

Technical Study

MSP as a tool to support Blue Growth

Roundtable discussion paper: Shipping and Ports, 11/12 October 2017

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Shipping & Ports

1 Introduction

Overall size of the sector and industry structure

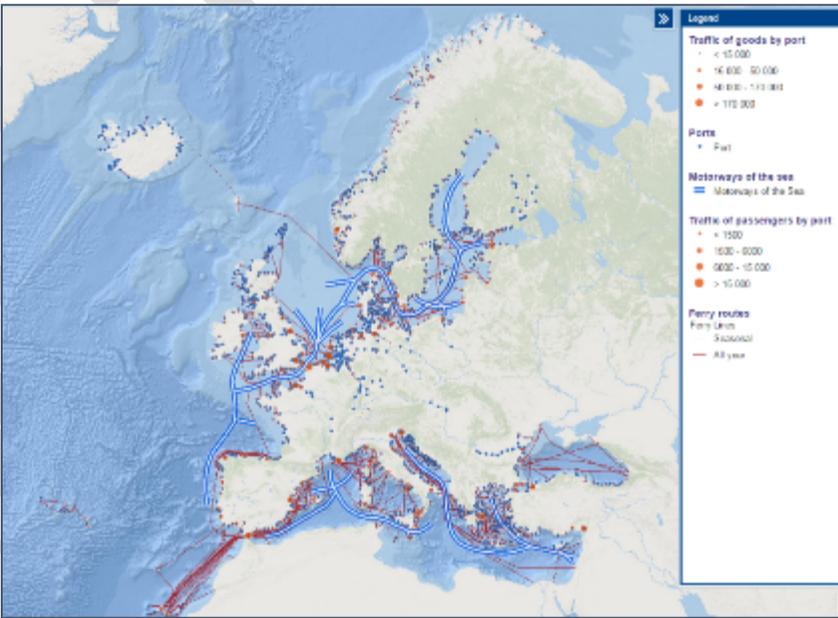
✓ Mature Growing (Cruise) Emerging

Shipping is the key enabler of international trade, but also secures a great portion of the energy supply (oil and other fuels). It is a long-standing, traditional sector with a multitude sub-sectors, including deep sea shipping, short-sea shipping, passenger ferry services, cruise shipping and inland waterway transport. Furthermore, a number of other maritime-relevant activities are developed as part of the value chain of the sector including port logistics, shipbuilding and ship scrapping, ports and terminal infrastructure as well as other marine services (bunkering, fleet monitoring etc.)¹. The industry shows strong yearly seasonality patterns, peaking during the autumn months until December, while dipping during the first quarter.

The shipping & ports sector is a highly developed industry, with major representation throughout the European coastline and waters. The busiest ports in terms of freight transport volumes in Europe are Rotterdam, Antwerp, Hamburg, Amsterdam, Algeciras, Marseille and Le Havre. Because of the nature and organization of the industry, shipping is internationally focused, rather than sea-basin specific².

¹ Blue Growth, Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts, report for DG MARE found [here](#)

² PartiSEApate, MSP Governance Framework Report

Time horizons		Spatial characteristics		
Seasonal	Yes	Place based	Yes, through ports	<p>Figure 1: EU shipping industry geographical snapshot in 2012³</p> 
Planning horizon	<p>Ship owner and operators: Decisions involving scheduling, routing and deployment of vessels typically have a short time horizon of six months and are reviewed on a yearly basis. On a wider, strategic level, the planning horizon rarely exceeds the 5-year mark.</p>	Linear	Yes	
	<p>MSP authorities: On the contrary, planning of shipping lanes (by IMO and national authorities) and of port and other infrastructure investments (by national and port authorities) are considering a long-term horizon (20-30 years).</p>			
Development time	Port infrastructure require multiple years to develop depending on the size of the vessels to be facilitated	Distance to shore and water depth	<p>Distance to shore: Not fixed</p> <p>Water depth: At least equal to the draught of the vessels on each route. Small container vessels require 8-12m while the largest container vessels</p>	

³ Source: [European Atlas of the Seas](#)

			have a draught of 16 meters ⁴ .	
		Moving	Yes	
Lifetime of installation	Ports are heavily capital intensive and rely on infrastructure connections. As such, they remain there as long as possible (forever).	Land Sea interaction 	Yes	Via the operation of ports in the coastal zone and the infrastructure required for the hinterland logistic connections

2 Relevance

Legend: ◆ = low presence ◆◆ = medium presence ◆◆◆ = high presence
 ➡ = none / limited potential ➡➡ = medium potential ➡➡➡ = high potential

Status in each Sea Basin (Table 1⁵)

Sea Basin	Presence / Status	Potential	Comments
Atlantic	◆◆	➡	
Baltic Sea	◆◆	➡	
Black Sea	◆	➡	Depending on political stability
East Med	◆◆	➡	
North Sea	◆◆◆	➡	
West Med	◆◆	➡	

⁴ https://people.hofstra.edu/geotrans/eng/ch3en/conc3en/containership_draft_size.html

⁵ Table based on expert judgment and assessment of the sources quoted throughout the document.

