

# MCA Insight Article – Why the Human Element

## Why the Human Element?

In their seminal 2010 work Gregory & Shanahan<sup>1</sup> posed the question “*where is safety – in people or in rules?*”. Whilst recognising that the traditional focus on rules and procedures seemed a reasonable way to improve safety, the crucial role of people was increasingly apparent. They contended that whilst rules have a significant role to play, real safety lay in the expertise, understanding, risk mitigation and decision making of operators at all organisational and regulatory levels. The more we learn about human behaviour, capability and performance the more their assertion proves to be true. This raises another question – “*what do we do about it?*”

## The Traditional Approach

The maritime industry by nature is very technical, where it is natural to look for technical and procedural solutions to drive forward improvements in safety and operational performance. This approach has been applied for decades, probably much longer, and has been successful in improving standards. Firstly, the 20<sup>th</sup> Century saw great technical advances in ships and ships’ equipment which led to far greater operational capability. This has picked up pace into the 21<sup>st</sup> Century particularly with the digital age and modern electronic equipment. Secondly, the increasing complexity of operations gave rise to a commensurate increase in formalised operational procedures and management systems. However, accidents continued.

Throughout the 20<sup>th</sup> Century the international seafaring community, through IMO, tried to address safety through developing a culture of compliance with prescriptive regulation, underpinned by effective enforcement supported by appropriate penalties for transgression, SOLAS<sup>2</sup>, MARPOL<sup>3</sup>, COLREGS<sup>4</sup> and STCW<sup>5</sup> being the instrumental Conventions. Whilst this approach had some success it was not a panacea, accidents continued, people were blamed, punished and careers ruined.

At the end of the 20<sup>th</sup> Century a cultural shift towards self-regulation was developed, encapsulated in the ISM Code<sup>6</sup>. This represented a step change, recognising that a one-size-fits-all prescriptive approach was neither effective nor possible. It enabled operators to assess and manage their own risks in the most effective way for their operation. Again, it has had some success, but accidents, including preventable accidents continue.

## The Common Factors

These approaches to addressing safety share some common factors;

- i) They are based upon a comprehensive set of rules, regulations and procedures. Compliance was supposed to ensure safety.
- ii) They assume crews are fully trained and proficient in all respects.
- iii) They assume the rules, regulations and procedures can be complied with at all times.

The focus is on the rules, regulations and procedures, not the human struggling to operate them, and that can be problematic. Not only is the crucial role of people often overlooked, they are also seen as the weak link in an otherwise supposedly sound system. They are seen as a source of error and something to be conveniently blamed when things go wrong. But this not a fair reflection of the real world and we are missing a crucial opportunity to identify safer and more effective ways of working through a better understanding of people.

## The Regulatory Environment

Rules and regulations generally stem from two sources, either national or international regulation; or company based policies, procedures and management systems. This generates a mass of information for the seafarer to absorb, understand and follow. When things go wrong we very often see people blamed for failing to comply with a procedure, procedures are dissected and any perceived weakness

“fixed” by introducing yet another procedure. But accidents continue.

### **The Human Factor**

It is impossible to write a set of procedures that covers every potential scenario or subtle variation in work demand, or enables crews to deal with the many novel situations that inevitably arise whilst simultaneously remaining compliant to the letter of the procedure. Gregory and Shanahan<sup>7</sup> explain the concept of the world as a complex adaptive system where it is impossible to predict every possible state. In these situations, we need to rely on the expertise, understanding, risk mitigation and decision making of operators at the front line and recognition of this at all organisational and regulatory levels. And this involves competence, proficiency and trust. It also requires an understanding that things will, occasionally, go wrong despite the best intentions and efforts of operators. People do not go to work to have a “bad day”. Most of our efforts are focussed on doing things right. Most of the time things do go right despite the complexity and adversities of work. We should focus more on how humans constantly adapt to make sure things mostly do go right, and we need to be more understanding and more capable of intelligent, non-judgemental learning on those rare occasions when things sadly go wrong.

The MCA is very much aware of the pivotal role people play in safety, an awareness that underpins the thinking behind *The Human Element – a guide to human behaviour in the shipping industry*<sup>1</sup> and *Being Human in safety critical organisations*<sup>7</sup>. Industry has much to gain in operational and safety performance through focussing more intently on the human in the system. To achieve this, we need to develop and promulgate a better understanding of the mental and physical capability of human beings and how this translates into normal behaviour. Only then will we have a chance of developing procedures, practices and management systems that meet the needs of the operators and enable them to get the job done in a safe and efficient manner. This is the key – the procedures, practices, tools and equipment need to be developed with normal

human capability at the forefront of thinking, and should not be something to which the human must adapt to make them work in less than optimal circumstances. As the saying goes, don't man the armaments, arm the man!

