



AEA Annual Conference

Pathway to Code

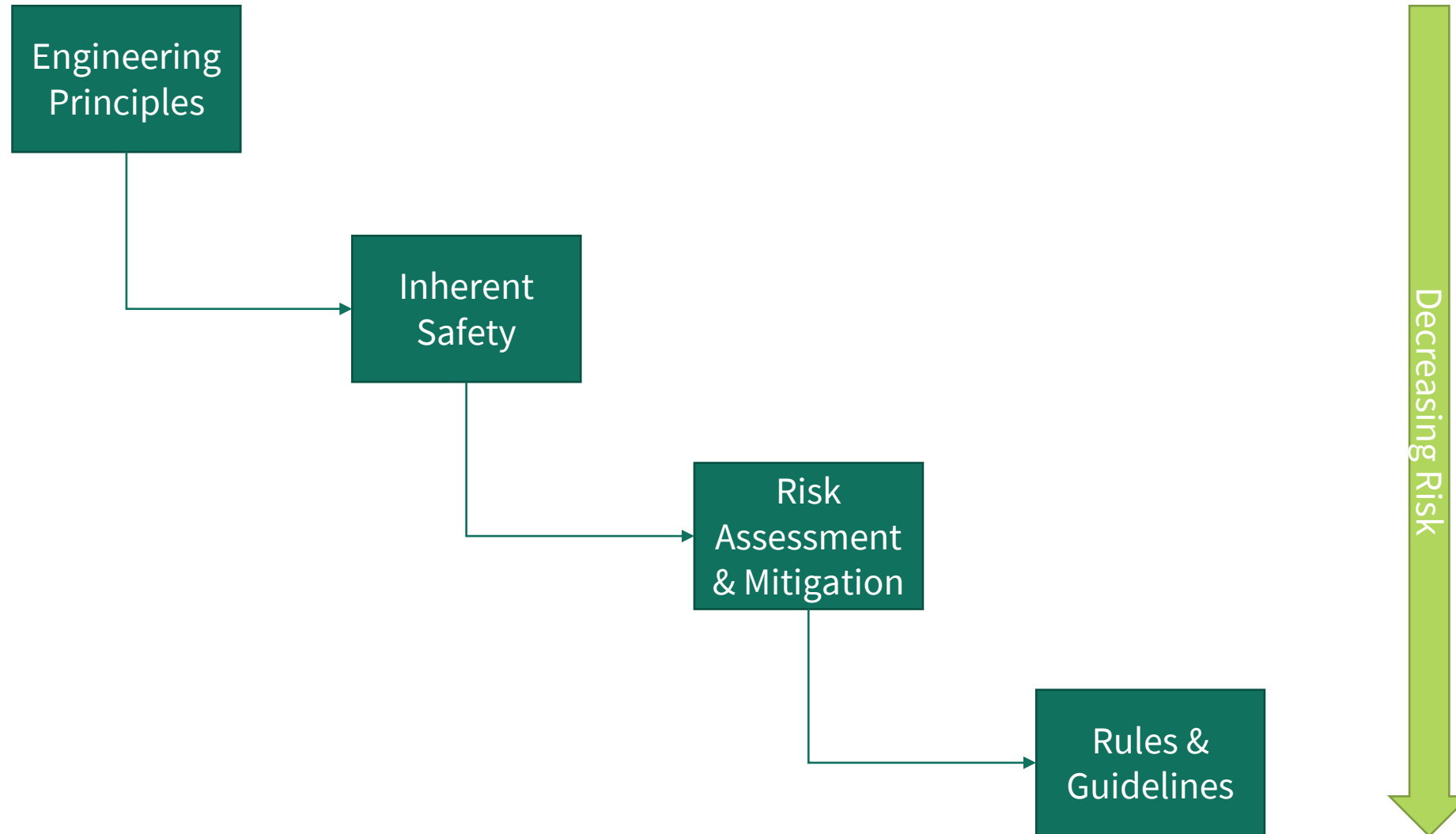
The Maritime Decarbonisation Hub

Presenter: Samie Parkar

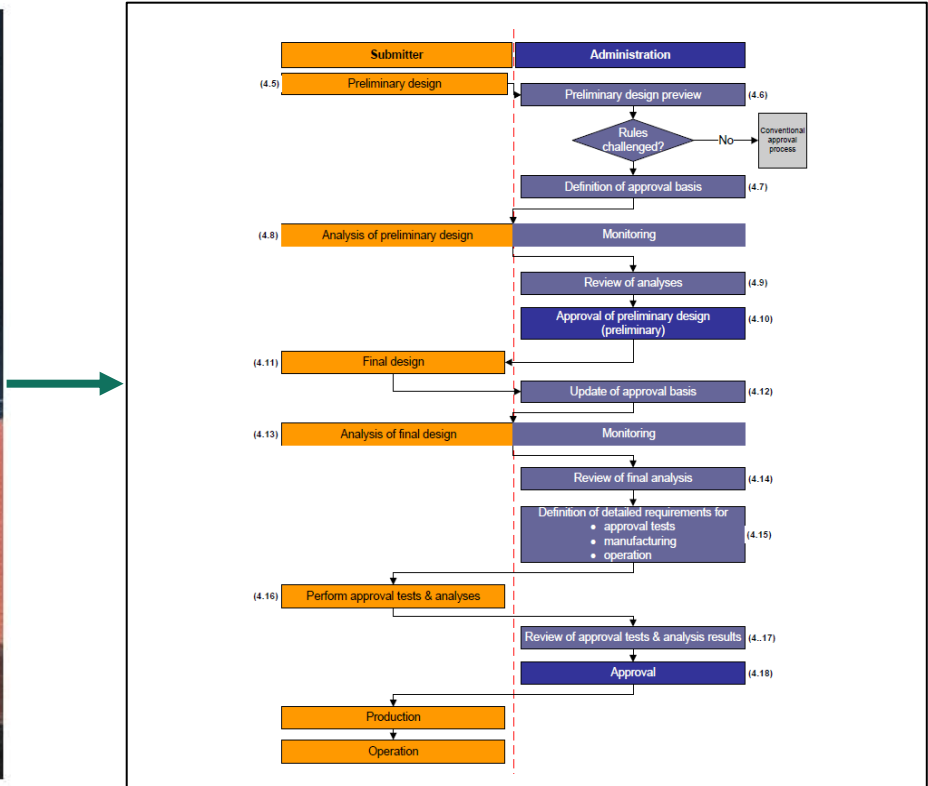
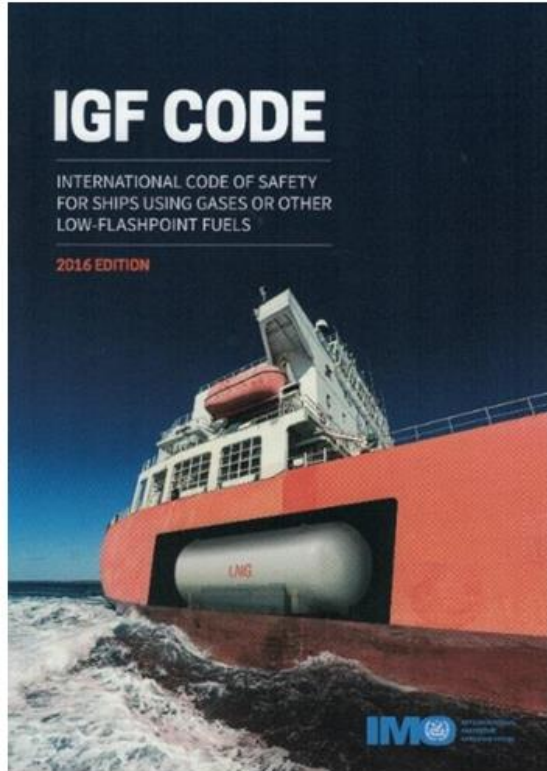
Date: 15th November 2023



Finding a Route to Safe Deployment



Current regulatory framework



MSC-MEPC.2/Circ.12/Rev.2 Annex, page 48

Decision Parameter	Acceptance Criteria		
	Lower bound for ALARP region	Upper bound for ALARP region	
	Negligible (broadly acceptable) fatality risk per year	Maximum tolerable fatality risk per year	
Individual Risk	to crew member	10^{-5}	10^{-2}
	to passenger	10^{-6}	10^{-3}
	to third parties, member of public ashore	10^{-5}	10^{-3}
	target values for new ships ⁵⁾	10^{-6}	Above values to be reduced by one order of magnitude
Societal Risk	to groups of above persons	To be derived by using economic parameters as per MSC 72/16	

Table 1: Quantitative risk evaluation upper and lower bounds

⁵⁾ While it is recommended that the maximum tolerable criteria for Individual Risk as listed should apply to all ships, it is proposed, in accordance with MSC 72/16, that for comprehensive FSA studies for new ships a more demanding target is appropriate.

5.3.2 It is important to understand, that the above risk acceptance criteria always refer to the total risk to the individual and/or group of persons. Total risk means the sum of all risks that, e.g. a person on board a ship is exposed to. The total risk therefore would contain risks from hazards such as fire, collision, etc. There is no criterion available to determine the acceptability of specific hazards. Therefore, the above criteria can be used to assess the acceptability of the total risk on being, e.g. on a passenger ship, but not for assessing the specific risk of dying on a passenger ship due to a fire.

