The pilotage paradigm

The need for a paradigm shift

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One of the most highly publicised recent examples of this paradigm is the case of the *Cosco Busan,* which struck the San Francisco-Oakland Bay Bridge while outbound in thick fog. This article follows and develops an earlier exposé of this occurrence that was published in the September 2008 issue of *Seaways* as 'The pilotage paradox'. The paradox: on the one hand, we wish to entrust the safety and con of the vessel to the pilot; yet on the other, insist it is the crew and captain who are ultimately responsible and accountable for the safe conduct of the vessel. And so, the current pilotage paradigm drives and nurtures the paradox.

The long sea voyage is over and the pilot has boarded for the next phase of the trip. Soon after arriving in the wheelhouse a short conversation between the master and the pilot takes place – the pilot card is exchanged and the discussion ends quickly as the pilot looks up and gives the next course to steer. The helmsman responds and the voyage under pilotage has begun. There is a sense of relief – the pilot has the con and finally the officer of the watch and master can relax and, quite possibly, get some other pressing work done before arriving at port.

If this scenario sounds familiar to many, it is only because it happens so often on so many vessels in so many parts of the world. Whether arriving or leaving, discussions are frequently rudimentary, often limited to the ship's manoeuvring characteristics and the odd snippet of sundry information. And regardless of whether a vessel passage plan has been prepared ahead of time, the pilot has a plan – and he or she intends to follow it. All the best bridge resource management (BRM) theories and principles, dutifully absorbed in training by the pilot, master and watchkeeper, have been sealed away more hermetically than King Tut's mummy within its sarcophagus. This practice, which we call the pilotage paradigm (a paradigm being a model or standard pattern), takes place in almost every corner of the globe.

Accidents are rarely, if ever, caused by a single factor and the *Cosco Busan* is certainly no exception. The National Transportation Safety Board (NTSB) report on this accident has revealed several contributory factors, not the least of which was the reported diminished cognitive and perceptual functioning of the pilot at the time of the accident, given his use of certain prescribed drugs. Yet on that fateful, foggy morning the *Cosco Busan* was conducted in a way that made the vessel susceptible to what is termed 'single point failure' – when one person makes a mistake and the other members of the team are unable to correct the error in time to avoid the unwanted consequences. The officer of the watch and master were unable to correct or challenge the pilot's conning error because they didn't have a plan with which they could compare. Not only were they not singing from the same song sheet – the bridge team didn't even have the lyrics.

The events surrounding the allision of the tankship *Kition* with Interstate 10 bridge in 2007 represents an interesting example of the mindset that drives the present pilotage paradigm. The vessel was berthed at Port Allen, Louisiana on the Mississippi River. All was ready when the pilot boarded and the usual exchange was conducted.

In fine weather and excellent visibility, the vessel was manoeuvred away from the berth and a series of orders were given by the pilot to the three attending tugs. Although after the accident the pilot told investigators that his initial plan was to turn the vessel once below (south of) the bridge, the orders given and their timing reveal that his intention was probably to turn adjacent to the berth. Soon after the manoeuvre began, and with the vessel off and parallel to the berth, the pilot ordered the bow tug to back hard, which had the effect of moving the *Kition*'s bow to starboard. The master of this tug later told investigators that he assumed the pilot would move the *Kition* down river through the bridge and then turn it. He said that the first indication that he intended to turn adjacent to the berth was when the pilot ordered him to back hard and for the two starboard quarter tugs to push hard aft. Soon after these orders were given the vessel hit the Interstate 10 bridge pier see fig 1, causing about $US8 million in damage to the structure and over 700,000 dollars in damage to the ship.

▲ Figure 1: Diagram from NTSB Report Mar 08/03

In any event, sharing the plan was not a standard procedure or high up on this pilot's priority list. This was evident as, after the accident, he told investigators that he did not discuss his plans for manoeuvring vessels with masters 'unless they ask'. One of the masters of the attending tugs, very experienced in departures at this terminal, later said he estimated that 90 per cent of the large vessels departing the dock are moved

down river through the bridge and then turned, while the others are taken up river and then turned.

Obviously, sharing the plan to turn adjacent to the berth before commencing the manoeuvre with the *Kition*'s master **and** the attending tug operators would have raised red flags and possibly caused the pilot to reconsider the manoeuvre, taking into consideration the prevailing risks. Less obvious and not mentioned in the NTSB report, standardised plans would have informed everyone, including the pilot, that turning adjacent to the berth with such a large vessel is not the best practice. In this instance, one must ask why 'best practice manoeuvres' have not been developed by a core group of senior pilots? Using modern technology such as electronic simulators in conjunction with their pilotage experiences, these could then be embedded into standard operating procedures. The aviation industry has, for some time now, developed best practice maneuvres for predictable events and has incorporated those techniques into their pilot training programs.

