

Scoping exercise relating to the future evaluation of evidence underpinning decision-making in the shipping industry

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Executive Summary

Introduction

The report describes the finding of a scoping exercise which aimed to inform a research design for the future evaluation of evidence which underpins decision-making in the shipping industry. The evaluation was funded by Lloyd's Register Foundation to further understanding of how evidence is being used within maritime and whether products within the sector are evidence based, following an open call for proposals.

Methods

Two approaches were used: a 'horizontally segmented approach' and a 'vertically segmented approach'. The horizontally segmented approach reviewed the decision-making that takes place across different layers of the industry, whereas the vertically segmented approach focused on how organisations made decisions in relation to safety about two specific pieces of equipment, lifeboats and steering gear.

Problems encountered

- The time needed to read lengthy documents in order to establish whether or not they related to decisions and referred to evidence
- Language limitations as not all website materials were available in English
- Access limitations as some websites provided limited access to non-members
- Limitations in relation to the efficiency of search engines
- Difficulties identifying potential interviewees with the necessary expertise
- Difficulties recruiting interviewees

Findings: The kinds of evidence underpinning decision-making in shipping, its location and accessibility

1. The IMO that dominates decision-making across the maritime sector.
2. It is rare for IMO resolutions to contain references to specific underpinning evidence and where evidence is alluded to it is not always possible to access.
3. Documents associated with MSC sessions, MSC working groups, and sub-committees (SSE and SDC) could sometimes be linked to decisions which contributed to the shaping of resolutions. However, this was frequently not the case.
4. Forty-four percent of the documents which could be linked to decisions gave no indication of underpinning evidence/referenced documents.
5. Within sub-committee documents links to decisions were easier to establish. Nine documents which were identified as being linked to decisions all gave enough detail so that underpinning evidence or referenced documents could be accessed.
6. In relation to the vertically segmented approach 31 documents could be linked to a decision or recommendation, and 25 mentioned evidence although it was not possible to identify and access this.

Policy-making at national maritime administrations

National maritime administrations write and modify national legislation to incorporate international regulations.

Whilst they are unusual, the horizontal approach to the research identified some examples of local decisions by the UK MCA which went further than international standards and regulations. It was possible to identify traceable evidence underpinning such decisions in three cases and untraceable evidence in four cases. The vertical approach to the research identified five decisions by Norway which went beyond international regulations on lifeboats. In four of these cases underpinning evidence was referenced but proved untraceable.

No cases where a decision to make or change policy/guidance was found for the Panama Maritime Administration using a horizontal approach or for Malta using a vertical approach.

Policy-making at company level

Changes in regulation drive changes in company practice. Incidents across their own fleets were a significant driver of change in relation to safety-related practice. Incidents in the world fleet and reports of specific problems in trade publications and by P&I clubs also stimulated change. Academic research did not play a significant part in informing change within companies.

Influencing debates and actions: EMSA

EMSA's role is advisory and it does not exert a significant influence at IMO. However, it does feed information and guidance into the maritime field, and this may act to influence debates and actions in the maritime domain.

The evidence and reference documents which underpin EMSA's technical reports, studies and plans is overwhelmingly identifiable and largely consists of practical tests, expert opinion, accident reports and statistics, safety assessments/gap analyses, statistics, academic outputs, in house studies and experience, industry reports, national regulations and IMO documents.

Influencing debates and actions: The Nautical Institute (NI)

The NI does not make policy but seeks to influence policy through its contributions to debates at IMO and via a number of publications that it produces for the sector. Where it was possible to trace and access evidence in these publications, we most frequently found academic papers, accident investigation reports, industry outputs and expert opinions. Evidence which was hinted at but was not accessible, took the form of academic papers, studies, industry papers, accident statistics, industry guidance, industry reports and regulations/codes.

Influencing debates and actions: Nautilus International

The union works to 'bring critically important subjects to the attention of authorities at national and global level' and it is involved in 'shaping the standards that govern the way the industry works, health and safety, and the working conditions of employees'.

Most published documents did not make reference to evidence. However, where evidence was mentioned and where it was traceable it took the form of industry surveys/feedback and academic reports. Where untraceable/inaccessible evidence was mentioned this included surveys/feedback, expert opinion, industry guidelines, Industry reports or national safety notices/guidance.

Influencing debates and actions: INTERTANKO

INTERTANKO aspires to influence policy at a high level. The research identified few relevant documents in the public domain. Of eight relevant documents that could be accessed two contained evidence or referenced documents that could be traced/ accessed, and five mentioned evidence that was not traceable/accessable.

Summary of the kinds of evidence underpinning decision-making in shipping and the forms they appear in

There is an overall lack of identifiable evidence underpinning documents relating to decision-making in the shipping industry. This is a challenge for academics seeking to evaluate the quality of the evidence which underpins decision-making in the shipping industry and it may have an adverse impact on decision making itself.

The findings give rise to the following hypotheses and tentative conclusions which might usefully be explored in the future.

- At IMO, flag state representatives would benefit from the inclusion of references to supporting evidence (of any kind) when considering decisions before them. This would assist them in understanding the basis for new proposals and it would allow them to follow-up on the evidence themselves so that they can arrive at better informed decisions.
- The IMO does not generate regulations based upon accounts of best practice but seeks to establish minimum acceptable standards taking account of the economic and social context of the shipping industry. In this context, much academic research relating to best practice and the potential for improvement via proactive change is rendered redundant and the evidence drawn upon is normally related to industry experience (of accidents for example) and expertise. Industry experience and expertise relating to accidents is self-evidently reactive in nature¹.
- Industry bodies representing seafarers and professional standards draw upon academic evidence and the evidence provided by practitioners and seek to influence decision-makers by shaping debates that may impact on regulatory agendas. However, their focus is oriented towards establishing best practice which does not often overlap with the establishment of minimum acceptable regulatory standards.
- Academic work may exert a significant influence on debates about best practice in the maritime field without being transparently identified as doing so. The value of much academic work in shaping policy agendas is likely to be hidden.

The advantages and disadvantages of the horizontally segmented and vertically segmented approaches to the identification of documents where decisions have been made at IMO

The vertically segmented approach was much more successful in turning up documents relating to a specific topic such as lifeboats than the horizontal segmented approach. This was because vertical searches can pick up documents across a far longer time-period than searches which are limited to sessions at IMO or shorter time-periods. However, the horizontal search picked up more documents overall as they include all kinds of safety-related decisions, not only those relating to specific piece of equipment.

¹ There is no intention here to elevate one kind of 'knowledge' (e.g. from academic studies) over another (e.g. from experience of accidents).

The advantages and disadvantages of horizontally and vertically segmented approaches to the identification of documents on the websites of organisations which do not make policy/practice decisions, but which may publish documents that exert an influence on future decisions (Nautical Institute, INTERTANKO, Nautilus International)

Many documents relating to lifeboats and steering gear were only picked up by vertical searches. This suggests that for these organisations vertical searches produce better results than horizontal searches

Overview of advantages and disadvantages of the vertical and horizontal approaches

Both approaches to searching for evidence within relevant documents had pros and cons. Searching using a horizontal approach provides the basis for a more systematic review because it avoids difficulties that may be associated with the search engines of different websites. However, searches made using a vertical approach have the advantage of being able to identify documents that appear in any part of a website and at any point in time.

Specific recommendations for ways to undertake the future evaluation of evidence and the limitations likely to be associated with this.

- Any future evaluation should focus on decision-making at IMO.
- To conduct a substantial review a very large number of documents should be accessed and read.
- A minimum of five sessions of the MSC should be incorporated into a larger study.
- A vertical review should be included of IMO documents relating to a 'hot' topic.
- A review of the scale required would necessitate two full-time staff working for two years.
- A review of evidence underpinning decision-making in the shipping industry may yield disappointingly sparse results.

Specific recommendations of an outline nature with regard to methods of evidence classification and evaluation

The diverse nature of the evidence which is drawn upon by the IMO and Maritime Administrations and by bodies which seek to influence decision-making in the shipping industry poses challenges to traditional methods of evidence evaluation. Current methods would need to be adapted and expanded to try to capture the value and robustness of evidence in this sector, requiring separate resource of a substantial nature.

Specific recommendations relating to the expansion of the exercise to allow it to include operational shipboard personnel

A case study approach using between four and six different companies would be advisable.

Such an exercise is unlikely to yield evidence that conforms to standards of peer-reviewed academic research. Evaluation standards and protocols for non-traditional evidence used in decision-making in the sector would need to be developed.

Background

The aim of this scoping exercise is to develop and inform a research design for the future evaluation of the kinds of evidence which underpins decision-making in the shipping industry. The evaluation was funded by Lloyd's Register Foundation to further understanding of how evidence is being used within maritime and whether products within the sector are evidence based, following an open call for proposals.

The scoping exercise was designed to meet the following objectives:

1. To ascertain if it is possible to identify the underpinning evidence relating to the development of safety-related policy in the sector via an examination of publicly available documentation?
2. To ascertain if it is possible to identify decision-makers within organisations such as maritime administrations who are willing to participate in interviews?
3. To ascertain whether it is possible for decision-makers to pinpoint evidence which has been drawn upon with clarity or whether the decision-making process is too opaque/diffuse for them to do so?
4. To ascertain whether individuals are able to provide documentary evidence attesting to the veracity of claims about the use of underpinning evidence in decision-making.
5. To establish whether a horizontally segmented approach, or a vertically segmented approach is preferable in relation to the further study of these issues².

Planned Methods

Two approaches were planned which are referred to hitherto as 'the horizontally segmented approach' and 'the vertically segmented approach'.

The planned Horizontally Segmented Approach

The planned horizontally segmented approach would focus on the following organisations:

- International Maritime Organization (IMO)
- European Maritime Safety Agency (EMSA)
- Two national maritime administrations: Panama Maritime Authority (PMA) and UK Maritime and Coastguard Agency (MCA)
- Two ship operators
- INTERTANKO
- The Nautical Institute
- Nautilus International

² The horizontally segmented approach will review the decision-making that takes place across each layer of the industry, for example decisions taken by international regulators.

