Washington State Maritime Defense Export Market Research

Discussion Draft

September 2016

Prepared for:

Department of Commerce
Innovation is in our nature.

Washington MilitaryAlliance

Prepared by:

cai community attributes inc

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Community Attributes Inc. tells data-rich stories about communities that are important to decision makers.

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EXECUTIVE SUMMARY

Background and Purpose

The maritime defense sector in Washington State is an important contributor to the state economy. In fiscal year 2015, the Department of Defense and U.S. Coast Guard awarded nearly $200 million in contracts for maritime-related work, ranging from boat construction and maintenance to research and ship components and supplies.

The maritime industry encompasses a wide breadth of activities in Washington. The maritime defense sector, an important subset of the maritime industry, includes the following core activities:

- Small Marine Craft
- Ship Maintenance and Repair
- Shipbuilding Supplies
- Research and Development
- Transportation
- Marine Construction and Engineering

Despite the robust nature of the maritime defense sector, potential future changes in federal spending may challenge the continued vitality and health of these businesses. One method for hedging against these possible headwinds is the expansion into overseas markets, both for defense-related and commercial work.

The Washington State Department of Commerce (Commerce) has requested this report to assess overseas exporting opportunities for Washington-based maritime defense contractors. This report includes a review of defense activities in Washington, global trends in the maritime sector (defense and civilian), potential market opportunities, and a set of recommended strategies for implementation by Commerce to help these firms diversify abroad.

Exporting entails numerous challenges, including regulatory barriers, export controls, economies of scale needed to expand overseas, and information gaps on where opportunities might exist. This report will help address many of these challenges and provide a strategic framework for Commerce to help defense contractors expand their business into overseas markets. Recommendations address key trends and considerations specific to maritime businesses in Washington engaged in defense contracting.

Key Findings

Research findings presented in this report include industrywide trends and market conditions shaping maritime exporting opportunities. These findings are summarized below.

Industry Trends and Baseline Conditions

- In fiscal year 2015, there were 138 unique maritime prime contractors and 17 maritime companies with subcontracts with the DOD and Coast Guard.
- The primary subsectors of maritime defense work in Washington in 2015 were: a) small marine craft manufacturing; b) ship maintenance and repair; c) shipbuilding supplies; d) research and development; e) transportation and f) marine construction and engineering.
- Of these, **the most exportable subsectors are small marine craft and shipbuilding supplies, and to a lesser degree maintenance and repair services**.
- For some maritime repair service contractors, services rendered are so specific to U.S. naval needs they are perceived to be non-transferrable for commercial purposes. Helping these firms diversify will represent a considerable challenge.
- U.S. (and Washington) shipbuilding and repair contractors are often not cost-competitive for commercial opportunities overseas.
- A number of international markets are subject to government policies that encourage sourcing from local businesses and suppliers, potentially limiting sales and service opportunities for Washington contractors. This is particularly the case for countries with large, vertically integrated state enterprise-run shipbuilding industries, such as China.

Geopolitical and Macroeconomic Factors

- **Tensions in the South China Sea and East China Sea**. Recent tensions in the South China Sea and the East China Sea, including moves by China to challenge and consolidate territorial claims to island chains in the region, have supported a strengthening of U.S. naval ties with regional allies, including Japan, the Philippines, and even Vietnam. A recent U.N. Permanent Court of Arbitration tribunal ruled in favor of the Philippines and against China. While this may not fully resolve these tensions, it created added impetus for the Philippines and neighboring countries to continue to bolster their naval capabilities, including acquisition of U.S. defense articles.
- **Pacific Pivot and strengthening of U.S. alliances**. Concomitant to this has been the Obama Administration's Pacific Pivot policy, first announced in 2011, whereby more U.S. military assets will be

concentrated in the Asia Pacific. These military ties have been, and will likely continue, to support foreign military sales and transfer of U.S. Navy and Coast Guard maritime vessels through the Excess Defense Articles program. For example, under the latter program since 2011 three U.S. Coast Guard Hamilton class cutters have been transferred to the Philippines.

- **Strong U.S. dollar**. Recent weakening of the global economy has created upward pressures on the U.S. dollar, weakening U.S. (and Washington) export competitiveness.

Markets and Opportunities: Small Marine Craft

- The opportunity markets for small marine craft are **Japan**, **Australia**, and potentially **Vietnam**. These market opportunities reflect a continuing strengthening of U.S. naval operations and alliances to the Asia Pacific region, including most recently the removal of an arms sales embargo on Vietnam.
- Japan presents the potentially largest and most immediate market for Washington maritime small craft and parts suppliers. Geopolitical factors have prompted a multi-year expansion of the Ministry of Defense budget, particularly in response to North Korean bellicosity and China's claims on the Japan-administered Senkaku/Diaoyu Islands.
- Despite limited commercial competitiveness, **foreign governments are willing to pay a high premium for U.S. military vessels**. Many foreign governments, especially U.S. allies, desire the same types of vessels and other hardware as the U.S. Navy, due both to the perceived high value of these assets and the interoperability between navies.

Market Opportunities: Ship and Boat Building Supplies, Components, and Maintenance

- Internationally, the largest ship and boat original equipment manufacturers (OEMs) are located in **Japan**, **Korea**, and **China**. As a region, the **European Union (EU)** is the largest center of global shipbuilding.
- Marine supplies are a large global market led by China, Korea, Japan and Singapore. Together the EU is the largest regional market for marine supplies.
- Opportunity markets for shipbuilding supplies are **Japan**, **Korea**, **Germany** and **Taiwan**. China is a major manufacturer, but the industry has a very high degree of vertical integration, precluding access for U.S. firms. The Chinese market presents additional challenges, as well, notably state policies that support strategically important sectors such as maritime ship construction.

- Some of the largest markets for ship parts for ship assembly are dominated by large, vertically-integrated conglomerates and state enterprises, particularly in China, South Korea, and Japan (to a lesser degree). This makes opportunities in these markets for parts and service providers more challenging.
- A number of maritime maintenance and repair companies indicated that foreign governments often select local contractors for cost and security reasons.
- Decommissioned and gifted/transferred U.S. Coast Guard vessels to foreign allies may present near-term service contract opportunities for Washington-based contractors. For example, since 2011 the U.S. government has gifted three U.S. Coast Guard Hamilton class cutters to the Philippines Navy. Vigor Industrial, based in Washington State, participated in the Fleet Rehabilitation and Modernization (FRAM) program in the late 1980s and early 1990s, working on Hamilton class cutters, and may be able to compete for this work.

Strategies for Supporting Maritime Defense Contractors

Opportunity/Theme	Key Findings/ Considerations	Strategy	Type of Assistance
Industry-wide	Foreign Military Sales are an important channel for defense exports.	**Facilitate communication** between Washington vessel manufacturers and federal export programs.	Education and training/market research
	Foreign militaries put a high premium on U.S. defense articles but are less aware of Washington maritime defense capabilities.	**Build brand awareness and marketing**. Create information on defense capabilities and translate into Japanese, Korean, and traditional Chinese (Taiwan) for distribution at trade shows and meetings with overseas OEMs.	Advocacy
	Many firms are still unaware of Washington State Department of Commerce services.	**Continue to disseminate information** on Washington State Department of Commerce services through Commerce's maritime webpage and proactively reach out to contractors.	Education and training
		Create a database of defense contractors willing to talk with each other and share their experiences, tips and ideas. They may be selling different products and services but much of the export basics and challenges will be the same and they can learn from each other's experiences.	Education and training
		Provide technical assistance and information dissemination through the Washington State Department of Commerce and the Procurement Technical Assistance Center.	Education and training

Opportunity/Theme	Key Findings/ Considerations	Strategy	Type of Assistance
Industry-wide (cont.)	Contractors need support understanding defense regulations and related technical assistance.	**Technical support**. Consider hiring a staff member to focus on technical outreach in the defense market. This position would act as an ombudsperson for maritime (and other sectors) by liaising with technical contacts at DOD and related agencies, and connecting companies to the right resources and contacts.	Technical assistance
	Contractors need more information on current and future trends in defense spending globally.	**Expand the Washington Military & Defense Economic Impact Tool** to include current information on maritime defense trends. The WMA can be broadened to provide information on maritime defense contractors in Washington through regular newsfeeds, website content, and communication with registered subscribers.	Education and training
Small Marine Craft Exports in Japan, Australia, and Vietnam/ASEAN countries	Pacific Pivot and increased defense spending among U.S. allies in Asia Pacific, in response to China.	**Foster contacts and relations with these governments and relevant departments**, e.g., with the Acquisition, Technology and Logistics Agency of Japan's Self-Defense Forces, and lead a delegation to Japan to meet with officials.	Education and training
		In-market support. Work with the U.S. government in advocacy role in difficult-to-penetrate markets, e.g., Japan.	Advocacy

Opportunity/Theme	Key Findings/ Considerations	Strategy	Type of Assistance
Shipbuilding Supply Contractor Exports in Germany, Japan, South Korea, Taiwan, and the UK.	It can be very difficult to access markets due to vertical integration.	**Identify potential partners/buyers in these target markets.** Work with companies in Washington that can provide components and have environmental advantages in these markets.	Market research
		Reach out to Washington companies on Washington State Department of Commerce services, e.g., partner vetting.	Market research
Maintenance and Repair Contractors	Hamilton class cutters being decommissioned and gifted to Philippines.	**Track the transfer of decommissioned vessels to foreign allies.** Continue to build relationships and communicae with officials in the Excess Defense Articles and Foreign Military Sales programs to stay abreast of potential future gifts and sales of vessels that require follow-up maintenance.	Technical assistance

CONTENTS

INTRODUCTION

Background and Purpose

Economic development practitioners have become increasingly concerned with how best to support defense contractors to weather future uncertainty in the federal defense budget. Defense contractors are an essential link in the U.S.'s defense supply chain, and the U.S. Department of Defense (DOD) wants to ensure they will be available for future defense needs. Export markets are an important opportunity to mitigate this uncertainty for defense firms, reducing individual contractor reliance on defense contracts while ensuring they will be available for future defense needs.

Washington is already one of the most trade-reliant states in the U.S. The state has one of the most extensive port systems in North America, and has a long history of linkages with other parts of the world, including Asia and Northern Europe. In 2012, the Washington Council on International Trade and Trade Development Alliance of Greater Seattle (TDA) found that 40% of all jobs across the state were tied to trade, the majority through export activities. TDA confirmed and updated this estimate in 2015 in partnership with the Brookings Institute and JPMorgan Chase Global Cities Initiative.

However, trade comes with risks. In addition to finance risk and uncertainty in overseas markets, local defense firms must also comply with U.S. federal government export controls, including the International Traffic in Arms Regulations (ITAR). Failure to comply with ITAR can result in significant penalties that may deter businesses from pursuing export opportunities. Export Administration Regulations apply to commercial products with potential military applications, and rules vary based on the country destination of sales. The U.S. government also administers financial sanctions through the Office of Foreign Assets Control. These sanctions cover specific individuals, organizations, and nations pursuant to the U.S.'s national security goals.

With these considerations and the goal of ensuring defense contractor stability in mind, the Washington State Department of Commerce (Commerce) contracted Community Attributes Inc. to develop an analysis of overseas market opportunities for maritime defense contractors in Washington state. The analysis leverages public data sources, interviews, reports, news articles, and other sources to present an extensive survey of the opportunities and challenges maritime companies will face in overseas markets.

Based on these findings, a set of actionable strategies was developed to help defense contractors diversify into overseas markets.

Methods

This project has required a hybrid research methodology, leveraging a wide spectrum sources and materials. These include:

- Existing federal and private sector research reports
- News articles
- Exporting and defense contractor data
- Industry forecasts
- Military spending data, sourced from national government budget reports and the Stockholm International Peace Research Institute, among other sources.
- Interviews with: 1) existing exporters in the maritime sector; 2) defense maritime contractors; 3) government and policy officials, including in the Department of Defense and U.S. Foreign Commercial Service; and 4) industry experts.

Method for developing recommendations

Recommendations are focused on addressing market opportunities specific to defense maritime activities and contractors in Washington. Variables considered include: 1) characteristics unique to defense contractors, including size and ability to scale to foreign sales; 2) domestic factors, such as regulatory considerations and pull of the domestic U.S. market over international markets; 3) foreign government factors, including state policies biased to indigenous industries; 4) industry and technology factors, such as the exportability of certain products and services; 5) macroeconomic conditions; 6) regional and geopolitical factors, such as the strengthening of U.S. military alliances in East and Southeast Asia; and 7) considerations specific to defense versus civilian opportunities.

Recommendations were further synthesized according to existing resources at the Washington State Department of Commerce. These include education and training, technical and regulatory assistance, market research, and advocacy support. A more detailed discussion of how recommendations were developed can be found in the **Appendix**.

Organization of Report

- **Maritime Defense Spending in Washington**. An overview of leading maritime subsectors and contractors in Washington.
- **Key Industry Trends and Global Considerations**. Factors and trends shaping opportunities and challenges for maritime defense contractors, including domestic and overseas barriers.
- **Exporting and Competitiveness Factors**. Strengths and weaknesses of Washington maritime defense contractors in overseas markets.

- **Market Opportunities**. Country and region-specific opportunities for defense contractors, based on the matching of current, resident capabilities and overseas demand and market conditions.
- **Recommended Strategies**. Actionable strategies the Washington State Department of Commerce can undertake to support maritime defense contractor exports.

DEFENSE CONTRACTORS IN WASHINGTON

There were 138 unique maritime prime contractors in fiscal year 2015. These contractors were awarded just under $200 million in product and service work with the Department of Defense (DOD) and Coast Guard in fiscal year 2015. Roughly half the state's maritime contracts were for the Navy and another quarter with the Coast Guard. Contractors also performed work for the Defense Logistics Agency and U.S. Transportation Command.

