

Captain Steve Pelecanos

Steve Pelecanos went to sea in 1970 as a deck cadet with the Blue Star Line of London.

He was appointed Master in 1981, became a pilot in 1984 and a Harbour Master in 1987.

He joined Brisbane Marine Pilots in 1990.

He is currently the Chairman of Brisbane Marine Pilots, Vice President of the International Maritime Pilots' Association and has recently stood down as President of the Australian Marine Pilots' Association – a position he held for five years.

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Marine Pilots – The New Generation

1. Introduction

We are constantly reminded that ours is perhaps the world's second oldest profession.

We know that the Egyptians of Memphis and Thebes used pilots to navigate their craft along the Nile. We know that the Rhodian Laws of the third century BC provide the first evidence of some form of regulation of pilotage. We know that the pilotage profession was one regarded with great reverence throughout the ages and we know that if pilots breached the trust accompanying their position, the penalties were quite severe. Beheading, hanging by the neck until dead and whipping by the "Hand of a Hangman" were some of the consequences of inappropriate behaviour.

Well, I'm pleased to say that times have changed. I'm quite happy to give up the reverence once enjoyed by my predecessors in exchange for the comfort of knowing that, for the time being at least, my head will remain firmly attached to the rest of my body.

By definition, a new generation must somehow differentiate itself from an old generation.

Our profession has gradually evolved over a period of five or six millennia, but because the pace of change has been slow, at any given time, there would have been little to differentiate incumbent pilots from their predecessors.

Pilots were traditionally engaged for four reasons: (i) their local knowledge, (ii) their independent judgement, (iii) their ship handling skills and (iv) in the days when sea power was a prevailing factor and there was a need to keep pilotage information secret and restricted, as a form of national security.

Except for the national security factor, these reasons are still valid today:

2. Present Role of the pilot

2.1. Local Knowledge

With navigation channels now marked, charted and described with unprecedented thoroughness and tide tables and other information freely available, the local knowledge aspect, although still important, is of lesser significance than previously.

2.2. Independent Judgement of a Second Person as a form of Risk Management

Article 6 of The SEAMANS Vade Mecum of 1701 states:

'No Masters of Ships shall force pilots to pass through dangerous places and to steer courses against their will...'

This was the rule when a ship could be carrying the equivalent of significant proportion of a nation's wealth in its holds. The thinking behind Article 6 was directed at reducing risk in case a Master's judgement became overwhelmed by commercial considerations causing him to act in a manner that could jeopardise the entire venture and result in disastrous commercial consequences. The pilot was present to provide

independent advice on navigation during a critical period and to countervail the possibility of commercial considerations alone influencing a Master's judgement. Today, ships, the people who work on them and the margins of safety within which they work are being pushed to the limit. The independent judgement of a pilot is at least as important today as it was in earlier times especially when the consequences of an accident to the environment is also taken into consideration. Independent judgement on navigation matters required of a pilot has a historical and commercial basis and, although somewhat obscured over time, is right up to date with the latest thinking on error detection and reduction, and risk assessment and management. Who provides the independent judgement when a Master has an exemption for pilotage and what is the level of risk management?

2.3. Expert Shiphandling Skills.

There are very limited opportunities for ships' masters to acquire and practice shiphandling skills. There is a critical difference between skill and knowledge. This is well understood in the airline industry but almost foreign to the thinking of the shipping industry. High level skills such as piloting need time and application to acquire and can only be maintained by regular practice. However, persons in the shipping industry who should know better continue to claim that all Masters can conduct a pilotage if given the opportunity. This may apply to Masters on regular trades with frequent opportunities to acquire and practice pilotage skills however, the truth is that most Masters possess the knowledge but not the skills to conduct a pilotage. Handling and managing large vessels in confined waters with limited margins of safety involves high order technical and management skills.

