Development of modular training stations for maritime mass rescue simulations
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Motivation
Maritime mass rescue operations occur rarely and need to be handled with great caution. In order to achieve the best coordination of the on-scene units, authorities have to practice search and rescue procedures and inter organisational communication. One approach are simulator trainings. Nowadays each participating authority is practicing separately in a simulator because of missing links between multiple simulator units. A novel approach is to practice within an interconnected set of simulators. The technology is supplemented by mobile, multi-functional operation stations (MO3), which can simulate either a shipmaster, helicopter or rescue centre workplace. As the needs and use cases are rather different a trade-off design of the MO3 has to be developed. The challenge is to reproduce realistic workload levels without having to create tailored and highly immersive environments.

By using the human centered design process (see figure 2), design alternatives for helicopter, shipmaster and rescue centre employees were developed. In order to evaluate early MO3 designs virtual prototypes were used to reach as many people as possible. The evaluation has been conducted in a mixed methods design with semi structured interviews, thinking aloud and the user experience questionnaire. Here 15 participants rated the shipmaster and helicopter models as desirable whereas they indicated the need of improvements for the rescue centre model. Based on the user feedback all models were improved and are used as the basis for the real multi-functional operation stations. Furthermore participants stated that virtual models are eligible for the evaluation. However the lack of interaction and greater details decreases the presence and the quality of feedback.

Method & Results
For the implementation of all necessary control and display elements, user requirements were gathered by the help of five focus group workshops. As a result a prioritisation of control and display elements was derived (see figure 1). The following design process was executed in a top-down approach. First, basic elements (macro perspective), e.g. tables, displays or server racks were placed. Afterwards special elements (micro perspective), like software components within the displays or the placement of control elements were arranged.

In the final stage of the user centred design process all three models were evaluated by lead users. Therefore participants were acquired from attendees of the above mentioned focus group workshops. The aim was to investigate, whether virtual prototypes are suitable for the evaluation of designs without interactive elements. The questionnaires and 3D-FOF’s including the model were send to the participants via E-Mail. Afterwards they were called by phone in order to execute the study. For the study a mixed methods approach was utilised (Creswell, 2013). Hence questionnaires (user experience questionnaire, semi structured questionnaire) and the method thinking aloud were applied. In order to stimulate the participants and to create a high presence, typical search and rescue training situations were given.

Conclusions
The participants rating in the user experience questionnaire matched with the qualitative data, derived from the semi structured interviews and thinking about task. Especially the workplace of the rescue centre employee was rated negatively. Here, qualitative data showed that participants emphasize more displays and more space for sheets and pens. The other two models were rated as more attractive and stimulating. Here, participants gave only minor hints for improvement. However the rating for novelty has a positive tendency but doesn’t reach the redline for a reliable meaning.

Overall individual prototypes seem to be suitable for early design evaluations. The answers within the semi structured questionnaires contained valuable feedback about the arrangement and needs of objects, the ability to set the system up and transport it as well as ways to optimise it (e.g. colour coding of the connector plugs). However, not implemented software interactions and low level of details were rated as negative aspects which may be improved.

References
Creswell, J. W. (2013). Research design: Qualitative, quantitati-