⁶

By the middle to latter part of the 20th century, schools began shifting away from vocational training to almost full scale preparation of students for college. According to Scott Christian, in a recent article in *Technology and Engineer Teacher*, “vocational training became known as a second tier, remedial track for students deemed less intelligent and non-college bound, pushing more students into the academic track seemingly bound for college”⁸⁷. In fact, in the fall of 2013 a record of 21.8 million students attended American colleges and universities – an increase of 6.5 million students since the fall of 2000⁸⁸. In 2012, 66.2% of 2012 high school graduates were enrolled in colleges or universities within the first year of their graduation from high school according to the U.S. Bureau of Labor Statistics.

The result of our countries efforts to prepare the majority of our high school students for college has resulted in just that – the majority of our students are attending college within the first year after graduating from high school and we are losing vocationally trained and certified tradesmen to perform detailed tasks that we take for granted every day – heating and air conditioning repair, plumbers, welders, and other similar labor related professionals. The graduation rate of the record numbers of enrolling college students is not as nearly as impressive as those who start college as a mere 40% of students complete their degree within four years and 58% complete their degrees within six years⁸⁹ leaving 42% of students without a degree and inadequately prepared for employment. Even graduates with a four-year degree face difficulties with only 71% finding employment within the first year with a median income of \$45,000⁹⁰.

The recent recessions (2000 and 2007), family preferences to see their children seek college degrees with a perception that they will earn more, and a perception by this author that high school graduates are leery of their own perception of blue collar work as back breaking and mind numbing resulting in low paying salaries, have resulted in all time low numbers of skilled tradesmen. The results of these trends and the loss of vocational training is having detrimental results on our nation’s ability to supply sufficient numbers of employees to perform manufacturing, construction, and technical jobs. Specifically for shipbuilding, a ranking member of the American Shipbuilding association interviewed by this author said the “shipbuilding industry is facing monumental shortages of trained skilled tradesman and is in dire straits” that require shipbuilding companies to take a hard look at how they recruit and train personnel. The issue compounding the shortage of new employees for the shipbuilding industry is what the American Shipbuilding Association representative described as a significant age gap with a high percentage of shipbuilders with over 30 years in the industry. During a tour of the Huntington Ingalls Industry (HII) Apprenticeship program I was told that the average age of an HII shipbuilder is 38 years old and 45% of the workforce has less than three years of experience. Over ten percent of HII’s workforce is a master shipbuilder



with over 40 years of experience. With a significant age and experience gap it is easy to see that in the near future the shipbuilding industry may face issues with quality assurance and control as their most senior, experienced employees will be retiring leaving behind a much more junior and less experienced workforce.

The country continues to see increases in new manufacturing positions, with a record 264,000 manufacturing jobs added to the payroll in February 2013⁹¹. “One key difficulty that the United States and other wealthier economies have faced in maintaining manufacturing employment is that, due to automation and computer aided processes, employment declines as productivity increases. Even those jobs that are created tend to involve highly specialized, complex skills.”⁹² As these positions become more technical they require more and more training, thereby creating a formidable barrier to entry that if not addressed will result in an inability for manufacturers or shipbuilders with insufficient new employees to satisfy their demand – or the demand may decrease as companies close because they can’t find employees to support their industry. While we may have brilliant engineers designing incredibly efficient and powerful ships or manufacturers developing new products, the bottom line is that tradesman are going to be involved in taking the concept from paper to creation.

Essay 8: Maintaining the Technological Edge

Technology in the US Armed Forces has been a key feature in the US Military’s dominance. This strategic principle of maintaining the technological edge in military equipment goes all the way back to the American Revolution but can be directly linked to the offset policy that is more than three decades old.⁹³ This offset policy was intended to use the technological advantages to ‘offset’ the numerical superiority that existed between the US and Soviet armed forces. This technological military was truly employed for the first time in DESERT STORM where it demonstrated its advantage over a less technological, but experienced military. This experience solidified the belief in technology as the great advantage in combat. As the defense budget continues to feel constant downward pressure, the question of how to maintain and increase the qualitative advantage in systems that we have the advantage in must be addressed.

