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Introduction

There is no decision support system known today, providing any level of *capability to quantify* ***severity*** *of an emergency scenario*, involving characteristic events such as outburst of fire, collision or grounding. Judgment on the severity in any of these scenarios is left today to the discretion of the ship master or crew in general. There are operational systems, e.g. emergency response on-shore teams, in place to offer support in making this decision. In each case a software, such as e.g. NAPA Onboard, is used to perform specific calculations on the basis of some crew readings on condition of the situation (e.g. extent of damage, flooding progression, smoke propagation, etc). Every such calculation is as good as the data provided and skill of the user, and is based on a simplistic modelling, e.g. static stability. It is conveyed in the form of subjective assessment on the possible development of the scenario. Hence, subjective judgement is all a crew member has at its disposal for ultimately deciding of the fate of as many as 4,000 passengers onboard modern cruise liners, should an emergency occur.
This sub-project intends to address this issue by development of a new and rational approach in quantifying severity of emergency scenarios. It is proposed to primarily use first-principles assessment techniques as the basis for prognosis on expected development of undesirable consequences in emergency scenarios, whilst in parallel using such prognoses for risk quantification, to facilitate development of “intelligent” risk-based decision support.

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The tools to be developed are intended to be used both on board, as direct decision support to the crew, ashore in the ship owners and –operators offices, and by 3rd party specialist services. A central premise for the development is the real-time transfer of necessary input data from the ship’s monitoring systems to shore-based support personnel, and real-time transfer of prognosis and assessment results from shore to the on-board computers.

Objectives

This report addresses the following specific objective of C2 subproject:

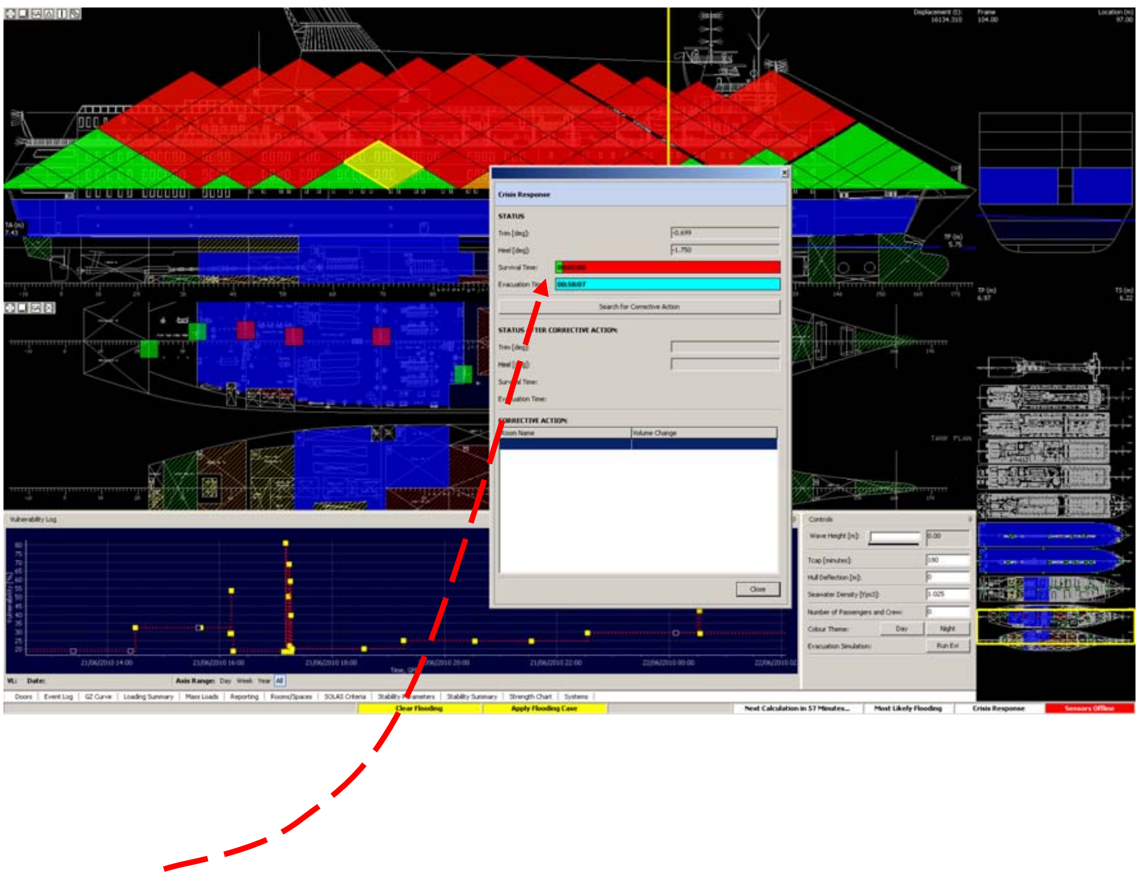
- To help synthesising of available data into a single measure of severity of a scenario and to enable easy ranking of possible mitigation actions to be taken.

