Sustainable Ocean Summit 2016

REPORT

“Ocean 2030: Sustainable Development Goals and the Ocean Business Community”

Rotterdam / 30 November – 2 December 2016
The Sustainable Ocean Summit 2016 took place from November 30 to December 2, in Rotterdam, Netherlands.

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Executive Summary

The World Ocean Council (WOC) Sustainable Ocean Summit (SOS) has become the premier forum for advancing industry leadership, ocean sustainable development, science and stewardship. Following the success of SOS in Singapore (2015), Washington D.C. (2013), Belfast (2010) and the continuing growth of the WOC, SOS 2016 was organized in Rotterdam, from November 30 to December 2, 2016.

The SOS 2016 theme “Ocean 2030: Sustainable Development Goals and the Ocean Business Community” has been addressed in a unique global business conference program. The SOS provided a timely, global platform for leadership companies and organizations to advance Corporate Ocean Responsibility and the implementation of ocean business community solutions to ocean sustainable development challenges.

Over three days, SOS 2016 attendees explored a range of cross-sectoral topics, strategies and solutions through workshops, plenary and parallel sessions. The working format helped identify clear, realistic pathways to successfully achieving shared objectives for sustainable ocean use.

SOS 2016 brought together a wide range of industries involved in the use of marine space and marine resources. The different sectors represented can be seen in the graph 1, below.

Graph 1. Sector representation of the SOS 2016 Participants

Attendees were primarily high-ranking executives and senior sustainability officers from the Ocean Business Community. Representatives of international organizations, government agencies, and academic research institutions were also in attendance. More than 230 participants represented 32 countries from all continents (in order of numbers, the representation ranking is Europe, America, Asia and Oceania, Africa).
SOS 2016: plenary highlights

The Sustainable Ocean Summit is the only international ocean business event to provide a global review of ocean economic activity for all the principle areas of ocean industrial activity - and to link this analysis to the 2030 Sustainable Development Goals (SDGs). The conference gathered ocean industry leaders and international experts covering the key ocean sustainable development topics affecting the future of responsible ocean business, with 5 emblematic flagship plenary sessions.

The Opening Plenary

This session featured key organizations Heads from the Ocean Business Community, including: Erik Solheim, Director, U.N. Environment Programme (UNEP), U.N. Under-Secretary-General; Vladimir Ryabinin, Executive Secretary, UNESCO Intergovernmental Oceanographic Commission (IOC); Joao Aguiar Machado, Director General, DG MARE, European Commission; Francis Valla, CEO, European Network of Maritime Clusters; as well as Cleopatra Doumbia-Henry, President of the World Maritime University.

Ocean Investment Platform

The SOS 2016 presented the opportunity to launch the Ocean Investment Platform, thereby developing mechanisms to finance ocean sustainable development projects. The participation of the insurance and financial sector to this common challenge, has been outlined as crucial. The Ocean Investment Platform set the goals of establishing an agenda as well as forming two to three partnerships between investors and solution providers in the next two years. A panel of senior investment professionals provided their perspectives on financing ocean sustainable development, the development of the Ocean Investment Platform and how the Platform can best identify, articulate and evaluate ocean industry opportunities for financing responsible ocean development.

Ocean Executive Forum

The Ocean Executive Forum is a plenary dialogue among the CEOs of 11 ocean industry sectors – a convening of ocean industry leaders unrivaled by any other business conference or ocean event. This extraordinary high-level, multi-industry panel considered the challenges and opportunities for the private sector to respond to the growing need to the responsible supply of energy, food, transport and information linked to the seas across the globe.

Ocean 2030 Plenary Sessions

These sessions featured authoritative presentations on the 15-year projections for 14 ocean business sectors – many delivered by the heads of global industry associations. The Ocean 2030 sessions considered the opportunities and risks that future ocean use creates within each sector; within the collective ocean business community; within the ocean economy overall, and for the ocean itself. The SOS 2016 linked this unprecedented collation of information on ocean economic activity to the WOC efforts to work with the ocean business community to develop SDG targets and indicators.
SOS 2016: outcomes and discussions

The main conclusions of the 24 different sessions (sessions’ details and precise discussions are included in the full SOS 2016 report), thanks to their rich array of speakers and analysts, were:

**Sustainable Development Goals**

The SOS 2016 introduced United Nations Sustainable Development Goals (SDGs) to a wide audience of key stakeholders from the ocean community. SDGs represent a unique opportunity to settle collaboration at all levels and place sustainability at the core of business practices, with regards to economic losses due to climate change effects on global ocean ecosystems. In that perspective, the SOS 2016 represented a unique opportunity for the Ocean Business Community to discuss and comment important challenges such as marine biodiversity, cross-sectoral collaboration and adaptation to climate change and extreme weather events.

The Ocean Business Community showed interest and support in tackling climate change challenges through cooperation and innovation.

**Data for Ocean Sustainability**

SOS Speakers agreed upon the necessity to collect and analyze more data. The biggest challenge in assessing the current state of the oceans is said to be the quantity of data necessary to have a good overview of the global ocean ecosystems’ situation. That is why all business sectors and, more largely, the ocean community, called for the development of accurate and rational data about the ocean. The growing demand could be fulfilled with a global effort for collaboration. Advanced data collection technology and infrastructure already exist, but it should be used through a global marine sensor network. Data could be provided to new technological tools, such as autonomous vessels, and important scientific data gaps could be filled.

**Legislation and Regulation**

Legislation can be a driver for innovation and should be considered as such when planning business. In that perspective, the SOS 2016 inputs on international regulation resulted in bringing key information to the business sector. The establishment of a legally binding instrument on Marine Biological Diversity Beyond National Jurisdiction (BBNJ) will affect industry operations in areas beyond national jurisdiction for the foreseeable future.

**Collaboration for Ocean Responsibility**

Cross-sector cooperation has been deemed as central by all SOS 2016 participants to foster sustainable oceans. Ocean industries have common interest and the potential for the exploration of synergies between sectors (e.g. offshore wind and fisheries/aquaculture) is tremendous. Maritime clusters, as unique examples of gathering of a sector, have been presented to inform the Ocean Business Community of the core principles to implement such a structure.
Energy for the Ocean

SOS 2016 discussions presented the latest trends as well as potential of the Oil & Gas business by focusing on the sustainable aspects of the sector. Some sessions also provided insight into opportunities to unlock and process raw materials such as mineral and associated practices (i.e. deep sea mining, etc.). The renewable energies issued from the ocean have been at the core of many passionate panel discussions, such as: offshore wind infrastructure and the associated risk for navigation, wind and tidal energy sources and battery technology.

Fishing and Aquaculture

The ocean food sector is a key stakeholder in the ocean business community. Fishing represents a crucial access to food for many developing countries and climate change could endanger food security. Various speakers exchanged opinions on Illegal Unreported and Unregulated Fishing (IUUF) and tailored programs to address IUUF have been presented. Aquaculture has also been at the core of many discussions, as a sustainable and growing alternative to fisheries which can help ensure food security in many countries.

Shipping

The potential to improve the efficiency of vessels has been discussed and industries agreed upon the necessity of collaboration to increase shipping vessels’ environmental efficiency. Speakers emphasized the need for “disruptive innovation” in the shipping industry, to increase the pace of change and anticipate regulations. Green certification is key to establish environmental indicators. Apart from this concrete need for business action in environmental efficiency of the shipping industry, the opportunity for smart shipping to disrupt the market appears as a central trend in the industry. Innovation and collaboration have been discussed within the context to change the structure of the market.

Marine Spatial Planning (MSP)

The MSP-sector faces similar challenges all over the world, most importantly, low stakeholder participation and poor communication between different ocean industry sectors. Noteworthy is that stakeholders struggling with these facets of MSP should use the unique platform offered by WOC to engage in productive cross-sectoral collaboration and communication.

Regional Business Council: Arctic

The Polar regions are changing rapidly. As a result, common practices changed and industry is in high demand to fill many data gaps. Collaborating with the science community will benefit industry operating in Polar regions, by improving models and greatly reducing operating risk. WOC has a unique opportunity to facilitate such challenging interactions, through its Smart Ocean-Smart Industries program.
Introduction

The World Ocean Council (WOC) held its fourth Sustainable Ocean Summit (SOS) in Rotterdam in November-December 2016. Over 200 participants gathered to discuss the role of the ocean business community in addressing critical marine environment and sustainability challenges.

SOS 2016 brought together a wide range of industries involved in the use of marine space and marine resources, including shipping, fishing, oil and gas, aquaculture, ports, mining, renewable energy, tourism, dredging, marine science and technology, maritime law, insurance, finance and others. Attendees were primarily high-ranking executives and senior environment and sustainability officers from the Ocean Business Community. Representatives of international organizations, government agencies, and academic research institutions were also in attendance.

The theme of SOS 2016 was “Ocean 2030: Sustainable Development Goals and the Ocean Business Community”. The conference sought to build on the highly successful discussions held at SOS 2010 in Belfast, SOS 2013 in Washington DC and SOS 2015 in Singapore.

Conference sessions reviewed the current state of knowledge of pivotal ocean sustainability issues, including ocean policy, regulation and governance, marine spatial planning, biofouling and invasive species, extreme weather events, fisheries and aquaculture, marine biodiversity, marine debris, and the future of the Arctic region. Leaders and innovators from different ocean sectors discussed these issues and how they relate to the future of the Blue Economy.

SOS 2016 aimed to advance the development and implementation of solutions to ensure sustainability of the marine environment. WOC guided the discussions in order to establish priorities, programs, and projects that will be integral to corporate ocean responsibility. SOS 2016 also fostered crucial information sharing and collaboration among the Ocean Business Community, without which it will be impossible to meet shared ocean environmental challenges and development goals.

The SOS is now an annual event recognized for successfully bringing private-public ocean stakeholders together for networking, stimulating debate, addressing important ocean-related issues and to offer a platform for the discussion and recording of practical solutions. This report aims to capture the essence of each session by reflecting on the main discussion points, listing a number of related questions and answers, and to offer some takeaways as outcomes. The report layout follows the same sequence as the official programme of SOS 2016 presented from November 30 to December 2 2016, in Rotterdam, Netherlands.
Plenary Sessions

1. Opening Plenary Session

Speakers
- Neil Baird, WOC Board of Directors, CEO, Baird Maritime (Chair)
- Wim van Sluis, Chairman, Stichting Nederland Maritiem Land (NML)
- Joao Aguiar Machado, Director General, DG MARE, European Commission
- Vladimir Ryabinin, Executive Secretary, UNESCO Intergovernmental Oceanographic Commission
- Erik Solheim, Director, U.N. Environment Programme (UNEP); U.N. Under-Secretary-General
- Cleopatra Doumbia-Henry, President, World Maritime University
- Francis Vallat, CEO, European Network of Maritime Clusters

Discussion
The goal of the WOC during SOS 2016 is to bring ocean stakeholders together to address the challenges of the ocean, sustainable development and to identify the work that needs to be done.

Paul Holthus (CEO, WOC) welcomed all and encouraged the business community to focus on achievable goals. He also thanked the members of the World Ocean Council.

Wim van Sluis welcomed all to Rotterdam. He sketched a scenario of what the impact of water would be in the Netherlands, should the dykes break. He stated that the story of the Netherlands is one of “we are living from the water, but fighting the water”. The port of Rotterdam is an industrial and commercial port made up of 5 large ports and connected to 1,014 other ports across the world. The NML is a cluster of 12 sectors made up by about 65,000 employees from 12,000 – 13,000 companies. The cluster provides 4% of the GDP of the Netherlands with exports of approximately 25 billion euro/year (2014 data). Apart from the network role, the cluster also focus on how to protect the land and rid the water from pollution.

Joao Aguiar Machado stated that the international community understands the importance of the ocean, pointing to the inclusion of a special ocean target (SDG 14) in the 2030 Agenda for Sustainable Development as evidence. The ocean business community must get fully involved and participate in the global SDG effort. Healthy oceans pay off and make economic sense. He focused on three main areas:
- Future challenges for the Blue Economy
- Importance of sustainable use of the oceans
- Key roles that the industry has to play

The Commission adopted an Agenda on November 22nd 2016 for the future of our ocean which includes 50 actions and covers 3 priority areas:
- Improve international ocean governance policy framework (e.g. biodiversity)
- Reduce human pressure on the oceans and create conditions for a sustainable Blue Economy
- Strengthen ocean research, knowledge and data

Vladimir Ryabinin claimed that the UNESCO Intergovernmental Oceanographic Commission is the only body in the UN which fully specializes in the ocean. Recent research done by the University College of London concluded that the reason government does not act on or react to science is because there needs to be a paradigm change, whereby other actors, not just scientists, demand government created policy based on scientific findings. The private sector is one of these actors. Another study showed that an investment of 5 billion dollars in research helped catalyze more than 300-billion of investment in the industry. There needs to be a platform created in which industry can help science and vice versa. The United Nations conference on SDG 14 in New York, scheduled for June 2017, was also highlighted.
Erik Solheim explained the environmental concerns in Mumbai, where in the absence of government or corporate involvement a group of volunteers decided to take action to rid the ocean of 1,000 tons of trash washed up on the beach from ocean currents. Efforts like this are powerful, but will do little to stop the increasing buildup of massive amounts of human waste in the oceans if we continue to pollute them. By 2050, it is forecasted that there will be more plastic in the ocean than fish. Mr. Solheim emphasized the need to improve waste management and recycling, as the temperature is increasing due to the radiation of detritus in the water. Chemical uses are also a huge problem. Another problem is that biodegradable plastics in the ocean often do not biodegrade because of physical parameters like temperature or microplastic bales in cosmetic products. “If we don’t want to destroy the biodiversity of the ocean, we have to do something and we have to do it now” Mr. Solheim concluded.

Cleopatra Doumbia-Henry said that ocean leaders must play an important role for society and the global economy. She invited all attendees to partner with the academic community to give ocean leaders the skills, entrepreneurial spirit and the knowledge to develop the ocean economy sustainably “Blue Economy is the knowledge economy” based on environmentally responsible behavior. The World Maritime University has produced 4,500 graduates in the last 34 years in the ocean industry. Ms. Doumbia-Henry highlighted the importance of gender equality and SDG 4, and concluded that “looking to the future, it is worth pointing out that education and training should not always be directed at filling existing jobs. Some forecast that many jobs, especially in the oceans, will be required for the future and they do not yet exist.”

Francis Vallat stated that the European Network of Maritime Clusters (ENMC) has aligned with the concept of the SDGs. They are very aware of the long-term challenges and the importance of heavy investments and the H2020 program. ENMC suggests the allocation of resources for biotechnology, deep sea mining and renewables without forgetting large industries like shipping. Sustainable development is the only solution. Mr Vallat claimed that either “blue and green growth will exist” or there will be not significant growth in Europe. It is possible to fight for the environment with an alliance between governance and good professionals.

Question & Answer
Paul Holthus and Vladimir Ryabinin signed The WOC and UNESCO Partnership Agreement, intended to promote ocean health and sustainable ocean industry practices.

Takeaways
• There is a need for data and the recognition of history, which is often ignored and leads us to try to reinvent the “ship’s wheel”. The ocean community must develop accurate and rational data about the ocean.
• Future ocean leaders should be educated about sustainability as they will play a crucial role in society.
• Industry (public and private sector) would like to engage in working together on partnerships to foster sustainable oceans.