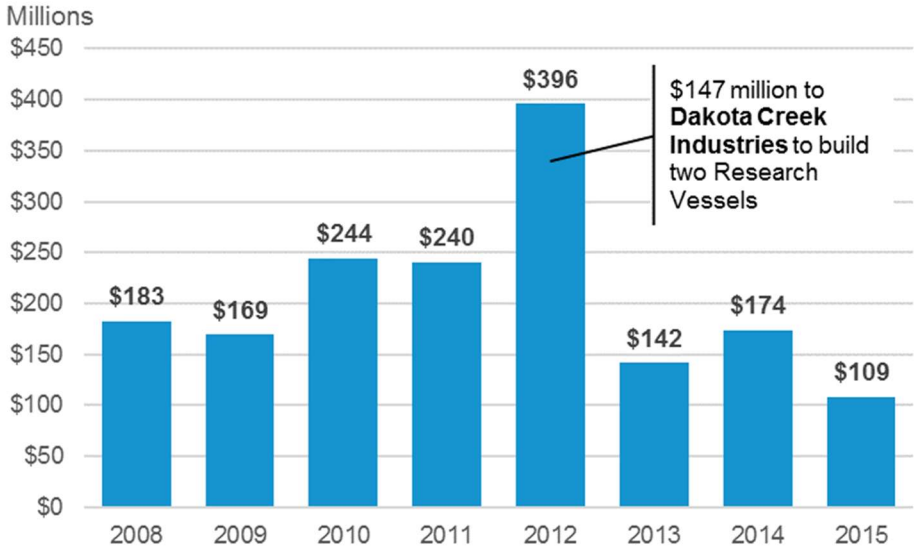
In fiscal year 2015, 17 Washington companies had subcontracts with DOD and Coast Guard maritime prime contractors. These subcontractors performed work ranging from diesel repair to specialty coatings. Some contractors, such as Korry Electronics, do both prime and subprime work for the DOD. The degree to which defense contracts constitute a share of total revenues varies widely across companies.

In this report, the maritime defense sector is organized around the following subsectors:

- Small Marine Craft
- Ship Maintenance and Repair
- Shipbuilding Supplies
- Research and Development
- Transportation
- Marine Construction and Engineering

Shipbuilding and ship maintenance and repair are two major naval maritime contracting activities; both are subject to cycle trends in DOD spending, reliant on relatively large, infrequent contracts. For example, Dakota Creek Industries was awarded $147 million in 2012 for two Auxiliary General Oceanographic Research (AGOR) vessels. As a result, the total contract value of shipbuilding and maintenance defense contracts in 2012 was nearly double the previous year's value. The two AGOR vessels constructed by Dakota Creek Industries were built over the course of two years and delivered in 2015 (Dakota Creek Industries, Inc., 2016). (**Exhibit 1**)

Exhibit 1. Ship & Boat Manufacturing and Maintenance Defense Contracts in Washington, Fiscal Years 2008-2016



Sources: U.S. Office of Management and Budget, 2016; Community Attributes Inc., 2016.

Major Subsectors and Contractors

This section reviews major defense subsector activities in Washington and provides detailed examples of contractors in each. Subsequent market opportunity assessments reflect these current concentrations of maritime defense activities in Washington.

Small Marine Craft

The U.S. Navy is increasing its reliance on small craft as a means of protecting its larger, high-value ships. One reason for this was the small craft attack on the USS Cole in 2000. Future attacks like these could be prevented by small intercept vessels. The U.S. has also placed a greater emphasis on patrol boats to guard against terrorism, drug interdiction, and border security. Several Washington firms have benefited from DOD demand for these vessels.

Examples of leading Washington defense suppliers of small marine craft include the following:

- **SAFE Boats International**, an aluminum hull boat producer, regularly sells small craft to the Department of Defense and the Coast Guard. SAFE Boats' production of the Response Boat Small (RBS) for the Coast Guard is one such example. The company's patented low-density foam collar construction allows for lightweight, buoyant vessels that are difficult to sink. Traditional inflatable rubber collars can suffer catastrophic failure when

punctured, making them less well-suited for defense applications. The company also produces self-righting boats for the Coast Guard. These vessels have a special distribution of buoyant compartments and watertight cabin space that allow them to return to an upright position after being capsized by stormy weather. SAFE Boats sells its police and military small craft to Chile, Mexico, Nigeria, Pakistan, Australia, and several countries in Europe. (SAFE Boats International, 2016)

- **Armstrong Marine** is a small craft manufacturer based out of Port Angeles. In fiscal year 2015, the company worked on $638,000 in contracts for the Department of Defense, including small craft sales to the Army. The company's Storm Interceptor, a multi-role patrol, interception, boarding, and combat vessel, is offered in sizes ranging from 42 feet to 62 feet. The Storm Interceptor is designed to beach on rugged coastlines, giving crew and passengers access to more coast than other vessels that require formal docking.
    - Armstrong also offers a 71-foot tactical response boat outfitted with crowd control water cannon. The vessel is designed for law enforcement, patrol, and response missions. Armstrong's non-defense products are also in the small craft space, and include survey boats, dive boats, pilot vessels, and fishing boats. In early 2013, the company sold an aluminum hydrographic survey vessel to the U.S. Army Corps of Engineers in Florida. In terms of exports, Armstrong Marine recently engaged in a licensing deal with NAIAD RHIBs. The New Zealand shipbuilder will produce and sell the Armstrong vessel portfolio under license. (Armstrong Marine, 2016; Office of Management and Budget, 2016)
- **Kvichak,** a subsidiary of Vigor Industrial, has been involved in the Coast Guard's recent Response Boat Medium (RBM) acquisition program. The mid-sized vessels are designed to replace the current fleet of 41-foot utility vessels that are in operation throughout the U.S. These ships have been among the Coast Guard's most utilized vessels for more than 25 years.
    - Kvichak recently delivered 180 patrol boats to the Coast Guard in a joint venture with Marinette Marine Corporation, a Wisconsin-based shipbuilding firm. The boats were designed to replace the Coast Guard's combined fleet of nonstandard vessels and feature increased maneuverability, the ability to mount light machine guns, increased speed, and comply with EPA emissions standards. The vessels have full cabins equipped with navigation, heating and air conditioning, shock mitigating seats, and communications systems. The multi-year contract, awarded in 2006, is valued at approximately

$600 million. On the commercial side, Kvichak is also building two 19-meter pilot boats for use in Oman's Port of Duqm. (Vigor Industrial, 2016; United States Coast Guard, 2006)

Ship Maintenance and Repair

Support activities for the global maritime sector scale in tandem with industry growth; as the industry adds more ships, those ships will need maintenance and repair over the course of their service times. The existing market for maintenance and repair operations is significant. Domestic demand for naval vessels is increasing, and repair and maintenance contracts along with it. (Dwight D. Eisenhower School for National Security and Resource Strategy, 2014)

Illustrative examples of defense contractors in this subsector include the following:

- **Vigor Industrial**'s defense contracts are primarily for the Department of Defense, but it also performs work for the U.S. Coast Guard. In fiscal year 2015, the company reported $6.0 million in contracts performed in Washington for the DOD. The Oregon-headquartered company, which has a large shipyard in Seattle, also had more than $130 million in other contracts reported through its Oregon location. (OMB, 2015)
    - Vigor Industrial is a shipbuilding and repair company with a significant presence in Washington. The company's projects range from non-defense activities, such as ferry and cruise ship maintenance, to aircraft carrier non-nuclear maintenance in Bremerton. In 2014, Vigor competed for a new aircraft maintenance contract but lost to Virginia-based NASSCO. NASSCO works with local Washington agencies to find qualified workers for its maintenance work in the state, as well as hires work to a large network of subcontractors in the state. (OMB, 2015; NASSCO, 2015)
- The **Lake Union Drydock Company** has provided shipbuilding and repair services to the Coast Guard, Navy, and Army totaling just under $7.5 million in fiscal year 2015. Most of its contracts are with the Coast Guard. (OMB, 2015)
- **Platypus Marine** is a full-service shipyard located in Port Angeles. The company's activities include U.S. Coast Guard and Navy vessel maintenance, repairs, and retrofits; commercial fishing shipbuilding; and recreational vessel refits and repairs.
    - Platypus Marine specializes in U.S. Navy and Coast Guard vessel refit and modernization. The company has completed more than 20 vessels refit projects. Activities range from complete sandblasting and repainting, like the company's service for the Coast Guard on the 87-foot

USCG Swordfish, to complete hardware replacement, like the company's refit of the USN YC-1570 barge. (Platypus Marine, 2016)

- **Dakota Creek Industries**, located in Anacortes, is a full-service shipbuilding and repair facility specializing in vessels up to 400 feet. In 2005, the company delivered a 133-foot research vessel for use in testing and demonstrations. For example, it was used to test a new waterjet from Rolls-Royce Naval Marine. In 2012, Dakota Creek Industries was contracted to manufacture two research vessels for the Navy. The company's recent defense contracting work, however, has been for repairing U.S. Coast Guard vessels. The company has worked on two 110-foot vessels for the Coast Guard, overhauling stabilizers, valves, and gears; replacing drive shafts; replacing hull plates; and inspecting hulls. (Dakota Creek Industries, Inc., 2016; Office of Management and Budget, 2016)
- **Modutech Marine** is another example of a defense contractor in the area of ship and boat repair and maintenance. The full-service repair company does everything from repairing gel cracks in small craft to retooling 100-foot yachts. In addition to repair contracting, the company serves the commercial sector with custom repair for the shipping, fishing, and pleasure craft industries. Modutech Marine also has the capability to build custom fiberglass boats up to 100 feet in length, as well as steel and aluminum construction boats. (Office of Management and Budget, 2016; Modutech Marine Inc., 2016)
- Finnish company **Wärtsilä** recently opened a manufacturing workshop in Seattle. The facility is designed to maintain and repair marine cylinder heads. In conjunction with the company's Poulsbo site, which repairs propellers, the new Seattle location represents an increased West Coast presence for the company. Wärtsilä's expertise lies in the maritime and energy industries, and it has recently garnered attention in both the maritime and clean technology sectors for refitting large vessels to run on liquefied natural gas. (Wärtsilä North America, 2014)

Shipbuilding Supplies

Supply chains for shipbuilding vary in nature depending on the market but primes are sourcing a variety of components supplies and parts in building ships large and small.

There are a variety of companies in Washington providing these components, supplies and parts from propulsions systems to various types of marine hardware.

- Bremerton-based **KLB Enterprises** was awarded $1.8 million in U.S. Naval and Coast Guard contracts for naval ship repair supply procurement (Office of Management and Budget, 2016). The

company works primarily with Nava Supply Systems Command Centers in Puget Sound, Yokosuka, Pearl Harbor, and San Diego, with additional work for Naval Sea Systems Command Keyport and Naval Ship Repair Facilities in Japan (KLB Enterprises, 2016).

- **Smith-Berger Marine** manufactures marine hardware. In particular, the company specializes in deck mountings and pulleys for tow leads, chains, and cables. These systems can be used for everything from hauling an anchor to hoisting a flag. The company's second area of manufacturing expertise is in the salmon butchering industry, for which it manufactures standardized machine parts. (Smith-Berger Marine, Inc., 2016; Office of Management and Budget, 2016)
- Seattle-based **Propulsion Systems**, Inc. sells and services controllable pitch propeller systems to the U.S. Navy and Coast Guard. Propulsion propellers with controllable pitch have internal gear systems that allow ships greater control over their speed and engine torque, giving them more room to compensate for different ocean conditions and vessel weight. Controllable pitch propellers are more efficient for large vessels that may have highly variable loads, as they give vessel operators the choice of increased speed when their vessels are relatively light and increased torque when their vessels are relatively heavy. (Kasten Marine Design, 2016; Propulsion Systems, Inc., 2016)

Research and Development

Washington state is a major center of research and development across a variety of sectors, including in the maritime sector. It is not an easily exportable service, however. The University of Washington is a notable player in R&D in the maritime field (and in many others).

- The **University of Washington** received a $14.9 million contract in fiscal year 2015 for ship defense system research. Researchers at the university's Applied Physics Laboratory are developing oceanographic data collection and data processing systems for both the Department of Defense and the National Science Foundation. Additionally, the University of Washington operates a U.S. Navy research vessel for the U.S. Academic Research Fleet. (Office of Management and Budget, 2016; University of Washington, 2016)

Transportation

- **Totem Ocean Trailer Express Inc**. regularly provides deep sea freight transportation services to the United States Transportation Command, one of nine unified commands of the Department of Defense. In fiscal year 2015, the company was awarded more than $24.1 million. (Office of Management and Budget, 2016)

- **Western Container Transport, Inc**., performs similar transportation services, albeit with a focus on intermodal transport to and from the state's ports. The company also rents its equipment, provides mechanic services, and operates container depots. (Office of Management and Budget, 2016; Western Container Transport, Inc., 2016)

Marine Construction and Engineering

Support activities for the global maritime sector scale in tandem with industry growth; as the industry adds more ships, those ships will need maintenance and repair over the course of their service times requiring marine construction and engineering firms. The existing market for maintenance and repair operations is significant. Domestic demand for naval vessels is increasing, and repair and maintenance contracts along with it. (Dwight D. Eisenhower School for National Security and Resource Strategy, 2014)

- California-based **Nova Group** has performed waterfront construction services for the Coast Guard and Navy, including several large projects in Washington. Recent projects include pier maintenance, dry dock construction, and ship repair wharf construction. (Office of Management and Budget, 2016)
- **Glosten Associates** provided engineering services to the Boeing Company for the installation of a mooring system for the semi-submersible SBX-1 radar platform in Adak, Alaska. The sea-based platform is part of the U.S. Department of Defense Ballistic Missile Defense System. (Glosten Associates, 2016)

KEY INDUSTRY TRENDS AND GLOBAL CONSIDERATIONS

Washington has long been a regional center of maritime activity. The state's strategic maritime location has historically made it an important shipbuilding and transportation center. Today, ships and boats built in Washington are sold to foreign companies and serve markets across the globe. In 2014, ship and boat builders received business revenues totaling $1.3 billion and paid average wages of $57,050 to their employees. Washington maritime companies exported $406 million in 2015.

Current and future global trends in the maritime industry, specifically in the subsectors where Washington has unique concentrations, will largely shape exporting opportunities for these firms.

Current and Future Maritime Industry Spending

Small Craft Demand

Overall small ship demand is forecasted to grow 1.5% year-over-year in 2016. Vessels in this size range—less than 2,000 tons—include

tugboats, patrol craft, and support vessels like those produced by SAFE Boats, Armstrong Marine, and Kvichak. Bremerton-based AMI International forecasts the largest increase in offshore patrol vessel spending to occur in the Asia-Pacific region, with spending increasing by 28% and new hulls acquired increasing by 35% from 2014 to 2034 (AMI International, 2015; Lloyd's Register Marine, 2015).

Global Military Maritime Spending

The United States, China, and Russia represent the largest navies in the world based on number of fleets. A large share of recent defense sales has been in Asia, owing in part to the growing influence and power projections of China, particularly in disputes in the South China Sea and East China Sea.