Status in each EU Country (Table 2) - Based on freight volume shipped⁶

Sea Basin	Country	Presence / Status ⁷	Potential	Comments
Atlantic	Ireland	◆	➡➡	Short-sea shipping
Atlantic	Portugal	◆◆	➡	Deep-sea shipping
Atlantic / North Sea	United Kingdom	◆◆	➡➡	Short-sea, passengers, cruise
Atlantic / West Med	France	◆◆◆	➡➡	Deep-sea cruise
Atlantic / West Med	Spain	◆◆	➡➡	Freight, passengers, cruise
Baltic Sea	Estonia	◆	➡	Short-sea shipping, passengers
Baltic Sea	Finland	◆◆	➡	Short-sea shipping, passengers,
Baltic Sea	Latvia	◆	➡	Short-sea shipping, passengers
Baltic Sea	Lithuania	◆	➡	Short-sea shipping
Baltic Sea	Poland	◆◆	➡	Short-sea shipping,
Baltic Sea	Sweden	◆	➡	Short-sea shipping, passengers
Baltic Sea / North Sea	Denmark	◆	➡	Short-sea shipping, passengers,
Baltic Sea / North Sea	Germany	◆◆◆	➡➡➡	Deep-sea, short-sea cruise
Black Sea	Bulgaria	◆	➡	Deep-sea, short-sea
Black Sea	Romania	◆	➡	Deep-sea, short-sea
East Med	Croatia	◆	➡	Passengers
East Med	Cyprus	◆◆	➡	Ship ownership
East Med	Greece	◆	➡➡	Ship ownership, passengers,
East Med	Slovenia	◆	➡	Short-sea, passengers
East Med / West Med	Italy	◆◆	➡	Deep-sea, short-sea, passengers, cruise
North Sea	Belgium	◆◆◆	➡	Deep-sea and short-sea shipping

⁶ Table based on expert judgment and assessment of the sources quoted throughout the document.

⁷ This assessment has been made in relative terms, based on the country's transport volumes.

North Sea	Netherlands	◆◆◆	➡➡➡	Deep-sea and short-sea
West Med	Malta	◆◆	➡➡➡	Deep-sea, passengers

Legend: ◆ = low presence ◆◆ = medium presence ◆◆◆ = high presence
 ➡ = none / limited potential ➡➡ = medium potential ➡➡➡ = high potential

3 Status and Evolution Analysis

Current Status

Maritime transport accounts for almost 75% of the externally traded goods in weight units and, similarly, 37% of the internal trade⁸. On top of that, more than 400 million passengers pass through European ports on a yearly basis⁹.

Shipping and related services contribute directly more than € 57 billion to GDP yearly, providing employment for around 640.000 people (2015 numbers). The contribution of the shipping sector is more than doubled, if one takes into consideration its indirect contribution through the great variety of activities included in the relevant supply chain.

Short Sea Shipping (SSS) for Europe has been in the spotlight for the past 20 years. As a result, 60% of total maritime transport of goods within Europe are transported via short sea shipping. SSS has a significant share of intra-EU maritime transport, particularly in countries around the Mediterranean, North and Baltic seas.

Fundamental Shipping characteristics

- The freedom of navigation principle applies (UNCLOS Article 87 (1a), mean that ships are generally free to sail wherever they want. Limitations to this principle are put in place on an exceptional level.
- Shipping routes (mandatory as well as recommended) are valid by international law. They are established by the International Maritime Organization (IMO). Such existing sectorial designations should be considered and integrated in an MSP. Changing these routes is possible, but a lengthy process.
- With regard to other space used by shipping, MSP fulfils the function of keeping important routes free from incompatible uses rather than restricting shipping to designated areas.

