

International Safety Management – Safety Management Systems and the Challenges of Changing a Culture

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ABSTRACT: Over the past generation, the ISM code has brought forth tremendous opportunities to investigate and enhance the human factor in shipping through the implementation of Safety Management Systems. One of the critical factors to this implementation has been mandatory compliance and a requirement for obtaining a Document of Compliance (DOC) for vessels operating globally or at least internationally.

A primary objective of these systems is to maintain them as “living” or “dynamic” systems that are always evolving. As the ISM code has evolved, there have been instances where large organizations have opted to maintain a voluntary DOC from their respective class society. This has been accomplished with a large human factor element as typically an organizational culture does not always accept change readily especially if there is not a legal requirement to do so. In other words, when considering maritime training is it possible that organizations may represent cultural challenges?

The intent of this paper will be to research large maritime operations that have opted for a document of compliance voluntarily and compare them to similar organizations that have been mandated by international law to do the same. The result should be to gain insight into the human factors that must contribute to a culture change in the organization for the purposes of a legal requirement versus the human factors that contribute to a voluntary establishment of a safety management system. This analysis will include both the executive decision making that designs a system implementation and the operational sector that must execute its implementation.

All success and failures of education and training can be determined by the outcome. Did the training achieve its goal? Or has the education prepared the students to embrace a new idea in conjunction with a company goal or a new regulatory scheme? In qualifying the goal of a successful ISM integration by examining both mandatory and voluntary ISM implementation in large maritime operations, specifically ferry systems, hopefully we can learn from the various factors that have gone into each.

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1 THE VOLUNTARY DOCUMENT OF COMPLIANCE

For the purpose of this study, there are two large passenger ferry operations worldwide that currently maintain a Voluntary Document of Compliance. One operator, Canada’s BC ferries acquired their

Voluntary Document of Compliance (VDOC) in 1995 from Lloyds Register. The second operator, New York City’s Department of Transportation operates the Staten Island Ferry which obtained their VDOC from the American Bureau of Shipping (ABS) in 2005. These operations have experienced fundamental, introspective change associated with major accidents

which resulted in the implementation of a Safety Management System (SMS) as way to capture the causal elements of each accident, mainly the human element. Although the circumstances behind each operation's SMS are different, they share the fact of "Voluntary" compliance with the ISM code. As you can imagine when dealing with the human psyche there are challenges inherent when introducing and attempting to apply anything voluntary. This can be primarily due to the observation that humans, seafaring ones in particular, are not always open minded to change.

When change is tangible, such as the advent of containerization and the shift away from traditional break bulk cargo, change was accepted on the basis of not being able to hide it. That, and the fact there was simply no stopping the forces causing the change to be implemented.

But when confronted with something like a "Safety Management System" that has the notion of being voluntary attached to it, the challenge of implementing it becomes more difficult. This said the challenges of implementing an institutional change, such as ISM to the global industry represents a paradigm change in the way companies operate and are held accountable for their actions and for those of the people they employ.

The curious nature of "change" as it applies to maritime operations voluntarily accepting ISM is not exclusive however to the voluntary aspect. The notion of ISM being required and NOT optional does not alter the dynamic challenges of implementation. This can be found in the events surrounding the tragic loss of the *Costa Concordia*. Costa Cruises was in possession of a DOC through international requirements and did so mandatorily. In addition, the vessel in question maintained a non-voluntary Ship Management Certificate (SMC), however the company and the vessel crew will undoubtedly become identified through this accident. This situation was similar in the event involving the NYC Ferry *Andrew J. Barberi* in 2003. Whereas the latter ferry boat did not maintain an SMC and NYC did not possess a DOC, the Staten Island Ferry has become identified to a larger audience through the events surrounding the tragic accident there than before.