In the present day, there is also a fourth justification:

2.4. Pilot's Role in the Protection of Port Infrastructure and the Environment

In addition to the pilot's role of ensuring the safe navigation of shipping and protecting the port's infrastructure from damage, the ports responsibility and consequently the pilot's role in reducing the risk of pollution is now well established as result of the 'Sea Empress' judgement. The general public, safety authorities and environment protection authorities now rely on the onboard presence of pilots and the application of their expertise as a necessary function in the reduction of operational and environmental risks.

Although the justification for engaging a pilot has not changed significantly over time, the environment in which pilots operate has changed considerably. And it is this changed environment that is breeding the new generation pilot.

3. Change

The major changes that have impacted on the pilotage environment in recent years are:

3.1. *The Change in the Masters Role*

Developments in communications, combined in recent years with the accountability of owners under the ISM Code, have seriously eroded the Master's authority from God to mere mortal.

In the new order of things, the Master takes the ship from A to B. The master is under constant pressure to keep the ship moving to a tight schedule but no longer has the authority to make commercial decisions on behalf of the owner. These decisions are made ashore. Once the ship arrives at port limits, a team of specialists boards to take over the running of the ship's '*in-port business*'. They pilot it, load it, discharge it, survey it, repair it, maintain it, store it and then return it to the crew to sail the ship to the next port where another team of specialists will once again board and take over. Pilots are the first of the *in port* specialists to board the ship when it arrives and the last to disembark when it sails.

Their role takes on a greater significance than in the past because in today's world, the commercial imperative alone rules and people don't matter. Reduced manning and multi-cultural crews are the order of the day. Pilots can no longer take for granted the presence of a well-rested, highly trained, competent bridge team to support them. They invariably act alone.

3.2. *The Changes in the Margins of Safety*

From the 1960's ships have been getting progressively larger and deeper yet the physical size of ports remains relatively unchanged. The pressure is on pilots to squeeze bigger ships into smaller holes. These changes in the shipping industry were described in the 1972 US National Transportation Safety Board (NTSB) Report:

'The sheer number of vessels has increased significantly.... And the size of vessels has increased sharply.... Design characteristics have changed considerably during the past ten years. Changes in traffic patterns.... caused by variance(s) in the size and speed of vessels and the nature of different ship types some with limited maneuverability are also of concern. Risk levels have risen during the past 10 years and probably will continue to rise in the future if no action is initiated to curb or reduce the cause of this rise. ... Another very important factor is the recent increase in types and quantities of hazardous cargoes.'

The environment for piloting, far from improving, has progressively become much more difficult and hazardous in the 29 years since the report was published.

A change of this magnitude is difficult to comprehend until we become aware of its consequences. The consequences have been the high profile accidents such as the *Torrey Canyon*, *Amoco Cadiz*, *Exxon Valdez* and, more recently, the *Sea Empress*. These accidents resulted in pollution on a scale that directly instigated a plethora of codes, conventions and legislation and brought the shipping industry into disrepute with the general public.

3.3. *Continuous and Sustained Pressure to Reduce Costs*

In this regard we are no different to any other industry. Thanks to the last two decades of economic rationalism, the "next generation" is a critical issue and of very serious concern, not only to pilotage, but to a number of other professions including

universities. People at the top end have been so focused on the bottom line that training and preparing the new generation to take over has been ignored to an almost criminal level. In a “bottom-line” environment, maintenance, safety and training are invariably the first victims of cost cutting. Pilots work at the front end of safety and are responsible for ensuring that safety systems are not compromised. In the process, they invariably find themselves at odds with those whose only fixation is the bottom-line.

3.4. Revolutionary Advanced Technologies

Revolutionary technologies are already transforming, and have the potential to radically transform, the nature of marine pilotage. These technologies are, of course, GPS and its derivatives – DGPS and Real Time Kinematic (RTK) – ECDIS and AIS.