⁸ DG MOVE Study: Analysis of recent trends in EU shipping and analysis and policy support to improve the competitiveness of short sea shipping in the EU, found [here](#)

⁹ Including cruise

- Space should be reserved for different purposes:
 - Paths that that are used by vessels.
 - Safety margin for collision avoidance manoeuvres to both sides of the path
 - Safety zone of 500 metres, in case of fixed installations in the EEZ (UNCLOS Article 60 (5))
 - Anchorage areas for emergency situations and waiting zones close to ports
- Three dimensions need to be taken into account
 - The general interest of shipping is to use the shortest and safest routes between two destinations. This includes access to ports.
 - The widths of a shipping lane designated in an MSP should depend on the traffic density as well as the maximum ship lengths appearing in the respective area

Drivers

- ✓ Global and regional economic growth - especially by consumers' purchasing power. The status and strength of the European economy versus the rest of the world directly affects import and export flows hence the traffic volumes.
- ✓ Increasing containerisation of commodities and economies of scale resulting in increased vessel sizes lead to consolidation of the shipping industry and greater competition between ports in order to attract these vessels. Investments in growing infrastructure and port expansion plans are thus foreseen affecting the planning of shipping lanes and their characteristics.
- ✓ Environmental sustainability: a push for cleaner shipping results in the need for cleaner fuel, shorter and more efficient navigation routes, new infrastructure (e.g. LNG terminal) and technological innovation (e.g. clean fuel, scrubbers etc.), these can produce a burden for implementation to the shipping sector.
- ✓ Digitalisation and automation of vessel navigation is expected to lead to more efficient navigation and thus have far-reaching impacts on the activities and processes of the shipping and logistics sector.
- ✓ Political support for shipping in its quality as comparably environmentally friendly mode of transportation. EU White Paper 2011 aims for a 50% shift from road to rail and waterways transportation by 2050. In this context, SSS is considered of particular importance and volumes are expected to grow (demanding relevant spatial resources).
- ✓ Security issues play a role in the choice of ports for vessel calls especially concerning the passenger and cruise segments. The instable situation in the Middle East has benefited EU destinations in the Mediterranean.

Barriers & Bottlenecks

Note: *Direct spatial implications* would be those which already hold a spatial characteristic (i.e. displacements, re-routings, etc.); *Indirect spatial implications* would be those which might occur or not depending if we solve the barrier/bottleneck or not (i.e. efficiency improvements might bring more efficient developments and less new developments might be needed in the future which would create less spatial implications in terms of less space required)

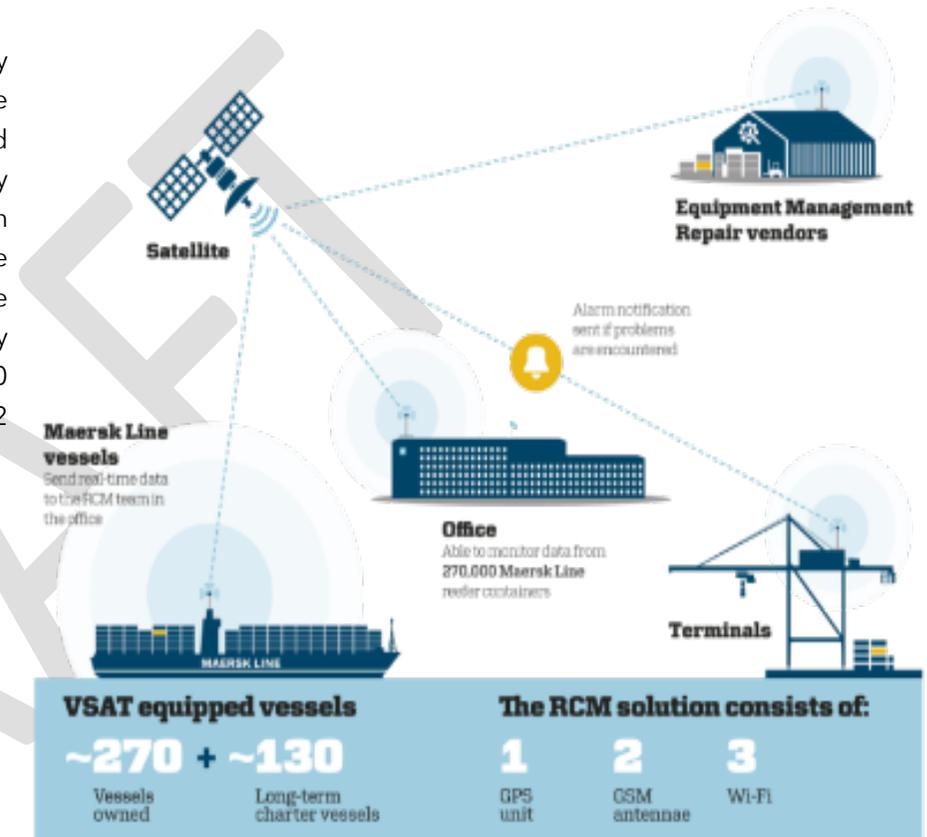
Barriers & Bottlenecks	Direct spatial implications	Indirect spatial implications	Comments
Cruise			Cruise has been proven to put high strains on small destinations both regarding the hinterland and the sea side and pressure is currently applied to regulate this shipping segment. This has an impact on the routing of cruise and the eventual choice destinations.
Digitalisation			Digitalisation of navigation is expected to lead to a reassessment of shipping lane dimensions. The capacity of the given technology will drive the sector's MSP requirements
Reduced adaptability			The shipping sector is highly volatile and subject to seasonal fluctuations. Additionally the slow response capacity (due to the long-term investments and the long periods required for ordering and deploying a vessel) reduces the adaptability of the sector in case of sudden changes in demand. Although the sector has partly recovered from the impacts of the financial crisis of 2007/2008, overcapacity is still an issue leading to low freight rates and profits
Spatial overlap with other sectors			Increasing competition for maritime (and also landside) spatial resources with other economic activities constrains the optimal development of the sector and defines its spatial requirements (e.g. in matters of shipping lanes, anchorage areas, port infrastructure etc.). The increasing use of fixed off-shore infrastructure limits the area freely available for shipping.
High peaks in demand			The sector is seasonal and especially concerning the cruise and passenger segments meaning that port infrastructure and shipping lane dimensions have to be designed for the high peaks in demand. This is aggravated by the just-in-time economy of the