In the case of BC Ferries, the decision to voluntarily adopt the ISM code into their operation was done so after a tragic accident in 1992 and another accident in 1995 involving ferry casualties with human elements as the causal factor. The purpose of exhibiting a subsequent case to is draw comparisons to three passenger vessel operations worldwide and their different relationships to the ISM code

- 1 BC Ferries – Voluntary ISM – Queen of the North accident post ISM implementation
- 2 Staten Island Ferries – Voluntary ISM – Andrew J. Barberi accident pre ISM implementation
- 3 Costa Cruises – Mandatory ISM – Costa Concordia accident post ISM implementation

2 BC FERRIES AND THE QUEEN OF THE NORTH

The *Queen of the North* was a large passenger ro-ro ferry operated by the British Columbia (BC) Ferry system. The vessel ran aground and subsequently sank during a transit in its normal operating area on 22 March 2006. The report of the sinking concluded that the vessel failed to make neither a required nor any course change for four nautical miles and over fourteen minutes to prevent it from grounding at 17.5 knots. It also concluded that human factors were the primary cause of the sinking that ultimately led to two passengers being not accounted for and presumed dead. Although this paper is not a review of accident causal factors, nor is it in any way representative of an analysis of any company or operation, it does represent an observation of marine operations operating with a VDOC and some of the factors that should provoke thought into how ISM is implemented and managed worldwide.

The following is an excerpt from the report conducted by Transport Canada into the accident.

"...In order to comply with the ISM Code, BC Ferries established procedures for identifying and responding to emergency situations. The *Emergency Management and Response Manual* outlined corporate strategy for emergency management, as well as policies for organizing and activating its response. Vessel-specific manuals contained the procedures for on-site responses to vessel emergencies and emergency procedures checklists were developed. Furthermore, the BC Ferries *Fleet Regulations* required that contingency plans be developed for all identified potential emergency situations - including abandoning ship - and that a schedule of drills and exercises be established for each plan. At the time of the occurrence, the *Queen of the North* had abandon-ship procedures in the vessel-specific manual, but these did not address the various situations that may be associated with an evacuation. Such situations include identifying and locating missing passengers, and directing passengers from assembly stations to embarkation stations.

BC Ferries was in the process of developing evacuation plans for its vessels. Although it has been a regulatory requirement since 1996, it was not until TC inspected the *Queen of the North* in early March 2006 that the requirement to have an evacuation plan/procedure was singled out.

The objectives of the International Safety Management Code (ISM Code) are to prevent human injury, loss of life, and damage to the environment. Although most vessel operators in Canada are not required to comply, several have done so voluntarily.

The goal of a safety management system (SMS) is to permit participants to detect and prevent unsafe practices and conditions before an accident occurs rather than having others identify safety shortcomings afterward. It is therefore important that, when any non-conformity is reported, appropriate corrective action be taken in a timely manner.

In this occurrence, internal and external audits failed to identify a number of shortcomings. It was also reported that external audits did not always apply the same standards regarding compliance.

Major non-conformities, for example, which would have otherwise been cited, may not have been issued because the ISM Code had been adopted voluntarily. Therefore, less emphasis may have been placed on taking corrective action - effectively defeating the objectives of both the ISM Code and an effective SMS.

In Canada, TC has delegated five classification societies to perform ISM Code audits on Convention vessels. TC also monitors, via audits, the activities of these classification societies. However, TC's monitoring, auditing, and overview is for mandatory systems only: TC does not monitor the application of the ISM Code where it has been voluntarily adopted.

The Board is concerned that this lack of consistent application compromises the objectives of the ISM Code. Moreover, the Board believes that, with the large numbers of passengers that may be carried at any one time on a passenger vessel, quality audits are essential in being able to identify deficiencies requiring corrective action. The Board, therefore, will monitor the situation..." [1]

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 30 January 2008.

It is important to note that the above conclusions are observations on the general state of ISM performance at BC ferries and with such conclusions in hindsight, how they contributed as causal factors in the accident.

However, the human factors that are also included in other areas of the report indicate something much more tangible to a vessel operation. Including but not limited to interpersonal and inter crew relationships, intra vessel and intra company communications and a general question of how ISM principles were adopted into the everyday working life of the vessel. Was there buy in? Specific human interface elements noted in the report are the following. First a steering stand had been recently retrofitted with a new steering mode selector switch. There was much deliberation and communication between the two crews that shared rotations onboard as to the procedure for the quartermaster to follow with hand steering, autopilot, and conning position. Ultimately there were two different procedures onboard specific to each crew. Secondly, the use of raster charts instead of vector ENC prevented certain ECDIS specific alarm functions from being enabled and useful in alerting the watch standers of the developing situation. Lastly, there was a significant element of intra crew personal relationships that potentially caused the watch standing crew to not maintain focus on safety management.