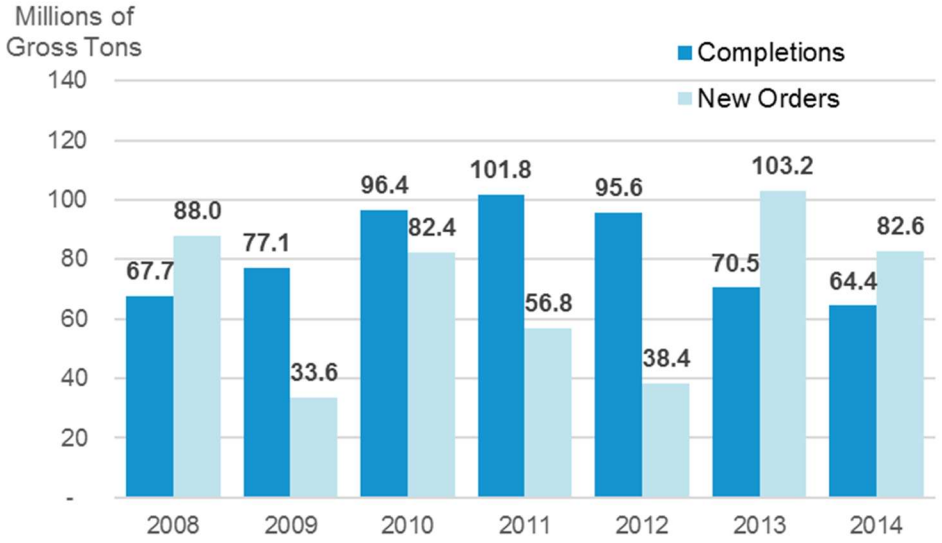
Defense spending in Southeast Asia is increasing due to the security issues surrounding the South China Sea and East China Sea. This spending includes Coast Guard spending with Japan and Vietnam leading the way (Tweed & Rojanasakul, 2016). Military outlays in Asia and Oceania—which includes Australia and New Zealand—grew 5.4% in 2015, outpacing a 1% rise in global spending, according to the Stockholm International Peace Research Institute. Indonesia boosted spending last year by 16%, the Philippines by 25% and Vietnam by 7.6%.

Global Shipbuilding Industry

The global shipbuilding industry both expanded and contracted over the past seven years. New orders of vessels 100 tons or greater in gross weight have varied significantly in recent years. Total tonnage of new orders has varied from 33.6 million tons (2009) to 102.2 million tons (2013) (**Exhibit 2**). Vessels of this size can require several years to manufacture.

Asia has been an important driver of new shipbuilding. The increase in orders from 2012 to 2013 was largely due to an increase in orders for Chinese ships. In 2012, China received orders for 704 new ships weighing a combined 13.8 million tons. In 2013, China received orders for 1,417 new ships weighing a combined 43.9 million tons. From 2012 to 2013, South Korea's new orders increased from 12.0 million tons to 35.5 million tons and Japan's new orders increased from 8.9 million tons to 13.8 million tons.

Exhibit 2. Global Total Tonnage of Large Ships Manufactured and Total Tonnage of New Orders, 2008-2014



Source: IHS, 2014.
Note: Includes only ships that weigh 100 gross tons or more.

Globally, there are several major clusters of maritime activities. Some of the largest OEMs in the world are located in East Asia. Korea and China are the largest shipbuilders by market share and volume, respectively, and Japan is also a major global producer. Considered together as a region, they represent the largest center of global shipbuilding, whether measured by deadweight tons or by shipbuilding revenue. Each of these three countries are home to some of the world's largest shipbuilders, including several state-owned enterprises. (**Exhibit 3**)

While each of the countries have a unique supply chain, they are vertically integrated to a significant degree. The notable exception is Japanese companies, many of whom have a large network of external suppliers. (OECD, 2016; OECD, 2015; OECD, 2010)

Germany is a major maritime producer in Europe, though the country does not produce ships on the same scale as China, Japan, or South Korea. Germany produces specialty vessels like cruise ships and police boats, and is home to several large ship and boat builders.

Exhibit 3. Major Shipbuilders in Top Markets

Country	Company
China	CSSC
	JV COSCO & KHI
	Yangzijang Shipbuilding
	CIC
	China Commerce
Japan	Imabari Shipbuilding
	Mitsubishi Heavy Industries
	Namura Zosensho
	Oshima Shipbuilding Company
	Truneishi Holdings
	Universal Shipbuilding
Korea	Hyundai Heavy Industries
	Daewoo Shipbuilding
	Samsung Heavy Industries
	Mitsubishi Heavy Industries
Germany	Meyer Werft Gruppe
	ThyssenKrupp Marine Systems
	Lürssen Gruppe
	Nordic Yards
	Blohm + Voss

Sources: OECD, The Shipbuilding Industry in China, 2010; OECD, Peer Review of the Korean Shipbuilding Industry, 2015; OECD, Peer Review of the Japanese Shipbuilding Industry, 2016; OECD, Peer Review of the German Shipbuilding Industry, 2015.

Ports and Locations of Global Shipbuilding

A number of international markets offer opportunities for the maritime subsectors. The locations of the world's largest ports are one indicator of areas with major maritime clusters. There are a large number of maritime activities that surround these ports, including shipbuilding, ship repair and maintenance, naval architecture, port maintenance and logistics, transportation, and, to a lesser extent, shipbuilding suppliers.

Exhibit 4 maps the 50 largest ports by twenty-foot equivalent unit (TEU) volume in 2014, with major regional ports called out in detail. In Asia, major ports located along China's coast, Japan, South Korea, and Southeast Asia draw attention to the region's importance for maritime activity, especially shipping. Many of these nations are also major shipbuilders, including China, South Korea, and Japan, the top three shipbuilding nations in 2015. India also has two ports in the top 50 ports by TEU volume, and is currently planning on making major port expansions (Journal of Commerce, 2015). The port of Santos in Brazil is another major global port. Brazil's government also has plans for major port expansions in the coming years (Reuters, 2013).

Exhibit 4. Top 50 Global Ports by Volume, 2014

Source: World Shipping Council, 2016.

Reliance on Small Craft

The U.S. Navy is increasing its reliance on small craft as a means of protecting its larger, high-value ships. One reason for this was the small craft attack on the USS Cole in 2000. Future attacks like these could be prevented by small intercept vessels. Other navies are following suit, making nations with the largest navies potential trade partners for Washington's small craft producers. U.S. allies have some of the largest navies globally; among these, the United Kingdom, Canada, and Australia have important ITAR exemptions. Japan's Maritime Self Defense Force is another large navy, and one that frequently engages with the U.S. on joint operations. This aspect of their navy is valuable, as cross-navy compatibility is important. (Heritage Foundation, 2007)

Maintenance, Repair, and Retrofitting

Support activities for the global maritime sector scale in tandem with industry growth; as the industry adds more ships, these ships will need maintenance and repair over the duration of their service. Domestic demand for naval vessels is increasing, and repair and maintenance contracts along with it. (Dwight D. Eisenhower School for National Security and Resource Strategy, 2014)

As of 2014, roughly $1.5 billion per year was spent through naval FMS annually. Some naval ships sold overseas via FMS (foreign military sales) may require U.S. maintenance and overhaul at some point during the continued service life of the vessel, though the work is likely to be performed at an overseas shipyard.

Under some circumstances, these FMS sales can present opportunities for maintenance work for U.S. companies. These sales may provide an opportunity to fill excess capacity in critical shipyards as well as improve interoperability between the US and allied states. (Dwight D. Eisenhower School for National Security and Resource Strategy, 2014).

Retired U.S. naval vessels are popular choices for other navies, especially Perry class frigates. More than 20 of the 55 Perry class frigates built are in service or in the process of being transferred to foreign navies (Dwight D. Eisenhower School for National Security and Resource Strategy, 2014); currently, the U.S. has only one of these frigates in service. Many naval frigates have been decommissioned at the Mayport, Florida site and then returned to naval operations through foreign military sales (U.S. Navy, 2015).

Decommissioned U.S. vessels

Part of the life cycle of aging U.S. Naval and Coast Guard vessels is their eventual decommissioning. What happens after a vessel is decommissioned varies based on the type of ship and potential future use.

The Coast Guard, for example, will soon be decommissioning three classes of cutters—the Coast Guard equivalent of a frigate-sized vessel, approximately 400 feet long at the water line—which will then be donated or sold to foreign governments through the Excess Defense Articles (EDA) program or Foreign Military Sales (FMS) program. Decommissioned coast guard vessels then gifted or transferred to foreign navies present potential opportunities for Washington-based ship maintenance firms. These opportunities may be niche and only represent a near-term, limited service opportunity, but nonetheless offer a means for local firms to access foreign markets.

The majority of work performed The Coast Guard has decommissioned seven Hamilton-class cutters since 2011, all of which have been transferred to foreign navies—three to the Philippines and two each to Bangladesh and Nigeria (Rahmat, 2016; Parameswaran, 2015).

Ten of the 15 frigates decommissioned in the past two years will be transferred to foreign governments where they will continue to contribute to global security (**Exhibit 5**). Recent sales include two frigates sold to Taiwan (Gary and Elrod), two frigates to Mexico, and two frigates to Thailand. Other vessels, like the Vandegrift, are currently being decommissioned and prepared for sale to foreign allies (Vigor Industrial, 2016; House of Representatives, 2014).

Exhibit 5. Recent U.S. Frigate Decommissions, 2014-2015

Fate	Ship Name	Decomissioning Date
Dismantling		
	Nicholas (FFG-47)	2014
	Halyburton (FFG-40)	2014
	Ingraham (FFG-61)	2014
	Taylor (FFG-50)	2015
	Samuel B. Roberts (FFG-58)	2015
Foreign Military Sale		
	Robert G. Bradley (FFG-49)	2014
	De Wert (FFG-45)	2014
	Rentz (FFG-46)	2014
	Gary (FFG-51)	2015
	McClusky (FFG-41)	2015
	Elrod (FFG-55)	2015
	Simpson (FFG-56	2015
	Vandegrift (FFG-48)	2015
	Kauffman (FFG-59)	2015
	Rodney M. Davis (FFG-60)	2015

Source: United States Naval Institute, 2015.

These decommissioned vessels will continue to need naval maintenance services after being transferred to foreign governments. Some Washington

firms may be positioned to provided supporting services for these maintenance operations, through the scale of these opportunities may be very limited. Vigor Industrial, for example, participated in the Fleet Rehabilitation and Modernization program in the late 1980s and early 1990s, working on these types of ships. Depending on the contract type for foreign maintenance work, Washington maritime companies could either send workers to an overseas shipyard or hire intensively in the particular foreign market (Vigor Industrial, 2016).

However, opportunities may be limited for other ship maintenance and repair contractors in the Puget Sound area. Some firms have indicated that, while most of their work is contracted with either the Department of Defense or Coast Guard, they do not export their services to the foreign equivalents of these U.S. entities. This is largely motivated by the prohibitive costs involved in either transporting a ship to Washington for repair or transporting staff and equipment to a foreign nation to work locally. At the same time, foreign countries may have security concerns over using foreign contractors to work on military vessels (Puget Sound Ship Repair Association, QED Systems, 2016).

Multiple ship repair companies in the Puget Sound region have also indicated that, even for vessels of the same class that they have worked on in the past, maintaining foreign vessels is not a viable export opportunity; foreign nations are much more likely to select a local contractor due to competitive pricing, may be unwilling to select a foreign contractor for security reasons, and/or prefer to support local, domestic shipyards. Finding ways to connect these companies to FMS maintenance and repair work may be challenging.

U.S. Leadership in Defense Spending

One element of the foreign defense market that can be easily overlooked is the role of the U.S. as a leader in defense technology. Many other countries recognize the U.S. as the preeminent defense spender, setting trends in the kinds of technology in which other countries invest. Making major sales to the U.S. Department of Defense or Coast Guard can thus act as a symbol of quality, and open doors to foreign sales. Kvichak, a Vigor subsidiary, entered in a joint venture with a Wisconsin firm to complete 180 patrol boats for the Coast Guard. The company sees this major sale as an opportunity to sell their products to foreign governments that want to emulate the U.S. (Vigor Industrial, 2016)

Supply Chain Characteristics of Washington's Maritime Sector and Current State Maritime Exports

Washington's ship and boat builders do not rely on extensive supply chains within the state for their manufacturing activities. Instead, the companies primarily purchase components through wholesalers and

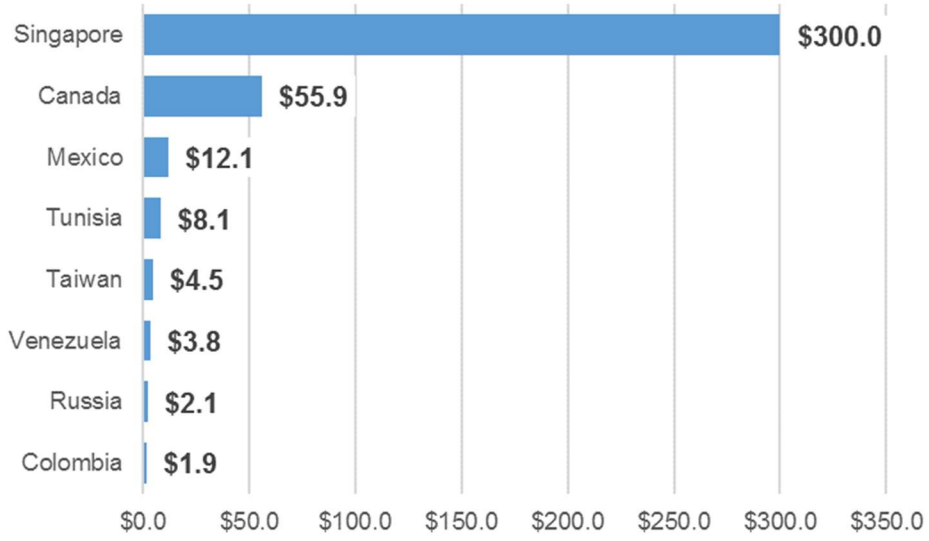
dealers from elsewhere in the U.S. One exception to this is the manufacturing of vessel superstructures—such as above-deck cabins—done by a supplier on Whidbey Island (Vigor Industrial, 2016; Nichols Boats, 2016). The need for certain highly-specialized materials have driven contractors to search as far as Texas for high-grade steel. This is mainly due to the stringent standards of the military (Puget Sound Ship Repair Association, QED Systems, 2016).

Interviewees explained that International Traffic in Arms Regulations (ITAR) considerations are less of an issue for small and medium vessels. While there are certain military specifications for these vessels, there is no certification among suppliers and the military's vessel class requirements are publicly-available information. (Vigor Industrial, 2016)

Exports

Washington's ship and boat building exports totaled $406 million in 2015, up from about $100 million in 2010. The majority of this growth came from $300 million in sales of floating or submersible drilling platforms to Singapore in 2015. The rapid increase in sales indicates this may be a one-time purchase. Other notable maritime exports in 2015 included motorboats ($35.6 million in sales); recreation vessels, such as yachts, canoes and kayaks ($21.5 million in sales); and maritime transportation vessels ($8.2 million in sales). (**Exhibit 6**)

Exhibit 6. Major Foreign Markets for Washington Ship and Boat Builders, Millions of Dollars, 2015



Source: U.S. Census Bureau, 2016.

