

Emergency support – the response from Ulstein to the need of hospital and aid ships

The best way to handle a crisis is to be prepared. The crisis can be sudden and unexpected, or predicted and expected. If many people get sick or hurt, the need of extra treatment facilities will soon emerge. In coastal areas, floating resources can be swiftly relocated.

The global spread of the COVID-19 virus has challenged the UN Sustainable Development Goal 2 Zero hunger and Goal 3 Good health and well-being of people. With 70% of the Earth' surface covered by water, one way to handle these types of crises is by developing a fleet of emergency support vessels to cover some of the most critical emergency situations faced in today's world. Existing vessels and newbuilds can be integrated into this fleet.

What is an emergency situation?

Emergency situations can include random non-predictable natural disasters, such as earthquakes, volcanic activity or landslides and flooding, seasonal events like extreme weather (tornados, tsunamis, etc), wildfires and extreme temperatures and longer-term drought situations. Other human-initiated events, such as wars, warfare and terrorist attacks are also part of these emergency situations. Also, hunger situations and regional, insufficient health support systems are still being experienced in many regions around the globe.

The number of natural disasters is rapidly growing, reaching over 800 serious incidences in 2018, four times as many as there were experienced in the 1980s. Although these events occur all around the globe, there are certain areas with higher concentration of occurrences. The majority of volcanic activity, for example, occurs near plate boundaries or at known "hot spots". Similarly, landslides are concentrated in southeast Asia and Central America, areas that are very susceptible to typhoons and hurricanes.

Accidents relating to ships in operation also represent an emergency target for hospital ships. The offshore oil and gas (OO&G) market also rely on emergency support vessels to protect oil and gas platforms and the people working onboard them.

Emergency Support Vessels (ESVs) – The concept

The phrase "hospital ship" and the need for them appears in the media and on the political agenda quite frequently when a major natural disaster or pandemic occur. The most recent event is the COVID-19 pandemic, starting in end 2019. The term hospital ship covers a range of functionality and services that are needed in such emergency situations, with its primary function being medical aid to distressed and people hurt.

In many of these cases involving severe emergencies, purposely and non-purposely built merchant and military emergency vessels are deployed to provide immediate emergency support services. Ulstein has identified five types of emergency support vessels as described in Figure 1. These groups include both civil and military applications.

Vessel types A to D are purposely built or converted to perform emergency support operations as their primary activity. Type E vessels are deployed in emergency situations as back-up and extra support to the main emergency fleet of vessels deployed in any one critical situation, making use of some of their functionality such as cargo carrying, firefighting, and mobility functions.

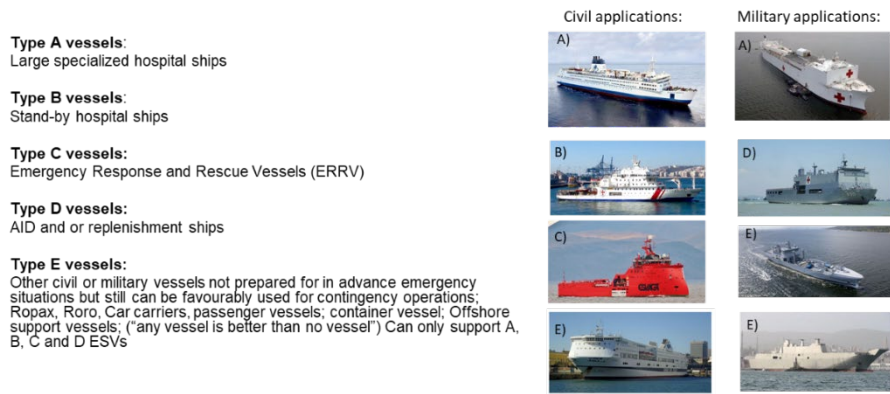


Figure 1. Overview and classification of emergency support vessels.

Based on the historical location of emergency situations, and the needs resulting from them, we have developed a deployment map as presented in Figure 2. This map indicates the distribution of ESVs on relevant operating hubs and their coverage zone. The five emergency support vessel types are grouped here in three, indicated by a red triangle, a blue square and a green diamond respectively.