			logistics sector which pushes for larger infrastructure in order to facilitate faster cargo flows. As planning is long-term, this has to account for the different growth scenarios for the sector.
Environmental characteristics			This includes the physical and natural characteristics of the seas and shipping lanes (channel sizes, water depths etc.). Such limitations put a constraint on the development of the sector. Furthermore, this limitation continues further down the supply chain.
Environmental requirements			Increasing environmental requirements (e.g. SECA zones) put pressure on the sector to increase its environmental performance and reshape the way shipping networks are developed.
Protectionism			An international and structural trend towards protectionism would reduce trade and shipping

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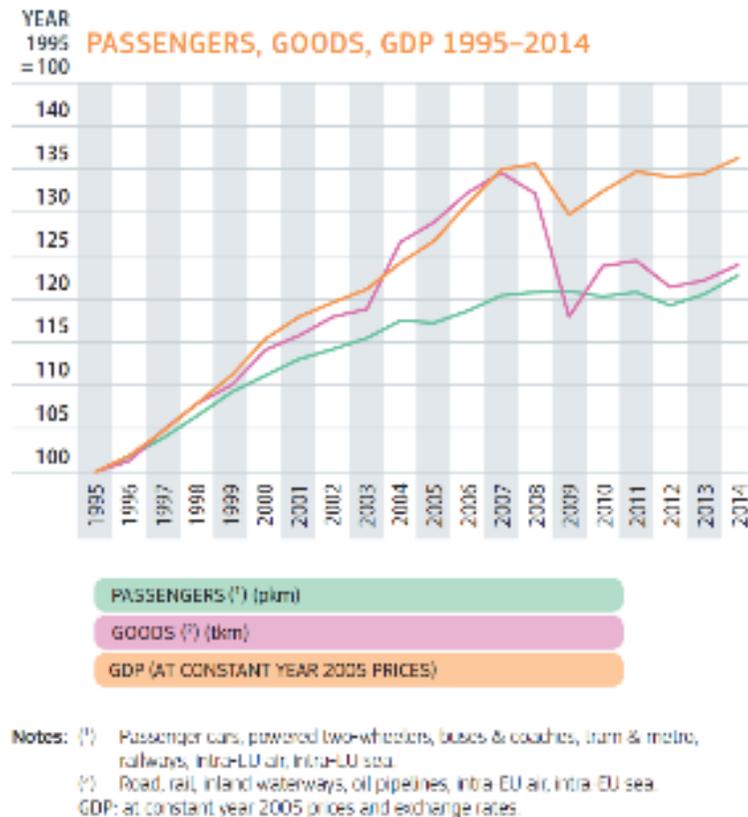
Policy & Management

Shipping routes (mandatory as well as recommended) are valid by international law. They are established by the International Maritime Organization (IMO). Such existing sectorial designations should be considered and integrated in an MSP. Changing these routes is possible, but a lengthy process. Shipping lane guidelines have been internationally established with the General Provisions on Ships' Routing of the International Maritime Organization (GPSR). Traffic lanes are designed for optimal use of available depths, along the length of the route. The width of lanes is determined mostly by the traffic density. As an example, a traffic lane with traffic density of 18.000 vessels/year of 400 meters maximum size, could have a minimum width of 3.2 kilometres¹⁰.