3.5. Close to Zero Tolerance for Marine Accidents and high levels of Accountability

In every society there exists an implicit or explicit social contract that binds its people together. Standards of safety are a reflection of this contract. In Australia there is, in general, a belief in free will the outcome of which is a very low tolerance for preventable accidents. In the maritime context this translates to a very low tolerance for accidents that involve human casualties or marine pollution. The former relates to the value we place on human life and the latter relates to the value we place on the environment. Pilots are perceived by an increasing, though still marginal, proportion of the population as having a direct role in reducing the risk of maritime casualties and marine pollution.

4. Pilotage in Modern Terms

Marine pilotage does not exist in a vacuum. It is affected by many factors and has to function in a framework that, in addition to expected commercial and operational safety aspects, must also take into account contemporary realities such as the huge public concern for the physical environment.

Most people in the shipping industry see the pilot's role only in a traditional sense - as a provider of local knowledge. This is a cliched view, if not a misrepresentation, and is seriously out of date. In modern terms the pilot is required to elicit close co-operation from the bridge team, utilise all available resources and coordinate port services so as to direct the movement of a ship in a safe and efficient manner during the most navigationally difficult phase of its voyage. That is, the phase of the voyage with the narrowest operating margins, the highest limits on maneuverability and the greatest vulnerability to weather and tidal conditions. It is the phase of the voyage when the vessel and environment are exposed to the greatest risk. It is a clear indication that a pilot's role is more than a simple provider of local knowledge is. The pilot is in essence the manager of a high-risk operation in a specific environment and demonstrates the need for management and technical (shiphandling) skills in addition to local knowledge. These skills have to be applied in a highly operational and time critical environment.

5. Sea Empress Grounding

Significant changes in the way we do things in our industry are almost always triggered by high profile accidents. The most significant accident in recent times to affect the regulatory and operational regime of pilotage and port waterways management is the grounding of the 'Sea Empress'. It is the outcome of this accident that does, and will continue for the foreseeable future, to determine the framework in which present pilots and the new generation will be required to function.

It is the *Sea Empress* accident and its legal consequences that I wish to focus on in order to differentiate the emerging new generation of pilots from the past. The lessons of this incident are fading into the distance - not as the result of a conspiracy but as a consequence of the all-pervading economic climate with its continuous focus on cost reduction. Pilots by the very nature of their work function at an operational level where safety considerations are always at the forefront. It is the responsibility of pilots to prevent the lessons from the 'Sea Empress' fading from living memory.

The 'Sea Empress' went aground off Milford Haven on 15 February 1996. More than 72,000 tonnes of oil were lost from the vessel before it was brought into port six days later. The Milford Haven Port Authority was found guilty on 15 January 1999 under the strict liability Water Resources Act for allowing 'polluting matter to enter controlled waters' and fined a substantial sum of money plus costs. This fine was later reduced on appeal (16 March 2000) but the verdict remains unchanged. A precedent was established for liability of ports for environmental incidents. This is separate from the previous terms of liability during pilotage where only the shipowner had the vicarious responsibility for the consequences of pilot error.

5.1. Duty of Care Owed to General Public and Third Parties by Port Authorities

In addition to the interests of the Port Authority and the shipowner there is now also a duty of care owed to the general public and third parties from the consequences of pollution to consider. This 'duty of care' is covered by a special Act and the reasons for this as stated in the transcripts of the appeal court are:

'The danger of oil pollution is so potentially devastating, so far reaching and so costly to rectify that Parliament attaches a criminal penalty ... even when no lack of care or due diligence is shown. ... Strict liability is imposed in the interests of protecting controlled waters from pollution'.

(Public and third party interests are protected by similar legislation in most maritime countries). What applies to ports also applies by implication to pilots.

The newly established liability of ports clearly makes the *Sea Empress* a watershed case.

5.2. Safety Management System of Port Waterways to be of the Highest Standard

The unprecedented decision against the port hinged on the less than adequate safety management system of the waterways. This included the inadequate training and experience of the pilot whose errors resulted in the grounding. In his judgement on the Milford Haven Port Authority following the grounding of the *Sea Empress*, the Hon Mr Justice David Steel said:

"It was not simply a question of furnishing a pilot who then commits an act of negligent navigation dislocated from the system of training and classification of pilots and from port control of navigation.