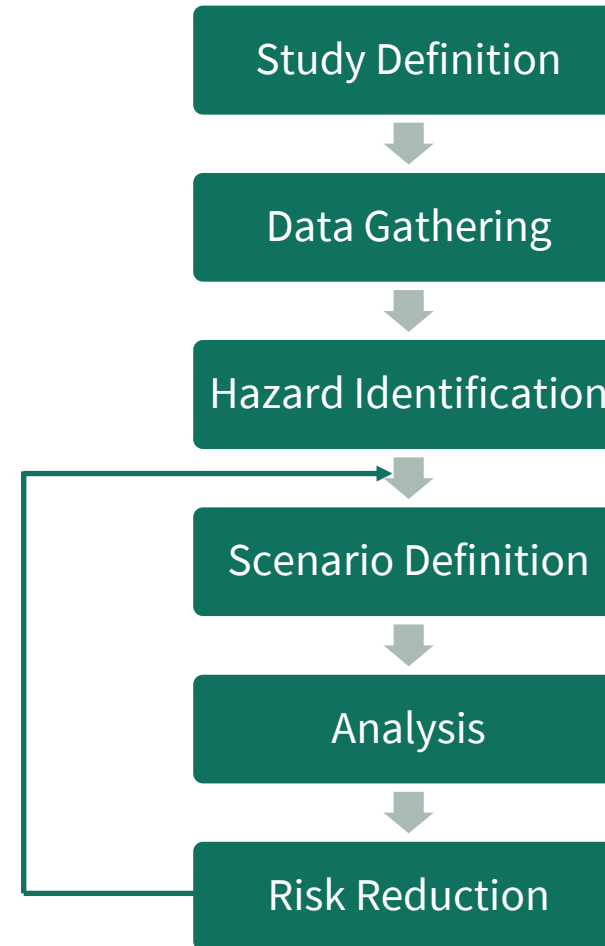
QRA

QRA flowchart

We used Quantitative Risk Assessment (QRA) to get numerical estimates of crew risk

QRA has been used for a long time in the Offshore Oil & Gas and Onshore Process industries but its use in Marine is relatively new

It is very detailed and can give useful insights into the main factors driving the risk



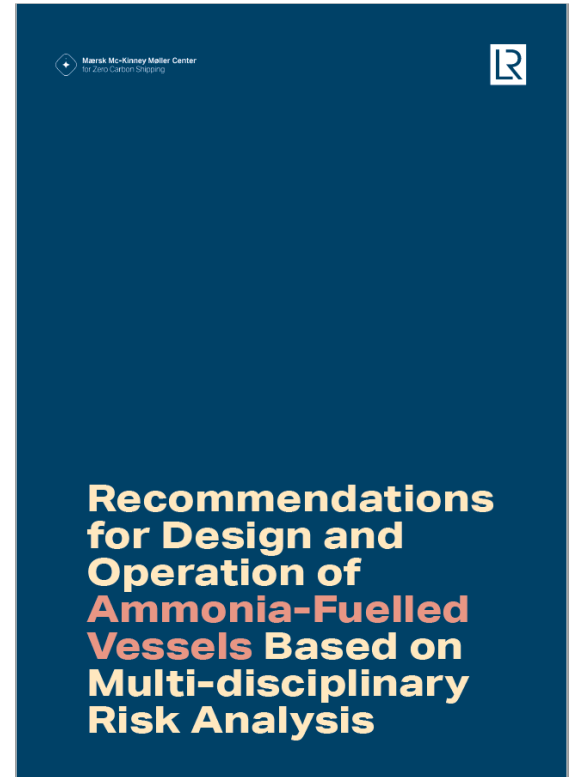
Application of QRA

Joint project with MMMCZCS, Maersk, MAN ES, NYK, MHI, Total Energy, BP, Stolt, Cargill, V.Group, ABS and CF Industries.

QRA for three different vessel types. Findings:

- Store at a lower temperature
- Access to and length of time spent in spaces should be minimised, monitored and controlled
- Divide the fuel preparation room into two or more separate rooms
- Ventilation outlets from spaces containing ammonia equipment should be placed in a safe location
- Multiple sensors of different types to detect ammonia leaks should be installed

QRA methodology is currently being applied to Castor Initiative project.



Conclusions

QRA is being used to understand risk where reference to experience is not possible

The results can help us:

- See whether the risk is within tolerable limits
- Understand what the main risk drivers are
- Focus risk mitigation efforts
- Compare design or risk mitigation options – different arrangements, storage conditions, even fuels

Ultimately the results can also inform development of guidelines and rules



Thank you

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Foundation

The **Lloyd's Register Maritime Decarbonisation Hub** is a joint initiative between Lloyd's Register Group and Foundation.

The mission of the Lloyd's Register Maritime Decarbonisation Hub is to accelerate the sustainable decarbonisation of the maritime industry.

www.maritimedecarbonisationhub.org