
Update of SSI Roadmap

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Report Summary

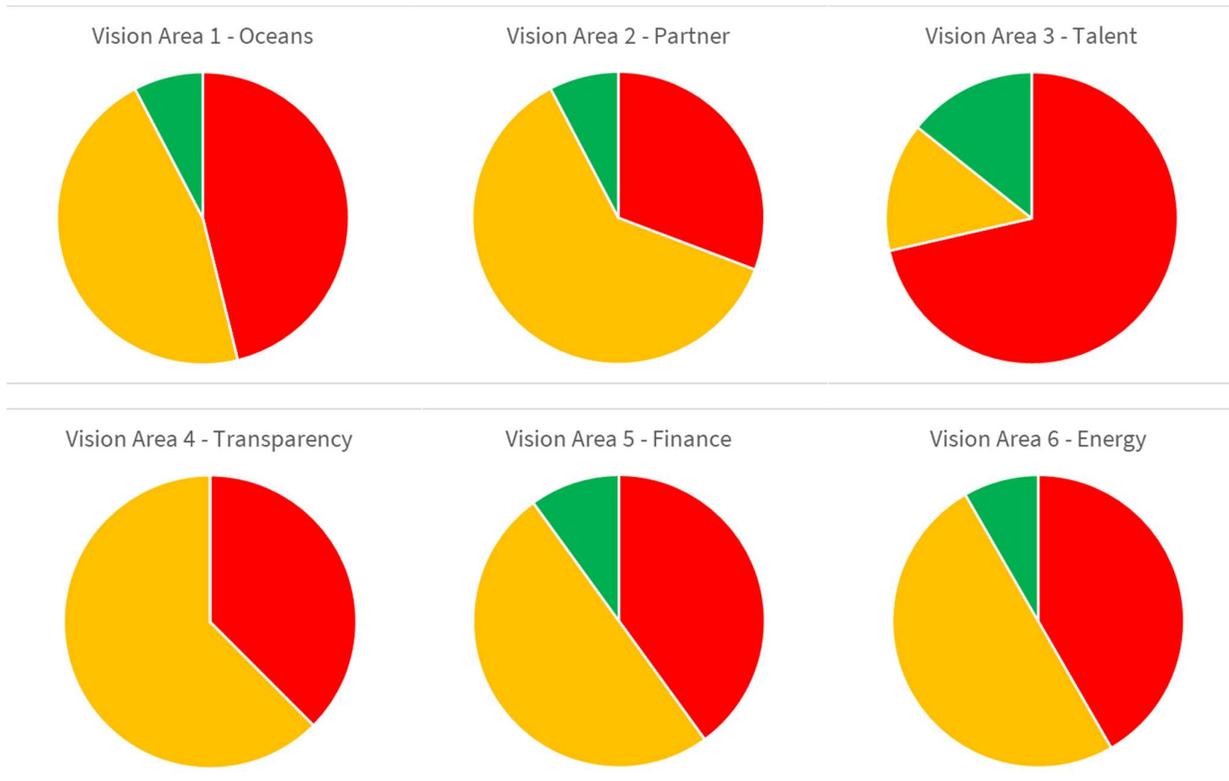
The Sustainable Shipping Initiative's (SSI) shared milestones are incorporated within the SSI's Roadmap under six vision areas, spanning a timeframe starting from 2010's, leading to the 2040's.

Lloyd's Register (LR) is assisting SSI to update its Roadmap by highlighting progress, identifying gaps and clearly pointing to where more action is needed to overcome shared barriers.

LR used below method and steps to undertake this project:

- Desktop review (Sections 2 to 7),
- E-survey (Appendix A),
- Stakeholder consultation (Appendix B),
- Validation and overall recommendations (Section 8), and
- Proposed Roadmap layout and content (Appendix C).

Outline of each vision area, Red Amber Green (RAG) status of the qualitative progress made against milestones, evidence of each milestone and recommendations for a new Roadmap are also included in this report. As a summary, for each vision area, overall progress has been little, and this can be seen in these RAG status pie charts (**red**: very little or no progress have been made within the industry; **amber**: some progress has been made but the milestone has not been fully achieved; and **green**: the milestone objectives are fully achieved).



Based on the reviewed milestones within the six vision areas, the following may be concluded for each vision area:

Vision area specific recommendations

Vision Area	Recommendations
1 – Oceans	<p>These goals set by the SSI under this vision area remain challenging to fulfil within the time frame. This is due to the natural cycle of work to agree on international regulations within the IMO, agencies and other bodies.</p> <p>It is also believed that the establishment of an international reporting system which is recognised by many administrations will promote recognition of responsibilities, while also enforcing MSPs.</p>
2 – Partner	<p>The set goals within this vision area appear to be moving in the right direction based on the updates of each milestone. For the SSI it is important to note that: Developed countries are leading in terms of meeting the objectives of this vision area hence for developing countries, this will continue to be the main challenge.</p>
3 – Talent	<p>The milestones under this vision area remain challenging particularly due to the following:</p> <ul style="list-style-type: none"> • To achieve zero accidents, the key milestones required to be fulfilled are: <ul style="list-style-type: none"> – Public sharing of information on near-misses, which currently remains at a voluntary level, and highly reserved due to commercial impacts. – Global transparency and establishment of a global set of standards rather than local reporting and focusing on niche areas. – Data on accidents, e.g. LTI, exists within consortiums such as P&I clubs etc. The industry’s access to this data and consistent reporting of incidents are vital aspects to achieve zero-accidents concepts. – The reduction of the human element within shipping (MASS) may also be a major enabler to achieving this goal. However, MASS may also present other consequences for seafarers, such as loss of skill sets. • When attempting to achieve equality, efforts should be focused on addressing the gender equality and diversity in shipping. • Once the equality has been achieved, this would make shipping more attractive as a career. • Relevant SSI members may wish to take further initiatives at a consortium level to lead the industry by example.
4 – Transparency	<p>The goals set by the SSI under this vision, remain challenging due to the following:</p> <ul style="list-style-type: none"> – Transparency and consistency remain the key issue behind compliance sustainability schemes; in particular, transparency associated with the area of energy efficiency. Effective performance monitoring and enforcement so far exist for rating schemes however, their adoption remains at a voluntary level. It is expected that the enforcement and monitoring of schemes would need to be conducted by trusted third-party verifiers to provide assurance and transparency. – Following the IMO’s initial strategy to achieve its targets by 2050, it is expected that the 2040 timeline suggested by the SSI may be too optimistic, and require an extension to 2050s, as the industry will need to follow defined targets by the IMO.

5 - Finance	<p>The goal set by the SSI under this vision, remains challenging, in particular:</p> <ul style="list-style-type: none"> - To achieve ecosystem valuations - this is highly influenced by the current IMO regulatory development process, which should be much better equipped similarly to the EU, for taking into consideration second-order consequences of regulation from one domain on the other. - This vision area may need to be extended into the 2050s, as the industry will need to follow defined targets by the IMO. - Overall, only climate change related risks are included in financial decisions and this should be extended to include all aspects of sustainability.
6 - Energy	<p>The goals set within this vision area for the SSI remain challenging while noting also the following considerations:</p> <ul style="list-style-type: none"> - It is anticipated that imbedding block-chain globally within the industry will be one of the key steps towards achieving a fully integrated supply chain. - The different paces that regions and sectors are moving at towards achieving this goal may be the biggest challenge to address.

Overall recommendations for the new Roadmap are listed below:

1. The existing roadmap is very comprehensive, and it is still valid in terms of its vision areas and most of its milestones to meet its objectives.
2. Vision Area 1's title should also include 'healthy use of the oceans' as well as governance.
3. Decades should be updated to 2020s, 2030, 2040.
4. Fulfilled milestones should be removed.
5. Unfulfilled milestones should be moved to a suitable decade with more attention drawn to them to improve focus.
6. Some of the milestones are repeated in more than one vision area or within the same vision area, these should be placed under the most relevant vision area only to avoid duplication and confusion.
7. Each milestone should be linked to its future milestone (as shown in this report) where possible to track progress.
8. Very specific milestones may be removed to replace them with more generic ones.
9. Titled tabs for each milestone are too many and inconsistent amongst each vision area. Some should be renamed and should be consistent for each vision area.
10. Dotted boxes are confusing, and they clutter the roadmap. If the case for action is complete, these would be redundant.
11. Objectives of each vision area should be clearly marked with clear language, so the readers understand the purpose of each vision.
12. Overall objective of the roadmap should be clearly identified at the beginning of the text, so the readers appreciate the purpose of the roadmap and how it adds value.
13. The Case for Action part of the roadmap needs to be clear that these are future trends and main industry drivers.
14. Current format of the roadmap is wordy and not so easy to understand.

15. Presentation should be improved to make it easy for the readers to digest its content and appreciate its main objective.
16. There is little need for two different versions, one simple version is sufficient.
17. The printing layout should be improved to make it easy to view it on hardcopy.
18. Overall, the Roadmap needs to be able to communicate and stay relevant for various stakeholders from various backgrounds.
19. Simple format of the Roadmap would help towards its maintenance in terms of time and cost.

The following simple format may be suggested for each vision area:

Vision Area 1		
2020s	2030s	2040s
Case for Action	Case for Action	Case for Action
Milestone 1	Milestone 1	Milestone 1
Milestone 2	Milestone 2	Milestone 2
Milestone 3	Milestone 3	Milestone 3
Milestone 4	Milestone 4	Milestone 4
Milestone 5	Milestone 5	Milestone 5
Ultimate objective		

Proposed Roadmap layout and content is provided in Appendix C which follows:

- LR’s recommended format;
- new improved plain wording;
- new decades;
- new numbering system;
- new milestone families;
- new consistent and reduced numbered titled tabs;
- removal of fulfilled milestones,
- consolidation of some milestones, case for action and outcomes,
- moving some milestones to more suitable vision areas,
- removing repetition, and
- in general, making the roadmap easy to read by all stakeholder with various backgrounds.

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Appendix B Stakeholder consultation

Appendix C Proposed Roadmap Layout and Content

1. Introduction

The SSI Roadmap is a resource for SSI members and the wider shipping industry to understand the present and future challenges, as well as the steps and milestones to shape their own sustainability strategies. Developed in line with SSI's Vision 2040 and Case for Action, the Roadmap was developed by SSI members and key industry stakeholders and defines tangible milestones for a sustainable shipping industry by 2040. These milestones are incorporated within the Roadmap under six vision areas, spanning a timeframe starting from 2010s, leading to the 2040s.

As a 'live' working tool, the SSI actively engages with the industry to periodically update the Roadmap based on progress made as well as how the industry landscape changes and evolves. In October 2018, SSI members reviewed each of the six vision areas of the SSI Roadmap, agreeing that a comprehensive update of the Roadmap is needed to ensure that milestones are sufficiently robust to serve as indicators against which progress can be tracked. Lloyd's Register was commissioned to conduct this work in 2019-20, with the outcome being an updated Roadmap highlighting progress, identifying gaps and clearly pointing to where more action is needed to overcome shared barriers.

This report contains the update of the milestones set within the six vision areas of the SSI Roadmap. The update was conducted at a milestone level within each vision area. For each milestone, the update was based on the marine industry regulatory and voluntary developments and LR's extensive experience within the various associated fields. These updates were then utilised as key benchmarks to rate the fulfilment of each set milestone through a suggested traffic light rating system.

For ease of reference and navigation within this report, the six vision areas defined by the SSI are:

1. **Oceans:** Proactively contributing to the responsible governance of the oceans (**Section 2**);
2. **Partners (formerly Communities):** Earning the reputation of being a trusted and responsible partner in the communities where we live, work and operate (**Section 3**);
3. **Talent (formerly Careers):** Provide healthy, safe and secure work environments so that people want to work in shipping, where they can enjoy rewarding careers and achieve their full potential (**Section 4**);
4. **Transparency:** Transparency and accountability drive performance improvements and enable better, sustainable decision making (**Section 5**);
5. **Finance:** Develop financial solutions that reward sustainable performance and enable large scale uptake of innovation, technology, design and operational efficiencies (**Section 6**);
6. **Energy:** Change to a diverse range of energy sources, using resources more efficiently and responsibly, and dramatically reducing greenhouse gas intensity (**Section 7**).

Although each milestone is provided with some recommendations, an overall recommendation is also included within each section.

1.1. Method and approach

The approach is taken by LR to undertake this project is detailed below:

Desktop review:

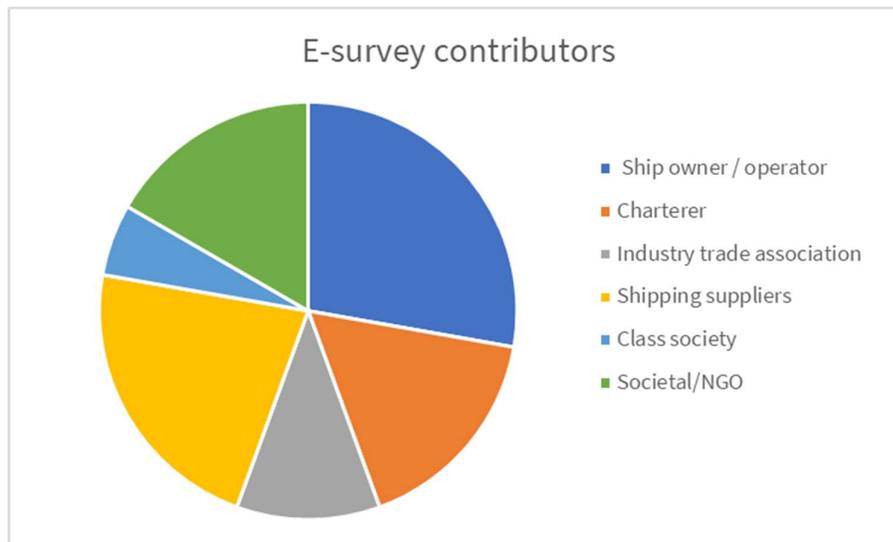
The desktop review of the existing Roadmap was in the form of industry documentation review, academic research review, discussions with subject matter experts and discussions with the SSI

secretariat. LR's own subject matter experts provided their detailed advice on areas of governance, regulations, statutory requirements, class requirements, port state control, health and safety, risk management, human elements, energy sources and sustainability.

E-survey:

The desktop review followed an e-survey which was prepared by LR in discussion with the SSI secretariat. The e-survey was made available to all SSI members and a large number of stakeholders from our industry. The true representation of these members is presented in the below pie chart. They represented different parts of our industry from different geographical locations.

Figure 1: E-survey contributors



The purpose of the survey was ultimately to update the Roadmap but also to understand where we are as an industry with our commitments to a sustainable future. The survey aimed to assess the degree of awareness, commitment and practices of marine businesses to sustainability and to clearly establish the type and the magnitude of existing and future business challenges, opportunities and drivers in this area. These were assessed on the basis of:

- The extent to which marine stakeholders currently do, or plan to address sustainability;
- whether key stakeholders see potential commercial advantages in more sustainable business practices; and,
- which key stakeholders currently implement sustainability strategies, or plan to develop them in the future.

Questions and some of the analysis of the survey are provided in Appendix A.

Stakeholder consultation:

The e-survey followed stakeholder consultation which was in the form of an open discussion with a number of SSI members and industry stakeholders. The participants were asked open questions in terms of the current Roadmap's content and format as well as their understanding of a sustainable business within our industry. Their thoughts and recommendations have been invaluable towards the conclusions and recommendations made within this project.

LR would like to express deep gratitude to SSI secretariat and other contributors for their invaluable assistance and insight. This project could not have been developed without their open and practical input.

Consultation questions and a list of stakeholders are provided in Appendix B.

Validation process:

Outline of each vision, RAG status of the qualitative progress made against the current milestones, evidence of each mission and recommendations for the update of the new roadmap are included in each section. Each milestone for relevant decades for every vision area in a more concise and easy to digest format are presented in a table format. Colour coding within the tables represents RAG status of these milestones and may be explained as below:

- **Red:** very little or no progress has been made within the industry;
- **Amber:** some progress has been made but the milestone has not been fully achieved;
- **Green:** the milestone objectives are fully achieved.

Validation process also includes incorporating feedback from SSI secretariat, SSI members and the SSI editorial committee (China Navigation Company, Louis Dreyfus Company and LR).

Proposed Roadmap layout and content is provided in Appendix C which follows:

- LR’s recommended format;
- new improved plain wording;
- new decades;
- new numbering system;
- new milestone families;
- new consistent and reduced numbered titled tabs;
- removal of fulfilled milestones,
- consolidation of some milestones, case for action and outcomes,
- moving some milestones to more suitable vision areas,
- removing repetition, and
- in general, making the roadmap easy to read by all stakeholder with various backgrounds.

1.2. Abbreviations and definitions

Abbreviations	Definitions
AAPA	American Association of Port Authorities
AIS	Automatic Identification System
APM	Associated Protective Measures
BIMCO	World’s largest direct-membership organisation for shipowners, charterers, shipbrokers and agents

BWM	Ballast Water Management
CCC	IMO's Sub-Committee on Carriage of Cargoes and Containers
CIMAC	Association of the Internal Combustion Machinery Industry
CO₂	Carbon dioxide
ECA	Emission Control Area
EEDI	Energy Efficiency Design Index
EEXI	Energy Efficiency Existing Ship Index (EEXI)
EF	Excess Factor
EGCS	Exhaust Gas Cleaning Systems
EMSA	European Maritime Safety Agency
EPCSA	European Port Community Systems Association
ESCO	Energy Service Company
ESI	Environmental Ship Index
EU	European Union
EU ETS	EU Emissions Trading System
EU MRV	EU Monitoring Reporting and Verification System
EcoSLC	ECO Sustainable Logistics Chain Foundation
EU SRR	EU Ship Recycling Regulation
GHG	Greenhouse gas
HKC	The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships
IAPH	International Association of Ports and Harbors
ICAM	Integrated Coastal Area Management
ICS	International Chamber of Shipping
IHM	Inventory of Hazardous Materials
ILO	International Labour Organization
IMO	International Maritime Organization
IMO DCS	IMO's Data Collection System
Intertanko	International Association of Independent Tanker Owners
IOC-UNESCO	The Intergovernmental Oceanographic Commission of UNESCO
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
ITF	International Transport Workers' Federation
IUU	Illegal, unreported and unregulated fishing
LR	Lloyd's Register
LTI	Lost Time Injuries
MAIB	Marine Accident Investigation Branch (UK)
MARPOL	The International Convention for the Prevention of Pollution from Ships
MASS	Maritime Autonomous Surface Ships

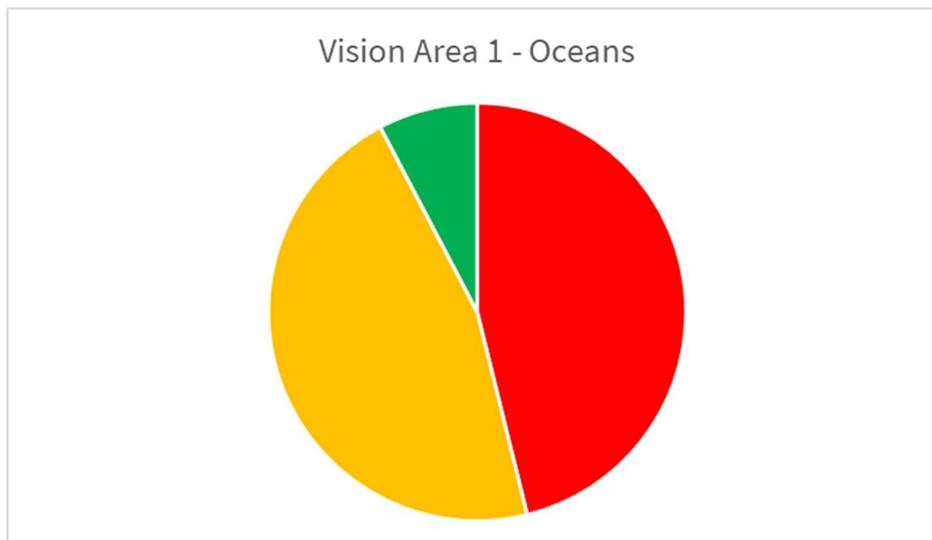
MEPC	IMO's Marine Environment Protection Committee
MLC	ILO's Maritime Labour Convention
MPA	Marine Protected Areas
MSC	IMO's Marine Safety Committee
MSP	Marine Spatial Planning
NORAD	Norwegian Agency for Development Cooperation
NO_x	Nitrogen oxides
OECD	Organisation for Economic Co-operation and Development
P&I clubs	Protection and Indemnity clubs
Paris MoU	Paris Memorandum of Understanding on Port State Control
PERS	Port Environmental Review System
Polar code	The International Code for Ships Operating in Polar Waters
PSC	Post State Control
PSSA	Particularly Sensitive Sea Area
RAG	Representation of status as Red Amber Green
RO	Recognised Organisation
SECA	Sulphur Emission Control Area
SIGTTO	Society of International Gas Tanker & Terminal Operators Ltd
SOLAS	International Convention for the Safety of Life at Sea
SO_x	Sulphur oxides
SSE	Sub-Committee on Ship Systems and Equipment
SSI	Sustainable Shipping Initiative
STCW	Standards of Training, Certification and Watchkeeping
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WOC	World Ocean Council
WPCI	The World Ports Climate Initiative

2. Vision Area 1 – Oceans

Proactively contributing to the responsible governance of oceans.

RAG status of the qualitative progress made against milestones for Vision Area 1 is demonstrated in below pie chart.

Figure 1: Progress made within Vision Area 1.



2.1. Outline of the current 2040 vision

The first area of the roadmap outlines the milestones needed to deliver the 2040 vision of having a formal system of global ocean governance in place by 2040, to recognise the rights and responsibilities of key ocean users and manage heavy use areas through a system of well-enforced marine spatial plans.

The Case for Action for this vision area is summarised and updated in Table 1a below.

Table 1a: Vision area 1 – Case for Actions.

	2020s	2030s	2040s
Case for Action	Arctic sea passages are used. Rapid increase of ocean industries. Reduce CO2 to 1990 levels to prevent runaway Climate Change. Global fleet increases significantly. Increased transparency and visibility of shipping creates more global demand for sustainable standards.	Sea control is needed. Rapid increase of coastal shipping puts pressure on coastal waters. Growing middle class in developing countries demand sustainable standards.	

Table 1b below presents the milestones for each decade for this vision area with a RAG status.

Table 1b: ‘Proactively contributing to the responsible governance of oceans’ vision milestones.

No	2010s	2020s	2030s
1	Implementation Standardised tools, resources and audits for MSPs for regional and national waters to be developed. Pilot projects for various fields to share good practice to be developed.	Implementation Preventing the heavy use of MSPs and progressive increase in performance standards required in MPAs. Increase in protected sea areas.	Governance Established high seas and coastal MPAs in place. Established MSPs in place.
2	Enforcement IMO strengthens its relationship with national and regional regulators to enforce standards and regulations.	Governance Rate of ratification at IMO is increased significantly.	
3	Enforcement Enforcement is ramped and strengthened to improve compliance.	Enforcement Effective enforcement for MSP and MPA.	
4		Governance Progressive increase in international and inter-agency ocean governance bodies.	Governance Overarching governance body is formed for all ocean and maritime industries.
5			Ship efficiency Better ship tracking, port management and route management are in place.
6	Implementation Pilot studies in place to address piracy.		Enforcement Piracy is eliminated and solved.
7			Implementation Unmanned ships are in place.

2.2. Evidence of progress against the milestones

Milestone 1 (2010s):

Standardised tools, resources and audits for MSPs for regional and national waters to be developed.

Pilot projects for various fields to share good practice to be developed.