The technological lead is not a single item or issue. It is a vast array of subject areas that include but are not limited to material science, electronics, software design, astrophysics and optics. In each subject area the US maybe ahead, behind or even with a competitor but that is only at that moment because the US may be loosing or gaining the lead in that technological area. In order to develop technology and deploy it in military systems, namely warships, a coherent disciplined method must be employed. Warship technology can be broken down into several key areas. They are hull, propulsion, mechanical & electrical, stealth, combat systems and survivability (armor, damage control, fire suppression). Several of these areas are not unique to shipbuilding and can be leveraged from other programs and systems. So how does the military maintain, increase or gain the technological edge in these areas?



The most significant way to maintain the technological edge is through research and development. It is vital that the US not only maintain funding for research and development (R&D) but also that R&D funding increases and that funding is done correctly, in a smart way. Just funding R&D programs does not equate to a technological superior force. The correct programs must be funded to develop technologies that will evolve into useful, applicable shipbuilding technologies. Funding must be applied across all seven levels of R&D, from basic research to operational system development, and be balanced. If R&D funding at levels 1-3 (basic research, applied research and advanced technology) are not funded appropriately for several years, then there are not technologies ready to fund in R&D levels 4-7 (advanced component development, system development and demonstration, RDT&E management and operational systems development) that will yield advanced technology ships. The consistent funding of R&D at the appropriate levels and in the right areas is critical to building high-tech warships. The figure below shows that RDT&E funding in Levels 1-3 has become constant or is in decline. If funding levels are not increased, then technologies to build advanced warships will not be available to incorporate in future ship designs.

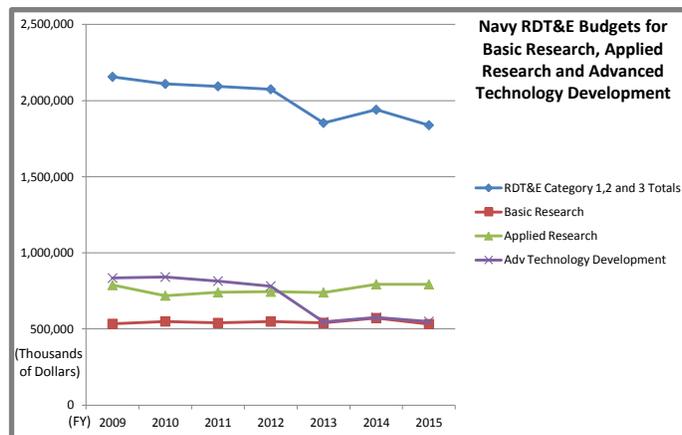
Research and Development Categories⁹⁴

Category Number	Research & Development Category
1	Basic Research
2	Applied Research
3	Advanced Technology Development
4	Advanced Component Development and Prototypes
5	System Development and Demonstration
6	RDT&E Management Support
7	Operational Systems Development

Ship requirements and design is another method to maintain the technological edge in shipbuilding. The requirements process must define the requirements for the future environment that a ship will operate in. The requirements must define the requirements for a future ship with enough time for R&D efforts produce a system that can counter the future threats and operate in the future environment. This requires the development of the requirements be completed so that the design process can start and have the time to incorporate all the aspects of requirements and implications of the future environment that a warship must be able to survive. The correct management of the requirements and design process are vital to building a warship that contains the advanced technology required to be the dominate military force for the next 30 years.



Navy Research and Development Funding



Notes: 1. Graph is in 2010 dollars. 2. Bureau of Labor Statistics used to convert to 2010 dollars. 3. Data taken from <http://www.finance.hq.navy.mil/fmb/12pres/books.htm>

Essay 9: Canada's National Security Procurement Strategy

The Eisenhower Schools Shipbuilding Seminar “Class of 2014” had the opportunity to visit Canada’s Naval Headquarters in Ottawa, Ontario. Senior members of the Royal Canadian Navy briefed many aspects of their Navy and Coast Guards capabilities and initiatives; however, the most intriguing subject was the exposure we received to their National Shipbuilding Procurement Strategy (NSPS).

