



Session: “Unmanned vessels: master ashore?”

IMO discussions and EMSA’s involvement in MASS

27th CESMA Annual General Assembly

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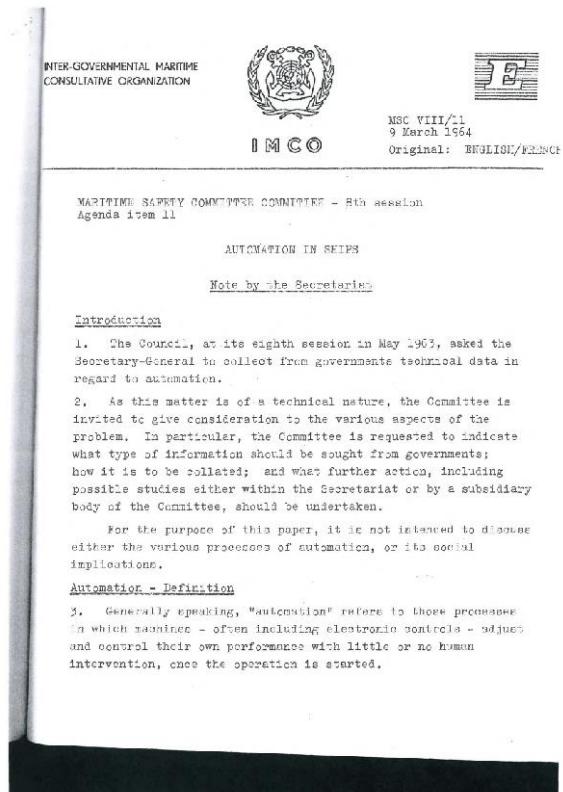
Genoa, 6 May 2022



"There is a growing interest in various applications of automation, among which may be mentioned:

- (a) Propelling machinery;*
- (b) auxiliary machinery;*
- (c) cargo handling;*
- (d) navigation and*
- (e) communication;*
- (f) other miscellaneous applications."*

**MSC VIII/11
9 March 1964**



The outcome of the RSE, approved by MSC 103 (5 to 14 May 2021), provides:

- An assessment of the degree to which existing regulatory frameworks might be affected in order to address MASS operations
- Information for identifying, selecting, and deciding on future IMO work on MASS/ new outputs
- Information for all degrees of autonomy for every instrument expected to be affected by MASS operations under the purview of the MSC and ways to address them
- Identification of themes and/or potential gaps that require addressing

- **(1) Ship with automated processes and decision support:** Seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated and at times be unsupervised but with seafarers on board ready to take control
- **(2) Remotely controlled ship with seafarers on board:** The ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions
- **(3) Remotely controlled ship without seafarers on board:** The ship is controlled and operated from another location. There are no seafarers on board
- **(4) Fully autonomous ship:** The operating system of the ship is able to make decisions and determine actions by itself

RSE: Potential gaps and/or themes to be addressed for MASS operations

	Common potential gaps and/or themes	Instruments
1	Meaning of the terms master, crew or responsible person	SOLAS chapters II-2, III, V, VI, VII IX and XI-1, COLREG, TONNAGE 1969, 1966 LL Convention and 1988 Protocol, Intact Stability Code, III Code, STCW Convention and Code
2	Remote Control Station/Centre	SOLAS chapters II-1, II-2, III, IV, V IX and XI-1, STCW Convention and Code, FSS, ISM, 1966 LL Convention and 1988 Protocol, Casualty Investigation Code
3	Remote Operator as a seafarer	STCW, STCW-F, SOLAS chapter IX, ISM
4	Provisions containing manual operations, alarms to the bridge	SOLAS chapters II-1, II-2, VI and IX, 1966 LL Convention and 1988 Protocol, Intact Stability Code, III Code
5	Provisions requiring actions by personnel (Fire, Spillage Cargo Management, onboard maintenance, etc.)	SOLAS chapters II-2, VI, VII, IX and XII
6	Certificates and manuals on board	SOLAS chapters III, XI-1, XI-2 and XIV
7	Connectivity, Cybersecurity	SOLAS chapters IV, V and IX
8	Watchkeeping	SOLAS chapters IV and V, COLREG
9	Implication of MASS in SAR	SOLAS chapters III, IV and V, SAR
10	Information to be available on board and required for the safe operation	SOLAS chapters II-1and II-2
11	Terminology	SOLAS chapters II-1, IV and V, COLREG, FSS, IBC, IGC, Grain, INF, 1966 LL Convention and 1988 Protocol, Intact Stability Code, SAR, TONNAGE, CSS, Casualty Investigation Code