... in the context of a scheme of compulsory pilotage. Shipowners and masters must needs engage a pilot. They have to take the training, experience and expertise of the pilot provided at face value. ...The port authority imposes a charge for pilotage but in the same breadth has the added advantage of the pilot being treated as an employee of the shipowner. All this calls for the highest possible standards on the part of the port authority."

Management of the Port waterways comes under the closest scrutiny. In the Judge Steel's view of the pilot's error that led to the accident '...errors and the possibility of making errors are ordinary facts of life' in the transport industries. According to the judge the existence of this possibility in pilotage and the consequences makes it imperative for the Port Authority to implement a safety management system of the "highest possible standard" to reduce the risk of such errors.

5.3. Error as a Consequence not a Cause

The judge clearly views error as a consequence not a cause. This is also a very significant change as previously the focus was almost entirely on the actions/inactions of the pilot when an accident occurred during pilotage. It indicates the need for a comprehensive and sophisticated approach to safety in pilotage.

5.4. Reappraisal of Pilot Authorisation

The expanded notion of liability indicates the need for a coherent up to date safety management system for port waterways. This incorporates a reappraisal of pilot authorisation/licensing including selection and training to meet the requirement of the 'highest possible standard' of safety management.

It is within this framework in which the new generation of pilots will be required to function. We are left to define and implement this "highest possible standard" in the management of port waterways, the training of pilots and the conduct of pilotage.

5.5. Criteria for Safety Management System for Port Waterways

In determining the required safe management system the following needs to be taken into consideration

- Training and experience to match task. There is a tendency by marine administrations to seriously underestimate the level of experience and training required for the pilotage task. In the case of the *Sea Empress* the Port Authority assigned a pilot without the appropriate training and experience to the vessel. The Port Authority was responsible for the selection, training and authorisation of the pilots.
- Training curriculum for pilots and the assessment procedures prior to authorisation and progression to different classes of vessels.
- Standard Operating Procedures. There was no clear policy, regulations or procedures governing the timing of entry relative to tide based on a need for margins of safety in Milford Haven. Also there were no established rules for routing for different categories of ships. Too much was left to the individual pilot resulting over a period of time in varying safety margins. In some situations this lead to a severe curtailment of safety margins and clearly indicates the need for establishing rules in this regard.

- Review of systems for categorising vessels for pilotage. The reduction in tonnage of the 'Sea Empress' by application of new Marpol rules lead to a lowering in pilotage requirements and the rostering of an inexperienced pilot with restricted authorisation boarding the Sea Empress. Prior to Marpol a ship the size of the Sea Empress was required to carry a senior pilot with unrestricted authorisation assisted by a second pilot to handle the communications. Under revised rules after the accident the rule for two pilots for a vessel of the size of the Sea Empress was reinstated.
- Adequacy of navigation aids for guiding ships into port appropriate to the prevailing conditions. This important issue must be a critical element in any risk management model for port.
- Monitoring of waterways under port control by radar and electronic means.

5.6. Need for Risk Management Approach

Though Judge Steel uses the plainest terms, at the conceptual level the reasoning behind his judgement would satisfy the most stringent requirements of a risk management expert. In the judgement there are both direct and indirect references to 'risk management', 'best practice', 'margins of safety' and establishment of minimum standards. Implementation is a joint task for port authorities and pilots. It also follows that the new generation of pilots will be required to work within the operational guidelines and procedures of a comprehensive safety management system developed jointly by the pilot organisation and the port authority.

5.7. Role of Human Factors in Sea Empress Accident

In the 'Sea Empress' case in accordance with the plea the judge was not required to take into consideration the role of the ship in the accident. However, a close reading of the case will show that there was no commonly agreed plan between the ship and the pilot for conducting the pilotage. This deficiency is mentioned in the official Marine Accident Investigation Branch (MAIB) report on the accident. Such a plan is a critical and fundamental tool of risk management in such a situation and can only be developed by clear and focused communications between the master/bridge team and the pilot.