Speakers
• Paul Holthus, CEO, World Ocean Council (Chair)
• Shipbuilding: Dave van der Heyde, CEO, Royal IHC
• Offshore Wind Energy: Paul de la Guérivière, CEO, IDEOL
• Ocean Energy: Bill Staby, CEO, Resolute Marine Energy
• Ocean Data/Technology: Graham Hine, Co-Founder; Senior Vice President, Liquid Robotics
• Submarine Cable: Raynard Leconte, CEO, Orange Marine
• Seabed Mining: Ivar Fossum, CEO, Nordic Mining
Discussion
Each panelist introduced him/herself and provided short introductory comments.

Dave van der Heyde explained that shipbuilders should make significant efforts to reduce the impact of ships on the environment. The environmental goals of shipbuilders should be to reduce greenhouse gas emissions as well as noise emissions. These challenges can be solved by innovation along the whole value chain. The industry, universities and governments need to work together. Pilot projects need to be facilitated, environmental goals should be set and uncertainties reduced. However, companies are the best positioned to innovate and find efficient solutions.

Paul de la Guérivière argued that floating offshore wind foundations can reduce cost significantly. The oceans are part of the solution to climate change and there is a need to harvest sustainable energy from the oceans. Cooperation between different industries is crucial (e.g. between offshore wind and offshore oil). Extended development of offshore wind energy might generate synergies with fisheries and aquaculture. Furthermore, if offshore wind energy opportunities are developed further offshore, conflicts with other industries might be reduced. Mr. de la Guérivière explained that offshore wind energy was originally driven by regulators. However, now it is more cost-effective than some of the conventional sources of energy (e.g. nuclear power).

Bill Staby described how Resolute Marine Energy (RME) is developing technologies that produce clean energy from ocean waves to power “off-grid” water desalination systems. One of its goals is to enhance the resiliencies of coastal communities. It is important that the technology we deploy in the ocean and rivers does not cause environmental damage – standards and certification protocols are needed.

Graham Hine explained how Liquid Robotics produces unmanned surface vehicles. These robots can carry sensors for long periods of time. Currently there are 400 robots in the oceans capable of using the energy of the ocean. In order to understand what happens below the ocean’s surface, a network in the ocean needs to be established (the “Digital Ocean”). Monitoring the ocean is of importance for climate science, marine biology, geology and physics and will enable us to better understand what is happening on our planet. As more autonomous data collecting devices are developed, the ocean will reveal more of its secrets.

Raynald Leconte described how Orange Marine operated six cargo ships laying submarine cables. Today 95% of international communications are done via submarine cables, and these cables do not harm the environment. In the future, the number of submarine cables will continue to increase, as will many activities in the shared resource of the ocean. The overlap of multiple sectors in the ocean must be carefully considered as most damages to submarine cables are caused by other users.

Ivar Fossum stated that Europe uses most of the world’s mineral production. However, only 3% of the minerals used in Europe are produced within Europe. It’s difficult to foresee a mineral free world, which is why Nordic Mining wants to find and map mineral resources in European waters. In Norway, there are no fiscal regulations for the extraction of minerals from the sea. Statistics systems are available for oil and gas extraction but not for minerals.

Alain Bernard explained the dredging industry’s efforts towards “green dredging”. Vessels are becoming more efficient and the number of LNG vessels is increasing in order to reduce negative environmental impacts. The ocean is full of clean opportunities and solutions need to be developed. For example, there is...
the need to clean parts of the ocean soil, but the financial framework for a sustainable and economic solution is still to be developed.

**Per Grieg** discussed how salmon aquaculture has developed tremendously as a sustainable activity. However, growth has stopped because of environmental challenges. Gried Seafoods takes part in a global environmental certification for aquaculture products (Aquaculture Stewardship Council). The company believes in transparency, and therefor publishes an annual sustainability report. However, Mr. Grieg recognizes the limits of ecosystems and confirmed the tendency for maritime activities to go further and further offshore.

**Allard Castelein** acclaimed the Port of Rotterdam as the gateway to Europe and pointed out that shipping is the most environmentally friendly way of transporting goods over long distances. Nevertheless, there is still a need to reduce the maritime industry’s negative environmental impacts, and there are many opportunities to do so. The Port of Rotterdam has been leading the way and hopes to share its experience with the world. Implementing greener solutions such as LNG facilities in harbors can help improve resource efficiency. Digitalization will further reduce inefficiencies (e.g. boats waiting in the harbor) and the Port of Rotterdam is piloting a project to optimize the value chain by cost saving and decreasing environmental impacts.

**Lori Kennedy** described Louisbourg Seafoods’ commitment to science linked to technology and data. Their main concerns are global warming, ocean temperature, salinity, and eliminating illegal fishing. Louisbourg Seafoods works closely with government actors, universities and the tourism industry.

**Jan Valkier** explained that while shipping is the best way to move goods, it is also the biggest polluting sector operating on the sea. In order to mitigate this challenge, many ship owners are currently promoting LNG as a way to reduce emissions. Shipping company Anthony Veder operates 13 vessels, among which 7 are running on LNG. Dredging and ferries are also switching to LNG, but there is still a long way to go for the shipping industry. Customers and end-consumers are increasingly asking for sustainable shipping solutions, so there is also a push from the demand side.

**Question & Answer (Special Panel Session)**

**Question 1:** How do you make your operation more transparent to the public?

**Answer by Lori Kennedy:**

*One of the requirements in the European Union is, that a catch certificate is attached to the fishery products. On that catch certificate, you find information about the vessel, fisherman, and catch area.*

**Answer by Allard Castelein:**

*We believe in transparency and report not only about the performance of our company, but about the performance of the whole area (3,000 companies; 250,000 employees). There is an annual reporting cycle and the reports include: inter alia - the ecological footprint, activities and targets.*

**Answer by Ivar Fossum:**

*Transparency is really key. We are establishing cross-stakeholder committees that are evaluating the environmental data.*

**Answer by Raynald Leconte:**

*If we lay a new cable, the customer gets a final report (incl. for example fuel consumption). However, we don’t give any precious geographic information (e.g. landing points) due to security reasons.*

**Question 2:** What are the challenges & opportunities in the cooperation with non-Western partners?

**Answer by Dave van der Heyde:**

*The best solution is to alliance with partners in the developing world. We should not establish buyer – seller relationships, but instead we need to team up with local companies. They know all the details of their*
situation and we can customize to their needs. While answering their needs, we can influence them to take into account – to some extent - environmental issues and help them upgrading the solution.

Answer by Graham Hine:  
Outside the US, Asia has been our biggest customer base. They see the benefit of a sustainable, modern system while developing their economies to higher levels. They want to establish a sustainable system as the ground zero. They start with using (foreign) sustainable technologies and techniques to establish a sustainable infrastructure. We are seeing this development from Indonesia, Malaysia and all over south-east Asia.

Question 3: Do you consider the planetary boundaries and the fact that the business community activities could likely push us to certain tipping points?

Answer by Allard Castelein:  
The Paris Agreement defines 1.5 degrees Celsius of increase in the average global temperature as the final goal. We have to think about the steps we can take today to reach this goal. What activities should you deploy? What measurements should you use? We are trying within the port area to come up with a transparent action plan. We have adopted our business model to become investors to make this transition happen. We take into account the planetary boundaries, our footprint and the remaining challenges and see them as opportunities for sustainable development.

Answer by Per Grieg:  
This question comes back to the discussion we had about the data. We have to understand in what environment you are working in and try to predict what is going to happen. When it comes to Aquaculture, water is flowing and influences your neighbor as much as it influences you. The industry has a rising acknowledgement of this topic. However, it is very difficult to be precise about what the carrying capacity is. It’s a very interesting topic, but very complex also.

Answer by Dave van der Heyde:  
The mission statement of companies does not include growth as the ultimate target anymore. It’s more about transformation. It’s about fulfilling the needs of your customer. For example, in the offshore industry the rental model is becoming more interesting. People are not buying the equipment, there are renting it. Companies are working together to reduce cost and standardize. By standardization, you reduce the cost you need for the operation and you become more efficient. If we increase the efficiency, there is an economic benefit and we reduce the ecological footprint automatically.

Comment by Paul de la Guérivière:  
I am not ashamed of having a target of growth. Growth is bringing jobs and is important for the stability of the whole society. Renewable Energies are creating growth and jobs.

Takeaways

- Data/Digitalization: there is a need for more ocean data and increased cross-sector cooperation to collect this data.
- Legislation/Regulation: legislation can be a driver for innovation. However, industries cannot always wait for regulators to act. Companies should guide regulators.
- Cross-sector cooperation: ocean industries often have common interest and there is a big potential for the exploration of synergies between sectors (e.g. offshore wind and fisheries/aquaculture).
3. Oceans 2030: Ocean Industry Projections and the Future of the ocean Economy (Part 1)

Speakers
- Tom Boardley, Executive Vice President for Corporate and External Affairs, Lloyd’s Register (Chair)
- Shipping: Peter Hinchliffe, Secretary General, International Chamber of Shipping
- Cruise Tourism: Bud Darr, Senior Vice President of Technical and Regulatory Affairs, Cruise Line International Association
- Ports: Maurice Jansen, Senior Manager, Innovation, Research and Development, STC-Group
- Ocean Renewable Energy: Jacopo Moccia, Policy and Operations Director, Ocean Energy Europe
- Offshore Wind: Martin Volker Gerhardt, Global Head of Strategy, Wind Power and Renewables, Siemens AG
- Seabed Mining: Gert-Jan Reichart, Professor of Ocean System Sciences, Royal Netherlands Institute for Sea Research (NIOZ)

Discussion

Peter Hinchliffe disagreed with some of the points made about the shipping industry earlier in the day. Shipping is an industry in crisis, he stated. It has not recovered from the 2008 recession and there are far too many ships for the available cargo. The global economic growth rate is far below the forecasted figures – The World Trade Organization cut the forecast of world trade in 2016 from 2.6% to 1.7% as world trade has not grown as expected. In 2017, the forecast was cut from 3.8% to 2-3%. Mr. Hinchliffe explained that there have been significant structural changes in the shipping industry and more are expected. In essence, the impact of shipping on the environment is adequately regulated but there are some bars that should be raised. New CO2 regulations will be introduced in 2020 requiring all ships engaged in international trade to stop burning heavy fuel and switch to cell fuel. This reduction in carbon footprint will affect international trade, in particular in developing countries, but industry will not wait for regulation to take SDGs into account.

Bud Darr reflected on the cruise line industry. The market share is about 300 vessels out of 50,000- 100,000 ships trading worldwide. The sector is small but visible and Mr. Darr is quite optimistic about their future despite that the rest of the shipping industry is in crisis. In reference to the carbon commitment of the shipping industry, the sector is very involved and the lack of significant progress could be due to insufficient interest shown by developing countries. The Cruise Line International Association reflects the fact that the cruise sector is truly a global business. The global deployment capacity is roughly as follows: 1/3 of the ships operate in Caribbean waters, 1/3 in the EU-market and 1/3 somewhere else. The future trends include building ships that are more efficient and sustainable.

Maurice Jansen explained that the goal of the Rotterdam Port is no longer to be the largest, but to be the smartest and most sustainable port in the world. One important trend in shipping and port management is the development of sustainable ocean emission controlled areas. Sulphur and nitrogen emissions must be reduced. Therefore, it is important for ports to make sure that clean ships with clean fuel come to the port. Port management controls suggest the use some form of incentives, besides regulations and fines.

Jacopo Moccia explained Ocean Energy Europe’s association and lobby group based in Brussels. They work with 114 companies, mostly within the sphere of submerged wind turbines generated by currents. Medium size turbines are installed all over Europe (France, Netherlands Scotland). The first large turbines, called cargo energy farms, will be installed in Scotland and France. Wave energy resources are abundant and will be game changers, but the technology is not yet there in terms of efficiency.

Martin Volker Gerhardt stated that offshore renewable energy is a young industry and Siemens AG (founded 1991) is one of the pioneers. Siemens AG is an economic success story – the cost of renewable offshore energy has dropped rapidly, already surpassing nuclear and gas powered costs. Hopefully politicians can help to promote renewable energy. Offshore is more efficient than solar and also very
reliable. There is a tremendous growth in deployment of offshore wind turbines worldwide. By 2030, there can be up to 140 GW capacity deployed and offshore wind energy could represent 6.2% of the global renewable energy supply mix over time.

**Gert-Jan Reichart** gave some background on the Royal Netherlands Institute for Sea Research’s (NIOZ) contribution to blue ocean research and their involvement with industrial projects. NIOZ is funded by the Dutch government and the European Union. Mr. Reichart indicated that deep-sea mining is going to increase as we are running out of materials, and outlined that this could have an influence on other activities such as offshore wind energy. The ecological impact of deep-sea mining is worrifying and plain to see – tracks are visible on the ocean floor even after a thousand years after an area is mined. Even after the sediment of the seafloor begins to accumulate (which takes place at a rate of 1mm per thousand years), deep-sea mining tracks are still visible. Mr. Reichart called for ‘responsible mining’.

**Question & Answer**
The Tidal Power Society highlighted the complementarity of offshore wind energy, current turbines and tidal energy. The question of the impact of offshore wind farms on fisheries was raised and it is clear that compromises must be reached, as climate change and high energy production CO2 emissions severely impact the fish stocks in the oceans.

**Takeaways**
- Wind and tidal energy sources will be complementary within the broader renewable energy spectrum.
- The only way to avoid market-based regulation will be to develop carbon-neutral liquid fuel (biofuel) and this requires more R&D.
- All the industries are working on lightening their environmental impacts and consider climate change to be a challenge and an opportunity to develop collaboration and find solutions.


**Speakers**
- Katherine Palmer, Global Environment and Sustainability Manager, Lloyd’s register (Chair)
- **Oil and Gas:** Jérôme Ferrier – Chairman, French Gas Association and Honorary President (IGU)
- **Seabed Energy Cables:** Domenico Andreis: ISMES Director, Engineering and Environment Division, CESI S.p.A.
- ** Fisheries:** Roy Palmer: Executive Director, Association of International Seafood Professionals
- **Aquaculture:** Arne Fredheim: Professor, Centre for Autonomous Marine Operations and Systems, Department of Marine Technology, NTNU; SINTEF Fisheries and Aquaculture
- **Dredging:** René Kolman: Secretary General International Association of Dredging Contractors (IADC)
- **Desalination:** Miriam Balaban: Secretary General, European Desalination Society
- **Yachting:** Vienna Eleuteri: Sustainability Manager, Viareggio Superyachts (VSY); Chair, Sustainability Committee, Super Yacht Building Association (SYBASS)

**Discussion**
Jérôme Ferrier presented the World Gas Association, which is made up of 91 countries representing the entire value chain of the industry. He outlined the importance of Liquid Natural Gas (LNG) – since the Paris Climate agreement natural gas has come to be considered part of the solution. The World Energy Outlook 2016 showed that LNG will grow faster than coal and oil. Furthermore, the number of LNG-fueled ships increased from 3 in 2005 to 75 (2016), with another 80 on order for 2017. LNG infrastructure is also improving, but more fuel ships are needed to provide bigger ships with LNG (e.g. cruise ships, container
Domenico Andreis stated that renewable energies are a disruption in their field. Compared to conventional sources, renewable energies are far less predictable. A better grid infrastructure is needed and interconnectors between countries are becoming more important. Interconnectors are becoming an engineering challenge, however. For example, the planned interconnector between Israel, Cyprus and Greece is 2500 km long and up to 3000 m in depth. The project is currently in the permitting phase. The engineering is incredibly complex and choosing the right path for the interconnector to avoid sensitive areas will be difficult. A strategic environmental assessment and an environmental impact study will both need to be conducted. Mr. Andreis did note that no negative impact of electromagnetic fields on fish has yet been detected and anti-trawl systems are used for protecting cables.

