



THE IMPACT OF DIGITALIZATION ON MARITIME SAFETY AND THE WORK ENVIRONMENT OF THE CREW

The overall aim of introducing digitalisation and automation in the shipping domain and on board has been to increase safety and efficiency. This has meant that the work has changed, tasks are performed differently, some tasks have been added and others have disappeared. However, this development has not only had positive consequences, but also a long series of negative ones. In addition to being considered in some situations as a potential factor of stress, other results have suggested that this technological development has brought about both counterproductive and ineffective consequences. Voices within the shipping industry have also highlighted problems linked to the digital equipment on board and highlight the need for more knowledge about the challenges crews face.

Purpose

The purpose of this project was to contribute to the understanding of the extent, nature and consequences of incidents and problems linked to the introduction of digitalisation and automation.

Quotes from the interviews

"...when it works...then it should be updated and every time we update then there will be new problems..."

"...it is rarely you get the support you need exactly when the problem occurs..."

Results

The results of the study showed that the operators consider digitization to be good. When everything works as expected, it saves time, makes work more efficient and makes data and information available in a way that an analog system cannot. But the results also pointed out several areas in need of improvement, for example systems that are too complex, not fit for purpose, the technology is perceived as "immature" and not fully developed, bugs in various systems, you get too much information, the operators must adapt to technology and change the way they work and procedures to perform their duties. The results also showed that system updates occur without prior warnings and often generate disruptions and multiple problems, and that operators call for reliable and accessible technical support when errors occur. Lack of support was what the operators considered to be the biggest problem.

This project was funded by The Swedish Transport Administration (Trafikverket), led by Swedish Shipowners' Association (Svensk Sjöfart) in cooperation with Chalmers University of Technology. The project was completed in 2023.

SUPPORT

Support deficiencies have many dimensions such as operators not understanding (a) what went wrong (b) how to fix it and (c) what can be learned from the incident. In addition, support is not always easy to reach, has long response times and is not always available around the clock. In some cases, this has disrupted the ship's operation, affected safety on board and/or prevented the ship from leaving port.

Table 1: Overview of the main-themes and sub-themes

The table below provides an overview of the problems that the study identified, sorted based on the research questions, main themes, and sub-themes that the analysis of the interviews generated (see the project report for more details).

Questions	Main themes	Sub-themes	
What problems occur?	1. "Hassles"	1.1 Bugs	
		1.2 Updates	
		1.3 Internet connection	
	2. Complexity	2.1 Many systems	
		2.2 Interface	
		2.3 Too much information	
	3. Distractions	3.1 Alarms	
		3.2 Interface	
	4. Support	4.1 Larger/smaller companies	
		4.2 "Personal" contacts	
	How do you prevent and solve the problems occurring?	5. Adjusting	
		6. Colleagues	
7. Creativity		7.1 "Work around" the problems	
How frequent are these problems?	8. Maturity of the programs/systems		
What targeted measures need to be developed?	9. Support		
	10. Standardization	10.1 Advantages	
		10.2 Disadvantages	
	11. User centered design	11.1 Structure	
12. Interconnected systems/programs			

ForeSea is an information system for accidents, near-accidents, and deviations with the primary purpose to prevent marine accidents and improve maritime safety. The system is developed by the Swedish Shipowners' Association in collaboration with maritime authorities. The system has searchable reports related to digitalisation, automation, and computers, among other things. The result of a search using these keywords confirmed many of the problems reported above. Incidents related to digitalisation, automation and computers had a wide range such as various technical and software problems that occurred on board and in some cases affected the operation of the ship and safety on board.

Scan the QR-code to read the full report



If you want more information:

Christina Palmén, Swedish Shipowners' Association, christina.palmen@sweship.se
 Monica Lundh, Chalmers Technical University, monica.lundh@chalmers.se