The ship had developed a passage plan for the conduct of the pilotage as required by the ISM code. (A plan is required for all critical operations). The Master had also conducted a pre-arrival briefing as required by the International Chamber of Shipping (ICS) Bridge Procedures Guide. However, after the pilot boarded there were no specific communications to develop a commonly agreed plan for the conduct of the pilotage. The existence of a ship's plan was never brought up and the pilot was left to conduct the pilotage to a plan that only he was aware of. The chief officer fixed positions* six times and felt 'not quite happy' about the pilots succession of course changes. He did not make known his concerns because there was no agreed to plan and assumed that the pilot was taking a short route to save time because of the late boarding.

The situation on the bridge of the Sea Empress indicates an almost complete breakdown in what is known as human factors and clearly a contributory cause. It is a textbook example of a 'one person error' accident.

5.8. Master/Pilot Relationship

Considering the liabilities associated with accidents in pilotage and time constraints the development of the Master-Bridge Team/Pilot relationship is one of most difficult management situations imaginable. The closest analogy is a visiting surgeon who has to develop a working relationship with an unfamiliar theatre team. It must be pointed out that in the analogy of the visiting surgeon the liability involved in financial terms is a considerable order of lesser magnitude. With the inherent high risk in pilotage and low level of tolerance for marine accidents the human factors aspect often referred to as the 'last frontier' of the safety problem must be addressed both in training and the development and implementation of operational procedures.

5.9. Pilot Training

The 'Sea Empress' accident leads to the obvious question - In the light of present day realities what is the 'highest possible standard' of training and experience referred to by Justice Steel? Determining and implementing such a standard for the new generation of pilots should be the combined task of authorities that license pilots and the present generation of pilots. But here we have a problem. As time goes on, marine administrations are becoming more and more detached from the real world of pilotage. They generally perceive pilots as over paid pursuers of self-interest and pay little attention to what pilots have to say. The result is that those who sit behind desks in ivory towers far removed from the bridge of ships, make all the rules. The severe lack of those with current pilotage experience in these administrations is potentially as dangerous as the lack of a proper training regime.

6. New Approach to Pilot Training in Australia

In Australia this has, to a large extent, led pilots into developing their own training and safety systems in isolation and has left the marine administrations playing catch-up. In regard to the 'highest possible standard' pilots in this part of the world have preempted this reappraisal. We anticipated the need for bringing the training of pilots up to date with present day realities and have been working on this aspect even before the 'Sea Empress' accident. We looked around the world and at other industries and were impressed by the model of training used for corporate airline pilots. Without going too much into specifics there are good reasons to respect the quality and integrity of training for an environment where most system failures are very likely to lead to the demise of the operator. There is nothing as focused as self-interest and nothing more urgent than self-preservation.

Some six years ago we made a conscious decision to bring the training of marine pilots in line with that of airline pilots. The implementation of this decision is well advanced for existing pilots but for practical reasons there has to be a certain level of compromise. For the new generation, starting with a clean slate, we can be more ambitious.

7. Training for New Generation of Pilots

In broad terms we see this as amounting to selecting the right person and then giving that person the right level of training and experience before authorisation. For the new generation of pilots the task of raising professional standards towards the goal of the 'highest possible standard' needs to be addressed at several levels.

7.1. Selection of New Generation of Pilot

If the notion of 'highest possible standard' is to be developed the first step is to select the right person for the job of marine pilot. Training pilots is expensive and the costs of failure can be very high. Criteria and procedures need to be developed for the selection of the new generation of pilots and these must incorporate an assessment of the aptitude and attitude of the applicant. Psychometric testing of applicants for marine pilot positions has already started in Australia.

7.2. Traditional Approach to Training

Most analyses find that about 80% of accidents in shipping and almost every other industry are a result of a breakdown in human factors. Yet, in spite of this figure, the efforts of all pilot training programs, until recently, have ignored human factors and have focused almost entirely on developing individual technical skills and experience. This is a serious deficiency in the training system and has been addressed by existing pilots undertaking human factors based stand-alone Bridge Resource Management (BRM) training.

