

Behaviour of deck officers with new assistance systems in the maritime domain

Albert Kircher¹, Fulko van Westrenen², Håkan Söderberg¹, & Margareta Lützhöft¹
¹Chalmers University of Technology, Göteborg, Sweden
²Umantec, The Netherlands

Abstract

The maritime domain is seeing new developments in systems aimed at increasing safety and efficiency of transport. These systems are tested for norm compliance and technical capability, but human factor aspects are not always part of the evaluation. The article argues that this is required, and exemplifies factors of interest with data from a simulator study. Two new systems related to collision warning and speed management were tested on 32 participants in full mission bridge simulators. The factors of main interest were the officers' experience, attitudes and workload. Data on the officers' behaviour were collected for complete runs and for different events related to possible collisions for the one system, and areas where speed should be limited for the second system. Differences in the officers' behaviour were observed in relation to several variables. The study claims that in addition to ensuring the technical capability of systems, a number of human factor issues have to be taken into account. Important aspects of the evaluation are highlighted.

Introduction

Ship's officers face an increasingly high number of novel systems to make navigation safer and more efficient. Theoretically, a nearly complete picture of their own ship, the surrounding ships, the navigation area, water depth and weather conditions is available, which could make navigation fundamentally safe. Radar systems are able to scan the surroundings and give the position and movement of other ships even at night. The Automatic Identification System (AIS) offers even more complete information about other ships by transmitting and receiving a variety of data related to ship type, voyage, position, and many more to all ships equipped with AIS. Electronic maps contain precise nautical charts, and can be integrated with Radar and AIS systems. Nonetheless, serious accidents happen, and a common claim is the involvement of the "human element". What the human factor is all about takes into account how humans are, and how they work with technical systems; this simple consideration entails several aspects, and the need for evaluating technical systems accordingly. This addition to function and compliance testing of technical systems may sound self-evident, but reality provides another picture. Human factor aspects can, and in fact should, be incorporated from the very early design stages of products or systems. We elucidate some of the factors which play a role in the way humans interact with systems (from here on systems will be synonymous with