Continuous improvement in the maritime industry

By Nigel S. Greenwood
Greenwood Maritime Solutions Ltd.

In the February issue of *BCSN*, I introduced the Nautical Institute (BC Branch)'s spring conference on Passenger Vessel Safety. The short historical review and comparison with today's passenger-carrying trends was enough to confirm that this topic has considerable scope. However, the tag-line of "What is the industry doing to ensure continuous improvement?" opens a number of avenues to a full discussion of attainment of the objective: safety of the sea-going public. In this article, I will discuss the subject of improvement, to demonstrate that this, in itself, is a topic of wide interest to the readers of *BCSN*, and to the maritime industry at large.

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Managerial excellence

"Continuous improvement" (sometimes "continual" improvement) has become a science all of its own in the past century. Beginning with the refinement of mass-production and the industrialization of warfare in the 1900s, much energy was spent in trying to optimize output. During wartime, the parallel search for greater efficiency alongside assured effectiveness was given greater rigour through the development of mathematical techniques of operations research. And following the Second World War, the reciprocal exchange of managerial/command-and-control experience between industry and military sought to profit from the best practices of both hierarchical high-order planning (military) and commercial, profit-driven innovation.

Of course, the characterization of distinct managerial styles between military and civilian practice is not a static comparison. The repeated reciprocal exchanges between these domains ensured that there was a steady cross-pollination of ideas, not just nationally, but across international boundaries.

The search for improvement (in terms of profit, or tactical advantage, and less directly in reliability or safety) took the form of both technical innovation and process change. The former was frequently perceived as the more interesting avenue to a break-through improvement, while the latter was often more incremental. While marine industries naturally gravitate toward technical solutions, there was much to be learned from the other approach in terms of "business process re-engineering" techniques perfected in the 1980s.

The adoption (actually, re-importation) of advanced business practices from the Japanese in the 1980s spawned a host of initiatives oriented to enhance efficiency and productivity. "Lean process design", time-distance-motion (ergonomic) studies, etc., trended toward emphasis on full-system knowledge. The more perfect understanding of systems, variability, theory of knowledge and psychology was seen as the route to maximize efficiency. This approach was exemplified by W.Edwards Deming, who developed "Total Quality Management" as a management mantra and formal process in the early 1980s. In fact, the intent behind his proposal of Plan-Do-Check-Act for business efficiency had much in common with the OODA Loop ("Observe-Orient-Decide-Act) process developed by USAF Colonel John Boyd for getting inside the decision cycle of a thinking (military or commercial) adversary.

Similar structures of thought or systems of organizational review have since been formalized in industry standards and progressive incentives for positive change. The most commonly known of these is the International Organization for Standardization (ISO), which has individual schemes for management excellence (ISO 9000), environmental management (ISO 14000) and risk management (ISO 31000), among others. In Canada, a collectivity dedicated to similar aims is the National Quality Institute, recently re-branded as Excellence Canada. Many companies, from small to multinational, have embraced these philosophies and branded schemes in the search for both competitive advantage and due diligence.

Systems-thinking

Whatever the scheme of management excellence used, what they mostly have in common is systems-thinking. This demands that all the component parts and internal interrelationships of the business be examined for improvement opportunities. Given that most enterprises cannot be shut down while this happens, most change has to be accommodated in an incremental fashion (the proverbial "redesign of the aircraft while in flight"). Nonetheless, the cumulative (perhaps compounded) effect of even small changes can occasionally add up to significant improvement.

In the maritime business domain we are considering, many different aspects present varied opportunities for change. Of course, scale of the operation, geographic area and environmental effects have to be considered and may not be amenable to change or even to perfect prediction. Each business however can be broken down into a number of sequential components, stages or activity areas. For instance, we might consider a new maritime company having to proceed through: business concept, platform design, construction, outfit, training, manning, marketing, operations, sustainment (logistics, maintenance, scheduling), monitoring, review and self-assessment, and finally, change implementation. In each area and above all of this there must also be some structure of accountability…who is responsible, and what are the mechanisms of oversight to objectively track both statutory compliance and attainment of company-mandated change targets?