Roy Palmer claimed that all SDGs have something to do with fisheries. There are over 30 million people working in the fishing sector – mostly poor and rural people. No other commodity is traded more than seafood, and the fishing sector makes a crucial contribution to food security and nutrition. Human impact from overfishing is an important issue all over the world – 2011 witnessed a total global fishery harvest of 63.6 million tons and 2030 is projected to be 93.6 million. The extraction volumes have been stable over the last two decades. There are also other environmental challenges such as the waste produced by fisheries. If this waste decreases, the harvest can be maximized further.

Arne Fredheim announced that aquaculture is the fastest growing ocean sector after the offshore wind energy sector. It contributes to food security, with traditional wild catches being limited. The carbon footprint from seafood is less than land based food, like beef. Aquaculture from fresh water and marine water is equally split in terms of production. Salmon is the driver of finfish aquaculture and production is mainly industrialized by large companies. Salmon trade is earning a lot of money at the moment. The salmon industry in Norway is becoming a marine industry of its own with very effective biomass production and a strictly regulated permit system (8 – 10 million euros for a permit, but also a “developing license” available for innovative technology and approaches). The market has grown so rapidly because biologically it is easy to farm salmon. Salmon can eat pelletized food, and salmon is also a very flexible product in the way consumers can eat it. In Asia, there are many small and family size businesses producing salmon, while Atlantic salmon is the driver for industrialized aquaculture.

René Kolman explained how the Association of Dredging Contractors brings together privately owned dredging companies. One of their goals is to inform the world about dredging. There is a strong misconception about dredging as Environmental Impact Assessments normally only focus on its negative effects. The concept of ecosystem services should be used to measure the impact of dredging. The construction of the Botany Bay Port Extensions in Sydney, for example, resulted in increased ecosystem services. There were negative impacts of the project, such as the loss of 1 hectare of mangroves, but there were five positive trends in ecosystem services due to the development of a new container terminal. A monetary assessment of the impact of the project found that the positives outweighed the negatives. Impact assessments such as these should be entirely factual and not emotional. For more detail see the Report Ecosystem Service at http://www.iadc-dredging.com/.

Miriam Balaban warned that the world population is increasing and we are experiencing a rise in water temperature and sea level. There will be a shortage of fresh water in the future, especially in North Africa, Mexico, South America, India, Pakistan, and China. There is a need to increase the desalination capacity by a factor of 50 by 2030. In the last ten years, it has grown by only a factor of 2, which is not even close to enough. Desalination plants take the salinity from the ocean and separate salt water from fresh water. This process is very energy intensive, however, it is becoming more energy efficient with advances in recent technology. The discharge of the saline back into the sea along with chemicals remains a problem. There is also a need for transportable desalination systems for emergency cases.
Vienna Eleuteri explained the importance of changing the super yacht (> 50m in size) industry into a sustainable smart industry. A conceptual framework and strategic partnerships are needed for this transformation. The super yacht sector is a leader in sustainable innovation, as clients are asking for innovative products. However, the cost-benefit relationship of green technologies has to be considered.

Questions & Answer

The question of the availability of data gathered for Environmental Impact Assessments was raised, highlighting the fundamental importance of data in conducting innovative projects. The management of Big Data and the Internet of Things (IoT) provides many opportunities for seabed energy cables as well as the protection of human life. Maurice Jansen questioned the rest of the panel about block chain solutions, stating the importance of using such processes when it comes to data capturing. He outlined the importance for companies in a value chain to lock their footprint into their block chain. It has been indicated that Maersk is currently doing a test project with block chains for their bills of lading. Vienna Eleuteri commented that it is a challenge when no data is available on a large scale. There needs to be a values-shift towards sharing data, as the current mindset is very sensitive on this topic.

Takeaways

- Natural Gas has great potential for sustainable shipping and is relatively sustainable compared to other traditional fuels.
- The food sector is a key stakeholder in the ocean business community. Fishing represents a crucial access to food for many developing countries and climate change could endanger food security. Aquaculture is a sustainable and growing alternative to fisheries and can help ensure food security in some countries.
- The lack of available fresh water will become an increasing problem in the future. New developments in desalination plants and techniques are very important.
- The need for global open data was at the core of the discussions in this session.

5. Ocean Sustainable Development, the Sustainable Development Goals (SDGs) and the Ocean Business

Speakers

- Christine Valentin, Chief Operating Officer, World Ocean Council (Chair)
- Paul Holthus, CEO, World Ocean Council Commissioner, Global Commission on Business and Sustainable Development
- Kristen Schuijt, Chair, Global Ocean Program Committee, WWF; Director, WWF Netherlands
- Rebecca Oliver, Deputy Director, Swedish Global Hub, Future Earth Secretariat
- Kathrine Angell-Hansen, Director, JPI Oceans
- Seriena Bal, Heerema Marine Contractors Nederland SE

Discussion

Paul Holthus emphasized the importance of creating a framework within the ocean context and bringing together different industries. Economic and business realities of the ocean business needs to be guided by the concept of sustainability. The SDGs are not just guidelines adopted by the UN, they are also the expression of the interests of citizens, which is why they have been adopted by the civil society and governments. They will not be achieved, however, unless the private sector is heavily involved. All the SDGs have some relevance to the ocean industry, but SDG 14 has specific targets on conservation and sustainable use of the ocean. There is a need to develop SDG indicators for the business community to respond to the opportunity and to get involved, and WOC has already begun doing this. This includes: setting priorities on how to contribute and demonstrate implementation of SDGs; taking action on how to reduce negative impacts and increase positive contributions; developing new products and services to reach the goals; and scaling them up. The identification and use of key performance indicators (KPIs) that will enable goals to be measured.
Examples for specific targets include:

- Share and collect more ocean data, e.g. install tsunami detection instrument on ships;
- Implement an ecosystem restoration process;
- Protect coastal ecosystems;
- Provide best practices;
- Leverage, e.g. only source supply from certified suppliers;
- Reinvent and customize the already existing process so it is accessible.

Kristen Schuijt stressed that this is the moment to take real action and to try to make a difference. We must understand the value of nature. The ocean produces 2.4 trillion dollars of revenue per year, and if it were a country, would rank as the 7th largest economic power of the world. However, 1/3 of the fish stocks is overfished and mangroves are disappearing 3-5 times faster than the tropical rainforest. Blue Growth and Blue Economy has turned to a common language in policy usage. The principles for a sustainable Blue Economy completely aligns with the SDGs and particularly with SDG 14. The Blue Economy, in summary, is defined to:

- Provide social and economic benefits for current and future generations
- Protect and maintain biodiversity and resilience
- Use renewable energy, clean technology and circular material flow

There are 3 examples of how we can apply these principles to reach the SDGs:

- In terms of investment, a 3.1 trillion USD gap is identified in order to reach the SDGs, and question how the private sector could help fill that out.
- Satellite tracking of the seafood traceability and transparency throughout the supply chain can be implemented. Commercial fisheries can register and be transparent.
- Shipping should contribute to keep global warming below the 1.5 °C raise.

Rebecca Oliver underlined the importance of research in the innovation and transition process. She posed a few questions to mirror the sustainability challenge, asking:

- Are we still moving in the right direction while sustainability is a moving target?
- Do we need research to guide us?

We have to make sure that we look at relevant issues and that assets are correctly named. In the future, we will need to understand the trade-offs and the role of integrated science. Future Earth is a global science platform and a growing community composed of 5 global hubs. The organization seeks to create knowledge action networks that feed into the different SDGs.

Kathrine Angell-Hansen presented a Joint Program, JPI Oceans, which brings together 21 EU members to focus on solving the societal challenges of our seas and oceans that cannot be solved solely at the national level. There is a need to lead a critical mass to corporate. The EU spends 2 billion euro per year on data collection, but still needs to reach out to the global community. JPI Oceans works on the long term with an integrated approach combining 70 disciplines. It has three main goals:

- Optimize the response to climate change and its impacts
- Build a knowledge-based sustainable maritime economy
- Bring legal obligations towards the environmental status of the seas

Seriena Bal reflected on the Young Ocean Professionals Platform workshop (see workshop session). She reported the workshop outcomes of the following questions:

- Who should be included?
- What goals should be set up?
- What events should be organized?
- What are the outcomes?

These questions challenged the workshop audience to think outside the box. Practical examples include: foster sustainability in the ocean industry; promote general equality across gender; retired people meeting
with young professionals in order to transfer knowledge; and be inclusive in terms of geographic scale and backgrounds from different fields.

**Takeaways**
- Incentives are needed for collaboration between the community which set up the SDGs (intergovernmental organizations basing their programs on scientific facts) and the industry. It is essential to foster sustainability.
- Communication between sectors (the scientific community and the business community, for example) is a core aspect of innovation and a common language needs to be found.
- It takes time and effort to get people engaged but the Sustainable Development Goals represent a unique opportunity to settle collaboration at all levels.

6. The Digital Ocean

**Speakers**
- Justin Manley, Director, Just Innovation (Chair)
- Graham Hine, Co-Founder; Senior Vice President, Liquid Robotics
- Graham Stickler, former Vice President, Products and Services, exactEarth
- Isabelle Duveaux-Béchon, Head of the Global Challenges and Partnerships Coordination Office (DG-SG), Strategy Department, European Space Agency (ESA)
- Kevin Forshaw, Associate Director, Innovation and Enterprise, UK National Oceanography Centre
- Yuval Magid, Business Development, Windward
- Tim Thornton, CEO, TeamSurv

**Discussion**

Speakers presented innovative techniques that have been developed, or are in the process of development for future use in the oceans. Graham Hine showcased a Liquid Robotics’ solar and wave powered autonomous data collection vessel, the wave glider. The wave glider has the potential to play an important role in various aspects of the digital ocean, including patrolling Marine Protected Areas and monitoring Illegal Unreported and Unregulated (IUU) fishing.

Kevin Forshaw presented the new Marine Robotics Innovation Centre, which opened in 2015. The UK National Oceanography Centre has been involved in various autonomous data collection robotic platforms, dating back to 1998, including VS air drones and underwater vehicles for measuring climate change and hydrothermal vents. These robots have yet to reach cost efficiency, but will do so in the near future when direct launching from the shore is achieved (at the moment robots must be launched from a support ship).

According to Yuval Magid, data should optimize our use of the ocean. There is a strong need for more maritime data and analytics and for clear, actionable information. Mr. Magid presented WindWard, collecting data on the interactions of reefers vessels with fishing vessels, enabling them to operate longer. He outlined the fact that such a use of the data leads to optimize the “from net to port” process.

Tim Thornton added to these facts our lack of knowledge on ocean, highlighting that only 5-10% of the seas have been surveyed. The question of the use of the 10 million vessels currently operating on the ocean, all equipped with basic devices such as GPS, is to be raised and Mr. Thornton believes that vessel recruitment is the best way to start automated data acquisition and transmission. With the large number of vessels, statistical quality of data is improved. He called for the development of a global marine sensor network and explained that TeamSurv is developing a marine sensor network (depth, wind, water salinity, dissolved oxygen etc.).

Graham Stickler discussed the role of satellites in ocean data collection, noting that satellites are sensors themselves. There are 600-700 satellites in space, very few of which are used to capture high resolution
images of the ocean. The capacity to store data is available, the challenge is identifying how to make this data usable for answering specific industry questions quickly and easily.

Isabelle Duveaux-Béchon commented that while space can be a tool for solving ocean safety and security issues, as well as a useful tool to collect marine climate data, it cannot solve everything. The key will be finding partnerships and links between space and industry through which to pursue the achievement of the SDGs.

Question & Answer
Questions focused on the availability of ocean data collected through the platforms described. Data from the European Space Agency is free and publicly available, but most companies are reluctant to share data as it provides them a competitive advantage. TeamSurv, for instance, is willing to share as much data as possible, but loses money in doing so. Liquid Robotics shares data when working alone, but is often unable to share data when partnering with private companies. Yuval Magid claimed that in 10-15 years, ocean data will be almost entirely open and shareable if current data-opening trends continue.

Takeaways
- There is a growing demand (particularly among industry) for ocean data. New and innovative technological tools, such as autonomous data collection vessels, can help meet growing demand and fill important scientific data gaps.
- Advanced data collection technology and host vessel infrastructure are already in place to vastly improve ocean data. The next step is to use the existing vessels and technology to collect and distribute data. Tim Thornton called for the development of a global marine sensor network.
- Limited data sharing in both the scientific and business communities remains an obstacle to progress.
- Data collectors should seek to integrate information from the various data collection platforms available – satellite, radar, soundecho, etc.

7. Ocean Investment Platform: Accelerating Investment for Ocean Sustainable Development

Speakers
- Jacques Demers, Founding Partner, Agawa Partners (Chair)
- Anna Creed, Standards Manager, Climate Bonds Initiative
- Veerle Vandeweerd, former Director, Energy and Environment Group, U.N. Development Program (UNDP)
- Ryan Whisnant, Head, Professional Services, Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
- Marjolein van Noort, Manager External Relations, Royal IHC
- Karianne Tieleman, Head of Risk and Portfolio Management Energy & Transportation, ABN AMRO (Panel Commentary)
- Elree Winnet Seelig, Managing Director, Global Commodities, Citi (Panel Commentary)
- David Campbell, Chief Finance Officer, Albatern (Panel Commentary)

Discussion
WOC’s Ocean Investment Platform will seek to bring together solution providers with investors looking for investment opportunities that positively impact the ocean and the blue economy. Jacques Demers explained the current structure of the platform – an advisory group has been established and an ambitious goal will be set to develop an investment agenda and to identify two or three investment partnerships within the next two years.
Anna Creed explained Green Bonds – tax-exempt bonds issued exclusively to finance green investments. So far there has been very little investment from green bonds directed towards the maritime sector. The Climate Bonds Initiative provides a standard certification for bonds that truly qualify as green investment with the goal of improving legitimacy and trustworthiness.

According to Marjolein van Noort, the key to accelerating green investment will be solutions generated by start-ups and small businesses. Complex ocean challenges such as overcrowded seas, waste management, ocean noise, and managing big data, present an opportunity for innovation.

Veerle Vanderweed introduced the concept of the New Development Paradigm – social and economic development plans must be guided by sustainable and inclusive development. According to Ms. Vanderweed, a high-level structure of ocean management is already in place, including global agreements (eg. Paris Agreement, SDGs) and regional agreements (eg. Regional Sea Conventions and Action Programs, Large Marine Ecosystems, Integrated Coastal Zone Management). The missing piece is local agreements, and local knowledge, capacity and expertise to construct sustainable ocean and coastal management programs.