Table 2: List of common potential gaps and/or themes

Source: MSC 103/WP.8



A roadmap for developing a goal-based IMO instrument for MASS was agreed upon



As an interim solution it was decided to proceed with developing a generic non-mandatory MASS Code as a first step



The Committee approved the establishment of a joint MSC-LEG-FAL working group on MASS to consider the common gaps and themes identified (first meeting 06/09/2022)

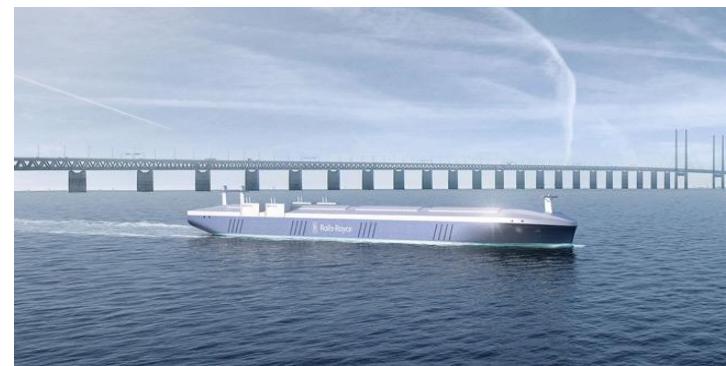


The above non-mandatory Code should initially cover cargo ships while also assessing the application to passenger ships at a later stage



Ambition to finalise the non-mandatory Code in 2025, gain some experience and have the mandatory Code enter into force on 1 January 2028

- **MASS correspondence group to submit a report to MSC 107 (2nd half 2023)**
 - Key principles/ common understanding of the purpose and objectives for the new instrument
 - Development of a non-mandatory goal-based MASS Code
 - Amending (or not) the definitions: MASS and degrees of autonomy/ consideration of potential gaps
 - Meaning of the terms: master, crew or responsible person; remote control station/centre; and determination of the remote operator as a seafarer
- **Joint MSC/LEG/FAL working group**
 - Develop a work plan by considering the roadmaps developed by the three Committees
 - Address the common issues
 - First meeting 6-8 September 2022 (remotely)



Upcoming work on MASS at MSC 106 and MSC 107



MSC Session	Key deliverables
MSC 106 (2 to 11 November 2022)	<ul style="list-style-type: none">Consideration of key principles, purpose and objectives for the new MASS code instrument; common potential gaps<u>Definition for MASS; degrees of autonomy; meaning of the terms: master, crew or responsible person; remote control station/centre; determination of the remote operator as a seafarer</u>Coordination with other Committees and with other International Organizations
MSC 107 (1st half 2023)	<ul style="list-style-type: none">Consideration of common potential gaps and/or Themes/ outcome of MSC/LEG/FAL Working Group (JWG)Will continue the development of the non-mandatory MASS CodeWill consider the impact and will identify changes to existing IMO instrumentsWill make recommendations on how to address the changes to those instruments - recommendations from the Joint MSC/LEG/FAL Working Group to be considered

EMSA's main activities on MASS



SAFEMASS study

Working on appropriate digital services

Involved in the RSE on behalf of the EC

Working on appropriate competencies for RCCs

Working on cybersecurity issues

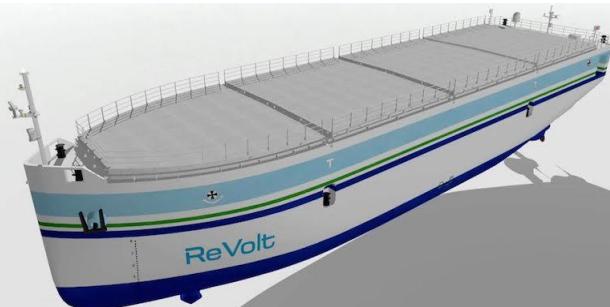
Assisting the EC on the operational guidelines on MASS trials



Risk Based Assessment Tool (RBAT) study

Risk based assessment tool (RBAT):

Support the risk assessment on whether introduction of increased or new ways of using automation is as safe or safer than conventional shipping.