In October 2010, the Canadian government issued a Solicitation of Interest And Qualification to 5 short-listed firms, for the opportunity to be part of the Conservative Party government’s 30-year National Shipbuilding Procurement Strategy. Up to 28 major ships would be built over that period, to equip the Canadian Navy and Coast Guard. One yard would build all combat ships, and the runner up would build the support ships.⁹⁵

The NSPS is a two-pronged approach to both reconstitute the Royal Canadian Navy (who has not commissioned a warship in over fifteen years) and to reconstitute the shipbuilding capability of the country. Navy shipbuilding in Canada has traditionally been a boom or bust industry, and by establishing a 30-year shipbuilding plan, the desired result was to stimulate competition for the contracts while giving companies incentives to make capital investments in facilities, processes and people. Canada has a proud shipbuilding history, but lack of periodic capital investments contributed to becoming uncompetitive on the global commercial market. The NSPS program has been slow to get off the ground, but the principles are promising and a good example for the United States to track and possibly emulate in the future to better incorporate industry earlier in the requirements and design process and enhance procurement predictability. According to the



canada.gc.ca government website:

The National Shipbuilding Procurement Strategy (NSPS) is an unprecedented long-term, multi-billion dollar commitment to renewing Canada's federal fleet. The NSPS will accomplish this by establishing strategic partnerships with two shipyards, with one building combat vessels and the other non-combat vessels. This strategy will help build and maintain an effective federal fleet for maritime security and services while maximizing economic benefits across the country.⁹⁶

Using this approach, the U.S. could ensure the U.S. shipbuilding industrial base remains warm during lean production years. This is a key aspect of maintaining a sustainable skilled work force that are hard to recoup once a nation/industry starts to divest in its shipyards and production. It is a national security issue because when the need arises to ramp up ship production, the skills may not be available or at a reasonable price. Additionally, a skilled workforce has the potential to benefit a plethora of industries that would stimulate the overall U.S. economy.

As stated in the Defense Daily.com; the winners of the new Canadian NSPS contracts were, Irving Shipyard, which received the contract to build the combat ships, and Seaspan a subsidiary of Vancouver Shipyards Co., which received the contract to build the support ships.⁹⁷ The senior officials in the Canadian Navy expressed some key factors/points about the NSPS program that in our opinion could possibly one-day assist in stabilizing the U.S. shipbuilding and U.S. contracting: (1) reducing some of the long lead-times to producing affordable ships by completing ship plans before production begins (2) allowing communication between the potential shipyards prior to contract award, and (3) closing non-productive shipyards. All of these points lead to a better predictability for the industry, which also will lend itself to lower prices for future ships.⁹⁸

Canada as a nation pulled together to assist an industry that fuels many sectors and supplies many excellent paying jobs. A lesson the U.S. could learn from our partner from the north, they have realized the importance to keeping the industry afloat, which means their government has stepped up with approved solutions to ensure the industrial capability survives to protect their national security. Here is what Canada's government expresses on its website laying out its intent for the shipbuilding industry and its NSPS program:

Canada's marine industry is a key economic driver and the lifeblood of many communities across the country. The federal government believes in the strategic importance of this industry and is committed to making its fleet renewal a key contributor to the industry's long-term well-being. The NSPS will provide a industry, while enabling significant cost savings from a long-term, steady work flow. The Strategy will help the industry avoid the boom and bust cycle that has characterized industry activity in the past. Communities across the country will benefit because this strategy creates and sustains highly skilled jobs for Canadian



companies, including small and medium-sized enterprises.⁹⁹

Understandably, Canada has fewer responsibilities than the U.S. has globally to defend and spreading democracy around the world. Thus implies the U.S. will spend more on defense and expensive warships; conversely, Canada has developed a more cost effective way to produce ships to meet the needs of their nation. Maybe its time for the U.S. to explore measures, that will lower the cost of ships and increase the stability of the shipbuilding industry.