RAG status: Amber

Evidence

The purpose of MSP is to reduce conflicts between competing maritime resource demands, encourage investment by providing clarity on the rules and requirements for use of maritime resources, increase cooperation between states and of course protect the marine environment. So far, the EU has established a framework for MSP and there are several European MSP projects which can be found in Ref [1].

By 2021 all EU Member States are required to establish maritime spatial plans, which will include how they will manage the competing demands for marine resources in areas of national jurisdiction to protect the marine environment. Internationally, there are examples of other activities, but no international instrument nor body is governing maritime spatial planning. In effect, the area-based management tools embodied in the work on areas beyond national jurisdiction may fill this gap.

The IMO has developed legally binding instruments which enable Flag States to meet their obligations under the United Nations Convention on the Law of the Sea (UNCLOS). However, no equivalent organisation or set of instruments exists to give effect to Section 2 (Conservation and Management of the Living Resources of the High Seas) of Part VII of UNCLOS and the articles therein.

Moving forward, the process of drafting the first-ever treaty addressing marine biodiversity of areas beyond national jurisdiction entered a new phase in August 2019, during the third-session of ‘The Intergovernmental Conference on an international legally binding instrument under the UNCLOS on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction’, as Member-States began text-based deliberations, with a view to reaching an agreement by the first half of 2020.

The important aspects of the text as drafted are:

1. Area based management tools including Marine Protected Areas which may be given higher levels of protection to ensure that conservation and sustainability objectives for these areas can be achieved. This is likely to have an impact on freedom of navigation on the high-sea. The IMO already uses Associated Protective Measures (APM) for Particularly Sensitive Sea Areas (PSSA) and it is important that the privacy of IMO is maintained.
2. The enshrinement of the principle of the ‘polluter pays’ in an area beyond national jurisdiction: This strengthens the challenge to the marine and offshore industries to address impacts on the environment, including but not limited to matters already covered by MARPOL. The point is to give shipping a simple regulatory framework in and beyond national jurisdiction which does not hinder or dissuade the industry from engaging in its own sustainability initiatives.
3. Environmental Impact Assessments would be required for all activities that parties consider may have an impact on the marine environment. In effect, this introduces a requirement to systematically assess the environmental consequences of activities in areas beyond national jurisdiction. This is not necessarily relevant to the shipping industry, but certainly relevant to the offshore activity.

The Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) is a body with functional autonomy within UNESCO (The United Nations Educational, Scientific and Cultural Organization). The purpose of the Commission is to promote international cooperation and to coordinate programmes in research, services and capacity-building, in order to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and the decision-making processes of its Member States.

The objective of IOC marine management activities is to assist IOC Member States in their efforts to build marine scientific and technological capabilities in the field of integrated coastal management as a follow up of United Nations Conference on Environment and Development (UNCED). The IOC provides marine scientific data, develops methodologies, helps countries operationalise ecosystem-based management, disseminates information and builds interdisciplinary capacity through symposia, workshops, seminars and training courses.

IOC also has an integrated coastal area management (ICAM) and MSP initiative in place. ICAM is an interdisciplinary activity where natural and social scientists, coastal managers and policy makers, in the long-term, focus on how to manage the diverse problems of coastal areas. The MSP initiative is helping countries implement ecosystem-based management by finding space for biodiversity conservation and sustainable economic development in marine environments.

The following four aspects are important for the fulfilment of this milestone:

1. Clarity and effectiveness of the regulatory framework for areas beyond national jurisdiction developed by the conference of parties which supports and encourages industry participation in ocean governance and industry-led sustainability initiatives;
2. Participation and engagement of industry in environmental impact assessments and consideration of area-based management tools;
3. Preservation of the importance of the IMO in matters affecting international shipping to avoid fragmented or contradictory requirements being imposed on the industry; and
4. Standardisation across national jurisdictions.

In terms of the pilot projects, this milestone remains not fully achieved. Although some MSP piloting took place in Greece, Cyprus, Russia and the UK in conjunction with the EU developed studies and guidelines; lack of a standardised approach across national jurisdictions remains to be the main issue.

It is expected that the fourth session of the Intergovernmental Conference on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, will fulfil part of the ambition behind this milestone.

The critical point is that to contribute to the sustainability of maritime resources, the shipping industry needs to be a positive part of the process.

Milestone 1 (2020s):

Preventing the heavy use of MSPs and progressive increase in performance standards required in MPAs.

Increase in protected sea areas.

RAG status: Amber

Evidence:

It is anticipated that restricting areas to ships may be developed instead of increasing performance. This may be associated with measures linked to seasons or environmental phenomenon. For the SSI's attention, risks appear not to be fully identified within this area, i.e. changes that may prevent achieving the set milestone.

To date, there is lack of an internationally established MSP programmes. MSPs remain under-development with standards not agreed so far, except at regional levels.

Several countries have piloted projects for MSPs and the EU is introducing fishing quotas as part of the wider MSP.

Milestone 1 (2030s):

Established high seas and coastal MPAs in place.

Established MSPs in place.

RAG status: Amber

Evidence:

Many countries around the world are using MSP to encourage compatible uses, reduce use conflicts, and balance sustainable use and marine conservation.

Many countries around the world have also established MPAs and these are mainly governed by local, state, territorial, native, regional and national authorities. The variation between these national bodies includes different limitations on development, fishing practices, fishing seasons and catch limits, moorings and bans on removing or disrupting marine life. For this reason, the establishment of more standardised governance is essential for this milestone to be fully achieved.

Milestone 2 (2010s):

IMO strengthens its relationship with national and regional regulators to enforce standards and regulations.

RAG status: Green

Evidence:

The IMO continued to increase the number of projects that have been supporting governments to enforce standards and regulations. A list of such IMO projects can be found within Ref [2].

Exemplary projects and agreements have been developed by the IMO with the support of some countries such as 'The Norwegian Agency for Development Cooperation (Norad)' framework Cooperation Agreements. This exemplary agreement focuses on developing cooperation to enhance the capacities of developing countries to implement and enforce related IMO Conventions, Codes and other Standards Ref [3].

Milestone 2 (2020s):

Rate of ratification at IMO is increased significantly.

RAG status: Red

Evidence:

This milestone is yet to be achieved. The rate of convention ratification may need to be defined by the consortium for the different conventions, for tracking this milestone. This is in conjunction with the view of different members having different reasons for non-ratification such as the United States' decision on not to ratify the Ballast Water Management Convention. The late ratification of conventions may lead to more national and regional regulations being developed and making it hard for industry to comply with various regulations for one environmental issue.

Milestone 3 (2010s):

Enforcement is ramped up and strengthened to improve compliance.

RAG status: Amber

Evidence:

Enforcement by the government usually includes:

- Inspections to determine the compliance status of the regulated human activities and to detect violations;
- Negotiations with individuals or managers of activities that are out of compliance to develop mutually agreeable schedules and approaches for achieving compliance; and
- Legal action, where necessary, to compel compliance and to impose some consequence for violating the law or posing a threat to public health or environmental quality, including monetary penalties or withdrawal of a permit.

Non-governmental organizations may also become involved in enforcement by detecting noncompliance, negotiating with violators, and commenting on government enforcement actions. In some cases, where the law allows, they may take legal action either against a violator for noncompliance or against the government for not enforcing the requirements.

In addition, certain industries (such as the banking and insurance industries) may be indirectly involved in enforcement by requiring the assurance of compliance with MSP requirements before issuing a loan or insurance policy to construct an offshore facility.

Various areas are reviewed for evidence of milestone progression listed below:

- Anti-whaling agreements – The lack of an international reporting platform is a factor contributing to legal enforcement.
- Prohibited fishing gear – Under MARPOL Annex V, garbage also includes fishing gear. To assist Governments, ships and port operators in implementing relevant requirements under MARPOL Annex V, MEPC has developed and adopted the Guidelines for the implementation of MARPOL Annex V, resolution MEPC.295(71).

With respect to enforcement, it is expected that effective marking of fishing gear is seen as a critical tool in addressing the problem. This would also help better implementation of the Annex V regulations.

The Food and Agriculture Organization of the United Nations (FAO), has agreed voluntary Guidelines on the Marking of Fishing Gear. The Guidelines assist fisheries management and can be used as a

tool in the identification of illegal, unreported and unregulated (IUU) fishing activities. The Guidelines address the purpose and principles, the scope of application and the implementation of a gear marking system and its associated components, including reporting, recovery and disposal of unwanted fishing gear and commercial traceability of fishing gear. The Guidelines also contain special considerations for developing States and small-scale fisheries with a view to capacity development, as well as guidance on conducting a risk-based approach to implementing gear marking systems. The Guidelines are expected to assist States in meeting their obligations under international law, including relevant international agreements and related governance frameworks and the specific requirements for gear marking contained in FAO's Code of Conduct for Responsible Fisheries.

- Emission Control Area (ECA) operational discharges – There has been significant activity levels within this area.

As of 1 January 2019, The Baltic Sea and the North Sea ECA, have been designated as NOx 'Tier III' emission control areas. All ships, (Diesel engines > 130 kW), constructed on or after 1 January 2021 will have to comply with 'Tier III'.

Exhaust Gas Cleaning Systems (EGCSs) retrofit, has proven to be a popular choice to comply with the sulphur requirements. Several ports within ECAs have recently introduced bans on discharging treated effluent water to the sea from open-loop EGCSs when ships are in port. This means that the EGCSs can only be used in port if the treated effluent from washed exhaust gases can be retained onboard. If this cannot be achieved, ships are required to use the EGCSs in a closed-loop mode (if available) or utilise compliant fuel.

In addition to the newly established Baltic Sea ECA, Annex IV has been amended introducing a Special Area (the Baltic Sea) regulating the discharge of sewage from passenger ships. The discharge is prohibited in this area except for ships that have an operative approved sewage treatment plant.

With respect to enforcement, notable maritime authorities such as the United States Coast Guard (USCG), the Australian Maritime Safety Authority (AMSA) and others have published their latest information on enforcement.

Milestone 3 (2020s):

Effective enforcement for MSP and MPA.

RAG status: Red

Evidence:

Compliance and enforcement are essential elements of the rule of law and good governance. However, they are often the weak links of the MSP process. General requirements, such as zoning regulations, permits and licences will be most effective if they closely reflect the practical realities of compliance and enforcement. With this in mind, they should:

- Be clear and understandable;
- Define which sources or activities are subject to the requirements;
- Define the requirements and any exceptions or variances;
- Clearly address how compliance is to be determined by specifying procedures;
- Clearly state deadlines for compliance; and

- Be flexible enough to be constructively adapted through individual permits, licences or variances to different regulatory circumstances.

MSP will only be as effective as its ability to enforce the agreed upon plans, rules and regulations. This is a fundamental requirement of the process. The objective of integrated spatial planning will be difficult to achieve if there is any significant measure of unauthorised development of marine areas.

An important task in relation to enforcement is to ensure that strategies, plans and regulations are not too forbidding. Instead, they should be integrated across sectors, and be communicated in a clear, concise manner to the public and the private sector. Stakeholders will usually support effective enforcement if the rules are consistently applied, on the basis of transparent policies and procedures.

Currently, legal enforcements remain only at regional levels, and not at MSP level (beyond 12 miles), due to the lack of international regulation. It is expected that the developments under UNCLOS (2020) and EU 2021 timeline will act as proxies on the status of legal enforcement.

For Particularly Sensitive Sea Areas (PSSAs) and MPAs, although the legal framework and context are well-defined under the EU and the IMO, concrete legal enforcement has not been established due to the lack of an international reporting platform.

The IMO has its guidelines for the identification and designation of PSSAs that have been revised in 2006. These guidelines also include the provisions within the application for legal action to be taken against non-compliance.

In terms of MPAs, in parallel with the IMO, the EU has also acted on its responsibility to maintain the health of its seas. As such political commitments including specific EU legislation, have been made by both the EU and individual countries. One of the key policy commitments is Aichi Target 11 under the Convention on Biological Diversity, that states by 2020, 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider seascape’.

Milestone 4 (2020s):

Progressive increase in international and inter-agency ocean governance bodies.

RAG status: Red

Evidence:

The IMO does not regulate resources below the seabed. This means that in general, this is to be potentially regulated by UNCLOS. To date, key maritime industries are not represented by an international governing body to enable the formal participation on the global ocean governance. The SSI may wish to re-consider this milestone or may wish to initiate/join an alliance with other key stakeholders, to enable the potential fulfilment of this milestone.

Milestone 4 (2030s):

Overarching governance body is formed for all ocean and maritime industries.

RAG status: Red

Evidence:

No current industry proxies indicate developments under this milestone as mentioned in milestone 4 (2020s).

Milestone 5 (2030s):

Better ship tracking, port management and route management are in place.

RAG status: Amber

Evidence:

This milestone is yet to be achieved. However, developments have been noted within the areas of virtual arrival, and best port management practices. These are further discussed in milestone 5 under Vision Area 6.

Milestone 6 (2010s):

Pilot studies in place to address piracy.

RAG status: Red

Evidence:

To date, there are no IMO studies underway to address piracy at source. Piracy is not a maritime problem but manifests itself in the maritime industry. This is believed to be the reason why it hasn't been addressed at a source level yet. It is also believed land-based measures that are emerging from less developed countries would be a more effective approach to tackle piracy.

The IMO has adopted appropriate guidance aimed at addressing maritime security, as well as piracy and armed robbery against ships. For piracy and armed robbery, this includes guidance to governments, shipowners and ship operators, shipmasters and crews on preventing and suppressing acts of piracy and armed robbery against ships; investigation of offences and the use of armed personnel on board ships.

Best management practices were developed by the shipping industry that outline the appropriate procedures to be employed when responding to acts or attempted acts of piracy and armed robbery against ships in specific regions. These are not limited to the IMO, as several bodies including BIMCO, Intertanko and the International Chamber of Shipping (ICS) have issued additional guidance on piracy Ref [4].

It is evident however, that the frequency of piracy related incidents remains high, with 10 incidents recorded in October 2019 alone, as reported by the IMO Ref [5].

For the SSI, it is suggested that this goal may be widened to capture not only piracy and armed robbery against ships, but also to involve cyber security Ref [6] threats to the industry. The IMO has taken the initiative to raise awareness across the industry on how to tackle risks by promoting a maritime cyber risk management approach. This concluded to adopt in 2017 Resolution MSC.428(98). Further guidance from industry bodies also followed.

Milestone 6 (2030s):

Piracy is eliminated and solved.

RAG status: Red

Evidence:

In April 2019, in co-operation with other international shipping associations, the Oil Companies International Marine Forum (OCIMF) and ICS submitted a proposal to the IMO Maritime Safety Committee calling for an inter alia for a more co-ordinated response by governments and the world's military navies to support the law enforcement of authorities in the region. The industry is also supporting a call by the Government of India for the United Nations to establish a diplomatic contact group with regular meetings to address the growing crisis, as it did with notable success to help resolve the surge of attacks off the coast of Somalia, in which around 4,000 seafarers were taken hostage until order was eventually restored by the world's military navies. Overall, the IMO should be a part of the action bodies within this area to eliminate piracy.

Milestone 7 (2030s):

Unmanned ships are in place.

RAG status: Amber

Evidence:

MSC 101 approved in June 2019 'MSC.1/Circ.1604', Interim Guidelines for Maritime Autonomous Surface Ships (MASS) Trials. The Maritime Safety Committee agreed to keep the Interim Guidelines under review and to amend them in view of the experience gained with their application and/or as and when the circumstances so warrant. Given the developments within this area of the industry, unmanned ships are anticipated to be in service sooner than expected.

Autonomous and remote-controlled ships are being trialled in some sea areas. Most predictions are that autonomous or semi-autonomous operation would be limited to short voyages, for example, from one specific port to another, across a short distance.

2.3. Recommendations

These goals by the SSI under this vision area remain challenging to fulfil within the time frame. This is due to the natural cycle of work to agree on international regulations within the IMO, agencies and other bodies.

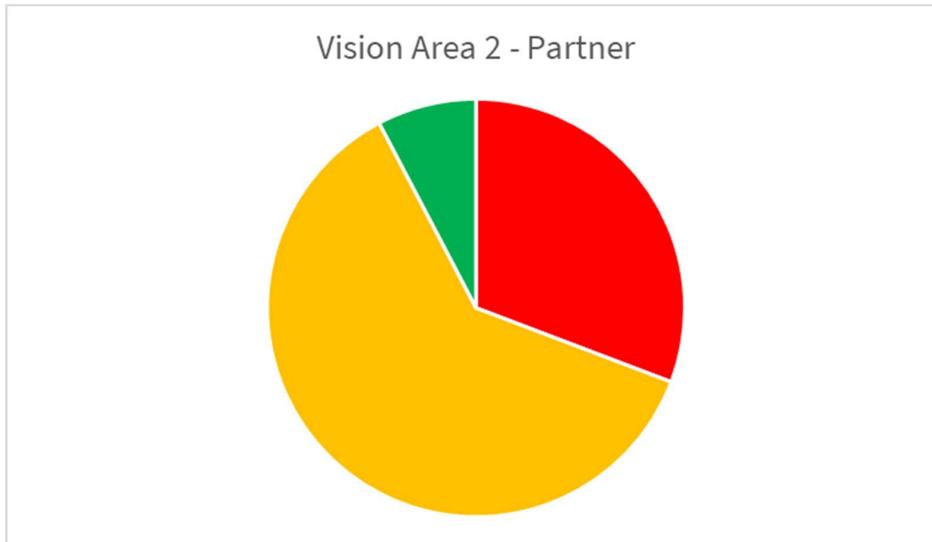
It is also believed that the establishment of an international reporting system, which is recognised by many administrations, will promote recognition of responsibilities, while also enforcing MSPs.

3. Vision Area 2 – Partner

Earning the reputation of being a trusted and responsible partner in the communities where the industry lives, works and operates.

RAG status of the qualitative progress made against milestones for Vision Area 2 is demonstrated in below pie chart.

Figure 2: Progress made within Vision Area 2.



3.1. Outline of the current 2040 vision

The second area of the roadmap outlines the measures for the shipping industry to earn the reputation of being a trusted and responsible partner in the communities where the industry lives, works and operates. This area’s primary goal is to ensure coastal communities are effectively represented in the maritime and land-based governance bodies at all levels with well-defined and enforced standards. This would mean that the port communities have a clean and healthy environment and the corruption is eradicated. Additionally, shipping is seen as an enabler to trade and development. The ultimate objective is to provide a harmony between ships, ports, and port communities in terms of jobs, condition and technology.

The Case for Action for this vision area is summarised and updated in Table 2a below.

Table 2a: Vision area 2 – Case for Actions.

	2020s	2030s	2040s
Case for Action	Increased transparency and visibility of shipping creates more global demand for sustainable standards from beyond the industry.	Growing middle class in developing countries demand sustainable standards.	

Table 2b below presents the milestones for each decade for this vision area with a RAG status.

Table 2b: ‘Earning the reputation of being a trusted and responsible partner in the communities where the industry lives, works and operates’ vision milestones.

No	2010s	2020s	2030s
1	<p>Implementation A coalition of leading port authorities/coastal states forms to share best practice.</p>	<p>Governance An international governance body formed to represent port and other coastal communities, involving port states/ cities/ authorities and maritime users across the land-sea interface.</p>	<p>Governance International governance body representing coastal/port facilities has significant role in determining standards of development and community engagement in the development of new port facilities.</p>
2	<p>Implementation Communities impacted by shipping are mapped and agreed with material impacts identified by the IMO. Measures are developed of social value contribution from shipping to port communities.</p>	<p>Governance International common agreement on environmental and social performance standards for port and port communities are ratified by the key stakeholders.</p>	<p>Enforcement Corruption at ports is managed at global level by the IAPH and IMO port facilities.</p>
3		<p>Governance Deregulation of cabotage frees up land-based congestion. Improve port infrastructure and efficiency.</p>	<p>Governance Improved infrastructure removes bottlenecks and improves access for smaller producers increasing productivity and employment.</p>
4		<p>Implementation Agree minimum standards for developing world ports. Major ports report environmental and social performance using a common standard.</p>	
5	<p>Health & Safety UNEP develops a coalition of developing country ports in reducing health impacts due to air quality in ports.</p>	<p>Health & Safety UNEP’s work with developing country ports succeeds in reducing deaths due to air quality in ports.</p>	
6	<p>Labour Conditions Standards for seafarers are improved and become implemented.</p>	<p>Labour Conditions Working and living standards for seafarers are improved and implemented. Seafarers are given equal treatment to on-shore staff.</p>	

3.2. Evidence of progress against the milestones

Milestone 1 (2010s):

A coalition of leading port authorities/coastal states forms to share best practice.

RAG status: Green

Evidence

This milestone is considered achieved, in particular following the coalition and expansion of networks similar to EcoPorts which is the main environmental initiative of the European port sector. EcoPorts goes beyond the green approach and is open for registration not only from European ports. EcoPorts offers a free exchange of knowledge and experience, that is now available as a voluntary measure for ports worldwide. Activities and the developments of EcoPorts can be found under Ref [7]. The following figures were noted in terms of the coalition and network growth:

- 112 EcoPorts members;
- 24 countries represented;
- 474 Self Diagnosis Method entries;
- 27 Port Environmental Review System (PERS) certified ports; and
- 52 ISO certified ports.

EcoPorts and its international, coordinating and administrative foundation ECO Sustainable Logistics Chain Foundation (EcoSLC), were recognised by the American Port Authorities Association (AAPA) in 2013, and subsequently by the African Ports Associations, the Taiwan Ports International Corporation, and the United Nations Environmental Program (UNEP). The World Bank also recognises EcoPorts and its standard PERS, as an international environmental management system and as an environmental risk prevention system, in the context of ports' application seeking investment from the bank. The most recent acknowledgement through a Memorandum of Understanding with the Arab Sea Ports Federation, in February 2017.

It is anticipated that the developments of this coalition will continue to grow. This is attributed mainly to the free-best practice sharing provided by this coalition, in conjunction with the developed certification under the PERS, which remains to be the only port sector specific environmental management standard.

Milestone 1 (2020s):

An international governance body formed to represent port and other coastal communities, involving port states/ cities/ authorities and maritime users across the land-sea interface.

RAG status: Red

Evidence

Such a governance body currently does not exist therefore, this milestone has not been achieved. However, it should be mentioned that these entities are represented at the IMO singularly by various different organisations.

Milestone 1 (2030s):

The international governance body representing coastal/port facilities has a significant role in determining standards of development and community engagement in the development of new port facilities.

RAG status: Red

Evidence

Such an international governance body currently does not exist therefore, this milestone has not been achieved. However, it should be mentioned that these entities are represented at the IMO singularly by various different organisations.

Milestone 2 (2010s):

Communities impacted by shipping are mapped and agreed with material impacts identified by the IMO.

Measures are developed of social value contribution from shipping to port communities.

RAG status: Amber

Evidence

The IMO attempted to take action on mapping the affected communities as a consequence of its regulatory framework. Within the IMO, the only exception if the assessment of impact on states is required, is for measures to reduce air emissions from ships. IMO's impact assessment for ECAs are comprehensive and this should be mirrored for other parts of the work to completely fulfil this milestone.

The lack of such guidelines within the IMO recently surfaced in the latest Marine Environment Protection Committee (MEPC) 74th session (MEPC 74). This was raised by far-reaching countries, on how they would suffer from increase cost in goods as a consequence of slow-steaming from shipping. This led to the agreement on a procedure for assessing the impact on states which remains limited for measures to reduce GHG emissions from ships.

In terms of other regulating bodies such as the European Commission (EC), the EC has its guidelines to impact assessment regulations Ref [8].

