

# The development of resource management and leadership behavioural markers for the Merchant Navy.

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## **Abstract**

Resource management principles, first established in the aviation industry, have been adopted and adapted for the Merchant Navy and other safety critical areas where the importance of the blend of effective technical and non-technical skills is recognised.

The 2010 Manila amendments to the STCW Convention and Code include requirements for deck and engineering officers to show competence in the non-technical skills of resource management, leadership and managerial skills.

This research sets out to identify whether the broad competence criteria described in the STCW amendments would be consistently interpreted by a range of maritime industry stakeholders, in the context of the behaviours that they would expect to see, hear or experience in demonstrating compliance with, and evidencing competence in, the criteria.

The paper will report on areas where interview respondents clearly identified effective and ineffective behavioural markers. Where such evidence was not forthcoming or requires amplification, the authors will propose effective and ineffective markers. It is anticipated that continuing research will validate the effectiveness and utility of the behavioural markers.

These behavioural markers will enable industry to assess the performance of the deck and engine room teams and to improve selection, training and promotion processes and procedures for merchant navy officers.

*Keywords:* Behavioural marker, resource management, non-technical skills, leadership and managerial skills, Merchant Navy.

## **1. Introduction**

We know that the human factor plays a significant part in maritime accidents, and that accident reports frequently highlight deficiencies in non-technical skills, such as communication, team-working and leadership. In the spirit of increasing the known knowns, the authors wanted to investigate how non-technical skills could be

better evaluated and thus hopefully contribute to the effectiveness of shipping operations and the increase of safety in vessels and their crews. There appears to be a paucity of formal research within the maritime industry on behavioural markers which could underpin criteria for evaluating competence in non-technical skills, and STCW itself provides only the broadest of measures. There has been much research in behavioural markers within aviation, which has led to adoption of its precepts within our industry. However, it is suggested that the unique aspects of the international maritime industry make the wholesale espousal of established criteria from another industry inappropriate.

These include:

- Development and maintenance of situational awareness on sea passages, differing from the regulation and control present within aviation
- Ships' teams 'hand over' to each other at regular intervals and are augmented as required. This does not routinely happen outside the maritime industry.
- Communication, including the use of interventions and challenges. Ships' teams can be more culturally diverse, with less utilisation of standard communication phrases.
- Organisational, professional, departmental and national cross-cultural issues associated with the globalisation of the maritime industry.
- Leadership and teamwork are impacted by the duration of the working relationship. The transitory nature of ships' crew, where teams are constantly changing due to leave rotations, can differ from other industries.
- Dynamic workload issues onboard a vessel operating routinely are influenced by external environmental factors, voyage duration, cargo operation and administration requirements and available support mechanisms.

In using the STCW revisions for measuring competence in Merchant Navy Officers, further issues arise.

One of the virtues of IMO is its inclusiveness: in reviewing the STCW convention and code, it has comprehensively consulted with its global membership. However, therein also lies a weakness. The statements, definitions and competence criteria are extremely broad, to allow for the different views of IMO stakeholders. This

problem is likely to be further exacerbated by widely different perspectives within both the industry and academia regarding views of what constitutes effective leadership and management, for example.

The implications are that measurement and monitoring of non-technical competences will vary not only from signatories to the Convention but also company to company. There is bound to be a lack of consistency and ambiguity in interpretations, and whilst flexibility is helpful, too much flexibility may result in defeating the object of the competence measurement which the STCW sets out to achieve.

Within the STCW amendments, resource management competences are replicated in leadership and team-working at the operational level, and again in leadership and managerial skills at the management level. There is no delineation in the evaluation criteria between them. Although similar behavioural markers are applicable at both levels, it is suggested that the different responsibilities of senior officers could be better highlighted. There is also no differentiation between the skills required for management and those needed in a good leader. In STCW, competence of leadership and team-working skills includes requirement for a working knowledge of shipboard personnel management and training. This is perhaps a management function rather than one accruing to leadership.

This confusion is also reflected in the views of those interviewed, some of whom saw no difference between leadership and management, and some of whom were very clear that they were separate competences.

Although there is recognition within the industry that the different departments onboard a vessel should not operate within a silo mentality if they are to operate maximally, STCW shows resource management and leadership/management separately in the sections on deck and engineering, although the competences required are identical. This means that training in resource management for the two departments tends to take place separately, manifesting as Bridge Resource Management (BRM) and Engine Room Resource Management (ERM). There are courses in Crew Resource Management (CRM) such as those held at Warsash Maritime Academy, where representatives from both departments work together in

order to practice the principles they will have jointly learned in the classroom. However, there seem to be fewer of these than those run for departments individually.

