Risk assessment at the sharp end

There is not much evidence to show that risk assessments, at least in their current form, are contributing to enhanced awareness of risks in the operational environment

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In 1966, the collapse of a coal mine in the Welsh village of Aberfan resulted in the killing of 116 children and 28 adults. Following the disaster, Lord Robens proposed a shift away from prescriptive rules towards a duty of care from those responsible for the ownership and management of high risk facilities. The duty of care implied that decisions on matters of risk and safety should be based on a systematic and documented assessment of risks.

Originally intended for the purpose of investment, policy and strategic matters, risk assessments are now being extensively applied at the 'sharp end' in high risk industries – that is, at the point where workers have to make difficult decisions in dynamic and complex situations – (in this context, during shipboard operations). The IMO describes this approach as 'a rational and systematic process for assessing the risks associated with shipping activity'. Moving away from punitive, reactive and prescriptive regulations, the underlying philosophy of the ISM Code is to impose a duty of care from the vessel operators through self-regulation and a proactive approach to risk and safety. A crucial aspect of the ISM Code is to ensure that all key operations are based on thorough risk assessments.

A risk assessment should:

- Communicate and raise awareness of the hazards and risks involved in an operation;
- Ensure that control and mitigation measures are based on systematic assessment;
- Facilitate decision making.

Unfortunately, it has now become questionable whether formal risk assessment achieves any of these three goals in 'sharp end' operations. In many ways, risk assessments have even become the antithesis of risk and safety management. Let us look at the problems with the way risk assessment is currently applied.

The starting point for a risk assessment is the identification of hazards associated with a particular operation or task (see central column). According to the IACS guide to risk assessments, a hazard is defined as 'a substance, situation or practice that has the potential to cause harm'. It is also the most common perception of hazards in the maritime and offshore industry. The tenuous nature of this definition stretches from an entire operation to a specific task or component depending on an individual's perception and position.

The conventional definition of a risk is 'a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.' A systematic approach to risk assessments consists of:

- Identification of operations (or processes),
- Identification of hazards associated with the operations,
- Identification of risks associated with the operations,
- Assessment of existing control measures,
- Introduction of new control measures as necessary,
- Evaluation of remaining (or residual) risks,
- Monitoring and control of risks up to the end of operation.

Hazard perception

For a sharp end worker, the perception of a hazard can become narrowly focused on the immediate task at hand. For example, hazards associated with carrying out hot work on fire mains can become focused on personal injuries, damage to welding cables, sparks, fumes, noise, rotating and grinding equipment. Not much thought is given to how a particular operation may interact with the wider system – for example the implications of an impaired fire extinguishing system on emergency response and crew awareness in the unlikely event of a fire.

Hazards are also dynamic and often cross boundaries across operations and tasks. The interaction between two or more unrelated operations may give rise to unexpected hazards. For instance, a survey in port may identify defects on a tank top which have consequences for structural integrity and hence cause delays to the vessel due to last minute changes to the loading plan. This may in turn require changes to passage planning and engine speed to make up time for arrival at the next port. A localised structural issue starts to disrupt an entire supply chain.

Similarly, routine operations on deck may become distracting, and hence a hazardous activity for a watch officer performing navigation in areas of traffic density. By the same token, a failure in dynamic position systems may affect cargo handling on an offshore support vessel.

Sharp end workers are often confronted with hazards that emerge abruptly and are far too difficult to contemplate in formal risk assessments. At times a single situation or event may not qualify as a hazard but a combination of such situations or events may do so. The weather conditions may still be at the edge of acceptable limits, the propulsion engines may have just become due for major overhauls, the bridge team may have nearly worked up to the limits of rest hours and the approach to the pilot station may require last

minute changes. We may fail to realise an emerging situation resulting from *concurrence* of activities operating at the edge of 'tolerable' limits. This is also a proposed theory of resilience thinking.

