INTERNATIONAL MARITIME ORGANIZATION

E

MARITIME SAFETY COMMITTEE
87th session
Agenda item 18

MSC 87/18/5
23 March 2010
Original: ENGLISH

FORMAL SAFETY ASSESSMENT

Comments by SAFEDOR on the report of the FSA Experts Group (FSA on RoPax ships)

Submitted by Denmark

SUMMARY

Executive summary:	This document comments on the report of the first intersessional meeting and the correspondence group of the Formal Safety Assessment (FSA) Experts Group. This document sets out the SAFEDOR responses to the FSA Experts Group's concerns regarding the FSA on RoPax ships (annex 2 to document MSC 87/18).
Strategic direction:	12.1
High-level action:	12.1.1
Planned output:	12.1.1.2
Action to be taken:	Paragraph 4
Related documents:	MSC 87/18, MSC 85/17/2 and MSC 85/INF.3

1 This document is submitted in accordance with the provisions of paragraph 4.10.5 of the Guidelines on the organization and method of work of the MSC and MEPC and their subsidiary bodies (MSC-MEPC.1/Circ.2) and comments on document MSC 87/18.

2 As a partner in the SAFEDOR project, Denmark has collected responses from the SAFEDOR experts who performed the FSA on RoPax ships.

3 The following comments are related to the major items discussed during the first intersessional meeting of the Formal Safety Assessment Experts Group, as set out in annex 2 to document MSC 87/18.

Action requested of the Sub-Committee

4 The Committee is invited to note the information and take action as appropriate.

***

ANNEX

COMMENTS ON THE REPORT OF FSA EXPERTS GROUP REGARDING THE FSA ON ROPAX SHIPS

To limit the number of pages, only parts of the questions posed by the FSA EG are repeated. Responses by the SAFEDOR FSA experts are given in *italics*. The numbering below refers to annex to document MSC 87/18, by the FSA EG.

Whether the expertise of participants in the FSA study was sufficient for the range of subjects under consideration (TOR 1.7)

1 Although some members pointed out the lack of sufficient information about each expert, the group, noting the relevant information on the SAFEDOR website, generally agreed that the expertise of participants in the HAZID of the FSA study was reported and sufficient. However, similar information on the remaining FSA steps was not found.
The reason that short CVs are given for the HAZID, where expert elicitation is used, is that such analysis is subjective – hence the need to be aware of the specific expertise on those subjects. The rest of the FSA is based on data that can be reanalysed by anyone and, as such, there should not be a need for providing CVs.

The validity of the input data and its transparency (TOR 1.3)

The reasonableness of the assumptions and whether the scenarios adequately addressed the issues involved (TOR 1.2)

2 The group noted the gap between the identified hazards (HAZID: step 1) and the remaining parts of the risk assessment (steps 2 to 4) in that the hazard details identified in HAZID were not used in later steps, but generic casualty categories (e.g., collision, fire/explosion, wrecked/stranded, machinery damage/failure, etc.) were used instead. The group was of the view that steps 2 to 4 should take into account all the major identified hazards unless the selection criteria are explained and justified. The human element, especially, should be considered further.
The HAZID session (step 1) concluded on the following as the major top-ranked hazards: failure of evacuation equipment during an emergency; fire in accommodation, vehicle deck and machinery spaces; collisions with other ships while in open sea or navigating in coastal waters; and grounding while navigating in coastal waters. On the basis of these results, it was justified to continue (steps 2 to 4) with the "generic" casualty categories of collision, grounding and fire, supplemented with the categories of impact and flooding from other causes, whilst the top-ranked hazard (failure of evacuation equipment during an emergency) is taken into account in the event tree modelling through the explicit consideration of different potential outcomes, which may (or may not) require evacuation of the ship. On this basis, and taking into account that, as analysis progresses onto steps 2 to 4, details become available and are quantified, this HAZID provided a good starting point for the whole FSA; hence serving its purpose well. MSC 85/INF.3 contains a summary of the HAZID results (at section 4 of Annex I) whilst the full HAZID report has been made publicly available on the SAFEDOR website.

3 Having noticed that the FSA used old casualty data on RoPax ships, the group agreed that the effect of new mandatory regulations introduced after those accidents, in particular the comprehensive revision of SOLAS chapter II-1, should be taken into account when considering RCOs.
*The casualty historical data used were of the period 1994 to 2004 for the calculation of incident frequencies and historical Potential Loss of Life values, PLL (in order to take into account the **Al Salam Boccaccio 98** incident, which happened on 3 February 2006,*

an additional historical PLL value was also included). The event trees produced were generally populated with branch probabilities, which were based on this set of data (of the period 1994 to 2004) and where this set was considered to be insufficient, data from other, contemporary or older, studies were used. A significant finding of the study was that accidents happen at a much reduced rate, hence use of older data was the only option in some cases. The full details of the assumptions made are given in document MSC 85/INF.3.