The vertically segmented approach will use examples of equipment to search for and focus upon decisions about safety.

Focussing upon the safety of life at sea, the following set of overall questions would be adapted as appropriate to each organisation:

- What documentation relating to decision-making in their organisation (in the field of safety) is in the public domain?
- What evidence is referenced as underpinning safety-related decisions in their publicly accessible documentation?
- Who are the decision-makers with regard to safety-related matters, and can they be contacted?
- What kinds of decisions are made in the respective organisations?
- How are decisions made?
- What kind of evidence is drawn upon in decision-making and how is this used and presented?
- Are examples of the evidence used publicly available and if so in what form?
- Might examples of the evidence used be privately available and what would need to be done to secure access?

These questions would be answered following the conduct of desk-based reviews of materials in the public domain and interviews with members of the identified organisations.

The Planned Vertically Segmented Approach

The planned vertically segmented approach would consider two examples of equipment about which there are a range of safety regulations, namely lifeboats and steering gear.

With regard to each piece of equipment, we would consider decision-making in the same kinds of organisations and ask the same questions as asked in the horizontally segmented approach previously outlined.

The questions would be addressed via both desk-based reviews of documentation and interviews.

Overall, desk-based research relating to nine organisations would be carried out. This would be augmented by intelligence gained from a maximum of 22 interviewees.

Methods in practice

Desktop Reviews

The websites for IMO, EMSA, UK MCA, PMA, INTERTANKO, The Nautical Institute and Nautilus International, were searched for relevant documents.

The Horizontal Review was carried out first for each organisation and this concentrated on locating and interrogating documents focussed upon decisions relating to safety at sea. The website for the IMO is substantial and after familiarisation with the overall contents and organisation of the IMO website, a decision was made to consider: Maritime Safety Committee (MSC) documents relating to one session of the IMO (session 102); Working group meeting documents for session 102; MSC meeting summaries for a period of three years (i.e. 2018-2020); maritime resolutions over a period

of five years (i.e. 2015-2019); MSC sub-committee Meeting documents on Ship Systems and Equipment (SSE) and on Ship Design and Construction (SDC).

The Vertical Review involved searching the websites for each organisation using their search engines with words relating to, and including, 'lifeboat' and 'steering gear' (see Appendix 1 for complete list of search terms used) and additionally making a visual search for references to the equipment in areas of the website that appeared likely to contain relevant references. Table 1 summarises the searches made.

Table 1: The websites examined for each agency during the horizontal and vertical reviews

Agency	Website	
	Horizontal Review	Vertical Review
International Maritime Organization (IMO)	<p>MSC Committee Meeting Documents (Session 102) https://docs.imo.org/Category.aspx?cid=49&session=102</p> <p>Working Group Meeting Documents (Session 102) https://docs.imo.org/Category.aspx?cid=49&session=102</p> <p>MSC Meeting Summaries – 3 years of https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/MSC-Default.aspx</p> <p>Maritime Resolutions – 5 years of https://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Pages/MSC.aspx</p> <p>MSC Sub-Committee Meeting Documents Sub-Committee on Ship Systems & Equipment (SSE) https://docs.imo.org/Category.aspx?cid=651&session=7</p> <p>Sub-Committee on Ship Design & Construction (SDC) – S7 https://docs.imo.org/Category.aspx?cid=649&session=7</p>	IMO Website https://www.imo.org/
EMSA	http://www.emsa.europa.eu/	No vertical desktop review as EMSA do not make decisions
Maritime Administrations	<p>The UK Maritime and Coastguard Agency (MCA) website <i>(part of the UK Government website https://www.gov.uk)</i> https://www.gov.uk/government/organisations/maritime-and-coastguard-agency</p> <p>Panama Maritime Authority (PMA) Website https://amp.gob.pa/</p>	Malta Maritime Administration https://www.transport.gov.mt/maritime-40 Norwegian Maritime Administration https://www.sdir.no/en/
Ship Operators	No desktop review	No desktop review
The Nautical Institute	https://www.nautinst.org/	https://www.nautinst.org/
INTERTANKO	https://www.intertanko.com/	https://www.intertanko.com/
Nautilus International	https://www.nautilusint.org/en/	https://www.nautilusint.org/en/

All documents located in these ways were reviewed and relevant details were recorded in a spreadsheet which documented:

- Document name
- Weblink
- Document description
- Decision-making status (decision made or not)
- Evidence which is referenced as underpinning decision or references to underpinning documents which might contain evidence
- Location of evidence where it can be located
- Brief description of evidence
- Whether or not the evidence provides sufficient information to allow for an evaluation

Interviews

In relation to the Horizontally segmented review 10 semi-structured interviews were carried out (see Table Two). In relation to the Vertically segmented review six semi-structured interviews were conducted. A further three semi-structured interviews which were not specific to either the horizontal or the vertical approach were undertaken with organisations which were too small to be likely to furnish us with interviewees with the required specialisms (these comprised Nautical Institute, Nautilus International, INTERTANKO). All interviews were recorded and were transcribed prior to analysis.

Deviations from the planned approach

Following the desk review of the EMSA website and the interviews undertaken as part of the horizontally segmented approach to the exercise, we determined that EMSA does not have a decision-making role with regard to safety regulations. As a result, we did not undertake the interviews on steering gear and lifeboats that were originally planned for EMSA as part of the vertically segmented element of the scoping exercise. A further three interviews which had been planned as part of the vertically segmented part of the exercise were abandoned after repeated attempts to make contact with the maritime administrations and the company concerned, were unsuccessful. In contrast, we also conducted some additional interviews. One additional interview was carried out as part of the horizontally segmented analysis of IMO and one additional interview was carried out with a maritime administration in relation to lifeboats as part the vertically segmented approach to the exercise. Finally, a degree of flexibility was necessary in order to benefit from the knowledge of interviewees. Sometimes interviewees lacked the detailed knowledge that would allow them to answer questions about decisions concerning equipment (as part of the vertically segmented approach), for example, so we responded by switching to asking the more general questions which were part of the horizontally segmented approach. Please see Table Two for details.

Table 2: Interviews conducted at each of the organizations for both the horizontal and vertical approaches

Organisation	Person		
	Horizontal	Vertical	
		Steering Gear	Lifeboats
IMO	1. Director of the IMO’s Maritime Safety Committee 2. An NGO Representative on MSC (from the Oil Companies International Marine Forum [OCIMF]) 3. A Maritime Administration representative (Norway) 4. Former UAE IMO Consultant PLANNED TOTAL: 3	1. Maritime Administration Representative at the IMO (Marshall Islands) ¹ PLANNED TOTAL: 1	1. Maritime Administration Representative at the IMO (Denmark) ² 2. Maritime Administration Representative at the IMO, Special adviser (Denmark) (This was an additional interview) PLANNED TOTAL: 1
EMSA	1. Senior Project Officer 2. Senior Project Officer - Safety, Security and Surveillance Department PLANNED TOTAL: 2	Vertical Interviews were not undertaken as EMSA do not make decisions. PLANNED TOTAL: 2	
Maritime Administrations	1. UK MCA - Human Element Seafarer Safety and Health Manager 2. Panama Maritime Administration- Director General of Merchant Marine PLANNED TOTAL: 2	1. Norwegian Maritime Administration UNABLE TO SECURE AN INTERVIEW PLANNED TOTAL: 1	1. Maltese Maritime Administration UNABLE TO SECURE AN INTERVIEW PLANNED TOTAL: 1
Ship Operators	1. Teekay Shipping- Director, Quality Assurance & HSE Services 2. Oldendorff Carriers - Director ISM & QSE PLANNED TOTAL: 2	1. Hapag-Lloyd AG UNABLE TO SECURE AN INTERVIEW 2. Maersk Line - Marine Risk & Safety Lead ¹ 3. TCC Shipping UNABLE TO SECURE AN INTERVIEW PLANNED TOTAL: 2	1. Stena Line Ltd - Port and Marine Risk Manager DPA/CSO 2. THOME - Group Marine & Safety Manager ² PLANNED TOTAL: 2
The Nautical Institute	Chief Executive Officer and Director of Projects ³ PLANNED TOTAL: 1		
INTERTANKO	Marine Director ³ PLANNED TOTAL: 1		
Nautilus International	Professional and Technical Officer ³ PLANNED TOTAL: 1		

¹ Despite discussion during emails about the nature of the interviews, the interviewee did not have specific knowledge about decisions relation to ‘steering gear’ and thus answered horizontal questions instead.

² The interviewee did not have specific knowledge about decisions relation to ‘lifeboats’ and thus answered horizontal questions instead.

³ The horizontal and vertical interviews were combined as planned due to the relatively small size of the organisation.

Problems encountered and how these were handled

A number of challenges were encountered in the course of the exercise.

To meet our objectives we first needed to identify where decision-making occurs within organisations and to do this it was necessary to carefully read a number of lengthy, and often highly technical, documents³. Within these documents we identified references to a very wide range of further documents, and it was necessary to make decisions about which of these constituted evidence and which did not (see Appendices 2 and 3). This process was more lengthy and more complex than we had anticipated prior to commencing the exercise.

In some cases, we were unable to fully interrogate a website due to the limitations of language. This was particularly the case in relation to the PMA website. Many subsections of the website and many of the documents published on it, were only available in Spanish. We also faced limitations of access to documents related to membership status. This applied to IMO, Nautilus, The Nautical Institute and INTERTANKO. In some cases the protected documents seemed unlikely to be of relevance to our purpose (e.g. on the Nautilus website we were unable to access the parts of the website offering member services). In other cases, such as INTERTANKO we endeavoured to explore the issues as carefully as possible at interview.