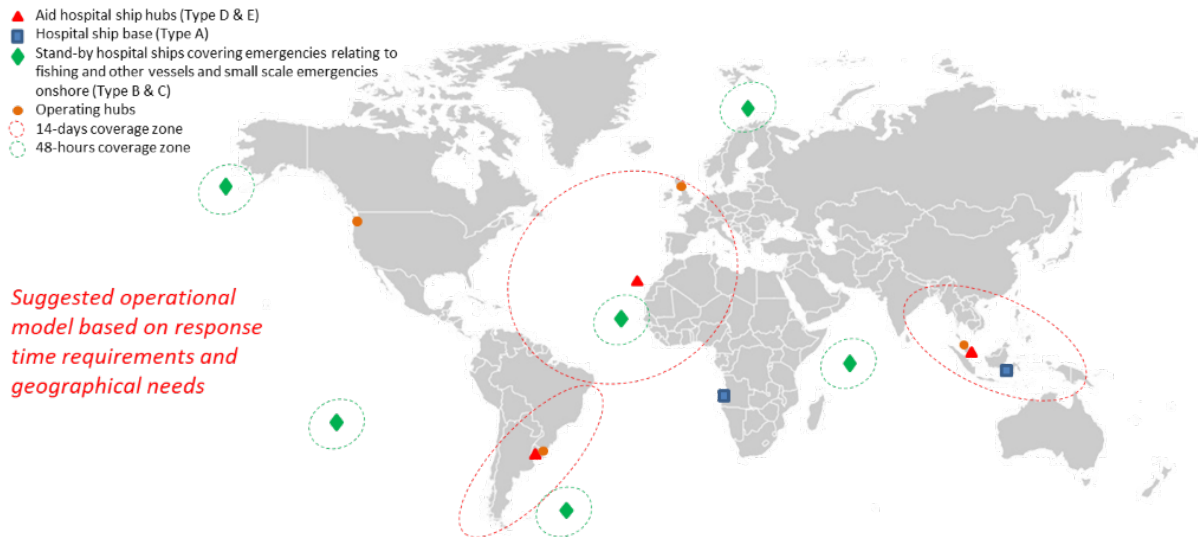


Figure 2. An illustrative distribution of emergency support vessel services.

Each of these emergency events has a set of characteristics that defines the type and scale of the emergency aid need, response time and duration and the criticality and severity of the situation.

We have categorised these events in three groups, relating to the intensity of the emergency assistance and response time. Figure 3 represents the distribution of emergency assistance overtime for these three event types. The blue curve characterises the typical response to events such as terrorist attacks, volcanos, or earthquakes which require a prompt response and high intensity of assistance in the first hours and decreasing thereafter. The red line represents events such as pandemics, wars or situations of extreme temperature. The need for emergency support follows here a quasi-normal distribution, with low resource need in the early phases and reaching a peak after a few days or weeks. The orange line represents situations where the intensity of emergency assistance is relatively constant, such as drought and hunger situations or support for insufficient health systems.

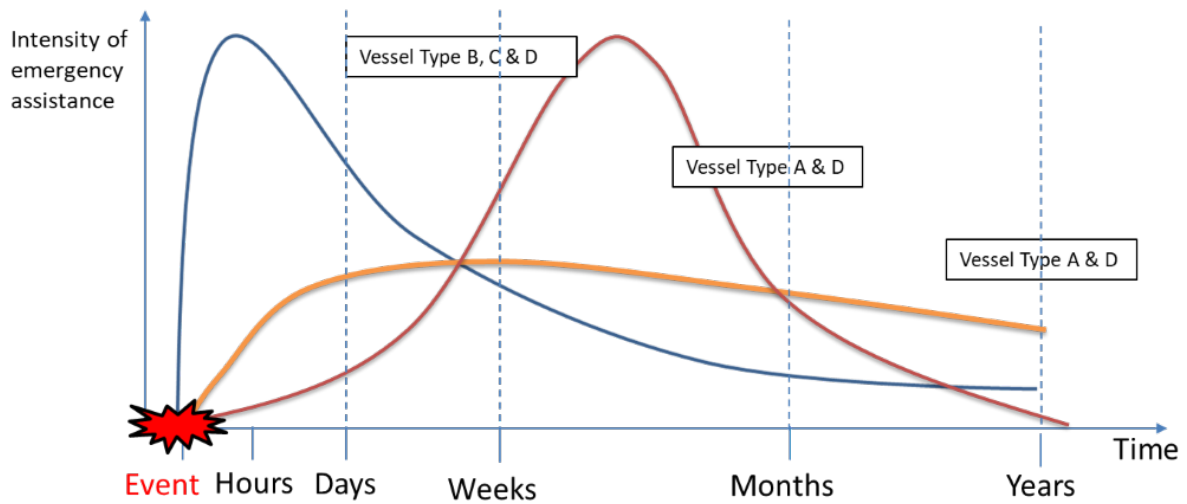


Figure 3. Timeline of the intensity of emergency assistance for a variety of emergency situations.