7.3. BRM Training

BRM training is about raising awareness of the critical role of the human factor in accidents and developing the skills to manage this very important aspect in a highly operational and time critical environment. The aim is to reduce the risk of 'one-person error' accidents by adopting management practices that increase the opportunities for error detection and containment.

Following a number of tragic and high profile accidents the airline industry addressed this issue of human factors about two decades ago. Sophisticated BRM type of training is routinely conducted and human factor issues are integrated into the industry's operational standards and culture. To meet the criterion of the 'highest possible standards' stipulated by Justice Steel, inclusion of BRM training is clearly indicated for marine pilots.

For the new generation of marine pilots just as in the airline industry this training can be raised to a higher level by the inclusion of *Human Performance and Limitations* as a subject in the initial stage of training. This can be followed by recurrent BRM training and integration of human factors into every aspect of training.

7.4. Local Knowledge, Shiphandling Skills and Visual Pilotage

The new generation pilot will still need to have extensive local knowledge and will need to have the shiphandling skills that the pilots of today possess. And, like the pilots of today, the new generation pilot will still need to learn visual pilotage techniques. The introduction of instrument navigation to pilotage has begun but for a large percentage of ships visual pilotage will be the norm for the foreseeable future.

7.5. New Technology and Precision Navigation

The technologies that have started to impact on pilotage and will continue to do so in the foreseeable future are GPS and its refinements DGPS and RTK, Electronic Charts and Information Display System (ECDIS), Automatic Identification System (AIS) and the Voyage Data Recorder (VDR). Several Australian ports have already instigated studies of 'squat' on ships. By very carefully measuring the actual ship's squat in real

time with GPS (RTK) and combining this with historical data of the port and data from the ship, these ports have been able to increase the available depths for ships. This increase in available depth has improved efficiency in terms of extra cargo lifted and also reduced the need for dredging. The GPS data is used to determine the parameters of the pilotage and requires additional skills from the pilot. This system is known as the Dynamic Under Keel Clearance (DUKC) system. In future such systems will proliferate and will be modified and refined with the use of AIS. AIS will eventually be used to monitor the implementation of the system in real time.

To effectively use this system and the technologies that are becoming available the new generation pilot will need to acquire precision navigation skills. These include techniques for making controlled turns and navigating within preset limits. After the 'Sea Empress' accident it is inevitable that pilotage will be conducted in a more structured manner with minimum standards and quantified limits. The new generation pilot will need to acquire the skills to operate within these preset limits and accurately position the ship at all stages of the pilotage. Learning these skills will be part of simulator training.

7.6. Remote Pilotage

The new generation of pilots will have to come to terms with the use of remote pilotage especially as more and more ships are progressively fitted with AIS until 2008 when all ships will be fitted with transponders. It is going to mean a pilot in the VTS centre guiding ships into more sheltered waters to extend port operations in marginal weather conditions. This can only be permitted in a properly equipped ship with a well-trained crew and the risks would need to be carefully weighed against the costs. Transponder technology certainly has the potential to facilitate this mode of pilotage and the new generation of pilot will need to have the skills to cope. Therefore part of the training of the future will need to be done in a VTS centre to enable the pilot acquire the skills necessary for conducting remote pilotage in special circumstances.

7.8. Reversionary Procedures

Except for a few specialist ships, it is unlikely that in the foreseeable future the 'on board' equipment will meet the exacting performance and reliability standards required for stand-alone instrument pilotage. The new generation pilot will need the ability to revert to visual navigation techniques or vice versa in the event of equipment failure or visibility deterioration. The ability to revert from one system to another is a high order skill and will need to be learned and practiced in simulator training. Validation of this high order skill will need to become part of the routine of a competency audit.