¹ Jennifer Ranking, “BAE Ends Shipbuilding in Portsmouth and Axes 1800 Jobs,” *The Guardian*, November 6, 2013, accessed May 12, 2014, <http://www.theguardian.com/business/2013/nov/06/bae-closure-portsmouth-shipyard-jobs>

² No Author Credited, “South Korea wins Royal Navy Tanker Deal worth 452 Million Pounds”, *BBC News*, February 22, 2012, <http://www.bbc.co.uk/news/business-17127488>

³ Hugo Dixon, Scottish Independence Vote Could Set Off E.U. Exodus, *The International New York Times*, May 11, 2014, http://www.nytimes.com/2014/05/12/business/international/scottish-independence-vote-could-set-off-eu-exodus.html?_r=0

⁴ “America’s Navy - A Cooperative Strategy for the 21st Century,” www.navy.mil, accessed March 12, 2014, <http://www.navy.mil/maritime/display.asp?page=strglance.html>.

⁵ “Aircraft Carrier Named the USS George H.W. Bush Commissioned,” *Fox News*, January 10, 2009, <http://www.foxnews.com/story/0,2933,479087,00.html>.

⁶ Ronald O’Rourke, “Navy Ford (CVN-78) Class Aircraft Carrier Program: Background and Issues for Congress,” www.fas.org, April 19, 2013, <http://www.fas.org/sgp/crs/weapons/RS20643.pdf>, 5.

⁷ Frederic C. Lane, *Ships for Victory: A History of Shipbuilding under the U.S. Maritime Commission in World War II* (Baltimore: Johns Hopkins University Press, 1950)

⁸ “U.S. Navy Shipbuilding,” *Shipbuilders Council of America*, accessed March 12, 2014, <https://shipbuilders.org/us-navy-shipbuilding>.

⁹ Testimony, The Navy’s Readiness Posture, Hearing Before the Sub-Committee on Readiness of the Committee on Armed Services, *House of Representatives*, H.A.S.C. No. 112-121, March 12, 2012, accessed March 4, 2014, <http://www.gpo.gov/fdsys/pkg/CHRG-112hrg73793/html/CHRG-112hrg73793.htm>.

¹⁰ “Status of the Navy,” www.navy.mil, accessed May 6, 2014, http://www.navy.mil/navydata/nav_legacy.asp?id=146.

¹¹ Ronald O’Rourke, “Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress,” www.fas.org, April 7, 2014, <http://www.fas.org/sgp/crs/weapons/RL32665.pdf>, 32.

¹² Congressional Budget Office, “An Analysis of the Navy’s Fiscal Year 2014 Shipbuilding Plan,” www.cbo.gov, October 2013, pg. 1, footnote 3, <http://www.cbo.gov/sites/default/files/cbofiles/attachments/44655-Shipbuilding.pdf>.

¹³ “Naval History and Heritage Command,” www.navy.mil, accessed March 12, 2014, <http://www.history.navy.mil/branches/org9-4.htm#1986>.



