Sea Smart: How Leadership Companies are Shaping the Future of the Ocean through "Corporate Ocean Responsibility"

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1. Introduction

The 2011 World Ocean Forum theme of "Emerging Smart Ocean Industry" highlights the need and opportunity for developing and implementing intelligent solutions to the challenges of expanded ocean use in the growing Blue Economy. Smart approaches and systems are being increasingly developed to support the sustainability, safety, security, productivity, and profitability of private sector use of ocean space and resources.

Smart companies are leading the move towards "Corporate Ocean Responsibility" in addressing the challenges of the diverse and growing ocean use. This evolutional and revolution in how the private sector engages on the oceans is a result of the emerging critical issues that create risk to continued access to ocean space and resources. Much of the attention is on smart technology in the form of information, communications, sensors, data management and the like. However, much broader, more fundamental changes are evident in how the private sector is addressing its responsibilities for ocean sustainability and stewardship.

Leadership companies are proactively tackling the future of ocean use through smart innovations in corporate policy, logistics and supply chain, operational practices, vessel design and construction, science, and many other areas. This is taking place across the diverse range of industries that make up the ocean business community, including: shipping, oil and gas, seafood, aquaculture, tourism, renewable energy, science, and, of course, technology. The government has an important role in creating public-private partnerships to spur industry innovation and leadership. One of the most important sea smart trends is the international, cross-sectoral leadership that is progressing among a diverse range of smart ocean companies. The trend towards collaboration and Corporate Ocean Responsibility is shaping the future of smart and sustainable seas in a growing Blue Economy.

Although the ocean covers over 70% of the earth's surface, it is an increasing crowded place. Ocean industries such as shipping, oil, fisheries, aquaculture, and tourism are big and have been expanding rapidly. Underlying the growing level and variety of industry activities is an ocean in trouble. Oceans provide 59% of the world's ecosystem benefits; nearshore marine areas alone (5% of the Earth's surface) provide 38% of these global benefits. Unfortunately, the global marine environment, its unique biodiversity and its life-sustaining resources are being degraded, destroyed and overexploited at an ever increasing rate and at a global scale.

Smart companies are realizing that they need to understand and proactively address their role in their impacts in order to maintain their social license and access to ocean space and resources. Innovative technology development by many leading companies is resulting in practical solutions to the important challenges facing the continued use of marine space and resources in a responsible, sustainable manner. Smart, innovative approaches and technologies are being developed by the leadership companies among the various ocean industries – and in ways that link the diverse ocean business community in collaborative efforts that catalyze coordinated “Corporate Ocean Responsibility”.

2. Technology Innovation to Address Sectoral Ocean Sustainability Challenges

2.1. Fisheries: Technology for Tackling Illegal Marine Capture Fisheries

Human consumption of seafood grew from 20 - 85 million tons during 1960 – 2002, at the same time that the UN Food and Agriculture Organization (FAO) estimated that 70% of fish stocks have become fully- or overexploited. Marine fisheries production has leveled off at about 80 million tonnes per year since 1995. However, this belies the continued dynamic nature of the sector. As inshore fisheries have become depleted over the decades, marine capture fishing effort is intensifying, spreading further offshore and going deeper to find those fish that are available. While considerable progress is being made on ensuring the sustainability of more and more fishing stocks, the seafood sector continues to have a major problem with illegal, unreported and unregulated (IUU) fisheries.

IUU fishery harvest is estimated to be worth between USD 4 billion and USD 9 billion a year, with USD 1.25 billion of this from the high seas and the remainder is taken from the exclusive economic zones (EEZs) of coastal states. Losses from the waters of Sub-Saharan Africa are thought to be USD 1 billion a year – roughly equivalent to a quarter of Africa’s total annual fisheries exports. IUU fishing thrives in areas of weak governance. It puts unsustainable pressure on fish stocks, marine wildlife and habitats, subverts labor standards and distorts markets. IUU fishing is resistant attempts to control it due to economic incentives (demand, overcapacity and weak governance) and by the lack of global political resolve to tackle its root causes.

Significant advances in information technology are now being brought to bear on exposing, deterring and enforcing IUU fishing. The rapid development of satellite-based tracking systems, or vessel monitoring systems (VMS) since the mid-1980s has had a major impact on the way in which fisheries are managed. Technology has become more affordable and the availability of satellite communications systems has created a competitive market for tracking vessels. The public availability of the Global Positioning System (GPS) added a new dimension to positioning accuracy. Most major fishing nations are already advanced in the use of VMS.