Further confusion also appears to exist within the industry between Bridge Team Management (BTM) courses which have components of technical skills embedded within them, and BRM which - in Warsash Maritime Academy - focuses purely on non-technical skills using the context of technical skills. For example, a BTM course may teach passage planning. A BRM course might identify the importance of communication, challenging and responding to questionable decisions, team-working, planning and prioritising when creating a passage plan.

In the draft amendments to Part B (page 54) under Evaluation of Competence, STCW states:

*“The criteria for evaluating competence (column 4 of Table A-II/1) identify, primarily in outcome terms, the essential aspects of competent performance. They are expressed so that assessment of a candidate’s performance can be made against them and should be adequately documented in the training record book.”*

Within this table, it is stated that Bridge Resource Management competences may be evidenced by approved in-service experience. If there is ambiguity around how competencies are evaluated, such evidence may not be robust. Who will carry out the approval? How clear and consistent are they on the evaluation criteria?

It was in the context of some of these challenging issues that our research was initiated.

## **2. Research Methodology**

### **2.1. Literature review**

A literature search was conducted to ascertain thinking in the area of non-technical skills both in the maritime world as well as other safety-critical industries. Aviation is the most common reference, because its CRM training and behavioural marker system has formed the basis for adaptations in other high risk environments.

In 1996, a European research consortium worked on identifying or developing a practicable methodology for assessing airline pilots' CRM (also called non-technical) skills. The result was NOTECHS, referring to a flight crew member's attitudes and behaviours in the cockpit not directly related to aircraft control, system management, and standard operating procedures. The behavioural marker system was defined by Klampfer, Flin, Helmreich et al (2001) as referring to:

*"...a taxonomy or listing of key non-technical skills associated with effective, safe job performance in a given operational job position (e.g. flight deck crew) with some decomposition of major skill areas (e.g. decision-making) usually illustrated by exemplar behaviours."*

The NOTECHS system led the way in making such training mandatory within aviation, researched and documented by the JARTEL (Joint Aviation Requirements: Translation and Elaboration of Legislation) consortium. Other safety critical areas have created behavioural markers for non-technical skills, including anaesthetics (ANTS) and the railways, the most recent industry in the UK to adopt a CRM training system.

In the maritime arena, the UK Maritime and Coastguard Agency (MCA) produced a guide in 2006 providing existing leaders and senior officers in the maritime industry with tips and best practices to improve their management skills. This was based on research carried out by Arthur D Little Ltd in 2004 in order to, inter alia, develop a set of core leadership qualities that have a positive influence on safety. Doctoral research has been carried out at Warsash Maritime Academy by Gatfield (2008) looking at behavioural markers for the assessment of competence in crisis management within an engine room control room. Several papers have been produced at Warsash by Barnett, Gatfield and Pekcan (2003, 2004, 2005, 2006) on CRM.

These papers are downloadable from <http://www.solent.ac.uk/mhfr/papers.aspx> .

Given both the weight of research carried out in other fields, predominantly aviation, and the latest revisions to STCW, we believe that further research into non-technical behavioural markers for the maritime industry is both timely and relevant. This view was shared by the stakeholders we interviewed.

## 2.2. Research approach

Given how comparatively little research appears to have been carried out on maritime behavioural markers, we decided on a social constructivist, exploratory methodology. This is particularly pertinent for this research topic, as a continuing part of this study will examine the way culture might affect behavioural markers.

Semi-structured interviewing was carried out to allow more flexibility of response on behalf of the interviewee, and also to allow the researchers to pursue new topics of interest as they arose. Interviewee selection of 20 participants was based on “purposeful sampling” where particular settings, people or events are specifically chosen for the information they can provide. The breadth of interviewees therefore included regulatory organisations, P&I Clubs, ship owners, and ship managers based in the UK as well as serving seafarers. We should highlight that the majority of our interviewees had a deck rather than an engineering background, as it appears senior posts are more likely to be held by them.

No problems were met in accessing gatekeepers and interviewees. On the contrary, they were keen to participate, underlining for the authors that the project was considered to have merit and usefulness to the industry.

Atlas ti, a computer based qualitative program, was used to analyse the data as it was apposite for a grounded theory approach. As the data continues to be sorted and contextualised, new insights will arise which may trigger further investigation. Qualitative research problems such as “going native” and researcher bias were addressed by continual reflexivity and theory disconfirmation. It was particularly useful that the authors have different backgrounds, allowing challenging of each others’ perceptions as well as contributions from individual expertise and experience.