7.9. Simulator Training

In his Judgement Justice Steel states "His (the pilot's) training and experience were such that he had never before attempted to bring in alone a vessel comparable to the 'Sea Empress' so close to low water, nor had his training involved simulation of such an entry". The MAIB Report of the accident makes the recommendation "Consideration should be given to the use of simulators as an additional means for both training and examining pilots". Both the Judgement and the Report clearly indicate the complementary role of simulators to on the job training for pilots.

Simulator training will figure prominently in the development and validation of skills of the next generation of marine pilots.

Applications of bridge simulators for training pilots:

- Increasing familiarisation with the port waterways and building the confidence level of a new pilot under training.
- Repeated runs over difficult sections of the pilotage to speed up training and consolidate skills with potential to shorten training period.
- Trials to determine port operating limits, shiphandling parameters and development of new techniques and procedures.
- As part of the examination of pilots.
- As part of the process of authorising a pilot to handle a new class of vessel.
- Development and practice of emergency procedures and contingency planning.
- Trials prior to new harbour developments to verify shiphandling parameters for the pilotage.
- Reviewing unambiguous post run records enabling a pilot to analyse own performance.
- Conducting a competency audit for pilots.
- Learning the techniques of instrument navigation.

As there is a strong focus on skill development and validation in simulator training it is important to incorporate human factors elements wherever relevant.

7.10. Competency Audit

To maintain public confidence, the critical nature of pilotage necessitates some form of competency audit of the pilot's skill levels at regular intervals. 'Check pilot' systems used by some organisations are useful but have limitations. Firstly, the pilot's ability to handle emergencies cannot be adequately tested and secondly, with no opportunity for playback and review the 'check pilot' system is generally perceived as being less than entirely objective.

(Following several inquiries into the relatively high rate of human error in the HealthCare industry doctors in a number of counties have agreed to undergo regular assessment of skills).

A competency audit requires the use of a bridge simulator and checks competencies in the:

- Practical application of BRM techniques
- Technical skills required for planning and safely and efficiently executing a passage
- Ability to handle realistic emergency situations.

The scenarios used for the competency audit are critical. Scenarios should be both realistic and also extend the performance envelope required to a high but manageable level. Considerable skills and effort are required to develop these scenarios.

The actual audit is done by using a specially prepared checklist and "playback" and a peer review."

Australian marine pilots completed the first competency audit on the lines described above earlier in June this year. So far as we know this is 'first' for marine pilots anywhere in the world.

The training of marine pilots is now in line with that of corporate airline pilots and goes some way towards meeting the 'highest possible standard' of Judge Steel. Once fully licensed, a competency audit (as previously described) will be part of the overall ongoing training of the new generation pilot. In the future this aspect of training will become a routine as it is in the airline industry today.

8. Safety Management Systems

The terms, definitions and concepts of risk management have become the main part of the vocabulary of communication on safety. The new generation pilot will recognise the profession as being a risk management function and will need to have a sound working knowledge of the latest safety management systems and particularly their application and relevance to pilotage.

9. Relations with General Public

The present generation of pilots has done a poor job of marketing itself to the general public and the maritime industry generally.

The new generation pilot will need to participate on an individual and organizational level in educating and informing the public of the role of pilots in:

- *Safeguarding the environment*
- *Protecting life and property*
- *Facilitating the throughput of cargo to feed commerce and industry*
- *The need to exercise Independent judgement during pilotage as a form of risk management*

The new generation pilot will need to project an image of belonging to a profession that operates in a high-risk environment, requires a high level of training and has a high sense of responsibility.

In the present economic environment, ships and crews are being pushed to the limit and ship's masters are being subjected to enormous commercial pressure and stress. This is likely to get worse in the future. The new generation of pilots must be disciplined enough not to allow these pressures to impede their ability to exercise independent professional judgement on matters relating to safety.

The new generation of pilots must never see this role of keeping the public informed as just an exercise in public relations. An informed public is a source of support for the pilot in exercising independent judgement and in this way indirectly contributes to improving safety.