Reliable and accurate VMS provides fisheries authorities with accurate near real-time information on the positions of all licensed fishing vessels and can significantly improve the efficiency of compliance activities. Continued improvements in the role of remote vessel monitoring systems in tackling IUU fishing and include the development of internationally accepted codes of practice for its correct application, with particular concern for security, reliability and data sharing.

There are several additional new technologies with the high potential useful capability to detect IUU fishing on the high seas. Satellite imagery is used to provide high resolution images of selected areas for surveillance, but since satellites are in pre-programmed orbit, real-time imagery is difficult to obtain and forward planning is required. Synthetic aperture radar (SAR) can provide all-weather imaging capability, but also requires advance planning to coincide with satellite passes. Nevertheless, the technology provides strong capability for identifying vessels in all weather conditions at a reasonable cost. Over the horizon radar (OTHR) is already in widespread use for surveillance and can provide long range detection capability at ranges of up to 2 500 nautical miles. When costs come down, these could be used in fisheries for real-time information which can readily be used to vector a patrol boat onto a target.

2.2. Aquaculture: Technology for Minimizing Impacts and Moving Offshore

It is estimated that 30 metric tons per year of extra aquatic products will be required to feed the planet by 2050. Aquaculture has been the fastest growing food production system of any kind (terrestrial or marine), with 7.5% growth per year over past twenty years. Farming of fish and other seafood in the sea and in ponds produced nearly 52 million tons in 2006 and now accounts for about 50% of seafood production and continue to grow. Aquaculture provides major opportunities, but also has considerable challenges in relation to product quality and safety and regarding environmental sustainability.

Unfortunately, there can be serious environmental challenges associated with the growing fish in floating pens and cages marine waters. Mariculture impacts can include: the accumulation of fish wastes and unused feed on the seafloor, especially in shallow protected waters without sufficient water movement; the use of large amounts of fish meal to feed fish in captivity; the escape of alien species that can wreak havoc on other species or the habitat and create genetic pollution in related species.

The aquaculture industry is meeting these challenges through technological innovation. In view of the need to move mariculture more off-shore, technology is advancing on open sea-cage farming, equipment and materials, knowledge of fish behavior, use of submersible lights to adjust photoperiod to control cycles of growth and maturation, and integration with seaweed and mollusk farming. New cages are being developed that are free floating and semi-submerged in order to keep the animals in deeper water with good water quality and circulation. Companies are using satellite information and oceanographic modeling to map and track water movement, and have begun experimenting with cages can move with the currents and eddies and be submerged when rough weather is approaching.

As aquaculture feeds often make up 50 percent and more of the production cost, it is clear that research in this field will remain a priority. Food science technology is allowing more and more of aquaculture feed to be developed from soybean products, moving toward reducing the inputs from other capture fisheries into fish feed to only those minimum essential elements needed for carnivorous fish being raised, e.g. salmon. Materials science and technology are working on net and cage construction that minimizes the potential for net failure and escapes, while at the same time reducing biofouling and maintenance.

2.3. Offshore Oil and Gas: Technology for Addressing Sound Impacts on Marine Life

The exploration and production of oil and gas from the seafloor continues to provide a growing portion of the world's fossil fuel. Offshore oil and gas is increasingly pushing into deeper waters, with deepwater (2,000 feet, 610 meters, or more of water depth) production capacity more than tripling since 2000 – rising from 1.5 mission barrels per day (mbd) in 2000 to more than 5 mbd in 2009. If deepwater production was viewed as its own country, it would be the fourth largest producer in the world – with only less production than Saudi Arabia, Russia and the United States. The volume of new oil reserves coming from deep water has been rising since the 1990s, and has become particularly important in recent years. From 2006 to 2009, annual world deepwater discoveries accounted for about half of all oil and gas discoveries worldwide – offshore and onshore.

Seismic surveys are used extensively by the oil and gas industry and scientists to study the geology of the sea floor and the Earth's crust. Sound is typically produced by arrays of 12-48 airguns, which vent pressurized air into the water as they are towed by survey vessels. The sound travels down through the water column, penetrates the sea floor and rebounds to the surface where it is analyzed. The sounds generated by these surveys can peak momentarily at fairly high levels at source. There are concerns about the effects of the sound from seismic survey airguns on marine mammals and other marine life. Worldwide the oil and gas industry operate 90 seismic survey ships of which about a quarter are usually in use. As demand for energy continues to increase, the impact of the sound generated by seismic exploration by oil and gas industries will continue to be a major challenge.