Social value contributions are irrespective of any convention, however, been always imbedded in an indirect mechanism behind the IMO principles. Contribution from ships to shore communities often is in the form of providing goods and shore reception facilities.

Social value contribution from shipping has been typically rare over the years, however, recent natural disasters have shown some positive interaction between ship and shore. Oil majors appear to demonstrate social contribution values as part of their giving back to the communities' programs, however, this is not scaled across different ship types.

After the recent natural disasters within the Caribbean, cruise companies have assisted the effected communities which are within their itineraries demonstrating a good example to the industry.

In addition to the above, initiatives taken by organisations such as SEA20 look promising to expand the understanding behind this milestone. The study 'Unleash our cities' conducted by SEA20, sheds light on the importance of assessing the key challenges confronting the modern maritime

ecosystem for sustainability, competitiveness and people, and how these challenges could be overcome through cooperation between three key players: cities, the maritime industry and ports.

To further close the gap within shipping and communities under this milestone, action in the following areas have been identified:

- A systemic approach to regulation, innovation, processes and collaboration needs to be adopted;
- Data is the way to efficiency and sustainability. We must build interoperability, standards and the trust necessary for the sharing of data;
- Cities must realise the importance of their role, and ports and industry should support their efforts. Cities can spread standards, harnessing their growing influence and accountability to their citizens; and
- Everyone needs to take an interest in maritime and recognise the challenges associated with closing the gap between cities, the maritime industry and ports.

Additional output within this area is further expected to conclude in the summer of 2020 Ref [9].

Milestone 2 (2020s):

International common agreement on environmental and social performance standards for port and port communities are ratified by the key stakeholders.

RAG status: Amber

Evidence

The establishment of voluntary port standards has already seen development as discussed above. International Port Community Systems Association (IPCSEA) also plays a role within port standards developments. IPCSEA works with its members to support trade facilitation and greater transparency in the supply chain.

With respect to best practices and voluntary standards for port communities, initiatives taken by organisations such as SEA20, and the European Port Community Systems Association (EPCSEA) Ref [10], look promising to expand the understanding behind this milestone. Developments within this milestone are further discussed in Milestone 4 below.

The World Ports Climate Initiative (WPCI) is a global programme to provide ports worldwide with a framework to mitigate their impact on climate change. The WPCI was launched in 2008 by the International Association of Ports and Harbours (IAPH) and regional Port Organizations. Their missions are to raise awareness of the need for action in the port and maritime community; initiate studies, strategies, and actions to reduce GHG emissions and improve air quality; provide a platform for the maritime port sector for the exchange of information; and make available information on the effects of climate change on the maritime port environment and measures for its mitigation.

Milestone 2 (2030s):

Corruption at ports is managed at a global level by the IAPH and IMO port facilities.

RAG status: Amber

Evidence

Developments in the adoption of principles and guidelines were observed in this area both at IAPH and the IMO levels.

- IAPH and sustainable ocean principles:

During the UN Climate Action Summit in 2019, the launch of the Sustainable Ocean Principles of the UN Global Compact took place. These aim at determining how ocean industries can advance progress towards the UN Sustainable Development Goals. These Sustainable Ocean Principles provide a framework for responsible business practices across sectors and geographies. The work of the platform builds upon the ten principles of the UN Global Compact, which outline business responsibilities in the areas of human rights, labour, environment and anti-corruption.

- The IMO's Facilitation Committee:

During its 43rd session, the IMO's Facilitation Committee decided to include a new output on its agenda, on "Guidance to address maritime corruption", with a target completion year of 2021. This followed the discussion of submission from several Member States and non-governmental organisations, which highlighted a Maritime Anti-Corruption Network (MACN) anonymous reporting mechanism that has collected over 25,000 incident reports up to October 2018. The submission proposed the development of IMO Guidelines and/or a Code of Best Practice, intending to address the problem of maritime corruption and reduce the impact on global trade, improving port governance and reducing adverse consequences on seafarers.

- The World Economic Forum Friends of Ocean Action:

Friends of Ocean Action is a coalition of over 50 ocean leaders who are fast-tracking solutions to the most pressing challenges facing the ocean. Its members come from business, civil society, international organizations, science and technology. They work towards a sustainable ocean economy that brings the political will of 12 heads of government. Their aim is to drive action and transformative, high-impact and scalable initiatives in time for the proposed UN Ocean Conference in 2020. They have actions on plastic pollution, sustainable ocean production, unregulated fishing, MPAs, decarbonisation of shipping, liberating ocean data, financing ocean innovation, gender parity and deep-sea mining.

Milestone 3 (2020s):

Deregulation of cabotage frees up land-based congestion. It also improves port infrastructure and efficiency.

RAG status: Red

Evidence

Cabotage remains high internationally. The EU has embraced the Organisation for Economic Co-operation and Development (OECD) principle of free trade of international shipping services, not only just between EU member states, but also between EU Member States and third countries. The EU has committed itself to progressively abolish existing restrictions and prevent the introduction of new restrictions. Therefore, there should be no change for ships trading internationally, regardless of where they are registered or where ownership is based. However, regulation of cabotage still remains to be an international challenge.

Milestone 3 (2030s):

Improved infrastructure removes bottlenecks and improves access for smaller producers increasing productivity and employment.

RAG status: Red

Evidence

This milestone is yet to be achieved with no significant updates within this area.

Milestone 4 (2020s):

Agree minimum standards for developing world ports.

Major ports report environmental and social performance using a common standard.

RAG status: Amber

Evidence

The agreement on a minimum standard for leading world ports exist to date through EcoPorts, and the Port Environmental Review System (PERS), which is the only port sector specific environmental management standard. This standard, however, remains limited to leading ports only as mentioned in Milestone 1.

It is important however to note that apart from the development of a minimum standard, efforts within consortiums such as the World Port's Sustainability Program (WPSP) should also be recognised. The WPSP have formed an alliance that developed areas of sustainability in 2017. The WPSP aims to demonstrate global leadership of ports in contributing to the Sustainable Development Goals of the United Nations. WPSP considers 17 UN sustainable development goals as single and indivisible orientation for the sustainable development of ports. As part of WPSP's declaration, their objectives include:

- Establish and maintain a global library of best practices;
- Provide a portal for projects and initiatives of international port-related organisations that joined the program as partners;
- Function as a think-tank and breeding ground for new collaborative projects; and
- Report regularly about the sustainability performance of the global ports sector.

One of the projects within WPSP is the Environmental Ship Index (ESI). The ESI identifies seagoing ships that perform better in reducing air emissions than required by the current emission standards of the IMO. The ESI evaluates the amount of NO_x and SO_x that is emitted by a ship. Ships subsequently benefit from incentives for showing reductions in their NO_x and SO_x emissions, which also enables ports and other interested parties to stimulate ships to improve their environmental performance. The ESI is voluntary and WPSP hopes that the global port community will recognise its positive role in improving the maritime and port environment. The ESI is noted however to be limited to major leading ports.

There is no common social performance standard that addresses best practices apart from the MLC's requirements. As per the convention, contracting Administrations need to have a minimum level of facilities that contribute towards the social value for seafarers. This level of facilities, however, is not auditable by Recognised Organisations (RO), although yearly, each contracting

Administration produces a report to the International Labour Organisation (ILO). It is expected that initiatives similar to SEA20, as discussed in Milestone 2, may pave the way for an agreed common standard for reporting social performance of ports.

Milestone 5 (2010s):

UNEP develops a coalition of developing country ports in reducing health impacts due to air quality in ports.

RAG status: Amber

Evidence

UNEP has initiated the Sustainable clean port program (SCP) Ref [11] to reduce Particulate Matter (PM) and Black Carbon (BC) emissions from the transport sector, particularly from heavy-duty diesel vehicles and engines in 2012, recognising that ports are one of the major sources of PM and BC. This SCP goes beyond PM and BC, addressing three main aspects: 'Air Quality Improvement, Institutional framework for SCP implementation, and Co-Benefits and side effects of SCP'. The number of ports participating is currently limited to five pilot project ports.

On a regulatory level, it is worth outlining IMO's latest efforts for addressing BC emissions from shipping. The IMO's Sub-Committee on Pollution Prevention and Response (PPR), for its upcoming 7th session (February 2020), had agreed to finalise the possible candidate measures for addressing BC from shipping, which will be reported to MEPC 75. This means that following the outcome of MEPC 75, measures can be mandatory or non-mandatory.

This anticipated work will consider the candidate short term measures that have been identified, as well as supporting measurement methods, and developing a standardised sampling, conditioning and measurement protocol to make accurate and comparable measurements of BC emissions.

It is worth highlighting for the SSI, that apart from BC and PM, a coalition of ports from developing countries exist, and participate under the Environmental Shipping Index (ESI) Ref [12]. The rating scheme is voluntary as mentioned previously, and through participating ports, provides incentives for ships that go beyond statutory compliance, and can prove reductions in their Carbon Dioxide (CO₂), Sulphur and Nitrogen Oxides (SO_x and NO_x) emissions.

Milestone 5 (2020s):

UNEP's work with developing country ports succeeds in reducing deaths due to air quality in ports.

RAG status: Amber

Evidence

The regulatory and voluntary improvements that are detailed in Milestone 5 (2010s) will contribute to fulfilment of this milestone.

Further work following PPR7, Filter Smoke Number (FSN) and Photo-Acoustic Spectroscopy (PAS) were recognised to be good measurement methods for the determination of BC emissions from marine diesel engines. The sub-committee decided however, that further research and scientific evidence were required before any regulatory measures could be proposed to control BC emissions. It is worth noting that a reduction in BC and SO_x leads to a reduction in PM.

A simple action such as the ESI voluntary scheme that includes BC and PM as additional emissions under which ships with proven reductions, may receive ports incentives, may accelerate the fulfilment of this milestone.

Milestone 6 (2010s):

Standards for seafarers are improved and become implemented.

Working and living standards for seafarers are improved and implemented.

RAG status: Amber

Evidence

Standards for seafarers have been increasing with the introduction of the MLC, projects like GoodShip with the recent additions to the rating schemes aimed at assessing seafarer working conditions and recognising good employers.

In addition to the above, the ILO minimum wage (agreed in 2018 with increments leading to 2021), is substantially higher than that paid for comparative work ashore in developing countries. Moreover, the total wage enjoyed by most able seafarers is significantly higher once overtime hours and other mandatory payments, such as leave entitlements, are considered. Most ratings from developing countries that serve on ships trading internationally, especially where International transport workers' federation (ITF) contracts apply, receive significantly higher wages than those recommended by ILO.

Further developments have also occurred within the ICS in collaboration with the ITF. In October 2018, ICS and ITF jointly published Guidelines for Implementing the Welfare Aspects of the MLC. This joint ICS/ITF publication is intended to assist governments and welfare agencies to draft their guidelines for implementing the welfare provisions of the MLC.

Milestone 6 (2020s):

Seafarers are given equal treatment to on-shore staff.

RAG status: Amber

Evidence

Progress within this milestone remains slow. Equal treatment with shore staff is the main proxy within this milestone. Comparing equal treatment is also both company policy and contract dependent.

On a regulatory framework, the 2018 amendments to ILO Maritime Labour Convention (MLC 2006) entered into force on 01 January 2020. These amendments partially fulfil this milestone. The amendments introduce a change which means that a Seafarer's Employment Agreement (SEA), including payment of wages, continues to have effect while a seafarer is held captive on or off the ship as a result of piracy or armed robbery against the ship, until they are repatriated or die in captivity. This is the case regardless of whether the expiry date of the SEA has passed or if notice has been given to suspend or terminate it.

With respect to decriminalisation, unions representing seafarers are noted to be the most active parties. The rate of prosecution of seafarers has increased when compared to the past decades. The

prosecution of crew members continues to include the ship's officers, or the ship's Master for example, who may not be aware of an offence being committed by a crew member.

On a positive note, the work done by the 'Human Rights at Sea Legal Research Programme' is promising. Human Rights at Sea is a charitable incorporated organisation which has been established for the benefit of the international community concerning explicit engagement in exposing and ending abuses at sea. It raises global awareness of human rights abuses at sea and delivers positive change through legal and policy development. It provides a public platform for seafarers, fishers and students from around the world, to showcase its academic work in support of tackling pertinent issues that are important.

3.3. Recommendations

The set goals within this vision area appear to be moving in the right direction based on the updates of each milestone. For the SSI it is important to note that:

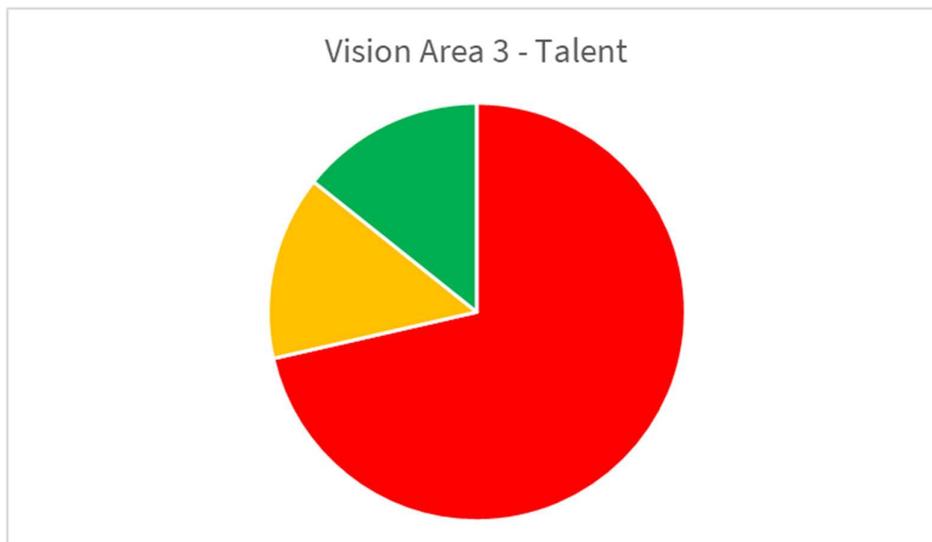
- Developed countries are leading in terms of meeting the objectives of this vision area hence for developing countries, this will continue to be the main challenge.

4. Vision Area 3 - Talent

Provide a healthy, safe and secure work environment so that people want to work in shipping.

RAG status of the qualitative progress made against milestones for Vision Area 3 is demonstrated in below pie chart.

Figure 3: Progress made within Vision Area 3.



4.1. Outline of the current 2040 vision

The third area of the roadmap outlines the measures for the shipping industry to provide a healthy, safe and secure work environment so that people want to work in shipping, where they can enjoy rewarding careers and achieve their full potential. This area has two goals, firstly to achieve zero accidents and secondly, that shipping is to be recognised as a sought-after career sector.

The Case for Action for this vision area is summarised and updated in Table 3a below.

Table 3a: Vision area 3 - Case for Actions.

	2020s	2030s	2040s
Case for Action	<p>Increased transparency and visibility of shipping creates more global demand for sustainable standards from beyond the industry.</p> <p>Low cost personal satellite / internet technology empowers seafarers to expose poor conditions.</p> <p>Technology enabling real-time monitoring of activity on ships is required by key customers to monitor standards.</p> <p>Ongoing difficulty in recruiting officer level seafarers puts pressure on the industry.</p> <p>Branded shipping customers seek to eradicate 'sweatshop ships'.</p>	<p>Growing middle class in developing countries demand sustainable standards.</p>	

Table 3b below presents the milestones for each decade for this vision area with a RAG status.

Table 3b: ‘Provide a healthy, safe and secure work environment so that people want to work in shipping’ vision milestones

No	2010s	2020s	2030s
1	Labour conditions Ratification of the MLC by 95% of member states is achieved.	Labour conditions Ratification of the MLC by 100% of member states is achieved.	
2	Health & Safety Industry and regulators apply strong financial, legal and regulatory pressure to ship recyclers to significantly improve ‘worst case’ performance.		
3	Health & Safety Globally agreed accident and near-miss reporting formats developed and used by critical mass of industry leaders to enable better identification of patterns, and design of safe processes and ships.	Health & Safety Global standards for accident and near-miss reporting are enriched in regulation and as a result shipping sector lost time injury rates is reduced by 10% per annum from 2012 baseline.	
4		Enforcement Existing standards are robustly enforced by PSC eliminating non-compliance ships.	
5	Diversity & Equality Women represent 2% of the maritime workforce.	Diversity & Equality Women represent 30% of the maritime workforce.	Diversity & Equality There is equality for people wishing to enter the shipping industry, regardless of race, gender, religion etc.
6	Training 80% of mariners have access to high-quality training facilities in all areas associated with poor standards including culture and language support to move shipping as a good career option.	Training Globally recognised minimum competence standards, qualifications and career development paths are adopted and ratified by 95% of IMO member states.	
7	Labour condition All mariners have access to union representation.	Labour conditions Bullying harassment and discrimination are eliminated/managed through actively enforced company policies with minimum standards enforced by the IMO.	Labour conditions Shipping careers rank equally with shore-based industries in terms of satisfaction, technology and impact on relationships.

4.2. Evidence of progress against the milestones

Milestone 1 (2010s):

Ratification of the MLC by 95% of member states is achieved.

RAG status: Green

Evidence

This milestone is fulfilled with 96% ratifications to date. It is anticipated that several countries will ratify the Convention and its amendments in 2020. Further details on the status of the Convention may be found under Ref [13].

Milestone 1 (2020s):

Ratification of the MLC by 100% of member states is achieved.

RAG status: Red

Evidence

The level of ratification of the MLC remains below 100%. The number of states that have ratified the Convention is currently 105. The Convention has received wide support from governments, with the European Union also encouraging member states to ratify. There has been a steady flow of ratifications with 90 states having ratified by the end of 2019. More than five years have passed since the MLC's entry into force, and it is now strictly enforced on a global basis and subject to Port State Control inspections.

In May 2019, ICS published a new edition of its Guidelines on the Application of the MLC. This is widely regarded as the comprehensive and definitive guide to MLC compliance for anyone involved with the employment of seafarers.

Milestone 2 (2010s):

Industry and regulators apply strong financial, legal and regulatory pressure to ship recyclers to significantly improve 'worst case' performance.

RAG status: Amber

Evidence

There is no credible enforcement under the ship recycling regulations from both the EU and IMO so far. To date any enforcements recorded were under the regulations within the Basel Convention. It is believed that it is a matter of time before enforcements are recorded within the industry, as this is mainly attributed to:

- The status of the Hong Kong Convention (HKC) which has not yet entered into force.
- The recent entry into force of the EU regulation, 31 December 2018 (for EU Flagged for both newbuild Inventory of Hazardous Materials (IHM) and end of life final survey requirements).

Any legal and financial enforcements recorded so far by the industry have been based on the compliance requirements stipulated within the Basel Convention (or EU implementation under the

EU Waste Shipment Regulation), for failure to control the transboundary movements of hazardous wastes and their disposal.

There is no provision for the HKC to impose financial fines for non-compliance. It will be restricted to prohibiting violations by national laws enforced by administrations.

Recent developments increased the number of countries that have ratified the HKC to 15 representing 31.2% of the world tonnage Ref [14]. The HKC will enter into force 24 months after ratification by 15 states representing 40% of world merchant shipping by gross tonnage and representing a combined annual ship recycling capacity of 3% of the required 40% of the gross tonnage of the world's merchant shipping (the current figure is 2.61%).

This currently means that financial and legal enforcements remain at the discretion of national administration that have already ratified the HKC or enforced the EU SRR.

It should be emphasised that for both EU SRR and HKC in the time leading up to the HKC to enter into force, infringement acts may continue to be avoided through legal means available to ship owners, such as ships re-flagging.

For the EU SRR, general entry into force was in 2013, but with delayed (31/12/2018) entry into force dates for end of life requirements. No specific financial enforcement regulations by member states were included in the regulation, although there was provision for further studies on the feasibility of financial mechanism to discourage re-flagging at end of life and encourage ship owners to recycle within EU listed facilities. Following its feasibility discussion in 2017 Ref [15], the financial incentives were not followed up, due to the high-cost for ship recycling within Europe.

The credible enforcements within the industry remain a matter of time under the HKC and EU SRR. This is primarily due to the short period that the EU SRR have been enforced and will continue to be highly dictated by the date the HKC enters into-force.

It is also worth noting that transparent enforcements will be an important aspect to consider within this milestone. Shipping companies with high influence within the industry and on their national administrations may often prove to be a factor behind credible enforcement and driving change across all sectors of the industry.

Milestone 3 (2010s):

Globally agreed accident and near-miss reporting formats developed and used by critical mass of industry leaders to enable better identification of patterns, and design of safe processes and ships.

RAG status: Red

Evidence

This milestone remains unfulfilled and is not anticipated to be fulfilled in the near future.

From a regulatory perspective, the existing IMO guidance on near-miss reporting (MSC-MEPC.7/Circ.7) Ref [16], remains for guidance only, and includes standardised reporting format.

There is no tool in use or being developed for companies (as defined in the ISM Code) to report near misses directly to the IMO' Global Integrated Shipping Information System (GISIS). This is primarily because it does not demonstrate any commercial benefit in particular for small operators as it introduces commercial backlashes and loss of trade risks.

On a statutory level, reporting of near-misses remains at the discretion of flag administrations. However, some flag administrations require reporting of certain near-misses such as the Hong-Kong Flag Administration requires the reporting of oil spills within the engine room as a near-miss.

On a different level, systematic reporting has started to emerge mainly in niche areas, such as the ship recycling business, however, this remains at community and consortium levels to avoid commercial backlashes. Although guidelines for reporting are available, they remain at a recommendatory and guidance levels only.

Taking the ship recycling business as a reference example, under the guidelines developed by the industry, 'Incident and spills reporting procedures' are part of MEPC Resolution 210(63). Although several significant incidents have taken place within this sector, lessons learnt remain only within a community level and are not shared at a global platform, unless made public by the media as a consequence of how grave such incidents were.

This goal may need to be revised since it is dependent on the willingness of the industry in sharing best practices from a lessons-learnt perspective anonymously. It may need to be focused on more niche areas such as ship-recycling.

Milestone 3 (2020s):

Global standards for accident and near-miss reporting are enriched in regulation and as a result shipping sector lost time injury rates are reduced by 10% per annum from a 2012 baseline.

RAG status: Red

Evidence

The lack of incentives and negative commercial consequences from reporting are two factors that have slowed developments within this area of the industry. Potentially, to achieve this milestone, the SSI may wish to explore initiatives within this area at a consortium level to lead the industry by example with its members.

The key stakeholders within this area remain:

- P&I clubs;
- Industry consortiums; and
- Regulatory bodies: the IMO, UNCTAD, European Maritime Safety Agency (EMSA), and the Marine Accident Investigation Branch (MAIB).

The challenges in reducing LTI are also directly related to common reporting standards and data sharing within the industry, which remains minimal due to commercial backlashes.

Milestone 4 (2020s):

Existing standards are robustly enforced by PSC eliminating non-compliance ships.

RAG status: Red

Evidence

Substandard ships continue to exist, although the current PSC control risk-based system is highly effective. It is worth noting that PSC severity remains highly correlated with geographical location.

Overall, annual improvements on compliance have been noted between 2017 and 2018, which mark the latest available comparative figures.

There is no doubt that the effectiveness and enforcement remain at the discretion of the states, with minimal enforcement in less developed countries. These can be observed within the white, grey and black list provided by Paris MoUs.

With respect to monitoring of PSC enforcement and quality changes, this can usually be observed on an annual basis, within the annual reports 'Performance List' issued by the Paris MOU Ref [17].

To make the flags' performance comparable, the excess factor (EF) concept was introduced. Each incremental or decremental step corresponds with one whole EF point of difference. In simple terms a higher EF introduces a higher level of risk.