- ¹⁴ “An Analysis of the Navy’s Fiscal Year 2014 Shipbuilding Plan,” [www.cbo.gov](http://www.cbo.gov/sites/default/files/cbofiles/attachments/44655-Shipbuilding.pdf), October 2013, <http://www.cbo.gov/sites/default/files/cbofiles/attachments/44655-Shipbuilding.pdf>, 3.
- ¹⁵ Ibid.
- ¹⁶ “America’s Navy -A Cooperative Strategy for the 21st Century,” www.navy.mil, accessed March 12, 2014, <http://www.navy.mil/maritime/display.asp?page=strglance.html>.
- ¹⁷ Roelof Jan Molemaker, “Study on Competitiveness of the European Shipbuilding Industry”, *Ecorys Research and Consulting*, October 8, 2009, http://ec.europa.eu/enterprise/sectors/maritime/files/fn97616_ecorys_final_report_on_shipbuilding_competitiveness_en.pdf, 7.
- ¹⁸ Ibid, 9.
- ¹⁹ James Crompton, “IbisWorld Industry Report 33661a: Shipbuilding in the US”, *IBIS World*, April 2014, 21.
- ²⁰ Marion C. Blakey, “The Unseen Cost: Industrial Base Consequences of Defense Strategy Choices,” *Aerospace Industries Association*, July 2009, http://www.aia-aerospace.org/assets/report_industrial_base_consequences.pdf
- ²¹ HOUSE COMMITTEE ON ARMED SERVICES, “Challenges to Doing Business with the Department of Defense: Findings of the Panel on Business Challenges in the Defense Industry,” www.house.armedservices.gov, March 19, 2012, http://armedservices.house.gov/index.cfm/files/serve?File_id=f60b62cb-ce5d-44b7-a2aa-8b693487cd44.
- ²² ECORYS SCS Group (Rotterdam), “Study on Competitiveness of the European Shipbuilding Industry,” *ECORYS Consulting group*, 8 October 2009, http://ec.europa.eu/enterprise/sectors/maritime/files/fn97616_ecorys_final_report_on_shipbuilding_competitiveness_en.pdf.
- ²³ Ibid, 35.
- ²⁴ Stew Magnuson, “China’s Navy Takes Great Leap Forward”, *National Defense Magazine*, April 2014, 22.
- ²⁵ Ibid, 24.
- ²⁶ Philip Koenig, Don Nalchjian, and John Hootman, “Ship Service Life and Naval Force Structure,” Research Paper, September 2008, 5. <https://www.navalengineers.org/SiteCollectionDocuments/2008%20Proceedings%20Documents/ETS%202008/Koenig%20Ship%20Service%20Life%20and%20Naval%20Force%20Structure%20FINAL.pdf>
- ²⁷ Assistant Secretary of Defense for Research and Engineering (ASD(R&E)), Technology Readiness Assessment (TRA) Guidance, April 2011, accessed March 22, 2014, <http://www.acq.osd.mil/chieftechologist/publications/docs/TRA2011.pdf>, 2-14.
- ²⁸ Transportation Institute, “Promotional Programs >> Title XI Shipbuilding,” *Transportation Institute*, accessed on 8 May 2014, <http://www.trans-inst.org/titleXI-shipbuilding.html>
- ²⁹ John Graykowski, “The Federal Ship Construction Loan Guarantee Program,” *Hearing Before the Seapower and Expeditionary Forces Subcommittee*, March 15, 2007, <http://www.gpo.gov/fdsys/pkg/CHRG-110hrg37536/html/CHRG-110hrg37536.htm>
- ³⁰ Ibid.



