The design of a visualization tool for container terminals to increase efficiency

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In this thesis a proposal for a visualization tool for container terminals is made for Cofano Software Solutions. Cofano is a software development company with a focus on logistics. It was founded in august 2010 and is based in Sliedrecht but also has an office in Enschede. Cofano is working on several projects and products to help the container logistics industry streamline their work.

A container terminal is a place where containers are stored and transshipped. The current situation on terminals of Cofano's clients is that there is a small group of people who know where certain containers are located. These people (usually the equipment operators) know this by heart or have written it down on a small piece of paper. Some of the clients do register or are starting to register the locations of the containers but only partly. This results in a low efficiency when getting containers but also when placing the containers on the terminal. There is no feedforward so it is difficult to see where other containers planned for the same transport modality and departure time are, which means it cannot be taken into account when choosing a location for a container on the terminal. That can result in containers getting buried by containers with a later departure date or having to drive around the whole terminal to get the containers for a single vehicle or vessel.

The goal of the assignment was to improve the process of finding the right containers and raise efficiency when loading/unloading the vehicles on a container terminal. This was to be achieved by a visualization of the terminal, as a picture of the container locations is faster than a long list. The result was to be a clear proposal for a visualization tool that fits the customer needs and can be incorporated within existing software of Cofano. The question that was to be answered in this thesis was:

'How can a visualization of a container terminal be used to increase the efficiency on the terminal?'

To achieve the objective and reach a satisfying product, first the requirements for the product were determined. This was done by further analyzing the problems and what causes them, analyzing the stakeholders and their needs and expectations, and analyzing existing solutions. After that, ideas were generated. Then, concepts were created, a final proposal was made, and finally, recommendations and a reflection were made.

The following points to use a visualization to increase efficiency on the terminal followed from the analyses:

1. Giving the equipment operators a picture of where the required containers are located on the terminal so they do not have to search for them
2. Showing the equipment operators where containers of the same modality, departure time, etc. are stored on the terminal so they can use that to place those containers closer to each other
3. Giving the equipment operators suggestions on where to place the containers
4. Simplifying the registration of container locations by letting the equipment operators pick a location on the map and automatically filling in the picked location

5. Giving the office staff an overview of the situation on the terminal so they can better estimate how long it will take to set up an order and see if all the containers are placed correctly

Two concepts were created to increase the efficiency on the terminal. The first concept did better on the aspect 1 while the second concept did better on aspect 5. To keep the stronger points of both concepts in these areas the concepts were combined. The proposed concept does not satisfy aspect 3. While the proposed concept does improve efficiency in aspect 1 and 4, it is hard to say how much it improve the efficiency on the terminal as it is still untested.

It is recommended to test the proposed concept with the clients to see if and how much it will increase efficiency on the terminal, and if the users also experience that. As the product is meant to increase efficiency it is important that the user can use it and learn it quickly. The proposed concept gives some extra tasks to especially the equipment operators but these tasks save time later on.

To take some of those tasks away from the equipment operators, it is recommended to implement a suggestion system for the placement of containers on the terminal. For this, algorithms have to be developed to find the most efficient way to fill in a container terminal. The office staff could also get the option to dedicate certain areas to containers with a certain transport modality to help the equipment operators choose a suitable location.