Ryan Whisnant presented the Partnership in Environmental Management for the Seas of East Asia (PEMSEA). PEMSEA has identified more than 300 regional green investment opportunities with positive market return value. A recent success story is a coastal management project in Xiamen, China, which turned a polluted wasteland into a healthy green space, and yielded a 7:1 return rate on investment. PEMSEA hopes to increase capital flows to investment projects throughout East Asia.

Question and Answer
All three panelists expressed optimism in the role of the Ocean Investment Platform to bring together investors and solution providers. However, they warned that investment projects will have to be commercially viable to attract funds. Asked how to make green investments more viable, the investment panel responded that structuring public-private investments, or leveraging public money, reduces the risk for investors and will result in greater capital flow to green investment projects.

Elree Winnet Seelig suggested pooling small enterprises and entrepreneurs together to create coordinated and solidified propositions with less risk. Another question raised was how to improve the flow of investment towards emerging technologies that have high potential but still considerable risk.

David Campbell pointed to the “gap” between the moment a new technology emerges and the point it becomes financially viable and commercialized. This gap must be covered with the help of government institutions to reduce risk to capital. For example, wave energy is currently in the same position as wind energy twenty years ago. Advances in technology are producing improved, but not yet certain and reliable results, therefore there has not been sufficient investment from capital markets as the risk is still too high.

Karianne Tieleman presented ABN AMRO support to clients to foster investment in energy transition, such as renewable energy supplied fleets. She deplored the market conditions, leading to very little investment in shipping and called for shipping certification and for more transparency.

Takeaways
• Speakers echoed the sentiment of “respect for capital”. Sustainable investment projects will not succeed just because they are sustainable, they have to be commercially viable as well.
• Partnering with government agencies and accrediting investments with green bonds were highlighted as pathways to reducing investment risk in ocean solutions.
• The Ocean Investment Platform set the goal of establishing an agenda and forming two to three partnerships between investors and solution providers in the next two years.

**Speakers**
- Alistair Pettigrew, Managing Director, Blue Communications (Chair)
- Ludovic Laffineur, Deputy Managing Director, Royal Belgian Shipowners’ Association
- John Willsher, Global Account Manager, AkzoNobel Marine Coatings Business
- Galen Hon, Shipping Manager, Carbon War Room
- Tristan Smith, Reader, University Maritime Advisory Service

**Discussion**
The session covered the launch of a new tool for improving shipping efficiency and enabling transparency. This session promoted a discussion between stakeholders, comparing the efficiency of vessels of the same type and size. The tool can be used for renting: clients can choose the most technically efficient ship in order to optimize activity and minimize GHG emissions. It combines the history of the vessel and the route map to enable negotiations between all the stakeholders. The session was structured in the following Q&A-format:

**What is the method of this tool?**
The tool is based on the quantification of the ratio of consumption / CO2 emissions, for every ship’s operation. This ratio takes into account the speed and the position of the ship tracked. All ships tracked of the same size and type are grouped and compared to determine the range of efficiency.

**How is it possible to compare vessels?**
All ships are different but vessels of similar type and size are grouped in the same category. The tool uses a combination of information received and the comparison of categories of vessels. The facts/particulars of the analysis are based on GHG emissions. The only problem is ensuring transparency. Access of the detailed data needs to be provided.

**What’s the advantage for green companies?**
The efficiency. The ship operator wants to know the guarantees, the efficiency of the service and how to prepare the ship. As a consequence, better data would be a good driver to make better informed decisions.

**How do you think ship owners will react?**
Recently, the oil industry began to engage with the shipping industry. This tool could help in the collaboration between these two sectors. Ship owners were skeptical at first but they have been trying to find a better indicator than the energy efficiency indicator. The difference with this tool is that it enables dialogue between stakeholders in the chain and is not limited to information only on a ship-level.

**In terms of making the best cost/efficiency investment, as a ship owner, can now ask how do I improve my efficiency score?**
By sharing data. This will enable stakeholders to better understand and get involved on more levels. Improving the data set is essential to ameliorating the information. The model can be improved, and in the future, the hope is to improve discussion between stakeholders and build other ways to understand the combination of opportunities/ship/environment.

**What feedback do you have from ship owners?**
They start with apprehension, but they were curious and wanted to do anything they could to improve the efficiency of their vessels.

**Why pay a high price for efficiency?**
The benefits of efficiency include transparency, a sensitivity analysis and engaging (collaboration) within the whole chain, apart from just focusing on the ship.
Question & Answer
Questions focused on how the tool works. By modelling the ship and tracking the vessel, it is a model with average data and not always specific to the ship data. For example, it does not take into account the cost of maintenance or specific costs, like the cost of paint used.

Another question related to the possibility for this tool to improve the capacity of business to evaluating transportation impact. It could be possible to improve such capacity, through finding the missing puzzle piece for the only transport mode not having such a tool. Connecting efficiency, value and decision-makers will help to find a way to connect people willing to pay for an efficient ship.

Takeaways

- A new tool is available to optimize collaboration between the different stakeholders in the value chain in order to make ships more efficient. There is enormous potential to improve the efficiency of vessels.
- There is a disconnect between people who pay for fuel and those who make decisions around efficiency. It is important to connect them to help improve overall efficiency.
- There is a need to collaborate with industries developing other tools around this topic. The possibility of transforming the tool to show overall shipping as the most efficient transport mode must also be explored.
- The innovation of this tool is to instill the idea that data is not held by one party. It offers sensitivity analysis and also a platform for dialogue. Dialogue is a key in the sector: for instance, there is no association for charterers. Ship owners have now established ‘think tanks’ which can feed into the IMO for their concerns to be taken on-board.
Parallel Sessions

9. Maritime Clusters and Ocean Sustainable Development

Speakers
- Francis Vallat, CEO, European Network of Maritime Clusters (Chair)
- Eric Hansen, President, Economic Transformations Group
- Frédéric Moncany de Saint-Aignan, President, French Maritime Cluster
- Peter Myles, Chair, Nelson Mandela Bay Maritime Cluster, South Africa
- Bill Starvey representing Ian Hutchison, Secretariat, Offshore Renewables Joint Industry Programme (ORJIP); Project Manager, Aquatera
- Arjen Uytendaal, Director, Netherlands Maritime Cluster
- Chris Allen representing Tony Livoti, Co-Founder, Blue Silicon Valley Accelerator

Discussion
The session was open by Francis Vallat giving an overview of the origin of the word cluster. He stated that the mission of a cluster must be to work towards the efficiency of economy; the protection of life and to safeguard the environment for future generations to enjoy. Mr. Vallat referred to the sustainable opportunities for the shipping sector, especially from the Juncker Plan, which was confirmed on Tuesday 8 November 2016 in support of greener shipbuilding projects.

Eric Hansen highlighted the three basic parts to clusters in any region. First, companies which are producers and commercialize their products through direct contacts with consumers should be part of a cluster. Secondly there should be a Suppliers Network for Inputs and Services, with supplying companies within the region. Finally, a cluster must count on providers of economic foundations, supporting competitiveness and resources of the cluster. This includes human resources, banks and universities. It’s all about people and getting people together in a region to share a vision, trust each other and take action. The three angles in the Sustainable Ocean Cluster Framework are: innovation, competitiveness and environment. All of these links up with one another and intersects, but can we get into a space where all three overlap to get into the “hot spot” - the intersection of all three powerful elements. He concluded by showcasing examples of best practices of various Maritime Clusters.

Frederic Moncany de Saint-Aignan explained that the French Maritime Cluster was created in 2006 to link all maritime activities working together in a Blue Economy. The goal of the French Maritime Cluster is to foster synergies between members and to stimulate business but always in a sustainable way. The aim is to get cleaner and healthier oceans and, to do so, to try to influence policy/decision makers to look at Blue Economy and its benefits.

Peter Myles sketched a picture of how South Africa has about 10% of the total African coast line. The main question is: how to close the gap between developing and developed coastal countries? The aim is to link economic corridors in South Africa so that commodities can flow more efficiently through the countries. Operation Phakisa is the biggest initiative in South Africa, but it could not happen without a growing maritime business. There will soon be marine spatial plans for the South African ocean, but there is a need to consider the larger territory that the country’s coastline is part of, larger oceans e.g. the Western Indian Ocean. There are many common elements within the Western Indian Ocean, such as tourism, with a strong cruise line industry. Therefore, there is a need to move from the triple to quadruple helix system: as of today, business, government and academia have been involved, but there was only little involvement and participation from the ocean business community.

Bill Starvey highlighted the principles of an offshore renewable joint industry program. The main purpose is the development of wave powered (renewable powered) desalination plants. Those plants aim at helping rural communities to get access to sufficient electric grid power and to power the desalination systems, which ultimately provides access to drinking water. Mr. Starvey’s company took part of many clusters, but
in different forms. In terms of identifying issues, he posed a few questions for consideration: How to introduce sustainability into discussions you are already a part in? What is the catalyst of action to get people to realize that they should introduce sustainable actions and take more note of the Blue Economy? This leads to a marketing question and the importance of presentation of an issue.

Arjen Uytendaal gave an overview of the Dutch Maritime Cluster, the oldest cluster in Europe, with Rotterdam at the center of the maritime cluster as the biggest port in Europe with inland waterways. The best practices of the Dutch Maritime Cluster included: a high-tech team; key economic indicators every year, showing how important the industry is to the national economy; innovation; and the investments from the maritime industry in the Netherlands of 4.2% of total revenue into research and development. The Netherlands show a strong collaboration between business, academia and government, working together in the triple helix to drive innovation, in clean ships as well as smart and safe shipping. The Dutch Maritime Cluster used to be subsidized by the government for a long period, but for the last five years, it has been privatized (professional trade associations are all part/members of the cluster). The Netherlands wants to be a leading maritime nation by 2025, that’s why the country needs to set priorities together with business. These priorities are concrete working plans that are updated every two years. The priorities for next year are:

- Trade: finding ways to work together and help each other with priorities (innovation)
- Human Capital: make industry more attractive for young people and for people already working in the industry
- Innovation: invite universities to work on research and development with the maritime cluster on its priorities, such as innovation or cleaner ships.

Chris Allen explained the aim of the Global Blue Silicon Valley Cluster: to leverage proximity of the research and development done by 27 marine institutes. The strategy to commercialize the performed research (leveraging) constitutes a challenge. The original idea was to commercialize all the marine science expertise and knowledge/research capability in the Silicon Valley area. A cluster could be formed in partnership with the WOC.

Question and Answer
Leah Cara posed the question on the method to bring sustainable development into discussions and collaboration with government institutes to reduce environmental impacts on the ocean. Arjen Uytendaal responded that the Dutch cluster places priority on greener/cleaner ships and tries to influence government to invest more in sustainable shipping. Concerns were raised about the growing number of clusters and the consequences it could have: less innovation in the sector due to less competition at the national level. Finally, the opportunities to tackle at a global level issues at pre-competitive development stages (like less noise pollution) have been outlined and organizing collaboration among clusters for a global cooperation has been suggested.

Takeaways
- Clusters are unique examples of gathering of a sector and they should work on increasing collaboration and reaching out to governments. Clusters should be independent from the public sector: Francis Vallat advised to “Never take state subsidies”.
- Partnerships and leverage of opportunities are important. South Africa is an example: the ninth international congress on coastal and marine tourism (13 – 16 June 2017, Gothenburg, Sweden) will be the first match-making event of 5 Sweden clusters with 2 clusters in South Africa. Furthermore, South Africa takes over the chair of Indian Ocean Rim Association (IORA), which leads to the possibility to convene an ocean business conference with the business community.
- Leader maritime clusters need to work together and focus on trade, human capital and innovation.
10. UN Law of the Sea: New Legally Binding Instrument on Biodiversity in Areas Beyond National Jurisdiction (BBNJ) – Implications for Ocean Industries

Speakers
- Peter Hinchliffe, Secretary General, International Chamber of Shipping; Chair, WOC BBNJ Coalition (Chair)
- Stephen Hakim, Program Manager, World Ocean Council
- Robin Warner, Professor, Australian National Centre for Ocean Resources and Security (ANCORS), University of Wollongong
- Lora L. Nordtvedt Reeve, Principal, Global Ocean Consulting, LLC
- Thomas Vanagt, Managing Director, eCOAST Marine Research
- Andreas Kaede, Attorney, Haver & Mailänder Rechtsanwälte
- Dominik Walkowski, Environmental Law Practice, Wardynski & Partners

Discussion
Stephen Hakim provided an overview of BBNJ and panelists followed with detailed explanations of the anticipated elements of a BBNJ agreement. Negotiations are underway at the UN for the Convention on the Law of the Sea (UNCLOS) to include an internationally legally binding instrument covering conservation and sustainable use of marine Biological diversity in areas Beyond National Jurisdiction (BBNJ). In 2017, the UN General Assembly will review recommended text produced in these negotiations for new Law of the Sea requirements covering:
- Marine Genetic Resources (MGRs)
- Area-based management tools including Marine Protected Areas (MPAs)
- Environmental Impact Assessments (EIAs)
- Capacity-building and transfer of marine technology

Robin Warner discussed Environmental Impact Assessments (EIAs). BBNJ negotiators are debating the exact definition of EIAs, the criteria for activities that will require EIAs in the high seas, and which actor(s) will bear the cost of conducting EIAs. One problem is that there are already existing instruments in place governing EIAs for specific sectors, for example the International Seabed Authority. Ideally, through a BBNJ agreement, EIAs could be incorporated seamlessly into national and international law.

Lora Reeve explained that Marine Protected Areas (MPAs) are a subset of Area Based Management Tools – spatial and non-spatial tools intended to protect a specified area by regulating one, more or all human activities. MPAs have been set up in many locations around the world. It is crucial that business is involved in the identification and establishment of future MPAs so that industry concerns are heard and accounted for.

Thomas Vanagt explained the history of Marine Genetic Resources (MGRs), stretching back to the 1993 Convention on Biological Diversity and the 2002 Nagoya Protocol. BBNJ negotiations are considering whether the benefits of exploiting MGRs should be shared between countries. A BBNJ agreement might also establish new rules governing exploration and access to MGRs, including potential EIA requirements for bio-prospecting.

Andreas Kaede explained Technology Transfer – the transfer of new technology from the originator to a secondary user, especially from developed to less developed countries for economic purposes. The water column above the seafloor (the oceans as a whole excluding the seafloor) is governed by the principle of freedom of the high seas, and therefore is not subject to technology transfer requirements. Technology transfer requirements under UNCLOS are focused on The Area – the seabed and subsoil beyond the limits of national jurisdiction (the seafloor). Under UNCLOS the Area belongs to the common heritage of mankind.

Domink Walkowski discussed the challenges of developing rules to govern environmental liabilities. Damage to the environment means damage applied to something that does not have a quantified
commercial value. The BBNJ instrument will examine whether to compensate environmental damage to the ocean, and if so how.

**Question and Answer**

Peter Hinchcliffe introduced the *WOC UNCLOS BBNJ Coalition* – a coalition of businesses interested in engaging in the BBNJ process and participating in the negotiation. Asked how long until the BBNJ agreement will come into effect, panelists agreed that at the moment it is very difficult to tell. The UN General Assembly will begin meeting at the end of 2017 to start working on generating a draft of the treaty, and this process itself could take up to five years. While it is difficult to predict the timing of the agreement, speakers agreed on the importance of industry input to the negotiations in order to avoid being left out of the ultimate decision making.