Assessing severity of a crises scenario

In an unlikely case, where a flooding event does actually occur, the following set of data can inform instantaneously about criticality of the situation.

- The exact time that can be confidently (99%) assessed as available for the ship before potential capsize, and
- The exact time expected for the persons onboard to reach the LSA and thereafter abandon the ship.

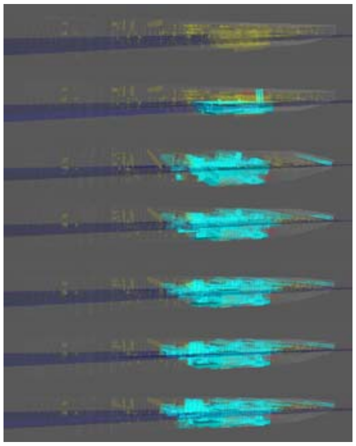
Shown as "bars" against one another, such set is ergonomically efficient for immediate decision making: if evacuation time is approaching survival time, the decision for abandonment becomes imminent.



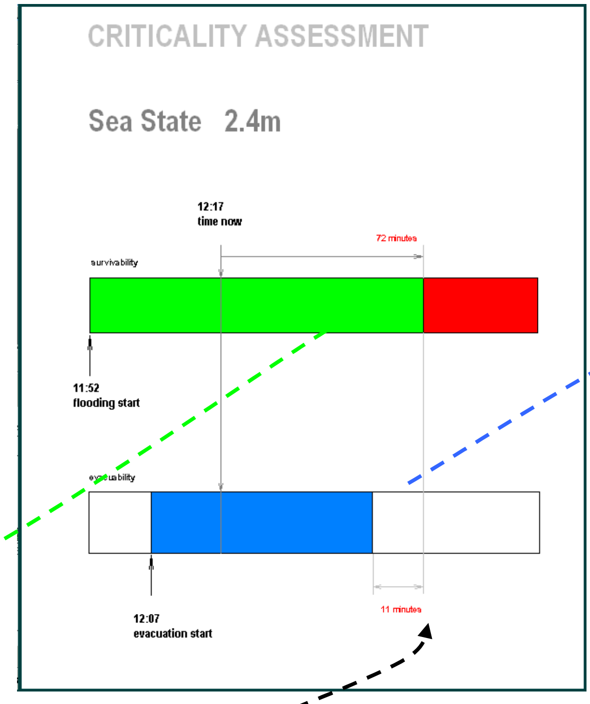
Both of data sets will reflect state of the art knowledge derived on ship survivability, analytically, numerically and experimentally, as shown in the figure below.

The algorithms underlying the two "bars" are described in D2.3.1.

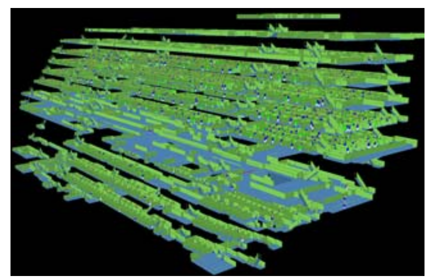
The figure below merely illustrates the principle of the "bar" indicators implemented in the user interface shown above.



The green bar reflects time that is available for the ship before capsize



The blue bar reflects time for full evacuation. It will be affected by heel angle and ship motions, time of the day, etc.



The difference is time left for decision making. Once blue bar is longer than the green, it is expected that fatalities might occur.

It might be possible to facilitate interactive insight into both of these processes (time-domain flooding and evacuation simulations online) at a later stage.

Conclusions

A simple yet extremely effective criteria for performing assessment on criticality of a scenario, subject to any mitigation measures, has been proposed.

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