It should be noted, however, that the interviewees were - with one exception - white Westerners. One of the co-authors of this paper - Simon Holford - is intending to explore the applicability of any finalised behavioural markers to a more global range of seafarers as part of his doctoral research.

### 3. Findings

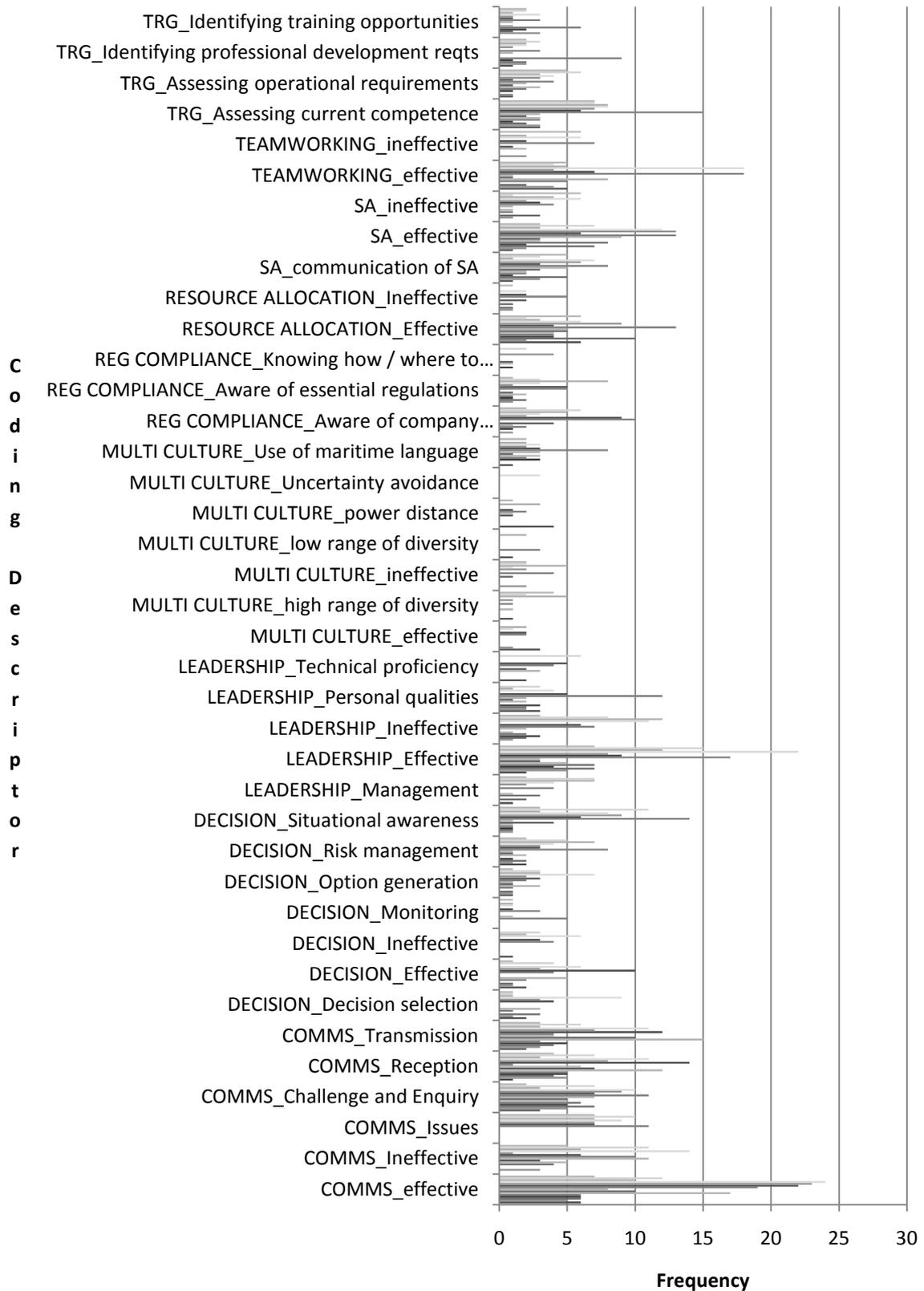
The graph of responses, included below at Table 1, evidences the different response ranges associated with responses and subsequent coding in specified areas of resource management and leadership. It can be inferred that respondents found some behaviours easier than others to describe. The coding of responses related to 'communications' as opposed to those for 'decision-making' highlights this issue. Similarly, low coding scores occurred in the areas of training, regulatory compliance and multi-cultural working.