Between 2011 and 2015, Canada has been Washington's largest single market for maritime vessels, with $320.3 million in sales (**Exhibit 7**). The peak year for exports to Canada was 2012, with nearly $77.3 million in

sales. While Singapore was Washington's largest maritime vessel market in 2015, nearly all of these sales occurred in 2015.

Exhibit 7. Washington's Top Markets for Maritime Vessel Exports, Cumulative Export Sales, Millions of 2015 Dollars, 2011-2015

Rank	Market	Cumulative Sales, mils 2015 $
1	Canada	320.3
2	Singapore	308.8
3	Chile	29.4
4	Mexico	24.9
5	Russia	16.1
6	Venezuela	15.3
7	Tunisia	14.8
8	Colombia	10.4
9	Taiwan	9.5
10	Australia	8.0
	All other countries	118.1
	Total, world	**875.5**

Source: U.S. Census Bureau, 2016; Federal Reserve Bank of St. Louis, 2016; Community Attributes Inc., 2016.

Supply Chain for Ship and Boat Manufacturing

The DOD purchases 30% of all ship and boat building final output on average, according to the U.S. Benchmark Input-Output Model (**Exhibit 8**). Washington's maritime original equipment manufacturers (OEMs) primarily produce small craft for harbor operations and security as well as vessels for coastal shipping. These companies sell to the Department of Defense and Coast Guard as well as police forces around the world. They also sell ferries to public transit organizations and provide port operations support and vessels. Foss Maritime, for example, sells harbor and ocean tugs in addition to transportation barges and specialty vessels.

Nationally, the federal government is the primary purchaser of ship and boat building and repair products, with sales for defense purposes representing a large portion of sales made by ship and boat builders. The water transportation industry is the second-largest purchaser at 3.2% of total sales.[1]

[1] The U.S. Benchmark Input-Output Table helps identify supply chain linkages, including major parts and inputs for ship and boat builders. At the same time, the model helps identify other industries that purchase similar intermediate goods and services, which in turn can be used to help identify potential overseas markets.

Exhibit 8. Purchasers of Ship and Boat Building, U.S., 2012

Category	Share
Inter-Industry Purchases	
Federal general government (defense)	10.1%
Water transportation	3.2%
Ship building and repairing	1.0%
Other state and local government enterprises	0.3%
Fishing, hunting and trapping	0.2%
Boat building	0.2%
Other	0.1%
Total Inter-Industry Purchases	15.1%
Final Uses	
Personal consumption expenditures	27.2%
Federal national defense: Gross investment in equipment	27.9%
Net exports, investments, and other final purchases	29.7%
Total Final Uses	84.9%

Source: U.S. Bureau of Economic Analysis, 2015.

Ship, boat building and repair firms purchase intermediate inputs from engine equipment manufacturing; management of companies and enterprises; motor vehicle gasoline engine and engine parts manufacturing; aluminum product manufacturing from purchased aluminum; among others.

Unlike some other maritime markets, most parts and components used in ship and boat building are actually purchased from outside of Washington through wholesalers and local distributors. Washington's maritime OEMs are not as vertically integrated as builders of larger vessels are overseas (e.g. Mitsubishi Heavy Industries).

Maintenance and repair work for small and medium-sized vessels is an important element of the industry. Cruise ships, fishing ships, fireboats, and drill rigs all need regular maintenance from maritime companies.

Marine supplies represent a large global market led by China, Korea, Japan, the U.S. and Singapore. Eurozone members counted together would be the largest market for marine supplies.

EXPORTING AND COMPETITIVENESS FACTORS

Washington defense contractors face a set of factors—both domestic and international—that will shape their ability to successfully export their goods and services. These range from foreign government ambitions to emulate U.S. military asset and hardware portfolios, to higher domestic labor costs and regulatory barriers. These factors are reviewed below.

U.S. Exporting Strengths and Opportunities

Foreign governments willing to pay a high premium for U.S. military vessels. Based on interview feedback, some foreign coast guards and navies are willing to pay a high premium to use the same vessels and equipment as the U.S.

Ability to leveraging defense work. Defense contracts can provide the ability to scale technologies that can then be leveraged for additional sales to overseas customers. For example, Kvichak recently completed—as part of a joint venture with a Wisconsin-based manufacturer—180 orders for response boat mediums (RBMs) to the U.S. Coast Guard. This kind of project could allow Kvichak and similar companies to develop the technological capabilities and manufacturing infrastructure and systems to produce additional vessels for potential foreign buyers, upon U.S. regulatory approval.

Competitive Challenges

Labor costs for commercial work. While the high cost of labor in the U.S. is partly due to an associated standard of quality, it can result in decreased competitiveness in the commercial space.

Government subsidies and market factors. Other countries may be more price-competitive for commercial vessels due to government subsidies and currency exchange rates favorable to exports, among other factors. For this reason, several Washington defense contractors have noted that they are much more competitive internationally in defense rather than in commercial.

Certifications

International certifications are widely used and required by overseas supply chains to ensure quality and traceability throughout the supply chain. In shipbuilding, ISO 9001 is a quality management system that covers recordkeeping, checking for defects, implementing a continuous improvement program, and others. This certification covers all manufacturing fields, including ship and boat fabrication.

ISO 14001 is an environmental standard to regulate organizations' environmental impact. While not directly related to maritime, many

maritime manufacturers seek ISO 14001 certification to signal to potential buyers their commitment to environmental safety.

For transportation companies in maritime, there is a large number of international standards for safety at sea that need to be met. These standards also apply to ship and boat builders.

In order to contract with the Department of Defense in certain areas, maritime manufacturers have to be certified according to military standards. These standards help the DOD ensure interoperability and quality. Power transformers and switches used on naval vessels, for example, must be produced according to strict military quality standards (MIL-DTL-18396 and MIL-T-16315). Defense contractors, having already achieved this level of quality, may find it easier to secure additional certifications. At the same time, the United States' military standards are different from those of other countries, which could stand in the way of exporting identical products to foreign markets. Some products used by the U.S. military are harmonized with those used by the United States' allies.

Export Controls

Maritime defense exports are often subject to export controls. These regulations on the overseas sales of maritime products help shape potential markets for Washington maritime defense contractors. Details on the rules and specific implications for maritime defense firms are discussed below.

International Traffic in Arms Regulations

The International Traffic in Arms Regulations (ITAR) control the import and export of defense articles and defense services. The U.S. Munitions List (USML) is a list of defense articles and services controlled under ITAR. USML is divided into 21 categories. USML Category VI (Surface Vessels of War and Special Naval Equipment) and USML Category XI (Military Electronics) are the most relevant to the maritime industry. For example, vessels equipped with guns may fall under USML Category VI and certain high power ocean radar may fall under USML Category XI.

ITAR has strict licensing requirements and exports of defense articles and defense services to almost all countries and in almost all circumstances require an export license from the U.S. State Department's Directorate of Defense Trade Controls (DDTC). Certain articles and services may, however, be exported to Australia, Canada, and the United Kingdom, without DDTC licensing if certain requirements are met. However, Washington defense contractors must carefully review ITAR's licensing requirements and exceptions to avoid inadvertently violating ITAR.

Export Administration Regulations

The U.S. Commerce Department's Bureau of Industry and Security (BIS) administers and enforces Export Administration Regulations (EAR). Maritime companies must consider compliance with EAR when providing non-military use products to customers outside of the United States.

The Commerce Control List (CCL) describes individual items and any licensing requirements needed to export. CCL is divided into ten categories. CCL Category 6 (Sensors and Lasers), CCL Category 7 (Navigation and Avionics), and CCL Category 8 (Marine) are the most relevant to the maritime industry. For example, marine acoustic seabed survey equipment falls under CCL Category 6, certain global positioning systems (GPS) fall under CCL Category 7, and ship hulls fall under CCL Category 8. In some cases, a product for export including all of these items may be subject to the licensing requirements under each of the categories.

Unlike ITAR, which requires DDTC licensing for nearly all exports, EAR does not require licensing for all exports. It is important to note that EAR controls products, design/testing/production equipment, materials, software, and technology. Accordingly, the email of detailed blueprints controlled under a specific ECCN might require an export license from the BIS just as an export of the end-item produced using those blueprints.

Each ECCN includes a list of the reasons for control. Once the exporter has located the precise ECCN and the reasons for control, the exporter can then refer to EAR's Commerce Country Chart. The Country Chart provides rows listing all countries of the world and columns listing the various reasons for control. By reviewing the reasons for control and the country, an exporter can determine if a BIS export license is needed. If the reason for control column includes an "X" next to a country, then the exporter must apply for an export license to export the item to that particular country, unless a license exception is applicable. Each ECCN includes information on special license requirements and any licensing exceptions that apply. When an export license is required, the exporter can apply using BIS's online system known as SNAP-R.

There are a number of country-specific export regulations under EAR. For maritime, a key export control is that U.S. companies are prohibited from selling arctic offshore drilling equipment and services to companies in Russia. If an exporter cannot show that their equipment will not be used in Russia for offshore drilling, it may not be able to export.

A detailed example of an export compliance review came be found in the **Appendix**.

Export Control Reform

Through the Obama Administration's Export Control Reform (ECR) effort, USML has undergone major revisions that have greatly reduced the number of products that fall under ITAR controls. As a result, Washington's maritime industry may see new market opportunities available because DDTC licensing may no longer be required for certain items that previously were under ITAR controls.

Although certain systems and major components have been removed from ITAR controls, in general the products affected have been parts, components and accessories that were only nominally adapted for military use and had both military and civilian uses, so called "dual-use items." For example, certain helicopters, small craft, and electronic components that were previously considered ITAR-controlled and can be used for either civilian or military purposes have shifted from USML to CCL.

GLOBAL MARKETS

The analysis of global markets presents an assessment of overseas opportunities across a set of nations with existing or prospective maritime ties to Washington. Each market is introduced, including an overview of key market conditions and maritime-specific considerations. Markets are then further assessed across three subsectors reviewed in this report: 1) small marine craft; 2) shipbuilding suppliers; and 3) ship maintenance and repair.

Markets for Japan and Australia are viewed as the most promising for Washington maritime contractors, and are discussed in more detail. The Middle East, ASEAN countries, Canada, South Korea, the UK, and Taiwan are also reviewed for specific subsector opportunities, with further detail in the **Appendix**.

Japan

Market Overview

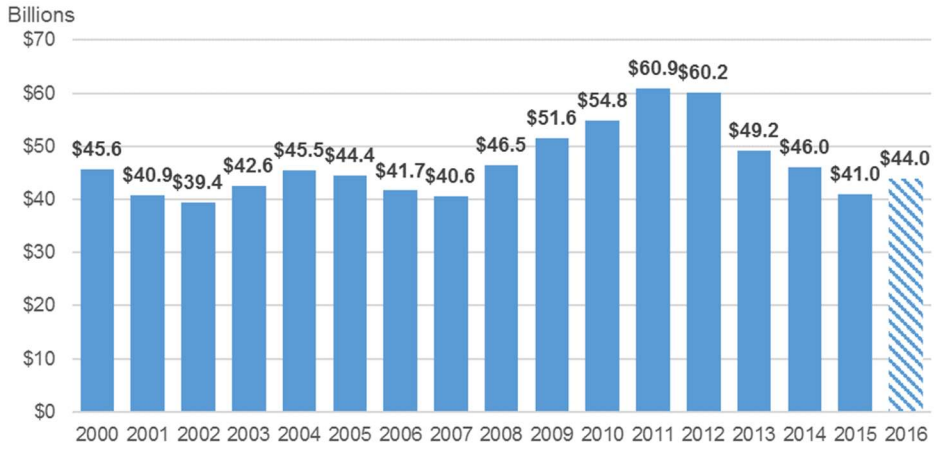
Like its Northeast Asian neighbors, the contemporary Japanese economy is inextricably linked to the conclusion of World War II. Japan's recovery from the conflict, in which the nation received U.S. aid and support, made it the economic power it is today. The country has experienced a dramatic economic slowdown since the 1990s characterized by stagnant growth and inflation—termed "stagflation"—but the country remains the third largest economy in the world with $4.7 trillion in GDP in 2015 and the real GDP per working adult has been growing at the same rate as the United States. The country has a population of 126.9 million. The country's military is characterized by continued joint operations with the United States, and the nation has been a close military partner of the U.S. since post-World War II reconstruction (CIA, 2016).

Japan is an important member of the global maritime industry. U.S. contractors already have a long history of working with the Japanese government. Though prohibited from engaging in aggressive military action by the Japanese Constitution, the nation's military is well-equipped and prepared to defend the nation's borders. The nation's 2016 defense budget was approved at $42.1 billion, representing a 1% increase over 2014 in inflation-adjusted U.S. dollars (**Exhibit 9**). The Ministry of Defense's 2017 budget request, made public in August 2016, would further increase defense spending to nearly 5.2 trillion yen ($51 billion).

Three factors are driving Japan's growing defense budget requests: 1) the ongoing and escalating dispute over the Senkaku/Diaoyu Islands, administered by Tokyo in the East China Sea but claimed by China; 2) the weakened Japanese yen and large share of procurement from overseas suppliers, notably from the U.S.; and 3) demand for missile defense technology in response to North Korean missile tests (Reuters, 2016). Japan recently announced plans to build three new vessels to patrol the disputed islands, included in a draft supplementary budget for fiscal year 2016 (Ryall, Dominguez, & Grevatt, 2016).

Explicit in the budget is the strong relationship between the U.S. and Japan: "Japan will build up its defense capabilities while focusing on the further enhancement of joint functions in order to seamlessly and dynamically fulfill its defense responsibilities" (U.S. Naval Institute, 2015; Japan Ministry of Defense, 2015).

Exhibit 9. Japan Defense Spending, 2000-2015, 2016 Projected, Billions of 2015 Dollars



Sources: Stockholm International Peace Research Institute, 2016; World Bank, 2015; Community Attributes Inc., 2016.

Market Opportunities: Military Build-up and Acquisitions

Recent tensions in the East China Sea and the U.S. Pacific Pivot policy agenda have strengthened the impetus for U.S.-Japan military cooperation

and an expanded role for the Japanese Maritime Self-Defense Force. Japan will likely increasingly become an important market for: 1) patrol boats and small craft; and 2) parts and other maritime defense technologies.