Confirmation bias

In order to improve the awareness of individuals about the hazards and risks involved in an operation, the ISM Code requires that all key operations are based on systematic risk assessments. However, there is not much evidence to show that risk assessments, at least in their current form, are contributing to enhanced awareness of risk. Consider the following interview with an AB on an offshore support vessel in North Sea Area:

Interviewer: What is the most dangerous job that you perform on the vessel?

AB: Transferring cargo to the rig when the weather is rough.

Interviewer: What can be done to improve the safety of the job?

AB: You have to be mindful, not get distracted and remain focused on the job. Don't think about your worries.

How can detailed risk assessments and planning deter people from acting mindfully? A thorough risk assessment and detailed planning carries with it with the assumption that the outcome of the operation will match our expectations. To a large extent this is the result of our professional knowledge and judgment (and when the outcome does not meet our expectations we improvise our response). This is also a reason to justify our position and pride as experienced professionals. But once we have predicted a certain outcome, we actively seek evidence that confirms our expectations and avoid evidence that may contradict them.

This may force us into a situation where we either overlook an escalating situation or overestimate the accuracy of our assessment. Put simply, we may become 'overconfident' and unaware of risks. In this case, detailed risk assessment and procedures merely confirm that our mental model of the situation is similar to what we anticipated in our plans. This behaviour is commonly termed 'confirmation bias' and is becoming an issue of concern in the maritime and offshore industry.

Workers may also deliberately ignore or avoid contradictory evidence when they think it is only going to increase their workload. Things get even more problematic when workload increases. Faced with multiple tasks at hand, the Master simply seeks assurance from the crew without getting into the details of the situation. The accident investigation onboard the *Herald of Free Enterprise* found a culture of 'negative reporting' within the organisation. The Master worked on the assumption that the watertight doors would be closed prior to departure unless he was explicitly informed otherwise.

There are valid reasons why we behave in this manner, particularly in our industry. Operations are highly dynamic and seldom provide opportunities for reflection and analytical thinking. Furthermore, the work environment is resource-constrained, which puts extra pressure on getting the job done.

Communication and feedback

Hierarchical crewing patterns and language difficulties do not necessarily encourage feedback when the outcome starts to diverge from our expectations or shows signs of escalation. Take the case of the following conversation during bunker operations in port:

Master: Bunkers all ok?

AB: All ok, Sir!

> "For a sharp end worker the perception of a hazard can become narrowly focused on the immediate task at hand"

The use of brief radio communication is a common practice in critical operations. However, implicit in such communication styles is a risk spectrum that swings from one extreme to another. The choices are either to report 'all ok' because there is no *immediate* threat, even if things are not going entirely as expected, or to create panic when the situation is out of control. Yet neither the operator nor the risk assessor intend to overlook the early signs of an escalating problem. Communication skills in a transnational work environment also become challenging as both parties are aware of their limitations and tacitly chose not to communicate beyond basic information.

Risk assessment and decision support

To examine the role of risk assessments in decision-making, let us consider the example of a vessel that comes alongside in port at 0600 hours. Cargo operations have commenced, divers are inspecting the ship's bottom, annual surveys are being carried out, tank cleaning is in progress, bunkers and provision stores are scheduled for delivery, a major crew change is planned and cargo operations are expected to complete at midnight for departure from port.

Now think carefully about the following questions from the perspective of a sharp end worker:

- There is no one standing by at the entrance to the tank I am cleaning: should I stop cleaning and exit the tank?
- Should I postpone bunkering operations until provisions and stores have been received?
- The weather has deteriorated, should I book an extra tug for unberthing?
- Is my team adequately rested and prepared for departing from port at midnight?

In these situations, formal risk assessments are the least useful tools in coming to the right decision. The choice between undertaking and rejecting a task has to be carefully considered in the context of an international labour market and questionable labour laws which place sharp end workers in a weak position. In actual fact there is not much choice but to follow as directed. It is challenging to exercise either assertiveness or authority in the absence of adequate institutional and organisational support. Newly promoted young Masters may struggle to assert their position when requesting an additional tug for unberthing when they are reminded that all the other Masters within the fleet manage perfectly well with only a single tug boat.