We suggest that respondents were better able to describe behaviours for externalised activities (i.e. communication) than perceived internalised ones (i.e. decision-making).

Some respondents perceived training and regulatory compliance as a process (something that is 'done') and were unable to identify how overt behaviours could evidence this. The multi-cultural working environment was recognised as presenting additional complexities. Behaviours which would demonstrate competence in this area were more difficult to identify for some respondents than others.

Issues identified whilst interviewing and analysing data are presented here to provide a context for the development of the behavioural marker system we propose. Key points are highlighted under separate competence headings hereafter.

## Code Distribution



**Table 1: Analysis Coding Frequency Data**

### 3.1. Leadership

It became apparent that not all respondents were able to differentiate between 'leadership' and 'management' and saw them as synonymous. It is interesting to note that STCW competences have been constructed in a way which delineates effective leadership behaviours but not effective management skills.

Where strong positive or negative experiences of leadership had been experienced, this remained with respondents for many years. One interviewee described a leader he had sailed with over 30 years previously as:

'5 feet 3 inches tall and a rampant megalomaniac... he was such a dreadful man to work for that actually you would almost have happily watched him go aground, just to spite him. It was that bad.'

He clearly recalled the negative effects on motivation, efficiency and well being that arose from it. Ineffective leadership not only adversely affects the efficiency of operations but has a toxic impact on crew morale. This was highlighted by another respondent:

'Everybody spent their whole time either avoiding him, avoiding talking to him, plotting against him. It was dreadful. It was awful to work ... probably the worst ship I've ever sailed on. And it was all down to one person. And the interesting thing was that he then went on leave and the atmosphere on board changed within 48 hours, which just goes to show how one person can affect and poison a whole ship's company.'

Conversely positive leadership runs through a ship like the heart of a rope.

'I can go on our ships today and I can pick up on the atmosphere within five minutes of being on board that vessel, if it's happy, if it's on the ball, and I can tell you a lot of things that are wrong on that ship without looking, without even leaving the ship's mess deck. And that's down to the fact that they're being ...not just managed, but led.'

A number of respondents' were able to recall how positive examples of leadership had clearly influenced their own attitudes towards effective leadership and how

they modelled it. Leadership is seen as a subtle inter-weaving of task skills and interpersonal attributes:

‘I think it was a combination of self-assuredness, technical ability, almost expertise, their ability to communicate to people above and below them in the rank hierarchy, and their professional sensibilities I think. I guess fairness and self discipline were there too, that they wouldn’t ask anything of anyone that they didn’t see themselves.

‘...the most effective leaders are people who are good communicators, because I think you have to be a good communicator to be a good leader... people who can do it without falling back on rank or privilege. Because if you actually have to fall back on that, you’ve probably failed anyway.’

For a minority of respondents the relationship between technical competence and leadership was important. For example, a master who did not demonstrate a high level of competence in ship handling would not be considered an effective leader.

‘It’s usually the immediate starting point of a workforce is “What the hell does he know? He’s never been on ship in his life.”’

For others the link between technical competence and leadership was less explicit and an ‘average’ performer in some areas of technical skills could still be viewed as an effective leader.

‘I’ve seen exceptional leaders that have no technical capability at all’

### **3.2. Team working**

Team working is not identified within the revisions to STCW as a specific competence: rather it is referred to in terms of ‘necessary team member(s)...’ and ‘...consideration of team experiences.’ However, the impact of positive and negative behaviours around teamwork was clearly identified, and thus we believe it to be an essential behavioural marker.

‘You’ve got to put the effort in...and make them feel important and part of the team.’

‘The team is relaxed with each other, they work well together and therefore might communicate more...’

‘People need to be, in my opinion, safe, happy and successful at sea.’

‘Behaviours of the team are inclusive rather than exclusive.’

‘...people genuinely care for each other, ultimately that has an impact on the operation.’

The benefits of working effectively together were seen as significant and trust within the team deemed to be crucial, whether that was a small watch keeping team or as a larger departmental or whole ship team. Some respondents made a link between effective leadership behaviours and effective team performance:

‘You’ll see a ship that where the people on board have purpose, know what they’re doing; they’re proud of it, all the rest of it. That comes out of good leadership. I think most of us can walk on board a ship and usually as you walk on board you instantly know whether it’s a well-run ship.’