Again, these comments are not intended to further any assignment of blame but to highlight conditions that are unfortunately typically found when there is not a very firm guidance from practitioners of ISM as to WHY the ISM needs to be embraced, instead of WHAT needs to be done in order to comply with it. The three conditions referenced above might have met better resolution if a poignant level of communication was focused on ensuring there was honest understanding of intrinsic value of the SMS as opposed to the instrumental value of simply seeking to comply with requirements. As it stood, they did

contribute materially to the end result in this tragedy and were conditions that the development of ISM was intended to capture and resolve.

3 STATEN ISLAND FERRY AND THE ANDREW J. BARBERI

The Andrew J. Barberi is a passenger ferry operated by the New York City Department of Transportation. A tragic accident occurred when the ferry allided with a pier in close proximity to its terminal destination. The text below is taken from the U.S. National Transportation Board (NTSB) report.

National Transportation Safety Board - 2005. *Allision of Staten Island Ferry Andrew J. Barberi, St. George, Staten Island, New York, October 15, 2003. Marine Accident Report NTSB/MAR-05/01. Washington, DC.*

Abstract: This report discusses the allision of the passenger ferry *Andrew J. Barberi* with maintenance pier B-1 at the Staten Island ferry terminal on October 15, 2003. The ferry carried an estimated 1,500 passengers and 15 crewmembers. Ten passengers died in the accident and 70 were injured. An eleventh seriously injured passenger died 2 months later. Damages totaled more than \$8 million, with repair costs of \$6.9 million for the *Andrew J. Barberi* and \$1.4 million for the pier. From its investigation of the accident, the Safety Board identified the following safety issues: actions of the assistant captain and captain, oversight of ferry operations by the New York City Department of Transportation, medical oversight of mariners, safety management systems, and the potential contribution of navigation technology to the safety of ferry operations.

On the basis of its findings, the Safety Board made recommendations to the New York City Department of Transportation, the U.S. Coast Guard, the States that operate public ferries, and the Passenger Vessel Association. [2]

The Staten Island Ferry operates a fleet of vessels on a single route between Staten Island, and Manhattan Island and since September 2001 carries only passengers. Vehicle carriage is limited to emergency response, or NYC government vehicles. All vessels are of the "double ended" bow loading type with two identical ends, and two identical pilothouses. Upon completion of a trip the vessel does not turn about, but the operating pilothouse transfers its control power to the offshore pilothouse, and the next trip commences after passenger loading is complete, as if the vessel simply was returning in reverse. In this manner, the Captain of the vessel would traditionally transfer power to the Assistant Captain who would be stationed in the opposite pilothouse or vice versa.

During the ensuing investigation after the accident, it was determined that there was an unofficial policy, a practice more specifically, where the Captain and Assistant Captain assigned to each vessel did not both occupy the operating pilothouse while underway. Once the operating officer transferred the power to the other, they would remain in their respective pilothouse until the conclusion of

that voyage leg and await the power to be returned and assume command again for the next trip. As a result of this practice, when the Assistant Captain on the *Barberi* became incapacitated, the Captain was not in the operating pilothouse, but in the offshore pilothouse as described above. In addition, due to the absence of appropriate procedures developed in accordance with accepted risk management principles, the bridge team consisted of the Assistant Captain, and a lookout. The lookout did not have any training in how to maneuver the vessel. This chain of circumstances contributed materially to why the vessel allided with the pier. At the conclusion of the investigation, the NTSB made numerous recommendations to the City of New York.

One of the central themes brought out of the aftermath of this accident was the familiar style of managing the operation. This means there was no formal Safety Management System present to perform the function of capturing safe operating practices as has been recognized worldwide with the advent of the ISM. Although this was the case, the Staten Island Ferry is a very mature operation that has been in service for over 100 years. During that time the safe performance of the system has been very good relative to incidents per vessel movement. However, after the accident the operation needed to take a look at the practices that had developed over time and determine how to build an environment that would make a best effort to capture any unsafe conditions before they escalated into an accident.