Access to documents placed on websites could also be hampered by the limitations of inbuilt search engines. These were relevant when undertaking searches as part of the vertically segmented desk reviews and did not impact on horizontally segmented desk reviews.

There were also emergent challenges associated with locating individuals who were willing and able to be interviewed as part of the vertically segmented element of the study. Two interviews (one with Marshall Islands scheduled for 'steering gear' and one with Denmark scheduled for 'lifeboats') had to be changed to 'horizontal approach' interviews when it transpired that despite attempts at clear prior communication the individuals concerned could not answer the specialist questions relating to the respective equipment. In the case of Denmark we organised an additional interview with the special advisor at the IMO for the Danish Maritime Authority who was able to handle questions on lifeboats. We had similar difficulties with shipping companies and changed two interviews that should have been part of the vertical element of the study into more general interviews once it became apparent that interviewees lacked the requisite knowledge of lifeboats and steering gear.

We were unable to get a response from either Malta or Norway following requests for interview. After multiple follow-ups we enlisted assistance from personnel at Lloyd's Register Foundation but the contacts they were able to pass on to us also failed to respond to our requests. We were also unable to get a response from one of the shipping companies that we approached.

³ We also drew on intelligence garnered from interviewees. However, to maximise the usefulness of interviews they were not undertaken right at the beginning of the process but only after we had developed sufficient knowledge to be able to meaningfully engage with the interviewees and their answers.

Findings: The kinds of evidence underpinning decision-making in shipping, its location and accessibility

The international shipping industry is regulated by the International Maritime Organization and the research undertaken as part of the scoping exercise confirmed the extent to which the IMO dominates decision-making across the sector. Due to the drivers of competition amongst flag states and companies, the sector shows a marked tendency to work to regulatory standards rather than seeking to exceed them. Thus, it was at IMO that the bulk of decisions were taken.

Polycymaking at the IMO

The identification of evidence underpinning a decision, or referenced documents underpinning a decision, presupposes that documents relating to decisions can be identified and are in the public domain. In relation to the IMO, the obvious starting point is to examine documents describing resolutions. These are in the public domain and are both the product of decisions and subject to future decision making (resolutions must be adopted before they come into force). However, the scoping exercise revealed that it is rare for IMO resolutions to contain references to specific underpinning evidence and where evidence is alluded to it is not always possible to access. In almost a quarter of the cases we examined we found that there was no indication of the evidence that an IMO resolution was based upon and in more than two thirds of cases we were unable to trace or access evidence or documents that were alluded to or referenced. Please see Table Three.

Table 3: Summary of findings from the horizontally segmented IMO desktop review

	Documents where a decision or recommendation has been made	Documents where the evidence or reference behind a decision is <u>identified</u> and <u>can be accessed</u>	Documents where the evidence or reference behind a decision is <u>identified</u> but <u>cannot be accessed</u>	Documents where the is <u>no indication of evidence</u> or a reference behind a decision	Total documents examined
MSC Resolutions⁴	46	4 (8.7%)	31 (67.4%)	11 (23.9%)	46
MSC Session 102 Documents	27	9 (33.3%)	6 (22.2%)	12 (44.4%)	171
MSC Session 102 Working Group Documents	2	2 (100.0%)			15
SSE Sub-Committee Docs⁵	9	9 (100.0%)			32
SDC Sub-Committee Docs	1			1 (100.0%)	2

⁴ This is where decisions can be seen to be made, although the evidence for this is not always there.

⁵ This is where evidence can be seen in the sub-committees.

Documents associated with MSC sessions, MSC working groups, and sub-committees (SSE and SDC) can sometimes be linked to decisions which contribute to the shaping of resolutions. However, this is frequently not the case. Of 171 MSC session documents examined, only 27 could be linked to decisions. Similarly, in the case of MSC session documents only 2 of 15 could be connected to decisions. However, in subcommittees links to decisions were easier to establish.

In the SSE subcommittee the nine documents (of a total of 32 which were examined) which were identified as linking to decisions all gave details of underpinning evidence or referenced documents that could be identified and accessed. Similarly, the two documents which could be linked to decisions in the MSC session 102 working group (of a total of 15) both gave details of underpinning evidence/referenced documents which could be identified and accessed. However, 44% of the MSC 102 session documents which could be linked to decisions did not give any indication of any underpinning evidence/referenced documents and 22% of them gave a hint that there was underpinning evidence or there were referenced documents, but this was untraceable and impossible to access. The single document which was linked to a decision from the SDC subcommittee did not make any reference to underpinning evidence.

When we undertook a search of the IMO website using search terms relating to lifeboats and steering gear as part of a vertically segmented approach to the scoping exercise, we were able to locate 48 documents in total. Of these, 31 could be linked to a decision or recommendation. In none of these cases was it possible to identify and access underpinning evidence/referenced documents. However, in 81% of cases underpinning evidence/referenced documents were alluded to but were not traceable or accessible (please see Table 4).

Table 4: Summary of findings from the vertically segmented IMO desktop review

	Documents where a decision, or recommendation has been made	Documents where the evidence behind a decision <u>is identified and can be accessed</u>	Documents where the evidence behind a decision <u>is identified but cannot be accessed</u>	Documents where there is <u>no indication of evidence or a reference</u> behind a decision	Total documents examined
Lifeboats	12	0	7 (58.3%)	5 41.7%)	24
Steering Gear	19	0	18 (94.7%)	1 (5.3%)	24
Total	31	0	25 (80.6%)	6 (19.4%)	48

In relation to decisions made at IMO we found that the basis for decisions referenced in documents relating to MSC resolutions tended to be other IMO documents. This applied to both documents that could be accessed and those which could not be accessed (see Tables 5 and 6). Amongst the references that could not be accessed however there were also mentions of evidence in the form of academic work, accident reports, accident statistics, in-house reviews/studies/experience and industry reports/papers (see Table 6).

Table 5: Accessible documents referenced in MSC resolutions grouped by type as part of the horizontal review

Evidence/Reference Type (references which were not evidence shown in blue)	Frequency
Main industry regulations/codes	2 (50.0%)
IMO main committee recommendations/decisions	1 (25.0%)
Marine industry guidelines	1 (25.0%)
<i>Total</i>	4 (100.0%)

Table 6: Inaccessible documents referenced in MSC resolutions grouped by type⁶ as part of the horizontal review

Evidence/Reference Type (references which are not evidence shown in blue)	Frequency
IMO sub-committee (and workgroups) recommendations/decisions	26 (68.4%)
IMO main committee recommendations/decisions	3 (7.9%)
Academic paper/article/literature review/book	1 (2.6%)
Accident investigation/report	1 (2.6%)
Accident statistics	1 (2.6%)
IMO circulars	1 (2.6%)
Industry paper/article/literature review/book	1 (2.6%)
Industry report/research	1 (2.6%)
In-house experience	1 (2.6%)
In-house review	1 (2.6%)
In-house studies/reports	1 (2.6%)
<i>Total</i>	38 (100.0%)

The basis for decisions referenced in MSC session documents which could be accessed consisted of in-house reports, practical tests/drills, expert consultation/opinion, IMO circulars and industry standards (see Table 7).

Table 7: Accessible documents referenced in MSC session documents grouped by type as part of the horizontal review (documents which are not evidence but which were referenced as underpinning a decision or action are shown in blue)

Evidence/Reference Type (references which are not evidence shown in blue)	Frequency
Gold-based standards (GBS) audits (termed 'In-house studies/reports')	4 (44.4%)
Practical testing/drills	2 (22.2%)
Expert/key stakeholders consultation/opinion	1 (11.1%)
IMO circulars	1 (11.1%)
Industry standards	1 (11.1%)
<i>Total</i>	9 (100.0%)

⁶ NB there were 31 documents where evidence/references were mentioned but in some documents there was more than one document mentioned which is why the table total exceeds 31.

The inaccessible documents referenced in MSC session documents included industry reports/research, accident investigation reports, expert consultations, IMO sub-committee recommendations, in house experience, national reports and IMO working group papers (see Table 8).

Table 8: Inaccessible documents referenced in MSC session documents grouped by type⁷ as part of the horizontal review

Evidence/Reference Type (references which are not evidence shown in blue)	Frequency
Industry report/research	3 (33.3%)
Accident investigation/report	1 (11.1%)
Expert/key stakeholders consultation/opinion	1 (11.1%)
IMO sub-committee (and workgroups) recommendations/decisions	1 (11.1%)
In-house experience	1 (11.1%)
National Report	1 (11.1%)
Working Group Papers	1 (11.1%)
<i>Total</i>	9 (100.0%)

It was only possible to identify two IMO working group documents which referenced evidence but in both cases this could be accessed. The evidence included expert consultation and formal safety assessments/gap analysis and more than one source of evidence was cited in each case (see Table 9).

Table 9: Accessible evidence referenced in IMO working documents grouped by type as part of the horizontal review

Evidence Type	Frequency
Expert/key stakeholders consultation/opinion	2 (50.0%)
Formal safety assessments/gap analysis	2 (50.0%)
<i>Total</i>	4 (100.0%)

Finally, it was possible to identify documents underpinning decisions in seven documents relating to IMO subcommittees related to MSC. In all cases the documents were inaccessible. They included IMO committee, sub-committee, and working group recommendations, academic work, and in house studies/reports (see Table 10).

⁷ See previous footnote

Table 10: Inaccessible evidence, or documents, referenced in IMO subcommittee documents grouped by type⁸ (horizontal review)

Evidence/Reference Type (References which are not evidence shown in blue)	Frequency
IMO sub-committee (and workgroups) recommendations/decisions	4 (40.0%)
Academic paper/article/literature review/book	2 (20.0%)
IMO main committee recommendations/decisions	2 (20.0%)
Academic report/research	1 (10.0%)
In-house studies/reports	1 (10.0%)
<i>Total</i>	10 (100.0%)

The vertically segmented approach to the scoping exercise focussed upon two pieces of equipment – lifeboats and steering gear. The review identified 31 documents associated with a decision and 25 of these mentioned evidence, or referenced documents, which could not be accessed (see Table 4). There were no cases of accessible evidence/referenced documents mentioned in these cases. Most of the documents which were mentioned were IMO committee and sub-committee recommendations⁹ but there was one mention of accident statistics found in relation to steering gear and there were three public consultations, along with an example of manufacturer testing/guidance, found in relation to lifeboats (see Tables 11 and 12).