### **3.3. Communication including challenge & response**

Respondents described a wide range of behaviours relating to the area of communication. Behaviours demonstrating effective coding and transmission of communication by a variety of means (verbal, written and visual) were described as were behaviours for decoding and reception.

Several interviewees recognised the difficulties of communicating with non-native English speakers and where the primary language was not uniform:

‘I’ve found personally that communication, once you move out of your own culture becomes more difficult’

‘...it’s a consideration of a potential language problem...’

‘I had a second engineer with me when I was sailing as a chief, who would mix the word ‘hope’ and ‘think’. So if I said to him “I suspect the piston is broken”, he would say “I hope so”. So what he means is “I think so”

However respondents proposed a number of strategies for managing this such as:

- Reducing the complexity of sentence structure;
- Moderating the speed of communication;
- Avoiding non-standard terms or 'slang'; and
- Questioning to confirm understanding. Using 'closed loop' communication (or similar process).

These strategies form the basis of a number of related behavioural markers.

When asked to describe behaviours associated with 'Questionable decisions and/or actions result in appropriate challenge and response' it became apparent that the word 'challenge' was not uniformly interpreted. For a minority of respondents the term 'challenge' had a connotation which suggested a challenge on the authority of senior officers, and was therefore considered an unacceptable behaviour.

'for some people it (*the word challenge*) has a negative connotation, ..it's a challenge to my authority'

'..so with challenges upwards, is in my opinion a lot more difficult on ships because they've got ranks.'

'the Chief Officer will not challenge the master, he will notify the office and we will challenge the master'.

For others the concept of challenging inappropriate actions or decisions was already embedded within their view of safe and effective ways of operating and as such presented them with little difficulty in identifying appropriate behaviours for challenging and responding to such a challenge.

'I would expect the person to say something'

'I'd be very, very unhappy if somebody spotted something and didn't say anything'

'it needs to be done with respect'

Respondents were also very clear in how a challenge should be responded to, with common themes around:

- Acknowledged positively (i.e. ‘Thank you...’)
- If the challenge is not accepted an explanation should be given immediately if time allows, or later.

Again, some respondents clearly linked this to other areas such as communication, situational awareness and leadership where creating a culture in which challenge and enquiry is fostered was identified as a positive behaviour.

### **3.4. Decision-making**

Identifying behaviours relating to the decision-making process was challenging for many respondents and several described the difficulty of

‘getting inside somebody’s head to see what is going on’

to identify if/what decision-making activity was being undertaken. The process of decision-making could be viewed in some circumstances as an internal cognitive process that is not shared with others until action is taken. The internalised decision-making process runs contrary to other competences such as ‘sharing accurate understanding of current and predicted vessel state’ and ‘communication is clearly and unambiguously given and received.’

STCW identifies the stages of decision-making at both operational and management level as:

1. Situation and risk assessment
2. Identify and consider generated options
3. Selecting course of action
4. Evaluation of outcome effectiveness

Both positive and negative behaviours were identified for situation and risk assessment aspects of decision-making, incorporating a range of resource management concepts such as sharing ‘mental models’, workload management and effective communication.

‘You want the right amount of information and you want it in a timely fashion’

‘If I do this then this could happen.’

‘We are looking for a mutual understanding between the people involved.’

Absence of relevant activities and actions also predicated a failure of effective decision-making.

‘I’d probably notice more if they weren’t doing it’

Some people indicated that with current manning levels on vessels it would be difficult to observe behaviours relating to stage two - identifying and considering generated options - as there may only be one watch-keeping officer (supported by a rating) who may not have another officer with whom to discuss options.

Where more than one officer was present there appeared to be greater emphasis placed on involvement in the process.

‘I would certainly expect today, not in the past ... to see some level of discussion between the OOW and the master to verify each others’ view on the safest course of action’

‘...nowadays there isn’t necessarily the depth of experience so it’s good to involve other people...’

‘...options should certainly be communicated and understood.’

Others noted that whilst a course of action may be selected, it remained important to remain flexible in what are naturally dynamic situations:

‘...if you’re faced with a choice of options, (you need to look at) which one gives you the most optionality in the future.’

‘They may not have dismissed other options...and they may revisit it further down the line. So there may be contingencies.’

Outcome effectiveness tended to be measured by the successful outcome of the job, manifesting as ‘the job gets done’ or ‘the collision is avoided’. There appears to be little emphasis placed on evaluating whether the outcome was

achieved by the most effective route, that is the optimal decision was made rather than any decision which avoided an undesirable outcome was acceptable.

