The Hue & Cry

Easter 2016 is the Centenary of Ireland’s 1916 Easter Rising - an attempt to escape 850 years of suppression from an Empire then bogged-down fighting Germany – the most serious rival to British business interests. Britain in 1905 had built the oil-fired Dreadnought battleship, which rendered all other warships obsolete. Britain had no access to oil, whilst Germany had almost completed the railway from Basra to Berlin. Britain started planning for war in 1905, but needed a ‘casus belli’: recent research suggests that Britain schemed with France & Russia to provoke Germany to attack France via Belgium. Plan B, if the British public preferred peace, was to unleash civil war in Ireland, then blame German treachery. The Easter Rising was the unintended consequence of a plot that makes Machiavelli look like a boy scout.

The focus of WW1 (and all wars since) was oil - hence the disastrous forays against the Turks. In April 1916, the 5-month siege of Kut-al-Amara ended: 13,000 starving British and Indian soldiers surrendered (the largest-ever surrender by the British). War is profitable business, but reduces Mankind to the very dregs of Humanity.

On a happier note: “Just Culture” is essential for BRM to flourish. NZMPA is heavily focused on working to achieve that nationally. MNZ has benefitted from this closer liaison, as would all our ports and national economy: all need to share the mental model – we are in the same boat.

The Pilot Boat Wakatere - Auckland’s new tug in a good light

Pilots are much more than the sum of their parts: NZMPA will shortly conduct a census to create a well of knowledge able to be drawn from as needed. No-one has a monopoly of good ideas. A new tug-training venture - driven by visionary Arie Nygh - has begun in Auckland; Lew Henderson observed the inaugural course (p.13). Another multi-talented pilot, Peter McArthur writes about Pilots and Chaos Theory (p.15).

Finally, a note on editing: the paper on Chaos had that effect on this magazine: I had prepared other pieces already, but had to sacrifice them all to keep the magazine down to 24 pages. There is always uncertainty over the length and the timing of the Ports of Call section, but it is that national contribution which makes our magazine quite unique and maintains Kiwi No.8 wire traditions...

Contents

N.B. Opinions expressed may not be those of NZMPA.

1. The Hue & Cry Ed
3. Shared Mental Model Steve Banks
5. Ports of Call Men in Black Trousers
10. Auckland’s Pilot Boat Wakatere Geoff Roberts
13. Tug Training MIT & SeaWays Lew Henderson
15. Piloting at the Edge of Chaos Peter McArthur

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The last 3 months since our Tauranga AGM & presentations, aviation seminar and my election to president have been very interesting and enlightening times for me. This was also off the back of the 2nd Generation BRM courses presented by Ravi Nijjer last year, where many of us came away with a refreshed approach to what we do, how we do it, and how our systems play a crucial part in all this. When I say systems, I’m not just looking about our procedures and training regimes, but also about how we are managed, supported and kept current with CPD.

The aviation seminar, presented by Accident Investigations Manager, Alan Bradbury and Human Factors Trainer and pilot, Paul Clayton of Air New Zealand, was insightful and a breath of fresh air to our sector of the maritime industry. Air NZ’s attempt to establish a Just Culture early in the new millennium failed, but a second attempt was more successful. This has removed most reluctance in reporting incidents, and the fear of retribution for unintentional errors. Alan’s explanation of getting a pilot back into the cockpit as soon as possible after an incident, and “getting the monkey off his back”, is something unfamiliar to most of us. Having experienced being stood down for a long period after an incident, I am very appreciative of those who suffer this knee-jerk reaction by companies or authorities, when little consideration is given to what this does to an isolated individual while the facts are established. Alan explained how he tries to put himself in the shoes of the individual, then establish the facts quickly. He then considers whether disciplinary action, coaching or consoling is required. The hope that this approach will become commonplace in our sector has been reinforced by my own company’s encouragement to report all incidents, with subsequent positive reinforcement.