Table 11: Inaccessible evidence or documents referenced in documents relating to steering gear, grouped by type

Evidence Type (References which are not evidence shown in blue)	Frequency
IMO main committee recommendations/decisions	15 (75.0%)
IMO sub-committee (and workgroups) recommendations/decisions	4 (20.0%)
Accident statistics	1 (5.0%)
<i>Total</i>	20 (100.0%)

Table 12: Inaccessible documents referenced in documents relating to lifeboats, grouped by type

Evidence Type (References which are not evidence shown in blue)	Frequency
IMO sub-committee (and workgroups) recommendations/decisions	5 (55.5%)
IMO main committee recommendations/decisions	4 (44.4%)
Public consultation	3 (23.1%)
Manufacturer testing/guidance	1 (7.7%)
<i>Total</i>	13 (100.0%)

⁸ NB some documents mentioned more than one source of evidence or referenced more than one document.

⁹ NB the reason why the IMO documents which were referenced could not be identified or accessed is that references were made at a very general level and no information was provided which would enable the specific underlying document to be found.

Polymaking at national maritime administrations

A significant task for the maritime administrations included in the scoping exercise, was to write or modify national legislation to incorporate the provisions of international regulations which had been adopted by their national governments. An interviewee explained that “Basically the IMO in terms of regulations is the centre, right? Once a discussion has been completed over there, that’s the bible, right? We have to take it; we have to implement it”. Furthermore, as interviewees more generally noted there is not a lot of incentive for maritime administrations to exceed internationally agreed standards established at IMO.

However, in the course of the horizontally segmented analysis it was possible to identify some examples of local decisions that were made by the MCA independently of international standards and regulations. For example, after consultation with local unions, tug owners and ports, modifications were made to a Marine Guidance Notice relating to safe mooring practices for workboats and tugs. We were advised by officials at MCA that documents outlining such changes in policy and practice do not usually cite underlying evidence for change. In relation to the MCA, the horizontal review identified seven cases where a decision to make or change policy/guidance had been made. However, there were no cases identified for Panama (see Table 13).

Table 13: Summary of findings from the horizontally segmented Maritime Administration desktop reviews – UK and Panama

	Documents where a decision or recommendation has been made	Documents where the evidence or references behind a decision <u>is identified and can be accessed</u>	Documents where the evidence or references behind a decision <u>is identified but cannot be accessed</u>	Documents where there is <u>no indication of evidence</u> or a reference behind a decision	Total documents examined
UK					
Working at Sea: training and certification	2	1 (50.0%)	1 (50.0%)	0	9
Ships and Cargoes	2	2 (100.0%)	0	0	26
Marine Notices	1	0	1 (100.0%)	0	18
All MCA services & information	2	0	2 (100.0%)	0	6
<i>UK Total</i>	7	3 (42.9%)	4 (42.9%)	0	59
Panama					
<i>Total</i>	0	0	0	0	8

In three cases it was possible to identify traceable evidence underpinning decisions taken to alter or introduce new policy/practice in the UK. Evidence included academic works, industry surveys or feedback and public consultation (see Table 14). In four cases, it was possible to identify evidence or references to documents that were inaccessible or untraceable, but which were identified in documentation as underpinning decisions. These references included accident investigation reports and statistics, academic outputs, safety assessment or gap analysis, inspection findings, public consultations and IMO sub-committee recommendations (see Table 15).

Table 14: Accessible evidence underpinning UK MCA decisions grouped by type

Evidence Type	Frequency
Academic paper/article/literature review/book	2 (40.0%)
Industry survey/feedback	2 (40.0%)
Public consultation	1 (20.0%)
<i>Total</i>	5 (100.0%)

Table 15: Inaccessible evidence or documents underpinning UK MCA decisions grouped by type

Evidence Type (References which are not evidence shown in blue)	Frequency
Accident investigation/report	2 (22.2%)
Accident statistics	2 (22.2%)
Academic report/research	1 (11.1%)
Formal safety assessments/gap analysis	1 (11.1%)
IMO sub-committee (and workgroups) recommendations/decisions	1 (11.1%)
Onboard inspection findings	1 (11.1%)
Public consultation	1 (11.1%)
<i>Total</i>	9 (100.0%)

In relation to the vertically segmented approach to the scoping exercise, we examined the websites of the maritime administrations in Malta and Norway. We did not find evidence of decisions made independently of international regulations made by Malta but we did find five examples of decisions which were made by Norway in relation to the safety of lifeboats and their use (see Table 16).

Table 16: Summary of findings from the vertically segmented Maritime Administration desktop reviews – Norway and Malta

	Documents where a decision or recommendation has been made	Documents where the evidence or reference behind a decision <u>is identified</u> and <u>can be accessed</u>	Documents where the evidence or reference behind a decision <u>is identified</u> but <u>cannot be accessed</u>	Documents where the is <u>no indication of evidence</u> or a reference behind a decision	Total documents examined
Norway					
Lifeboats	5	0	4 (80.0%)	1 (20.0%)	17
Steering Gear	0	0	0	0	1
<i>Total</i>	5	0	4 (80.0%)	1 (20.0%)	18
Malta					
Lifeboats	0	0	0	0	8
Steering Gear	0	0	0	0	1
<i>Total</i>	0	0	0	0	9

In Norway, out of five cases where a decision was made to adjust policy/practice, there were four where underpinning evidence was referred to but was not traceable. In relation to one decision there was not any evidence or reference mentioned. The kind of evidence that was referred to included public consultation and manufacturer testing or guidance (see Table 17).

Table 17: Inaccessible evidence underpinning Norway decisions grouped by type

Evidence Type	Frequency
Public Consultation	3 (75.0%)
Manufacturer testing/guidance	1 (25.0%)
<i>Total</i>	4 (100.0%)

Policymaking at company level

The research design did not incorporate a desk review of company documentation relating to policymaking, as this is not normally in the public domain. However, five interviews were conducted with representatives from different companies, and these explored the internal decision-making processes of each company and the evidence that was used in arriving at decisions. Overall, it was taken as ‘given’, by company personnel, that changes in regulation drive changes in practice. However, all interviewees also pointed to the way in which incidents across their own fleets were a significant driver of change in relation to safety-related practice. Incidents in the world fleet and reports of specific problems in trade publications or communications from P&I clubs, and so forth, could also stimulate discussions of change in the companies where personnel were interviewed. The example of the *Ever Given* was offered by one company representative, who explained that after they had learnt about the incident in the Suez Canal, they conducted an internal review of all of their

relevant procedures and an associated risk assessment to try to make sure that the same thing could not happen in their fleet. Internal reviews of practice often involved personnel from a range of jobs within companies and often included serving sea-staff (such as captains). However, it was apparent that academic research did not play a significant part in stimulating or informing change within companies.

Influencing debates and actions: EMSA

The role of EMSA is to offer ‘technical expertise and operational assistance in maritime safety, security and pollution’¹⁰ to European Union (EU) institutions and national maritime administrations as well as European Free Trade Association (EFTA) coastal state maritime administrations. EMSA does not make decisions about policy. However, it does play a role in promoting best practice and very occasionally contributes to policymaking in contributing research, or other support, to the IMO. At interview an EMSA officer described how he had once been involved in research that had influenced an amendment of SOLAS at IMO. He was keen to point out, however, that “*the final result was a bit compromised; it wasn’t what, let’s say, research had suggested*”. Overall, EMSA’s role is advisory and although it does not appear to exert a significant influence at IMO it does feed information and guidance into the maritime field, and this may act to influence debates and actions in the maritime domain.

In contrast to IMO, the evidence and reference documents which underpin EMSA’s technical reports, studies and plans is overwhelmingly identifiable (see Table 18). It largely consists of practical tests, expert opinion, accident reports and statistics, safety assessments/gap analyses, statistics, academic outputs, in house studies and experience, industry reports, national regulations and IMO documents (see Table 19).

Table 18: Evidence Underpinning EMSA reports, studies and plans

	Documents where a decision or recommendation has been made	Documents where the evidence or reference behind a decision is <u>identified</u> and <u>can be accessed</u>	Documents where the evidence or reference behind a decision is <u>identified</u> but <u>cannot be accessed</u>	Documents where there is <u>no indication of evidence</u> or a reference behind a decision	Total documents looked at
Technical reports, studies and plans	47	43 (42.6%)	4 (8.5%)	0	50

¹⁰ https://european-union.europa.eu/institutions-law-budget/institutions-and-bodies/institutions-and-bodies-profiles/emsa_en (accessed 23/2/22)

Table 19: Accessible evidence and documents underlying EMSA’s technical reports, studies and plans, grouped by type

Evidence Type (References which are not evidence shown in blue)	Frequency
Practical testing/drills	10 (16.9%)
Expert/key stakeholders’ consultation/opinion	8 (13.6%)
Accident statistics	7 (11.9%)
Formal safety assessments/gap analysis	6 (10.2%)
Statistical information on STCW certification	5 (8.5%)
Academic paper/article/literature review/book	4 (6.8%)
National regulations/resolution	3 (5.1%)
Accident investigation/report	3 (5.1%)
In-house studies/reports	2 (3.4%)
In-house experience	2 (3.4%)
Industry paper/article/literature review/book	2 (3.4%)
Academic report/research	2 (3.4%)
Maritime traffic data	1 (1.7%)
Industry report/research	1 (1.7%)
IMO Regulations/Resolutions/Codes/Standards	1 (1.7%)
Fleet statistics	1 (1.7%)
Fleet information	1 (1.7%)
<i>Total</i>	59 (100.0%)

Influencing debates and actions: The Nautical Institute (NI)

The Nautical Institute is a non-governmental organisation (NGO) with consultative status at IMO. The stated aim of the NI is to ‘promote professionalism, best practice and safety throughout the maritime industry and to represent the interests of our members’¹¹. The NI does not make policy but seeks to influence policy through its contributions to debates at IMO and via a number of publications it produces for the sector. As part of the horizontally segmented element of the scoping exercise, the resource subsections of the website as well as four issues of the Alert bulletin were examined alongside one issue of the membership magazine ‘Seaways’. Both the ALERT bulletins and Seaways contain materials designed to influence policy and practice across the shipping industry.