¹⁰ The Shipping Industry and Marine Spatial Planning - A professional approach, World Ocean council and The Nautical Institute, 2013, found [here](#)

Trends



Passenger as well as freight traffic volumes follow closely the GDP evolution trend. This is also the case for the European economy and transport market. Using conservative assumptions of economic growth, a 50% increase in port cargo volumes is expected by the year 2030¹¹. The means and methods used to accommodate this increasing demand are expected to change significantly. However the modalities to do so are likely to change.^{12,13}

- **Shipping company alliances** are another trend. They are initiated by cost-saving efforts, shipping lines have been increasingly forming alliances and cooperation schemes, to achieve operational efficiencies. This has the potential to lead to better vessel utilisation and fewer empties being transported, freeing up space both in the sea as well as in the port areas.

Figure 5: Maersk's Remote Container Management (Source: Maersk website, 2015)

- **Increasing vessel sizes:** Over the past decades, the vessel sizes have been steadily increasing. In 2015, the average vessel size increased from about 12,000 to 14,000 TEU¹⁴. Currently the largest ships carry about 19,000 TEUs and vessels with a capacity of 25,000 TEUs have been designed¹⁵. The growth of the sector suggests that this trend will continue in the coming years, increasing the demand for relevant port infrastructure as well as the spatial needs. The larger the vessel, the more supporting services are necessary such as pilotage.
- **Increase in short sea shipping:** In line with the increase in vessel size, short sea shipping is expected increase, because the cargo transported by very large carriers to hubs, will need to be transshipped to further destinations. In addition, a modal shift from road to waterways is supported at the political level.

¹¹ EC Memo: Europe's Seaports 2030: Challenges Ahead found [here](#)

¹² Source: Lloyd's Register, QinetiQ and University of Southampton

¹³ Source: <http://www.mpa.gov.sg/web/wcm/connect/www/77bb6866-4c2b-4ba5-9249-1203a943852a/Presentation+-+James+Forsdyke.pdf?MOD=AJPERES>

¹⁴ Source: The Load Star, 4-4-2016. *Drewry questions viability of ultra-large container vessels, as carriers focus on cost-cutting*

¹⁵ Source: <http://www.ship-technology.com/features/featuremega-container-ships-and-how-they-are-changing-ports-4974826/>

- **Port clustering:** Another trend in the sector is ports forming economic clusters in an effort to secure their market share through cooperation and specialisation. Depending on the area and ports involved, this trend can result in variations on marine spaces uses around Europe.
- **Use of cleaner and alternative fuels:** The need to meet the strict requirements of the Directive (2012/33/EU) on sulphur content in marine fuels has pushed the use of alternative fuels in shipping forward. Liquid Natural Gas (LNG) is currently one of the most accepted oil alternatives¹⁶, with a fleet of more than 200 LNG-powered vessels, in service and on order combined as of March 2017¹⁷. However, these new vessels call for new refuelling infrastructure both at ports as well as at open seas, demanding more space. Furthermore, as LNG requires fuel tank of larger volume compared to oil-based fuels, this trend could lead to even larger vessels hence altering the size of shipping lanes.
- **Digitalisation of the shipping and port sector:** Information and communication technology is increasingly being used in navigation, logistics and administration, both on ships and in ports. The aim is to make processes safer, faster and more efficient. Vessels as well as port infrastructure becomes increasingly autonomous. In the not too distant future, the first remotely operated vessels and, as a second step, fully autonomous ships are expected to enter into operation initially resulting in a need to reassess the dimension requirements of shipping lanes.