With respect to regulatory and developments that capture the tightening of PSC procedures:

- The IMO Assembly's 31st meeting developed the introduction of a new resolution that revised the PSC procedures (A.1138(31)). Should a tightening in PSC procedures take place, it can only be anticipated within the Sub-Committee on Implementation of IMO Instruments (III), as it is the sub-committee that dictates enforcement of new procedures. The SSI may wish to follow III7 developments Ref [18].
- Concentrated inspection campaigns are usually exercised, which tend to put inspections in general and certain inspected items on a higher alert.

For the SSI, substandard ships will remain an item to address over the decades. Another approach for achieving this milestone maybe by setting a target EF to be achieved/maintained. With this approach, the enforcement and effectiveness of PSC procedures can be effectively monitored.

Milestone 5 (2010s):

Women represent 2% of the maritime workforce.

RAG status: Green

Evidence

To date, as reported by the International Transport Workers' Federation (ITF) Ref [19], the number of women at sea remains only an estimated 2% of the world's maritime workforce. Women seafarers remain mainly in the passenger ship sector, often for Flags of Convenience (FoC) vessels.

The promotion of shipping as a career is nowadays equivalent to any other shore career and the gender diversity within the sector remains to be the real challenge.

Milestone 5 (2020s):

Women represent 30% of the maritime workforce.

RAG status: Red

Evidence

Higher numbers of women seafarers may be achievable when employers, the ILO and trade union address the following issues:

- Reducing gender stereotypes within the industry;
- Provision of sanitary items onboard ships;
- Access to confidential medical advice;
- Consistent and improved approach to maternity benefits and rights; and
- Development of sexual harassment policies and appropriate training, including within cadet training and education.

For the SSI, appropriate members within the consortium may aim to increase the number of women within their fleet by a certain target within a certain timeframe, setting an example to the industry. This is in conjunction with taking actions that support the ILO and trade unions in tackling the above-outlined issues.

Milestone 5 (2030s):

There is equality for people wishing to enter the shipping industry, regardless of race, gender, religion etc.

RAG status: Red

Evidence

This milestone is linked with the UN Sustainable Developments Goals 5 and 10. There are some initiatives through NGOs particularly focusing on women in the maritime industry, however, in line with the previous findings there is little evidence of substantial change. A global insight on gender equality by way of example may be seen through non-profit organisations.

It is also believed that little progress has been made at the macro level on diversity of entry or equal or equitable treatment once in. However, one positive improvement can be reported that several women in maritime network groups are currently working towards achieving this goal.

Milestone 6 (2010s):

80% of mariners have access to high-quality training facilities in all areas associated with poor standards, including culture and language support to make shipping a good career option.

RAG status: Red

Evidence

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW Convention) is the current minimum standard for the training of seafarers. There is some specialised training organised by organisations such as SIGTTO, which provides specialised best practices training.

With respect to recent regulatory developments on increasing the quality of training available to seafarers under the STCW, the ICS submission to the IMO's Sub-Committee on Human Element training and Watchkeeping Ref [20], outlines some concerns of shipowners and operators regarding the 1978 STCW, in meeting its objectives. This is, in particular, to address the two following aspects under the STCW:

- Cost of formal training; and

- Raising the minimum standard to address the training quality and trail of audit.

It is believed that amendments to address the training standards within the STCW Convention are vital for enabling the achievement of this milestone among others.

Challenges with achieving the ambition under this milestone remain vastly within the application of the STCW Convention. Under the STCW, certain certification may be issued by flag-administrations on a prima facie basis such as language proficiency for marine officers. When audited by an appointed RO, the quality of such certification sometimes proves to be questionable. In addition, such issues involving quality concerns (in this context) are often hard to address formally between Administrations and their ROs.

In order to address the quality aspect, it is believed that amendments to the STCW Convention prove to be the most formal and efficient route. One of the proposed approaches to fulfil the ambition is the establishment of a proper testing procedure of such certification, to be embedded within the STCW.

Milestone 6 (2020s):

Globally recognised minimum competence standards, qualifications and career development paths are adopted and ratified by 95% of IMO member states.

RAG status: Red

Evidence

The agreement on revised STCW minimum standards may be a key enabler for this milestone to be fulfilled, as mentioned in above Milestone 6 (2010s).

Milestone 7 (2010s):

All mariners have access to union representation.

RAG status: Amber

Evidence

Currently, not all seafarers have access to union representation as it is not a requirement under the MLC. However, their contracts are drawn in line with MLC. At the same time, seafarers obtaining ITF agreements are being considered at an advantage in comparison to other unions.

Some of the proposed approaches to fulfil the ambition are:

- Transparency in union representation remains an issue. This transparency is with the quality of union representation seafarers receive and whether it is acting in the seafarers' interest or only the union's interest. A reasonable approach to see this transparency may be by drawing parallel experience from other sectors such as aviation.
- Monitoring the level of union representation may be done under one trade union (such as the ITF) on an annual basis. It is important to note that although the ITF has seafarers at heart, it may not represent all seafarers. Seafarers that are part of the ITF are often at an advantage in comparison to other seafarers Ref [19].

- Union representations tend to be quite dependent on the nationality of the crew onboard and the ship's flag administration. It is also important to note that it is the responsibility of seafarers to pursue being represented and ensure they receive the expected quality of representation. Some administrations are more active than others in finding the most suitable means of representation for their seafarers.

Milestone 7 (2020s):

Bullying, harassment and discrimination are eliminated/managed through actively enforced company policies with minimum standards enforced by the IMO.

RAG status: Red

Evidence

The MLC recognises the negative effect that bullying and harassment can have on seafarer's health and wellbeing, and have voted to bring these serious issues under Regulation 4.3 (Guideline B.4.3.1), the health and safety protection and accident protection code. These are currently overseen by the competent authority and three changes have been made:

- The latest version of the guidance on eliminating shipboard harassment and bullying, is to be taken into account, which is jointly published by the ICS and the ITF.
- 'Harassment and bullying' have now been taken into account for the various health and safety matters of the MLC.
- To the list of matters which should be considered for investigation in a health and safety context, 'problems arising from harassment and bullying' has been added. Seafaring has long been considered a tough occupation due to the masculine nature of the profession and the rough conditions that prevail at sea.

Before achieving this ambition, for the minimum standards to be enforced by the IMO, companies and management can be the primary active agents of change, by adopting a zero-tolerance approach to dealing with bullying and harassment at sea. This can be implemented by measures that align with the following actions:

- establishing clear policies and procedures for dealing with harassment and bullying onboard;
- disseminating company's policies regarding harassment to everyone onboard (in native language of crew members);
- organising ongoing awareness programs, training sessions, campaigns, videos, conferences and other media; and
- more importantly improving human right at sea.

Milestone 7 (2030s):

Shipping careers rank equally with shore-based industries in terms of satisfaction, technology and impact on relationships.

RAG status: Red

Evidence

Little has happened or changed in the structure or operations of the industry which would indicate progress in this area at a macro level. One of the key aspects of this is transferring seagoing jobs to office-based jobs by adopting remote control or autonomy technology in shipping.

4.3. Recommendations

The milestones under this vision area remain challenging, in particular, due to the following:

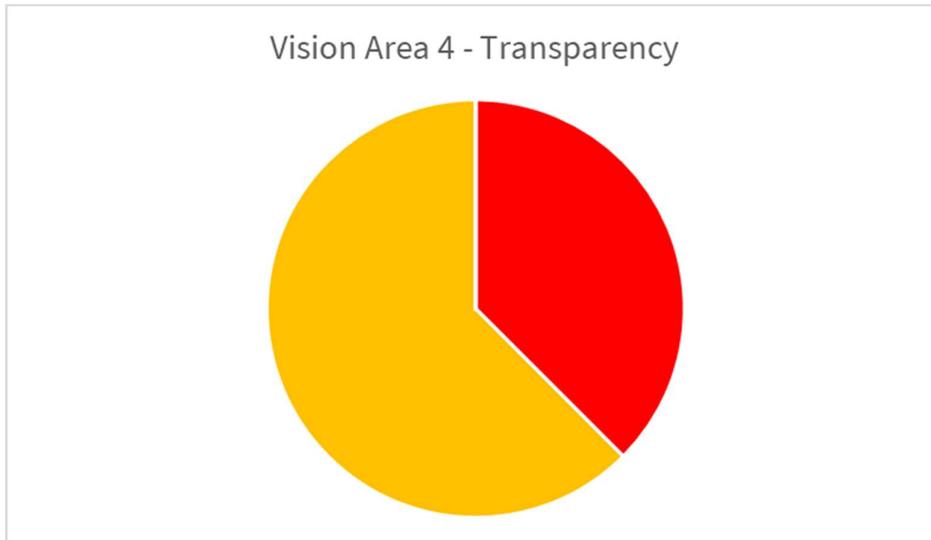
- To achieve zero accidents, the key milestones require to be fulfilled are:
 - Public sharing of information on near-misses, which currently remains at a voluntary level and highly reserved due to commercial impacts.
 - Global transparency and establishment of a global set of standards rather than local reporting and focusing on niche areas.
 - Data on accidents, e.g. LTI, exists within consortiums such as P&I clubs etc. The industry's access to this data and consistent reporting of incidents are vital aspects to achieve zero-accidents concepts.
 - The reduction of the human element within shipping (MASS) may also be a major enabler to achieving this goal. However MASS may also present other consequences for seafarers such as loss of skill sets.
- When attempting to achieve equality, efforts should be focused on addressing the gender equality and diversity in shipping.
- Once the equality has been achieved, this would make shipping more attractive as a career.
- Relevant SSI members may wish to take further initiatives at a consortium level to lead the industry by example.

5. Vision Area 4 - Transparency

Transparency and accountability drive performance improvements and enable better, sustainable decision making.

RAG status of the qualitative progress made against milestones for Vision Area 4 is demonstrated in below pie chart.

Figure 4: Progress made within Vision Area 4.



5.1. Outline of the current 2040 vision

The fourth area of the roadmap outlines the measures for the shipping industry to be transparent and accountable to drive performance improvements and enable better, sustainable decision making. This area has two goals: the first one is to have beyond compliance sustainability rating schemes which are used to inform shipping related commercial decisions and only transparent, accountable companies have a 'licence to trade'; and the second centres around all ship types having credible sustainability rating schemes which assess both design and operation across a comprehensive range of environmental, social and economic criteria.

The Case for Action for this vision area is summarised and updated in Table 4a below.

Table 4a: Vision area 4 - Case for Actions.

	2020s	2030s	2040s
Case for Action	<p>Increased transparency and visibility of shipping creates more global demand for sustainable standards from beyond the industry.</p> <p>Campaign groups use satellite data to prosecute ship operators following pollution incidents.</p> <p>Low cost personal satellite / internet technology empowers seafarers with social media voice.</p> <p>Technology enabling real-time monitoring of activity on ships is required by key customers to monitor standards.</p> <p>Ongoing difficulty in recruiting officer level seafarers puts pressure on the industry.</p> <p>Branded shipping customers begin to focus on shipping.</p>	<p>Growing middle class in developing countries demand sustainable standards.</p>	

Table 4b below presents the milestones for each decade for this vision area with a RAG status.

Table 4b: ‘Transparency and accountability drive performance improvements and enable better, sustainable decision making’ vision milestones.

No	2010s	2020s	2030s
1		Improving Performance Globally agreed minimum performance expectations are actively used to eliminate ‘worst offenders’ in terms of labour, standards and environmental performance.	
2	Improving Performance Credible rating schemes are available for all major ship types.	Improving Performance Mainstream schemes expand or merge to increase scope to beyond carbon/energy, to include all key environmental and labour issues in the design and operation of ships.	Improving Performance Performance levels achieved as required to meet or exceed safety, emissions and other vision 2040 objectives.
3	Reliable Data Validated public domain reporting of ships performance data.	Reliable Data Accurate data of ships emissions, performance across a range of conditions, other performance indicators and labour conditions are audited, validated and published by flag states on public domain.	
4	Financial Decisions Strong evidence of poorly performing ships losing trade due to their poor environmental or social performance. Fully transparent sustainability rating scheme performance results are factored into commercial and finance decisions. Shippers articulate to end-user (retailer/customer)	Financial Decisions Strong evidence that ship builders, equipment manufacturers and other shipping services are competing based on ability to assist with achievement of high sustainability performance. Cargo market, shipping finance and insurance companies are actively using beyond compliance sustainability rating schemes to make decisions.	

5.2. Evidence of progress against the milestones

Milestone 1 (2020s):

Globally agreed minimum performance expectations are actively used to eliminate ‘worst offenders’ in terms of labour, standards and environmental performance.

RAG status: Red

Evidence

Developments within this milestone have been poor to date. This is due to the lack of a globally agreed rating standard. Although there are several voluntary rating schemes, there is lack of consistency and focus only on environmental aspects within these which is believed to be the main delaying factor.

Milestone 2 (2010s):

Credible rating schemes are available for all major ship types.

RAG status: Amber

Evidence

This milestone may be considered as partly achieved as several schemes have been launched for rating major ship types.

Under regulatory compliance the EEDI remains to be the only reliable benchmark for measuring ships design efficiency.

Ships to which the EEDI apply have also taken part in voluntary incentive schemes under vetting organisations such as ESI, RightShip, Green Award etc. Ships going beyond statutory compliance can benefit from offered incentives. These voluntary schemes have seen an uptake within the existing ships’ market with third party-verifiers.

Some schemes, however, give a higher level of confidence to the industry than others such as the condition assessment programme, which has gained in popularity in the tankers and bulk carriers market. No similar programme has been established for other existing ship types, such as container ships or passenger ships. The rating within the latter ship types remains at a bespoke level and includes buy and purchase inspections.

For the vetting organisations, where ships emissions and efficiency have been benchmarked as the main criteria, transparency remains under consideration.

It is anticipated that the potential adoption of the Energy Efficiency Existing Ship Index (EEXI) during (MEPC 75), is expected to introduce a regulatory benchmark for rating schemes across existing ship types and may assist in fulfilling the ambition set by the SSI under this milestone.

Milestone 2 (2020s):

Mainstream schemes expand or merge to increase scope to beyond carbon/energy, to include all key environmental and labour issues in the design and operation of ships.

RAG status: Red

Evidence

Although several voluntary rating schemes exist to date, as mentioned in Milestone 2 (2010s), this milestone is yet to be fully achieved, with reasons relating to transparency, commercial impacts and global agreement.

Milestone 2 (2030s):

Performance levels achieved as required to meet or exceed safety, emissions and other vision 2040 objectives.

RAG status: Red

Evidence

Although several voluntary rating schemes exist to date, as mentioned in Milestone 2 (2010s) and Milestone 2 (2020s), this milestone is yet to be fully achieved.

Milestone 3 (2010s):

Validated public domain reporting of ships performance data.

RAG status: Amber

Evidence

This milestone may be considered as partially achieved under the EU MRV regulation as this regulation does not apply to the global fleet. The collected data is validated and placed in public domain.

In terms of an international requirement, the milestone may be partially fulfilled under the IMO DCS Regulation, which applies to the global fleet above 5,000 GT, regardless of their flag and operation. The collected data is validated however, it is placed in a database anonymously. The data is not open to public domain therefore, cannot be accessed by all stakeholders.

Milestone 3 (2020s):

Accurate data of ships' emissions, performance across a range of conditions, other performance indicators and labour conditions are audited, validated and published by flag states for the public domain.

RAG status: Amber

Evidence

Although some ship emissions are regulated by the MARPOL Convention, this milestone remains not completely fulfilled. Apart from voluntary incentive schemes, such as the ESI, CO₂ remains to be the only GHG emission which requires auditing and publishing so far by the EU and the IMO.

Voluntary incentive schemes such as the ESI Ref [21], publicly provides a ship's score which accounts for its SO_x, NO_x and CO₂ emissions. It is expected that the experience-building phase on monitoring, verifying and reporting of CO₂ will potentially allow the introduction of similar regulations for other ship emissions, therefore, making shipping a more transparent sector. The

quality of recorded data has proven so far to be the biggest challenge to the prescribed regulations with ships failing to comply.

It is worth noting that in a move towards transparency within the industry, shipping companies have been publishing their sustainability reports. Our recent survey demonstrated that the external factors that drive industry's approach to sustainability reporting are mainly compliance requirements; shareholder or investor engagement; and competitive advantage.

Overall, this milestone is yet to be fully achieved. It is important for the SSI to determine a proxy for measuring developments under this milestone. It is believed that once goals are set within the industry (not limited to ships emissions) at a strategic level by the IMO, further developments should emerge.

Milestone 4 (2010s):

Strong evidence of poorly performing ships losing trade due to their poor environmental or social performance.

Fully transparent sustainability rating scheme where performance results are factored into commercial and finance decisions.

Shippers articulate to end-user (retailer/customer).

RAG status: Amber

Evidence

It is evident that schemes that initiated rating the efficiency of ships have made it harder for poorly performing ships to gain trade. In parallel, this also led to the introduction of schemes that offer incentives to efficiency and emissions from ships going beyond statutory compliance, Ref [23], and the ESI which also add commercial attractiveness to these assets. Having said this, there is still a lack of evidence for the market rewarding better performing ships, but this is slowly changing with charterers initiatives and Poseidon Principles as detailed below.

Charterers find that they can ask for more seaworthy ships, less insurance premiums, by adding to the requirements through vetting inspections. This has seen the greatest uptake, mainly in the bulk carriers and tankers markets.

The introduction of the Poseidon Principles in 2019, Ref [24], marked a major step towards the fulfilment of this milestone. To date at least 20% of global shipping is being financed by institutions that factor sustainability including rating schemes into their financing decisions.

The launch of the IMO's initial strategy on reduction of GHG emissions from ships in 2018, gave financial institutions clarity on financing sustainable shipping. Previously, banks and investors have been utilising vetting organisations to supplement their internal risk processes, when financing assets which lacked an overall ambition for shipping.

Currently 13 financial institutions are signatories to the Poseidon Principles, representing a bank loan portfolio to global shipping of approximately \$100 billion – around 20% of the global ship finance portfolio. As with all new schemes, more banks are anticipated to become members.

The level of achievement within this milestone is dependent on the level of engagement between shippers and end-users. The feedback loop, including communication within shippers and end-users, remains not fully-established.

This milestone started seeing development from larger cargo/owners and customers and further development will be highly influenced by national strategies, laws and international regulations. This is usually observed in each customer's annual sustainability reports, with customers being mainly positioned within most developing countries.

The UK's largest food retailers are working with OceanMind to monitor vessels through satellite technology which can give assurance of responsible and legal fishing practice at the point of capture, Ref [25].

On a statutory level, the UK had launched its plans to be the first major economy to pass the net zero emissions law and their target will require the UK to bring all GHG emissions to net zero by 2050, Ref [26]. This is in conjunction with its government's route map for the transition to a future of zero-emission shipping, Ref [27]. Both developments will require working with cargo owners and customers to factor sustainability within their business models.

The formal introduction of carbon pricing may be a major proxy for achieving this set milestone. It is anticipated that this may be introduced in multiple transport sectors, including aviation.

Fulfilling this goal will remain a continuous challenge depending on whether any newly introduced regulatory framework that addresses rating of assets, allows a fair representation across different ship types.

Milestone 4 (2020s):

The cargo market, shipping finance and insurance companies are actively using beyond compliance sustainability rating schemes to make decisions.

Strong evidence that ship builders, equipment manufacturers and other shipping services are competing based on the ability to assist with the achievement of high sustainability performance.

RAG status: Amber

Evidence

Developments within the cargo market remains slow, which is primarily attributed to the lack of a globally agreed rating scheme as detailed above.

Clean Cargo is an initiative that involves major brands, cargo carriers, and freight forwarders dedicated to reducing the environmental impacts of global goods transportation and promoting responsible shipping. They represent around 80% of global container cargo capacity and constitutes the leading buyer-supplier forum for sustainability in the cargo shipping industry. Their members share a vision of a shipping industry that is a responsible part of sustainable supply chains and that supports clean oceans, healthy port communities, and global climate goals. Their work can be seen as a very positive step towards this milestone's achievement.

5.3. Recommendations

The goals set by the SSI under this vision, remain challenging due to the following:

- Transparency and consistency remain the key issue behind compliance sustainability schemes; in particular, transparency associated with the area of energy efficiency. Effective performance monitoring and enforcement so far exist for rating schemes, however, their adoption remains at a voluntary level. It is expected that the enforcement and monitoring of

schemes would need to be conducted by trusted third-party verifiers to provide assurance and transparency.

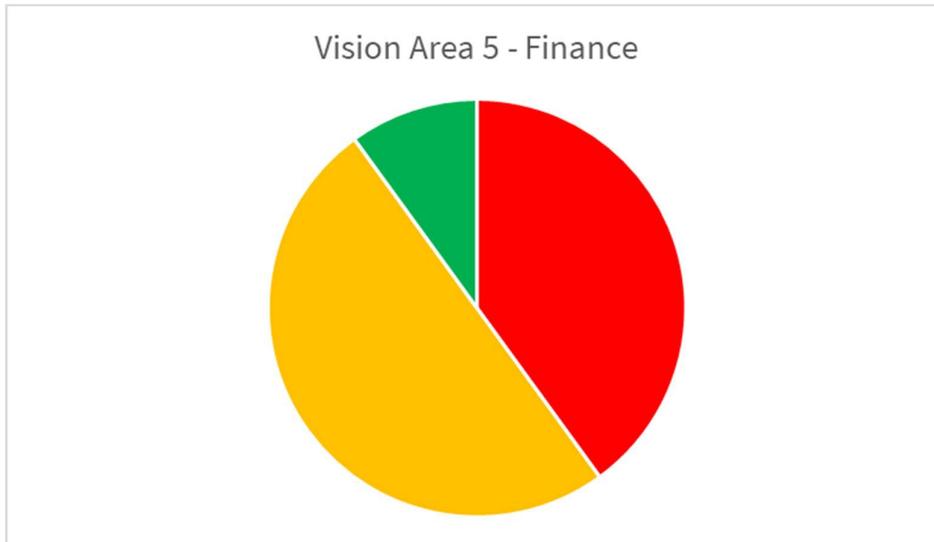
- Following the IMO's initial strategy to achieve its targets by 2050, it is expected that the 2040 timeline suggested by the SSI may be too optimistic, and require an extension to 2050s, as the industry will need to follow defined targets by the IMO.

6. Vision Area 5 - Finance

Develop financial solutions that reward sustainable performance and enable large scale uptake of innovation, technology, design and operational efficiencies.

RAG status of the qualitative progress made against milestones for Vision Area 5 is demonstrated in below pie chart.

Figure 5: Progress made within Vision Area 5.



6.1. Outline of the current 2040 vision

The fifth area of the roadmap outlines the measures for the shipping industry to develop financial solutions that reward sustainable performance and enable large scale uptake of innovation, technology, design and operational efficiencies. This area has two goals: one, the ecosystem valuations are routinely used by key global institutions in decisions affecting maritime regulation and ocean planning; and two, financial and insurance institutes have developed preferential rates for those with high sustainability performance.

The Case for Action for this vision area is summarised and updated in Table 5a below.

Table 5a: Vision area 5 - Case for Actions.

	2020s	2030s	2040s
Case for Action	<p>Investment in safer ships required. Investment in ECA compliance required. New ownership models emerge such as owner supplies and Energy Service Company (ESCO) models.</p> <p>New ship ownership models emerge such as ownership of the vessel and all technical installations, the owner buys and supplies to yard (owner supply) ESCO models (energy service company) with suppliers retaining ownership of equipment and guaranteeing lifecycle cost OR performance on spot-test.</p>		

Table 5b below presents the milestones for each decade for this vision area with a RAG status.