The industry realized it needed better, up to date information on the effects of sound on marine life to more accurately conduct the risk assessments. Since 2005, a group of major oil and gas companies have engaged in a joint study of the potential impacts of sounds generated by offshore hydrocarbon exploration and production on marine life. The Joint industry Project (JIP) identified key areas for research in specific, operationally focused questions that relate to the effects of sound generated by the offshore industry on marine life and a research program that will test scientific hypotheses and produce data needed to address these questions. The JIP mission is to provide a more comprehensive understanding of the potential environmental risks from oil and gas operations and determine the basis for mitigation measures that are protective of marine life, cost effective and credible with outside stakeholders.

Research on the sound and marine life issues has been carried out in five key areas: source characterization, physical and physiological effects and hearing, behavioral effects and biological significance, mitigation and monitoring; and technological development. Initial analysis indicated that considerable progress could be made by investment in the development of animal-borne instruments as there is a critical need to measure the received levels of noise and the response of individual animals to these levels. This requires the adaptation of tags and sensors, including for: depth (pressure), temperature, location, speed, orientation, acceleration, light level, sound (up to 100 kHz), salinity, and water chlorophyll. Data telemetry is an essential component of this approach and involves the use of some form of radio telemetry to transfer data. Archival instruments, because of their greater simplicity, are manufactured by a broad range of suppliers but are also used in situations where very large data volumes are collected, especially for sound recording. Localization methods have recently been enhanced by the capacity to collect and transmit position data from animals that surface only briefly, which can provide high-resolution tracks of individuals.

2.4. Shipping: Technology for Ballast Water Treatment to Reduce Invasive Species

Seaborne shipping accounts for 90% of global trade, and worldwide cargo will continue to rise, notwithstanding current economic difficulties. Containerized liner shipping has been the fastest growing sector of the maritime transport especially during the last two decades. With annual growth rates of over 10%, container traffic is today estimated to account for more than 70% of international seaborne trade by cargo value. The growth of maritime transport is strongly correlated with the growth of international trade and container traffic is estimated to account for more than 70% of international seaborne trade by cargo value. Shipping poses threats to the marine environment from routine discharges of oily bilge and ballast water from marine shipping; dumping of non-biodegradable solid waste into the ocean; accidental spills of oil, toxics or other cargo or fuel at ports and while underway; air emissions from the vessels' power supplies; port and inland channel construction and management; and ecological harm due to the introduction of exotic species transported by vessels.

The introduction of invasive marine species by ships' ballast water, by organisms attached to ships' hulls and via other vectors has been identified as an important threat to marine biodiversity. Ballast water contains a variety of organisms including bacteria and viruses and the adult and larval stages of the many marine and coastal plants and animals. These non-native species, if they become established, can result in serious ecological, economic and public health impacts.

Ballast water treatment methods include: mechanical filtration and separation, physical treatment methods such as sterilization by ozone, ultra-violet light, electric currents and heat treatment; chemical treatment methods such adding biocides to ballast water to kill organisms. All of these currently require significant further research effort. Major barriers still exist in scaling these various technologies up to deal effectively with the huge quantities of ballast water carried by large ships (e.g. about 60,000 tonnes of ballast water on a 200,000 DWT bulk carrier). To be practical, treatment options must not interfere unduly with the safe and economical operation of the ship and must consider ship design limitations.

Requirements for ballast water treatment have arisen from regulation and a number of technologies have been developed and commercialized. The implementation of technologies used for treating ballast water is constrained by key factors such as space, cost and efficacy. The number of ballast water treatment technology systems has significantly increased in recent years. The systems that have obtained type approval demonstrate that a wide range of technologies, with or without the use of active substances, are suitable for the treatment of ballast water to the standards required, with over one hundred such systems installed worldwide.

2.5. Cruise Ship Tourism: Technology for Waste Water Discharges and Maintaining Water Quality

The cruise industry is one of the world's fastest growing tourism sectors, with cruise ships operating in every ocean worldwide. The number of cruise ship passengers has been growing nearly twice as fast as any other travel sector. In 2008, more than 13 million people took a cruise vacation. In recent decades the average ship size has been increasing at the rate of roughly 90 feet every five years. Most cruise ships carry on average between 3,000 and 7,000 people including the crew. The newest generation of ships carries more than 8000 passengers.