### **A Way Forward**

If we are going to arm the man effectively we need to reassess our approach to human factors.

**Human Centred Design:** the concept and principles of human centred design are well known but are implemented with inconsistency, ranging from very effective to not at all. This is particularly true in the maritime industry where we seem to be playing catch-up with some other industries. Ships and ships' equipment should as a matter of course be designed with the human operator in mind, taking full account of human physical and mental capabilities. The tools and equipment must support and enable effective and safe working, not be a barrier to doing so.

**Human Centred Procedures:** similarly, the way we ask crews to operate should take full account of the same human capabilities. Procedures should be centred upon the task as it is required to be done at the front line, not as imagined how it should be done in head office. But we must recognise that it is impossible to write procedures for every state or scenario. Operators need the capability, and authority, to deal with all situations in the most effective way, based upon the best principles of proficient seamanship rather than prescriptive micro-management. And whilst they should be responsible and accountable for their actions, undesirable outcomes do not necessarily attract culpability.

**Professionalism:** this is so much more than competence, and is critical to success. Maritime training traditionally focusses very much on technical skills and competence, perhaps to the omission of other professional qualities that bring success.

Mandatory in other industries, formalised training and education in human factors has so much to offer the industry yet we seem reticent to embrace the opportunities. This would be particularly beneficial in areas such as safe behaviour and performance, communication, learning, skill maintenance, and would help designer, operator and manager alike, leading to potential significant gains in operational and safety performance. And it goes without saying, this is even more beneficial during emergency and crisis situations.

For instance, a rudimentary understanding of the functioning of the eye and visual system can enable much more effective scanning and detection of potential problems before they arise. An understanding of the effects of poor light, or adverse motion on human perception and decision making may yet yield untold benefit.

For further information on human performance and limitations see Human Performance and Limitations for Mariners by The Nautical Institute<sup>8</sup>, and for some performance influencing factors (e.g. the Deadly Dozen<sup>9</sup>) see MGN 520M.

Similarly, a greater emphasis on nurturing non-technical skills, both operational and management, would provide a cohesive force on board to enable much more effective working relationships. The 2010 Manila amendments to STCW<sup>5</sup> leadership and management requirements, and the UK's Human Element Leadership and Management<sup>10</sup> course are a step in the right direction, but so much more could be done to improve operational and safety performance through human factors – a potential consideration for future revisions to STCW perhaps? And this needs to extend ashore, for a common complaint from seafarers is the lack of understanding and cohesion between ship and the shore side company.

We need to move towards a state of more than simply proceduralised competence, but one of proficiency and expertise where most operators are capable of effectively dealing with the many novel and demanding situations they face in

reality above and beyond anything capable of being captured in procedures or a safety management system. In essence, we need to build a strong capacity for individual and organisational resilience<sup>7</sup>.

We should not ignore existing standards of training and competence, in particular the risk of skill fade, the need for regular refresher and re-qualification training, drills, familiarisation and the impact of automation. Skill fade is highly probable for activities we don't use and practice regularly, particularly traditional seafaring skills in a modern technological world. This becomes high risk for emergency or safety critical activities at precisely the time we need slick, faultless operation and teamwork. These are the situations where we really need proficiency built upon effective human interaction.

Ideally, we will take more account of our continually advancing understanding of human factors and develop effective training interventions at all levels fit for the operational demands 21<sup>st</sup> Century shipping.

**Seafarer Wellbeing:** there are moral, legal and operational drivers for looking after seafarer wellbeing. Needless to say, a happy, healthy, well-motivated workforce is more likely to be a productive and safe one. Seafarer wellbeing is currently a hot topic and should be a joint responsibility between seafarer and company.

MCA is working with several partner organisations to address many of the wellbeing issues identified. There are many aspects of life aboard that can impact on a seafarers' physical health, but we are becoming increasingly aware of the need to look after mental health which can have an equal, if not more devastating impact on seafarers and their families. While we recognise the need for ships to have good levels of habitability, diet and recreational activities, shore leave, living and working conditions (to MLC<sup>11</sup> standards), the role of organisations in supporting crew through difficult times, particularly effective communications with the company and with friends and family is increasingly apparent.

**Fatigue:** much work has been carried out into fatigue in recent years, most notably the EU funded HORIZON project<sup>12</sup>. MCA followed this with a couple of short term fatigue studies into the 8-hours on/8-hours off watchkeeping pattern<sup>13</sup> and a diverse theoretical study using mathematical modelling into a wide range of watchkeeping patterns<sup>14</sup> some of which are not currently permitted under STCW, but useful to study all the same.