Table 5b: ‘Develop financial solutions that reward sustainable performance and enable large scale uptake of innovation, technology, design and operational efficiencies’ vision milestones.

No	2010s	2020s	2030s
1	Governance Establishment of a credible, global coalition of institutions and organisations to advance natural capital accounting & adoption by IMO.	Governance Global governance body established for overseeing ecosystem goods and service valuations.	
2	Financial Decisions Flag administrations move/play a role in finance to exploit their interest or need for quality tonnage.		
3	Consistent Methodologies Establish methodology for costing performance of ships. Pilot methodologies demonstrate the monetary value of the services produced by marine ecosystems within a pilot area. Lessons learned from ecosystem valuation are fed back into the design process to minimise ecosystem costs.	Consistent Methodologies IMO trials the use of a global methodology of an ecosystem valuation in development of regulations and adopts. Due to better data and valuation, financial rewards for eco performance is introduced.	Consistent Methodologies Ecosystem valuations are factored into major MSP negotiations and IMO decisions.
4	Public Awareness Public and political awareness and support is strong due to investment in education, lobbying and capacity-building activities.		
5	Financial Decisions Pioneering banks are factoring sustainability rating scheme performance into financing decisions and as a result, a voluntary pricing scheme is adopted.	Financial Decisions Sustainability rating scheme performance is factored into financing decisions for >20% of new and used ship purchases.	Financial Decisions Legislative requirement for natural capital accounting valuations to be included in sales price of goods and services.

6.2. Evidence of progress against the milestones

Milestone 1 (2010s):

Establishment of a credible, global coalition of institutions and organisations to advance natural capital accounting and adoption by IMO.

RAG status: Red

Evidence

The natural capital accounting is not used in the shipping industry therefore, this milestone may need to be removed.

Milestone 1 (2020s):

Global governance body established for overseeing the ecosystem of goods and service valuations.

RAG status: Red

Evidence

The establishment of such a governance body is yet to be achieved.

Milestone 2 (2010s):

Flag administrations move/play a role in finance to exploit their interest or need for quality tonnage.

RAG status: Green

Evidence

This milestone was set around 2015 and may be considered accomplished in terms of efforts being made for moving towards quality tonnage. The accomplishment levels of this milestone for the SSI is highly dependent on how much the SSI wishes to see flag administrations potentially playing a role in the financing of shipping.

Taking the successful efforts of the Liberian Registry for prioritising quality over the three years (2015-2018), which has seen a 62% reduction in vessel detentions in the United States. In-line with this milestone ambition in 2018, the Republic of Liberia has amended its maritime law to allow lease financing structures to be recorded as mortgages. This has assisted the Registry in strengthening their financial position, which is internationally recognised and acceptable to banks from many jurisdictions, allowing the opportunity to obtain favourable financing.

Milestone 3 (2010s):

Establish a methodology for costing performance of ships.

Pilot methodologies that demonstrate the monetary value of the services produced by marine ecosystems within a pilot area.

Lessons learned from ecosystem valuation are fed back into the design process to minimise ecosystem costs.

RAG status: Amber

Evidence

This milestone has seen some developments and covers the costing of ships performance through the following stages:

- At a new build stage: Poseidon Principles and other rating schemes are being utilised by financial institutions as mentioned previously. The majority of the financing would be dependent on a ship's lifespan performance and its alignment with the IMO's initial strategy.
- At a regulatory level, it is anticipated that the IMO DCS Regulation will enable several organisations, not limited to financial institutions, to establish additional methodologies that introduce a formal costing mechanism.
- In operation: Both the regulatory framework and voluntary incentive schemes have established a non-direct cost through loss of trade for poor-performing ships.

In terms of pilot methodologies, there has been no movement to demonstrate monetary value.

Examples of ecosystem services include products such as food and water, regulation of floods, soil erosion and disease outbreaks, and non-material benefits such as recreational and spiritual benefits in natural areas. The term 'services' is usually used to encompass the tangible and intangible benefits that the public obtain from ecosystems, which are sometimes separated into 'goods' and 'services'.

Under studies delivered on 'Ocean governance and blue growth', a glimpse of such methodologies was highlighted, Ref [28], including studies under development (SEA20), Ref [9].

It is anticipated that the agreement on an MSP regulatory framework, at both international and on a regional level, will allow further development within this field.

In terms of the lessons learnt, there has been little development. The learning feedback is not fully evolved. On a national, regional and international level, lessons learnt have not been yet shared nor fed back into the design loop. This is excluding, of course, international disasters such as oil spills that introduce changes to designs and regulations.

It is also important to emphasise that this is highly interconnected with the nature of the marine sector which remains to be reactive.

Milestone 3 (2020s):

IMO trials the use of a global methodology of an ecosystem valuation in the development of regulations and adopts.

Due to better data and valuation, financial rewards for eco performance is introduced.

RAG status: Red

Evidence

The IMO currently assesses only the impact of regulatory requirements within either the safety or the environmental domain. It does not have a formal mechanism to assess second-order consequences of regulation from one domain on to the other. An example of a more holistic approach is the impact assessment requirements associated with proposals for legislation which

looks at second-order consequences. This approach is currently better represented by the EU's approach on impact assessing regulatory developments. Also, see milestone 3 in Vision Area 2.

Therefore, this milestone is yet to be fully achieved. No notable developments were seen within this area.

Milestone 3 (2030s):

Ecosystem valuations are factored into major MSP negotiations and IMO decisions.

RAG status: Red

Evidence

This milestone is yet to be fully achieved. No notable developments were seen within this area. Also see milestone 1 in Vision Area 1.

Milestone 4 (2010s):

Public and political awareness and support is strong due to investment in education, lobbying and capacity-building activities.

RAG status: Amber

Evidence

This area has seen development during 2019, due to a wide public and political awareness through investments mainly in lobbying and capacity building activities believed to be a consequence of climate change. The proxy for the fulfilment of this milestone, is further affected by how individual countries are acting on:

- International agreements, in particular, for shipping to align with the Paris agreement; and
- National laws and strategies to meet set targets that are in line with global activities. It is important to note, that national strategies within developing countries, are expected to heavily invest on education to appreciate sustainability, Ref [26].

Milestone 5 (2010s):

Pioneering banks are factoring a sustainability rating scheme performance into financing decisions. As a result, a voluntary pricing scheme is adopted.

RAG status: Amber

Evidence

This milestone may be considered as partly achieved. As mentioned before, currently around 20% of new builds are being financed based on their alignment with the IMO's initial strategy under the Poseidon Principles, Ref [23]. Prior to this, several banks, insurers and P&I clubs have and continue to use vetting organisations to supplement their internal risk processes.

It is important to note that IMO's initial strategy is only aiming at reducing GHG emissions and it does not factor sustainability as a whole into consideration.

We also know that not all banks are currently factoring sustainability into financing decision, as expected in any new schemes, where potential users are waiting to see the outcome of their competitors' approach.

The SSI may wish to reconsider setting a percentage of banks that they wish to see factoring sustainability into their financing decisions by certain dates. It is expected that this move will also be dependent on the IMO's initial strategy, and any regulatory decisions that may result from its future sessions.

Milestone 5 (2020s):

Sustainability rating scheme performance is factored into financing decisions for >20% of new and used ship purchases.

RAG status: Amber

Evidence

Schemes such as ESI are already well established with clear financial incentives for demonstrated reductions in ship emissions. However, these schemes remain voluntary and do not include all sustainability practices as a whole as mentioned in the milestone above.

Milestone 5 (2030s):

Legislative requirement for natural capital accounting valuations to be included in the sales price of goods and services.

RAG status: Red

Evidence

This milestone is yet to be fully achieved. No notable developments were seen within this area. Also see milestone 2.

6.3. Recommendations

The goal set by the SSI under this vision, remains challenging, in particular:

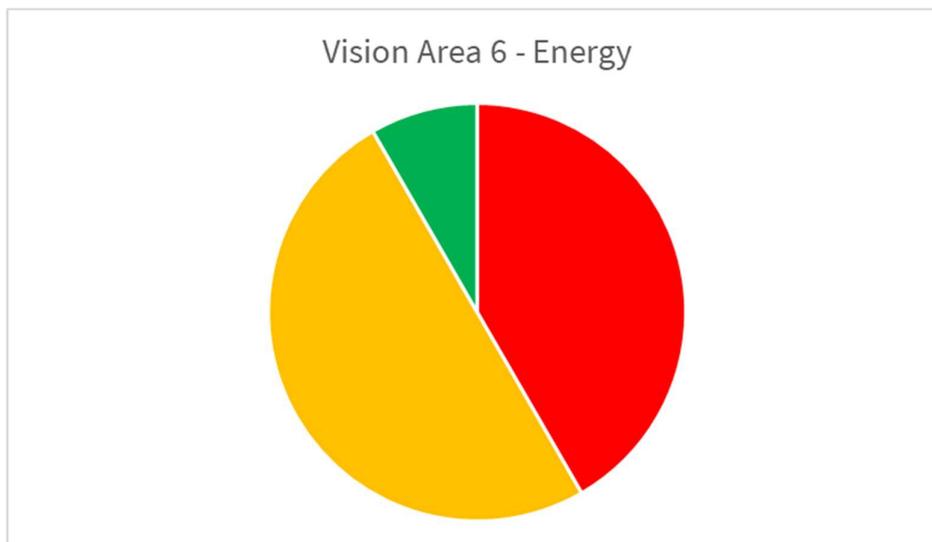
- To achieve ecosystem valuations - this is highly influenced by the current IMO regulatory development process, which should be much better equipped, similarly to the EU, for taking into consideration second-order consequences of regulation from one domain on the other.
- This vision area may need to be extended into the 2050s, as the industry will need to follow defined targets by the IMO.
- Overall, only climate change related risks are included in financial decisions and this should be extended to include all aspects of sustainability.

7. Vision Area 6 - Energy

Change to a diverse range of energy sources, using resources more efficiently and responsibly, and dramatically reducing greenhouse gas intensity.

RAG status of the qualitative progress made against milestones for Vision Area 6 is demonstrated in below pie chart.

Figure 6: Progress made within Vision Area 6.



7.1. Outline of the current 2040 vision

The sixth area of the roadmap outlines the measures for the shipping industry to change to a diverse range of energy sources using resources more efficiently and responsibly and dramatically reducing greenhouse gas intensity. This area has three key goals: one is shipping reduces CO₂ emissions by 80-90% of 2012 levels, two is shipping has decarbonised using a mix of alternative fuels and three is the establishment of large efficient supply chains.

The Case for Action for this vision area is summarised and updated in Table 6a below.

Table 6a: Vision area 6 - Case for Actions.

	2020s	2030s	2040s
Case for Action	<p>Reduce CO₂ to 1990 levels to prevent runaway climate change.</p> <p>Arctic sea passages open.</p> <p>IPCC predicts significant increase in extreme weather.</p>	<p>Intergovernmental Panel on Climate Change (IPCC) predict significant impact on coastal infrastructure due to climate change.</p> <p>Third generation biofuel wide availability to shipping.</p> <p>Depletion of US shale gas reserves.</p>	

Table 6b below presents the milestones for each decade for this vision area with a RAG status.

Table 6b: ‘Change to a diverse range of energy sources, using resources more efficiently and responsibly, and dramatically reducing greenhouse gas intensity’ vision milestones.

No	2010s	2020s	2030s
1	Regulations Globally unified regulations are introduced. Fuel transition plan is in place. IMO implements GHG emissions reduction plan in line with the UNFCCC.	Regulations Sustained 20% reduction in CO ₂ per ton from 2012 levels.	
2	IMO develops biofuels guidelines.		
3	Low sulphur regulation and SECA promoted fuel switch over.		
4		Multi-modal Multi-modal collaboration is optimised. Multi-modal reporting process is in place and used by leading organisations. Modal shift from air to sea transport.	
5		Big data Big data is used to optimise supply chain and third-party supplier licencing.	
6	Ship efficiency Digital monitoring and advanced power management used as standard in all new ships. Slow steaming, weather routing, backhaul cargo, virtual arrival and other efficient operational practices are introduced and used globally.	Ship efficiency Cold ironing, advanced terminal facilities, backhaul cargo and virtual arrival are commonly in place globally. Ship design is improved with new materials, technologies and ballast requirements.	Ship efficiency Operational efficiency is further improved with un/low-manning requirements, advance materials and reduced ballast.
7	Perverse Trading Perverse trading is mapped and cost to the global economy is understood.	Perverse Trading Trading models are developed, trialled and standardised to avoid perverse trading.	
8		Financial Decisions Carbon accounting is factored into decision making. Carbon pricing is used to inform procurement processes and logistics design.	

7.2. Evidence of progress against the milestones

Milestone 1 (2010s):

Globally unified regulations are introduced.

Fuel transition plan is in place.

IMO implements GHG emissions reduction plan in line with the UNFCCC.

RAG status: Amber

Evidence

In terms of the globally unified regulations, this milestone remains unachieved. The IMO DCS and EU MRV regulations are one of the latest indicators. This milestone may be achieved if the IMO manages to:

- Allow for quicker actions to be taken; and
- Align its regulatory developments with already established methodologies.

Exhaust Gas Cleaning Systems (EGCS) remain as a gateway for ships to comply with the global sulphur cap regulation, without the need to switch to compliant fuels. Several national administrations, however, have banned the use of open-loop EGCS within their jurisdictions. It is believed that the series of bans on the use of open-loop EGCS within the jurisdiction of several administrations had an impact on their uptake as a compliance solution.

LR's figures which are based on bunkered fuels globally indicate that around 2% of the global fleet are using EGCS, with a projected increase up to 25% of the global fleet being fitted with these units.

The following should be noted that:

- The initial cost of the installation of EGCS is high and their uptake will remain within niche markets, in particular, the cruise market where their return on investment is tangible.
- The uptake of EGCS is very dependent on both oil and fuel oil bunker prices.
- It is anticipated that the outcome of the phase building experience (2020 to 2021) and the EGCS compliance status noted through PSC inspections, will highly dictate the next move by the industry.

The strategy on a transition plan remains unfinalised by the IMO, however, the following developments that occurred within MEPC 74 are the main indicators on when this plan will be anticipated:

- Terms of reference for the 4th IMO GHG Study were agreed;
- Concrete proposals for short term measures including speed reduction were considered but no final decisions were taken; and
- Medium- and long-term measures will be addressed at future sessions.

In terms of GHG emissions reduction plan, this milestone may be considered as partly achieved. The IMO has issued its initial strategy in line with the Paris Agreement. It is important to note that the success of this strategy depends highly on:

- The commitment of member states to reductions as per UNFCCC. This in particular from members states, which tend to be of high influence in the shipping industry, such as the US withdrawal from the Paris Agreement in 2017.
- The success of the measures set by the IMO under its strategy, including their implementations, in particular the short-measures-term measures. The IMO has a fragile consensus around goal-based short-term measures, which means the SSI may wish to continue monitoring the fulfilment of these as a proxy for the fulfilment of this milestone.

Milestone 1 (2020s):

Sustained 20% reduction in CO₂ per ton from 2012 levels.

RAG status: Red

Evidence

The SSI was anticipating early action by the IMO (circa 2015), with regards to implementing a global decarbonisation strategy. However, the IMO strategy was only adopted in 2018, to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008, instead of the 2012 levels.

The IMO has progressively increased the EEDI levels for several ship types, however, these are limited to new ships.

With respect to understanding the current reduction from 2012 levels, reference should be drawn to the 4th IMO study on GHG. This study will include an inventory of global emissions of GHG emissions from international shipping from 2012 to 2018, this will estimate carbon intensity of the global fleet on the same period and also for the 2008 baseline. This study will also include scenarios for future international shipping emissions in the period 2018-2050. The study started in Autumn 2019 for submission of the final report to be for MEPC 76 in Autumn 2020.

Milestone 2 (2010s):

IMO develops biofuels guidelines.

RAG status: Red

Evidence

The IMO's guidelines on biofuels focuses on carriage of biofuels (in particular biodiesel) as cargo and not as an energy source. These have seen some developments and may be useful for the future guidelines to be developed by the IMO for the use of fuels. The available industry guidance on the use of biodiesel as fuel was produced by the International Council on Combustion Engines (CIMAC).

Some shipping companies have also taken the initiative to use biofuels within their fleet with the guidance of their flag administrations and their classification societies taking a risk-based design approach, Ref [30].

Milestone 3 (2010s):

Low sulphur regulation and SECA promoted fuel switch over.

RAG status: Green

Evidence

The regulations to reduce SO_x emissions introduced a global limit for sulphur content of ships' fuel oil, with tighter restrictions in designated ECAs. Since 2010, further amendments to Annex VI have been adopted, including amendments to introduce further ECAs.

Under the new sulphur limit, ships have to use fuel oil on board with a sulphur content of no more than 0.50% m/m. The "fuel oil used on board" includes use in main and auxiliary engines and boilers.

Ships may also meet the SO_x emission requirements by using approved equivalent methods, such as EGCS as mentioned above.

Milestone 4 (2020s):

Multi-modal collaboration is optimised.

Multi-modal reporting process is in place and used by leading organisations.

Modal shift from air to sea transport.

RAG status: Amber

Evidence

This area has witnessed some developments, with the introduction of the block-chain concept to shipping by major carriers. It is believed that further work is required within this area before considering this milestone as achieved. This is, in particular, the adoption of this optimised collaboration not only at conglomerates level.

In terms of air to sea transport shift, although the developments of reporting processes are noted for major conglomerates, this milestone is yet to be achieved. It is crucial however, for the SSI to note that the current IMO S2020 initiated an opposite effect i.e. increasing sea freight costs therefore, making air freight look less expensive for a short burst. This is of course for a certain type of goods only.

Milestone 5 (2020s):

Big data is used to optimise supply chain and third-party supplier licence.

RAG status: Red

Evidence

Strong evidence and tools now exist within the industry that prove how big data has played an important role for optimising the supply chain, through optimising fleet voyage operations, planning and technical management. Optimised supply chain examples include:

- Voyage operations, where accurate estimated time of arrival and cargo information is needed.
- Ship chartering utilising AIS information to find the right ship for cargo at the most economical price, as the task is highly dependent on information provided to them by known brokers and ship owners.

With respect to utilising big-data to optimise third-party suppliers' license, several examples exist within the industry, however, the level of achievement depends on the SSI's ambition. For example, Singapore and Malaysia utilise big data techniques to create advanced inspection systems to assess the history and cargo type of importers. The purpose of that is to segregate importers and suppliers that most require inspection and allow other importers to operate quickly without impacting the port's security objectives.

Milestone 6 (2010s):

Slow steaming, weather routing, backhaul cargo, virtual arrival and other efficient operational practices are introduced and used globally.

Digital monitoring and advanced power management used as standard in all new ships.

RAG status: **Amber**

Evidence

Slow-steaming has been a concept widely adopted in the industry as a simple measure to cut down emissions. This is of course coupled with other measures, such as trim optimisation, that show fuel consumption savings up to 4% (indicative figure from LR studies).

An important consideration is that not all ships benefit commercially from slow-steaming, hence its widespread adoption across the industry is unlikely. For example, LNG carriers benefit from sailing at high speed as they primarily rely on spot charter rates.

Virtual arrival guidance (see Ref [31] and clauses in Ref [32]) within the industry exist and are exercised by several companies, including developed countries ports, where efficiency is a commercial advantage. The advantage comes from optimising voyage management and reducing vessel emissions.

Commercial aspects, including finalising mandatory policy by the IMO on such arrangements, remain the core reasons behind globally achieving this milestone. It should be noted that during MEPC 74, the IMO had adopted Resolution MEPC 323(74), to encourage voluntary cooperation between the port and shipping sectors to contribute to reducing emissions from ships, Ref [33].

Although the IMO is yet to formally conduct a study on virtual arrival time, nor include it as part of its mandatory requirements, the concept is embedded within its short-term measures under its initial strategy and the recently adopted voluntary resolution, Ref [33]. Under these short-term measures, national administrations are encouraged to develop port activities and logistic chains to facilitate the reduction of GHG emissions from shipping.

In terms of digital monitoring and advanced power management from a technology perspective, the industry is considered to have mainly achieved this milestone. Aspects of these technological advancements are embedded within classification society rules as a result of existing industry standards, in conjunction with statutory functional requirements (SOLAS, Chapter II-1).

Milestone 6 (2020s):

Cold ironing, advanced terminal facilities, backhaul cargo and virtual arrival are commonly in place globally.

Ship design is improved with new materials, technologies and ballast requirements.

RAG status: Amber

Evidence

Smaller ships drawing power from the land-based mains supply when docked is not a new phenomenon. Shore power (or cold ironing) has been used extensively for many years for ships with moderate power requirements; typically, less than 50 to 100 kW. For the larger ships with higher power requirements (100 kW up to 10 to 15 MW) it is more complicated. To serve these ships with shore power, dedicated and relatively costly installations are required, both on land and on-board ships. This may include upgrading the grid capacity, frequency converters and complex high-power connectors.

The industry recognises the importance of cold ironing for achieving reductions of emissions within ports. New buildings, in general, have cold ironing capabilities, with standards already existing within the industry, including safety and technical standards already imbedded within classification societies rules.

As an industry milestone, the IMO's sub-committee on Ship Systems and Equipment during its seventh's session (SSE 7 – March 2020), agreed on the interim guidelines on the safe operation of onshore power supply service in port for ships engaged on international voyages. These interim guidelines focus on operational aspects instead of being technical guidelines. The IMO's sub-committee on Human Element, Training & Watchkeeping (HTW), will be asked to review the guidelines and advise MSC 103 if there are any implications for the training for shore operators. Finally, it should be noted that Sub-Committee on Ship Systems and Equipment (SSE) agreed that there is no need to develop draft amendments to SOLAS chapters II-1 and II-2, which should facilitate their adoption.

It is important to note that shore-infrastructure may pose delays to achieving this milestone, as even some ports within developing countries remain unable to offer shore-power connections and infrastructure.

In terms of new materials for ship design, challenges for the industry remains within the scalability of ships utilising alternative materials, including expertise and adaptability of shipyards. However, projects within this area have been noted such as FIBRESHIP.

FIBRESHIP's main objective is to overcome current technical and regulatory challenges in using fibre-reinforced polymer composites to replace steel in conventional shipbuilding. FIBRESHIP has already developed a methodology for material selection and has carried out verifications for mechanical properties, fatigue behaviour simulations and small-scale fire tests of the proposed materials. High-precision calculation software has also been designed to aid the structural design, considering both static and dynamic forces.

Milestone 6 (2030s):

Operational efficiency is further improved with un/low-manning requirements, advance materials and reduced ballast.

RAG status: Amber

Evidence

This milestone remains unachieved and is linked with the prescribed milestones developments, but may be ranked as amber, given the early contemporary developments on advance materials and reduced ballast designs.

Although several developments were noted in operational efficiency from advance ships material (FiberShip project), including some ballast free designs, these remain at their early stages. It is important to highlight under this milestone the unprecedented time-scales within the IMO that led to the early developments of interim guidelines for Maritime Autonomous Surface Ships (MASS) trials (MSC.1-Circ.1604). Such efforts may potentially lead to accomplishing this milestone before 2030.

Milestone 7 (2010s):

Perverse trading is mapped and the cost to the global economy is understood.

RAG status: Red

Evidence

Studies are being developed to understand the cost of perverse trading, however, understanding the cost implications still requires further developments within the areas of data collection and carbon pricing.

Studies by the Transport & Environment (T&E), Ref [34] and the United Nations Conference on Trade and Development (UNCTAD), Ref [35] serve towards understanding this milestone's developments.