As the cruise industry continues to expand, there is increasing concern about the impacts cruise ships may have on the marine environment – concerns that the industry works to address through developing the policies, practices and technologies needed to address these issues. Cruise ships produce seven main waste streams: plastics, food, gray water, hazardous substances, non-plastic trash, oil and sewage. A moderately sized ship on a week's voyage can generate more than 200,000 gallons of human sewage, a million gallons of gray water, 25,000 gallons of oily bilge water, more than 100 gallons of hazardous waste, and eight tons of solid waste, including ground up food waste.

Cruise lines have made the treatment of wastewater one of their highest priorities. Significant efforts have been focused on developing the technology for Advanced Wastewater Treatment systems (AWTs). Wastewater goes through physiological, biological and chemical treatments for purification, then passes through an ultrafiltration system, where clean water comes out. The water is then chemically treated or treated with ultraviolet light before it is pumped back into the ocean

AWT system development has required considerable investment in technology that delivers improved screening, biological treatment, solids separation (using filtration or flotation), and disinfection (using ultraviolet light) as compared to traditional systems. Membrane bioreactor systems use aerobic biological treatment followed by ultrafiltration, sometimes followed by dissolved air flotation, with ultraviolet (UV) disinfection to reduce pathogens. Some systems treats high concentration and low concentration waste streams with different processes. AWTs are very effective in removing pathogens, oxygen demanding substances, suspended solids, oil and grease, and particulate metals. AWTs remove some of the dissolved metals and most volatile and semi-volatile organics are removed to levels below detection limits, while others show moderate removal. AWTs achieve moderate nutrient removals, likely resulting from nutrient uptake by the microorganisms in the bioreactors.

Many cruise ships, including all of those traveling to Alaska, have installed AWTs to treat sewage and often graywater at a cost of USD 1 -10 million per vessel. As of 2007, it was estimated that about 40% of the 130 ships in the main industry association (which make up two-thirds of the world fleet) had installed AWTs, with 10 to 15 more systems being added each year. Through the development of advanced wastewater management technology, the cruise line industry has made tremendous advances in protecting the marine environment, with the research and development of improved technology continuing.

3. Smart Companies and the Challenge of Sustainability in an Interconnected Marine World

3.1. Smart Industry Leadership and Collaboration in Sustainable Ocean Use

Sustainable use of the dynamic, interconnected global ocean "commons" - for which everyone, and no one, is completely responsible - presents unique opportunities and challenges for ocean industries to be "sea smart". As the health of the marine environment health declines, ocean industries are often held responsible for their impacts to the ocean by the public, governments, non-government organizations (NGOs), and inter-governmental organizations (IGOs). Advocacy groups are confronting ocean industries on a sector, incident, or local basis (e.g. oil spills, deep sea trawling, port expansion). Moreover, ocean environmental concerns are increasingly being pursed through globally coordinated campaigns (e.g. ocean zoning, marine protected areas (MPAs), ocean noise, marine debris, greenhouse gas emissions). Unfortunately there is often not a corresponding coordination of effort by the sectorally fragmented ocean business community to engage these cross-cutting issues.

Ocean stakeholders are pushing for increased regulation in a variety of international venues where international ocean rules are established. Some of the most important ocean governance developments are being pursued through the non sector-specific international policy processes that include oceans, e.g. the Convention on Biological Diversity (CBD) and the UN Convention on the Law of the Sea (UNCLOS), etc. Smart, coordinated industry participation in these processes is lacking, as is balanced, comprehensive information regarding industry efforts to address marine environmental issues. Marine industries are often portrayed only as the cause of ocean problems, and are unable to create any other perception if they are not "at the table" and constructively engaged in ocean developments.

Ocean governance regimes and policies are emerging from processes in which industry is not well engaged and in which other stakeholders have sophisticated, well organized agendas and involvement. As a result, private sector access to ocean resources, services and space - even by companies with the best environmental record - is increasingly at risk from the loss of the social license to operate in the seas and from the ocean governance regimes and policies that are emerging from processes in which industry is not well engaged. There have been efforts by responsible companies to differentiate themselves from poor performers and try to do business in a more environmentally sustainable way. However, the efforts of one company or even a whole sector are not enough to address collective global impacts by a diverse range of industries in a shared global ecosystem.