The conclusion may seem obvious, but we need the scientific data to give objective credibility to the argument, common sense alone is not enough. It is clear that most watchkeeping patterns are not good for maintaining high levels of alertness, but some are worse than others. Initial research suggests some currently not permitted under STCW may be less fatiguing than permitted patterns, but more work is required to verify this. Further, long working hours with restricted rest, broken or poor quality sleep, and long tour lengths are detrimental to operational performance and possibly longer term seafarer wellbeing. A fatigued seafarer is much more likely to make a mistake, possibly a serious one. We need to base our practices on scientific evidence and accept that the problem exists and take effective action, within the possibilities of a 24/7 industry. MGN 505(M)<sup>15</sup> provides further advice and guidance on fatigue management.

**Intelligent Use of Intelligence:** accident and near miss reports provide valuable information for safety improvement but to achieve this we need to use the information intelligently. We need to get away from the fallacy that many near miss reports somehow equates to a dangerous operation – they are almost certainly taking their responsibility for continuous improvement seriously. However, whilst incident and near miss reports provide metrics on the nature and frequency of accident and incidents, we need to drill down into the “why” an incident occurred i.e. the human factors and organisational factors underlying the incident. As Dekker<sup>16</sup> explains, to gain any real benefit from a review of an incident

we need to understand the mind of the operator at the time, not use the artificial benefit of hindsight to derive our own interpretation of events. This is where a greater understanding of human factors, particularly those that drive human behaviour and performance would help greatly, certainly in identifying issues after the event, but potentially before, thereby helping avoid the incident altogether. CHIRP<sup>17</sup>, MARS<sup>18</sup> and company reports are all potentially highly valuable sources of information. But this does require training and proper understanding of human factors.

**The Individual and the Organisation:** *“People make mistakes. Organisations make it possible for them to be really serious”*<sup>1</sup>.

Accident investigations have traditionally concluded “human error” as the cause. But is this a useful term? Does it help us identify why something went wrong? Does it help us prevent it happening again? Or does it just conveniently point the finger of blame at one or a few crew members?

We need to know not just what went wrong, but why it went wrong, how it went wrong and more relevantly how we can prevent recurrence. Front line crew operate within the context of the organisation, and the complex interaction of organisational issues are often implicated in accidents. The report into the Herald of Free Enterprise disaster in 1987 identified serious individual and organisational failings at many levels in the organisation<sup>19</sup>. The dramatic training film produced by Walport<sup>20</sup> illustrates clearly how a commercial decision taken at senior management level can have ramifications leading to the grounding of a vessel. It identifies interactions that may not be immediately obvious but can be identified through evaluating human factors. Rarely is a single individual culpable, we need to recognise this, remove the understandable emotion and look for a more just, fair and productive outcome. As they say, find causes not culprits.

However, for organisations to learn, the culture must be right. To learn, organisations need information, and that information must be provided by the front-line operators. But for that to happen, the operators must know that information they provide will be treated fairly, confidentially and with respect, and that it will be used for its intended purpose, i.e. making safety improvements. And this requires trust at all levels in the organisation.

The concept and principles of Just Culture are well known, if not particularly well implemented. This is not the right place to discuss Just Culture in depth, indeed it could be the subject of an article in its own right. However, suffice to say that a properly implemented Just Culture demonstrably improves operational performance and safety and develops organisational trust. Just Culture is enshrined in European legislation in aviation<sup>21</sup> and aircraft operators are required to demonstrate compliance within their management systems. We are a long way from this in the maritime industry.

Just Culture is not an end in itself, but it is a key factor in cultural development and is an underpinning component in developing High Reliability Organisations (HROs) where the impact of a safety failure could be catastrophic, operationally, reputationally and financially. Hudson's Just Culture Model<sup>22</sup> and Baines Simmons FAiR<sup>23</sup> are examples of principles and methodologies that help organisations assess and manage failures and lead towards continued improvement. Hudson & Parker's<sup>24</sup> safety culture ladder takes this concept further and shows how, through appropriate use of resources, effective process and cultural development, companies can aim to excel in safety performance. MCA's HEAT<sup>25</sup> tools provide self-assessment tools for ships and companies to assess their current level of safety culture and identify areas for improvement. Similar self-assessment tools are available from other organisations.

The role of the organisation cannot be overemphasised. Masters and their crew are well trained professionals who are capable of

operating their vessels effectively. However, they cannot do it alone and the organisation needs to support its crew and vessels in routine operations, but more critically in times of adversity. Understanding the needs of the human from a human element perspective will enable a far more effective and pragmatic interaction.