Currently, there are no ethical or environmental grounds for treating the shipping industry more leniently than road transport. It is believed that the right way of removing current subsidies on fuel oil and understanding their cost to the global economy is through emissions trading, noting that several countries have already committed to delivering this.

Given the enforcement of the EU MRV and IMO DCS with the aid of the AIS data, published data will allow for the industry to understand per ship type and deadweight, the approximate cost to the global economy for the defined route.

Milestone 7 (2020s):

Trading models are developed, trialled and standardised to avoid perverse trading.

RAG status: Red

Evidence

Poseidon Principles can be referenced as the only main scheme accounting for long-term sustainability that achieves results at procurement levels.

Procurement processes should also be focused on well-defined deliverables that cover environmental, social and economic issues, such as reducing CO₂ emissions, promoting equal pay and providing opportunities for small and medium enterprises and others.

The introduction of block-chain concept will assist in achieving an optimised supply chain that includes reverse-logistics. However, surge in prices at source from such practices may disrupt the supply and demand within the market.

Milestone 8 (2020s):

Carbon pricing is used to inform procurement processes and logistics design.

Carbon accounting is factored into decision making.

RAG status: Amber

Evidence

Carbon pricing has not yet been formally introduced, however, it may be introduced by the IMO from 2030 to reduce GHG emissions.

The EU emissions trading system (EU ETS) is the EU's policy to combat climate change and its tool for reducing GHG emissions.

The EU ETS works on the 'cap and trade' principle. A cap is set on the total amount of certain GHG that can be emitted by installations covered by the system. The cap is reduced over time so that total emissions fall. Within the cap, companies receive or buy emission allowances, which they can trade with one another as needed. They can also buy limited amounts of international credits from emission-saving projects around the world. The limit on the total number of allowances available ensures that they have a value.

After each year a company must surrender enough allowances to cover all its emissions, otherwise heavy fines are imposed. If a company reduces its emissions, it can keep the spare allowances to cover its future needs or else sell them to another company that is short of allowances. Trading brings flexibility that ensures emissions are cut where it costs least to do so. A robust carbon price also promotes investment in clean, low-carbon technologies. The EU ETS has proved that putting a price on carbon and trading in it can work. Emissions from installations in the system are showing fall.

7.3. Recommendations

The goals set within this vision area for the SSI remain challenging while noting also the following considerations:

- It is anticipated that imbedding block-chain globally within the industry will be one of the key steps towards achieving a fully integrated supply chain.
- The different paces that regions and sectors are moving at towards achieving this goal may be the biggest challenge to address.

8. Conclusions and overall recommendations¹

Based on the reviewed milestones within the six vision areas, the following may be concluded for each vision area:

Table 7: Vision area specific recommendations

Vision Area	Recommendations
1 – Oceans	<p>These goals by the SSI under this vision area remain challenging to fulfil within the time frame. This is due to the natural cycle of work to agree on international regulations within the IMO, agencies and other bodies.</p> <p>It is also believed that the establishment of an international reporting system which is recognised by many administrations will promote recognition of responsibilities, while also enforcing MSPs.</p>
2 – Partner	<p>The set goals within this vision area appear to be moving in the right direction based on the updates of each milestone. For the SSI it is important to note that:</p> <p>Developed countries are leading in terms of meeting the objectives of this vision area hence for developing countries, this will continue to be the main challenge.</p>
3 – Talent	<p>The milestones under this vision area remain challenging, in particular, due to the following:</p> <ul style="list-style-type: none"> • To achieve zero accidents, the key milestones required to be fulfilled are: <ul style="list-style-type: none"> – Public sharing of information on near-misses, which currently remains at a voluntary level, and highly reserved due to commercial impacts. – Global transparency and establishment of a global set of standards rather than local reporting and focusing on niche areas. – Data on accidents, e.g. LTI, exists within consortiums such as P&I clubs etc. The industry’s access to this data and consistent reporting of incidents are vital aspects to achieve zero-accidents concepts. – The reduction of the human element within shipping (MASS) may also be a major enabler to achieving this goal. However, MASS may also present other consequences for seafarers such as loss of skill sets. • When attempting to achieve equality efforts should be focused on addressing the gender equality and diversity in shipping. • Once the equality has been achieved, this would make shipping more attractive as a career. • Relevant SSI members may wish to take further initiatives at a consortium level to lead the industry by example.

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4 – Transparency	<p>The goals set by the SSI under this vision, remain challenging due to the following:</p> <ul style="list-style-type: none"> – Transparency and consistency remain the key issue behind compliance sustainability schemes; in particular, transparency associated with the area of energy efficiency. Effective performance monitoring and enforcement so far exist for rating schemes however, their adoption remains at a voluntary level. It is expected that the enforcement and monitoring of schemes would need to be conducted by trusted third-party verifiers to provide assurance and transparency. – Following the IMO’s initial strategy to achieve its targets by 2050, it is expected that the 2040 timeline suggested by the SSI may be too optimistic, and require an extension to 2050s, as the industry will need to follow defined targets by the IMO.
5 – Finance	<p>The goal set by the SSI under this vision, remains challenging, in particular:</p> <ul style="list-style-type: none"> – To achieve ecosystem valuations - this is highly influenced by the current IMO regulatory development process, which should be much better equipped, similar to the EU, for taking into consideration second-order consequences of regulation from one domain on the other. – This vision area may need to be extended into the 2050s, as the industry will need to follow defined targets by the IMO. – Overall, only climate change related risks are included in financial decisions and this should be extended to include all aspects of sustainability.
6 - Energy	<p>The goals set within this vision area for the SSI remain challenging while noting also the following considerations:</p> <ul style="list-style-type: none"> – It is anticipated that imbedding block-chain globally within the industry will be one of the key steps towards achieving a fully integrated supply chain. – The different paces that regions and sectors are moving at towards achieving this goal may be the biggest challenge to address.

Overall recommendations are listed below:

20. The existing roadmap is very comprehensive and it is still valid in terms of its vision areas and most of its milestones to meet its objectives.
21. Vision Area 1’s title should also include ‘healthy use of the oceans’ as well as governance.
22. Decades should be updated to 2020s, 2030, 2040.
23. Fulfilled milestones should be removed.
24. Unfulfilled milestones should be moved to a suitable decade with more attention drawn to them to improve focus.
25. Some of the milestones are repeated in more than one vision area or within the same vision area, these should be placed under the most relevant vision area only to avoid duplication and confusion.
26. Each milestone should be linked to its future milestone (as shown in this report) where possible to track progress.
27. Very specific milestones may be removed to replace them with more generic ones.

28. Titled tabs for each milestone are too many and inconsistent amongst each vision area. Some should be renamed and should be consistent for each vision area.
29. Dotted boxes are confusing, and they clutter the roadmap. If the case for action is complete, these would be redundant.
30. Objectives of each vision area should be clearly marked with clear language, so the readers understand the purpose of each vision.
31. Overall objective of the roadmap should be clearly identified at the beginning of the text, so the readers appreciate the purpose of the roadmap and how it adds value.
32. The Case for Action part of the roadmap needs to be clear that these are future trends and main industry drivers.
33. Current format of the roadmap is wordy and not so easy to understand.
34. Presentation should be improved to make it easy for the readers to digest its content and appreciate its main objective.
35. There is little need for two different versions, one simple version is sufficient.
36. The printing layout should be improved to make it easy to view it on hardcopy.
37. Overall, the Roadmap needs to be able to communicate and stay relevant for various stakeholders from various backgrounds.
38. Simple format of the Roadmap would help towards its maintenance in terms of time and cost.
39. The following simple format may be suggested for each vision area:

Vision Area 1		
2020s	2030s	2040s
Case for Action	Case for Action	Case for Action
Milestone 1	Milestone 1	Milestone 1
Milestone 2	Milestone 2	Milestone 2
Milestone 3	Milestone 3	Milestone 3
Milestone 4	Milestone 4	Milestone 4
Milestone 5	Milestone 5	Milestone 5
Ultimate objective		

9. References

No	Reference
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16	IMO, ' Guidance on Near-Miss Reporting ', January 2020.
17	Paris MoU, ' Publications ', January 2020.
19	IMO, ' Assembly 31st session ', January 2020.
19	' International Transport Workers' Federation (ITF) ', January 2020.
20	The International Chamber of Shipping, ' Comprehensive review of the STCW Convention and Code - Submitted by ICS, dated 22 February 2019 ', January 2020.
21	Environmental Shipping Index, ' List of Participating Ships ', January 2020.
22	Carnival Corporation & PLC ' Sustainability From Ship to Shore – FY 2018 Sustainability Report ', January 2020.
23	RightShip, ' Port Incentive Programs ', January 2020.
24	The Poseidon Principles, ' The Poseidon Principles ', January 2020.
25	Sainsbury's, ' Sainsburys Sustainability Report 2018 ', January 2020.
26	Gov UK, Climate change and energy, ' UK becomes first major economy to pass net zero emissions law ', January 2020.
27	Gov UK, Maritime and the environment ' Clean maritime plan: Maritime 2050 environment route map ', January 2020
28	European Parliament, ' Ocean governance and blue growth Challenges, opportunities and policy responses ', January 2020.
29	LR, ' IMO CCC 6 Summary Report ', January 2020.
30	CMA CGM, ' CMA CGM accelerates the deployment of marine biofuel ', January 2020.

31	Intertanko and OCIMF, ' Virtual Arrival ', January 2020.
32	BIMCO, ' Virtual Arrival Clause for Voyage Charter Parties 2013 ', January 2020.
33	IMO, ' RESOLUTION MEPC.323(74) - INVITATION TO MEMBER STATES TO ENCOURAGE VOLUNTARY COOPERATION BETWEEN THE PORT AND SHIPPING SECTORS TO CONTRIBUTE TO REDUCING GHG EMISSIONS FROM SHIPS '.
34	T&E, ' EU Shipping's €24billion/year fossil tax holidays ', January 2020.
35	UNCTAD, ' Review of Maritime Transport 2019 ', January 2020.

Appendix A E-Survey

A.1 Questions



Sustainable Shipping Initiative's sustainability survey 2020

A sustainable future for the marine industry

Introduction

The SSI Roadmap is a resource for SSI members and the wider shipping industry to understand the present and future challenges, as well as the steps and milestones to shape their own sustainability strategies. As a 'live' working tool, the SSI actively engages with the industry to periodically update the Roadmap based on progress that is made, and the industry landscape changes and evolves. Lloyd's Register has been commissioned to conduct this work in 2020, with the outcome being an updated Roadmap launched on the occasion of its 10th anniversary in October 2020.

Developed in line with [SSI's Vision 2040](#) and [Case for Action](#), the [SSI Roadmap](#) was developed by SSI members and key industry stakeholders and defines tangible milestones across all areas of sustainability for a sustainable shipping industry by 2040. It is available to download [here](#).

The SSI is a multi-stakeholder initiative that brings together like-minded and leading organisations with shared goals and equal determination in improving the sustainability of the shipping industry in terms of social, environmental and economic impacts.

SSI members range from charterers, shipowners and shipyards to ports & port operators, banks, ship finance and insurance providers, classification societies and technology companies.

SSI's 2018-21 strategy identifies a series of deliverables to achieve the objective "to shine a light on what is working, and what is needed, to accelerate sustainability and shape a positive narrative". While some preliminary data collection was done in 2018, further work is required to achieve this objective through an updated SSI Roadmap that highlights progress, identifies gaps and clearly points to where more action is needed to overcome shared barriers.

Purpose of this survey:

This survey aims to update SSI's Roadmap and understand where we are as an industry with our commitments to a sustainable future. This survey also aims to assess the degree of awareness, commitment and practices of marine businesses to sustainability and to clearly establish the type and the magnitude of existing and future business challenges, opportunities and drivers in this area. These will be assessed on the basis of:

- The extent to which marine stakeholders currently do, or plan to address sustainability;
- whether key stakeholders see potential commercial advantages in more sustainable business practices; and,
- which key stakeholders currently implement sustainability strategies, or plan to develop them in the future.

Part 1 – What sustainability means to you

1. Generally, what does sustainability mean to your organisation?

Please select all that apply:



Environmental impact	Compliance	Social/Cultural impact	Ethical	Reputational/PR
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Long-term strategy	Carbon footprint	Corporate social responsibility	Economical/Financial	Business longevity
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk management	Innovation	Circular economy	Nothing	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you answered 'Nothing' or 'Other' please provide the reasons as to why?

[Click here to enter your reason\(s\).](#)

2. How would you rate the relevance of sustainability to your organisation?

Please tick the appropriate box:

A – Very relevant	B – Somewhat relevant	C – Neutral	D – Somewhat irrelevant	E – Irrelevant
<input type="checkbox"/>				

If answer D or E, please provide the reasons as to why?

[Click here to enter your reason\(s\).](#)

3. How would you rate the current sustainability of your organisation?

Please tick the appropriate box:

A – Extremely sustainable	B – Very sustainable	C – Average	D – Not very sustainable	E – Not at all sustainable
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If answer D or E, please provide the reasons as to why?

[Click here to enter your reason\(s\).](#)

4. How well do you think sustainability is understood in your organisation?

A – Very well	B – Well	C – Understood	D – Not very	E – Poorly
<input type="checkbox"/>				

5. Are you concerned about the sustainability of your organisation compared to that of your competitors?

Please tick the appropriate box:

A – Extremely	B –Very	C –Indifferent	D – Not very	E – Not at all
<input type="checkbox"/>				

If answer A or E, please provide the reasons as to why?

[Click here to enter your reason\(s\).](#)

6. How do you rate the sustainability of your organisation when compared to that of your competitors?

Please tick the appropriate box:

A – Very ahead	B – Marginally ahead	C – Same	D – Behind	E – Far behind
<input type="checkbox"/>				

If answer A or E, please provide the reasons as to why?

[Click here to enter your reason\(s\).](#)

7. Where do you think shipping industry is in terms of its sustainability journey when compared with other forms of transport such as aviation and road?

Please tick the appropriate box:

A – Very ahead	B – Marginally ahead	C – Same	D – Behind	E – Far behind
<input type="checkbox"/>				

If answer A or E, please provide the reasons as to why?

[Click here to enter your reason\(s\).](#)

Part 2 – Your sustainability priorities

1. Does your organisation have any of the following?

Please select all that apply:

Sustainability strategy	Sustainability policy	Sustainability an element of business culture	Sustainability a core business value/creed	Sustainability part of your mission statement
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sustainability targets	Sustainability report	Sustainability training	Sustainability embedded within governance structure	Sustainability data for ESG rating organisations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
None of the above	Other			
<input type="checkbox"/>	<input type="checkbox"/>			

If you answered 'None of the above' or 'Other' please provide the reasons as to why?

[Click here to enter your reason\(s\).](#)

2. How important do you think the sustainability of your organisation is to your customers and business partners?

A – Extremely	B –Very	C –Indifferent	D – Not very	E – Not at all
<input type="checkbox"/>				

3. Do you have sustainability goals / outcomes set as part of any of the following areas?

Please select all that apply:

Increasing efficiency	Business innovation	Technology development	Performance monitoring	Performance reporting
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transparency/ communication	Stakeholder engagement	Cultural change	Other	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

If you answered 'Other' please provide the reasons as to why?

[Click here to enter your reason\(s\).](#)

Part 3 – Your sustainability practices

1. Does your organisation have a dedicated staff member or team for managing sustainability?

Yes

No

If 'Yes', at what level in your organisation does this resource sit?

[Click here to select the nature of the Sustainability resource](#)

If 'No', is sustainability addressed by another resource in your organisation?

Yes

No

If yes, what level?

[Click here to enter](#)

2. Does your organisation measure any of the following?

Please select all that apply:

Environmental
impact

Employee
engagement

Social value

Sustainability
performance

3. Does your organisation report on its sustainability performance?

Yes

No

If 'Yes', is your report:

Internal

External

Voluntary

Mandatory

To an external
standard

Stand alone

Integrated within
company annual
reporting

If to an external standard, which?

[Click here to enter the standard\(s\).](#)

4. Who has overall responsibility for sustainability in your organisation?
[Click here to select the nature of the Sustainability Resource](#)

5. Do you select business partners on the basis of their sustainability?

Yes

No

6. Does your organisation do any of the following?

Please select all that apply:



Publicly available set of policies on social and environmental issues

Published data on relevant social, environmental and economic issues

Identified sustainability risks

Innovation and business development are integrated in sustainability

Publicly available environmental targets

GHG reduction targets beyond compliance

Emissions reduction targets beyond compliance

Environmental class notations

Biosecurity management targets beyond compliance

Waste reduction targets including shore-based facilities

Zero accidents targets

Staff satisfaction survey

Adoption of high standard of working conditions during recycling

None of the above

Other

If you answered 'None of the above' or 'Other' please provide the reasons as to why or details?

[Click here to enter your reason\(s\).](#)

Part 4 – Your sustainability drivers

1. Which internal factors drive your approach to sustainability?

Financial reasons	Ethical reasons	Employee engagement	Reputational reasons	Concern over longevity
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Senior management champion	Other			
<input type="checkbox"/>	<input type="checkbox"/>			

If you answered 'Other' please provide details?

[Click here to enter your reason\(s\).](#)

2. Which external factors drive your approach to sustainability?

Competitive advantage	Shareholder/ Investor engagement	Compliance requirements	NGO / Civil society
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If for 'Compliance Requirements', which type?			
International	Regional	National	Industry best practice
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Can you list of opportunities that are posed on the industry by sustainability?

[Click here to enter your answer](#)

4. Rank the following factors in terms of their perceived influence on your sustainability strategy:

1 = Least; 4=Greatest

Financial / Commercial

Technology

Stakeholders

Regulation

5. Rank the following drivers based on their perceived importance to your organisation:

1 = Least; 7=Greatest

Climate change

Geopolitical change

Technology development

Supply of resource

Finance

Compliance

Future regulations.

Part 5 – Your sustainability challenges

1. Please list your organisation's sustainability challenges?

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

2. What would help you overcome these challenges?

Select those that apply:

Education & awareness	Financial incentives	De-risking of technology	Regulatory changes	Competitive advantage
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other				
Click here to enter				

Part 6 – About SSI

1. Please provide some information for us to improve our work.

Please fill in your answer:

Have you heard about SSI and our work before this survey?

Click here to enter your answer

Have you ever seen our Roadmap before this survey?

Click here to enter your answer

Our Roadmap has six areas, do you feel that they represent all areas for a sustainable shipping?

Click here to enter your answer

Do you feel that our work is adding value to the marine industry?

Click here to enter your answer

Which area(s) do you feel SSI should focus on during 2020 to 2023?

Click here to enter your answer

What else would you like us to do to make shipping more sustainable?

Click here to enter your answer

Would you consider being a part of our organisation?

Click here to enter your answer

Would you recommend our work to your colleagues or stakeholders?

Click here to enter your answer

Part 7 – Basic information and data protection

The survey results will be anonymised.

The survey results will be stored in LR's secure server during the project delivery time.

The survey results will be used to update the SSI roadmap.

The survey results will be deleted on completion of the project.

1. Please provide some basic information for survey analysis purposes.

Please fill in your answer:

Company name:

[Click here](#) to enter the name of your company.

Position/Department:

[Click here](#) to enter your position.

The nature of your position

[Click here](#) to select the nature of your position

The nature of your role:

[Click here](#) to select your business sector

If you have further comment about this survey, please state here.

[Click here](#) to enter your comment.

Thank you for your cooperation with this survey.

Any sensitive information provided will remain strictly confidential.

For additional information and support to discuss topics within this survey and to take advantage of the opportunity to share knowledge on a non-commercial basis please feel free to contact persons listed below:

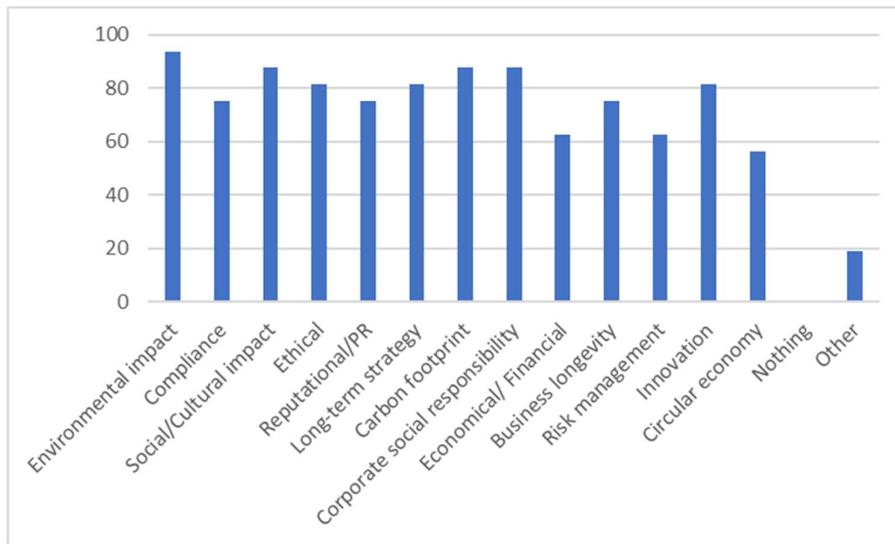
Name	Position	Email Address	Telephone
Yildiz Williams	Senior Marine Consultant Lloyd's Register	Yildiz.williams@lr.org	T +44 (0)3304 140 088 M +44 (0)7805 812 136
Nicole Rencoret	Head of Communications and Development Sustainable Shipping Initiative	N.Rencoret@ssi2040.org	T +45 22 45 38 11

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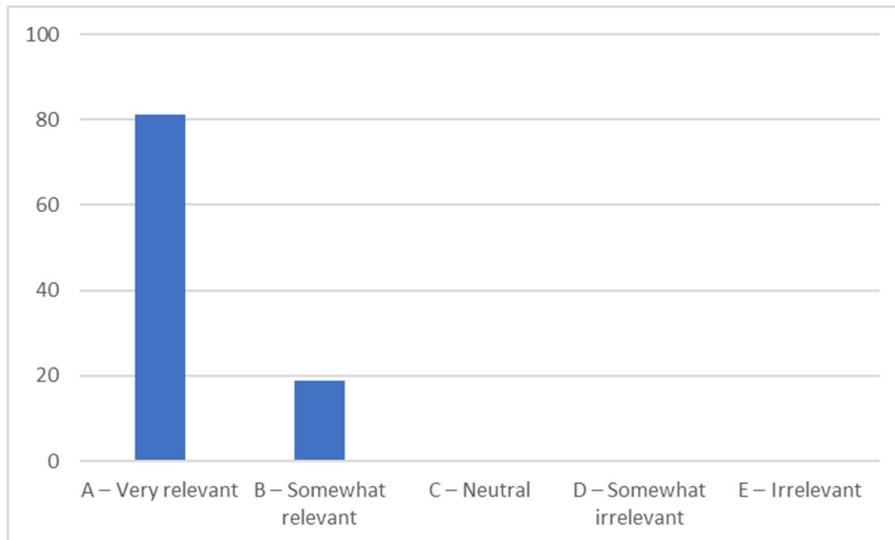
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A.2 Results

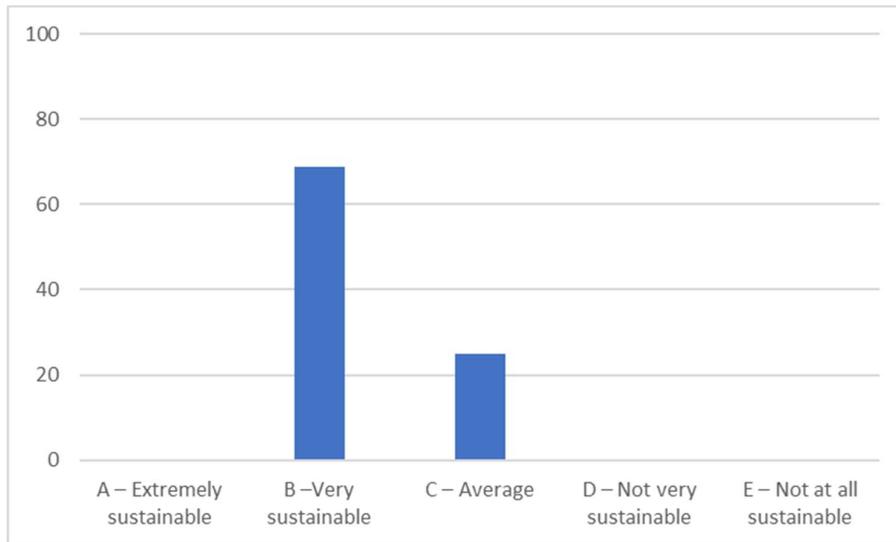
Part 1 – Question 1: Generally, what does sustainability mean to your organisation?