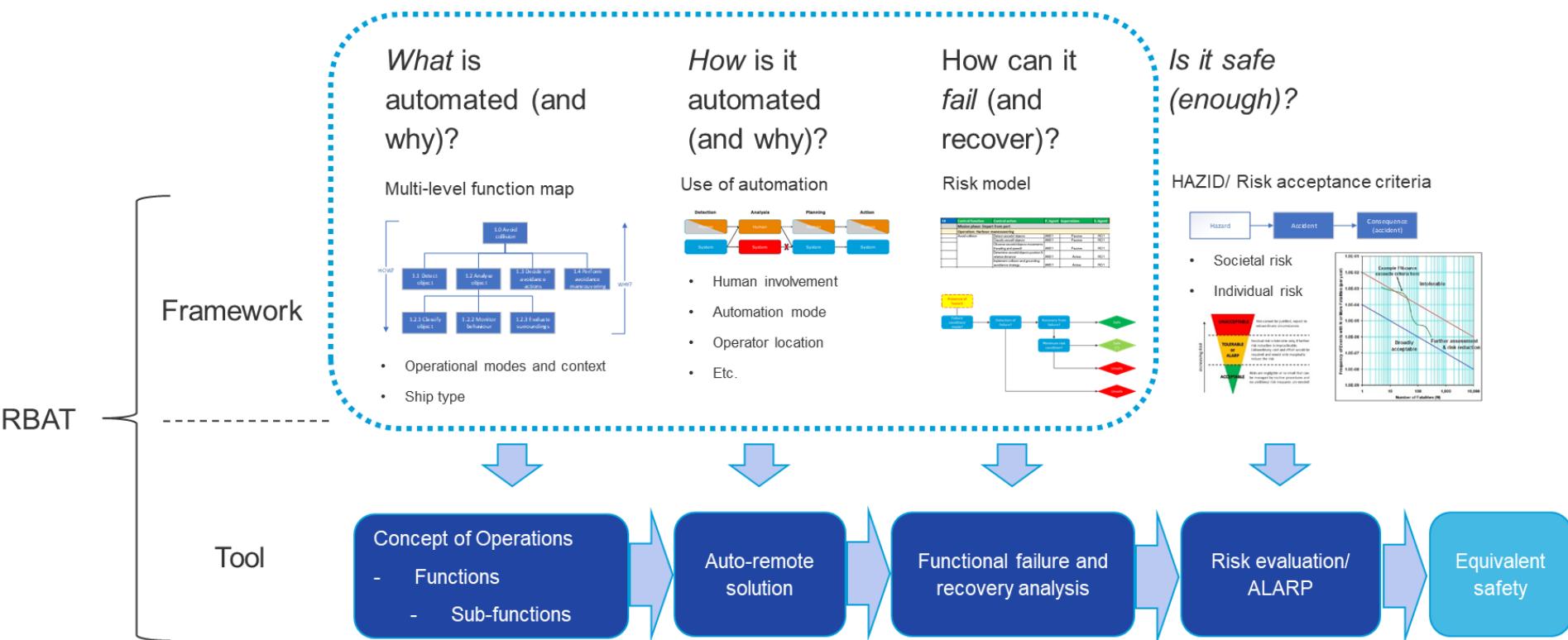
RBAT is conducted by DNV and is separated in 3 parts:

1. Develop the framework for the tool (end 2020 - mid 2021)
2. Develop the first version of the tool with limited functionality (July 2021 - July 2022)
3. Develop the complete version of the tool (mid 2022 - mid 2023)