A shared plan not followed

In another case, the passenger vessel *Van Gogh* grounded while leaving Devonport, Tasmania in 2008. Although there had been an agreed upon plan between the pilot and bridge team, it was not followed by the pilot nor were the actions of the pilot challenged by the bridge team. As the Australian Transport Safety Bureau report points out:

The importance of having a passage plan for pilotage cannot be over-emphasised. Without a proper and functional passage plan there can be no shared mental model, no challenge and response opportunities, no real knowledge and understanding of roles and responsibilities of the bridge team members and no defined limits.

Importantly though, it should be understood that having a passage plan which is not followed is just as ineffective as not having a plan in the first place.

According to the report, other contributing factors to this accident were an incomplete master/pilot pre-departure information exchange and not informing the pilot of the practice of using the ship's engines independently for manoeuvring.

Standardised passage plans

It is recognised that each pilotage situation is different: weather, vessel size and manoeuvrability, channel constraints and currents, among others, all influence the way the operation will be conducted. However, standardised passage plans do provide a template of best practice. These plans need to be comprehensive but not overly complex, as they must be understood by all parties. Any adjustments due to special or temporary considerations can be made quickly and communicated to all. Everyone is then in tune with the plan, able to monitor it and, if need be, challenge it in an effective manner.

In many ways, the agency charged with investigating marine occurrences in Canada, the Transportation Safety Board of Canada (TSB) may have been ahead of the curve on this. In a report published in 1994 the TSB stated that: 'Knowledge of the pilot's passage plan would provide a focus for the OOW to effectively monitor the intentions of the pilot, the track and the progress of the vessel. Currently, it is not common practice for pilots to provide passage plans to ship's personnel or for the pilotage authorities to provide such plans to their pilots.'

The Board went on to recommend that: 'The Department of Transport require that the pilotage authorities publish official passage plans for compulsory pilotage waters and make them available to masters to facilitate monitoring of the pilot's actions by the vessel's bridge team. (Recommendation No. M94-34).'

In 1995, the TSB went one step further and conducted a safety study on the operational relationship between ship masters/watchkeeping officers and marine pilots (report number SM 9501). Some of the many interesting findings of this study were as follows;

- With respect to the overall exchange of information between pilots and masters and OOWs, apparently each party is under the assumption that the other knows the necessary information and, if they do not, they will request it.
- Pilots and bridge officers disagree on the extent to which OOWs monitor the vessel's progress, the pilots expressing some dissatisfaction with respect to how well they are being supported or monitored by bridge personnel. However, both groups agree that the pilots seldom assist the OOW in monitoring the vessel movements.
- Most of the foregoing findings are indicative of serious barriers in the relationship among pilots, masters and OOWs, thereby compromising their effectiveness as a coherent team.
- Several foreign organisations have recognised the relationship between crew interaction and accident causation, and have begun implementing various training regimes in bridge resource management.

To date, the TSB recommendation has not been acted upon in Canada. However, several major Australian ports such as Sydney and Port Philips Pilots (Melbourne) have made electronic passage plans that play as animations available on their websites. The animations can be customised according to the desired ship length. Both inbound and outbound plans for many berths at Sydney and Port Botany are available online at: www.sydneyports.com.au/port_operations/sydney_pilot_service/passage_planning Port Philips Sea Pilots plans are available at: www.ppsp.com.au/passage-planning-/choose-your-passage.aspx

As is stated on the Sydney Ports internet site, 'ports reduce their own risk exposure and enhance safe operating procedures for the vessels and crews using their port by providing early and detailed information to port users... be they shippers, shipowners, charterers, etc. Obviously, the same is true of pilotage areas other than ports.

▲ Figure 2: Online passage plans, Sydney and Port Botany

Another example, again in Australia, is the Queensland government's port passage plans. This government has seen fit to publish on the internet detailed passage plans for the four major ports under its jurisdiction. For example, one may find the following plan for Thursday Island Port:

▲ Figure 3: Thursday Isabel port passage plan

While the Queensland passage plans are helpful, there is still room for improvement. For example, what are the points and distances used by the pilots for

their parallel indexing on the indicated courses? (Both Sydney and Melbourne have these.) Additionally, allowable cross track errors, optimum courses, and speeds for each leg of the passage could be indicated. If the master of the *Cosco Busan* had known such information, especially the parallel indexing used by the pilot, he could have been a valuable backup as they navigated the vessel out of the harbour in thick fog. As it was, the master was relegated to an observer as the pilot gave helm and engine orders and the vessel came almost parallel with the San Francisco-Oakland Bay Bridge. Unfortunately, they ran out of both time and space and made contact with the fendering of the Delta pier as the vessel made its way under the bridge.