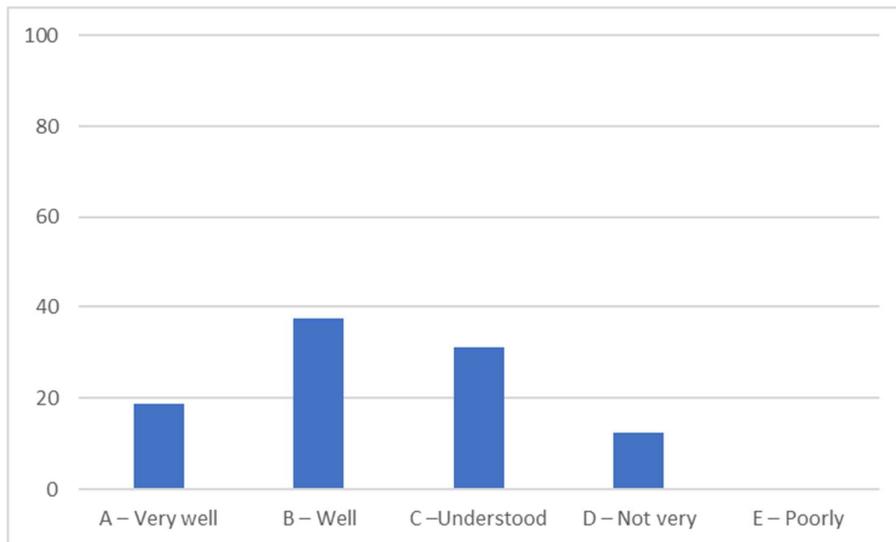
Part 1 – Question 2: How would you rate the relevance of sustainability to your organisation?



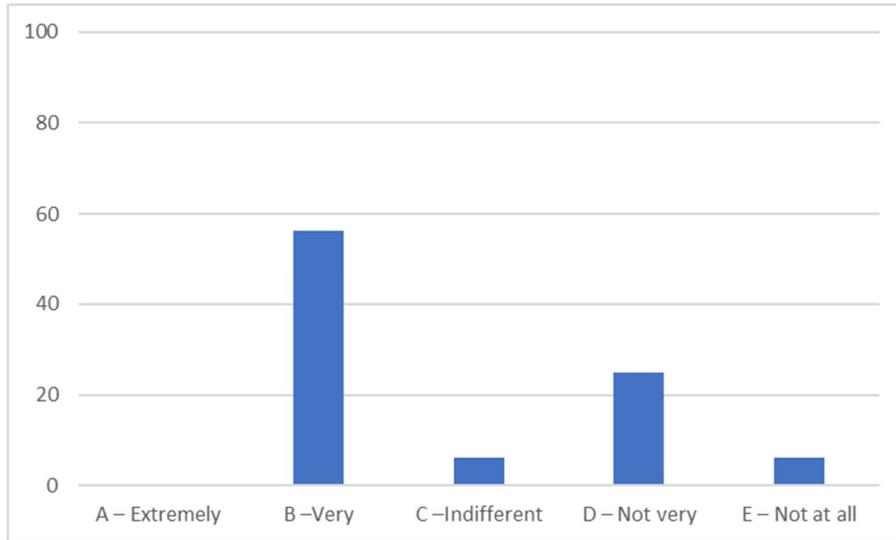
Part 1 – Question 3: How would you rate the current sustainability of your organisation?



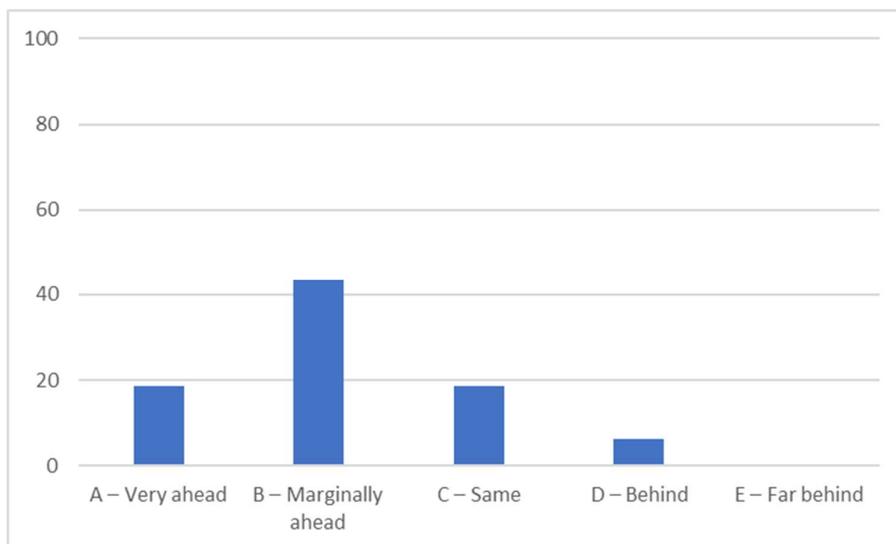
Part 1 – Question 4: How well do you think sustainability is understood in your organisation?



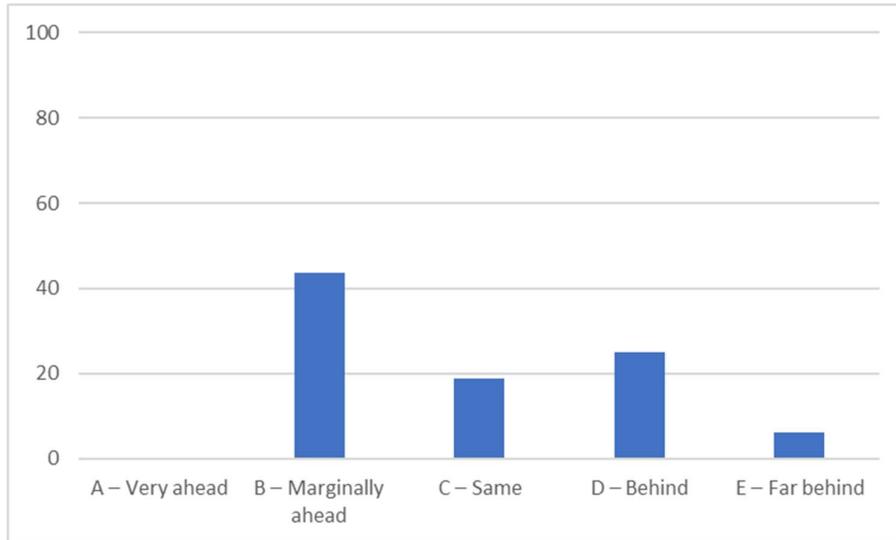
Part 1 – Question 5: Are you concerned about the sustainability of your organisation compared to that of your competitors?



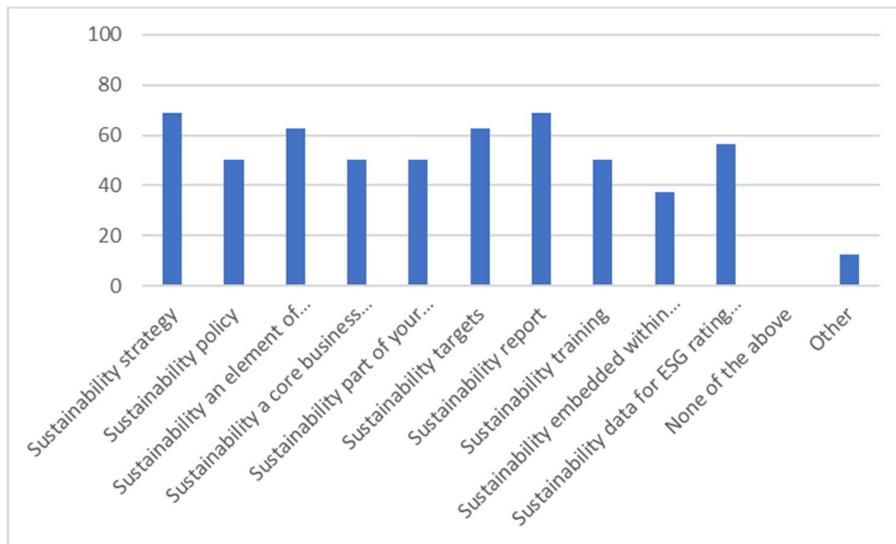
Part 1 – Question 6: How do you rate the sustainability of your organisation when compared to that of your competitors?



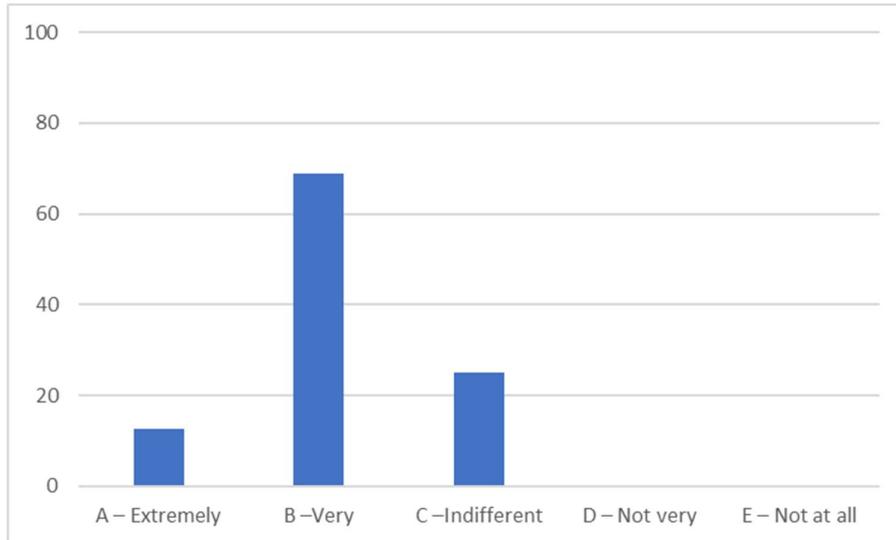
Part 1 – Question 7: Where do you think the shipping industry is in terms of its sustainability journey when compared with other forms of transport such as aviation and road?



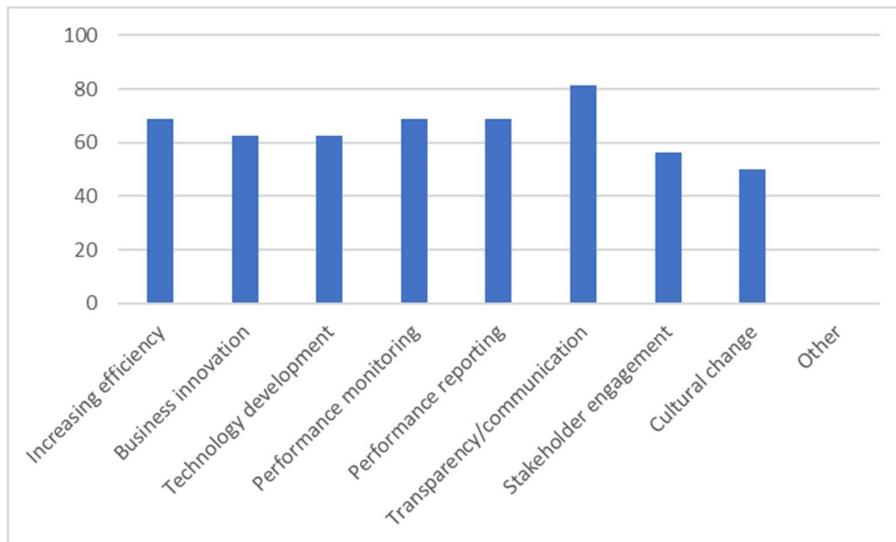
Part 2 – Question 1: Does your organisation have any of the following?



Part 2 – Question 2: How important do you think the sustainability of your organisation is to your customers and business partners?



Part 2 – Question 3: Do you have sustainability goals / outcomes set as part of any of the following areas?



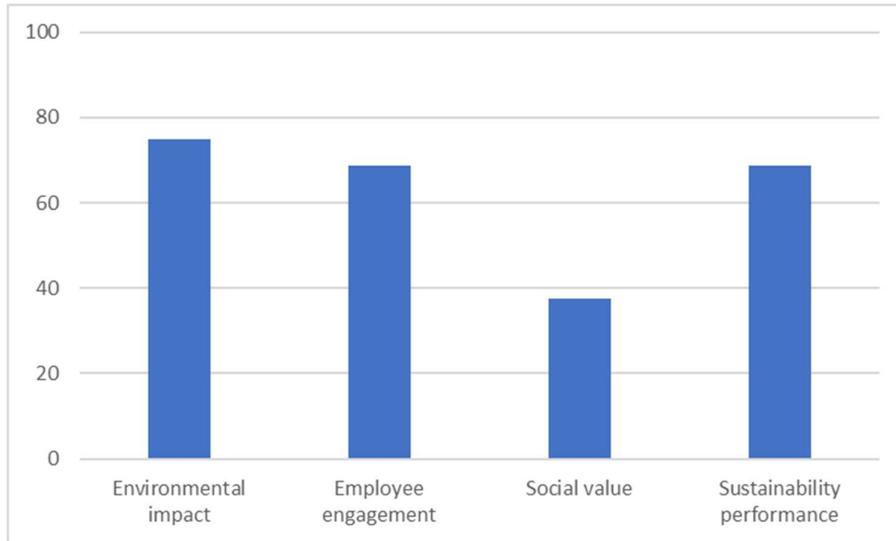
Part 3 – Question 1: Does your organisation have a dedicated staff member or team for managing sustainability?

Yes = 63%

No = 31%

Neither = 6%

Part 3 – Question 2: Does your organisation measure any of the following?

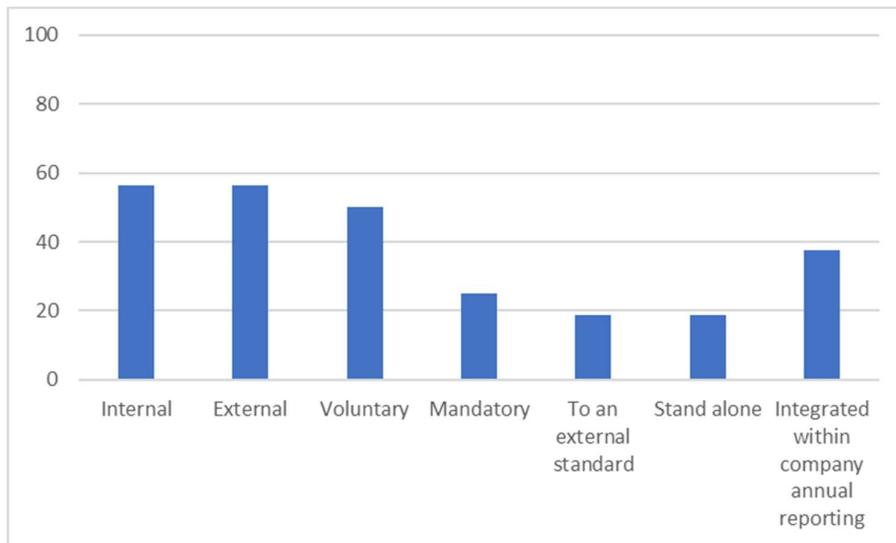


Part 3 – Question 3: Does your organisation report on its sustainability performance?

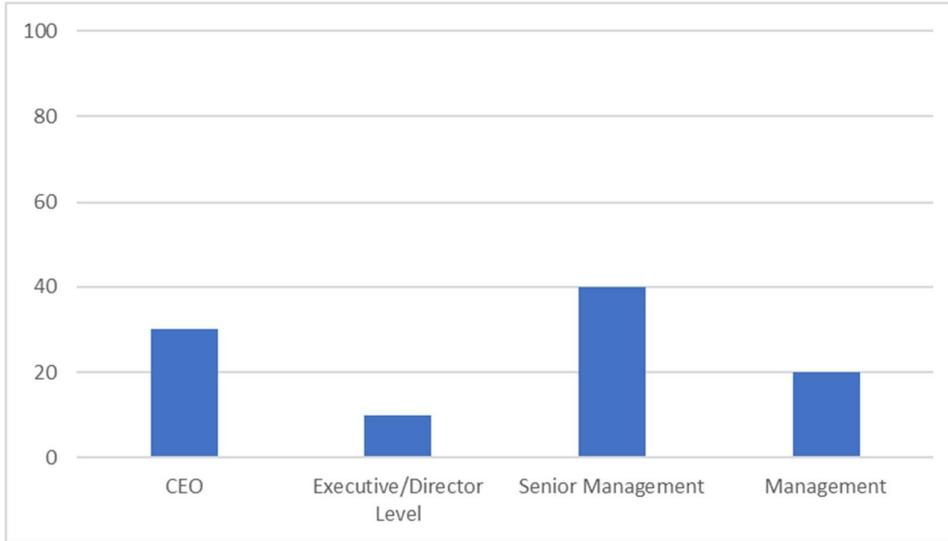
Yes = 81%

No = 6%

Neither = 13%



Part 3 – Question 4: Who has overall responsibility for sustainability in your organisation?



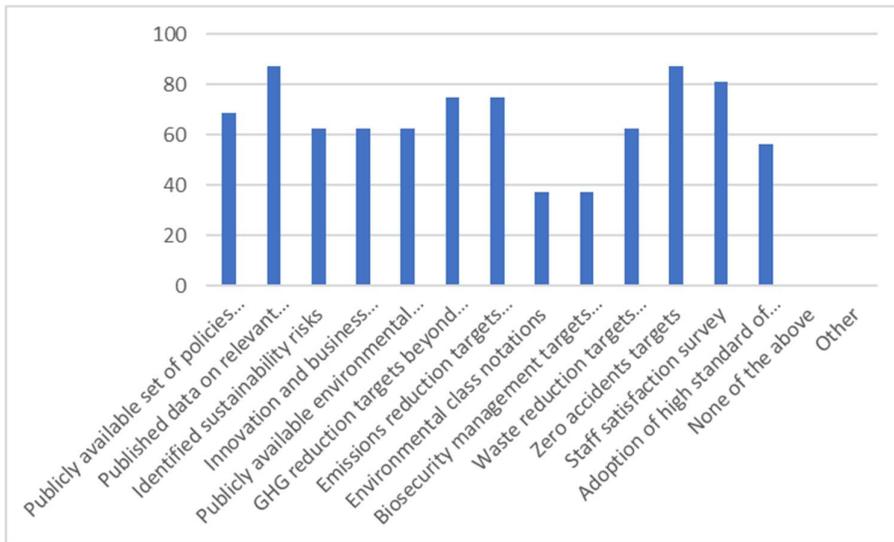
Part 3 – Question 5: Do you select business partners on the basis of their sustainability?

Yes = 56%

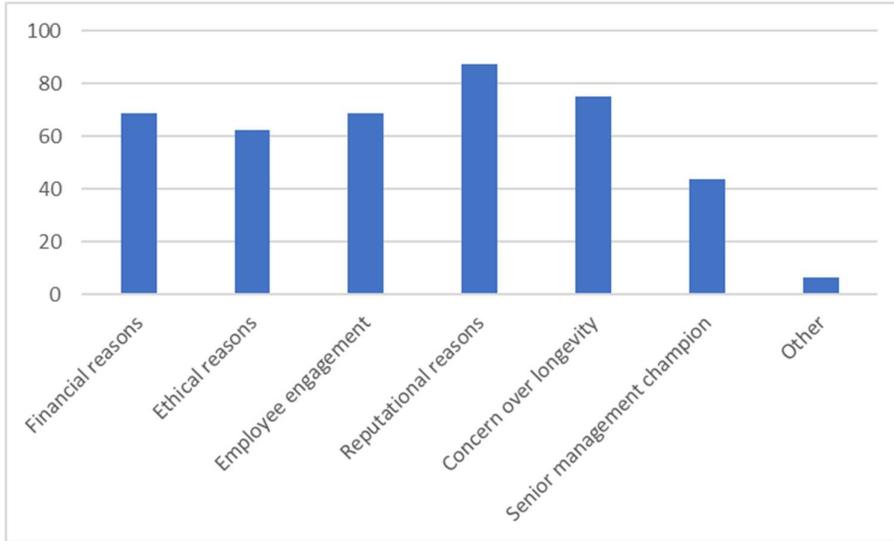
No = 31%

Neither = 13%

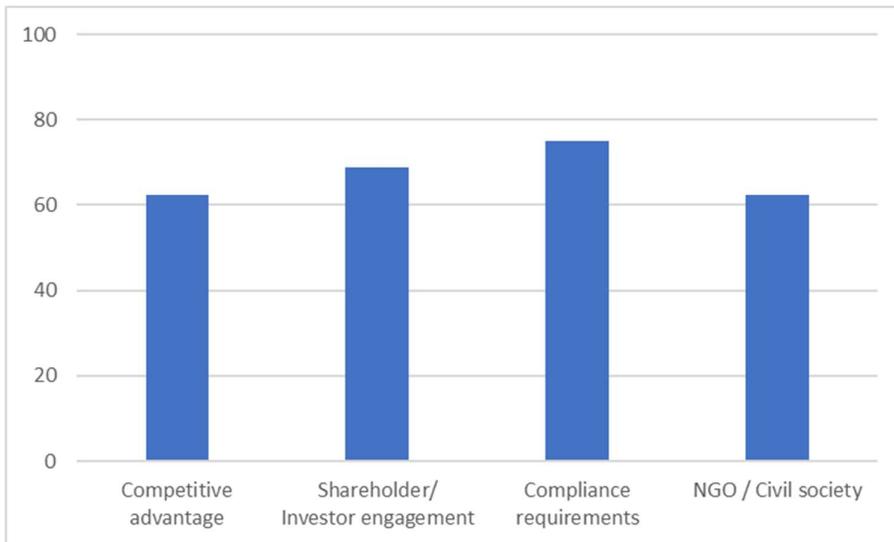
Part 3 – Question 6: Does your organisation do any of the following?



Part 4 – Question 1: Which internal factors drive your approach to sustainability?



Part 4 – Question 2: Which external factors drive your approach to sustainability?



Part 4 – Question 3: Can you list opportunities that are posed on the industry by sustainability?

New Consumption Pattern, New Trade Routes, Alternative Energy and Technological Changes with Governmental Incentives.

First mover advantage in owning sustainable and eco-friendly shipping solutions.

Realising that doing the right thing and making money can be done in tandem.

All should be viewed as “opportunities”. If not, then it is merely “compliance” for the sake of complying: Innovation, Compliance, Technology advancements, Financing, Human Health Improvement, Environmental Emissions and their effects on Global Warming, Risk Management.

Zero GHG emissions, Industrial revolution.

It is a growing requirement when recruiting and an opportunity to maintain an image as the greener transportation segment vs freight customers.