With the private sector as the primary ocean user, it is well placed to develop and deliver solutions in response to society's demands that marine ecosystem use is sustainable and industry impacts are minimized. The ocean business community can develop this leadership and deliver ocean sustainability solutions that work for business, rather than being forced to react to conditions advanced by other stakeholders. A cross-sectoral ocean business community of leadership and collaboration is needed among those who want to address marine environmental issues, differentiate themselves from poor performers, collaborate with like-minded companies within and across sectors, and engage ocean stakeholders and policy processes. Given the size and scope of ocean industries, visionary companies and executives have a particular opportunity to provide leadership in collaborative, industry-driven ocean sustainability.

3.2. Corporate Ocean Responsibility and the Future of the Ocean

Ocean sustainability issues are increasingly affecting the future of ocean health. Smart industry leadership on sustainability issues is not only important to the future of the industry operations, but also to the future of the ocean. Industry leadership in "Corporate Ocean Responsibility" is essential to navigating this critical juncture and ensuring the long term health of both the ocean and responsible industry use of marine space and resources. Responsible industry performers are well positioned to develop and drive business-oriented solutions to marine environmental challenges and collaborate with other ocean industries and stakeholders in ensuring the health and continued economic use of the seas.

Many of the policy, practical and reputational aspects of ocean industry activities are now affected, if not dominated, by environmental concerns. These issues are affecting all industries that use ocean space and resources, e.g. oil and gas, shipping, fisheries, aquaculture, ports, tourism, ocean renewable energy, seabed mining, dredging, etc. This is creating important needs and opportunities for collaboration, synergies, and business benefits among the ocean business community. Unfortunately ocean industries are not engaging in a coordinated systematic approach to many of the developments affecting their ability to do business in the ocean, missing opportunities for collaboration and economies of scale in developing solutions.

As the principle users of the marine environment and with the marine environment subject to increasing commercial use, ocean industries have the most to gain by developing and delivering solutions to sustainability - and the most to lose by continuing to be perceived only as the cause of ocean problems.

To address these ocean sustainability issues and opportunities critical to business, the World Ocean Council (WOC) was established to create an unprecedented global, cross-sectoral industry alliance. The WOC is catalyzing proactive, collaborative efforts towards "Corporate Ocean Responsibility" by bringing together the diverse mix of ocean industry sectors. Cross-sectoral leadership and collaboration will result in significant business value for the operators committing to the vision of a healthy and productive ocean that supports sustainable use by the responsible ocean business community.

The UN Secretary-General's 2010 report on oceans and the law of the sea noted there is a need to "create awareness and understanding among industry of the ecosystem approach, marine biodiversity and marine spatial planning; develop regional ocean business councils; and strengthen efforts to create a global cross-sectoral industry alliance to constructively engage in United Nations and other international processes relevant to oceans, through organizations such as the World Ocean Council."

4. Smart Seas: Industry Leadership to Better Understand, Monitor and Manage the Ocean

4.1. The Industry Need for Ocean Knowledge

The need for improved understanding of the physical, biogeochemical and ecosystem properties of the ocean, marine meteorology and ocean-atmosphere interactions has never been greater. The drivers for this include the need to: better understand and model the ocean's role in climate change; document how the marine environment is responding to climate change, e.g. increased storm frequency and intensity, ocean acidification; address the impacts on marine ecosystems, biodiversity and resources of the increased use of marine space and resources by a growing number and kind of commercial activities; ensure ocean ecosystems maintain their optimal capacity to sequester "blue carbon".

Shipping and other ocean industries are exposed to increased risk and uncertainty from changes in ocean conditions and climate and the limits to our ability to accurately model and predict these changes. The lack of data for much of the ocean, especially in the high seas and the open ocean atmosphere, contributes to this risk, especially as the effects of climate change become more evident.

Data is lacking due to the limits to ocean science programs and their resources available to collect information at the scale, frequency and intensity required to significantly improve ocean understanding. There are only a limited number of oceanographic vessels, which are expensive to operate and can only ensure partial coverage of the 70% of the earth that is ocean. Observations from scientific vessels have been augmented in recent years by an array of moored, mobile and temporary data gathering instruments. Oceanic and atmospheric data feed into an increasingly well-organized network of national and international ocean/atmosphere science programs. However, the extent of the unknowns, growing ocean use and impacts, and changes to global climate far outweigh the ability of current observations to adequately understand, predict and protect the future of the ocean.