10. Competition and Independent Judgement

The prevailing economic orthodoxy is market economics and likely to remain so for the foreseeable future. One of the tenets of belief in this orthodoxy is the role of competition in reducing costs. To drive down costs market economics zealots will attempt from time to time to bring competition into pilotage. One of the principal functions of a pilot as mentioned previously is to exercise independent judgement during a high-risk operation. Exercising independent judgement is made extremely difficult in an environment of competing pilotage services and potentially devalues the contribution of the pilot as an agent for risk management.

This approach indicates a poor understanding of the role of the pilot and an almost reckless belief in the infallibility of the unlimited application of market economics. Attempts will continue to be made from time to time to bring pilotage under the umbrella of market economics. And again and again the new generation pilot will be required to explain the incompatibility of pilotage and competition.

11. Pilotage Exemptions

Authorisation and progression of pilots and exempt masters, until fairly recently, was more or less based entirely on the completion of a prescribed number of port entries/departures on the bridge, passing a oral local knowledge examination and being supervised by a licensed pilot for a stipulated number of pilotages. Considering the risks and liabilities involved this was clearly not 'best practice'.

It is clear that the operational and regulatory standards for port waterways management and pilots have now been tightened up and the trend is likely to continue. What corresponding changes have been made to the system of granting pilotage exemptions? Has there been an upgrading of training standards for gaining exemptions? Are exempt Masters subject to routine checking or a competency audit? Are there equivalent requirements for fatigue management similar to those now required of pilotage organisations?

In terms of risk management what is the potential for the exercise of independent judgement on the bridge with an exempt master and junior officers? Is this equivalent to a Master and Pilot on the bridge? This is a difficult question and I will go no further than suggest that the value and the very likelihood of independent judgement is largely dependent on the operational experience, knowledge and skills of the persons involved. Independent judgement in a situation such as pilotage is a critical element of risk management.

12. Undermanning and Fatigue

With the reduction in the manning of ships in recent years it is time that consequences of undermanning are highlighted. Apart from the extra operational risks imposed by lack of numbers there is the accompanying fatigue that affects the performance of the ship's officers. Performance impairment from fatigue adds to the risk level in a situation like pilotage. Some shipowners either overlook the extra demands during port entry and departure and the need for an appropriate level of manning or they have decided that the ship is the responsibility of the port after the pilot boards. If the present trend continues there may be a need for two pilots for undermanned ships, the second pilot to strengthen the bridge team. Eventually this could lead to ports providing mooring crews. This is a situation that the new generation of pilots will need to be aware of and participate in the solution.

13. Conclusion

The new generation pilot will work in an environment the outline of which is already apparent today. The present day pilots must work towards raising professional standards and laying the foundation for establishing and consolidating the profession in modern terms.

Pilotage is a high-risk operation requiring the combination of local knowledge, technical knowledge, expert motor skills, expert judgement and high-level

management skills, all of which need to come together in a highly operational and time critical environment. For the foreseeable future the operation will require the services of a specialist. The new generation pilot working in cooperation with the Master and ships crew but exercising independent judgement when necessary will continue to be the singular, most effective form of risk management.

*(A question arises for what purpose was the chief officer fixing the ships position on the Sea Empress? It has been claimed that it was to comply with the Charterers or P & I Club inspectors requirements to see positions marked on the chart during pilotage. And facetiously to make it easier for official accident investigators to reconstruct the ships track. In the critical environment of pilotage the value of position fixes is questionable. Position fixes in this situation provide a historical record. What is required is the positioning as close to real time as possible to enable the bridge team to closely monitor the progress of the vessel. Such is the fear of failing to meet requirements of the inspectors that positions are fixed on charts regardless of whether they are correct or not. Pilots have glanced at charts and been rudely surprised to find the ship fixed incorrectly. This is a cause of some concern to pilots because these erroneous positions could become the historical record of the pilotage. In this regard Pilots claim the example of the Sea Empress in fixing positions for no clear purpose related to the actual pilotage is not an isolated case but more the norm. This serious deficiency needs to be acknowledged, carefully analysed, and addressed by education and training).

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