Whilst on the subject of incidents, the recent case of the Azamara Quest which made contact with a rock in Tory Channel, is very relevant to discussions about how we pilot
these days. Ravi’s view that we need to move from “traditional” to “modernised” pilotage methods is supported in this case. Whilst there have only been sketchy reports so far, with much conjecture, and TAIC indicating that it will be 18 months before they release a report, it gives rise to consideration of how we do this type of operation. Tory Channel is a stretch of water with strong tidal flows, minimal clearances of obstructions and narrow safety margins. For this reason it reinforces the need for BRM to be at an optimal level, with the bridge team sharing the same mental model as the pilot. For ferries, this would be expected, however for a foreign cruise ship this is a big ask when the team has possibly never transited Tory Channel before. This is not relevant solely to Tory Channel or cruise ships however, as on a daily basis around New Zealand we pilot other types of ships within very narrow safety margins. This may be due to weather, restricted waters, vessel restrictions, traffic and abnormal situations. For this reason I feel we need to reappraise how we tackle these less-than-routine operations involving narrow safety margins, using those philosophies and methodologies adopted by the aviation industry. Yes this is a big ask for an industry which is steeped in tradition, but advances in technology and greater understanding of Human Factors are anything but traditional to us.

Having said all this, what are we going to do about it? Following our AGM last November, there was discussion about a number of initiatives to address many of the matters I have raised. A number of members inside and outside of the Executive, have offered to be involved in committees and working groups. Once established, these will look at training methods and standards, engagement with the cruise industry, setting up a PAN (Peer Support Network), and promotion of ongoing Professional Development. With increased engagement rather than indifference from our members, we may see a move towards modernisation of our pilotage operations having an easier transition.

On a final note, our Vice President Lew Henderson and I have had two meetings with Keith Manch and his senior managers in December and February. Whilst a certain journalist has seen these meetings akin to fraternising with the enemy, we have concluded that without face-to-face meetings, our initiatives will be dead-in-the-water. We continue to condemn the situation at Taharoa, but to be totally absorbed with that alone will see other areas of concern founder. We are working hard to be involved in future decision-making processes where our members’ expertise could be employed, and the logic in this has been acknowledged by the regulator and his managers. Members will soon be contacted about how they may be involved in this process.

A final thought from the cruise ships, “Think out loud”, and from me, “You are human, you make mistakes – have a Shared Mental Model”. Safe sailing.

Steve Banks
President, NZMPA

Note on Subs from Treasurer Mike Birch: All Full and Associate members, please look-out for the annual subs invoice coming their way shortly. Subs remain the same this year at a $300 for Full members and $100 for Associate members. Your early attention to the invoice would be appreciated and a chase-up if necessary with your finance department if they pay direct.
As most mariners and every schoolchild versed in the basics of geography will know, the Marianas Trench off the Philippines is the deepest part of the world’s oceans. At some 11,000 metres deep it is rarely visited and it was not until 1959 that Sir Vic Allsmere in the bathyscaphe, *Deep-Joy*, managed to plumb the depths and sit on the bottom only to observe that there was next to stuff—all there except *xenophyophores* - a form of racist and bigoted single cell organism, remarkably similar to the human form of the same, and a few miserable creatures living under immense pressure. Indeed, one such specimen examined was found to have two juvenile offspring bunking off from the school and a partner nursing another 3000 eggs of which only 200 would survive, the resulting mortality needing to be explained to submarine social services; all this in zero light conditions and no detectable benefit from the effects of global warming. Such pressure is normal at those depths.

What most schoolchildren are unaware of, even those precocious little bastards whose parents have convinced them to assume they know everything about everything, is that coming in a close second to the deepest trench in the world is Otago Harbour at an abyss-like but nevertheless abysmal 13.5 metres; down a whole half metre from the previously declared 13.0 metres, a report on which may have bored the reader witless some months ago. The bottom of this trench has only just recently been visited by Captain Paul Wilson, utilising far newer technology in the form of the drag-head of the dredge New Era - he having neither the time nor the inclination to go down there himself. However, despite lacking Sir Vic’s personal touch to exploration of the deep, much more interesting discoveries were made than during the over-priced and frankly commercially unsound visit to the bottom of the Marianas Trench, of which more later. Two *New World* shopping trollies, numerous fishing weights and lures, since sold on Trade-Me to offset capital dredging costs, and a flattened Speight’s Gold Medal beer can dating back to last October were recovered in a matter of months. All-in-all, a *King’s Ransom* of a haul.