The paradigm shift

The shift from the present paradigm – that is, the pilot working alone, giving helm or course orders with the plan in his/her head, while the crew takes a passive role, not knowing the plan and yet trying to ensure the safety of the vessel nonetheless – is one that has endured, but not without costly consequences. In the excellent book *Risky Work Environments,* edited by Christine Owen, et al, (published by Ashgate, ISBN 978-0-7546-7609-6) the authors' posit that this 'traditional' way of piloting is plagued by several weaknesses, not the least of which is how it frames the pilot's performance in an individualistic way such that they 'do not see a need to share them [the tasks] or to communicate their intentions or knowledge…'

On the other hand, the authors allow that the traditional manner of piloting also has strengths, one of which is its 'situational adaptability'. Their analysis also highlights important tensions and stresses in the system that reduces safety and efficiency. These include;

- The strength of the current piloting practice lies in its skill-based adaptability. That this does not include communication and cooperation among the bridge crew to the degree currently required.
- The on-bridge responsibility and power relations (based on professional skills) between the master and the pilot are in contradiction with those enacted in the law. This does not manifest itself until the situation demands it.
- The demands of piloting are not taken into account when designing the ship's navigation technology. They should be part of the validation and verification criteria of bridge technology.

The September 2008 article in *Seaways*, 'The pilotage paradox' mentioned how Brisbane pilots have modified their working practices to enable a 'systems approach' and are actively soliciting the support of the ship's bridge team in the pilotage act. These pilots also ensure that, before commencing the pilotage, their plan and that of the vessel are reconciled. This not only forms a more cohesive navigation team but brings the ship's bridge team 'into the pilot's head'.

The paradigm shift is indeed now happening even beyond Brisbane. In June 2009, the Hydrographic and Oceanographic Service of the Chilean Navy (SHOA), the Maritime Authority of the Chilean Navy and the Chilean Channels Authorised Pilots Association, in cooperation with Jeppesen Marine, agreed to begin the introduction of that company's marine pilotage charts (MPC) into use for the waters in and surrounding Chile.

According to the company, this product is the aggregation of both operational and navigation information traditionally found in a variety of sources, presented in a consistent, easy-to-use presentation. MPCs also provide a basis for capturing and retaining valuable knowledge from experienced masters and making it available to all bridge teams, thus promoting the use of 'best practices' throughout the pilotage operation.

The paradigm shift is also happening along quality assurance and safety management lines with the acceptance and adoption of the International Standard for Maritime Pilot Organisations by an increasing number of pilotage organisations. One of the requirements states: 'The pilot organisation shall establish procedures for the preparation, planning and execution of the pilotage passage, with due consideration to local, national and international requirements and local best practice.'

Conclusion

The situation is not a simple one: there is a complex web of interconnected issues that must coalesce for a complete paradigm shift to occur:

- Ships' bridge teams must be ready to step up and actively participate in pilotage.
- Ships' bridge teams must possess the BRM and English language skills to be effective partners with the pilot and support the operation.
- Shipping companies must realise that their navigation officers and masters cannot do ancillary tasks while under pilotage but must assist and validate the navigation process. As such, the chronic under crewing that is observed on many vessels must be reversed.
- Pilots must engage and integrate the ship's bridge team into the performance of the pilotage act.
- Government and port authorities must, in consultation with their pilots, establish and publish standardised routes to which preliminary passage plans in pilotage waters can be made.

It is too late for the managing company of the *Cosco Busan* given the potentially devastating criminal and civil suits going forward in the United States. It certainly is too late for the pilot, facing criminal charges and prison time (see Nautelex). In reference to the pilot, a US Justice Department official recently made the chilling statement that: 'Today's guilty plea is a reminder that the *Cosco Busan* crash was not just an accident, but a criminal act. This is not a case involving a mere mistake. The lesson here is that environmental stewards, who abandon ship, act negligently and cause major environmental damage will be vigorously prosecuted.'

As the assistant US Attorney stated at the sentencing of the pilot, he '…was acting more like a solo practitioner than a team player'. Yet, it is unfortunate that the US is actively pursuing the 'criminalisation' of mariners. In many ways the pilot and the bridge team of the *Cosco Busan* were victims of the prevalent pilotage paradigm. Had they truly all been working from a common plan each with key interrelated functions to enhance safety and acting as a backup for the other, the chances are that the vessel would have slipped under the bridge without notice or consequence. As the Port Philip Sea Pilots website describes it, 'If the pilot's plan differs from the vessel's plan, both plans are flawed and effective monitoring cannot take place.'

In practice, the present paradigm tacitly approves the passive role of the ship's bridge team in pilotage and unduly burdens the pilot – yet in the event of a mishap it is the master and officer of the watch who are ultimately accountable. It is high time that the workload be appropriately redistributed and risks reduced further by not only establishing and publishing the templates – the standardised plans, the preliminary passage plans for pilotage waters, but by employing the principles of BRM while under pilotage: in a word – teamwork. Teamwork can only be true to its name if a common plan is known and monitored by all.