‘the right thing has been done when it’s been conducted safely, in accordance with guidance and the ISM and everybody is happy.’

‘the fact that the job had been completed’

The implications of this apparent lack of effective evaluation may impact on future decision-making strategies, with the possibility that a sub-optimal mental model is used for future situations, and risk taking behaviour is reinforced.

### **3.5. Situational awareness**

Situational awareness engendered more positive behaviours than ineffective ones which were clearly linked with other factors such as communication, leadership and team-working and the importance of seeing the bigger picture:

‘assuming roles have been given, then people talking about traffic ... talking about where the vessel is in relation to track... about under-keel clearance... about what’s coming up ahead, tugs, hardly anyone being left out, and everybody feeding in and ensuring that others knew what the current status was’

For some, the effective attainment of situational awareness had a core component of technical capability relating to an individuals ability to elicit information from equipment available to them.

There was also recognition from respondents about the cognitive levels of situation awareness in line with the model developed by Endsley, (1995). Endsley’s model proposes three levels of situation awareness, namely perception, comprehension and projection. Perception is evidenced by:

‘You’re getting it (*information*) from all sources...’

‘seeking input from the various instruments, from the various people’

Comprehension is supported by:

‘...an awareness of everything that’s going on around you.’

‘...he is stepping back and he can see everything...’

And the highest order level of projection is supported by:

‘They will anticipate...’

‘...calmness, concentration and by relevant concentration and information, i.e. talking about the task ahead...’

### **3.6. Adherence to rules**

While there was universal recognition of the importance of adherence to international maritime conventions, regulations and national legislation, the plethora of documentation was seen as a serious problem:

‘I think what we need to do, not just in (our company) but in other companies is to get out of this idea of creating a million page SMS.’

It therefore depends on how much support a company may provide in providing more focussed documentation and guidance pertinent to the role and the operational area of the relevant vessel and its officers. Some respondents thought it would be helpful to have the mandatory separated out from the guidance in order to assist them rather than have “a telephone directory of rules” through which they would have to wade.

Operational adherence is a fundamental factor in the training in any competent ships officer, though this may be functioning more at a sub-conscious rather than conscious level:

‘I think it is possible in some cases, you could be doing something which is professionally correct without actually know why you are doing it...’

There was also a recognition that what might be instilled as part of company and statutory procedure may not always translate into the reality of what takes place on a vessel:

‘There is ... disconnect between what is in the paperwork, what is in the files and what is actually happening onboard.’

There is a danger of a tick box approach being taken in order to satisfy regulatory authorities and company auditors and behavioural markers would need to take account of this.

### **3.7. Training and competence**

Issues were raised as to whether team member competence genuinely reflects formal qualifications. Concern was expressed that a proper discussion should be held both at induction (and on an ongoing basis) regarding strengths and weakness and what training needed to occur to match operational requirements. Some commented that training which had taken place in certain parts of the world was less robust than that carried out in the traditional maritime nations.

‘there’s a lot of people...(whose *qualifications*) aren’t worth the paper they’re written on’

‘I had a BA wearer once, who obviously I could see wasn’t comfortable wearing a BA so then I talked to him and he started telling me his experiences and he had only done a two day course in Mumbai and they had watched how to wear a BA kit on a video and he had been given a certificate and here we were expecting him to be a member of the fire party.’

Several respondents identified that it was important to observe an officers capability when they first joined a ship until there was a degree of comfort that they could perform effectively:

‘A certificate of competence...doesn’t mean that you are a competent watch keeper.’

For one respondent it was important to assist a team member ‘not to fail’ by discussing not only there strengths but there training and development needs and arranging for them to be remedied. However, this discussion needs to take place in a constructive fashion and not all ships officers have a natural ability to assess

robustly. The company also needs to have a robust appraisal system / skills matrix through which formal training in assessment may be delivered as opposed to “the swimming pool method where an officer is left to sink or swim” in assessing others.

The bottom line for several interviewees were interweaving team competence and capabilities and operational requirements was that individuals should be able to operate safely, and not put themselves or their team in danger:

‘What you are looking for is somebody that is safe...ultimately and somebody that you can trust.’

This component of trust was illustrated by several respondents who had served as masters at sea who indicated that what was important to them was the ability to sleep well at night knowing that the vessel was in safe hands.