¹¹ <https://www.nautinst.org/> (accessed 23/2/22)

Table 20: Summary of findings from Nautical Institute horizontally segmented review

	Articles where recommendations have been made	Articles where the evidence behind a recommendation is identified and can be accessed	Articles where the evidence behind a recommendation is identified but cannot be accessed	Articles where the is <u>no indication of evidence</u> behind a recommendation	Total articles looked at
Nautical Institute website (resources subsections)	9	4 (44.4%)	5 (55.6%)		34
ALERT!	18	6 (33.3%)	8 (44.4%)	4 (22.2%)	19
Seaways	2	2 (100.0%)			10
<i>Total</i>	29	12 (41.4%)	13 (44.8%)	4 (13.8%)	63

Where it was possible to trace and access evidence, we found that academic papers, accident investigation reports, industry outputs and expert opinions were most frequently cited in the NI publications we examined (please see Table 21).

Table 21: Accessible evidence/documents mentioned in resources subsections of NI website, ALERT bulletins and Seaways grouped by type (horizontally segmented review)

Evidence Type (References which are not evidence shown in blue)	Frequency
Academic report/research	3 (14.3%)
Accident investigation/report (anonymous/confidential)	3 (14.3%)
Industry report/research	3 (14.3%)
Academic paper/article/literature review/book	2 (9.5%)
Expert/key stakeholders consultation/opinion	2 (9.5%)
Accident investigation/report	1 (9.5%)
IMO Guidelines	1 (4.8%)
IMO Regulations/Resolutions/Codes/Standards	1 (4.8%)
Industry not specified - report/research	1 (4.8%)
Industry paper/article/literature review/book	1 (4.8%)
Main industry regulations/codes	1 (4.8%)
National regulations/resolution	1 (4.8%)
National safety notices/guidance	1 (4.8%)
<i>Total</i>	21 (100.0%)

Inaccessible evidence and documents were also identified in the materials examined and this included more expert opinion as well as academic papers, studies, industry papers, accident statistics, industry guidance, industry reports and regulations/codes (see Table 22).

Table 22: Inaccessible evidence/documents mentioned in resources subsections of NI website, ALERT bulletins and Seaways grouped by type

Evidence Type (References which are not evidence shown in blue)	Frequency
Expert/key stakeholders consultation/opinion	6 (35.3%)
Academic paper/article/literature review/book	2 (11.8%)
Academic report/research	2 (11.8%)
Industry paper/article/literature review/book	2 (11.8%)
Accident statistics	1 (5.9%)
IMO Regulations/Resolutions/Codes/Standards	1 (5.9%)
Industry guidance	1 (5.9%)
Industry report/research	1 (5.9%)
Main industry regulations/codes	1 (5.9%)
<i>Total</i>	17 (100.0%)

We were unable to identify any documents of relevance when searching the NI website using terms related to lifeboats. We found one relevant document concerning steering gear (see Table 23). This evidence took the form of an anonymous accident report (see Table 24).

Table 23: Summary of findings from Nautical Institute vertically segmented review – lifeboats and steering gear

	Documents where a recommendation has been made	Documents where the evidence behind a recommendation is identified and can be accessed	Documents where the evidence behind a recommendation is identified but cannot be accessed	Documents where there is no indication of evidence behind a recommendation	Total documents examined
Lifeboats	0	0	0	0	2
Steering Gear	1	1 (100.0%)	0	0	14
Total	1	1 (100.0%)	0	0	16

Table 24: Accessible evidence mentioned in documents relating to steering gear

Evidence Type	Frequency
Accident report (anonymous/confidential)	1 (100.0%)
<i>Total</i>	1 (100.0%)

Influencing debates and actions: Nautilus International

Nautilus International is a trade union for officers working in the maritime field in the UK, Netherlands and Switzerland. The union works to ‘bring critically important subjects to the attention of authorities at national and global level’ and it is involved in ‘shaping the standards that govern the way the industry works, health and safety, and the working conditions of employees’¹².

As part of the horizontally segmented approach to the scoping exercise we reviewed documents located on ‘news and insight’ pages of the Nautilus International website including: 50 articles from their newspaper the *Telegraph*; book reviews; 50 news articles (not published in *Telegraph*); Nautilus reports covering a ten-year period; advice and guidance; partnership publications; general meeting and branch conference resolutions; COVID-19 resource documents and documents under a subsection of the website labelled ‘industrial’. From these sets of documents 43 were identified as relevant and were carefully examined. Of these documents, 19 included a recommendation and, in 12, underpinning evidence or references could be identified. In a further four cases evidence was mentioned but was not traceable/accessible (see Table 25).

Table 25: Summary of findings from Nautilus International horizontally segmented review

	Documents where a recommendation has been made	Documents where the evidence or reference behind a recommendation is identified and can be accessed	Documents where the evidence or reference behind a recommendation is identified but cannot be accessed	Documents where the is no indication of evidence or referenced documents behind a recommendation	Total documents examined
Total	19	12 (63.2%)	4 (21.1%)	3 (15.8%)	43

In most cases where evidence was traceable it was in the form of industry surveys/feedback and academic reports. Industry guidance documents and IMO guidelines were also referenced in the documents where recommendations were provided (see Table 26).

Table 26: Accessible evidence mentioned in documents analysed as part of the horizontally segmented analysis of Nautilus International

Evidence Type (References which are not evidence shown in blue)	Frequency
Industry survey/feedback	8 (61.5%)
Academic report/research	2 (15.4%)
Industry guidance documents	2 (15.4%)
IMO Guidelines	1 (7.7%)
<i>Total</i>	13 (100.0%)

Where untraceable/inaccessible evidence or other documents were mentioned in a Nautilus International publication making a recommendation these included industry surveys/feedback, expert opinion, industry guidelines, Industry reports or national safety notices/guidance (see Table 27).

¹² <https://www.nautilusint.org/en/our-union/what-we-do/voice-of-the-maritime-industry/> (accessed 24/2/22)

Table 27: Inaccessible evidence and references mentioned in documents analysed as part of the horizontally segmented analysis of Nautilus International

Evidence Type (References which are not evidence shown in blue)	Frequency
Industry survey/feedback	2 (33.3%)
Expert/key stakeholders consultation/opinion	1 (16.7%)
Industry guidelines	1 (16.7%)
Industry report/research	1 (16.7%)
National safety notices/guidance	1 (16.7%)
<i>Total</i>	6 (100.0%)

The vertically segmented review of Nautilus International documents relating to steering gear and lifeboats did not yield any documents where a relevant recommendation was made.

Influencing debates and actions: INTERTANKO

The International Association of Independent Tanker Owners (INTERTANKO) is a trade association for independent tanker owners. It has observer status at IMO and aims to influence strategic developments at the highest level. More specifically, one of its stated objectives is to ‘be a **positive and proactive influence** with key stakeholders, developing policies and positions, harmonising a united industry voice, and engaging with policy and decision makers.’¹³

Many of the documents published on the INTERTANKO website are only available to members. Of 12 relevant documents that could be accessed, eight made a recommendation/decision (Please see Table 28). Of these, two contained evidence or referenced documents that could be traced and accessed and five mentioned evidence that was not traceable/accessible. In one case there was no evidence or reference document mentioned. Documents that could be identified were IMO documents and an accident investigation report. Documents/evidence that couldn’t be accessed included anonymous reports of accidents, academic papers, accident investigation reports and statistics, industry outputs, industry standards and in-house statistics (please see Tables 29 and 30).

Table 28: Summary of findings from INTERTANKO horizontally segmented review

	Documents where a decision, or recommendation has been made	Documents where evidence or references behind a decision or recommendation is <u>identified and can be accessed</u>	Documents where evidence or references behind a decision is <u>identified but cannot be accessed</u>	Documents where there is <u>no indication of evidence or references</u> behind a decision	Total documents examined
Total	8	2 (25.0%)	5 (62.5%)	1 (12.5%)	12

¹³ <https://www.intertanko.com/about-us/mission-statement> (accessed 25/2/22)

Table 29: Accessible evidence mentioned in documents analysed as part of the horizontally segmented analysis of INTERTANKO

Evidence Type (References which are not evidence shown in blue)	Frequency
IMO documents	1 (50.0%)
Accident investigation/report	1 (50.0%)
<i>Total</i>	2 (100.0%)

Table 30: Inaccessible evidence and references mentioned in documents analysed as part of the horizontally segmented analysis of INTERTANKO

Evidence Type	Frequency
Accident investigation/report (anonymous/confidential)	2 (22.2%)
Academic paper/article/literature review/book	1 (11.1%)
Accident investigation/report	1 (11.1%)
Accident statistics	1 (11.1%)
Industry paper/article/literature review/book	1 (11.1%)
Industry report/research	1 (11.1%)
Industry standards	1 (11.1%)
In-house statistics	1 (11.1%)
<i>Total</i>	9 (100.0%)

In the vertically segmented review of INTERTANKO’s website a high number of documents of potential interest were identified but these could not be accessed as they were only available to members. There were no accessible documents where a decision or recommendation was made in relation to steering gear and only four where a decision or recommendation was made in relation to lifeboats (see Table 31).