Ulstein ESV Portfolio

Based on these premises, Ulstein has developed a portfolio of specialised emergency support vessels and explored the conversion of existing laid-up tonnage. These developments are complemented with a business case exploring commercial and operational means to realize the implementation of an emergency support vessel fleet infrastructure for worldwide commissioning.

Figure 4 includes four examples of our portfolio. Top left is a hospital ship with aid capability. A standby emergency response vessel is presented top right. Two conversions of platform supply vessels (PSV) are presented at the bottom. The vessel bottom left represents a quick mobilisation of temporal medical aid on the weather deck of the vessel. The vessel to the right represents a PSV complemented with emergency support capability on a permanent basis.

Hospital + Aid ship



Emergency Rescue & Response Vessel



Temporal adaptation of a PSV



Converted PSV with hospital facilities

Figure 4. Ulstein portfolio of Emergency Support Vessels (ESVs).

Case study 1: Hospital and Aid Ship

A hospital and aid ship as a part of the emergency support vessel segment is a vessel that combines hospital facilities with a large cargo-carrying capacity – Figure 5. Ulstein has developed a portfolio of three units, size ranging from a berth capacity of 100 and up to 200 permanent bed-patients, and capacity to assist over 1,000 people daily. Two RoRo decks give the vessel the ability of quickly mobilizing and demobilizing equipment and aid upon support needs. Those decks can be equipped with temporal berths for expanding the hospital capacity during peak demands. The RoRo functionality allows for the provision of emergency support in inland areas by mobilization of ambulances, trucks and other emergency vehicles.

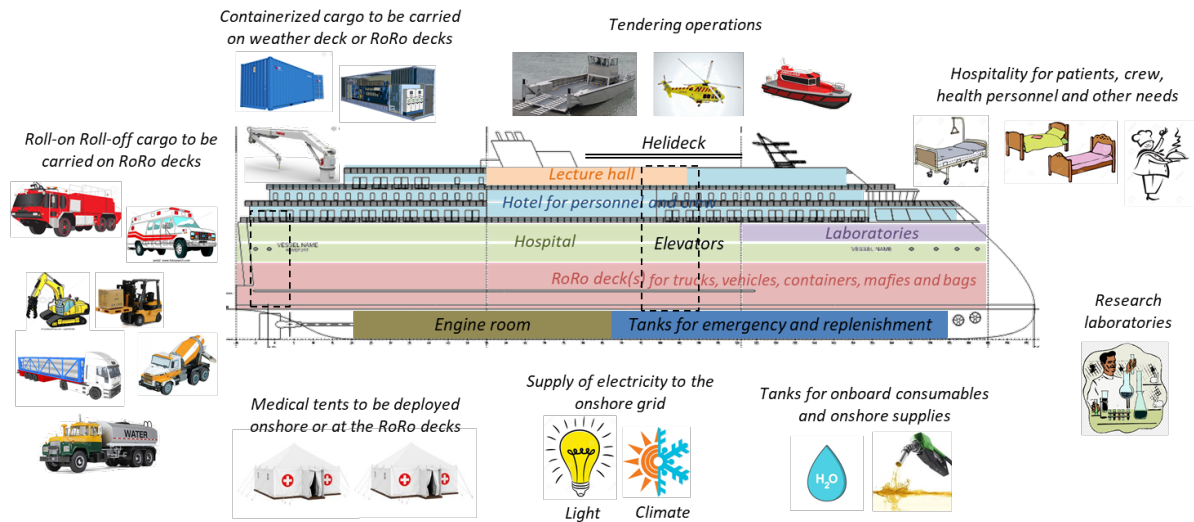


Figure 5. Functional model on an Ulstein hospital and aid ship - ESV.