- ³¹ Maritime Trades Department, AFL-CIO, Commercial Shipbuilding, www.maritimetrades.org, accessed on 14 May 2014, <http://maritimetrades.org/issues/allied-trades/commercial-shipbuilding/>
- ³² National Center for Educational Statistics, “Key Questions – What is vocational training?,” *Institute of Education Sciences*, accessed May 1, 2014, <http://nces.ed.gov/pubs/web/95024-2.asp>
- ³³ National Center for Educational Statistics, “Issue Brief - Vocational Educational Offerings in Rural High Schools,” *Institute of Education Sciences*, July 2002, <http://nces.ed.gov/pubs2002/2002120.pdf>
- ³⁴ Bureau of Labor Statistics, “The Employment Situation April 2014,” U.S. Department of Labor Press Release, 2 May 2014, <http://www.bls.gov/news.release/pdf/empsit.pdf>
- ³⁵ Michael Agnes, *Webster’s New World Dictionary*. 4th ed. (Cleveland: Wiley Publishing, Inc, 2003), 637.
- ³⁶ Michael W. Guillot, “Strategic Leadership Defining the Challenge.” *Air & Space Power Journal*, Winter 2003.67., <http://www.airpower.au.af.mil/airchronicles/apj/apj03/win03/win03.pdf>
- ³⁷ U.S. Department of Transportation, “The Economic Importance of the U.S. Shipbuilding and Repairing Industry,” *Maritime Administration*, Final Report 2013, http://www.marad.dot.gov/documents/MARAD_Econ_Study_Final_Report_2013.pdf
- ³⁸ “National Security Strategy,” *The White House*, 2012, http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf
- ³⁹ Darrell Conner and Nick Milonas, “Strengthening the US Marine Transportation System: A National Maritime Strategy,” *Pacific Maritime Magazine*, January 1, 2014 Vol 32, No 01. <http://www.pacmar.com/story/2014/01/01/features/strengthening-the-us-marine-transportation-system-a-national-maritime-strategy/202.html>
- ⁴⁰ T.L. Friedman. *The World is Flat: A Brief History of the Twenty-First Century*. (New York: Farrar, Straus and Giroux, 2007), x.
- ⁴¹ Transportation Institute, “Jones Act/Domestic Shipping,” www.trans-inst.org, accessed May 1, 2014, <http://www.trans-inst.org/jones-act.html>.
- ⁴² American Maritime Partnership, “The Jones Act,” www.americanmaritimepartnership.com, accessed May 1, 2014, <http://www.americanmaritimepartnership.com/economy-security/jones-act/>.
- ⁴³ U.S. Department of Transportation, “U.S.-Flag Waterborne Domestic Trade and Related Programs,” *Maritime Administration*, accessed May 1, 2014, http://www.marad.dot.gov/ships_shipping_landing_page/domestic_shipping/domestic_shipping.htm.
- ⁴⁴ Kenneth M. Mead, “Title XI Loan Guarantee Program,” www.oig.dot.gov, March 23, 2003, <http://www.oig.dot.gov/sites/dot/files/pdfdocs/cc2003116.pdf>.
- ⁴⁵ Mitchell Behm, “Title XI 508 Loan Guarantee Program,” www.oig.dot.gov, December 7, 2010, <http://www.oig.dot.gov/library-item/5467>.
- ⁴⁶ Mr. Connaughton, “The Federal Ship Construction Loan Guarantee Program,” *Congressional testimony*, <http://www.gpo.gov/fdsys/pkg/CHRG-110hhrg37536/html/CHRG-110hhrg37536.htm>.
- ⁴⁷ H. Clayton Cook, Jr., “Testimony Regarding Maritime Administration Title XI Loan Guarantee Program to the HASC Subcommittee on Seapower and Expeditionary Forces,”



www.maritimeadvisors.com, March 5, 2007,

<http://www.maritimeadvisors.com/pdf/ClayCookpdf.pdf>.

⁴⁸ Cynthia L. Brown, “The Federal Ship Construction Loan Guarantee Program,” *Congressional testimony*, March 15, 2007, <http://www.gpo.gov/fdsys/pkg/CHRG-110hhrg37536/html/CHRG-110hhrg37536.htm>.

⁴⁹ Parker, Barry, “Where is Title XI Headed?,” *Janes Information Group*, July 10, 2007, <https://www.blankrome.com/siteFiles/News/4835627364E913BCBDFC203FE78FD1E4.pdf>.

⁵⁰ John Graykowski, “The Federal Ship Construction Loan Guarantee Program,” *Congressional testimony*, March 15, 2007, <http://www.gpo.gov/fdsys/pkg/CHRG-110hhrg37536/html/CHRG-110hhrg37536.htm>.

⁵¹ Ibid.

⁵² Kenneth M. Mead, “Title XI Loan Guarantee Program,” www.oig.dot.gov, March 23, 2003, <http://www.oig.dot.gov/sites/dot/files/pdfdocs/cc2003116.pdf>.