The close interdependence of the U.S. and Japanese militaries is often described as a "spear and shield" arrangement: Japan's self-defense forces are the shield and American forces stationed in Japan and the region are the spear. The two nations frequently engage in joint operations together, making compatibility a key factor for Japanese military procurement decisions.

Japan agreed to large contracts with Lockheed Martin for its F-35A Lightning II Joint Strike Fighter in 2011 and again in early 2015 to upgrade its Aegis-class destroyers, as well as with Northrop Grumman for E-2D Advanced Hawkeye information surveillance aircraft. These products are designed to integrate seamlessly with U.S. forces, allowing greater joint operability than in the past (U.S. Naval Institute, 2015; U.S. Naval Institute, 2015).

In 2014, Japan announced a new arms procurement agency designed to streamline its defense contracting process. In the past, sea, land, and air forces purchased articles separately. The new agency brings the three forces together, making contracting easier for both the nation's defense forces and for contractors. The agency, called the **Acquisition, Technology and Logistics Agency**, will operate similarly to the U.S. Department of Defense's Defense Logistics Agency, which was designed to unify the U.S. military's military depots into a single consolidated network. Future foreign military sales will go through the new agency. (Reuters, 2014)

More recent purchases by Japan's Self-Defense Forces include the RQ-4 Global Hawk High-altitude Unmanned Aerial Vehicles (UAVs), MV-22 Osprey tilt-rotor aircraft, and advanced F-35 Lightning II fighters. Tokyo has expanded its submarine fleet from 16 to 22 boats and is developing a 4,000-man rapid reaction amphibious capability, emplacing radar and anti-ship cruise missiles along its remote southwest islands (Harold, 2016).

The Ministry of Defense's (MOD) fiscal year 2016 budget has outlined several key foci for procurement and deployment (Japan Ministry of Defense, 2015). Under its third objective to "ensure and maintain maritime supremacy," the MOD has called for a list of necessary hardware purchases, including the construction of an Aegis-equipped destroyer and extension of five existing in-serve destroyers through parts procurement; the latter may present opportunities for Washington defense parts suppliers.

Market Barriers

Some of the leading maritime shipbuilding conglomerates in Japan have a high degree of vertical integration, potentially precluding opportunities for foreign firms to sell into these supply chains. Japan's shipbuilding companies are also part of a larger ecosystem that covers all of the maritime cluster. The Japan Bank for International Cooperation (JBIC) provides credits to buyers of Japanese ships for exports, strengthening the country's industry, further evidencing state support for the sector.

Australia

Market Overview

Australia has experienced two decades of nearly continuous economic growth, low unemployment, low inflation, and limited public debt. The country has an open market with minimal import restrictions, and is an active member of the World Trade Organization, APEC, G20, and other free trade forums. The nation entered into a free trade agreement with China in 2015, expanding its network of bilateral free trade agreements. Notable agreements include those made with ASEAN, New Zealand, Chile, Japan, the Republic of Korea and the U.S. Australia's GDP has grown between 2.4% and 2.5% for the past three years, and it has a labor force of 12.5 million. (CIA, 2016)

Market Opportunities

Australia has been an important part of the U.S.'s Asia-Pacific alliance structure since the conclusion of World War II. Today, the nation hosts U.S. troops as part of the U.S. rebalance to Asia, with commitments to host up to 2,500 marines in the northern Australian city of Darwin. The U.S. and Australia also regularly engage in joint military exercises. The nation's 2016 Defence White Paper stated specifically that "an important part of the Government's strategy is to continue to strengthen our alliance with the United States" and "Australia will seek to broaden and deepen our alliance with the United States, including by supporting its critical role in underpinning security in our region through the continued rebalance of United States military forces."

Australia is aware of and subject to the same regional security concerns that the United States recognizes in the Pacific, especially those surrounding territorial disputes in the East China Sea and South China Sea. These regional considerations are all the more important for Australia given its proximity to and reliance on major sea lines of communication as well as its access to abundant fisheries. In its 2016 Defence White Paper, Australia indicated the importance of maintaining secure Exclusive Economic Zones (EEZ), ocean areas extending from a country's shores to which it is entitled exclusive economic use under the U.N. Convention on the Law of the Seas. With 10 million square kilometers in its EEZ, Australia has the largest in the world. The nation is also responsible for

operating 53 million square kilometers of search and rescue operations. (Bloomberg, 2015; Australia Department of Defence, 2016; United Nations, 2013)

Australia sees several key issues at the heart of its military strategy as of early 2016: address terrorism at home and abroad, prevent instability in the south Pacific, maintain Australia's technological edge, and address cyber security. The country's first defense priority is a stable and secure Australia. Second is an equally stable near region, and third is a stable Indo-Pacific region (Australia Department of Defence, 2016).

Australia is also an important NATO contributor. While not a NATO member, the nation is designated a "partner across the globe" and is one of the top non-NATO troop contributors to NATO-led operations. The nation has been a valuable collaborator in NATO activities for more than a decade. (North Atlantic Treaty Organization , 2016)

Major International Markets by Subsector

Small Marine Craft

Several international markets for small marine craft are profiled in this section.

Japan

A focus on joint operability combined with the critical importance of sea power in the Asia Pacific region for the U.S. and its allies in projecting power, especially through littoral[2] and amphibious missions, provides an opportunity for Washington's small craft producers (Captain Takuya Shimodaira, 2014). In an early 2016 conference hosted by the U.S. Naval Institute, Admiral Tomohisa Takei, chief of staff of the Japan Maritime Self-Defense Force, delineated several reasons for improving Japan's military and increasing interoperability with the U.S.: 1) China's military modernization and expansion of naval capabilities; 2) North Korea's missile developments; 3) Russia's increased maritime presence in the Pacific; and 4) transnational threats from natural disasters and crimes (U.S. Naval Institute, 2016).

For its 2016 budget, Japan's Ministry of Defense has allocated 18.4 billion yen (roughly $170 million USD) for building out its amphibious mission capability, including amphibious vehicles and related facilities (Japan Ministry of Defense, 2015). Not only does Japan need small craft to engage in amphibious missions, but it needs small craft that are compatible with its chief military ally, the United States. Washington defense contractors like SAFE Boats International and Kvichak Marine Industries manufacture small police and patrol craft suited to this kind of

[2] Littoral refers to the region around the shore of a lake or sea.

purpose. Overall, Japan's preliminary 2016 defense budget is expected to total $44.0 billion.

At the same time, the majority of Japanese shipbuilding is for small coastal ships; the kinds of small craft required by the Japan Maritime Self-Defense Forces could be contracted to domestic producers rather than foreign ones.

In the past, domestic Japanese manufacturers like Sumidagawa Shipyard have produced light patrol craft for the Japanese Navy and Coast Guard. The shipbuilding arm of Mitsubishi Heavy Industries manufactured Japan's Hayabusa Class patrol boats. The light vessels are designed for patrol missions, overlapping with Washington defense contractors' areas of expertise. (OECD, 2016; Sumidagawa Shipyard Co., 2016; Mitsubishi Heavy Industries, 2016)

Foreign Military Sales

As a NATO member, Japan enjoys several export benefits related to foreign military sales (FMS). U.S. contractors that make military sales to Japan have a higher threshold for mandatory congressional notification and a more lenient statutory notification period. U.S. companies may also export defense articles to Japan through direct commercial sales. However, sales through FMS offer standardization with U.S. forces and provide administrative services that may not be available through the private sector. Due to the high importance of interoperability, sales to Japan may be better off going through the more stringent FMS system. (Defense Security Cooperation Agency, 2016)

Market Assessment

Japan's growth in small coastal ships and defense integration with the U.S. make it a valuable market opportunity for Washington's small craft manufacturers. The country is made more attractive by relatively low barriers to trade, even with the presence of export assistance for shipbuilders.

Australia

Australia's geographic orientation necessitates a significant naval presence. The nation is paying particular attention to its navy for the following two decades, announcing an increase in its submarine force from 6 to 12 submarines. The new submarines are being built with U.S. interoperability in mind. The nation's surface fleet will also see several new additions in the coming years, including a new fleet of nine frigates, and numerous patrol vessels, unmanned aircraft, and a new large-hulled patrol vessel. The Australian government's shipbuilding plans revolve around long-term continuous builds, starting with the manufacturing of patrol vessels in Australia in 2018 and frigates in 2020. Overall, 25% of the nation's

projected investments are in the maritime and anti-submarine warfare space. (Australia Department of Defence, 2016)

In 2016, Australia released its 10-year defense investment outlook plan in a white paper. The document describes planned purchases over the next decade, and pays particular emphasis to the nation's requirements for small offshore patrol vessels. In addition to describing the nation's military needs, the paper notes that defense will share responsibility with border protection, especially for smuggling control and other border interdiction activities. (Australia Department of Defence, 2016)

The Royal Australian Navy is a medium sized fleet with vessels of all size and combat roles. In 2012, Australia announced plans for a new light naval ship that would fit multiple combat roles. Dubbed Offshore Combat Vessel (OCV), the 2,000-ton ships would be able to engage in patrol, anti-submarine missions, as well as littoral missions. An important role for the planned vessels will be combing Australia's coastline as a patrol boat. In late 2015, companies began proposing vessels for the OCV program.

Washington's small craft producers have demonstrated expertise in this class of naval vessels, and have the opportunity to slot into the process as subcontractors or to propose vessels themselves. However, the Australian government has specifically stated that these ships will be built in Australia, meaning that any bids from U.S. contractors would need to include Australia-based manufacturing in order to be competitive. Functionally, this requirement may be realized in the form of offsets or in an implicit advantage in the bidding process to domestic Australian shipbuilders. (IHS Janes 360, 2015; Australia Department of Defence, 2016)

Additionally, Australia has announced plans to build a new frigate fleet in 2015. In addition to the 2,000-ton OCV plan, this program includes the construction of new 7,000-ton frigates. These larger vessels require a different set of skills and competencies than their smaller cousins. As with the OCVs, the Australian government has committed to manufacture these vessels in Australia. (The Diplomat, 2015; Australia Department of Defence, 2016)

<u>Market Barriers</u>

The U.S. has important ITAR exemptions with Australia that make exporting otherwise controlled material easier. However, Australia has indicated that its new vessel construction, including the frigates and OCVs, would occur in South Australia with a preference for local firms (Agence France-Presse, 2015). And while there may be a significant opportunity as a potential supplier or subcontractor, the geographic

distance may be too great to prove financially competitive for Washington suppliers compared to local Australian suppliers and subcontractors.

U.S. companies may also export defense articles to Australia through direct commercial sales or foreign military sales (FMS). Sales through FMS benefit from standardization with U.S. forces and administrative services that may not be available through the private sector. Sales to Australia may be better off going through the more stringent FMS system, however, due to Australia's stated goal of interoperability with U.S. forces. (Defense Security Cooperation Agency, 2016)

Market Assessment

Compared to other countries, the market barriers to enter Australia are relatively low. Washington's defense contractors can pursue the country's stated goals of building a new naval fleet with the confidence that ITAR exemptions will make such a process significantly easier than in some other markets. However, the nation's commitment to manufacturing its new surface fleet domestically may prove challenging for foreign contractors, and could require the inclusion of offsets or other concessions in the contracting arrangement. The nation's goal of improving interoperability is advantageous to Washington contractors that already produce vessels for the U.S. Department of Defense and Coast Guard. Additionally, Australia's goal of developing an advanced fleet lines up with the highly technical and advanced products offered by Washington's maritime contractors.

Vietnam/ASEAN Countries

Vietnam is beefing up its coastal defenses. According to IHS Janes, Vietnam has interest in buying used Lockheed Martin's P-3 Orion maritime patrol aircraft and Raytheon coastal radar systems. Vietnam is third behind China and Japan in size of coast guard fleet in East and Southeast Asia. (Janes Defense, n.d.)

Other countries such as the Philippines and Malaysia are also increasing their defense spending, especially in coastal defenses. The Philippines has concentrated a large amount of its procurement efforts on acquisition of patrol boats to guard its coasts in response to aggressive moves by Chinese ships in the South China Sea.

Market Barriers

Vietnam is interested in growing domestic marine production. This may mean Washington companies will need to locate some production to Vietnam or partner with Vietnam domestic companies. While this is a challenge, it could also offer opportunities to also sell to other ASEAN countries. Vietnam's economy is still heavily controlled by the government. Developing good connections with the government and/or

with entities who have good relations with the government, is a key to being successful in Vietnam.

Market Assessment

Given Vietnam's desire to build its coastal defenses, Vietnam offers a good opportunity for Washington state small marine craft companies. At the same time, Vietnam is a challenging market requiring the time and ability to build up relationships. There may also be some financing issues for the government to purchase marine craft.

Middle Eastern Countries

The maritime products in demand in the region—naval patrol vessels and missile defense systems—are ITAR-controlled. This means there are complicated certification and licensing requirements for export that may discourage a company from seeking to export to the region. Additionally, the U.S. maintains a long list of financial sanctions to individuals and organizations in the region. Assuring that the end use has no connection to any of these sanctioned entities is another important consideration when assessing the Middle Eastern market.

Current exporters mentioned the cultural barriers to doing business in the Middle East. One interviewee indicated that his company almost ruined their business opportunity in Pakistan due to a cultural misunderstanding. In particular, this interviewee pointed to the importance of face-to-face meetings to build trust and understanding the etiquette appropriate to business meetings. Doing business in the Middle East often requires building long-term relationships, necessitating significant investments in travel and time.

Market Assessment

ITAR controls represent middling barriers to export to the region, particularly around growth markets in small naval vessels. Regional security also remains an important consideration for exporters. While exporting light naval vessels can contribute to regional security, the current situation in the region cannot be ignored.