Each such component of a business might be examined for marginal improvements, each of which must be evaluated in terms of cost-benefit analysis…what advantage is obtained for what known (or predicted) cost/risk of implementation? This can be a difficult and uncertain process, as the parameters of comparison may only be estimated, or supposed on the best information available from suppliers of new equipment. And new equipment is the easy part; far harder and more difficult to implement is organizational "cultural" change; "institutional inertia" is famous as the killing ground of many a greatly heralded change initiative.

Photo credit: ventuari/www.shipspotting.com

Safety at sea is not only about flashy, technological development, although the shifting yardsticks of cutting-edge design constantly challenge set ideas about the subject.

So, what in the end provides sufficient incentive for movement against organizational complacency and uncertain gains?

Incentive

Clearly, in the business we are most closely examining, the passenger vessel trade, safety of life is the driving incentive. For example, Canadian vessels move over 55 million passengers yearly, with over 23 million in British Columbia. There is much to be proud of in the safety record to date in this region, but this demands constant vigilance. But how much safety is enough, and how does one assess sufficiency of safety in inherently risky activities in which daring is part of the deliverable …think white-water rafting, or (almost any) ships in icy polar waters.

One way of assessing sufficiency of safety practice and preparedness is through assessment of one's liability in a legal sense. Without straying into the shoals of legal definition, this can be characterized briefly as the degree of confidence that one has in

Photo source: www.ferriesofsydney.com blog

Sometimes the need for improvement is more or less obvious…

demonstrating either absence of negligence or alternatively, as in the case of due diligence with regulatory offences, that one has done everything reasonably possible to foresee and forestall accidents using established risk management principles. Lacking this assurance, the penalties to individuals and corporations resulting from action in criminal, civil, regulatory or admiralty courts could be critically damaging to the enterprise.

In some ways, the financial cost-avoidance incentives are post-facto at best; a train of thought that leads to a consideration of what (legal, financial) consequence is survivable, rather than what pro-active operational changes can materially reduce risk. And yet, a proper legal defence of unforeseen occurrences requires a degree of organizational culture that inculcates continuous risk assessment. Many companies do this formally, through highly evolved Hazard Identification and Risk Assessment (HIRA) methodologies. In all relevant areas of an operation (e.g., technical readiness, qualifications, manning levels, training, damage control), discrete elements are examined for all possible failure modes. Each instance is assessed for probability and consequence and the result is plotted on a matrix to determine if it falls within the permissible limits of risk acceptance. The more complex risk-assessment methodologies also consider the compounding effects of marginal risks in sequential or related processes.

Photo source: Patrick/www.shipspotting.com

The Herald of Free Enterprise *capsizing off Zeebrugge in 1987 led to stricter standards for passenger-ferry stability and control of bow doors.*

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Of course, classification societies and insurance companies are experts in this sort of risk assessment based upon loss records. They are considerably aided in this by the accumulated wealth of knowledge and experience which results in recognized industry standards. The development and adoption of IMO standards over the last century, enshrined in participating nations' regulatory schemes, provides a fundamental basis for assessing "sufficient compliance" with reasonable safety standards. Layered on top of these has been the increasing prevalence and demands for Safety Management Systems (corresponding with the IMO's ISM Code, or other guidance) in order to establish systematic reviews to facilitate the identification and mitigation of risks.

All of these processes require an audit function and oversight based on practical experience. This is why it is critically important that governments and industry cooperate. An example of this is Transport Canada's "Moving Forward" policy (2007), which looks to performance standards between government and industry and seeks a combined risk management approach.

Innovation and best practices

Regulation is an evolutionary process, a gradual accretion of standards and requirement. This is generally a codification of increased minimum design or performance criteria and, sadly, often in response to past marine incidents. The capsize of the *Herald of Free Enterprise* in 1987 was one such example in which subsequent evolution

"SailSafe" represents BC Ferries' combined management and union dedication to an internalized safety culture within the company.

of regulation corrected previously unrecognized risks.

