

Interactive comment on “Systemic hazard analysis of offshore service operations” by Romanas Puisa et al.

Anonymous Referee #2

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General comments:

The authors points out that SOV operations constitute a complex socio-technical system, consisting of several subsystems. Each subsystem has specified safety procedures, but the authors argue that potential hazards resulting from the interaction of subsystems might not be properly accounted for with the existing approach, which focus on potential hazards for each subsystem. Instead, they propose to use the systemic method STPA, where the starting point is to identify hazards on the system level. The topic of the paper is relevant, and it is generally well structured. However, I see some issues in the quantitative outcome of the analysis, as given below. The authors make conclusions about the risk in the abstract, however, they do not actually do a risk analysis, as they do not consider the consequences/potential losses, and also not

C1

directly the likelihood. They write in line 224-225: “As incident prevention is the focus on this paper, the likelihood alone can be used to rank the hazards, provided the consequences all considered hazards are similarity intolerable.” However, there is no justification that the hazards are similarly intolerable. In fact, according to the reference for the applied STPA analysis (Leveson and Thomas 2018), the first step of the analysis should be to identify losses (before hazards are identified). However, the authors seem to omit this part of the analysis. I suggest the authors to either modify the analysis to include the losses, or to clearly state in the paper and abstract that this part of the analysis is omitted, and not to make conclusions on the risk.

The hazard exposure is quantified through the number of scenarios leading to each hazard, and results are presented in tables 3-5. It is not clear to me, whether this is this the number of different scenarios, or if it is some frequency of exposure. It is also not clear to me how these scenarios were actually found – e.g. were they found using some documents, in dialog with Kongsberg Maritime, using incident reports, or other? If the number of scenarios is to be understood as the number of different scenarios that can potentially lead to a hazard, I do not follow the argument, that it can be seen as a measure of exposure. The exposure would depend on the probability/frequency and duration of the “scenarios”. The number of scenarios seem to depend mainly on how things are defined, and how exhaustive/imaginative the analyst is. The assumption that the hazard exposure can quantified through the number of scenarios leading to each hazard seems to be made, in order to come up with a quantitative outcome of the analysis, but I cannot see the need (or justification) for coming up with a quantitative outcome. In the abstract, it is written: “The objective of this paper is to bring awareness of hazards that may have been overlooked in earlier assessments, and allow for a preliminary comparison of various operational stages.” Specifically, they wish to “explore hazardous scenarios caused by flawed interactions between system components”. Based on this, I believe that the main outcome of the analysis, and the main result to be presented in the paper, should be the identified “hazardous scenarios caused by flawed interactions between system components” If such scenarios were

C2

not found, the abstract and conclusion should reflect this.

Specific comments:

Line 32-33: "It is normally a motion-compensated (3 or 6 DoF) gangway system, which allows for relatively safer (based on experience so far) and time-efficient (within some 5 minutes) transfer." I believe that the bump-and-jump method is significantly more time-efficient, if conditions allow for transfer this way - this could be mentioned. (see e.g. Nikki Twigt, Access Systems for Offshore Turbines - A review of conventional and walk-to-work transfer methods, 2020)

Technical corrections:

Line 72: Reference to Section 0

The paper needs a language check.

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