The vessel is designed to compete with land-based temporary and permanent emergency support solutions; therefore, low capital and operational costs are paramount. Multifunctionality is a premise to enhance the utilization of the vessel and cover the needs of diverse emergency scenarios. The vessels will operate, in most of the cases, along-side quay, and draft limitations have been a critical aspect of the design. Where quay operations are not feasible, the vessel will use an ambulance boat and landing crafts for more heavy beaching operations to transfer patients from shore to port, or by helicopter. Since not all the ports are equipped with facilities to utilize deck ramps, a quarter ramp will enable operations when operating along-side and no quay or link-span facilities exist. Where ramp operation is not feasible, lifting capabilities shall still allow the transfer of aid to shore and other cargo handling operations.



Figure 6. Lateral view of an Ulstein Hospital and Aid concept.

Functionality:

- Fully equipped hospital
- Emergency vehicles: Fire-fighting vehicles, ambulances, cleaning vehicles, police cars,
- Containerized units to be towed by trucks: Diesel-generators, water-makers, vaccine stations, decontamination-stations, food-trucks, workshops, construction machinery, communication antennas/wifi, excavators, cleaning, campaign hospital
- Research laboratories: vaccine facilities
- Lecture hall: university, 1st assistance courses – and more
- Helideck / Ambulance boat

Typical deployments:

- Campaigns in Africa and other countries under development
- First assistance in natural disasters: avalanches, earthquakes, volcanos, fires, etc
- Both coastal and inland assistance (RoRo functionality)

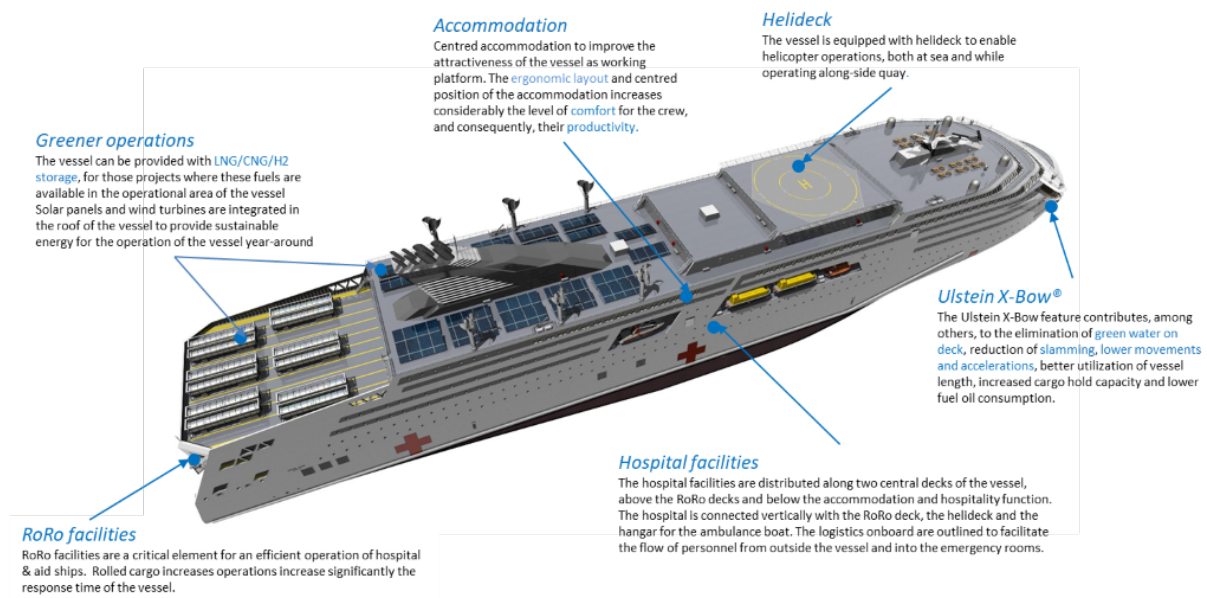


Figure 7. Highlighted functionality of an Ulstein Hospital and Aid Ship concept.

Case study 2: Small Hospital and Aid Ship – Temporal PSV conversion

A small hospital and aid ship is a vessel that combines some basic hospital/emergency facilities with some cargo-carrying capacity. Ulstein has developed two concepts relying on the conversion of existing platform supply vessels (PSV). These concepts represent quick and less expensive ways of supplying additional emergency assistance at small scale by boats on a temporal or longer-term basis.