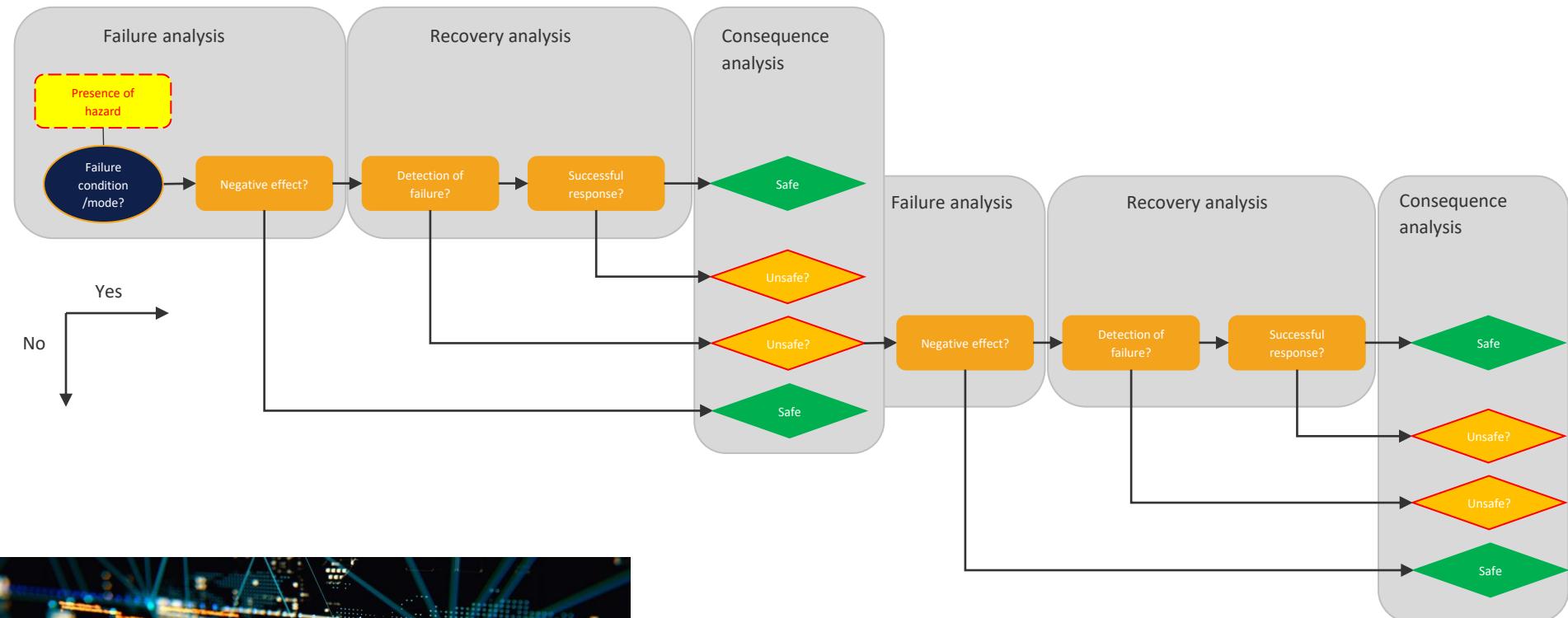
RBAT use cases

	Short Sea Cargo	Small passenger ferry	Ropax ferry
Length	80 m	15 m	120 m
RCC	- Vessel Operator - Chief Engineer	- Vessel Operator	Vessel Operator
Vessel Manning	Unmanned	Unmanned (with passengers)	Reduced Manning - Bridge crew - Deck crew
Fleet size	3 sister vessels	10 sister vessels	5 sister vessels
Area of operation	Enclosed and open waters	Enclosed/sheltered waters	Short route in narrow waters (fjord)
Concept-function combination #1	Arrival in port – perform harbour manoeuvring	Transit to location – navigate through sheltered waters in high traffic	Arrival in port - perform docking
Concept-function combination #2	Transit to location – perform collision and grounding avoidance	Transit to location - perform collision and grounding avoidance	Activities in port – maintain position & charge
Concept-function combination #3	Activities in port – perform loading & unloading	Transit to location – maintain communication	Depart from port – Embark/disembark, operate ramp and manoeuvre
Concept-function combination #4	Transit to location – handle loss of communication link	Emergency response in transit – perform evacuation	Transit to location – handle blackout