**Takeaways**

- The establishment of a BBNJ agreement will affect industry operations in the area beyond national jurisdiction for the foreseeable future.
- Ocean industries that operate in the area beyond national jurisdiction should closely follow negotiations (all WOC members receive periodic BBNJ briefings) and join the WOC UNCLOS BBNJ Coalition to actively engage in the process.

**11. Shipping Sustainable Development and Synergies: Communication and Coordination among Green Shipping Initiatives**

**Speakers**

- Neil Baird, WOC Board of Directors; CEO, Baird Maritime (Chair)
- Kris Fumberger, Sustainability Manager, RightShip
- Galen Hon, Manager, Ship Efficiency, Carbon War Room
- Ian Petty, General Manager, Sustainable Shipping Initiative
- David Bolduc, Executive Director, Green Marine
- Peter Swift, Advisory Board Member, Green Award

**Discussion**

Discussion centered on the role of green certification organizations in solving environmental challenges. Kris Fumberger discussed risks and safety issues associated with shipping in the absence of proper marine spatial planning. In the North Sea, fishing, oil and gas, transportation, renewables, tourism, aquaculture and nature conservation are all competing for the same space. So far, the spatial planning process has been participatory and led by government, but has struggled to overcome the challenges of limited space, conflict for the most favorable locations, knowledge gaps and complicated policy frameworks. Different sectors of the industry have different cultures, societal and policy objects and traditions. In order to overcome the challenges of spatial planning, it will be essential to bring all sectors involved together in one forum.

Galen Hon presented BetterFleet, a brand-new tool for shipping, on behalf of the Carbon War Room, exactEarth and University Maritime Advisory Service (UMAS). BetterFleet is a free-to-access online measurement tool of shipping efficiency. The program can be used to show how efficiently an individual vessel has operated over the past year and even to compare it against similar vessels.

David Bolduc explained Green Marine – a voluntary certification program that evaluates environmental issues through twelve different performance indicators. Underwater noise was recently added as a new performance indicator in 2016. The program evaluates ship-owners, ports, terminals, Seaway Corporations and shipyards in North America. Mr. Bolduc introduced a recent Memorandum of Understanding signed by Green Marine and Rightship to foster a productive working relationship between the two companies in pursuit of shared goals.
Peter Swift presented on Green Award, an environmental certification program that operates globally and awards accreditation to individual ships which demonstrate exceptionally efficiency and safety. Mr. Swift expressed interest in collaborating with Green Marine, but noted that Green Award does not offer transparency on its members.

Ian Petty presented the report of the Sustainable Shipping Initiative and his vision for 2040. Collaboration remains the key in making sustainability in the shipping sector a reality. Working together can also lead, according to Mr. Petty, to the development of new technologies and their economic viability. The sector should work on cooperation and should aim at incentivizing technical and environmental solutions.

Question & Answer
The question and answer period centered on the transparency of the presented certification programs and regional focuses of green certifications and environmental regulations. Mr. Petty explained that international initiatives and legislation for compliance with environmental issues exist more on the regional level than the international level. Asked whether Green Marine is considering expanding to the Pacific region, Mr. Bolduc explained that the company (which currently only operates in North America) is in fact considering this expansion but with a franchise model. Mr. Swift was asked to explain Green Award’s transparency policy further. Green Award does not make information on its members publicly available, but those companies are free to disclose any information they submit to Green Award. Similarly, there is currently no system of third-party verification in place, whereby a third party would conduct a verification assessment of a Green Award certification, but individual companies and ship owners can conduct their own assessments if they wish.

Takeaways
- Green certification organizations appeared interested in future collaborations to establish key environmental indicators and work together towards establishing a broader and more exhaustive global green certification regime.
- Transparency was a major topic of discussion for the certification programs. Most speakers recommended third party verification and/or a comprehensive advisory board.
- Multiple speakers pointed to the need for certification programs in the Pacific region.

12. The Global Ocean Ecosystem: Status and Changes and What They Mean for Ocean Industries

Speakers
- John Ridley, Managing Director, Ocean Nourishment (Chair)
- Alan Simcock, Joint Coordinator of the UN Group of Experts of the Regular Process (World Ocean Assessment I)
- James Spurgeon, Director, Sustain Value
- Deborah Brosnan, President, Deborah Brosnan and Associates
- Renee Grogan, Director, Gro Sustainability
- David Osborn, Director, Environment Laboratories, International Atomic Energy Agency (IAEA)
- Igino Emmer, Principal, Carbon Project Development, Silvestrum

Discussion
Discussion focused on how human activity impacts the global ocean ecosystem and tools to assess and reduce these impacts. Alan Simcock started by highlighting the importance of regular assessments such as the second World Ocean Assessment, which is currently in process. This project is based on 10 main themes and underlines that climate change and the current exploitation of marine living resources undermine social benefits from the global ocean ecosystem and threaten food security and food safety. Mr. Simcock emphasized the importance of cumulative impacts of different sectors.
James Spurgeon presented the Natural Capital Protocol (NCP), a network of industrial stakeholders (companies, consultants, academia) who use the same protocol for impact assessment. This tool gathers different evaluation methods and harmonizes their guidelines. The NCP provides information on the priority issues to tackle in an organization. The marine sector protocol is to be completed by more data and a marine guide, facing the challenge of bringing industries to work together in a complex space such as the ocean.

Deborah Brosnan discussed the impact of climate change, particularly extreme weather events, on the ocean business sector. Evoking the example of a harbor adaptation to climate change and the need for rapid investments to avoid substantial damages (70% of ports would be vulnerable), she pointed to the high economic consequences of tsunamis and earthquakes and argued for prioritizing aligning assessments and approaches and creating a global system basis.

Renee Grogan found similar priorities in the deep-sea mining sector. Bringing together all the stakeholders, building partnerships between industries and communities and sharing data are key steps to tackle the impacts of the mining industry in the global ocean ecosystem. The industry is shifting to responsible mining practices such as minimizing waste but collaboration with others sectors will tackle the cumulative effects their activities.

David Osborn addressed ocean acidification as one of the key challenges for the industry. Pinpointing the great impacts of this phenomenon on sensitive biological systems, Mr. Osborn presented the drawbacks of the decreasing reproduction rates and resiliency of key species for the business community (fishing, tourism and medical industries as well as real estate & coastal infrastructures are at stake).

Igino Emmer introduced the major concept of blue carbon, i.e. the carbon dioxide stored and sequestered in the ocean ecosystems. While ocean and coasts store a substantial part of the CO2 present in the Earth system, these carbon sinks’ positive effects are decreasing with climate change (mangroves, tidal marshes and seagrass). The market of credits from blue carbon is growing on the carbon offset market and represents a business opportunity for the ocean community.

Question and Answer
The International Windship Association raised the question of the insurance sector role in tackling the impact of industry on the ocean ecosystems. There is already collaboration on preventative initiatives and an awareness of the insurance and financial sector of the risks deterred by climate change. According to Deborah Brosnan, the array of possibilities of extreme weather disasters is so large that it leads to a difficulty of identification and prioritization.

The inclusion of natural capital in green finance has been discussed and panelists showed optimism on this topic. Renee Grogan was questioned on data from deep sea mining organizations. Since deep sea mining operates within rather small areas, data is collected to estimate the impacts of the processes and is shared with industries in the area such as fisheries. The next step in terms of data is transparency and publicity.

Finally, the central position of WOC to foster the World Ocean Assessments was discussed. The WOC represents a link between sectors and can therefore play an important role in data gathering. There is no global network for oceanography and it is crucial to analyze data on a global scale to identify the gaps and to enable countries to carry out their development programs. Integrated assessment and consistency of data are challenges to work on.

Takeaways
- The economic losses due to climate change effects on global ocean ecosystems are important and should steadily increase. The natural capital should be taken into account in the equation. Indeed, climate change affects the maritime industry and commercial activities.
- There is a massive lack of information on current and future environmental impacts on global ocean ecosystems that could enhance extreme events, sea level rise and ocean acidification.
The biggest challenge in assessing the current state of the oceans is the quantity of data necessary to have a good overview of the global ocean ecosystems’ situation. Data must cover the whole planet and must come from many different industries and sectors. The solution is therefore, firstly to encourage private companies to make their own assessments, and secondly, to bring their knowledge to the table, so that we can carry out a systematic approach including all actors and have a complete picture. The participation of the insurance and financial sector to this common challenge is crucial.


Speakers
- Lucy Greenhill, Research Fellow (Marine Planning), MASTS Marine Planning and Governance Forum Convener, Laurence Mee Centre for Society and the Sea, Scottish Association for Marine Science (Chair)
- Chloe Montes, Programme Officer, Business and Biodiversity Programme, U.N. Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC)
- Sander van der Berg, Aquaculture Researcher, Wageningen Research
- Sarah Young, Celtic Seas Partnership, WWF UK
- Francesco Musco, Erasmus Mundus Master Course on Maritime Spatial Planning (EMMCMSP), University Iuav of Venice
- Angela Schultz-Zehden, Lead Manager, European MSP Platform
- Linlin Sun, Researcher, Leiden University

Discussion
Speakers discussed the challenges and successes of Marine Spatial Planning (MSP). Lucy Greenhill defined MSP as the process by which relevant authorities analyze and organize human activities in marine areas to achieve ecological, economic, and social objectives. As overall ocean activities continue to expand, MSP has become an important, if not essential tool for industry to manage space, coordinate with other sectors and mitigate conflict. Ms. Greenhill pointed to two important limitations of MSP that should be addressed moving forward – regulatory issues and insufficient stakeholder engagement (planning only works if all relevant stakeholders are involved).

Chloe Montes presented the findings of a UNEP-led study on Marine Spatial Planning. Through a series of surveys and workshops the study focused on fifteen MSP processes, including the Wider Caribbean, the South China Sea and the Pacific South West. The most common challenge across all fifteen cases was moving from the planning to implementation stage. Insufficient funding and human capacity, governance issues, data gaps and poor cross-sectoral communication were also identified as widespread challenges to successful MSP. In order to avoid these shortcomings, MSP must have strong stakeholder engagement, sufficient data and tools, local and regional government support and sufficient resources.

Sander van der Berg discussed MSP in the North Sea, where fishing, oil and gas, transportation, renewables, tourism, aquaculture and nature conservation are all competing for the same space. So far, the spatial planning process has been participatory and led by government, but has struggled to overcome challenges of limited space, conflicts for the most favorable locations, knowledge gaps and complicated policy frameworks. Different sectors of industry have different cultures, societal and policy objects and traditions.

In Europe, Angela Schultz-Zehden also identified the challenge of integrating sectors that don’t entirely know and understand each other to work on MSP. Sarah Young found similar challenges in MSP in the Celtic Sea – conflicts for hotspot areas and weak relationships between the different sectors involved. In order to effectively manage the area, Ms. Young believes transboundary management and baseline surveys of all
activities in the region will be necessary. Francesco Musco identified transboundary issues, competition between sectors and lack of stakeholder input as important issues in MSP in the Adriatic Sea as well.

**Question and Answer**

Ms. Young was asked to explain the UNEP-led study in more detail. Regarding the goal of the study, the intention was to publicize the value of MSP, to make information about MSP transparent and to start the conversation about global solutions to the challenges of MSP. In response to a question about MSP initiatives in Africa, panelists responded that planning processes for Namibia and Angola are currently being considered.

**Takeaways**

- MSP faces similar challenges in many regions around the world, most importantly low stakeholder participation and poor communication between different ocean industry sectors. Industry and other stakeholder struggling with these facets of MSP should use the unique platform offered by WOC to engage in productive cross-sectoral collaboration.
- WOC launched a Marine Spatial Planning platform in 2014 and intends to act as a vector of cross-sectoral communication.

14. Polar Region Arctic Sustainable Development: Business and Science Collaboration in the Arctic and Antarctic

**Speakers**

- Nicole Biebow, Head of International Cooperation Unit, Alfred-Wegener-Institute; Project Manager, EU-PolarNet (Chair)
- Jeremy Wilkinson, Senior Scientist, British Antarctic Survey
- Annette Scheepstra, Coordinator Willem Barentsz Polar Institute, Rijksuniversiteit Groningen
- Juanjo Dañobeitia, Director, Unidad de Tecnología Marina, Spanish National Research Council (CSIC)
- Sveinung Loset, Professor, Sustainable Arctic Marine and Coastal Technology (SAMCoT), Norwegian University of Science and Technology (NTNU)
- Lars-Henrik Larsen, Head of Department, Marine Assessments and Monitoring, Akvaplan-niva AS
- Eero Hokkanen, Communications Manager, Arctia Ltd

**Discussion**

Nicole Biebow and Annette Scheepstra explained EU-PolarNet – the world’s largest consortium of expertise and infrastructure for polar research, comprised of 22 European multi-disciplinary research institutions. EU-PolarNet organized this session of the conference and hopes to achieve integration on polar research programs and to improve dialogue and cooperation on arctic research. EU-PolarNet and the World Ocean share many goals, among which is the improvement of dialogue and cooperation on Polar research. The World Ocean Council develops programs such as Smart Ocean-Smart Industry, aiming at facilitating cooperation between the industry and the science community. The partnership between EU-PolarNet and the WOC on several projects has led to increased collaboration, for example a survey that was conducted the winter of 2016-2017 among the Polar business community to multiply cooperation opportunities for Polar data collection.

Jeremy Wilkinson discussed projections of artic sea ice loss. Climate change is affecting the arctic (and Antarctic) more quickly than the rest of the world – an average global temperature increase of 2°C in the world equates to a 6° or 7°C increase in the Arctic. Industry can help scientists model change by assisting with data collection in the arctic. As the ice recedes, shipping will be possible in the summer, but very difficult in the winter when there is near 24-hour darkness. Lars-Henrik Larsen added that while there has been very little experience navigating long shipping routes in darkness to date, it will not be impossible.
Juanjo Dañobeitia explained the Polar Code – a mandatory international code for all ships (excluding fishing boats and fixed platforms) operating in polar waters. The Polar Code includes operational, safety and environmental measures, including anti-pollution procedures, fostering Polar sustainable development in the ocean business community. For example, the Polar Code declares polar waters “zero discharge zones” and explicitly prohibits any form of discharge or waste dumping. It came into effect in January 2017 for new vessels and will come into effect in 2018 for older vessels.

Sveinung Loset presented the Sustainable Arctic Marine and Coastal Technology (SAMCoT) initiative – a research coalition committed to capacity building in the arctic. SAMCoT represents a diverse group of stakeholders including 13 industry partners, 8 research partners and 2 public partners.

Eero Hokkanen expressed Arctia’s eagerness to collaborate with the global science community, reflecting the business community interest for cooperation. Arctia is a Finish company that owns and operates icebreakers. Without icebreakers Finland’s ports would be fully covered by ice in the wintertime and unable to conduct trade and shipping. Arctia hopes to collaborate with the science community to fill knowledge gaps and allow the collection of data on summer and winter arctic ice.