The first concept presented in Figure 8 and Figure 9 represents a temporal alternative with short mobilization time. Building on an existing platform supply vessel, the vessel can be fitted with up to 56 TEUs including medical facilities, accommodation for personnel and aid supplies. Besides, the vessel will have sufficient space on the aft deck to install medical tents or carry non-containerised aid supplies.



Figure 8. Lateral view of a temporal PSV conversion to Hospital and Aid Ship.

Functionality:

- Campaign hospital/emergency facilities
- Options:
 - Laboratories (e.g. vaccines), helideck, crane, ambulance boat, gangway

Typical deployments:

- Expand local infrastructure (or provide redundancy) in local areas with small populations close to sea or rivers
- Provide medical assistance in offshore areas with high vessel density or lacking onshore infrastructure (fishing areas, offshore O&G, offshore wind, Arctic & Antarctic)

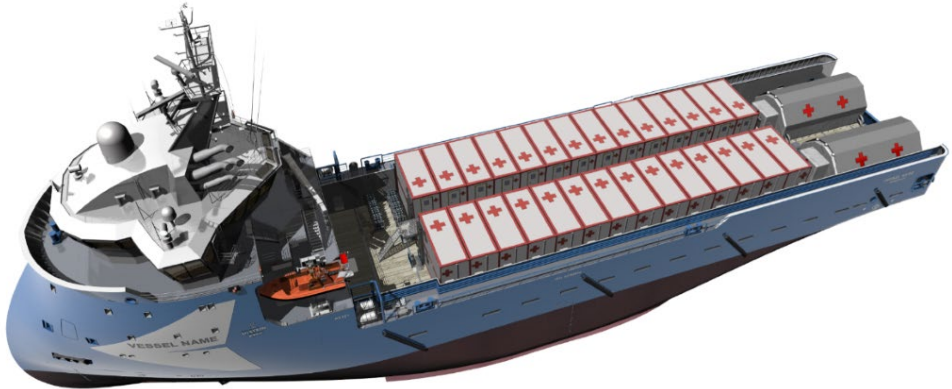


Figure 9. Top view of a temporal PSV conversion to Hospital and Aid Ship.

Case study 3: Small Hospital and Aid Ship – Permanent PSV conversion

The second PSV conversion concept is presented in Figures 10 and 11. Building on an existing platform supply vessel, the vessel can be fitted with a large accommodation module at working deck to accommodate for hospital facilities, laboratories, and hospitality for personnel. Additionally, the vessel has sufficient space on the aft deck to accommodate up to 28 TEUs, install medical tents or carry non-containerised aid supplies. An onboard crane increases the flexibility of the vessel for loading and offloading in areas where onshore facilities are not available.

As a complementary feature, the vessel can also be equipped with a RoRo ramp in the aft of the ship to reduce mobilisation and demobilisation time and increasing, therefore, its response time in way of emergency situations.



Figure 10. Lateral view of a permanent PSV conversion to Hospital and Aid Ship.

Functionality:

- Campaign hospital/emergency facilities
- Options:
 - Laboratories (e.g. vaccines), helideck, crane, ambulance boat, gangway, RoRo ramp

Typical deployments:

- Expand local infrastructure (or provide redundancy) in local areas with small populations close to sea or rivers
- Provide medical assistance in offshore areas with high vessel density or lacking onshore infrastructure (fishing areas, offshore O&G, offshore wind, Arctic & Antarctic)