Summary

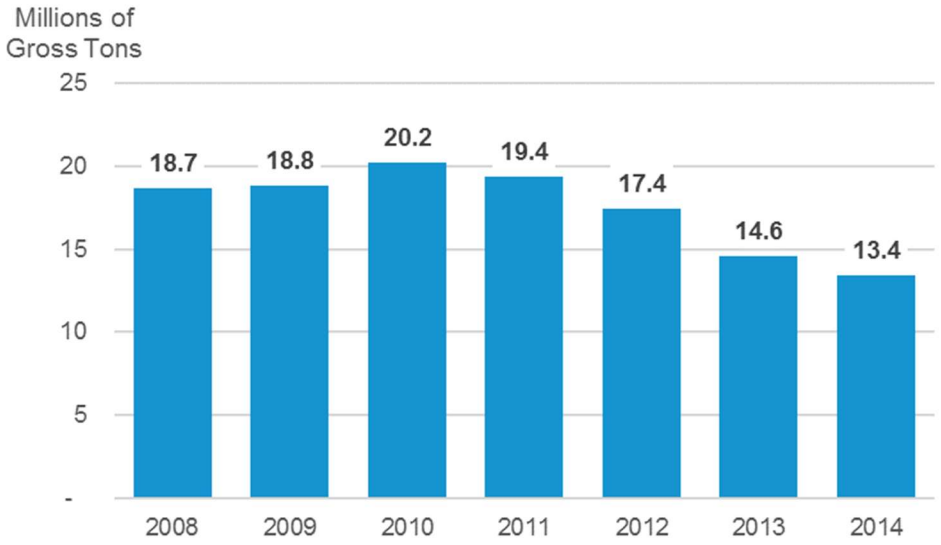
Japan and Australia offer good opportunities with the least barriers. The main barriers are policy bias and customs towards procurement from local suppliers and sources. Vietnam and ASEAN countries also offer opportunities in the patrol craft space.

Shipbuilding Supplies

Japan

In 2014, Japanese shipbuilders completed large ships (those that weigh 100 gross tons or more) with a combined gross weight of 13.4 million tons, making it the third-largest producer of vessels 100 tons and over. Since 2010, Japan's production of vessels this size has decreased from 20.2 million tons. (**Exhibit 10**)

Exhibit 10. Total Tonnage of Large Ships Produced in Japan, 2008-2014



Source: IHS, 2014.
Note: Includes only ships that weigh 100 gross tons or more.

Japan holds a number of maritime trade shows including the Sea Japan International Maritime Exhibition and Conference, which takes place in even years. There are exhibitors from 28 countries at the trade show whose sectors include shipbuilding, marine equipment and marine services.

China

Presently, China's shipbuilding industry is composed of three main categories: the first is large state-owned enterprises with the capacity to build the largest vessels. This includes China State Shipbuilding Corporation and China Shipbuilding Industry Corporation. The second component is private enterprises. In 2008, 55% of total national production was done by private companies. The third component is joint foreign-Chinese enterprises. Japan and Korea, China's two main shipbuilding competitors, have invested heavily in Chinese enterprises. Nantong COSCO KHI Ship Engineering Co., Lt. is a joint company by

China Ocean Shipping Company and Kawasaki Heavy Industries. (Yang & Yu, 2011)

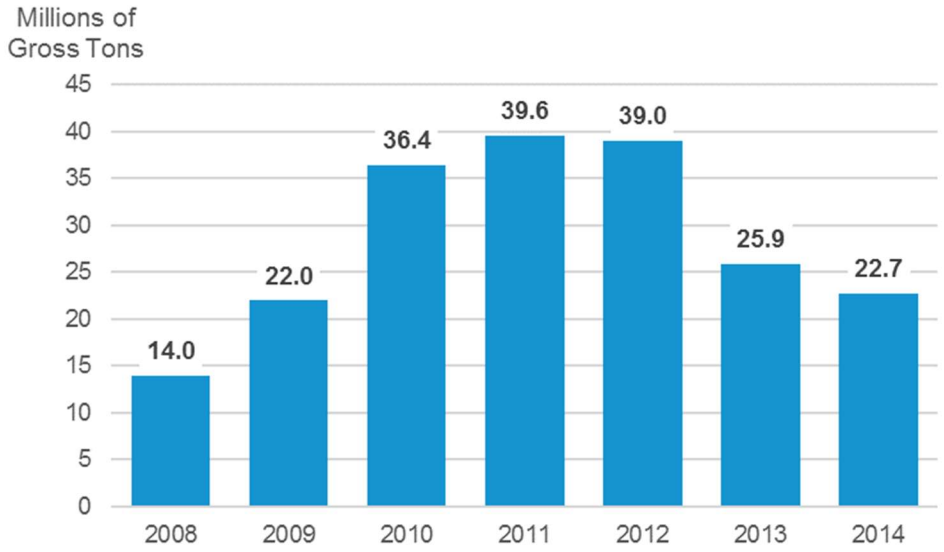
Market Opportunities

China is the largest maritime nation by ship volume. China has significant cost advantages over its competitors in Korea and Japan, due in part to cheap labor and state policies supporting ship construction. China is making use of its low cost advantage and large domestic demand to develop its domestic shipbuilding sector. (OECD, Peer Review of the Korean Shipbuilding Industry, 2015; OECD, The Shipbuilding Industry in China, 2010)

The Chinese government's plan to improve its shipbuilding sector involves foreign partners. In order to increase the local production of key ship components, China has allowed foreign maritime suppliers to create joint ventures with Chinese companies. It has also allowed foreign suppliers to build up their own production plants in China. However, foreign investors in shipbuilding and marine engine manufacturing are only allowed to control up to 49% of a company, with the Chinese partner maintaining a majority share. (OECD, The Shipbuilding Industry in China, 2010)

China is a major shipbuilding nation. In 2014, it produced a total of 906 vessels each weighing 100 tons or more. Together, these vessels weighed 22.7 million gross tons. From 2011, the nation's production has declined slightly. Global ship production of vessels this size has decreased since 2011 from a peak of 101.8 million gross tons across 3,670 vessels. (**Exhibit 11**)

Exhibit 11. Total Tonnage of Large Ships Produced in China, 2008-2014



Source: IHS, 2014.
Note: Includes only ships that weigh 100 gross tons or more.

Market Barriers

China classifies shipbuilding as a strategic sector and has limited foreign shareholdings in Chinese shipyards, marine diesel, and crankshaft factories to 49% (Dwight D. Eisenhower School for National Security and Resource Strategy, 2014). U.S. companies are also prohibited from exporting defense technology to China, limited sales to the civilian realm and with significant ITAR and EAR restrictions.

One of the most important barriers for maritime contractors who wish to do business in China is the 1989 suspension of munitions exports to China. In response to the Chinese government's crackdown on protestors during the Tiananmen uprisings, the U.S. State Department suspended all active licenses to export defense articles and services to China under the Arms Export Control Act. This suspension has remained in place, and no U.S. companies can export defense articles to China. This barrier prevents the export of Washington maritime contractor's biggest product by value: patrol boats. At the same time, other defense articles and ITAR-controlled items cannot be exported to China, further limiting Washington contractors' opportunities with the nation.

Market Assessment

China's reliance on domestic production combined with the emphasis on the country's cost effectiveness advantage in the maritime industry make

exporting to the country a less attractive proposition than other markets for Washington's defense contractors.

South Korea

The Korean shipbuilding industry is dominated by shipbuilders who manufacture very large vessels like container ships, oil and gas tankers, and offshore vessels and structures. This core competency is very different from Washington shipbuilders, who primarily manufacture small and medium vessels. While there is some overlap in the kinds of supplies and components required to produce large vessels and small vessels, many high-value systems like engines differ greatly based on vessel size. (OECD, Peer Review of the Korean Shipbuilding Industry, 2015)

Marine Week is a trade show held in Busan every other year on odd-numbered years. More than 30 countries participate in the trade show with exhibits and sectors covering shipbuilding, repair and maintenance, cargo and material handling, equipment and engineering services.

Market Opportunities

Outward foreign investment from Korean shipbuilders has increased since 2002. Large Korean shipbuilders have overseas business operations in China, Romania, Vietnam, Finland, and France. (OECD, Peer Review of the Korean Shipbuilding Industry, 2015)

Korean SMEs in shipbuilding have been experiencing order cancellations and are under financial pressure. These companies have been closing smaller yards in the country. The Korean government sees SMEs as future providers of supplies and parts for the larger shipbuilders. Sourcing from the most competitive suppliers, however, is the goal of the country's large companies. This could be an opportunity for Washington's maritime suppliers. Some defense contractors in Washington supply shipbuilding parts, including Smith-Berger, Propulsion Systems, and KLB Enterprises. (OECD, Peer Review of the Korean Shipbuilding Industry, 2015)

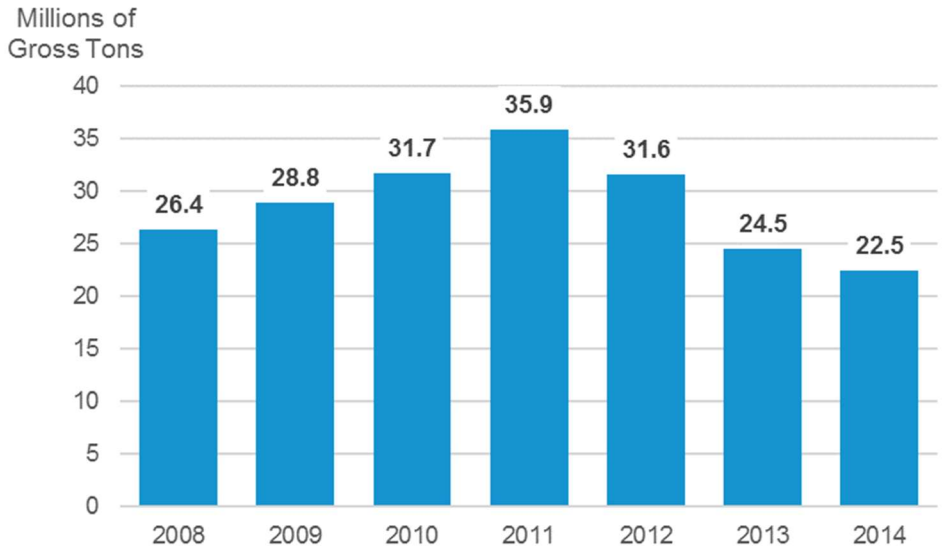
Market Barriers

Shipbuilding in South Korea is dominated by nine major companies, with the largest (by vessel completions) being Hyundai Heavy Industries, Daewoo Shipbuilding and Marine Engineering and Samsung Heavy Industries. Like shipbuilders in other countries, Korea's shipbuilders are largely privately-held companies. Since these are not publicly-traded, there is little data or information available to the public. This uncertainty can be a barrier to engaging in business. (OECD, Peer Review of the Korean Shipbuilding Industry, 2015)

South Korea is the second-largest producer of ships that weigh 100 tons or more. In 2014, the nation produced 341 ships of this size with a

combined weight of 22.5 million gross tons. The nation's production peaked at 35.9 million tons in 2011 and has since decreased in tandem with the global decline in large ship production. (**Exhibit 12**)

Exhibit 12. Total Tonnage of Large Ships Produced in South Korea, 2008-2014



Source: IHS, 2014.
Note: Includes only ships that weigh 100 gross tons or more.

Like other countries, Korea offers export credits. They were a major part of the Korean government's response to the economic crisis. Export credits increased from under 3 trillion KRW in 2006 to a high of 11 trillion KRW ($9.2 billion) in 2013. Export credits can act as a barrier to imports from foreign nations by shifting the country's trade balance. As a result, it may be more difficult to export shipbuilding supplies to Korea.

Market Assessment

The opportunities for maritime suppliers to fit into South Korea's shipbuilding supply chain are tempered by the country's primary reliance on domestic suppliers. At the same time, export assistance programs in Korea and the high degree of control Korean shipbuilders have over their domestic supply chain make Korea a difficult export opportunity to fully capitalize on. However, one important advantage is the bilateral free trade agreement signed that took effect between the U.S. and South Korea in 2012. As a result, boat manufacturers—for both commercial and military use—enjoy a zero rate duty on products exported there.

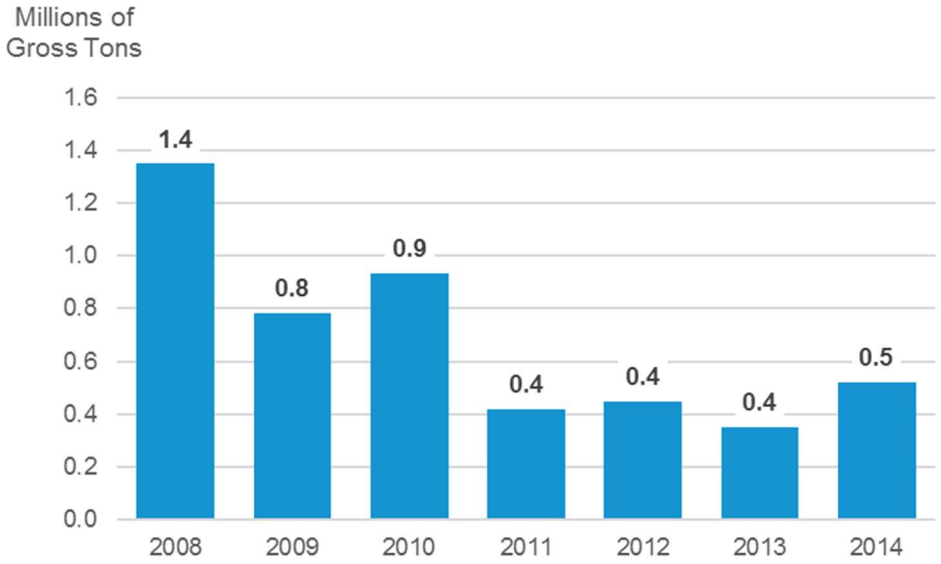
Germany

The German shipbuilding industry is a small component of the German economy as a whole. It is an important regional economic activity in the

Baltic and North Sea area, where the country's shipyards are concentrated. Most of Germany's shipyards are relatively small and family-owned, compared to state-owned yards or yards that are part of big shipyard groups in other countries. While Germany is the sixth largest shipbuilding industry in the world (after China, Korea, Japan, the Philippines and Taiwan), Germany's share is rather low, accounting for less than 1% of global ship completions in 2014. The supply industry has about three to four times more employees than the shipyards and is located throughout Germany. (OECD, Peer Review of the German Shipbuilding Industry, 2016)

Germany is Europe's largest producer of ships over 100 tons in gross weight. In 2014, it produced 15 vessels of this size with a combined weight of 0.5 million gross tons. Germany's production of vessels this size has decreased in recent years, following the same trend seen in other shipbuilding nations from 2010 to 2014. (**Exhibit 13**)

Exhibit 13. Total Tonnage of Large Ships Produced in Germany, 2008-2014



Source: IHS, 2014.
Note: Includes only ships that weigh 100 gross tons or more.