4 Spatial Consequences of Future Trends

Implications

Traffic density	Traffic density is an indication of which areas are valuable to shipping. The more heavily an area is trafficked, the wider a shipping a shipping lane in MSP should be to allow for safe overtaking.
Ship size	For determining the width of a shipping route, it should be assessed what are the biggest vessels that use a particular area. The bigger the ships, the bigger their turning circle. It need to be ensured that sufficient space is be reserved for collision avoidance manoeuvres. Furthermore, water depth in shallow areas limits the accessibility for vessels with a bigger draught. Canals and locks may also restrict the access of bigger ships to certain waterways.
Traffic patterns	In addition to the traffic density of the regular, commercial ship traffic, other types of navigation, e.g. fishing vessels, vessels servicing fixed installations, leisure boats should be considered.

¹⁶ EMSA website: <http://emsa.europa.eu/main/air-pollution/alternative-fuels.html>

¹⁷ The world's LNG-fuelled ships on order, 2017, article by Mike Corkhill, http://www.lngworldshipping.com/news/view,the-worlds-lngfuelled-ships-on-order-2017_47089.htm

Port infrastructure	It is important to anticipate, which ports will be frequently accessed by what kind of ships in the future in order to determine which routes ships will use in the future. Existing and planned port infrastructure is a decisive factor. For example, only a small number of ports accommodates very large carriers and cargo is then transhipped to other destinations. Apart from that, the offer of alternative bunkering technology in a port, will decide about the direction of traffic flows, once a bigger number of vessels will use such technology. Some small ports may even decline in importance in the competitive environment.
Autonomous vessels	The spatial implications of autonomous vessels are difficult to foresee. In the trial phase, testbeds will be established that may be closed for other ships. In the foreseeable future, autonomous and manned vessels will coexist. Some experts say that in the beginning, autonomous vessels may require a separate lane. Others argue that autonomous shipping will require less safety distances, because technology will be more reliable than vessels operated by humans.
Climate change	In recent years, the weather becomes more extreme (heavier rain and storms), which also affects shipping. According to IMO Resolution A.528(13) weather routeing is important and could even take precedence over regular ship's routeing. The aim of weather routeing is to ensure that ships are provided with the optimum routes, so that they can avoid bad weather. In order to allow weather routeing, space needs to be available, so that ships can temporarily deviate from the well-known shipping lanes. In addition, climate change may trigger an opening of the Arctic route during summer, which may later sea traffic patterns in some areas.

Relationship with other sectors

As shipping is by nature incompatible with other marine space uses that occupy water surface (wind energy, aquaculture, oil & gas), the probability of conflicts rises as shipping demands more space. From the ports perspective, increasing the level of service and capacity for container handling will demand more space and/or more intense operations. Therefore, it can be expected that conflicts might arise with fisheries that operate in the same waters.

The matrix below indicates the potential of the Ports & Shipping sector's compatibility (synergies and conflicts) with other marine sectors (Note: red = potential conflicts; green = potential synergies; grey = not applicable).

		 Shipping & Ports	 Tourism & Recreation	 Oil & Gas Extraction	 Pipelines & Cables	 Fishing	 Aquaculture	 Marine Renewables	 Marine Aggregates	 Conservation
Ports & Shipping	Synergies									
	Conflicts/Risks									

Recommendations for MSP

(After the conference)

5 Resources / Actors / References

Actors

Name of Actor	Type of Actor	LINK	Short explanation
ECSA	EU Organisation	http://www.ecsa.eu/	European Community Shipowners' Associations, representing the national shipowners' associations of the EU and Norway. Aim is to promote the interests of European shipping so that the industry can best serve European and international trade and commerce in a competitive free enterprise environment to the benefit of shippers and consumers and help formulate EU policy on critical maritime transport-related issues
ESPO	EU Organisation	http://www.espo.be/	The European Sea Ports Organisation is the principal interface between European seaports and the European institutions and its policy makers. Represents the port authorities, port associations and port administrations of the seaports of 23 Member States of the European Union and Norway at EU political level

CESA	EU Organisation	http://www.cesa-shipbuilding.org	Community of European Shipyards Associations, represents the shipbuilding industry from 17 Member States
CLIA	International Organisation	https://www.cruising.org/	Cruise Lines International Association (CLIA) is the world's largest cruise industry trade association, providing a unified voice and leading authority of the global cruise community.
WOC	International Organisation	https://www.oceancouncil.org/	World Ocean Council (WOC) is a global, cross-sectoral ocean industry leadership alliance, developed by and for the private sector, with a unique and multi-sectoral approach to address cross-cutting issues affecting ocean sustainable development, science and stewardship of the seas.
IMO	International Organisation - UN Agency	http://www.imo.org	IMO is the global standard-setting authority for the safety, security and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented.

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