Table 31 Summary of findings from INTERTANKO vertically segmented review

	Documents where a decision, or recommendation has been made	Documents where references or evidence behind a decision is identified and can be accessed	Documents where references or evidence behind a decision is identified but cannot be accessed	Documents where there is no indication of evidence or references behind a decision	Total documents considered
Lifeboats	4	3 (75.0%)		1 (25.0%)	93
Steering Gear	0				30
Total	4	3 (100.0%)		1	123

Where evidence or references could be traced they consisted of accident investigation reports and IMO circulars (see Table 32).

Table 32: Accessible evidence mentioned in documents about lifeboats analysed as part of the vertically segmented analysis of INTERTANKO

Evidence Type (References which are not evidence shown in blue)	Frequency
Accident investigation/report	3 (75.0%)
IMO Circulars	1 (25.0%)
<i>Total</i>	4 (100.0%)

Summary of the kinds of evidence underpinning decision-making in shipping and the forms they appear in

As part of the horizontal review of documents at IMO a total of 266 documents were examined. In relation to the horizontal review of the websites of the national maritime administrations of UK and Panama, 59 documents were reviewed. These produced a combined total of 325 documents examined. Only 92 of these documents could be linked to a decision and only 66 contained a reference to the reason why a decision was made (this could be evidence, or it could be an IMO internal procedure/function). Within the 66 documents there were only 43 references to evidence (see Appendices 4 and 5 for details). These were most likely to be references to an academic paper/article/literature review or book, an accident investigation report, expert/stakeholders' opinions, GBS audits (in house studies), or industry reports. However, there was quite a broad range of different types of evidence cited and the majority of it did not conform with typical understandings of academic work (see Table 33). It is also worth noting that the creation of an IMO resolution does not in itself guarantee change in policy. Resolutions must be adopted by member states and the decision to adopt a resolution or an amendment to a resolution is frequently highly political. One interviewee asserted that many members' decisions were motivated by a desire to minimise the changes that they were required to make to national regulatory standards. In their words "their position is made based upon alignment with their national regulations. So, they are trying to minimise impact on their national registration". In addition, interviewees explained that member states often engage in discussions with parties who have no knowledge of the evidence associated with a particular case for change, and some talked of very informal conversations over coffee at IMO having considerable traction. Such an acknowledgement does not imply that decisions are taken by uninformed individuals at IMO, as delegations will generally be advised by, and often accompanied by, experts who feed into both formal and informal discussions.

Table 33: Summary of evidence types underpinning IMO and Maritime Administration documentation as revealed by the horizontal reviews

Evidence	Frequency	Percentage
Academic paper/article/literature review/book	5	11.6%
Accident investigation/report	4	9.3%
Expert/key stakeholders consultation/opinion	4	9.3%
GBS audits (termed 'in-house studies/reports')	4	9.3%
Industry report/research	4	9.3%
Accident statistics	3	7.0%
Formal safety assessments/gap analysis	3	7.0%
Academic report/research	2	4.7%
Industry survey/feedback	2	4.7%
In-house experience	2	4.7%
In-house studies/reports	2	4.7%
Practical testing/drills	2	4.7%
Public consultation	2	4.7%
Industry paper/article/literature review/book	1	2.3%
In-house review	1	2.3%
National report	1	2.3%
Onboard inspection findings	1	2.3%
<i>Total</i>	43	100.0%

The overall lack of identifiable evidence may not only be a challenge for academics seeking to review and evaluate the quality of the evidence which underpins decision-making in the shipping industry. It may have an adverse impact on decision making itself. As one interviewee explained when discussing procedures at the IMO, “if you as a flag state are not involved in the subgroups then the proposal you are seeing, whatever you are supposed to decide on, does not include the evidence [...] and we often wonder what this proposal is based upon”.

Discussion

The findings give rise to the following hypotheses and tentative conclusions which might usefully be explored in the future.

- At IMO, flag state representatives would benefit from the inclusion of references to supporting evidence (of any kind) when considering decisions before them. This would assist them in understanding the basis for new proposals and it would allow them to follow-up on the evidence themselves so that they can arrive at better informed decisions.
- The IMO does not generate regulations based upon accounts of best practice but seeks to establish minimum acceptable standards taking account of the economic and social context of the shipping industry. In this context, much academic research relating to best practice and the potential for improvement via proactive change is rendered redundant and the evidence drawn upon is normally related to industry experience (of accidents for example)

and expertise. Industry experience and expertise relating to accidents is self-evidently reactive in nature¹⁴.

- Industry bodies representing seafarers and professional standards draw upon academic evidence and the evidence provided by practitioners and seek to influence decision-makers by shaping debates that may impact on regulatory agendas. However, their focus is oriented towards establishing best practice which does not often overlap with the establishment of minimum acceptable regulatory standards.
- Academic work may exert a significant influence on debates about best practice in the maritime field without being transparently identified as doing so. The value of much academic work in shaping policy agendas is likely to be hidden.

The advantages and disadvantages of the horizontally segmented and vertically segmented approaches to the identification of documents where decisions have been made at IMO

When we compared the success of the horizontal and vertical approaches in searching the IMO website, we observed that for specific equipment such as steering gear and lifeboats (vertical) searches made using terms relating to lifeboats and steering gear (as outlined in Appendix 1) were more successful in turning up documents than an approach based on looking across the website at rafts of documents from particular time periods or particular sessions at IMO (see Tables 33 and 34). This is because vertical searches can pick up documents across a far longer time-period than searches which are limited to sessions at IMO or shorter time-periods. Self-evidently horizontal searches pick up more documents overall as they include all kinds of safety-related decisions and not only those relating to specific topics (in this case lifeboats and steering gear).

Table 34: The overlap between the horizontal and vertical searches of the IMO website for documents relating to decisions about steering gear

	Document picked up only in Horizontal	Document picked up only in Vertical	Document picked up in both Horizontal and vertical	Total
Decision made	2 (9.5%)	19 (90.5%)		21 (100.0%)
No decision made	1 (16.7%)	5 (83.3%)		6 (100.0%)

Table 35: The overlap between the horizontal and vertical searches of the IMO website for documents relating to decisions about lifeboats

	Document picked up only in Horizontal	Document picked up only in Vertical	Document picked up in both Horizontal and vertical	Total

¹⁴ There is no intention here to elevate one kind of 'knowledge' (e.g. from academic studies) over another (e.g. from experience of accidents)

Decision made	10 (45.5%)	11 (50.0%)	1 (4.5%)	22 (100.0%)
No decision made	9 (42.9%)	12 (57.1%)		21 (100.0%)

The research design did not incorporate both vertical and horizontal reviews for every Maritime Administration and we cannot compare the approaches in the same way as we are able to for IMO. However, our results suggest that the quality of the Maritime Administration website may be more of a determining factor in relation to the identification of documents, than the approach that is adopted to searching. The UK website was searched using a horizontal approach which turned up a total of seven documents associated with a decision while the equivalent horizontal search for Panama yielded nothing. Meanwhile the vertical searches of the Norway Maritime Administration’s website revealed five documents where a decision appeared to have been made and a vertical search of the website for Malta yielded nothing.

The advantages and disadvantages of horizontally and vertically segmented approaches to the identification of documents on the websites of organisations which do not make policy/practice decisions, but which may publish documents that exert an influence on future decisions (Nautical Institute, INTERTANKO, Nautilus International

When we combine the results for vertical and horizontal searches of the websites of Nautilus International, the Nautical Institute and INTERTANKO it is clear that many documents relating to lifeboats and steering gear were only picked up by vertical searches (see Table 36). This suggests that for these organisations vertical searches produce better results than horizontal searches.

Table 36: The overlap between the horizontal and vertical searches of the Nautical Institute, Nautilus International and INTERTANKO websites relating to decisions about lifeboats and steering gear combined

	Document picked up only in Horizontal	Document picked up only in Vertical	Document picked up in both Horizontal and vertical	Total
Steering Gear and Lifeboats	3 (2.1%)	134 (95.0%)	4 (2.8%)	141 (100.0%)

Overview of advantages and disadvantages of the vertical and horizontal approaches

Both approaches to searching for evidence within relevant documents had pros and cons.

Overall, searching using a horizontal approach is likely to provide the basis for a more systematic review because it avoids difficulties that may be associated with the search engines of different websites. However, searches made using a vertical approach have the advantage of being able to identify documents that appear in any part of a website and at any point in time (subject to the constraints of the website concerned).

In relation to interviews the scoping exercise indicates that interviews relating to specific topics had particular drawbacks. They were more difficult to arrange and conduct in relation to decision making concerning specific examples of equipment/issues (the vertical approach) than they were when discussing decision making more generally (the horizontal approach)¹⁵.

Specific recommendations for ways to undertake the future evaluation of evidence and the limitations likely to be associated with this.

Decision-making in the shipping industry is somewhat opaque. Most decisions are taken at IMO. Superficially they occur at the stage when IMO resolutions are passed or amendments to IMO resolutions are passed. However, once a resolution is drafted the decision-making process is highly political and it is based on layers of previously produced IMO documentation (and related decisions) which does not normally reference evidence at all.

If a future evaluation is carried out of the evidence used to arrive at decisions in the shipping industry, we would recommend that it focuses on decision-making at IMO because it is the IMO that sets the regulatory agenda for the sector and many other organisations simply defer to, or refer to, IMO regulations in relation to the decisions that they might take. Such an evaluation should focus on IMO MSC resolutions, MSC session documents, MSC working group documents and MSC subcommittee documents.

The limited amount of traceable evidence referenced in IMO documents indicates that in order to conduct a substantial evidence review a very large number of documents would have to be accessed and read. In this study, we reviewed documents relating to a single session of the IMO. We would recommend that a minimum of five sessions are reviewed if a larger study is undertaken.

We would also recommend that a vertical review is conducted of IMO documents relating to a 'hot' safety-related topic for the industry. This would provide access to details of evidence drawn upon over a longer period of time, which would be beneficial.