### Resources

Paying more attention to the human element will obviously have some resource implications regarding, time, effort, training etc. and this must be recognised. However, this should be viewed in terms of investment rather than cost. The saying "*if you think safety is expensive try having an accident*" may be something of a cliché, but is fundamentally true.

The maritime industry has made significant gains through technical advances. Human and organisational factors, whether through active or latent failures, still predominate accidents, and turning effective attention to the human element offers the best chance of making the further significant improvements in safety that we require.

### Conclusions

This is an overview of just some of the many human element issues we face in safety critical organisations. Whilst not a magic carpet ride to an accident free future, serious consideration of the following may help.

**Human Factors Training:** develop formal human factors training for operational seafarers, appropriate shore side personnel, accident investigators, designers and regulators.

**Technical training:** don't overlook existing technical and professional training, but recognise the risks of skill fade and associated operational problems that may occur as a result. Recognise that technology will go wrong.

**Research:** continue and expand the many strands of excellent scientific research into all aspects of human factors at sea.

**Data:** use data from accident investigations and near miss reports intelligently.

**Cultural development:** aim for continuous improvement in safety culture, acknowledge and use the many benefits of the Just Culture and Safety Culture Ladder concepts

**Wellbeing:** recognise there are moral, legal and operational grounds for ensuring the mental, emotional, social and physical wellbeing of seafarers. Recognise that fatigue can be a serious problem and take effective mitigating action.

**Build resilience:** crucially, accept the limitations of prescription and build individual and organisational resilience.

## References

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<sup>3</sup>International Maritime Organization, International Convention for the Prevention of Pollution from Ships, 1973 as modified (Latest Consolidated Edition 2011)

<sup>4</sup>International Maritime Organization, Convention on the International Regulations for Preventing Collisions at Sea, 1972.

<sup>5</sup>International Maritime Organization, International Convention on Standards of Training, Certification and Watchkeeping 1978 as amended (latest edition 2010)

<sup>6</sup>International Maritime Organization, International Safety Management Code (latest edition 2014)

<sup>7</sup>Gregory and Shanahan, Being Human in safety critical organisations, 2017

<sup>8</sup>The Nautical Institute, Human Performance and Limitations for Mariners, 2015

<sup>9</sup>Maritime and Coastguard Agency, MGN 520(M)

<sup>10</sup>Human Element Leadership and Management (HELM) training, MCA accredited, details from the Merchant Navy Training Board

<sup>11</sup>International Labour Organization, Maritime Labour Convention, 2006, as amended

<sup>12</sup>Warsash Maritime Academy et al, 2012, Project HORIZON-a wakeup call, <http://www.warsashacademy.co.uk/about/resources/final-horizon-report-final-as-printed.pdf>

<sup>13</sup>Maritime & Coastguard Agency, 2016, Investigation of the 8-hours on/8-hours off watchkeeping system, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/612588/Fatigue\\_Research\\_8on\\_8off.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/612588/Fatigue_Research_8on_8off.pdf)

<sup>14</sup>Maritime & Coastguard Agency, 2017, Modelling the hours of work and rest of merchant navy watchkeepers and tug crews, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/613099/Fatigue\\_Research\\_workload\\_modelling.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/613099/Fatigue_Research_workload_modelling.pdf)

<sup>15</sup>Maritime & Coastguard Agency, MGN 505(M)

<sup>16</sup>Dekker, The Field Guide To Understanding Human Error, 2006.

<sup>17</sup>Confidential Hazardous Incident Reporting Programme (CHIRP)

<sup>18</sup>Mariners Alerting and Reporting System, The Nautical Institute

<sup>19</sup>Herald of Free Enterprise, Report of Court No 8074, 1978

<sup>20</sup>Walport Training Films, The Human Element

<sup>21</sup>EU Regulations 996/2010 and 691/2010

<sup>22</sup>Hudson, Just Culture from Shell's Hearts and Minds Project 2004, extract reprinted with permission from Global Aviation Network (2004) in The Human Element-a guide to human behaviour in the shipping industry, Gregory & Shanahan<sup>1</sup>

<sup>23</sup>Baines Simmons, FAiR<sup>®</sup>2 System, A behaviour-based system for supporting and sustaining a Just Culture, © 2015 Baines Simmons Limited

<sup>24</sup>Hudson and Parker 2002, extract reprinted with permission in The Human Element-a guide to human behaviour in the shipping industry, Gregory & Shanahan<sup>1</sup> source: <http://info.ogp.uk/HF> (Mar 2010)

<sup>25</sup>Maritime & Coastguard Agency, Human Element Assessment Tools for Ships (HEAT-S) HEAT and Human Element Assessment Tool for Companies (HEAT-C)