**Question & Answer**

Asked about opportunities for the private sector to invest in artic research, panelists agreed that industry could work directly with scientists to evaluate risk that could affect their business. Some of this work is being carried out by governments, but there remain huge data gaps that will impact business. Asked how to achieve better data sharing, Mr. Loset described the conflict for industry – they want to be involved in data sharing as it will reduce risk for their company, but they are also slowed down by economic competition. Ms. Biebow added that 60% of the artic is owned by Russia and no research is allowed to be conducted there by foreigners. This lack of access has created a sizeable data gap.

**Takeaways**

- The Arctic is changing rapidly and industry collaboration is in high demand to fill data gaps.
- Collaborating with the science community will benefit industry operating in the arctic by improving models and greatly reducing operating risk.
- There are many opportunities for industry to engage in arctic research, two of which were presented at this session: EU-PolarNet and SAMCoT.

15. Smart Ocean-Smart Industries: Industry Data Collection and Sharing to Improve Ocean Knowledge

**Speakers**

- Steve Raaymakers, CEO, EcoStrategic Consultants (Chair)
- Gilles Bessero, Director, International Hydrographic Organization
- Jan-Bart Calewaert, Head, EMODnet Secretariat, European Marine Observation and Data Network (EMODnet)
- Nicole de Plessis, Project Officer, The Offshore Oil and Gas Environmental Research Collaboration Project, Operation Phakisa, South Africa
- Scott Johnston, Branch Chief, US Fish and Wildlife Service
- Amos Barkai, CEO, OLRAC SPS

**Discussion**

The World Ocean Council’s Smart Ocean-Smart Industries program aims to match scientific organizations seeking to collect data with ocean industries willing to host data collection instruments. The program is relatively new and intends to expand quickly.
Speakers primarily presented opportunities for collaboration between science and industry. Gilles Bessero explained the General Bathymetric Chart of the Oceans (GEBCO) project, which aims to deliver the world’s most authoritative and publicly available bathymetry data set of the oceans. Mr. Bessero hopes to find industry partners to host data loggers for crowd source data collection. He also imagines a role for industry in developing new tools and techniques for measurement.

Jan-Bart Calewaert explained the European Marine Observation and Data Network (EMODnet) — a new system the EU invests in which seeks to bring all European ocean data bases together. At the moment, international data collection is expensive and difficult to combine as it is often stored in different formats and languages. EMODnet hopes to fix this problem, and to involve industry to ensure infrastructure is fit for users, as well as to collect and feed data into the system.

Amos Barkai is hoping to find industry partners to host the Olrac Marine Observer – the latest development from Olrac SPS. The Olrac Marine Observer is a sophisticated but easy to use data collection device that collects marine species data. Information collected through these device is compiled and made publicly available on a web-based server.

Scott Johnston is seeking industry volunteer ships in the Caribbean to host observation instruments for the US Fish and Wildlife Service. The instruments collect data on migratory bird species.

Nicole Du Plessis presented a successful example of a science/industry collaboration – the South African Marine Research and Exploration Forum (SAMREF). SAMREF is a data collection project designed to use oil and gas exploration activities as platforms to gather marine ecosystem data. Operation Phakisa, launched by the South African government in 2014, focuses currently on four main clusters, grouped as:

- Transport and manufacturing;
- Offshore oil and gas sector;
- Aquaculture; and
- Protection of governance.

SAMREF acts as the facilitator to identify and take advantage of opportunities provided by industry (Oil & Gas, Fisheries, Tourism, Transport) to gather important marine ecosystem data which would otherwise be difficult and expensive to obtain. By following a stakeholder driven approach, the aim is to facilitate new collaborative offshore studies that would increase South Africa’s state of knowledge of the offshore marine environment. This is also related to renewable energy potential, marine biodiversity and ecology, climate change and ecosystem functioning.

Question & Answer
Speakers discussed various obstacles to engaging industry in data collection projects. First, a large investment of time is required by both the researcher and the industry volunteer. Second, industry often does not understand all the benefits of providing host vessels. Neil Baird commented that while this may be true, there is in fact a huge pool of volunteers that would be willing to host research vessels, including fishermen, yachtsmen, recreational ship-owners, cruise ships, and others. The challenge is establishing the most succinct and understandable methods of approaching these ocean users, and explaining the central focus of each project. The WOC was called on to fill this role. Paul Holthus explained that WOC plans to play the match-making role between industry and research organizations, adding that it takes time and effort to establish research partnerships. The first step is to establish pilot programs, which will be built out and eventually lead to big opportunities. Mr. Holthus also introduced the idea of a broad, global programmatic approach to science/industry collaboration through WOC as the way forward.

Takeaways
- There is a large opportunity for industry to get involved in research and data collection. However, there are significant challenges for the scientific community in engaging industry. WOC has a unique opportunity to facilitate such interactions.
- A “maritime directory” listing all of the actors operating in the ocean that could potentially serve as host vessels would be a useful step for science to understand the potential partners that exist.
In order to advance the Smart Ocean-Smart Industries program, a global programmatic approach to science/industry collaboration will be necessary. The first step will be to engage in pilot projects between industry and science, and to build these into larger initiatives.

16. Reducing CO₂ Emissions: Affordable, Scalable Solutions for Maritime Industries

Speakers
- Martin Dorsman, Royal Association of Netherlands Shipowners (Chair)
- Kris Fumberger, RightShip
- Theofanis Karayannis, International Maritime Organization
- Michael Traut, University of Manchester
- Gavin Allwright, International Windship Association
- Abdul Rahim, Class NK
- Walter Vermeer, Boosting Initiatives for Collaborative Emission reduction with the Power of Shippers
- Eric van der Schans, Port of Rotterdam

Discussion
Speakers presented ideas for reducing CO₂ emissions in maritime industries. Kris Fumberger believes the shipping industry is in need of "disruptive innovation" along the lines of the effect Google had on the newspaper industry. He also pointed to the importance of greenhouse gas emissions rating systems, which give customers and industries an index to analyze ship efficiency.

Walter Vermeer suggested the introduction of a rating system that would encourage customers to choose sustainable shipping companies.

Theofanis Karayannis presented the IMO’s ambitious goal of eliminating one billion tons of CO₂ sector-wide by 2050 in pursuit of SDG 13 (tackle climate change). Mr. Karayannis explained two continual difficulties with emissions regulations – the tension between voluntary and mandatory regulations, and the ongoing challenge of bringing together all relevant stakeholders into regulatory discussions. To mitigate these issues in the developing world, developed countries must share their insight and experiences with their developing-country counterparts. Another opportunity for improvement is the use of GloMEEP, a global industrial alliance that seeks to bring private and public sectors together to assist nations in the implementation of the SDGs.

Michael Traut outlined the fact that the shipping sector is aware of its emissions (2% of global CO₂ emissions) and is working on reducing them, leading to a decrease in recent years. According to an IMO scenario, staying below 2°C of global average temperature increase in the next 100 years would imply for the shipping industry to avoid CO₂ emissions increasing trends in a very short term and to work on decarbonization of the sector.

Ships will soon have to operate in a zero-emission world, according to Gavin Allwright. The question at hand for the shipping industry is whether to invest resources towards designing entirely new ships or to offsetting emissions of existing vessels. It is imperative that future regulations and fuel prices are stable and predictable so that companies can plan ahead.

Abdul Rahim presented the “tuna fish approach” – an emissions reduction program designed to reduce fuel consumption by up to 50%. The method creates small holes in ship’s paint (similar to the skin of a tuna fish), which fill up with water and flatten the exterior of the ship.

Eric van der Schans argued shipping companies should work with universities and start-ups to jumpstart innovation. He also suggested that ports should incentivize sustainable shipping by giving port-fee discounts.
to companies that meet sustainability requirements. Government coordination and support for legislation would be required to enact such measures.

**Questions & Answer**

Questions focused on technical aspects of the emission reductions proposals. Mr. van der Schans emphasized the need to improve technology and project management in order to achieve greater emissions reductions. Mr. Allwright was asked to explain the use of liquid natural gases, which he described as a transition technology to more sustainable solutions. Mr. Vermeer explained that his organization has made a concerted effort to support promising ideas that don’t have the necessary financial backing. He is much more inclined to trust emerging organizations that offer calculated efficiency evaluations, and encouraged other industry members to consider this as well.

**Takeaways**

- Speakers emphasized the need for “disruptive innovation” in the shipping industry in order to increase the pace of change.
- All speakers were enthusiastic about the idea of an index to map greenhouse gas emissions and climate-friendly business practices. However, there were no practical suggestions on the specifics of such an index or how it could be implemented on a large scale.
- Stricter and more effective maritime legislation, as well as innovative solutions, are keys to improving shipping efficiency.

**17. Renewable Energy from the Ocean: Understanding and Addressing Opportunities and Barriers to Growth**

**Speakers**

- Bill Staby, CEO, Resolute Marine Energy (Chair)
- Kevin Banister, Business and Government Affairs, Principle Power
- Ulrik Stridbæk, Senior Director, Group Regulatory Affairs, DONG Energy
- Raza Ali Mehdi, Maritime Risk and System Safety Research Group, World Maritime University
- John Ridley, Managing Director, Ocean Nourishment
- David Campbell, CFO, Albarten, Wave Energy

**Discussion**

Discussions centered on the role of renewable energy from the ocean, and how to understand and address emerging opportunities.

Kevin Banister presented a new offshore energy solution which differs from previous technology in that it relies on the structures. The structures are not fixed on the seabed like many projects, but are floating with anchors. The offshore energy sector is growing, especially in Europe and Asia. With this new technology, Principle Power is able to go further into the high seas to catch stronger wind. The verticality of the turbine is also maximized to optimize the efficiency.

Ulrik Stridbæk highlighted the demand of European consumers for renewable energy, which has triggered an increase in new energy. Currently, offshore energy attracts 85% of energy investment. Almost all of the time (99%) the power plant of renewable energy is working, and 50% of the time, the power plant is at the maximum capacity of electricity production. Originally, DONG Energy began in Denmark, where the big power plant was first built. The biggest one is now in the UK, the second largest in Germany and the third largest in the Netherlands. Mr. Stridbæk evoked one of the major difficulties of renewable energy in the ocean: to share the space and to work along with multiple stakeholders such as fisheries, cable providers and shipping.
Raza Ali Mehdi gave an overview of the Offshore Renewable Energy Installation (OREI). The sea space is a crowded place with very high ship intensity routes. The development of the offshore wind energy sector causes a conflict between sectors and competition for space. This also represents a risk for security. A research gap has been identified, namely that there are very robust tools available for efficiency and safety but the lack of communication is slowing down progress. Sea space is needed to be used in a more efficient way. Three solutions are listed:

- Harmonization and integrated risk assessment frameworks (mapping, by plotting the turbines).
- Improvement of the quality of input data through simulation studies (simulate the behavior and use).
- Risk management tools for operational end-users (e.g. Dynamic Risk Decision Support System, use a dynamic model)

John Ridley explained how gas in the ocean can contribute to the transition towards a sustainable future. Specifically, ocean gas can help achieve the goals of the Paris agreement, through negative emissions in the ocean. The notions of peak oil or peak gas are not relevant anymore, as a big share of the hydrocarbon reserves will have to stay underground in order to respect the agreement. Mr. Ridley also spoke of the importance of developing carbon capture solutions. The ocean is large, and is a particularly stable sink of carbon compared to the continents. Nonetheless, ocean productivity is limited by nitrogen. The answer is in adding nitrogen to enhance ocean phytoplankton productivity and improve fish growth as a consequence (thus, a double effect in terms of climate and food security). Amazingly, phytoplankton equals 0.05% of land plant biomass, but has the same cycle (photosynthesis) capacity as all of the land plant biomass combined. A project to add nitrogen to the ocean could lead to floating farms extracting gas and growing algae.

David Campbell concluded the panel talks by highlighting the difficulties associated with developing wave energy in an efficient way. The history of wave energy dates back to 1882. Economies of scale are important and more units added together result in better yields. The potential market model of wave energy will replace expensive diesel generators on small islands and will tackle off-shore energy needs. So far, Albarten has experienced difficulties in raising non-public funding, but the first clients are coming on board (e.g. aquaculture farms).

Question & Answer

The chair posed a question about the biggest challenge for their industry in the transition to wind energy. Ulrid Stridbæk replied that getting away from the on-shore and other activities, that is to say overcoming the status quo, has been difficult. They focus now on cost reduction and economies of scale. The regulators can help in cost reduction through better harmonization of regulation.

Kevin Banister stated that for them the status quo is conventional off-shore. They have developed a good technology that can overcome the drawbacks of conventional off-shore, and they now need to find more capital to develop their activities. Raza Ali Mehdi responded that they have to consider not only risk, but also opportunities and that there is a need for better cohabitation between shipping and wind farms. Furthermore, wind farms have a positive impact on fish (e.g. artificial reef). David Campbell indicated that they had to work on safety, but also had to exclude the “ghost” of risk. This is due to the fact that industry cannot afford to bear the cost of risks. Other questions related to availability of college courses for the development of new talents in this industry (and according to the panel, there is currently no real shortage) and decommissioning of the wind farms (which were indicated as included in the project costs and an important part of the sustainability assessment).

Takeaways

- Renewable energies are efficient and battery technology could store energy, but people have to change their behavior. The global economy still relies heavily on hydrocarbons and used more oil in 2016 than in 2015.
- Manufacturers and academic players are paying a lot of attention to LCA (Life Cycle Assessment). Decommissioning is important and will soon be implemented in Denmark.
- Navigation and environmental risks linked to offshore wind farms are real. These risks are the largest for fishermen and represent a significant cost for a small company. Regulators should
harmonize regulations on ocean use at a large scale in order to be homogeneous rather than starting from zero every time a new regulation must be put in place. There are tools and models to be taken from other ocean regulations available to assist.

- Bio engineering could be a solution to tackle climate change and it could come from the ocean: phytoplankton is a carbon eating machine and could be used to enhance the role of the ocean as the world’s largest carbon sink.

18. Marine Biodiversity: Challenges and Opportunities for the Ocean Business Community

Speakers
- Christine Valentin, World Ocean Council (Chair)
- Jan-Willem Bochove, The Biodiversity Consultancy
- Theofanis Karayannis, International Maritime Organization
- Luke Smith, Woodside Energy
- Riji Djohani, Coral Triangle Center
- Mikael Kamp Sorensen, DHI
- Chloe Montes, United Nations Environment Programme

Discussion
Speakers discussed pressing marine biodiversity issues that pertain to ocean industries. In order to reduce negative environmental impacts of business operations in the ocean, Jan-Willem Bochove suggested applying the “mitigation hierarchy” – a four-step plan of avoidance (preventing adverse impacts on the environment), minimization (reducing impact), restoration (restoring impacted biodiversity), and offsets (policies that counteract environmental impacts).

Theofanis Karayannis spoke about the potential dangers of the spread of invasive species through biofouling. Most invasive are spread via fouling on recreational vessels, which are extremely difficult to regulate. It is difficult to assign a quantitative value to the potential negative environmental effect of biofouling, but reducing the impact of fouling should be a priority for ocean industries and directly contributes to SDGs 2 (end hunger), 6 (ensure clean water and sanitation) and 14 (conserve and sustainably use the oceans).

Luke Smith displayed two examples in which Woodside cooperated with governments to produce important research data – once with the Australian Institute of Marine Science and once with the government of Myanmar. He urged business to seek out and engage in similar collaborative research partnerships with governments and NGOs.