This exercise would be extremely labour intensive. To identify the evidence underpinning decisions in the IMO is a very time-consuming exercise in itself. To then trace and evaluate the identified evidence would be extremely challenging. Furthermore, because a lot of evidence does not take the form of traditional peer-reviewed academic studies but may simply be, for example, accident statistics, accident investigation reports or the results of stakeholder consultations, much of it may not lend itself to systematic review. It may not, for example, contain sufficient information about the methods underpinning its conclusions to allow for evaluation. In these circumstances, we would estimate that a review of the scale required would need to be undertaken by two full-time staff working for two full years. Even given this level of resource, we conclude that a review of evidence underpinning decision-making in the shipping industry would be highly problematic and may yield disappointingly sparse results.

Specific recommendations of an outline nature with regard to methods of evidence classification and evaluation

¹⁵ As previously noted, several interviews had to be changed after they commenced because it became apparent that interviewees did not have the specialist knowledge required to talk about either lifeboats or steering gear.

The diverse nature of the evidence which is drawn upon by the IMO and Maritime Administrations and by bodies which seek to influence decision-making in the shipping industry (but who may or may not enjoy any success in doing so) poses challenges to traditional methods of evidence evaluation. It is likely that current methods would need to be adapted and expanded to try to capture the value and robustness of evidence in this sector. A more granular and holistic examination of the working groups, industry bodies and experts therein (using ethnographic methods for example) would shed more light on the broader kinds of evidence drawn upon by industry bodies and IMO. However, this exercise would, in itself, require separate resource of a very substantial nature.

Specific recommendations relating to the expansion of the exercise to allow it to include operational shipboard personnel

In order to understand decision-making at the level of shipping companies it is apparent that a qualitative study would be most likely to reveal the processes and influences that lead to change in policy and practice. A case study approach using a minimum of four different companies and a maximum of six would be advisable. Properly qualified social scientists with an understanding of the shipping industry and experience of qualitative methods would need to undertake the research. Researchers would require access to company offices where decision-making occurs so that they could informally and formally interview personnel, review relevant documentation provided on site, and observe relevant meetings, consultations and discussions. Once again, the material which such an exercise is likely to yield is unlikely to conform to standards of peer-reviewed academic research. Evaluation standards and protocols for non-traditional evidence used in decision-making in the sector would need to be developed prior to the conduct of the research.

Appendices

Appendix 1: Search terms used for the vertically segmented searches

Steering Gear	Lifeboats
Steering	Lifeboats
Steering gear	Life boats
Steering motors	Rescue boat
Steering control system	Hook
Steering gear telemotors	Hook release mechanism
Steering room	Hydrostat
FFU - full-follow-up mode	On load
NFU - non-follow-up mode	Off load
Tiller	Freefall
Rudder	Release gear
Rudder angle indicator	Cable
Hydraulic control solenoid	Davit
Steering pump	Life raft
Steering actuator	Liferaft
ROT – Rate of Turn	Abandon ship
Steering compartment	Emergency procedure
Emergency Steering	

Appendix 2: Classification of the different types of evidence which emerged (NB each piece of evidence was judged as a standalone document so not every report/consultation etc was automatically counted as evidence)

Types of Evidence	Evidence
Academic paper/article/literature review/book	Academic articles
	Academic book
	Academic literature review
	Academic papers
Academic report/research	Academic reports
	Academic research
	Academic research project
	Academic studies
	Academic study reports
National report	Governmental department report
	MCA reports
	Records of the US Senate and other US official bodies
	UK government report
National safety notices/guidance	Information from UK Government
In-house experience	In-house experience with guidelines
	In-house experience with resolutions
In-house risk assessment	Future in-house risk assessment
	In-house generated evidence through failure analysis
	In-house risk assessment
Formal safety assessments/gap analysis	Formal safety assessment
	Gap analysis
In-house statistics	In-house statistics on those completing the checklist
In-house studies/reports	In-house comparative studies
Expert/key stakeholders consultation opinion	Consultations with members of EEA states
	Information for professional maritime bodies
	Expert consultation
	Expert focus groups
	Expert groups, meetings of the NDG
	Expert guidance from other industries
	Expert opinion
	Expert/key stakeholder groups opinions
Professional experience	
Public consultation	Public consultation(s)
Onboard inspection findings	Findings of PSC inspections
	Onboard inspections
	PSC deficiencies
Practical testing/drills	DNV 403 tightness testing procedure results
	In house generated evidence from undertaking the exercise
	Independent analysis of moisture content
	In-house generated evidence through the exercise
	In-house practical experience
	Observation of drills
	Physical testing of equipment
Practical drills	
Manufacture testing/guidance	Manufacturer product testing
	Practical tests by manufacturers
Accident investigation/report	Accident investigation
	Accident report(s)
	Bulk carrier accident reports
	Incident reports
	Reported incidents
	Reported near miss onboard
Reports of cyber attacks	

Accident investigation/report (Anonymous/confidential)	Confidential accident reports
Accident statistics	Accident report figures
	Accident statistics
	Casualty statistics
	Damage statistics
	Enclosed spaces fatality statistics
	Incident statistics
	Accident data
Industry Paper/Article/literature review/book	Industry book
	Industry paper(s)
	Online articles/grey literature
Industry Report/Research	ILO reports
	Industry report(s)
	Industry research
	Industry research project
	Industry study
	Other USCG reports
Industry Survey/feedback	Industry survey
	Feedback from users
	Union survey
	User feedback
	User survey
	HSE safety alerts
Industry not specified - Paper/Article/ Literature Review/ Book	A paper
	Literature review
	Literature reviews
	Published books (could not obtain)
	Books
Industry not specified - Report/ Research	Report
	Research project
	Research studies
	Studies

Appendix 3: Grouping applied to different types of underpinning documents which were not 'evidence' as such but were referenced in decision making - as such, in theory, they could contain references to evidence or evidence itself

Grouped Evidence type	Evidence type
IMO regulations/resolutions/codes/standards	Existing regulations
	IMO codes
	IMO regulations
	IMO standards
	MSC resolution
	Performance standards on IMO website
IMO Main Committee recommendations/decisions	IMO committee recommendations
	IMO main committee decision (MEPC)
	IMO main committee documents
	MSC committee recommendations
	Other IMO committee documents (MEPC)
	Recommendations by the Secretariat
	Recommendations of the IMO MSC committee
IMO sub-committee (and workgroups) recommendations/decisions	IMO sub-committee recommendations
	IMO workgroup
	Paper presented to IMO sub-committee
	Recommendations of the IMO sub-committee (DSC)
	Sub-committee recommendations
	The report of the IMO Editorial and Technical Group
IMO Guidelines	IMO guidance/guidelines
IMO Circulars	IMO circular(s)
	IMO MSC circulars
IMO Paper	IMO paper
Main industry regulations/codes	LSA code
	MLC 2006
	SOLAS
	STCW Code
Marine industry guidelines	Further American Club guidance documents
	Industry guidance documents
National regulations/resolution	EU Directives
	National Resolution
	UK government regulations
	UK Merchant Shipping regulations
	UK regulations
	UK Shipping Maritime Safety regulation
National safety notices/guidance	UK Shipping Maritime Safety notices
	MCA guidance
	MCA guidance note
Company/organisation news report/safety bulletin	Company News Report
	NOPSEMA (National Offshore Safety and Environmental Management Authority) Safety Bulletin
	Shipowner reports
Manufacture testing/guidance	Manufacturer safety alert
Industry guidelines	Guidelines
	Guidelines from other industries
	HSE guidance
	ILO/WHO guidelines
	Other industry guidelines
Industry standards	Industry standards
	ISO Standard
Technical standards and specifications	Standards - British Standards (BS) or European Norm (EN)
	Technical standards and specifications
	EU testing standards

Appendix 4: Evidence used by policy makers (IMO and Maritime Administrations)

Evidence Type	Link
In-house studies/reports	https://docs.imo.org/Shared/Download.aspx?did=112230
In-house studies/reports	https://docs.imo.org/Shared/Download.aspx?did=112428
In-house studies/reports	https://docs.imo.org/Shared/Download.aspx?did=116262
In-house studies/reports	https://docs.imo.org/Shared/Download.aspx?did=112230
Practical testing/drills	https://docs.imo.org/Shared/Download.aspx?did=122301
Practical testing/drills	https://docs.imo.org/Shared/Download.aspx?did=122301
Expert/key stakeholder consultation/opinion	https://docs.imo.org/Shared/Download.aspx?did=119106
Expert/key stakeholder consultation/opinion	http://www.emsa.europa.eu/firesafe.html
Formal safety assessments/gap analysis	http://www.emsa.europa.eu/firesafe.html
Expert/key stakeholder consultation/opinion	https://docs.imo.org/Shared/Download.aspx?did=120766
Expert/key stakeholder consultation/opinion	https://docs.imo.org/Shared/Download.aspx?did=120766
Academic Report/research	https://docs.imo.org/Shared/Download.aspx?did=120781
In-house studies/reports	https://docs.imo.org/Shared/Download.aspx?did=121052
Academic paper/article/literature review/book	https://nrc-publications.canada.ca/eng/view/ft/?id=dbd6856d-b5f0-4342-9f6e-515ef1ffe86e
Academic paper/article/literature review/book	https://www.bmvi.de/SharedDocs/DE/Anlage/WS/study-on-safety-model-teil1.pdf?__blob=publicationFile
Public consultation	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/834586/MSN_1870_Personal_Protective_Equipment_Regulations_1999_Consultation_Outcome.pdf
Industry survey/feedback	https://www.hse.gov.uk/safetybulletins/mild-steel-welding-fume.htm#utm_source=govdelivery&utm_medium=email&utm_campaign=welding-alert&utm_content=ebul-link-2
Academic paper/article/literature review/book	https://publications.iarc.fr/569 https://www.thelancet.com/pdfs/journals/lanonc/PIIS1470-2045%2817%2930255-3.pdf
Industry survey/feedback	https://www.hse.gov.uk/safetybulletins/mild-steel-welding-fume.htm#utm_source=govdelivery&utm_medium=email&utm_campaign=welding-alert&utm_content=ebul-link-2
Academic paper/article/literature review/book	https://publications.iarc.fr/569 https://www.thelancet.com/pdfs/journals/lanonc/PIIS1470-2045%2817%2930255-3.pdf