### **3.8. Resource allocation**

The effectiveness of allocation, assignment and prioritisation of resources was measured by several respondents in terms of a successful outcome which was similar criterion in decision-making. Further it was also measured by what wasn't happening negatively:

‘If the bridge team is working well, nobody's appearing to be doing too much and getting overstressed or overworked, there is time for any one of them to come around and have a look to see what someone else's doing and that other person isn't (saying) ‘what are you doing?’ ... if there is this decent flow of information and gentle movement of people around, that's an indication that everybody's working and nobody's overworked and hopefully nothing's getting missed.’

Key factors were communication of the task and the ability of the team to clarify understanding and to highlight potential risk issues:

‘...this boils down to understanding of the briefing, the briefing is clear, that the task given are right and the equipment is probably good. And safety I suppose, that all the people concerned ... are fully aware that under no circumstances do they undertake an unsafe task, and that whatever they've

been given they have the gut understanding that if its not going correctly to stop. (They) should be aware that they also have the right to feedback, to delay things without fear of retribution.

There was also awareness that resource allocation and assignment would be focussed differently depending on the situation:

‘Your priorities are different if you’re on coastal passage rather than when you’re on a deep sea passage and the traffic situation and those priorities get less and less the further you get away from land.’

#### **4. Development of the behavioural markers**

Behavioural markers were developed and refined through the process of response coding, which were then distilled into prioritised markers. These proposed markers will be tested for validity and reliability in the second year of this research. It is anticipated that these will be measured in bridge, cargo and engine room simulated environments

This will allow the markers to be refined into a user friendly matrix of positive and negative markers which can then be applied with some adaption to processes of selection, appraisal, training and promotion.

The example shown below in table 2 has been tentatively prioritised - less crucial markers have been italicised.

**Table 2: Example behavioural markers**

Effective communication		High performance markers	Low / Weak performance markers
Communication is clearly and unambiguously given and received	Establishing shared understanding	<ul style="list-style-type: none"> <li>✓ Plans, expectations and roles are explained and understood by those concerned</li> <li>✓ Clear and concise briefings and updates are given at appropriate times</li> <li>✓ Communication is followed up by questioning and/or observation to confirm understanding</li> <li>✓ Standard maritime English is used where appropriate</li> <li>✓ Encourages responses from all levels of personnel</li> <li>✓ <i>Check lists or trigger cards are used to aid briefings</i></li> <li>✓ <i>Range of communication methods (spoken word, written instruction, hand signals etc) are used during message transmission.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Fails to communicate plans and expectations</li> <li>• Fails to check that recipient has understood plans and expectations</li> <li>• Briefings are unclear, lengthy or delivered at inappropriate times</li> <li>• Non-standard terminology is used resulting in confusion of the recipient(s)</li> <li>• Communication is one way and fails to allow or encourage questioning or feedback</li> <li>• <i>Checklists or trigger cards are not utilized to support planning and briefing communications</i></li> <li>• <i>Communication methods used are inappropriately limited to a single media (ie spoken only, written only etc)</i></li> </ul>
	Style of communication	<ul style="list-style-type: none"> <li>✓ Communicator uses appropriate sentence structure, terminology and speed of delivery acknowledging that not all attendees may share a common language</li> <li>✓ Communication acknowledges cultural diversity</li> <li>✓ Type and quantity of communication is appropriate to the situation and explicit and specific</li> <li>✓ Clearly puts forward their views whilst listening to others</li> <li>✓ <i>The right medium is selected to deliver the message (face to face, radio, email, telephone, etc)</i></li> </ul>	<ul style="list-style-type: none"> <li>• Communication fails to recognize that crew may be confused by inappropriate sentence structure, terminology and speed of delivery</li> <li>• Fails to acknowledge cultural diversity</li> <li>• Language used is vague and open to more than one interpretation</li> <li>• Communication delivered in a passive or aggressive manner</li> <li>• Communication is one way and fails to allow or encourage questioning or feedback</li> <li>• <i>Communication is delivered via an inappropriate medium</i></li> </ul>
	Feedback	<ul style="list-style-type: none"> <li>✓ receives feedback constructively</li> <li>✓ Communication results in appropriate action being taken</li> </ul>	<ul style="list-style-type: none"> <li>• Feedback is not welcomed or encouraged</li> <li>• Communication does not result in appropriate action being taken</li> </ul>

## 5. Considerations

In advance of adopting a behaviour marker system, a number of factors need to be considered, these comprise of:

- Cultural implications - eastern versus western cultures.
- Must have shipboard and shore side 'face validity' - markers which are seen as irrelevant, overly complex and intangible will not be fully adopted.
- Flexibility and adaptability to meet individual organisational needs and requirements - must, inter alia, match ethos, values and maturity of the organisation and supported by appropriate induction, appraisal and promotion processes.
- Recognition of the variety of factors which can impact on behaviours - including personality, external pressures, fatigue, sickness and stress as well as the behaviours of other team members.
- Behavioural marker assessors need to be trained to observe and apply markers in an objective manner.

