

Graduation project summary – Ingmar Wever

This document includes a short description of the graduation project for my double degree at the TU Delft. Combining both my maritime knowledge and computer science knowledge during a project at Damen Shipyards. The project is worth 60 ECTS, of which 30 ECTS is shared and 15 ECTS specifically per degree. The responsible supervisors at the TU Delft are:

Dr.ir. Robert Hekkenberg
Ship Design
Maritime Technology - DPO

Prof.Dr. Mark Neerincx
Interactive Intelligence
Computer Science – DST

Computer science becomes more relevant for the maritime industry, as more data is generated and stored. This involves software architecture, testing and cyber security. But what interests me is how the developments really support the desires and needs of the people using the software and data. Projects driven by the combination of computer science and maritime technology are predictive maintenance, autonomous vessels, development of sales strategies, and the generation of ship configurations.

Research will be conducted in a form where: Available information for a specific case is mapped, insight is acquired in collecting the data, how to store the data and finally how to use the data.

This specific project, will first consider and determine all relevant variables in a specific use case. Followed by a generalisation which can be used in a tool. This will be done in an iterative process which depends on the availability of time. To guide this process several milestones are defined beforehand. During the project is determined which are realistic to achieve. The initial milestones are:

- Predict safe area around a ship. Dependent on the manoeuvring properties of the ship, and on the expected manoeuvring properties of the encountered ship or obstacle. Considering for example the environmental conditions, ship type and failure cases.
- Develop model to predict warning domain for different vessel types.
- Improve warning system for crew to inform them about situation and determine needed awareness. Based on warning domain.
- Framework based on the tool to support more features, such as:
 - Warning signals for maintenance
 - Enable fleet management to supervise and set targets for captain

Required for the computer science part is the evaluation of human interaction with the developed tool. The tool can only be developed when there is knowledge on the input (data acquisition and database usage) and the output (user interface and visualisation of the data). In an iterative process, the tool will be improved, this is among other things based on evaluation tests with users. Leading up to a final design for an interaction design pattern.

The maritime technology part will be related to the models behind the tool. Having a good model for the warning domain around a vessel will help to improve AIS warning systems currently used, and the models are needed for the development of autonomous vessels. Different properties will be considered, including their impact on the final warning domain. Depending on the progress of the project, it is possible to look at more use cases for the comparison method used. Where the right data should be selected and presented in a clear manner.