Part 1 out of 3



Accident scenario / Event sequence diagram



RBAT novelty

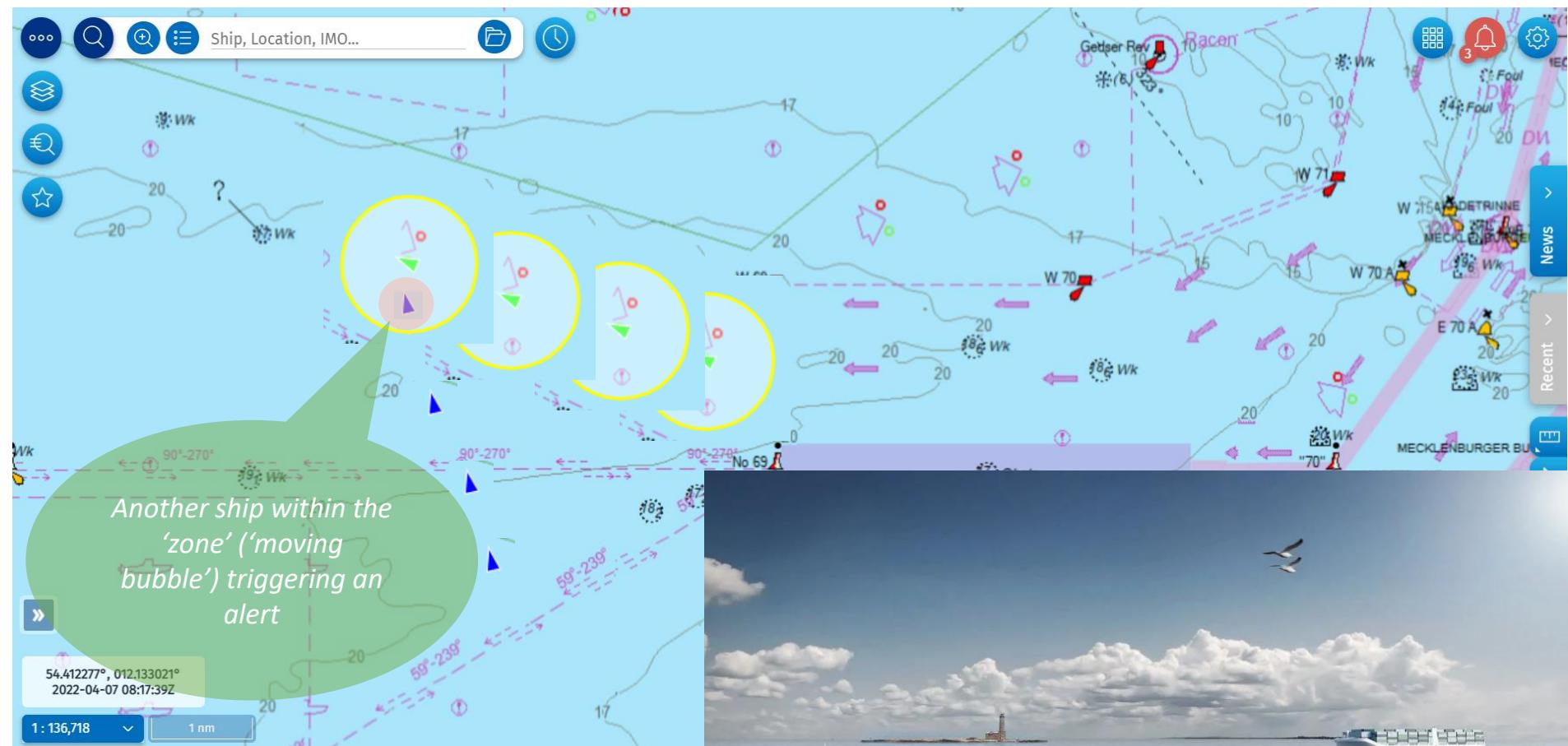
RBAT evaluates as a function of severity and mitigation effectiveness:

- How severe is the worst-case outcome from an undesired event?
- How effective are the mitigations/mitigation layers to prevent losses?

Risk acceptance criteria (RAC) have been proposed to allow demonstrations of risks being made as low as reasonably practicable (ALARP).



Illustration of the 'Zone Around the Ship' ABM





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