Here is further excerpt from the NTSB report...“A safety management system necessitates a cultural change in an organization, where the safety of operations is the objective behind every action and decision by both those who oversee procedures and those who carry them out. The system leads to standardized and unambiguous procedures for each crewmember, during both routine and emergency operations. Duties and responsibilities are specified and supervisory and subordinate chains of command delineated, again for standard and emergency operations. Each crewmember, as a result, understands precisely what he or she is to do, and say, in critical phases of operations. In addition, safety management systems call for the creation of plans for responding to a range of possible emergency situations, with crewmember duties and responsibilities specified.

The National Transportation Safety Board determines that the probable cause of this accident was the assistant captain's unexplained incapacitation and the failure of the

New York City Department of Transportation to implement and oversee safe, effective operating procedures for its ferries. Contributing to the cause of the accident was the failure of the captain to exercise his command responsibility over the vessel by ensuring the safety of its operations.” [3]

The element of the findings that point to failure of oversight for safe operating procedures essentially point out that the management as opposed to the vessel crew were responsible to implement a safe operating *system*. While the crew is ultimately responsible for the vessel in all cases, it is interesting to note that the results of this finding led to the

recognition that an international standard of safety management would be necessary, even if on a “voluntary” basis.

The Staten Island Ferry obtained its VDOC from the American Bureau of Shipping (ABS) in 2005 and has successfully maintained both its VDOC and the vessel SMC's since then.

4 COSTA CRUISES AND THE COSTA CONCORDIA

The ability to analyze the events leading up to this tragic accident has been made very clear as a result of the comprehensive technical report from the Italian Ministry of Infrastructures and Transport dated May 2013. The findings of the report, contain the constructive elements of casualty reporting as can be found in the case of BC Ferries, and Staten Island Ferries. It is from these findings that the marine researcher or educator may be able to provide the foundation for a thorough lessons learned type of analysis.

This much however is known...The *Costa Concordia* certainly was in possession of a valid SMC. Costa Cruises most certainly was in possession of a valid DOC, of which the option to maintain it voluntarily would not have existed. What is also fairly certain is that the grounding occurred from a combination of human element errors. In addition there was either a significant deviation from a company policy regarding safe voyage planning or an absence of company procedural detail in qualifying what is to be acceptable safe voyage planning.

An excerpt from the technical report summarizes the situation from the objectivity of an investigator “...It is worth[while] to summarize that the human element is the root cause in the Costa Concordia casualty, both for the first phase of it, which means the unconventional action which caused the contact with the rocks, and for the general emergency management.

It should be also noted that the Costa Concordia is, first of all, a tragedy, and that the 32 dead people and the 157 injured, depended only by the above mentioned human element, which shows poor proficiency by key crewmembers.

According with the evidences found at the end of the present investigation, it is necessary to put in evidence that Costa Concordia maintained full compliance with all the SOLAS applicable regulations, matching therefore all the related requirements once she left the Civitavecchia Port on the evening of the 13 January 2013...”[4]

At this point in the paper, hopefully the reader can begin and see although the circumstances behind how ISM, SMS, and fatal accidents, connect the three examples above, the major underlying theme should be increasingly apparent that there is a cultural gap in the organizations that may be contribute to why the elaborate safety management mechanisms aren't fully integrated in these operations to prevent such accidents from occurring.

5 ISM BEGINNINGS – THE HERALD OF FREE ENTERPRISE

The capsizing of the *Herald of Free Enterprise* in March 1987 is the subject of voluminous study.

So much so that the IMO was motivated to seek a potential solution for worldwide implementation in order to capture a culture of safety management that could be developed to avoid similar circumstances that led to this disaster. The excerpt below from the formal inquiry is very succinct and set the foundation for viewing safety management as a cultural responsibility within a vessel crew and operating company.