For the calculation of the probability of sinking of the struck ship following a serious collision incident, the HARDER set of data on attained subdivision index A was used, which formed the basis for the comprehensive revision of SOLAS chapter II-1. Further, the range of examined RCOs referring to damage stability and survivability, investigated a range of attained subdivision index up to 1.0, hence covering any potential effect of the new mandatory regulations introduced in 2009. What was taken into consideration in the data set analyzed was the influence of the introduction of Stockholm Agreement as demonstrated by significant reduction in accident occurrence in Northwest Europe.

4 The group partially agreed with the validity of the input data and reasonableness of the assumptions. Some members, however, pointed out that as in other FSAs, collisions, groundings, impacts and other accident hazards are treated as causes and not as consequences of other root-cause events (such as for instance, a steering gear failure that leads to a collision). This may skew the ensuring analysis including what may be appropriate RCOs, which are mostly mitigation-oriented.
Collisions, groundings, fires or other accident categories were not used as "causes" in the risk analysis presented. They were used as initiating events to present the event trees produced. It is agreed that there is certainly a wide variety of causes (not analysed in this high-level FSA study), which can lead to the events investigated. However, a range of different RCOs was investigated, including RCOs aimed at improving navigation safety (RCOs, which are definitely categorized as prevention-oriented), with an outcome as presented in document MSC 85/INF.3 (Table 35 and Figure 17 of Annex II), indicating that a combination of prevention and mitigation RCOs could considerably improve the safety level of RoPax ships.

Whether risk control options and their interdependence were properly evaluated and supported by the assessment (TOR 1.4)

Whether uncertainty and sensitivity issues have been properly addressed in the FSA study (TOR 1.5)

6 The group noted that the FSA focused on mitigating risk control options (RCOs) which would hypothetically reduce total risks and directly relate to loss of life (fatality), and that no RCO interdependencies were examined.
Detailed answer for this point is provided in the answer to point 4 above. Any interdependence between the examined RCOs is simple to be established during the decision-making process, on the basis of data provided in document MSC 85/INF.3.

7 With regard to the cost-benefit assessment, in particular regarding the FSA's sensitivity analysis using attained subdivision index A (stipulated in SOLAS chapter II-1), the group, while noting the above-mentioned explanation (paragraph 3), found some difficulties in following the analysis and justification. After discussion, the group was of the opinion that the FSA needs more robust sensitivity/uncertainty analysis.
Reference is made to our answers to points 3 and 4 above. Parameters characterizing the RCOs considered were examined to their limits, it is not clear what is meant by "more robust sensitivity/uncertainty analysis". This FSA was perhaps the only one that evaluated cost-benefit with consideration of uncertainty. It is proposed that future FSA guidelines address this issue and provide guidance on what level of uncertainty analysis could be considered sufficient for decision-making purposes.

9 The group noted that the FSA study conducted sensitivity and uncertainty analysis and the results were reported. Some members observed the merit of the presentation and results. However, some members were of the opinion that these analyses were not conducted in an adequate manner.
Reference is made to our answers to points 3, 4 and 7 above.

Whether the methodology was applied in accordance with the FSA Guidelines and the Guidance on the use of HEAP and FSA (TOR 1.1)

10 Based on the above consideration, the group noted that the FSA followed the steps specified in the FSA Guidelines but did not fully comply with them. Some members felt that access to casualty database, gap between step 1 and the rest of the FSA, treatment of RCO interdependencies and calculation of concordance among experts were points of departure from the FSA Guidelines. The group noted that the FSA reports had not included a human reliability analysis.
The issue on the gap between step 1 and the rest of the FSA is covered by our answer to point 2 above, whilst the treatment of RCOs interdependencies is covered by the answer to points 4 and 6 above.

It is agreed that no concordance analysis of the opinions of the HAZID experts was carried out, however this does not render the HAZID results invalid, nor it is relevant for the results obtained in this FSA study. Also, no explicit human reliability analysis was carried out, which should be part of a root-causes analysis. Due to the high-level nature of the FSA these were not studied.

Consideration on the proposed final recommendations in each FSA study (TOR 2)

12 With regard to measures to improve damage stability and survivability of RoPax ships as the first priority, the group noted that the SLF Sub-Committee has already included the item A.9 on this issue and that the EU-funded GOALDS project, which is relevant to the issue, has just started. Since the FSA strongly recommended undertaking further research in this area, the group recommends the Committee to wait for the results of relevant ongoing researches and the outcome of the SLF Sub-Committee.
The SAFEDOR partners agree with this recommendation. However, it is worthwhile noting that the sensitivity study in this FSA demonstrated beyond doubt that using the currently available at IMO cost-effectiveness criteria, it will be cost-effective to increase the Required Index for RoPax vessels to much higher values that that attained by the existing RoPax fleet. This is unlikely to change with GOALDS or indeed any other research.

13 It was noted that the recommended RCOs are of general nature; this may be resulted from the nature of the high level FSA.
The SAFEDOR partners concur with this statement.

14 With regard to measures aimed at improving navigation safety, the group recommends to the Committee that those recommendations should be proposed, if necessary, by Member Governments to the Committee or related sub-committees (in case there are relevant agenda items).
The SAFEDOR partners agree with this recommendation.