Riji Djohani discussed coral bleaching, pollution, destructive fishing practices, and the impact these threats have on the coral triangle in Southeast Asia. According to Ms. Djohani, engagement with the business community is the only way to successfully resolve these issues. The Coral Triangle Center hopes to partner with maritime industry leadership in Southeast Asia to launch an initiative to ensure sustainable development in the region.

Mikael Kamp Sorensen explained that lack of knowledge about key environmental issues could pose a risk to industry operations. Environmental modelling could present a viable solution to this problem by measuring the effect of potential stressors (e.g. ocean noise) on the behavior of biodiversity (e.g. whales). Mr. Sorensen proposed combining ecosystem and agent-based modelling to quantify and reduce environmental risks.
Chloe Montes explained her goal of No Net Loss of marine biodiversity in the ocean. In order to move towards this ambitious goal, she suggested prioritizing critical marine governance barriers and the use of the mitigation hierarchy.

**Question & Answer**

Asked about the practicality of biological restoration, Mr. Bochove and Ms. Montes explained that it is the second to last resort in the mitigation hierarchy because it is such a long process. Ms. Djohani added that preservation (the first stage of the mitigation hierarchy) is in almost all cases superior to restoration. According to Mr. Smith, the requisite knowledge base is not yet in place to enable accurate preventative policies for ocean industry. Finally, Ms. Montes explained the “precautionary principle” which holds the following: in the absence of scientific consensus that a given action is not harmful to the public or the environment, and there is a suspected risk that the action could be harmful, then that action should not be undertaken by business.

**Takeaways**

- Speakers suggested the use of the “mitigation hierarchy” to preserve marine biodiversity. See the mitigation hierarchy explained in full by the Biodiversity Consultancy.
- Cooperation and sharing of information between businesses, governments and the science community will be necessary to preserve and maintain marine biodiversity.
- Lack of knowledge is a significant barrier to intelligent and effective preventative business practices. Complex modelling, multi-sector collaboration and cooperation between industry and the science community will be key to establishing successful preventative practices.

**19. Large Marine Ecosystems (LMEs): Engaging the Ocean Business Community in Regional Ocean Governance in partnership with Intergovernmental Oceanographic of UNESCO**

**Speakers**

- David Vousden, Senior Consultant, Coastal and Ocean Management and Governance, UNDP (Chair)
- Paul Holthus, CEO, World Ocean Council
- Patrick Debels, Regional Project Coordinator, Caribbean LME
- Chris O’Brien, Regional Coordinator, Bay of Bengal LME
- Ryan Whisnant, Head, Professional Services, Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)

**Discussion**

The discussion focused on the role and impact of Large Marine Ecosystems (LMEs).

Dave Vousden opened the discussions stating that Large Marine Ecosystems are already existing platforms for cooperation between industry and researchers. The main threats to the world’s coastal and offshore ecosystems include unsustainable exploitation of living marine resources and the impacts from climate variability. In this regard, the Global Environment Facility (GEF) is one of the major funders to address these issues. The approach is:

- Valuation;
- Analysis;
- Spatial Planning and monitoring.

This results in Blue Economy policy making (which references to SDGs 8 – 14) with regards to an ocean management strategy. All stakeholders (inclusive of private sector) need to be involved to make this a success and a profitable plan.

Paul Holthus stressed that LMEs are the link between governments and transnational projects. The main opportunity for the private sector is to engage with vessels to help with data collection and share the collected data. This would help particularly in less documented parts of the ocean, such as the Indian Ocean.
However, there are also numerous challenges to engage with the private sector. First, there is an institutional and cultural gap (a strong emphasis has been put on the gap from a language perspective). There is sometimes a misunderstanding of the culture of others. An aspect of this misunderstanding leads to think that finding funds is easy for companies and that they should be financing projects. One proposition has been suggested to reduce this gap: give a monetary value for data collection in a partnership or define this as an in-kind contribution. Leveraging the use of ships is extremely valuable and important for LME-projects, such as the case of creating a functioning oceanographic vessel.

Patrick Debels gave an overview of the Caribbean LME from 2009-2014, including 26 countries and 18 overseas areas - a challenge to align policies and commitments between so many partners. The value of the ecosystem services has been evaluated, in countries where land based visitors are more than one million. The Caribbean LME revenue was 407 billion USD in 2014. Key elements to tackle pollution are coastal protection and habitats for the fishery industry. Additionally, population growth must also be taken into account.

Chris O'Brien made it clear that to build a Large Marine Ecosystem agency, you first need to conduct a Transboundary Diagnostic Analysis. This will lead to the Strategic Action Program (SAP) bringing the agency together. However, there are challenges with public and private partnership. Noteworthy is the importance to evaluate all sectors and services to have a strong overview. The role of the private sector must be clearly communicated and the Strategic Action Program is earmarked as a vehicle to enable private sector to communicate with all stakeholders. Finally, he outlined the advantage for governments as LMEs will also assist the countries in reporting on the SDG targets.

Ryan Whisnant explained the PEMSEA partnership. PEMSEA includes Japan, North Korea, South East Asia, China and Philippines. Operations started in 1993, focusing on pollution prevention. Nowadays, integrated coastal management and river basin management are part of the scope. The PEMSEA LME project has brought value to the governments and to the private sector by developing a sustainable development strategy. As a result, they harmonized the international and regional targets. Local authorities, following their Strategic Action Program, have aligned with international agreements which also represents billions of dollars in terms of investment. They also contributed to the development of a national coast report that will be compiled as a regional coast report. Xiamen LME is a success story, turning a polluted wasteland into a healthy green space, and yielded a 7:1 return rate on investment. Naturally, such numbers help to convince governments and private sectors to invest in the LME.

Question and Answer
Steven Demoor from Plymouth Lab referred to the strong linkages between government and business, both in practices and vision of the LME projects and asked whether such LME partnership included academia. Ryan Whisnant replied that the research and the technical report(s) of the PEMSEA LME have been done by academia. Patrick Debels noted that one thing that they had observed, is that they need to know what information is necessary for the decision makers. Reference was also made to IW Learn for capturing lessons learnt. Finally, Paul Holthus remarked that for financing and private public partnerships, the need is for a group of companies willing to engage and help with data collection.

Takeaways
- Ensure to engage the private sector from the beginning of the development of the Strategic Action Program for the LME and value the in-kind contribution of companies.
- LMEs are bringing value through evaluation and monetarization of some areas and through the development of a network around the area. Their Strategic Action Program is key for local authorities to align with national and international agreements, as well as with targets.
- Issues such as language, culture and institutions are important within the context of evaluation of the ecosystems services. The development of Strategic Action Programs has to include industries (private sector).
20. Marine Environmental Impacts from Vessels: Avoiding and Reducing Ocean Inputs and Impacts

Speakers
- David Patraiko, Green Award (Chair)
- Craig Carter, Thordon Bearings
- Hulda Winnes, IVL Swedish Environmental Research Institute
- Margaret Hepburn, Hepburn Bio Care
- Steve Raaymakers, EcoStrategic Consultants
- Maria Delafuente, Peace Boat
- Bopp van Dessel, ProSea

Discussion
Discussion focused on the environmental impacts of vessels, and emerging initiatives to reduce or eliminate these impacts. Steve Raaymakers gave an overview of the environmental impact of the shipping industry. Shipping is the most eco-friendly form of transport and bears the lowest environmental cost per unit of cargo transported. Shipping has contributed greatly to SDG 8 and 14 by perpetuating the growth of global trade and dramatically reducing its environmental impact per ship in the last 50 years. According to Mr. Raaymakers, the spread of invasive species through biofouling is the most pressing environmental concern for the industry to deal with at the moment, followed by the emerging issues of underwater noise and marine animal strikes. Craig Carter explained that most commercial ships (95%) use oil lubricated metal propeller shaft bearings to allow propellers to operate while immersed in water. Oil bearings are a huge problem as they leak small amounts of oil over time. With so many ships using oil lubricated systems, there is an estimated total of 130 million to 244 million liters of oil leaked into the ocean annually. Regulation of ship bearings is quickly becoming more rigorous. The US Environmental Protection Agency now recommends that all new vessels use seawater-based bearings systems, and the Polar Code, which entered into force on January 1st 2017, states that polar waters are “zero discharge zones” where any discharge of oil or oily mixtures is prohibited. Thordon Bearings has developed seawater lubricated propeller shaft bearings systems which are already used by 2,000 ships around the world. Seawater bearings do not pollute the environment and have low operating costs as there is no need to transport and store oil. They also require less maintenance than oil bearings.

Hulda Winnes explained a Baltic Sea Research and Development Program study on bilge water. Bilge water is the accumulation at the bottom of the ship (the bilge) of liquids from leaky pipe lines, pump and valve glands, machinery, tank overflows, accidental spills and salt water. Bilge water must be discharged at controlled way ports unless it is cleaned to a level below 1ppm of oil. The study contacted 7 ship-owners to analyze the extent to which proper bilge water procedures are carried out and found the following:
- There is very little data on bilge water collection and discharge
- Many of the ships’ discharges had an oil content above 1ppm, and contained large amounts of detergent, often twice as much as oil
- Concentrations of 1-5% bilge water in sea water can be toxic to zoo plankton

Margaret Hepburn presented Hepburn Bio Care, which ecologically treats wastewater on over 200 vessels, hotels, and institutions. There is a clear business case to use fewer toxic chemicals as using cheap and harmful chemicals almost always means incurring high costs in other budgeting areas. For example, acidic chemicals slowly corrode waste water tanks, pipes, diaphragms and seals. Switching to bio-chemicals not only reduces negative environmental impacts, but can improve efficiency, performance and savings substantially.

Maria Delafuente presented Peace Boat’s Ecoship Project. Peace Boat is Japan’s largest cruise organization and an international non-profit organization that works to promote peace, human rights, equal and sustainable development and respect for the environment. The Ecoship Project is a plan to construct the planet’s most environmentally sustainable cruise ship, which will serve as a floating sustainability laboratory.
to conduct ocean research and encourage active engagement with the SDGs. The ship will also be used as a platform for round-the-world education voyages and exhibitions on green technology in 100 ports per year.

Bopp van Dessel presented ProSea, an independent non-profit organization that operates as a global center of marine expertise and training on marine awareness. In the modern era, it is paramount that marine professionals understand why things have to be done a specific way, particularly regarding sustainable practices. ProSea hopes to collaborate with WOC to pursue the joint goal of increasing global sustainable marine business practices.

**Question and Answer**
Questions primarily focused on the enforcement of discharge regulation. Princess Line recently had to pay a fine of $40 million for using an illegal bypass system, dubbed a “magic pipe”, to dump more than 4,000 gallons of oily waste off the coast of England. Asked why a cruise line would take such a high risk to avoid environmental regulation, Ms. Winnes answered that the risk of getting caught was likely perceived as very low. The idea of using EU “REACH” legislation was raised, which has been used in Europe to enforce strict environmental regulation through registration, evaluation, authorization and restriction of chemicals. Other speakers responded that in fact there is a competent whistle blower framework in place, particularly in Australia, the Baltics, and in North America where whistle blowers are paid a percentage of the fine for catching an illegal discharge. Speakers generally agreed that the vast majority of shipping companies take their environmental obligations seriously, but that regulation and enforcement could be improved.

**Takeaways**
- The proliferation of environmental education and awareness is critical to addressing sustainability challenges in the shipping sector. Peace Boat and ProSea are both operating in this space, and would benefit from collaboration with WOC and other likeminded organizations.
- As regulations increase for shaft bearings coatings, bilge water, wastewater treatment and other environmental measures, smart shipping companies should invest now in alternate solutions that will keep them ahead of the curve, reduce environmental degradation and ultimately save money by reducing costs in other budgeting areas.

21. Engaging Industry in High Seas Governance and Sustainable Development

**Speakers**
- David Vousden, Senior Consultant, Coastal and Ocean Management and Governance, UNDP (Chair)
- Paul Holthus, CEO, World Ocean Council
- Stephen de Mora, Chief Executive, Plymouth Marine Laboratory; Commissioner, Sargasso Sea Commission
- Alejandra Pacheco, Director, Co-Investments, MarViva
- Peter Mabson, CEO, exactEarth

**Discussion**
The session was opened by the Chair, David Vousden, explaining that rules and regulations can only be enforced through international regional and global ocean governance, such as UNCLOS. He stated that we have massive resources but they are less useful or valuable if there are no regulations. Noteworthy is that several countries have asked for an extension of their Exclusive Economic Zone (EEZ) into the continental shelf. This means that more of the seabed will be under a particular country’s sovereign rights. Other important high seas space includes: seamounts (most common eco-system of the world) and deep sea hydrothermal vents. Finally, one of the main threats according to him is the mineral exploitation.

Stephen de Mora explained that the Sargasso Sea, located in the North Atlantic, is classified as a special region. The project is led by the Government of Bermuda in accordance with UNCLOS. By testing the
boundaries of the Areas Beyond National Jurisdiction (ABNJ), the aim is to see what they can achieve collectively. The science evidence base (groundwork) is available and the case is made for a special plea with regards to the importance of this region, due to the biological characteristics. The aim is to get international recognition for the Sargasso Sea and to be declared as a distinct and protected area. In this regard, the Hamilton Declaration Meeting Participants list is still in progress as there are members signing up. The Hamilton Declaration Structure relies on funds from businesses and individuals with a very small staff base. They try to gain international recognition for the ecological importance and fisheries habitat of the Sargasso Sea.

Alejandra Pacheco reflected on The Costa Rica Thermic Dome’s ecological relevance as a marine area located in the northeastern region of the Eastern Tropical Pacific. Apart from a rich sea life, the socio-economic activities include fishing, ecotourism activities such as whale watching as well as turtle beaching. Threats to the sustainability of this biodiversity include: entangling animals in nets with bycatches, especially sharks; noise pollution; ship strikes and maritime traffic as the dome is on route to the Panama Canal. The increase in the size of the canal can cause an expected increase in the traffic. The challenges are mostly the limited capacity of governments to protect the high seas, thus possible collaborations between the different sectors are paramount (such as raising awareness and building partnership with the USA).

According to Peter Mabson, the IMO mandates that for vessels over 300 tons an Automatic Identification System (AIS) must be installed on board, which sends out automatic transmissions to vessels about what other vessels are in the same area. In this regard, exactEarth is a new data set for the maritime sector to make use of. There has been an explosion of internet technology based on land-wired infrastructure, but for the maritime industry satellite technology is essential. A new concept has been emerging: private investments in satellite technology and their use of information from these systems, instead of funding from Government institutes. He concluded that we are heading towards a world where we will be able to have data on everything, thus we will be able to see traffic patterns and trade routes all over the world.

Question and Answer
The panel has been interrogated on regulations for the protection of high seas areas that are assessable as shipping routes. Lori Kennedy stated that vessels are tracked in real time with their own tracking devices and that the vessels have to continually update their information about size of catch, arriving times and ETA’s. David Patraiko added that (1) regulations would stop vessels sailing through areas such as the Costa Rica Thermic Dome and (2) on a volunteer side, if educated on it, mariners can choose not to ballast and discharge bunkers in the area, but this will only be done by winning the hearts and minds of mariners. Gavin Allwright was concerned that within this crowded marine space with lots of data recently available, there would be an effect on raising the bar of the moratorium of certain activities. He took as an example the ongoing releases of the Fukushima plant into the ocean. Stephen de Mora noted that some governments haven’t signed up and therefore agreed with major inventions, mitigating the effect of such regulations. Finally, Paul Holthus referred to the Costa Rica Thermic Dome and Sargasso See as ‘pilots’ areas and outlined the fact that companies should partner with MarViva in the case the Costa Rica Thermic Dome, to foster sustainability.