It should also be noted that within the structure of STCW competences are replicated in both the operational and management levels. However, we suggest that at the management level, the strategic nature of their roles needs to be recognised within the marker system. For example, under the competence *Allocation, assignment and prioritisation of resources*, there is a marker which refers to *Recognises and balances the importance of safe operations*. We would expect a Master or Chief Engineer, for example, to take into consideration the commercial priorities in conjunction with safe operations in order to demonstrate that they had a clear overview of the impact of their decision-making.

## Conclusions

We set out to establish behavioural markers specific to our industry which would enable resource management and leadership competencies to be evaluated against the framework of STCW. We have been able to propose behavioural markers which can now be validated in a simulated environment as the next stage of this

research. We have remarked that the broad nature of statements in STCW is mirrored in the by the myriad of interpretations of these statements.

We suggest this could be attributable to the fact that some of the behavioural markers pertaining to evaluation criteria - even once made more specific - are less tangible to identify. Some competencies are overt. Communication and situation awareness (or lack of it) can be identified more clearly than those which require the identification of how cognitive processes are operating, which by their very nature are covert unless the 'mental models' are consciously shared.

In interviewing our participants, it was clear that some areas were very emotive for them. In particular, the effects of toxic leadership behaviours were such that they were still recalled with much feeling many years after the event. It is clear that the impact of effective leadership, open working culture and strong teamwork can make the difference between a high performing crew operating safely and efficiently, and one that fails to achieve the potential of those on board with its associated positive effects. These include both human and commercial outcomes. As one of our respondents observed, a safe, happy and efficient ship is a goal to which everyone in the industry should be striving to achieve.

This philosophy has been endorsed by the universal willingness of the stakeholders that we approached to participate in our research - they believe, as we do, that resource management, leadership (and their associated behavioural markers), are fundamental to progressing the effectiveness of the industry to attract and retain high calibre officers who then have the potential to carry their expertise into the wider maritime industry.

## References

IMO (2010) The Manila amendments to the STW Convention and Code

Endsley, M. (1995) *Toward theory of situation awareness in dynamic systems*.  
Human Factors 37 (1)

Gatfield, D. (2008) *Behavioural Markers for the Assessment of Competence in Crisis Management*. Southampton Solent University.

Klampfer, B., Flin, R., Helmreich, R., et al. (2001) *Enhancing performance in high risk environments: Recommendations for the use of Behavioural Markers*. Daimler-Benz Foundation

[http://www.abdn.ac.uk/iprc/documents/GIHRE21\\_enhancing\\_perf\\_recommendations\\_4\\_beh\\_markers.pdf](http://www.abdn.ac.uk/iprc/documents/GIHRE21_enhancing_perf_recommendations_4_beh_markers.pdf) (downloaded 26 January 2010)

MCA (2006) *Leading for Safety - A Practical Guide for Leaders in the Maritime Industry* <http://www.mcga.gov.uk/c4mca/leading-for-safety.pdf> (downloaded 26 January 2010)

## **Bibliography**

Flin, R., O'Connor, P. and Crichton, M. (2008) *Safety at the Sharp End: A Guide to Non-Technical Skills*. Ashgate, Aldershot.

Joint Aviation Requirements: Translation and Elaboration of Legislation (2002) *Final Report - JAR TEL - Consolidation of Results*. European Commission, DG TREN.

Lowe, A.R., Hayward, B.J. and Dalton, A.L. (2007) *Guidelines for Rail Resource Management*. Rail Safety Regulators Panel, Queensland.

Roop, S. et al. (2007) *Railroad Crew Resource Management (CRM): The Business Case for CRM Training in the Railroad Industry*. US Dept. of Transportation, Washington

RSSB. (2009) *A model for the measurement of non-technical skills and the management of errors in the simulator*. Rail Safety and Standards Board, London.

Yule, S., Flin, R., Rowley, D., Mitchell, A., Youngson, G.G., Maran, N., Paterson-Brown, S. (2008) *Debriefing surgical trainees on non-technical skills (NOTSS)*. *Cognition, Technology & Work*, 10, 265-274