

The Benefits of Human-Centred Design in Maritime Safety

Ships are incredibly complex structures on which humans, technology, and nature are constantly negotiating with one another. Implementing effective systems and ship design is pivotal in enhancing maritime safety. A well thought out design not only ensures operational efficiency, but also mitigates the risk of accidents at sea. Sorry. Didn't mean to push the emergency shutdown button.

Poor systems and ship designs have been found to be one of the key contributing factors to maritime accidents. This means that many accidents or incidents could be avoided if the tools on board were truly fit for purpose. Perhaps you've struggled to work in a control room that has a tight space or maybe you've cursed at a screen when you cannot find the information you need. Those situations are symptoms of something far greater. So let's talk about usability, human centered design, and ergonomics.

Perhaps it's time for a new perspective and a new approach. Why should mariners simply accept poor system design or layouts that increase the likelihood of errors or complicate the execution of correct procedures? Incorporating mariners into human centered design initiatives results in more practical and usable designs. This strategy enables ship designers, equipment manufacturers, and ship operators to establish an environment that not only improves designs but also leads to better decision making and ultimately contributes to the reduction of maritime accidents. It all goes beyond merely enhancing safety.

This approach also optimizes efficiency and gives precedence to the well-being and ease of the crew workload. Human centered design is a tool that encourages designers to understand and prioritize the needs, behaviors, and preferences of end users, such as seafarers, in the design process. The aim is to create a functional and efficient product or service to provide better usability, effectiveness, efficiency, and user satisfaction, and to define and solve problems from the end user's perspective. Ergonomics is the study and design of working environments such as workstations, engine control rooms, or ship's bridges, and their components, work practices, and work procedures for the benefit of the workers' productivity, health, comfort, and safety. Consider this crucial question.

The Benefits of Human-Centred Design in Maritime Safety

When it comes to the design of ships and their systems, should it be mandatory to engage seafarers at the design and testing stage? End users and mariners were questioned by the nautical institute in association with the Ocean Project about their engagement with the design of systems, tooling, and the layout of ships. The vast majority of the participants had more than 10 years of experience in the maritime industry, and most of them were somewhat familiar with the concepts of human centered design and ergonomic approaches. However, 85% of them had never received any training about the significance of human centered design or ergonomics in maritime. And yet a huge majority of maritime professionals have grappled with challenges stemming from poorly designed systems or layouts.

Honestly, the participants' responses make it evident that mariners have important insights to share. Their feedback underscores the need to listen closely and integrate their experiences into the design approach. The following examples taken from our survey illustrate the possibility of causing accidents or leading to incorrect decisions. Our bridge window deserved the picture to the point of giving you a headache. In my boat, I have to move away from the helm position to respond to radio traffic.

Equipment added wherever it would fit rather than in places that made it useful to access. The ship security alert system, SSAS button, placed where we rested our hands on the radar when looking at the screen, and the stop buttons for the steering gear pumps, alternating with the stop buttons for the deck wash pump and the fire pump. The modern bridge has so much backlight from monitors that cannot be dimmed properly at night, it becomes an issue seen out of the windows. The gyro repeater away from the helmsman's sight. So if human centered design is so important and mariners know it, why don't they report any shortcomings that they come across?

The participants provided a variety of reasons from the difficulty to describe the systems or layouts to the fact that nearly half of them didn't even realize reporting these issues was possible. The majority expressed concerns about added hassle and paperwork, but it was undeniable. There is a clear call for a human centered approach.

The Benefits of Human-Centred Design in Maritime Safety

The respondents considered that the right design could improve workflow and improve safety. They mentioned that it would also aid to reduce fatigue and excessive workload.

Many participants emphasize that mariners can provide concepts and practical solutions. We can make reporting easier through having QR codes on equipment. Education, spreading awareness, and designers should spend time operating their creations at sea to understand the practical issues. So let's simplify the issue. The survey shows that the shipping industry faces a critical communication gap between end users at sea and designers.

Through interviews, surveys, and workshops, Marin has indicated that while intermediaries like shipyards, shipping companies, classification societies, legislators, and manufacturers keep a constant communication with each other, seafarers are not normally being considered and included on the design of the ships and systems they will end up using. Consider this real life accident. An MIB report on the investigation of the collision between car carrier city of Rotterdam and the RORO freight ferry, Primula Seaways, on the river Humber in the UK in 2015. The city of Rotterdam was already being pushed by the wind and the tidal stream, but the bridge design was the final straw. It was dark.

The inward slope of the window removed all objects in the pilot's periphery and there were no visual clues such as a forward structure or bow tip. This created a relative motion illusion that deceived him into thinking that his view from the window above the starboard VHF radio which was actually 33 degrees off the vessel's centerline axis was the vessel's direction of travel. In this case, the location of the VHF radio by the off axis window created the illusion that he was looking ahead. And sadly this was not picked up by the bridge team until 14 seconds later a collision occurred. The potential for this illusion was unforeseen and not taken into account during the design of the city of Rotterdam.

The Benefits of Human-Centred Design in Maritime Safety

Stricter adherence to the ergonomic principles of bridge design principles of bridge design detailed in SOLAS would reduce the likelihood of anyone making a mistake. So as a mariner, how can you proactively address and overcome challenges presented by bad design and procedural inefficiencies to enhance safety and reduce errors. What if the next time one of the tools on board doesn't perform as anticipated, you think how could this have been done better? Is it possible that this equipment could be better suited to the actions and behaviors that mariners typically perform? If you do find yourself in such a situation, report it.

Reporting issues and shortcomings you find is an important step in helping the industry realize that those problems exist and that Mariners need to be included at every step of the process. Your involvement could drive changes to ensure that technology and designs work in concert with the seafarers and are fit for purpose, making the life for those on board easier and safer. Let's go back to the accident between the city of Rotterdam and the Primula Seaways. The next generation of the vessel included a bridge redesign, which fundamentally changed the bridge layout and windows. So in conclusion, yes.

Shortcomings in technology design matter a lot. Accidents are not always a seafarers' fault, but the result of a system that is working against and not for those using it. If you find any issues with the vessel or its tools, speak up and share your opinions with the powers that be. I advise on how to improve the equipment you are using every day.