“...At first sight the faults which led to this disaster were the aforesaid errors of omission on the part of the Master, the Chief Officer and the assistant bosun, and also the failure by Captain Kirby to issue and enforce clear orders. But a full investigation into the circumstances of the disaster leads inexorably to the conclusion that the underlying or cardinal faults lay higher up in the Company. The Board of Directors did not appreciate their responsibility for the safe management of their ships. They did not apply their minds to the question: What orders should be given for the safety of our ships? The directors did not have any proper comprehension of what their duties were. There appears to have been a lack of thought about the way in which the *HERALD* ought to have been organized for the Dover/Zeebrugge run. All concerned in management, from the members of the Board of Directors down to the junior superintendents, were guilty of fault in that all must be regarded as sharing responsibility for the failure of management. From top to bottom the body corporate was infected with the *disease of sloppiness*. This became particularly apparent from the evidence of Mr. A. P. Young, who was the Operations Director and Mr. W. J. Ayers, who was Technical Director. As will become apparent from later passages in this Report, the Court was singularly unimpressed by both these gentlemen. The failure on the part of the shore management to give proper and clear directions was a contributory cause of the disaster. This is a serious finding which must be explained in some detail....” [5]

6 DO MANAGEMENT SYSTEMS WORK?

From the perspective of a mariner, and an educator, finding the right message how to successfully sell an organizational culture change is a daunting task. In the case of a safety culture, there is a tremendous amount of material and themes to explore when teaching about the “whys” of being committed to the intent of safety management. Probably the biggest challenge to the recipient of this teaching is how to balance being committed to the intent of the ISM code or being committed to complying with it if that is all the culture permits. Here is where the psychology of how people perceive value gets uncovered.

This also brings an all too common conundrum to the discussion of why after decades of investment in technology, studies, academy curriculum, and systemic management programs are there still such a

high percentage of human factor related casualties despite the investment in mitigation systems?

In order to answer the question, a thought process should include the concept of moving from compliance to commitment. Taken in its most literal meaning, it suggests that the well intentioned and justifiably successful regulatory framework as it currently stands for maritime operators has unintentionally resulted in a situation where some shipboard personnel view these regulations as merely a requirement without a necessary appreciation for why they exist. Not in all cases, but summarily the burden of proof to this idea lies in the existence of continuing marine casualties with a large human element causal factor.

Thus, it appears that a sea going officer potentially views his or her role in performing these functions as solely an act of “compliance”. In other words, just making sure the paperwork is satisfactory so the attending port state control, vetting auditor, or port captain can confirm the “check in the box” of completion and compliance.

It also suggests that a sea going officer should be more aware of the benefits of “commitment” where they have a deeper understanding of why these procedures need to be fully developed and understood. Essentially, be committed to the intent of the regulatory framework instead of determining it satisfactory to merely comply with it.

In an excellent PhD thesis, Captain S. Bhattacharya uncovers many of the “gut” feelings about the effectiveness and reality of implementing safety management systems. To the point that the reader can understand how there could be a much more holistic “buy in” across the industry. In the thesis he conducts research among oil tank vessel operators specifically within the realm of how ISM is implemented. Although the comparison of oil tankers to passenger vessels does not fit in with the stated objectives of this paper, the fact that ISM compliance is mandatory for their international trade allows some relevant comparisons to be considered. His excerpts are as follows...

“... Research shows that proper and up-to-date documentation is an essential part of ship management. It not only ensures managerial compliance but is also crucial from the commercial as well as regulatory viewpoints. The negative impact of bureaucracy in the implementation of the ISM Code in the maritime industry has already been pointed out in the review of the literature. Anderson, for example, in his research pointed out how excessive formalization of management procedures resulted in unnecessary paperwork (Anderson *et al.*, 2003). Such bureaucracy does not contribute to the implementation of the ISM Code. A number of industry commentators (see for example Lloyds List, 2002d; 2006b; 2007e) also identify bureaucracy as a major hindrance to effective practical operation of the ISM Code. Research in shore-based industries has also indicated that in many organizations, implementation of SMSs resulted in unnecessary bureaucratization often taking the focus away from effective management of organizational safety (see for example Frick *et al.*, 2000).