⁵³ Mitchell Behm, “Title XI 508 Loan Guarantee Program,” www.oig.dot.gov, December 7, 2010, <http://www.oig.dot.gov/library-item/5467>.

⁵⁴ IBIS World Report, “IbisWorld Industry Report 33661a: Shipbuilding in the US”, *IBIS World*, April 2014.

⁵⁵ Cynthia L. Brown, “The Federal Ship Construction Loan Guarantee Program,” *Congressional testimony*, March 15, 2007, <http://www.gpo.gov/fdsys/pkg/CHRG-110hhrg37536/html/CHRG-110hhrg37536.htm>.

⁵⁶ Isaak Hurst, “US Cabotage Laws and Alaska’ LNG Trade The dawn of the Jones Act Waiver,” *Alaska Business Monthly*, February 2014,

<http://www.akbizmag.com/Alaska-Business-Monthly/February-2014/US-Cabotage-Laws-and-Alaska-LNG-Trade/>

⁵⁷ Ibid.

⁵⁸ Ibid.

⁵⁹ Ibid

⁶⁰ Isaac Arnsdorf. “U.S.-Flag LNG Ships Gain Support as Export Costs Seen Rising,” *Bloomberg.com*, March 7, 2014, <http://www.bloomberg.com/news/2014-03-07/u-s-flagged-lng-ships-gain-support-as-export-costs-seen-rising.html>.

⁶¹ Ibid

⁶² Ibid.

⁶³ Ibid

⁶⁴ Ibid

⁶⁵ Andrew Maykuth, “America’s Cup legislation amended to let foreign tankers sail for Sunoco,” *The Inquirer*, November 8, 2011, http://articles.philly.com/2011-11-08/business/30373694_1_natural-gas-foreign-flagged-tankers.

⁶⁶ Anna Louie Sussman, “Analysis: Shale oil storm blows U.S. tanker trade out of doldrums,” *Reuters.com*, July 1, 2013, <http://www.reuters.com/article/2013/07/01/us-usa-tankers-jonesact-analysis-idUSBRE96004K20130701>.

⁶⁷ Ibid.

⁶⁸ Ibid.

⁶⁹ Ibid

⁷⁰ Ibid.



⁷¹ Ibid

⁷² Cathy Bussewitz, “Hawaii, Alaska And Territories Team Up Against The Jones Act,” *Huff Post Business*, March 13, 2014. http://www.huffingtonpost.com/2014/03/13/hawaii-alaska-jones-act_n_4961203.html.

⁷³ Eric Martin Stamford, “US rejects strict shift in Jones Act rules for LNG carriers.” *Tradewinds*, February 14, 2014, <http://www.tradewindsnews.com/weekly/332400/us-rejects-strict-shift-in-jones-act-rules-for-lng-carriers>.

⁷⁴ John Fritelli and William J. Mallett, “Freight Issues in Surface Transportation Reauthorization,” *CRS Report for Congress*, 2009,

⁷⁵ Ibid. .

⁷⁶ US Department of Transportation, “Freight Performance Measurement: Travel Time in Freight-Significant Corridors,” *Federal Highway Administration*, 2006, <http://www.ops.fhwa.dot.gov/freight>.

⁷⁷ Texas Transportation Institute, “Urban Mobility Report 2007”, www.mobility.tamu.edu, <http://mobility.tamu.edu/ums>.

⁷⁸ William J Mallett, “Surface Transportation Congestion: Policy and Issues,” *CRS Report for Congress*, February 6, 2008, <http://congressionalresearch.com/RL33995/document.php?study=Surface+Transportation+Congestion+Policy+and+Issues>.

⁷⁹ Ibid.

⁸⁰ David M. Thomson, “Transloads – Freight Movement Efficiencies in the Next Decade,” *ASME/ASCE/IEEE 2012 Joint Rail Conference Proceedings*, April 17-19, 2012, <http://www.hrgreen.com/Documents/Articles/HRG-TransloadEfficiencies.pdf>.