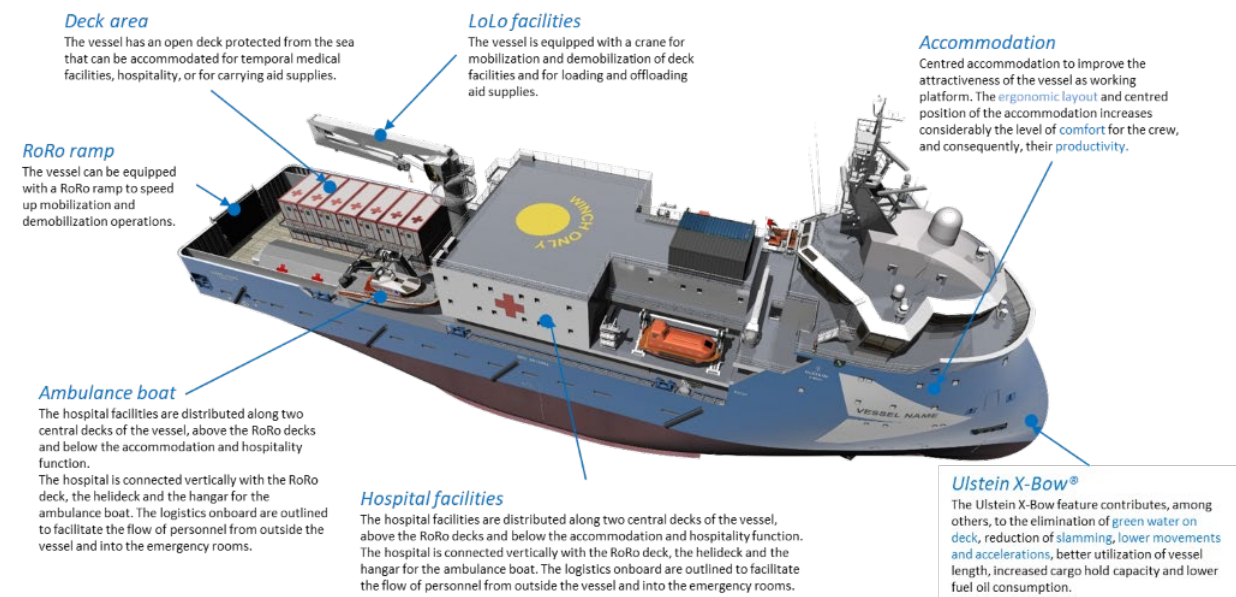


Figure 11. Highlighted functionality on a Ulstein PSV vessel converted to Hospital and Aid Ship.

As an alternative market, the converted unit could also be used as a walk-to-work (W2W) vessel in the offshore oil & gas industry (OO&G) or the offshore wind energy generation industry (OWEG).

Case study 4: Emergency Response and Rescue Vessels

The market for emergency response and rescue vessels (ERRVs) is a well-known and established market for Ulstein. With three vessels designed and currently in operation within the offshore O&G market, Ulstein has recently explored new design avenues to develop even smarter, greener and safer ERRVs, which can be used in a broader set of emergency and aid operations and markets.

Figure 12 includes an overview of recent ERRV vessel concepts developed by Ulstein. Response time is critical in emergencies, and vessel speed is an enabler for quicker response time. However, speed carries a penalty on the cost of owning and operating the vessel, and not less importantly on the environmental footprint. For those situations where response speed is important and cargo carrying capacity is of less relevance, Ulstein has developed two new concepts that favour lower costs and lower emissions. These two concepts are presented in Figure 12-left and Figure 12-right.

One of the avenues (Figure 12-left) relies on a SWATH concept for drone operations.

This concept is thought of like a surveillance and emergency response vessel. The drones can be used for any type of surveillance and for support in emergency situations such as picking up people from the sea, aid support distribution, ship-to-ship transfers, and potentially firefighting.

The second concept (Figure 12-right) has a trimaran hull, providing a large working and storage area while offering lower fuel consumption during response situations at high speeds.

These vessels spend more of their life in standby mode, which represents a relatively high cost for the charterer. The ERRV concept presented in Figure 12-centre proposes a combination of ERRV and W2W functionalities. These vessels return to shore every 30, 45 or 60-days for replenishment and crew change. That trip could be complemented by performing crew changes on the oil platforms the vessel is collectively supporting and offload those existing operations from using the expensive and more polluting helicopter transfers, typically, carried out today.

Ulstein is also exploring the use of LNG and H₂ in these vessels. Functionality has also been integrated into the trimaran concept as shown in Figure 12-right, which integrates a tank for H₂ or LNG in the bow capable of supplying energy for an up to 60-days campaign of standby services.



Figure 12. Recent concepts of Ulstein ERRV vessels.

From idea to market – the vessel business case

Ulstein has developed a set of business cases based on these emergency support vessel (ESV) ideas and concepts that can be discussed with interesting parties, both, as a single ownership initiative or as a cooperative effort.

The business case includes the establishment of an emergency support infrastructure based on a single vessel operation, but also at a larger scale integrating different vessel types and sizes to cover regional or global demand.