Faced with difficult choices, it would be helpful to have defined guidance and procedures when deciding between control measures. For example, should the wind speed increase beyond a certain Beaufort scale measure a tug should be ordered without hesitation. If the bridge team has not rested for at least six hours prior to sailing, the departure should be postponed. However, such details are rarely stipulated within the standard templates for risk assessments and safety management systems.

Control measures

Accurately assessing risk is important. But it is equally important to determine the effectiveness of control and mitigation measures. The behavioural actions of sharp end workers remain the most common control measure in risk assessments, although they are lowest in the hierarchy of control measures in most risk standards (including OHSAS 18001). In one case, it was noted that the design of the crane cabin was obstructing the view of the operator, but this was never picked up as a hazard in the risk assessment during lifting operations. Rather, the risk assessment was preoccupied with behavioural issues such as 'crew awareness'; 'proper use of personnel protective aid'; and 'slips, trips and falls'.

Design and engineering issues are the most effective control measures, but they rarely appear in risk assessments for sharp end operations. How exactly does the level of risk reduce from 'intolerable' to 'acceptable' by wearing a helmet during a lifting operation, or having a rescue team standing by outside an enclosed space during confined space entry? All this is not necessarily obvious to a sharp end worker. Risk assessment is one step removed from the end user and perhaps this is one reason why it loses its perceived importance for these workers.

Decision support

In most cases it is professional judgement that complements formal risk assessments in making difficult sharp end decisions. If these decisions achieve a positive outcome, that outcome is put down to the success of an effective safety management system. But when decisions translate into negative outcomes, the same professional judgment is classified as 'risk taking behaviour' or human error. The credit for success is shared across up to the highest level of the organisation while the condemnation for failure stays fixed at the lowest level of shop floor. Many seafarers believe that the trend towards detailed and documented risk assessment in sharp end operations is merely an attempt to limit liability and blame those at the sharp end in the event of an accident.

It is extremely concerning that professionals are increasingly becoming risk averse. A vessel manager stated that 'For every small thing we get a phone call from the captain asking if he could undertake the task. This is very annoying for a vessel manager when people don't take responsibility.' If risk assessment is intended to improve the awareness and decision-making of sharp end workers, clearly this objective is not being met. The erosion of decision-making skills at the sharp end is a warning of deeper problems within the industry. Perhaps we need to find ways to empower professionals to engage directly and creatively with risks and hazards.

Finding a better model

The problem is due in part to the probabilistic methods used for risk assessment. These sophisticated tools were originally intended for scientists, engineers and economists. Their application in the dynamic and complex situations that the sharp end workers face on a regular basis is highly questionable, particularly when they are not complemented with adequate support and authority. On the one hand, risk assessments are turning corporate objectives into simplified numeric expectations (ie KPIs) at the top while on the other hand even more complexity is being introduced at the sharp end. Instead, there are various evolving models of dynamic risk assessments such as STAMP, FRAM and interdependency modelling that have been successfully applied in high risk industries. Such initiatives should also be introduced within our industry.

Another practical solution to facilitate decision-making at the sharp end is setting boundaries for action. Traffic light systems have proven highly effective to guide operators in many industries, particularly for systems operating at the edge of threshold. The success of these systems is acknowledged in the underlying philosophies of reliability centered maintenance (for example lubricating oil analysis). Companies should think about ways in which such initiatives can be implemented and monitored through internal controls. Here it is important to examine how safety culture is empowering people to act without hesitation.

The perception of hazards, risks and control measures should be examined closely through audits, reviews and onboard visits. Often, audits and ship visits focus excessively on areas of marginal importance while ignoring the risks that matter the most. Partly this is the result of an organisational culture that remains stagnant in the language of compliance and at the behest of detailed checklists. In the absence of a genuine appreciation of hazards and risks, and the imagination to engage with them, risk assessments are nothing but fantasy documents having no perceptible link with reality.

How useful are shelves of risk assessments to the seafarer making a decision at the sharp end?