Takeaways
- It is crucial to imply the private sector in programs of protection of the high seas on a voluntary basis. It is important for mariners to be able choose not to ballast and discharge bunkers in the area, that’s why an efficient communication regarding the topic should be done to win the hearts and minds of mariners.
- Existing marine protecting high seas areas are in place and regulations are developed for deep sea mining. Risk assessment (with involvement of industry) is important to establish protection of special areas.
- Increasing cost is a problem to the shipping industry at the moment. Thus, there is a need for regulation to mandate the sustainable cost to all shipping companies, to ensure they are doing business on the same level playing field.
22. Plastics and Marine Debris: Reducing the Industry Input of Plastics and Other Wastes by Ensuring Adequate Port Waste Management and Reception Facilities

**Speakers**
- David Osborn, Director, Environment Laboratories, International Atomic Energy Agency (IAEA) – (Chair)
- Sotiris Raptis, Senior Advisor, Environment and safety, Coordinator EcoPorts, European Sea Ports Organization (ESPO)
- Coen Peelen and Kenny Baas, Maritime Directorate, Ministry of Infrastructure and the Environment, Netherlands
- Ron van Gelder, Senior Advisor, Port of Rotterdam Authority
- Margretta Morris, Vice President, Materials Management and Community Affairs, Covanta.

**Discussion**

Sotiris Raptis stressed the importance of creating networks of port reception facilities. The European experience was based on the revision of EU law, including the decrease of litter from vessels at sea. Importantly, ports have to give access to facilities. There is a huge debate in the EU about air pollution. To measure the environmental performance of a vessel, the question of “green” standard has to be answered. Finally, there is a strong need for dissemination and implementation of information.

Coen Peelen and Kenny Baas referred to a Dutch agreement: to separate waste on the sea. They stressed the fact that once arrived at the port, all of this waste just ends up in one big container. They raised the problem of the plastic ingested by sea animals, noteworthy mentioning that 75% of debris in the ocean is made out of plastic. According to them, the challenge is to have more transparent and harmonized procedures in the EU. Their solution is to manage a ship’s waste like a small city would manage its waste. Showing examples, they demonstrated that the waste can be separated before collection and, after its arrival in the port, machines come to the vessel to facilitate the collection of the recycled waste. All the waste is then verified by hand, leading to 93% of waste being recycled and only 7% ending up as landfill. Overall, an international approach will be the most effective.

Ron van Gelder viewed waste collection in ports as a success but highlight the remaining issue of packaging waste. He evoked other initiatives such as the Waste Shark (catching plastics in the river before it reaches the sea), Shoreline (collecting plastic in a corner) or Recycled Park.

Margretta Morris presented the Hawaii “Nets to Energy” program, transforming debris that ends up on the beach into energy value. They are using only non-usable fishing gear. Stressing the importance of collaboration with fishermen and the states, she outlined the importance of understanding the different roles within the diverse ports, in order to raise awareness efficiently. Finally, this program is also a way to educate the ports on their management practices by indicating what can or cannot go to the garbage dump.

**Question and Answer**

Questioned on waste management and how to benefit from waste, the panel answered that the first step in the process of waste management seems to be awareness. Ports must take accountability for waste management and create infrastructure to scale-up. Finally, it has been agreed that all stakeholders need to look for alternative uses for plastic debris.

**Takeaways**
- Separation of waste before collection is key before the ship arrives in the port to promote and improve the recycling of waste.
- Other initiatives such as catching plastics in the river before it reaches the sea or transforming used gears into energy are crucial to raise awareness, change mindsets and tackle the problem early on.
- Waste management is a combination of active intervention (recycling), raising of awareness, education of ports on their management practices and monitoring of waste management activities.
23. Food Security from the Sea: Addressing the Challenges of Sustainable Fisheries and Aquaculture in a Multiple Use Ocean

Speakers
- Chris O’Brien, Regional Coordinator, Bay of Bengal LME, U.N. Food and Agriculture Organization (FAO) - (Chair)
- Jerry Schubel, President and CEO, Aquarium of the Pacific
- Rob Ayasse, International Manager, Energy, Environment and Security, Kongsberg Satellite Services (KSAT)
- Arjan Van Houwelingen, Director of Policy and Advocacy, UK Campaigns Manager, World Animal Protection
- Amos Barkai, CEO, OLRAC SPS
- Alastair McIlgorm, Professor, Australian National Centre for Ocean Resources and Security (ANCORS), University of Woolongong
- Bertie Armstrong, CEO, Scottish Fishermen’s Federation
- Chris Allen, Director, Chris Allen Associates

Discussion
Chris O’Brien opened the session reflecting on food security as all people at all times requires physical, social and economic access to sufficient, safe and nutritious food. The session addresses SDG 2 and SDG 14.

Jerry Schubel painted the theme of food security on a maritime-canvas with the USA promoting marine aquaculture for finfish. China and Asia are also big aquaculture producers in the world with seafood being the most traded food in the world. There is great potential to expand marine aquaculture in the USA, however the permitting process to make marine aquaculture happening is yet not implemented. Among the biggest advantages of the USA we can find its EEZ area, the largest in the world, a growing demand for seafood and strong food safety standards. Nonetheless, these advantages are slowed down by the lack of leading federal agency on the topic.

Rob Ayasse shared some insights of the advantages of satellite based monitoring within the food security theme. Ground satellites can give information quickly (e.g. vessel-detection). What’s more, it is possible to see the metal hull of a vessel and combine Synthetic Aperture Radar (SAR) with Automatic Identification System (AIS) data. Crossing the data enables to track down illegal fishing: seeing a vessel on SAR but not on AIS is a way to see which vessels are not supposed to be there. According to the patterns of the vessels, we can determine which vessels are the ones that are fishing illegally. This technology allows to cover a large area in the ocean, with the satellites detecting vessels from 20-100 m, and from +7m if with a metal hull.

Arjan Van Houwelingen presented the Ghost Gear Initiative. A lot of fishing gear is lost in the ocean every year. It impacts food security in two ways. Firstly, the gear continues fishing after being lost, but fish are no longer part of the producing process. Secondly, most fishing gears are made out of plastic and become micro-plastic, piling up in the food chain. The solution is a multi-stakeholder partnership to deal with ghost gear. The initiative has three aims: compile evidence; establish best practice with informed policies; and catalyze solutions. They are looking at data input (gear location, characteristics, etc.), followed by statistical analysis (which fisheries use similar gear, where was similar gear found, etc.) and finally formulating this into workable outcomes. The initiative works with a best practice framework (e.g. why is the gear lost, how can this be prevented), followed by practical solutions such as bring end-of-life and damaged gear back to shore and recycle. The Ghost Gear Initiative is linked to SDG 2,3,6,12,14.

Amos Barkai remarked that most illegal fishing happens in the legal sector coining it as “Legal Unreported and Unregulated fishing”. This includes: misreported catch, unreported discard, unreported bycatch, misreported fishing locations, misreported fishing effort, use of illegal gear/methods and flags of convenience. The bureaucrat solution to these problems consists in more regulations, however, these
regulations are pressing hard on the fishermen as it is difficult to implement, costly for fishermen and hard to enforce. A different approach is to include the fishermen and to communicate. In this regard, technology can assist in solving the problems, by precise reporting. The existing technologies (e.g. IAS, VMS, cameras, etc.) are not cooperating and need to be combined into an integrated solution, such as a combination of eTMR VMS, eLOG and cameras all together. All can be used for monitoring and control, but also as a way to collect data. This is important to be able to better target scarce resources and to create maritime domain awareness.

Alastair Mcllgorm posed the question of the rebuilding of depleted fish stocks. The solution would be to limit entry, leading to quotas. This tends to corporatize the industry, impacting the original nature of fishing. The fishing crisis is in essence a failure of governance and government. What’s more, the finance sector is reluctant to loan to fisheries as it is an uncertain business. As a result, individual fishermen have difficult access to fishing license, to the purchase of a boat and a fishing quota. Fishing licenses used to be only available for fishers, but it changed towards large non-fishing owners buying fishing licenses. It’s important to acknowledge that waiting for fish stocks to recover will not work, fishing is necessary to eat for too many population.

Bertie Armstrong addressed the audience on the challenges in a multiple-use ocean. The key is cooperation and for the North Sea, particularly with the oil and gas industry. The Scottish Fishermen’s Federation has supported this collaboration and contributed to help minimizing the conflict between Scottish fisherman and the oil and gas industry. The stock biomass is increasing since 2000. The main challenge was the pipeline decommissioning but cooperation could be achieved.

Chris Allen reviewed IUU fishing in Asia-Pacific. Through a partnership of USAID with regional, national and global level stakeholders, a catch documentation and a traceability system could be implemented. Unfortunately, the industry response was lacking. He emphasized the several cornerstones of partnerships, namely:

- The design of the program;
- The technical specifications;
- The key implementation partners;
- The regulators and regulations in the industry.

Question and Answer
The panel was asked the following question: What are the roles of other ocean industries in relation to the need to increase food from sustainable fisheries and aquaculture? The answers varied from removing waste to keeping the oil industry also accountable to do their part. A member in the audience requested a more balanced approach, stating that we are producing enough food and indicating that what is to produce on land as well as on sea. The overall conclusion relied on the moral obligation to look on ways to be more sustainable. Bertie Armstrong stated that various different industries worked together to foster sustainability.

Takeaways
- Illegal fishing is a major problem. From Illegal Unreported and Unregulated Fishing to “Legal UUF”, many aspects should be worked on to ensure food safety. Technology now allows to cover a bigger area of ocean as before and illegal fishing can be tracked down. As for “Legal UUF”, solutions such a communication to fishermen and investments of the finance sector in the fishing activity should be implemented.
- Programs have to be tailored to build catch documentations and traceability systems. Based on partnerships between the regulators and the industry, they should include all stakeholders at all steps of projects: design of program; technical specifications; implementation.
- Several side issues are increasingly problematic, i.e. gears lost by fishermen and impacting the ecosystems of the oceans and, as an end result, the biomass stocks.
Speakers
- Aleyda Ortega, Royal IHC (Chair)
- Julia Tasse, Young Ocean Professionals Coordinator at WOC
- Birgit-Marie Liodden, YoungShip International
- Tina Qianwen Lui, Young Professionals Shipping Network China and Elane Inc.
- Jessica Fraser, Nelson Mandela Metropolitan University
- Jean-Ronan Le Pen, Ocean and Climate Platform
- Seriena Bal, Heerema Marine Contractors

Discussion
Speakers presented examples of established professional networks and offered advice and suggestions to the Young Ocean Professional Network (YOP). Birgit-Marie Liodden presented YoungShip International—a non-profit organization for young professionals in the global maritime industry. YoungShip was founded in 2004 and comprises more than 2,500 members in Norway, Cyprus, Singapore, England, UAE, Sweden, Italy, Netherlands, Germany and the United States. Ms. Liodden highlighted crowd-sourcing as a method YoungShip hopes to use to capture external ideas to solve internal problems within the shipping industry. YoungShip also organizes an annual week-long event called Young@Nor-Shipping.

Tina Qianwen Lui explained the origin, successes and failures of the Young Professionals Shipping Network China. She evoked the difficulty to gather people in a culture where such networks are not yet very common. She presented the cultural differences between Western young professionals and Chinese young professionals, and how those differences led her to logistically start the network and expand it in a way very distinct from what other young professionals’ networks could be.

Jean-Ronan Le Pen presented the Ocean and Climate Platform, a platform to ensure ocean issues are included and prioritized in climate and environmental negotiations. Mr. Le Pen hopes to collaborate with WOC and YOP’s sharing similar goals.

Jessica Frazer presented the Nelson Mandela Metropolitan University Business School, which offers an array of advanced degrees focused on marine science, oceanography, ocean governance, marine protection and marine engineering. Ms. Frazer pointed to a long history of male domination in the shipping industry, and implored YOP to prioritize gender issues and the promotion of gender equality. She believes the YOP network has a great opportunity to advance SDGs 5 (gender equality), 8 (promote sustainable economic growth), 14 (conserve and sustainably use the oceans) and 17 (strengthen means of implementation). She explained how she strongly believes that the younger generation will make the change and take into account all SDGs in their every-day work. She outlined current issues as for the implementation of SDGs and highlighted the different point of views young professionals could have on such problematics.

Workshop
The workshop was organized by Seriena Bal (Heerema Marine Contractors), Aleyda Ortega (IHC Mining) and Julia Tasse (YOP Coordinator at WOC). Julia Tasse introduced the creativity workshop by a brief presentation of the concept and the nature of the Young Ocean Professionals initiative.

The session split into small groups to discuss three questions:
- Who will be the primary members of the YOP Network?
- What goals and outcomes does the YOP Network hope to achieve?
- What events will YOP host?

In terms of members, focus groups generally agreed that there should be no age discrimination, as senior and retired marine professionals could play a powerful role in the network as mentors. YOP should seek to...
attract ocean professionals from all sectors and geographic locations, including those who are tangentially involved in ocean issues, such as investors and government officials.

Focus groups identified goals of the YOP as networking, promoting environmental practices, promoting and implementing the SDGs, innovation and mentorship. In terms of specific outcomes, YOP hopes to develop a calendar of action items, create specific working groups, create new business models and foster ocean business sustainability. The importance of empowering young professionals to make the change was outline, and career development training and mentoring was suggested.

Focus groups suggested that YOP host events such as competitions, company visits, festivals, start-up days, ocean exploration events (eg. sailing, diving, cruise), webinars and web-based platforms. YOP hopes to create an international presence with ambassadors in local communities worldwide.

**Takeaways**
- WOC officially launched the YOP initiative.
- YOP plans to draw on the experiences of its members in other maritime networks, such as YoungShip International, Young Professionals Shipping Network China and others to build a global, cross-sectoral and cohesive network.
- YOP’s brainstormed the members, goals and events that should be associated with the network moving forward. The workshop outcomes will be taken into consideration for the development of the YOP initiative in 2017.

**Report Conclusion**

The Sustainable Ocean Summit 2016 gathered many different sectors and domains around the Ocean Sustainable Development. All the participants have shown interest in Corporate Ocean Responsibility and the Sustainable Development Goals of the United Nations.

It is interesting to see that four main solutions to climate change in the ocean have emerged from all the sessions and the discussions:
- Corporate sustainability and Sustainable Development Goals as targets;
- Data for Ocean Sustainability as a critical tool for sustainable development and research;
- Ocean Investment Platform, a necessary link between the investors and the projects; and
- Cross-sectoral Collaboration for Ocean Responsibility as a paramount step to foster innovation and implementation of projects.

The SOS 2016 has brought to the ocean business community the insights and the solutions to tackle climate change and work on more sustainable products and services. The SOS 2017 (Halifax, Canada, 29 November – 1 December) will bring more tools and targets to the business community with the theme “The Ocean Sustainable Development Goal (SDG14): Business Leadership and Business Opportunities”.