Market Opportunities

German shipbuilders are concentrated in a number of specialized areas, including cruise ships and research vessels. The country's maritime sector also produces ferries, patrol boats, mega-yachts, and offshore platforms for oil and wind farms. Overall, the industry has shifted toward niche production and maintenance. (OECD, Peer Review of the German Shipbuilding Industry, 2016)

German shipbuilding companies are focusing technical development on three areas: reducing emissions, improving efficiency, and improving environmental performance. Attaching gas desulphurisaiton and nitrous oxide scrubbers to reduce emission s are being employed, and companies are exploring natural gas as a fuel source for future ships. Shipyards and researchers are looking into new ways to improve the efficiency of large ships. (OECD, Peer Review of the German Shipbuilding Industry, 2016)

Washington shipbuilding contractors have overlapping expertise with some of Germany's shipbuilders. In particular, defense contractors in the state have also worked on ferries, offshore platforms, and are involved in increasing efficiency and reducing the environmental impacts of ships.

Hamburg, Germany hosts one of the larger maritime trade shows, SMM. Held every other year in even years, SMM attracts exhibitors from more than 60 countries and focuses on shipbuilding, shipyard industry, ship operation equipment, and marine technology.

Market Barriers

The German ship industry has become increasingly export-oriented over time. The industry's supply segment is also large, accounting for 27% of the EU's exports in shipbuilding supply. 74% of German shipbuilding supply value was exported in 2014, largely to Asia (46%) and other European countries (37%). (OECD, Peer Review of the German Shipbuilding Industry, 2016)

The German ship industry may offer opportunities for Washington suppliers to partner with German shipbuilders on projects destined for other EU markets. European Union countries have attempted to harmonize rules and standards for ship inspection and survey organizations. With the goal of mutual recognition in mind, these organizations, termed "Classification Societies," nevertheless have differing requirements. Navigating these requirements can be difficult for outsiders, sometimes prohibitively so. There has also been resistance to harmonization attempts from individual societies, which argue that standardizing certifications would only dilute meaningful certifications and negatively impact safety. (Lloyd's Register Marine, 2012; Universal Maritime Trade Union, 2006)

Market Assessment

Maritime exports to Germany have middling barriers compared to other countries: the nation's niche shipbuilding activities match closely with Washington's, creating an opportunity for collaboration in areas where most companies in the world have little expertise. At the same time, the country's increasing emphasis on implementing environmentally-friendly solutions provides a further opportunity for Washington's defense

contractors in the area of clean technology. While shared expertise on niche products is an important opportunity, it is simultaneously a barrier: breaking into an established niche market may be difficult. An additional barrier is that presented by the extra certification requirements required to comply with Classification Societies in the E.U.

Taiwan

Taiwan is already an important trade partner for Washington state companies. It is also the fifth-largest destination for Washington ship and boat building exports. Taiwan is also intent on growing its defense capabilities, including in the coastal and navy sectors. According *Defense News*, the Taiwanese Navy announced in June 2016 it will invest $14.7 billion over a 23-year period—from 2017 to 2040—on twelve new shipbuilding and force modernization programs (Minnick, 2016).

Defense News further reports that programs will include "a Taiwan Aegis destroyer and frigate, submarine, high-speed minelayer, landing platform dock (LPD), 11 additional stealthy Tuo Jiang-class missile corvette catamarans, and multi-purpose transport. Other programs include more AAV7s, a type of assault amphibious vehicle, for the Taiwanese Marine Corps, underwater swimmer delivery vehicles for special forces, and assorted weapons for special forces."

There is speculation on whether Taiwan can afford these purchases and whether the expenditures will actually occur. In addition, Taiwan would like to develop its domestic defense industry so as not to be too reliant on acquisitions from the U.S., which are seen as too expensive and politically volatile.

But even if Taiwan is able to build more indigenous capability, there will still be a need to source components and parts. A Taiwan defense analyst is quoted in the above *Defense News* article as saying the new effort "could offer enormous opportunities for international firms to supply sensors, weapon systems, critical components, advanced manufacturing technology and tooling, as well as technical assistance in design, engineering and program management services."

Middle Eastern Countries

<u>Market Opportunities</u>

Middle Eastern Countries are expected to increase spending on naval platforms, specifically coast guard and light patrol vessels. Most recent purchasing activity in the region has been for these light vessels, which include both low-end counter terrorism and high-end missile defense systems. Major growth in the region's naval spending is anticipated in Saudi Arabia and the United Arab Emirates as well as Algeria in North

Africa. In Washington, SAFE Boats already sells small craft to Middle Eastern Countries.

India

Market Opportunities

India is a major shipping destination, origin, and intermodal location. In the fiscal year ending March 31 2014, publicly-owned port container volume reached 8 million twenty foot equivalent units (TEUs), an increase of 7% from the previous year. Leadership has pledged to double tonnage capacity at major ports from the current 800 million tons within five years. The increased port construction, logistics, and maintenance operations present a unique set of opportunities for Washington's defense contractors involved in similar activities domestically. (Journal of Commerce, 2015)

Market Barriers

Construction at new ports in India is frequently tied with operating concessions: Adani Ports, the firm that will construct a new container port at Vizhinjam in Southern Kerala, has a 40-year operating contract for port activities. The port construction market in India is dominated by domestic firms, especially for construction of publicly-owned ports. The reliance on domestic companies makes sense from an economic development standpoint, ensuring that public money helps generate domestic jobs. (Journal of Commerce, 2015)

Market Assessment

Barriers to market entry are high compared to other countries, tempering the opportunities represented by India. Domestic competition made stronger by government goals to use domestic firms make exporting to India a proposition that will require careful consideration.

Brazil

Market Opportunities

In June 2013, the Brazilian government passed reform laws for ports, aiming to modernize infrastructure and improve the nation's competitiveness. Foreign shippers as well as domestic producers are concerned about the bottlenecks in Brazil's trade infrastructure. Brazil is heavily reliant on trucks due to limited rail infrastructure. This has resulted in internal transportation bottlenecks, like a 30-mile truck gridlock in 2013 that put a halt to shipping for thousands of drivers around Santos port. With these concerns in mind, the government of Brazil developed a set of projects: centralize port intermodal systems, increase port berth depths, privatize ports and allow private operators to

move third party cargo, and consolidate paperwork requirements. This follows on the successful privatization of airports in 2013. (Reuters, 2013)

Together, these planned changes represent important opportunities for Washington's maritime companies: with port expansion comes increased need for port operations, logistics, and maintenance. Support activities also include pilotage and tugboat operation, and Washington defense firms also produce tugboats.

Market Barriers

Brazil's current economic condition limits its attractiveness to would-be exporters. Additionally, the numerous political scandals in the country in recent years, including the revelation of $4 billion in bribes made to governing Worker's Party leaders, make it appear less stable than other markets. (TIME, 2015)

The Brazilian government has an implicit preference to contract with local companies for its major public works infrastructure and maintenance projects. For this reason, port logistics, port maintenance, and marine architecture defense contractors from Washington may have difficulty capitalizing on this particular market opportunity.

Market Assessment

Barriers to exporting to the Brazilian market are not high from a regulatory standpoint. However, other considerations surrounding economic and political concerns in the nation as well as internal transportation inefficiencies make it important to carefully consider the market before pursuing any export opportunities.

Summary

Germany, Japan, Korea, Taiwan and possibly the UK offer the best opportunities for Washington shipbuilding supply companies. Both Japan and Korea have challenges because of their interest in working domestically and obstacles to penetrating the market. However, the Brexit vote incited uncertainty in the UK market. Germany and Taiwan may be the easiest markets to access and find partnerships.

Ship Maintenance and Repair

Philippines

The primary opportunity for ship maintenance and repair relates to niche opportunities for Washington firms to service decommissioned U.S. Coast Guard and Navy ships gifted to foreign allies. The most immediate opportunity in this space is in the Philippines.

The Philippines Navy has largely relied on the use of decommissioned vessels from the U.S. and other allies as an important source of maritime defense hardware. As on illustrative example, in the 2011 the U.S. government transferred—through the Excess Defense Article program—the U.S. Coast Guard Cutter Hamilton to the Philippines Navy—a ship original commissioned into service in 1967. The vessel was de-weaponized and the recommissioned as the BRP Gregorio del Pilar. In 2013, the U.S. government granted through the same program another Coast Guard Cutter, the USCG Dallas (Global Security, 2016).

More recently, in 2015 the Obama Administration further emphasized its commitment to the Philippines as a strategic regional ally during the President's visit to Manila. The president announced the transfer of two additional U.S. vessels to the Philippine Navy—the R/V Melville (a research vessel to help map its territorial waters) and another U.S. Coast Guard vessel, the Boutwell. However, diplomatic tensions between the Philippines and the U.S. became strained when new Filipino president Rodrigo Duterte insulted President Obama. President Obama has since canceled a diplomatic mission to the Philippines. (Parameswaran, 2015; The Guardian, 2016)

RECOMMENDATIONS TO SUPPORT DEFENSE MARITIME CONTRACTORS IN WASHINGTON

Industry-wide Strategies

To support contractors, Commerce can carry out several broad, industry-wide strategies that apply across many different markets. In many cases, maritime defense contractors either do not have the relationships with existing federal programs and/or lack information on existing service offerings by Commerce.

- **Facilitate communication between Washington vessel manufacturers and federal export programs**. Washington state officials should organize domestic visits to 1) DOD officials handling foreign military sales and 2) the Defense Security Cooperation Agency (DSCA), which is responsible for the excess defense articles programs. Local suppliers need to forge relationships with these programs to learn about and take advantage of opportunities to either sell to foreign buyers or provide follow-up service work for decommissioned and transferred military vessels.
- **Building brand awareness and marketing**. In many cases, foreign militaries and governments do not have knowledge of Washington state's role as a center for maritime military and defense expertise. An effort to create such awareness, including in certain cases, in the language of the targeted markets, will help open up opportunities for Washington maritime defense

contractors overseas. Commerce should create such information and translate it into Japanese, Korean, and traditional Chinese (Taiwan) for distribution at trade shows and meetings with overseas OEMs.

- **Disseminate information**. Build out and update a maritime sector section of the Commerce website with information and data on target markets, regulations, financing information, trends, and contact information for the maritime sector lead. A shared knowledge database for maritime defense contractors can also include basic information on exporting, logistics, shipping, customs and more.
- **Create a database of defense contractors** willing to talk with each other and share experiences, tips and ideas. They may be selling different products and services but much of the export basics and challenges will be the same and they can learn from each other's experiences.
- **Provide technical assistance and information** dissemination through the Washington State Department of Commerce and the Procurement Technical Assistance Center.
- **Consider hiring a staff member to focus on technical outreach in the defense market.** This position would act as an ombudsperson for maritime (and other sectors) by liaising with technical contacts at DOD and related agencies, and connecting companies to the right resources and contacts.
- **Expand the Washington Military & Defense Economic Impact Tool to include current information on maritime defense trends**. The WMA can be broadened to provide information on maritime defense contractors in Washington through regular newsfeeds, website content, and communication with registered subscribers.

Recommendations for Small Marine Craft Contractors

Target Japan, Australia, and Vietnam/ASEAN countries as market growth opportunities. These markets represent the greatest opportunity for future export sales, given close and/or strengthening U.S. military ties and strategic alliances, largely in the face of China's growing influence and power projection in East and South Asia. Commerce should:

- **Foster contacts and relations with these governments**, especially relevant departments, to help companies gain entree to the markets. In particular, Commerce should reach out to the Acquisition, Technology and Logistics Agency of Japan's Self-Defense Forces and lead a delegation to Japan to meet with agency officials to raise awareness of Washington's defense maritime capabilities.

- **Work with the U.S. government in an advocacy role in difficult-to-penetrate markets**, e.g., Japan. This can be done through coordination with the U.S. Foreign Commercial Service stations in Japan and elsewhere to initiate and facilitate meetings with overseas OEMs.

Recommendations for Shipbuilding Supply Contractors

Commerce should focus its efforts on supporting export sales to Germany, Japan, Korea, Taiwan, and the UK. Specific strategies include:

- **Identify potential partners/buyers in these target markets**. Washington state companies can form partnerships with companies in these countries who also export their finished goods to other markets. Work with firms in Washington that can provide components and have environmental advantages these companies value.
- **Outreach to Washington companies**. Continue to reach out to shipbuilding supply companies to inform them of Commerce's ability to help, including vetting potential partners and distributors. Provide them information on target markets.
- **Trade shows**. Provide companies with information on international maritime trade shows and include a list and schedule of shows on Commerce's international trade website. One option is to take a small pilot group of companies to a trade show, while coordinating and working with appropriate support organizations such as the Washington Maritime Federation.

Recommendations for Maintenance and Repair Contractors

- **Tracking transfer of decommissioned vessels to foreign allies**. The Department of Commerce should continue to build relationships and ongoing communication with officials in the Excess Defense Articles and Foreign Military Sales programs to learn about and stay abreast of potential future gifts and sales of vessels that require follow-up maintenance that Washington state contractors could provide. Examples include the recent gifting of two U.S. Coast Guard (USCG) Hamilton class cutters to the Philippines Navy. Ships that are transferred to foreign navies sometimes require follow-up maintenance and related support work, presenting potential opportunities for Washington contractors, especially among those that have previously performed work on USCG cutters.

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APPENDIX

Methodology for Developing Recommendations

The table below delineates key considerations that help shape strategy development for the maritime sector.

Exhibit A-1. Framework for Developing Strategies for Supporting Maritime Defense Contractors

Strategic Considerations	Description	Examples
Firm characteristics	• Firm size • Experience exporting	• Small firm vs. large firm economies of scale • Ability and/or desire to export • Resources to invest in exporting effort
Domestic conditions	• Health of U.S. economy • Regulatory issues • U.S. government programs supporting exporting	• Strength of U.S. market versus overseas opportunities • ITAR, EAR, FCPA, compliance challenges and access to necessary information • U.S. Foreign Military Sales Program and U.S. foreign military aid (e.g., Egypt, Israel) • Excess Defense Articles program • ITAR exemption status among certain allies, including Australia
Foreign market/ government conditions	• State policies supporting local industries • Weak/limited IPR enforcement • Cultural barriers	• Taiwan's recent plan to support more domestic production of maritime vessels • China's weak record on IPR protection • Offset requirements • Relationship building • Finding overseas distributors • Foreign governments often demand for same hardware as U.S. military.
Firm characteristics	• Firm size • Experience exporting	• Small firm vs. large firm economies of scale • Ability and/or desire to export • Resources to invest in exporting effort
Domestic conditions	• Health of U.S. economy • Regulatory issues • U.S. government programs supporting exporting	• Strength of U.S. market versus overseas opportunities • ITAR, EAR, FCPA, compliance challenges and access to necessary information • U.S. Foreign Military Sales Program and U.S. foreign military aid (e.g., Egypt, Israel) • Excess Defense Articles program • ITAR exemption status among certain allies, including Australia
Foreign market/ government conditions	• State policies supporting local industries • Weak/limited IPR enforcement • Cultural barriers	• Taiwan's recent plan to support more domestic production of maritime vessels • China's weak record on IPR protection • Offset requirements • Relationship building • Finding overseas distributors • Foreign governments often demand for same hardware as U.S. military.