Expanding the scope and scale of ocean and atmosphere observations is essential to improved understanding, modeling and predicting of the ocean and climate. This will in turn reduce risks to ocean industries posed by changing conditions. Government and scientific institutions and budgets will not be expanding in the near term to fill this need. The presence of growing numbers of ships and platforms in the marine environment present a unique opportunity to cost effectively scale up data collection and a compelling case for ocean industries to expand their involvement in ocean observations.

4.2. The Opportunity for Engaging Smart Industry Ships and Platforms in Data Collection

Ocean industries are active in much of the global ocean with fixed and mobile assets that create an enormous potential to respond to the need for more ocean observations. There are currently more than 50,000 merchant vessels (cargo, tanker, bulker, cruise) and 8,000 offshore oil and gas rigs, as well as ferries, fishing vessels, a growing number of offshore wind and wave energy platforms and aquaculture facilities, one million kilometers of submarine cable and upcoming seabed mining and carbon sequestration operations.

The opportunity to use commercial vessels and platforms to collect oceanic and atmospheric data has been developed in a limited manner to date. These include: the Ship of Opportunity Program (SOOP) (oceanic data collection from merchant ships), the Voluntary Observer Ships (VOS) (atmospheric data collection from merchant ships), and the Ferry Box program (ocean data collected by ferries in Europe). There have also been several projects by individual shipping lines and oil companies to collect data from vessels or platforms in partnership with specific government or scientific institutions.

These important efforts to use ships and platforms of opportunity have generated valuable data. They have also accumulated critical experience in understanding what it takes to engage companies in ocean observations, develop the working relationships between commercial and scientific entities, install and maintain instruments, train seafarers, and, ultimately, collect and report data. Vessel and platform operators have been receptive to having ocean and atmosphere observing instrumentation on board. They see this as providing a service that provides feedback for their own benefit and only require that the equipment makes no demands on costs, insurance, time, people or operations.

Unfortunately, there are limitations to these programs. There have been significant difficulties in creating sustained, long term observations, e.g. due to companies being bought and sold, ships getting reassigned to different routes, lack of understanding and support at senior corporate levels for participation in voluntary observation programs, etc. Where there have been specific, one-off data collection partnerships between companies and scientific institutions, these sometimes miss the opportunity to ensure the information can contribute to globally standardized data systems and analysis. On a broader scale, the programs to date have mainly focused only on merchant ships, and on oil platforms to a limited extent, but have not included other kinds of observation platforms, such as fishing vessels, offshore wind farms, aquaculture facilities, etc.

The scientists involved in international ocean observation programs recently concluded that: "Limited progress has been made towards designing an integrated and global ocean observing system that would meet the needs of physical oceanographers, bio-geochemists and climate scientists and the policy makers charged with responding to the challenges of global change; biologists and ecologists and the natural resource and biodiversity managers charged with responding to degradation of habitats and ecosystem services; and maritime industries."

There is tremendous potential for ocean industry leadership in advancing the regular, sustained collection of standardized oceanographic and atmospheric data for input to scientific programs. However, effective use of industry ships and platforms requires a coordinated approach.

4.3. Smart Seas: The Global Program for Coordinating Industry Observations of Ocean and Climate

A structure and process is needed to facilitate and coordinate the collaboration between the scientific community and ocean companies in expanding the level of data collection from ships and platforms of opportunity over the long term. With the advent of the WOC - the international, cross-sectoral industry leadership alliance on ocean sustainability - there is now an organization that is uniquely positioned to catalyze the role of business in addressing a range of priority ocean needs and opportunities. One of these priorities is developing a system to coordinate interaction with the scientific community to collaborate in expanding and improving data collection by ocean industries.

A large-scale integrated multi-industry effort to advance the role of ships and platforms in collecting data must employ standardized procedures, technologies and instrumentation. Collaboration will facilitate the development of sensors and instrumentation appropriate for harsh marine conditions and rigors of routine operation on commercial vessels and platforms, and also ensure easy installation, removal and servicing. Overall, the program can create synergies and economies of scale in developing the technology, operational practices and institutional arrangements, both within key sectors, such as shipping and offshore oil and gas, and across the wider range of ocean industries.

