

## Normal maritime accidents in the Navy – analyzing the collisions of US Navy J. S. McCain and US Navy Fitzgerald

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This paper explores two maritime accidents in 2017, based on the NTSB accident reports issued in 2019 and 2020. The two different collisions involved modern destroyers, i.e. the US Navy John S McCain and the US Navy Destroyer Fitzgerald. Based on a system approach, we have analysed design and Human Factors issues as described in the NTSB accident reports.

We have explored safety incidents, and have explored root causes based on a system perspective, i.e. exploring Man (Human Factors issues), Organizational issues, and Technology issues; abbreviated to MTO. In addition we have explored how the blunt end (Command and control in the Navy) and the sharp end (i.e. crew on the bridge) has been evaluated by key actors such as the Navy, courts and the investigation authority - NTSB. We have based our evaluation on an accident investigation model as used by the safety investigation authority. In addition we have performed a limited survey of maritime accidents investigations focusing on the technical equipment on the ship bridge and an exploration of best practices of bridge design. Design challenges has been a part of our analysis. We have tried to find the root causes leading to human errors, and we have tried to include the sensemaking of the involved actors from the sharp end. We have tried to identify the difference between work as imagined (procedures) and work as done (as documented by the accident investigation reports). The two specific accidents took place on a bridge, that were dependent on the use of modern technology. Both accidents happened during night time (where sensemaking is impacted by the circadian rhythm), at high speed (i.e. around 20 knots), with poor interaction with surrounding traffic - the AIS (automatic identification system) was turned off making communication with other ships challenging, the Navy's ineffective oversight in the areas of crew training and fatigue mitigation, loss of situational awareness/ ineffective communication and cooperation on the bridge. In addition our limited survey of maritime accidents, have highlighted the poor quality of situational awareness on the bridge, too many alarms, insufficient training, insufficient passage planning, poor work load assessment and poor (safety) management. The accident reports raise the issue of usability and user involvement from design through acceptance of the bridge systems, and raise the question "are the systems so poorly made that they are a challenge to use?" Based on the issues highlighted in the NTSB report, and our review of maritime accidents, it seems that the operation of the destroyers created the environment for

a Normal Accident – or an accident waiting to happen. However the John S McCain and the Fitzgerald case, the actors in the sharp end was blamed and punished for the accidents, thus indicating the need for a more “just culture” in the naval environment.

*Keywords:* Accidents, Accident investigations, Human Factors

## **References**

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