Interviews with ship managers showed that they did not always believe the seafarers paperwork. Nearly every manager who was interviewed pointed out that most seafarers simply ticked boxes in work permits or blindly filled in checklists. In their interviews the managers commented that they believed that some of the paperwork was fabricated and merely depicted what should happen rather than what actually happened onboard.

One manager, for instance, said: 'I have a hunch that this Master (captain) of Ship-X never follows procedures, but I have no means to verify that. All his paperwork looks too perfect... But there is nothing much that I can do... paperwork is important but sometimes there is too much gap between paperwork and reality.'

Criticism over sea farers non-compliance to the requirements of SMS and lack of trust in the veracity of the paperwork is widespread. A significant section of managers and superintendents even believed that some captains and chief engineers were routinely falsifying SMS paperwork. They felt that as a consequence the management was unable to appreciate what happened onboard the ships. Thus they feared that their personal standing in the company or the company's reputation could also be compromised. One manager, for instance, revealed how captains disregarded company's SMS in their day-to-day tasks; citing one case, he said:

'I had one captain who welded on deck without my permission when the ship was loaded with Naphtha. His paperwork was always false... Now what can you do sitting in the office? ...we (management) can hardly control what happens on ships'. [6]

The views suggest an appreciation that unsafe practice and non-compliance cannot be prevented by the bureaucratic means alone, yet the system remained vital to the way in which managers understood and implemented the SMSs. The reason given for this was that by ensuring the production of paper trail, the managers had objective evidence of their system working, and given the distance between the office and workplace this was perceived to be important for the reasons given above.

7 WHAT DO WE DO ABOUT IT? – THE PSYCHOLOGY OF VALUE

It would be understandable to ask what comes next. By exploring the various casualties above and how they are linked by causal factors, and by understanding at what levels the crew and companies implement a management system, the answer to what happens next should lie in how we as educators present the expectations of management systems in general. It is necessary to instruct all mariners both young and old alike in the specifics of what is expected of them in performance of their jobs. However, the students and cadets of today hopefully will become the Captains, Chief Officers, Chief Engineers, Ship Mangers and Company Superintendents of the future. Therefore, the idea of

teaching the WHY of safety management should take more prominence over the HOW.

For example, the psychology of value or ethics has a long history of contemplation. It can be linked to axiology, or moral philosophy, and can be explained at a high level by the writings of historical philosophers such as Immanuel Kant (1754-1804) or John Dewey (1859-1952) even finding its origins in the writings of Plato. [7]

Teaching the seafarer to embrace wholly the idea of safety management should include how to move beyond what is scientifically empirical. In other words, take the example of the check the box mentality and move toward the job of convincing the student of what is ethical or just plain the right thing to do.

Should a Captain or Manager be a fully introspective psychologist? Feels like it sometimes, doesn't it? Realistically we can start with a sort of sociology where value theory is based on personal values. And strive to educate practitioners of safety management of the sense in making safety a value that is held in common within the shipboard community. Realistically not just make believe. From here the concept of intrinsic versus instrumental value comes into play.

Intrinsically, ISM is a good thing. It defines safety management and it's the law. However, Instrumentally, ISM is a means of achieving something else, such as the highest state of safety awareness possible onboard a vessel. The key is to turn ISM and SMS from something of questionable intrinsic value (as with the incidents of human lapses) to something of much greater instrumental value that is held as a common belief in the community. Admittedly this is not an easy task, if it is even possible. Stealing is commonly held as reprehensible, and murder is universally condemned amongst the human race however it still occurs. However, the majority of the world population holds the condemnation of these things as a common value.

On vessels and in operating companies, one other way to tangibly promote more realistic compliance might be to promote a bottom up management and implementation of the SMS. As leaders, an atmosphere of collaboration amongst the company and crew is essential to the 'buy in' quotient of this. As educators, we should recognize how vital it is to instill in our students this expectation of a shared instrumental value in keeping vessels safe. And that there is an expectation that personal, ethical responsibility of their behavior extends to how they interpret the culture of safety on board a vessel. By starting at this point there may be a true way to effect a cultural change in how safety management is viewed by the people who have to implement it.

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