⁸¹ Ibid.

⁸² Ibid.

⁸³ John Fritelli and William Mallett, “Freight Issues in Surface Transportation Reauthorization,” *Congressional Research Service*, June 2, 2009, http://assets.opencrs.com/rpts/R40629_20090602.pdf

⁸⁴ “White House Advanced Manufacturing Initiatives to Drive Innovation and Encourage Companies to Invest in the United States,” *Office the Press Secretary, The White House*, 12 July 2012. <http://www.whitehouse.gov/the-press-office/2012/07/17/fact-sheet-white-house-advanced-manufacturing-initiatives-drive-innovati>

⁸⁵ Joshua Wright, “Americas Skilled Trades Dilemma: Shortages Loom as Most-In-Demand Group Workers Ages,” *Forbes Magazine*, 7 March, 2013, <http://www.forbes.com/sites/emsi/2013/03/07/americas-skilled-trades-dilemma-shortages-loom-as-most-in-demand-group-of-workers-ages/>.

⁸⁶ Harold Sirkin, “Ease the Skills Shortage, Bring Back the Vocational high School,” *Business Week*, 20 March 2013, <http://www.businessweek.com/articles/2013-03-20/to-ease-the-skills-shortage-bring-back-the-vocational-high-school>.

⁸⁷ Scott Chrisman, “Preparing for Success Through Apprenticeship,” *Technology and Engineer Teacher*, September 2012, <http://eric.ed.gov/?id=EJ980034>.

⁸⁸ Fast Facts, “Back to School Basics,” *National Center for Education Statistics*, accessed May 1, 2014, <http://nces.ed.gov/fastfacts/display.asp?id=372>.



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- ⁸⁹ Van Thompson, “What Percentage of High School Students Attend College After Graduation,” *www.classroom.synonym.com*, accessed 1 May 2014, <http://classroom.synonym.com>
- ⁹⁰ Fast Facts, “Back to School Basics,” *National Center for Education Statistics*, accessed May 1, 2014, <http://nces.ed.gov/fastfacts/display.asp?id=372>.
- ⁹¹ Oxford Analytica, “United States Edge in New Manufacturing Tech Grows,” *Oxford Analytica Ltd*, March 13, 2013, <http://search.proquest.com.nduexproxy.idm.oclc.org/docview/1316087384?accountid=12686>.
- ⁹² Ibid.
- ⁹³ William J. Perry, “Military Technology: An Historical Perspective.” *Technology in Society*, 2004.
- ⁹⁴ Fryer-Biggs, Zachary, “Looking for Leaps.” *Defense News*, April 21, 2014.
- ⁹⁵ “Canada’s National Shipbuilding Strategy (NSPS),” www.defenseindustrialdaily.com, accessed May 4, 2014, <http://www.defenseindustrialdaily.com/Canadas-National-Shipbuilding-Strategy-07164/>.
- ⁹⁶ “National Shipbuilding Procurement Strategy - Canadian,” www.ic.gc.ca, accessed May 4, 2014, <http://www.ic.gc.ca/eic/site/sim-cnmi.nsf/eng/uv00050.html>.
- ⁹⁷ “Canada’s National Shipbuilding Strategy (NSPS),” www.defenseindustrialdaily.com, accessed May 4, 2014, <http://www.defenseindustrialdaily.com/Canadas-National-Shipbuilding-Strategy-07164/>.
- ⁹⁸ Commander RD McColl, (NSPS, Senior Officer in the Canadian Navy Staff) in discussion with ES Shipbuilding Industry Study, 3 April 2014.
- ⁹⁹ “National Shipbuilding Procurement Strategy - Canadian,” www.ic.gc.ca, accessed May 4, 2014, <http://www.ic.gc.ca/eic/site/sim-cnmi.nsf/eng/uv00050.html>.