But there is more to safety management, than mere compliance with existing regulation. Nor is limitation of liability in response to external (punitive or retributive) financial incentives the epitome of responsible maritime management practice. Increasingly, successful businesses in the maritime industry have realized that change has to be internalized and willingly embraced throughout each organization. And this only results from a pervasive culture of safety consciousness within a company, such that change becomes employee-driven (i.e., not just by management).

One means of achieving this aim is to empower (encourage) all employees to report on safety hazards, or to go further in proposing change initiatives that improve safety while yielding efficiencies. BC Ferries has such an initiative in their "SailSafe" program. This program is credited with creating a shift in culture through a solid collaboration between BCF and the BC Ferry and Marine Workers' Union. All 4,500 employees are engaged in the ALERT (All Learning Events Reported Today) process; a very high rate of closure on submitted ALERTs maintains credibility and collective engagement in the culture change.

Another aspect of change management is learning, both individually and institutionally. Many large corporations nowadays have a well-established scheme of internal training and encourage their employees to seek educational improvements in advance of specific needs. In some cases, this is captured in "learning plans" that the employee fills in as part of an annual review cycle. Such a commitment to life-long learning is the individual equivalent of "continuous improvement," a constant exploration of opportunities for the application of (new) skills in novel ways.

Institutionally, learning takes place in industry forums and professional gatherings. These serve as a medium for the sharing of best practices as well as benchmarking to industry leaders. Industry bodies, such as the Canadian Ferry Operators Association (CFOA), function as a means for the sector to network and develop common positions on important issues based on corporate knowledge and operational experience. This enables the association to advocate on behalf of these positions in various forums, such as Ministerial offices, Transport Canada and the Canadian Marine Advisory Council (CMAC) meetings. This is also in keeping with

Transport Canada's Moving Forward policy which seeks input from all stakeholders in a holistic approach.

A similar industry collective representing a more diverse swath of the passenger vessel sector in Canada and the U.S. is the Passenger Vessel Association, whose members together convey some 200 million passengers annually. On a wider scale, the Cruise Lines International Association (CLIA), which consolidated in December 2012 from nine separate associations, covers the cruise industry worldwide. Each of these associations places a very high priority on safety, and the sharing of tips on risk assessment and safety management is prominent on their websites.

Conclusion

This article started with the premise that "improvement" in the maritime industry, whether it be continuous or step-wise (continual), is of great interest to the readers of this magazine. Surely this is the case, given the applicability of the subject across the industry. The range of talents required spans the gamut from technical innovation, through construction to operational management and managerial excellence. Dedicated risk assessment and risk management must be married with commercial imperatives such that the linked processes of risk awareness, avoidance, prevention and reduction result in a profitable and safe business. This is only good management. And nowhere are the incentives for improvement so clear as where safety of human life is at stake, as in the passenger vessel industry.

It is also equally clear that one of the most effect means of advancing collective agendas for safety is the sharing of ideas through the networking of engaged professionals. To this end, the BC Branch of the Nautical Institute invites robust attendance at their spring conference, May 9-10 in Victoria, on the subject of Passenger Vessel Safety. This conference will cover all sectors of the industry from small, recreational eco-tourism operators to major cruise lines in two days of discussions dealing with an entertaining range of expert speakers on both technical and operational topics. For more information, and to register, please see http://www.nibcconference2013.com.

One final thought: in this region of unsurpassed beauty and undeniable attraction, the sea welcomes many diverse users. While the risks can be recognized, mitigated or managed, they cannot always be avoided. The very least that this conference will accomplish, we hope, is that in the event of an accident the immediate response will not only be formed along the lines of formal accountabilities and complex overlapping jurisdictions. Rather, success in extreme circumstances will be the result of close personal relationships formed among actively engaged regional professionals.

Nigel Greenwood is a retired Rear-Admiral of the RCN and a member of the Nautical Institute. He writes and consults on maritime issues from Victoria and at GreenwoodMaritime.com.