A-2. Categories of Assistance and Support from the Washington State Department of Commerce

Type of Assistance	Examples
Education and Training	• Seminars on exporting opportunities, how to find market opportunities • Seminars on legal and trade barriers and issues • Trade delegations to learn about new markets, including trips to DC to meet with embassy officials. • Add info and links to existing website on resources
Technical and Legal Assistance	• Proper paperwork • Export finance • Export control compliance
Market Research	• Identifying overseas opportunities (defense and civilian) • Finding distributors and/or overseas representatives • Helping develop connections with the Foreign Military Sales program
Advocacy	• Helping firms dealing with trade disputes and IPR infringement cases and other barriers • Commerce as a first point of contact for defense contractors

Example of Maritime Defense Export Controls Compliance Example

As an example, suppose that Company A is interested in selling a 45 MW controllable-pitch propeller to Company B in Japan and also to Company C in the United Arab Emirates. Company A would search CCL Category 8 to determine that such propellers are listed under ECCN 8A002. More specifically, controllable-pitch propellers rated for over 30 MW are listed under ECCN 8A002.o.2.a. ECCN 8A002.o.2.a. notes that such propellers are controlled for reasons of national security (NS) and anti-terrorism (AT). ECCN also indicates that on the Country Chart, for NS, column 2 applies, and for AT, column 1 applies (**Exhibit A-3**).

Exhibit A-3. ECCN Reasons for Control Entry for 8A002

License Requirements

Reason for Control: NS, AT

Control(s)	*Country Chart (See Supp. No. 1 to part 738).*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

Company A can then look at the country entries for Companies B and C on the Country Chart. Japan does not have an "X" in either the NS or AT columns (**Exhibit A-4**). Accordingly, Company A likely does not need a BIS license to export the propeller to Japan. (EAR contains a list of ten general prohibitions that must be reviewed in connection with any international transaction. If one of those prohibitions applies, then a BIS license is required regardless of the determination under the Country Chart analysis.)

However, the United Arab Emirates has an "X" under NS (**Exhibit A-5**). According to the Country Chart, a BIS license may be required to send the propeller to Company C.

Exhibit A-4. CCC for Japan

Commerce Country Chart

Reason for Control

Countries	Chemical & Biological Weapons			Nuclear Nonproliferation		National Security		Missile Tech	Regional Stability		Firearms Convention	Crime Control			Anti-Terrorism	
	CB 1	CB 2	CB 3	NP 1	NP 2	NS 1	NS 2	MT 1	RS 1	RS 2	FC 1	CC 1	CC 2	CC 3	AT 1	AT 2
Iceland[3]	X					X		X	X							
India[7]	X	X		X		X	X	X	X							
Indonesia	X	X		X		X	X	X	X	X		X		X		
Iran[1]	See part 746 of the EAR to determine whether a license is required in order to export or reexport to this destination.															
Iraq[1]	X	X	X	X	X	X	X	X	X	X		X	X			
Ireland[3,4]	X					X		X	X			X		X		
Israel	X	X	X	X	X	X	X	X	X	X		X		X		
Italy[3]	X					X		X	X							
Jamaica	X	X		X		X	X	X	X	X	X	X		X		
Japan[3]	X					X		X	X							

Exhibit A-5. CCC for United Arab Emirates

Commerce Country Chart

Reason for Control

Countries	Chemical & Biological Weapons			Nuclear Nonproliferation		National Security		Missile Tech	Regional Stability		Firearms Convention	Crime Control			Anti-Terrorism	
	CB 1	CB 2	CB 3	NP 1	NP 2	NS 1	NS 2	MT 1	RS 1	RS 2	FC 1	CC 1	CC 2	CC 3	AT 1	AT 2
Togo	X	X		X		X	X	X	X	X		X		X		
Tonga	X	X		X		X	X	X	X	X		X		X		
Trinidad & Tobago	X	X		X		X	X	X	X	X	X	X		X		
Tunisia	X	X		X		X	X	X	X	X		X		X		
Turkey[3]	X					X		X	X							
Turkmenistan	X	X	X	X		X	X	X	X	X		X	X			
Tuvalu	X	X		X		X	X	X	X	X		X		X		
Uganda	X	X		X		X	X	X	X	X		X		X		
Ukraine[8]	X					X	X	X	X	X		X	X			
United Arab Emirates	X	X	X	X		X	X	X	X	X		X		X		
United Kingdom[3]	X					X		X	X							

Company A may refer back to ECCN to see if it qualifies for any license exceptions (**Exhibit A-6**). The only applicable exception is for shipments of low value (LVS). If the controllable-pitch propeller is less than $5,000, Company A likely would not need a BIS license to send it to Company C.

Exhibit A-6. ECCN License Exceptions Entry for 8A002

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: $5000; N/A for 8A002.o.3.b

GBS: Yes for 8A002.e.2 and manipulators for civil end-uses (e.g., underwater oil, gas or mining operations) controlled by 8A002.i.2 and having 5 degrees of freedom of movement; and 8A002.r.

CIV: Yes for 8A002.e.2 and manipulators for civil end-uses (e.g., underwater oil, gas or mining operations) controlled by 8A002.i.2 and having 5 degrees of freedom of movement; and 8A002.r.

Special Conditions for STA

STA: License Exception STA may not be used to ship any commodity in 8A002.b, h, j, o.3, or p to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

As can also be seen in **Exhibit A-6**, for this particular ECCN, 8A002.o.2.a, no special licensing conditions apply.

In addition to the above example, there are a number of country-specific export regulations under EAR that may apply to other products. As an example specific to the maritime industry, a key export control is that U.S. companies are prohibited from selling certain items to be used in arctic offshore drilling to companies in Russia or for use in Russia.

In addition to CCL, BIS also maintains lists that designate certain persons, companies, or organizations that are restricted from receiving certain exports. Companies that receive export requests from unfamiliar organizations or individuals should consult these resources as part of their due diligence.

Additional Market Information

Korea

The Korean peninsula was occupied by Japan from the early 1900s to the end of the second World War. At the conclusion of the war, South Korea was set up as a democratic government while the northern portion of the peninsula became home to a communist regime. In the rebuilding effort that followed the conclusion of the second World War, foreign aid came from the U.S. and U.N. to South Korea and from Russia and China to North Korea. Since 1953, a formal armistice was brokered between the two countries with help from their respective allies. The issue remains a tense topic and a source of discord for allies for South Korea and North Korea alike. (CIA, 2016)

Today, South Korea has a population of 49.1 million. In 2004, the country's GDP exceeded $1 trillion. In 2015, its GDP had increased to $1.9 trillion. Its primary industries are electronics, telecommunications, automobiles, steel, and shipbuilding. (CIA, 2016)

The Korean shipbuilding industry made a significant contribution to the country's post-WW II industrialization. Korea is the leading country by value, second only to China by volume. Korea's shipbuilding industry contributions to GDP were roughly 10x that of Japan. (OECD, Peer Review of the Korean Shipbuilding Industry, 2015)

Vietnam/Other ASEAN Countries

Vietnam is a fast growing, young demographic country with lots of coast to patrol in a South Asian sea that is increasingly contentious. In fact, Vietnam has a 2000-mile coastline to defend with 50% of its population living along the coast. Vietnam last year spent $4.4 billion or 8% of its budget on defense spending, up from $1 billion a decade ago. Vietnam is using the increased defense spending to modernize its military and beef up its coastal defenses.

Traditionally, Vietnam has bought its defense products from Russia. But with the U.S. "pivot" to Asia, that could change. However, there are reports that Vietnam will need financing help to make additional military purchases. Vietnam is also interested in some of the production being conducted in their country. Such production partnerships in Vietnam could also lead to sales to other ASEAN countries who face similar challenges in an evolving Asian security landscape

United Kingdom

The UK is a leading economic and trading center of the world and the third largest economy in Europe. It has traditionally been an entry point into European markets. However, the recent Brexit vote has created large uncertainty as for the UK's economy and its role in European markets.

The UK has a long maritime history with centers in London, Liverpool and other parts of the country. The main sectors are ports, shipping and maritime services. According to Maritime UK, the nationwide shipbuilding sector supported—including direct and secondary impacts—229,100 jobs (of which 130,900 were UK-based), a £7.7 billion gross value added contribution to UK GDP, and £2.0 billion in tax receipts. The maritime business services sector supported 48,600 jobs, a £3.5 billion gross value added contribution to UK GDP and £1.0 billion in tax revenues.

Major shipyards have closed in recent years, including one in Portsmouth in 2013. The UK increasingly purchases ships from foreign shipbuilding companies, including navy ships.

Maritime UK also notes that marine systems and equipment form a major element of the UK's exports. "While the naval equipment sector is important, the global merchant shipping industry provides a massive potential market for commercial systems and equipment."

The leisure marine sector is comprised mostly of SMEs - the nine largest companies represent only 25% of the market. The leisure sector ranges from surveyors and charterers to specialist equipment.

Canada

Canada is the 11th largest economy in the world and Washington's proximity to Canada makes it the state's largest trading partner in a number of categories. It is a market with few barriers and a high degree of transparency. There are many support firms in Washington with expertise in doing business in Canada and a robust, active Canadian Consulate is located in Seattle.

Canada has a maritime industry known for shipbuilding and for a variety of subsectors in the industrial marine industry. In shipbuilding, Canadian companies manufacturer patrol, rescue craft, tugboats, fishing boats and yachts. The largest number of shipbuilding companies in Canada are located in British Columbia with 101 companies (Government of Canada, 2016). The United States is the largest export market for Canadian shipbuilding companies.

Taiwan

Taiwan is the 5th largest economy in Asia with a strong export industry and close economic ties with China and other parts of Asia. GDP per capita of nearly $40,000 is the 28th highest in the world.

Taiwan has continued political tensions with China and because of this has a robust national defense. Taiwan has announced plans to modernize its Navy and increase defense spending.

Middle Eastern Countries

Market Overview

The Middle East is a diverse market composed of mature economies and developing states. Beset by foreign influence in the Cold War and domestic terrorism in recent decades, the region is not without its share of challenges, many made worse by the presence of rich oil fields. The Saudi Arabian economy is primarily driven by oil production: the nation sits on roughly 16% of the world's proven oil reserves and oil accounts for approximately 42% of the country's GDP. Turkey is the region's second-largest economy with $1.6 billion in GDP in 2015.

Exhibit A-7. Purchasing Power Parity GDP of Middle Eastern Countries, 2015, Billions

Country	2015 GDP
Saudi Arabia	$1,681
Turkey	$1,576
Egypt	$996
United Arab Emirates	$642
Iraq	$531
Iran	$397
Israel	$281
Qatar	$192
Oman	$171
Kuwait	$123
Yemen	$76
Syria	$56
Lebanon	$54
Jordan	$38
Bahrain	$31
Cyprus	$28

Source: CIA World Factbook, 2016.

India

Market Overview

India is the second largest nation in the world with 1.3 billion people. In 2015, its GDP totaled $2.2 trillion, representing 7.3% growth from 2014. The country is driven by a large agriculture sector (16.1% contribution to GDP), industrial sector (29.5% contribution to GDP), and a growing services sector (54.4% contribution to GDP). (CIA, 2016; World Bank, 2016)

Brazil

Market Overview

Brazil, the largest and most populous country in South America, has grown to be a regional leader. In the early 2000s, the country drew from its significant natural resources and domestic labor pool to drive economic growth. Economic growth in the early 2000s has foundered in recent years: national GDP dropped from $3.26 trillion in 2014 to $3.17 trillion in 2015, a decrease of 3%. At the same time, the country is beset by domestic political scandals resulting in large public demonstrations. (CIA, 2016; TIME, 2015)

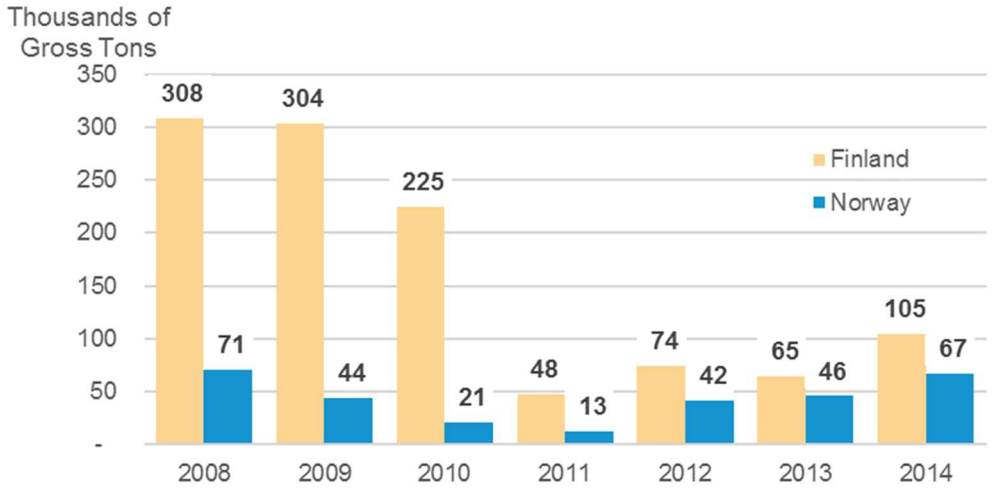
Scandinavian Countries

Market Overview

Finland, Sweden, Denmark, and Norway share distinct but mutually-intelligible languages, cultures, and geographic features. Two of these countries in particular, Finland and Norway, present export opportunities for Washington's maritime defense contractors. Finland had a GDP of $225 billion and a population of 5.5 million in 2015. Norway's population totaled 5.2 million in 2015, and the country's GDP was $356.2 billion.

Together, Norway and Finland produced ships that weighed a total of 172,000 tons in 2014, roughly 0.1% of global production. Since 2008, Finland's production has dropped significantly. In 2010, Finland's Minister of Economic Affairs, Mauri Pekkarinen, pointed to the nearly 90% drop in the number of shipbuilding orders from 2009 to 2010 as the primary cause of the industry's contraction. (**Exhibit A-8**)

Exhibit A-8. Total Tonnage of Large Ships Produced in Finland and Norway, 2008-2014



Source: HIS, 2014.
Note: Includes only ships that weigh 100 gross tons or more.

Germany

Germany is Europe's largest economy and second most populous nation (after Russia), making it an important element in the region's economic landscape. In 2015, the country was home to 80.9 million people and was the fifth largest economy globally. Its 2015 GDP was $3.8 trillion. (CIA, 2016)