Appendix 5: Evidence used by potentially influential bodies (EMSA, Nautical Institute, Nautilus International and INTERTANKO)

Evidence Type	Link
Maritime traffic data	http://www.emsa.europa.eu/publications/reports/download/6635/4436/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/6504/4343/23.html
Accident statistics	http://www.emsa.europa.eu/publications/reports/download/6358/4266/23.html
Accident investigation/report	http://www.emsa.europa.eu/publications/reports/download/6374/4276/23.html
Statistical information on STCW certification	http://www.emsa.europa.eu/publications/reports/download/6252/3977/23.html
Academic report/research	http://www.emsa.europa.eu/publications/reports/download/6186/3895/23.html
Academic paper/article/literature review/book	http://www.emsa.europa.eu/publications/reports/download/6186/3895/23.html
Formal safety assessments/gap analysis	http://www.emsa.europa.eu/publications/reports/download/6186/3895/23.html
Formal safety assessments/gap analysis	http://www.emsa.europa.eu/publications/reports/download/6176/3892/23.html http://www.emsa.europa.eu/publications/reports/download/6177/3892/23.html http://www.emsa.europa.eu/publications/reports/download/6178/3892/23.html
Expert/key stakeholder consultation/opinion	http://www.emsa.europa.eu/publications/reports/download/6176/3892/23.html http://www.emsa.europa.eu/publications/reports/download/6177/3892/23.html http://www.emsa.europa.eu/publications/reports/download/6178/3892/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/6498/3863/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/6066/3849/23.html
Fleet statistics	http://www.emsa.europa.eu/publications/reports/download/6385/472/23.html
Accident statistics	http://www.emsa.europa.eu/publications/reports/download/5854/3734/23.html
Statistical information on STCW certification	http://www.emsa.europa.eu/publications/reports/download/5780/3662/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/5605/3508/23.html
Formal safety assessments/gap analysis	http://www.emsa.europa.eu/publications/reports/download/5483/3424/23.html http://www.emsa.europa.eu/publications/reports/download/5485/3424/23.html http://www.emsa.europa.eu/publications/reports/download/5486/3424/23.html http://www.emsa.europa.eu/publications/reports/download/5487/3424/23.html
Accident statistics	http://www.emsa.europa.eu/publications/reports/download/5425/3406/23.html
Accident investigation/report	http://www.emsa.europa.eu/publications/reports/download/5404/3388/23.html
Statistical information on STCW certification	http://www.emsa.europa.eu/publications/reports/download/5282/3321/23.html
Accident investigation/report	http://www.emsa.europa.eu/publications/reports/download/5177/3253/23.html

Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/5168/3243/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/5122/3217/23.html
In-house studies/reports	http://www.emsa.europa.eu/publications/reports/download/5064/3185/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/5064/3185/23.html
Industry paper/article/literature review/book	http://www.emsa.europa.eu/publications/reports/download/5064/3185/23.html
Expert/key stakeholder consultation/opinion	http://www.emsa.europa.eu/publications/reports/download/5064/3185/23.html
Industry paper/article/literature review/book	http://www.emsa.europa.eu/publications/reports/download/5034/3168/23.html
Accident statistics	http://www.emsa.europa.eu/publications/reports/download/4989/3156/23.html
Statistical information on STCW certification	http://www.emsa.europa.eu/publications/reports/download/4871/3094/23.html
In-house studies/reports	http://www.emsa.europa.eu/publications/reports/download/4860/3092/23.html
Expert/key stakeholder consultation/opinion	http://www.emsa.europa.eu/publications/reports/download/4860/3092/23.html
Expert/key stakeholder consultation/opinion	http://www.emsa.europa.eu/tags/82-rpas.html
Expert/key stakeholder consultation/opinion	http://www.emsa.europa.eu/publications/reports/download/4683/3003/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/4657/2972/23.html
Accident statistics	http://www.emsa.europa.eu/publications/reports/download/4529/2931/23.html
Fleet information	http://www.emsa.europa.eu/publications/reports/download/4529/2931/23.html
Academic paper/article/literature review/book	http://www.emsa.europa.eu/publications/reports/download/4557/2925/23.html
Academic report/research	http://www.emsa.europa.eu/publications/reports/download/4557/2925/23.html
Academic paper/article/literature review/book	http://www.emsa.europa.eu/publications/reports/download/4545/2921/23.html
Formal safety assessments/gap analysis	http://www.emsa.europa.eu/publications/reports/download/4545/2921/23.html
Accident statistics	http://www.emsa.europa.eu/publications/reports/download/4524/2903/23.html
Statistical information on STCW certification	http://www.emsa.europa.eu/publications/reports/download/4243/2779/23.html
Academic paper/article/literature review/book	http://www.emsa.europa.eu/publications/reports/download/4142/2726/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/4002/2647/23.html
Formal safety assessments/gap analysis	http://www.emsa.europa.eu/publications/reports/download/3942/2627/23.html
Accident statistics	http://www.emsa.europa.eu/publications/reports/download/4524/2903/23.html
Practical testing/drills	http://www.emsa.europa.eu/publications/reports/download/3998/2645/23.html
Industry report/research	http://www.emsa.europa.eu/publications/reports/download/3547/2419/23.html http://www.emsa.europa.eu/publications/reports/download/3550/2420/23.html

	http://www.emsa.europa.eu/publications/reports/item/2421-study-3-emsa-3-evaluation-of-risk-from-groundings.html
Formal safety assessments/gap analysis	http://www.emsa.europa.eu/we-do/safety/ship-safety-standards/download/3549/2423/23.html
Industry not specified - report/research	https://www.nautinst.org/uploads/assets/51406b1b-203f-4a8f-a0d71eebe0d73720/S-Mode-User-Test-using-Eye-tracker-SeoJeong-Lee-Korea-Maritime-and-Ocean-University-and-Western-Norway-University-of-Applied-Science.pdf
Accident investigation/report (anonymous/confidential)	https://www.nautinst.org/resources-page/202136-green-seas-on-deck-cause-one-fatality-and-four-serious-injuries.html
Accident investigation/report (anonymous/confidential)	https://www.nautinst.org/resources-page/202134-strong-winds-send-berthed-vessel-adrift.html
Accident investigation/report	https://www.dmaib.com/media/9104/svendborg-maersk-heavy-weather-damage-on-14-february-2014.pdf
National safety notices/guidance	https://www.uscg.mil/Portals/0/Strategy/Cyber%20Strategy.pdf
Industry report/research	https://www.uscg.mil/Portals/0/Strategy/Cyber%20Strategy.pdf
Expert/key stakeholder consultation/opinion	https://www.uscg.mil/Portals/0/Strategy/Cyber%20Strategy.pdf
Academic paper/article/literature review/book	https://functionalresonance.com/how-to-build-a-fram-model/index.html
Industry report/research	http://www.ilo.org/sector/Resources/codes-of-practice-and-guidelines/WCMS_325319/lang--en/index.htm
Academic paper/article/literature review/book	http://www.ilo.org/sector/Resources/codes-of-practice-and-guidelines/WCMS_325319/lang--en/index.htm
Industry report/research	https://www.he-alert.org/en/utilities/download.cfm/fid/62004701-BB34-41A4-AA42284DCD7D5CA3
Industry report/research	http://www.seahealth.dk/en
Industry paper/article/literature review/book	https://www.he-alert.org/en/utilities/download.cfm/fid/41078B12-B942-4856-8D86771C88D348AE
Industry report/research	https://www.he-alert.org/en/utilities/download.cfm/fid/6FEF9E65-0AF4-4D55-AD6AD4D26310E430
Academic report/research	https://www.he-alert.org/en/utilities/download.cfm/fid/D46E52D7-D918-48DE-83AAA6FAF40C29F7
Expert/key stakeholder consultation/opinion	https://www.nautinst.org/uploads/assets/82a1cb3a-789b-4a1d-875be95af463e2ab/Seaways-Jan-18.pdf
Accident investigation/report (Anonymous/confidential)	https://www.nautinst.org/resources-page/7013-aground-after-total-power-loss.html

Accident investigation/report	http://www.atsb.gov.au/media/5299888/MO-2014-002-Final.pdf
Industry survey/feedback	https://www.nautilusint.org/globalassets/public-resources/pdfs/report_cadet_survey_march-2021_web_optimised.pdf
Industry survey/feedback	https://www.nautilusint.org/globalassets/public-resources/pdfs/report_cadet_survey_aug19_web.pdf
Industry survey/feedback	https://www.nautilusint.org/globalassets/public-resources/pdfs/stcw_survey_nautilus_report_march_2020.pdf
Industry survey/feedback	https://www.nautilusint.org/globalassets/my-nautilus/member-resources/pdfs/fair_treatment_report_october_2019.pdf
Industry survey/feedback	https://www.nautilusint.org/globalassets/public-resources/pdfs/autonomous_shipping.pdf
Industry survey/feedback	https://www.nautilusint.org/globalassets/public-resources/pdfs/connectivity_at_sea_nautilus_whitepaper.pdf
Academic report/research	https://www.nautilusint.org/globalassets/public-resources/pdfs/project_horizon_report.pdf
Industry survey/feedback	https://www.nautilusint.org/globalassets/public-resources/pdfs/seafarers_conditions_survey_report_2010.pdf
Industry survey/feedback	https://www.nautilusint.org/globalassets/public-resources/pdfs/bullying_discrimination_harassment_survey_2010.pdf
Academic report/research	https://www.nautilusint.org/en/news-insight/resources/partnership-publications/maritime-career-path-mapping/