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Systems Engineering and Ship Design: a synergy for getting the right design and the design right

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What makes a successful ship design? The most brilliant solution cannot be called a success if it is something nobody desires. Nonetheless, if a solution can in principle fulfill customer's needs but it is not appropriately executed, it is a failure as well. Therefore to have a successful solution both elements are crucial: getting the right design and getting the design right. Respectively they answer the question "what is the right thing to build and why?" and "how do we build it?".

The traditional design method, represented by the "design spiral", is a solution-oriented approach that works well when requirements have already been defined. It surely results in a feasible ship possibly fulfilling the customer's requirements, but it is not ascertained a priori that it is the best one from all point of views. The exploration of the problem domain, necessary to select the right design, can be achieved with a problem-oriented approach such as Systems Engineering (SE) methodology. The aim of SE is to identify the best possible solution that satisfies customer needs in the most efficient and effective way.

In this paper a new approach that merges the traditional ship design procedure with the Systems Engineering (SE) processes will be discussed, with a special focus on the conceptual integration between the SE V-model and the design spiral. In these perspective, it will be necessary to discuss the definitions of Measures of Performance (MOPs) and Measures of Effectiveness (MOEs). MOEs are related to the achievement of the mission in the intended operational environment, while MOPs characterize physical attributes of system/ subsystems. The objective is to open a discussion within the naval architects community to define an innovative methodology which will support the decisional process in finding the best possible solution, in the specific domain of naval ships.

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