Within the framework of broad scale needs and opportunities for improved data collection by industry it will be very important to develop a phased approach. This will enable leadership companies to focus on specific, implementable activities that deliver short term outputs, e.g. demonstrating the ability to form the partnership for one ship to install and operate with instrumentation collecting and reporting basic oceanographic data and then scaling this up to more kinds of data and/or more vessels.

It is critical to learn from and build on the existing ships of opportunity programs and to work with and through existing national and international organizations that collect, transmit, store and analyze oceanographic and atmospheric information. In particular, WOC will coordinate with the relevant programs at the World Metrological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of Unesco, especially the Global Ocean Observing System (GOOS). The Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) - Ship Observations Team (SOT) provides an encompassing international science coordination structure for the vessels of opportunity programs and there is a good working relationship between the JCOMM and WOC.

4.4. The Benefits and Value for Industry, Science, Governments and the Ocean

Improved and expanded information will contribute to improved modeling of weather, ocean conditions and climate change and will support responsible use of ocean space and resources – all with clear benefits for science, governments, society, and business.

The business value of the program include: improved information for ocean condition observations, nowcasts, forecasts and hindcasts; improved predictability of, and reduced risk from, extreme events that impact ships and platforms; improved weather information and resulting savings from ship routing, fuel efficiencies, etc.; reputational benefits from contributing to “ocean positive” efforts to document and monitor the marine environment; opportunities for educational and promotional outreach to stakeholders and the public; increased leverage and opportunities to shape ocean science and policy; participation in the development of emerging new observational technologies; increased data on the physical and biological environment in which commercial activities are taking place; standardized data on environmental conditions and impacts, e.g. air and water emissions; data-driven input to corporate policies and practices; an increased and improved science basis for interaction with stakeholders on marine environmental issues.

The Smart Seas program benefits to science and governments (including navies) include: the ability to collect oceanic and atmospheric data on a significantly expanded spatial and temporal scale; the collection of data over longer time series and/or along repeated routes; the observation of ocean and atmosphere conditions in ways and places impossible to get by other means; the opportunity to fills major gaps in data and understanding; a highly cost effective means of data collection; increasing the global scope, scale and perspective of ocean data and understanding; improving and expanding the partnership and common ground between science, government and industry.

A comprehensive system of oceanic and atmospheric observations and monitoring will also provide input to international conventions and treaties, including: United Nations Convention on the Law of the Sea (UNCLOS); United Nations Framework Convention on Climate Change (UNFCCC); Convention on Biological Diversity (CBD); International Maritime Organization (IMO) Marine Pollution treaties (MARPOL).

4.5. Industry Leadership to Understanding of the Ocean through Smart Seas

The WOC is moving forward developing the Smart Seas international program as a bold new initiative for voluntary observations from private sector ships and platforms – with smart technology and smart companies.

The vision of the Smart Seas program is:
Leadership companies from a range of ocean industries are collaborating with the scientific community vin the systematic, regular, sustained and integrated collection and reporting of standardized ocean and atmospheric data for input to operational and scientific programs that improve the safety and sustainability of commercial activities at sea and contribute to maintaining and improving ocean health.

The goal of the Smart Seas program is:
To establish a platform/portal that facilitates and coordinates efficient, cost effective scientific and ocean observing community collaboration with shipping and other ocean industries in the collecting of ocean and atmospheric information.

Smart Seas will link the commitment of leadership ocean companies to improving ocean science and health with the scientific community (academic and government). The program will spur the development and use of smart technology and communications to collect and analyze ocean and atmospheric data for better understanding the ocean and climate and smarter use of the seas. The program provides an opportunity for key companies in the ocean business community to provide leadership in creating an "ocean positive" program to increase the data used to improve the safety and sustainability of commercial activities at sea and contribute to maintaining and improving ocean health. Discussions have been undertaken with a number of key national and international ocean and atmospheric observing programs, all of whom have shown strong interest in the proposed program. Leadership companies from a range of ocean industries have encouraged the WOC to develop this portal for coordinating and expanding industry involvement in data collection from vessels and platforms.

The WOC is providing the organizing capacity and secretariat to work with those companies ready to engage in this unprecedented leadership opportunity, and to develop the working relations with government agencies, intergovernmental organizations, academic institutions and other key partners. The WOC is bringing together industry, science and government representatives in December 2011 to develop a shared understanding of the need and opportunity for the Smart Seas program - and develop the roadmap and workplan for moving forward with this commitment to Smart Seas in support of the Blue Economy.