Longevity of their business, good reputation that translates to business profitability, ability to set up long-term strategies.

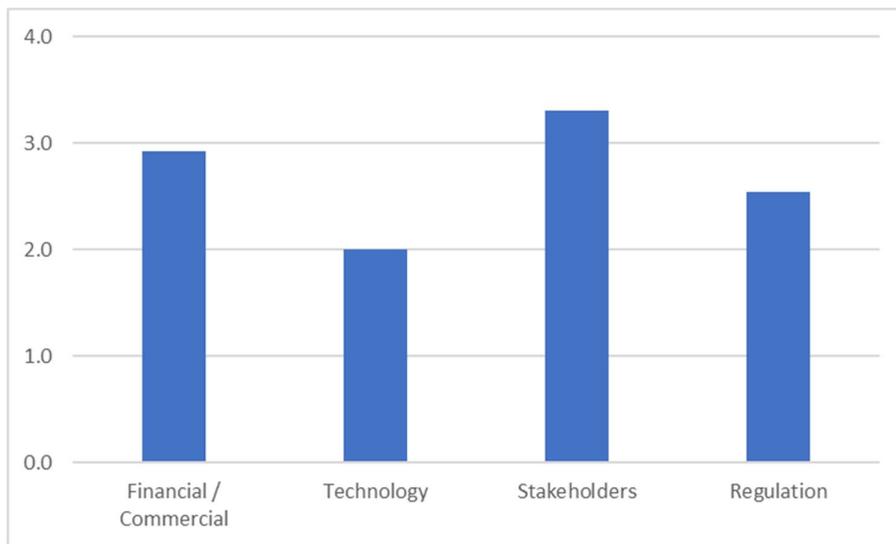
Market and competition.

Remain competitive and ability to sell to high demand companies.

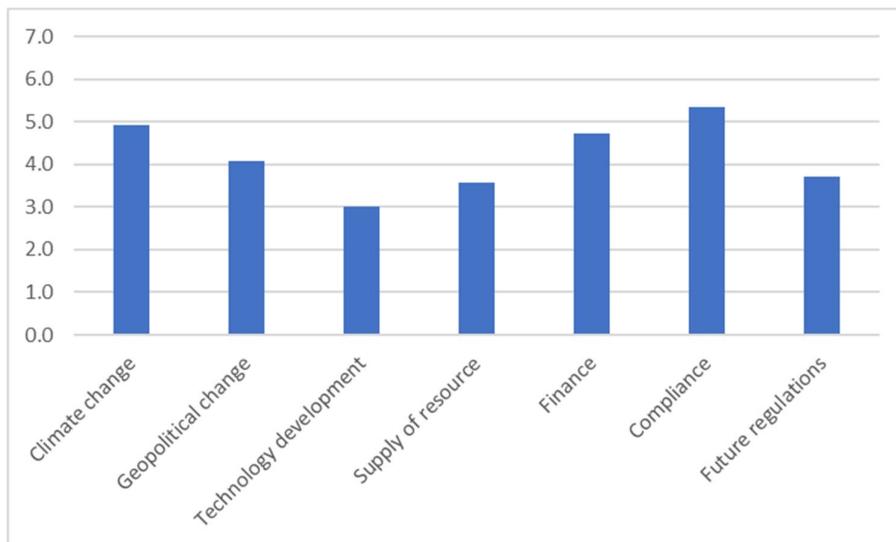
The right regulations / standards can be the driver for material change.

Meeting the goals and aspirations of the people we employ.

Part 4 – Question 4: Rank the following factors in terms of their perceived influence on your sustainability strategy: 1 = Least; 4=Greatest



Part 4 – Question 5: Rank the following drivers based on their perceived importance to your organisation: 1 = Least; 7=Greatest



Part 5 – Question 1: Please list your organisation’s sustainability challenges?

Technology Advancement

Talent Attraction and Retention

Uncertain/ volatile geopolitical environment

Finance

Future regulations

Creating clarity and transparency

Dovetailing sustainability with business drivers

Communicating sustainability effectively and avoiding cynicism

Uncertainty on terms of regulation and technology

Timelines and controls

Getting LCA assumptions correct and with respect to competitive fuels so not comparing apples vs oranges

Providing confidence to the market that adequate supply is available

Educating the market on technological and financial benefits of methanol-based circular economy

Bringing conventional product producers to support renewable product as the future

Attracting international funding for renewable methanol projects

Influencing sustainable policy which is balanced with appropriate targets and sound incentives

Scaling renewable product capacity

Indirect impact of services provided to clients

Direct impacts

Understanding of what sustainability means to us

Integration into business strategy

Leadership buy-in and engagement

Decarbonisation

Community Investment

Engaging with clients who take a long term view

Engaging with all stakeholders to raise the bar, beyond compliance

Communication of the message

Fossil dependence

Diversity of thought

Challenge to recruit females, youth and first generation migrants

Ship recycling

Supply chain control

Common Industry emissions calculations and reporting

Industry transparency – emissions and safety

Crew Welfare

Diversity

Waste disposal/plastics

Ship recycling

Geopolitical change

Future regulations

Finance

Supply of resource

Reputational risks from association with polluting sectors and companies

Reputational issues from management of protected areas

Emissions from air travel

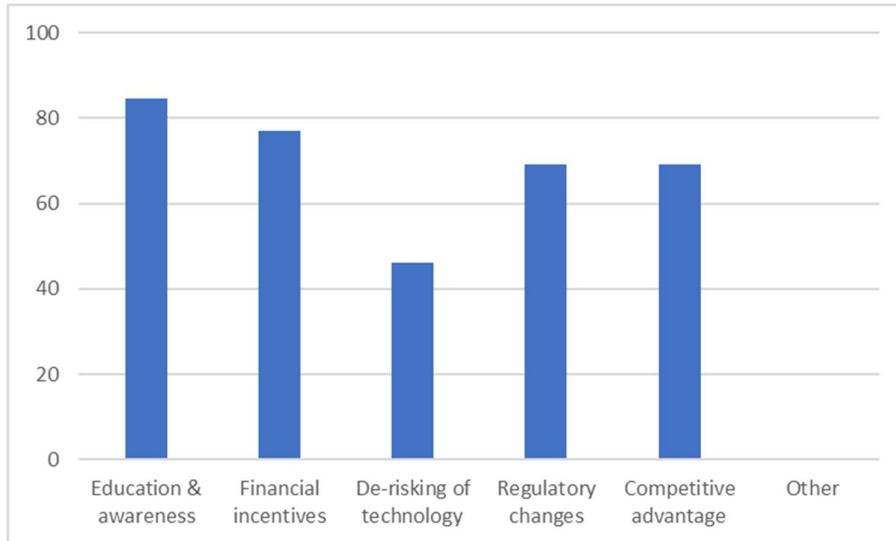
Staying competitive

How to monetize a high sustainability standard

Leading and/or maintaining position in the industry

Cultural change

Part 5 – Question 2: What would help you overcome these challenges?



Part 6 – Question 1: Have you heard about SSI and our work before this survey?

Yes = 92%

No = 8%

Part 6 – Question 2: Have you ever seen our Roadmap before this survey?

Yes = 69%

No = 31%

Part 6 – Question 3: Our Roadmap has six areas, do you feel that they represent all areas for sustainable shipping?

Yes = 54%

No = 38%

No reply = 8%

Part 6 – Question 4: Do you feel that our work is adding value to the marine industry?

Yes = 69%

No = 8%

Partially = 23%

Part 6 – Question 5: Which area(s) do you feel SSI should focus on during 2020 to 2023?

Getting the whole fleet to zero carbon, the systemic impacts (on other sectors, health, environment, land and biodiversity etc) of options to do that: biofuels, hydrogen and ammonia; circularity with recycling should continue. Preparing for the disruption on current and future crews from automation.

Collaboration between all parties in the shipping value chain to meet UNSDG and IMO 2030 & 2050 climate action goals.

Environment.

Build a bridge between regulation and technology and the competing timelines.

Initial steps which can be implemented now and during that time. Not always searching for the “zero carbon solution”, or silver bullet.

Climate action and what sustainability means to the Shipping industry All the areas in Part 5, Q1.

Emissions to air, diversity, plastics in the ocean.

Transparent reporting of emissions.

Greenhouse gas emissions; Alternative zero emission fuels; working conditions and worker rights.

Social and how sustainability can be cash positive for the industry.

Part 6 – Question 6: What else would you like us to do to make shipping more sustainable?

Being more clear on what the industry needs to do to get there, advocating for the actions needed.

Nature disaster, but beyond our control.

Improve public perception.

Lobby governments at higher levels, not only shipping.

Influencing and transforming change.

Show a competitive advantage for sustainable shipping companies.

A regular short format regulatory update.

Formulate an example on what good sustainability looks like in the industry. What initiatives should a company have incorporated in their sustainability to be considered as leading in this area.

Be more outspoken and more visual.

Laws and regulations / rules.

Availability of digital twins for all ships. Transparency of certification of emissions per ship.

Part 6 – Question 7: Would you consider being a part of our organisation?

Yes = 54%

No = 23%

Already a member = 23%

Part 6 – Question 8: Would you recommend our work to your colleagues or stakeholders?

Yes = 69%

No = 8%

Neutral = 8%

No reply = 15%

A.3 Participants

The survey was sent to 52 stakeholders and below sent their replies.

- Ardmore Shipping
- Bunge
- Cargill
- Forum for the Future
- IMarEst
- Imc Industrial Group
- Louis Dreyfus Company
- LR
- Maersk
- Methanol Institute
- MISC Bhd
- Nanjing Ocean Shipping Co Ltd
- SDSC Ship Management Co Ltd
- Stena Line
- The China Navigation Company Pte Ltd
- Tianjin COSBULK Ship Management Co Ltd
- TOSCO KEYMAX International Ship Management Co Ltd
- UK Chamber of Shipping
- WWF

Appendix B Stakeholder consultation

Stakeholder consultations were in the form of open discussions based on below questions:

1. The objective of the interview is to further tease out the issues that emerged in the desktop review and surveys hence can you tell me what gaps there are within the existing roadmap?
2. Our recent survey indicates that most participants consider their organisations as 'very sustainable'. In your view, what does a sustainable company in the shipping industry look like?
3. How has the view of sustainability in the shipping industry changed over the past five years? How will this view change in the next five years?
4. Give an example of how external factors (such as regulation compliance, shareholder/investor engagement and NGO pressures) have shaped your approach to sustainability.

Stakeholder consultation participants were:

- IMarEst
- Louis Dreyfus Company
- LR
- The China Navigation Company Pte Ltd

Appendix C Proposed Roadmap Layout and Content

Vision Area 1			
Proactively contributing to the responsible governance and healthy use of the oceans.			
	2020s	2030s	2040s
Case for Action	Arctic sea passages are used. Ocean industries increase rapidly. Reduce CO ₂ to 1990 levels to prevent out of control Climate Change. Global fleet increases significantly. Increased transparency and visibility of shipping creates more global demand for sustainable standards.	There is more need for sea control. Rapid increase of coastal shipping puts pressure on coastal waters. Growing middle class in developing countries demand sustainable standards.	
Milestones	A1.2020.M1 Implementation Standardised tools, resources and audits for MSPs for regional and national waters developed. Pilot projects for various fields to share good practice are underway.	A1.2030.M1 Implementation Preventing the heavy use of MSPs and progressive increase in performance standards required in MPAs.	A1.2040.M1 Governance Established high seas and coastal MPAs in place. Established MSPs in place.
		A1.2030.M2 Governance Rate of ratification at IMO is increased significantly.	
	A1.2020.M3 Enforcement Enforcement is ramped and strengthen to improve compliance.	A1.2030.M3 Enforcement Effective enforcement for MSP and MPA is in place.	
		A1.2030.M4 Governance Progressive increase in international and inter-agency ocean governance bodies.	A1.2040.M4 Governance Overarching governance body is formed for all ocean and maritime industries.
Outcome	A formal system of global ocean governance is in place, recognising the rights and responsibilities of key ocean users. All 'heavy use areas' are managed through a system of well enforced MSPs.		

Vision Area 2

Earning the reputation of being a trusted and responsible partner in the communities where we live, work and operate.

	2020s	2030s	2040s
Case for Action	Increased transparency and visibility of shipping creates more global demand for sustainable standards from beyond the industry.	Growing middle class in developing countries demand sustainable standards.	
Milestones		A2.2030.M1 Governance An international governance body formed to represent port and other coastal communities, involving port states/ cities/ authorities and maritime users across the land-sea interface.	A2.2040.M1 Governance International governance body representing coastal/port facilities has significant role in determining standards of development and community engagement in the development of new port facilities.
	A2.2020.M2 Implementation Communities impacted by shipping are mapped and agreed with material impacts identified by the IMO. Measures are developed of social value contribution from shipping to port communities.	A2.2030.M2 Governance International common agreement on environmental and social performance standards for port and port communities are ratified by the key stakeholders.	A2.2040.M2 Enforcement Corruption at ports is managed at global level by the IAPH and IMO port facilities. Piracy is eliminated and solved.
		A2.2030.M3 Governance Deregulation of cabotage frees up land-based congestion. Improve port infrastructure and efficiency.	A2.2040.M3 Governance Improved infrastructure removes bottlenecks and improves access for smaller producers increasing productivity and employment.
		A2.2030.M4 Governance Agree minimum standards for developing world ports. Major ports report environmental and social performance using a common standard.	A2.2040.M4 Governance Better ship tracking, port management and route management are in place.
	A2.2020.M5 Health & Safety UNEP develops a coalition of developing country ports in reducing health impacts due to air quality in ports.	A2.2030.M5 Health & Safety UNEP's work with developing country ports succeeds in reducing deaths due to air quality in ports.	

Outcome	<p>Coastal communities are effectively represented in maritime and land-based governance bodies, at a local, national, regional and international level, with well-defined and enforced standards.</p> <p>Port communities have clean and healthy environments.</p> <p>Shipping industry is seen as an enabler to trade and development.</p> <p>Corruption is eradicated.</p> <p>IAPH drives improvements through globally recognised standards and reporting requirements.</p> <p>There is harmony between ships, ports and port communities in terms of jobs, conditions and technology.</p>
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Vision Area 3

Provide healthy, safe and secure work environments so that people want to work in shipping, where they can enjoy rewarding careers and achieve their full potential.

	2020s	2030s	2040s
Case for Action	<p>Increased transparency and visibility of shipping creates more global demand for sustainable standards from beyond the industry.</p> <p>Low cost personal satellite / internet technology empowers seafarers to expose poor working conditions.</p> <p>Technology enabling real-time monitoring of activity on ships is required by key customers to monitor standards.</p> <p>Ongoing difficulty in recruiting officer level seafarers puts pressure on the industry.</p>	<p>Growing middle class in developing countries demand sustainable standards.</p>	
Milestones		<p>A3.2030.M1 Governance Ratification of the MLC by 100% of member states is achieved.</p>	
	<p>A3.2020.M2 Health & Safety Globally agreed accident and near-miss reporting formats developed and used by critical mass of industry leaders to enable better identification of patterns, and design of safe processes and ships.</p>	<p>A3.2030.M2 Health & Safety Global standards for accident and near-miss reporting are enriched in regulation and as a result the shipping sector lost time injury rates is reduced by 10% per annum from 2012 baseline.</p>	
		<p>A3.2030.M3 Enforcement Existing standards are robustly enforced by PSC eliminating non-compliance ships.</p>	
		<p>A3.2030.M4 Diversity & Equality Women represent 30% of the maritime workforce.</p>	<p>A3.2040.M4 Diversity & Equality There is equality for people wishing to enter the shipping industry, regardless of race, gender, religion etc.</p>
	<p>A3.2020.M5 Training 80% of mariners have access to high-quality training facilities in all areas associated with poor standards including culture and language support to move shipping as a good career option.</p>	<p>A3.2030.M5 Training Globally recognised minimum competence standards, qualifications and career development paths are adopted and ratified by 95% of IMO member states.</p>	<p>A3.2040.M5 Training Unmanned ships are in place and seafarers are ready for a new way of working.</p>

	<p>A3.2020.M6 Labour condition Standards for seafarers are improved and become implemented. All mariners have access to union representation.</p>	<p>A3.2030.M6 Labour conditions Working and living standards for seafarers are improved and implemented. Bullying harassment and discrimination are eliminated/managed through actively enforced company policies with minimum standards enforced by the IMO. Seafarers are given equal treatment to on-shore staff.</p>	<p>A3.2040.M6 Labour conditions Shipping careers rank equally with shore-based industries in terms of satisfaction, technology and impact on relationships.</p>
Outcome	<p>Zero Accidents. (Accident rates in shipping achieve parity with those of land-based industries). The shipping sector's fatality rates are reduced by 90%. Shipping is a recognised career sector and features in rankings of sought-after careers. Labour conditions are assessed on a level playing field across all segments of the industry.</p>		

Vision Area 4

Transparency and accountability drive performance improvements and enable better, sustainable decision making.

	2020s	2030s	2040s
Case for Action	<p>Increased transparency and visibility of shipping creates more global demand for sustainable standards from beyond the industry.</p> <p>Campaign groups use satellite data to prosecute ship operators following pollution incidents.</p> <p>Low cost personal satellite / internet technology empowers seafarers with social media voice.</p> <p>Technology enabling real-time monitoring of activity on ships is required by key customers to monitor standards.</p> <p>Ongoing difficulty in recruiting officer level seafarers puts pressure on the industry.</p> <p>Branded shipping customers begin to focus on shipping.</p>	<p>Growing middle class in developing countries demand sustainable standards.</p>	
Milestones	<p>A4.2020.M1 Health & Safety</p> <p>Industry and regulators apply strong financial, legal and regulatory pressure to significantly improve 'worst case' performance.</p>	<p>A4.2030.M1 Health & Safety</p> <p>Globally agreed minimum performance expectations are actively used to eliminate 'worst offenders' in terms of labour, standards and environmental performance.</p>	
	<p>A4.2020.M2 Governance</p> <p>Credible rating schemes are available for all major ship types.</p>	<p>A4.2030.M2 Governance</p> <p>Mainstream schemes expand or merge to increase scope to beyond carbon/energy, to include all key environmental and labour issues in the design and operation of ships.</p>	<p>A4.2040.M2 Governance</p> <p>Performance levels achieved as required to meet or exceed safety, emissions and other vision 2040 objectives.</p>
	<p>A4.2020.M3 Governance</p> <p>Validated public domain reporting of ships performance data.</p>	<p>A4.2030.M3 Governance</p> <p>Accurate data of ships emissions, performance across a range of conditions, other performance indicators and labour conditions are audited, validated and published by flag states on public domain.</p>	
		<p>A4.2030.M4 Big data</p> <p>Big data is used to optimise supply chain and third-party supplier licencing.</p>	

	<p>A4.2020.M5 Sustainable Decisions Strong evidence of poorly performing ships losing trade due to their poor environmental or social performance. Fully transparent sustainability rating scheme performance results are factored into commercial and finance decisions.</p>	<p>A4.2030.M5 Sustainable Decisions Strong evidence that ship builders, equipment manufacturers and other shipping services are competing based on ability to assist with achievement of high sustainability performance. Cargo market, shipping finance and insurance companies are actively using beyond compliance sustainability rating schemes to make decisions.</p>	
Outcome	<p>Beyond-compliance sustainability rating schemes are used to inform shipping related commercial decisions – only transparent, accountable companies have ‘license to trade’. Performance is effectively monitored and policed. Credible sustainability rating schemes are in place for all ship types, assessing both design and operation across a comprehensive range of environmental, social and economic criteria. Performance levels are commensurate with Vision2040 aspirations.</p>		

Vision Area 5			
Develop financial solutions that reward sustainable performance and enable large scale uptake of innovation, technology, design and operational efficiencies.			
	2020s	2030s	2040s
Case for Action	<p>New ownership models emerge:</p> <ul style="list-style-type: none"> · ownership of the vessel and all technical installations · owner buys and supplies to yard (owner supply) · ESCO models (energy service company) with suppliers retaining ownership of equipment and guaranteeing lifecycle cost OR performance on spot-test 		
Milestones	<p>A5.2020.M1 Governance</p> <p>Establishment of a credible, global coalition of institutions and organisations to advance natural capital accounting and adoption by IMO.</p>	<p>A5.2030.M1 Governance</p> <p>Global governance body established for overseeing ecosystem goods and service valuations.</p>	
	<p>A5.2020.M2 Governance</p> <p>Establish methodology for costing performance of ships. Pilot methodologies demonstrate the monetary value of the services produced by marine ecosystems within a pilot area. Lessons learned from ecosystem valuation are fed back into the design process to minimise ecosystem costs.</p>	<p>A5.2030.M2 Governance</p> <p>IMO trials the use of a global methodology of an ecosystem valuation in development of regulations and adopts. Due to better data and valuation, financial rewards for eco performance is introduced.</p>	<p>A5.2040.M2 Governance</p> <p>Ecosystem valuations are factored into major MSP negotiations and IMO decisions.</p>
	<p>A5.2020.M3 Public Awareness</p> <p>Public and political awareness and support is strong due to investment in education, lobbying and capacity-building activities.</p>		
	<p>A5.2020.M4 Sustainable Decisions</p> <p>Pioneering banks are factoring sustainability rating scheme performance into financing decisions and as a result, a voluntary pricing scheme is adopted.</p>	<p>A5.2030.M4 Sustainable Decisions</p> <p>Sustainability rating scheme performance is factored into financing decisions for >20% of new and used ship purchases.</p>	<p>A5.2040.M4 Sustainable Decisions</p> <p>Legislative requirement for natural capital accounting valuations to be included in sales price of goods and services.</p>
Outcome	<p>Ecosystem valuations are routinely used by key global institutions in decisions affecting maritime regulation and ocean planning (MSP). There is clear evidence that ecosystem valuations have a material impact on decisions.</p>		

Vision Area 6			
Change to a diverse range of energy sources, using resources more efficiently and responsibly, and dramatically reducing greenhouse gas intensity.			
	2020s	2030s	2040s
Case for Action	Reduce CO ₂ to 1990 levels to prevent out of control Climate Change. Arctic sea passages open. Intergovernmental Panel on Climate Change (IPCC) predicts significant increase in extreme weather.	IPCC predict significant impact on coastal infrastructure due to climate change. Third generation biofuel wide availability to shipping. Depletion of US shale gas reserves.	
Milestones	A6.2020.M1 Regulations Globally unified regulations are introduced to improve different energy sources to be used such as nuclear.		
	A6.2020.M2 Governance IMO implements GHG emissions reduction plan in line with the UNFCCC.	A6.2030.M2 Regulations Sustained 20% reduction in CO ₂ per ton from 2012 levels.	
	A6.2020.M3 Regulation IMO develops alternative fuels guidelines.		
	A6.2020.M4 Implementation Fuel transition plan is in place.		
		A6.2030.M5 Multi-modal Multi-modal collaboration is optimised. Multi-modal reporting process is in place and used by leading organisations. Modal shift from air to sea transport.	
	A6.2020.M6 Implementation Digital monitoring and advanced power management used as standard in all new ships. Slow steaming, weather routing, backhaul cargo, virtual arrival and other efficient operational practices are introduced and used globally.	A6.2030.M6 Implementation Cold ironing, advanced terminal facilities, backhaul cargo and virtual arrival are commonly in place globally. Ship design is improved with new materials, technologies and ballast requirements.	A6.2040.M6 Implementation Operational efficiency is further improved with un/low-manning requirements, advance materials and reduced ballast.

Outcome

Global shipping fleet achieves 80-90% CO₂ per tonne/mile from 2012 levels.
Shipping is becoming de-carbonised and uses a diverse range of fuels including renewables and possibly nuclear.

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