Consequently the pressure on the miserable creatures living in the Otago area is a lot less than that off the Philippines coast, with the CEO and Civil GM Engineering kicking back, confident in the knowledge that they will have no worries at their next presentation to the board as they can still fleece New World for the price of the trollies’ return if rising costs need enhanced mitigation. Even further down the food-chain, maritime pilots are showing little in the way of pressure at the prospect of handling 13.0 metre draft ships now that the channel depth has increased to a depth whereby negative UKC’s and an accountant’s imagination will no longer be considered necessary when doing tidal calculations. Apologists for the Marianas Trench developer have been quick to point out that even with a 10% UKC it can handle vessels of 5400 metres draft at chart datum, but whereas both Maersk Line and MSC have on the one hand been quick to appreciate the titanic tectonic efforts made over billions of years, they have on the other pointed out that the global shipping market is some way off requiring ships of that draft. That has not prevented a call...
from NZMPA for pilots to be trained in anticipation of the arrival of Marianas-max vessels, stating that; “…on past experience an estimated five millennia lead-in time for training is not an unreasonable expectation”.  (Craig Holmes)

**TARANAKI**

We finally came out of the closet and admitted a PPU would be a good asset to have. After testing different units, the decision went to the Danish company “Marimatech” and we’re delighted with this piece of kit. Tommy Mikkelsen is hopeful of tying in a trip to New Plymouth around the April AMPI conference for discussions over the installation of their shore based AIS monitoring system for the area as there have been numerous close calls with ships dragging anchor and not keeping a proper watch. While doing the hazard ID and writing a procedure for their use and integration with the Bridge team, together with the transfer process to the ship (bags to be sent up separately), it’s food for thought that we could maybe have an NZMPA standard that is then fleshed-out by each Port to cater for their requirements?
The Port is getting closer to ordering a new tug – 24 metre 65T azimuth tractor tug. In the meantime “Kupe” has/is helping out in Lyttelton while down there for docking. “Tuakana” went to Admiralty Bay for a week to assist with the float-on of oil rig “Ensco 107” to a heavy transport ship, so had the pleasure of Tauranga’s “Kaimai” helping us out – all were very impressed with her performance.

Last year we introduced the Dutch ShoreTension system onto the cargo berths as a trial to negate the need to use the old shore mooring system and to hold ships alongside during periods of surge conditions when otherwise the Port had to send ships to sea. This has been so successful that another two intrinsically safe suites have been built and due to be delivered and installed in May for the tanker berths.

Had an interesting cargo - Fitzroy Engineering here manufactured of all things a 416 tonne underwater restaurant for the Maldives (I suppose it will give the fish a chance to see where they are going to end up!). This was loaded onto the Jumboship “Fairlane” by her crane.

It’s been such a long time of flat seas that the return of bumpy boat rides is going to be a hell of a shock to the system. Best regards from the Naki.  (Neill MacKean)

**BLUFF**

I always seem to start these things with reference to the weather, and for the sake of consistency, this is no different. It has been a very slow start to summer with the grass barely deciding to grow and my as yet unfrozen winter meat supply has been moved around the garden regularly in search of fresh fodder.

South Ports latest and greatest tug has been regularly used and makes some of those more time-consuming jobs like swinging loaded bulkies on to Tiwai a pleasure. An effective 30% increase in bollard pull has been a real bonus. We welcomed the first 260m container ship *MSC Vienna* to the port in about 18 months in typical fashion of wind and rain last weekend. *Te Matua’s* extra power made it possible for the vessel to depart on time.

We have had some staffing changes: we fare-welled Friso who returns to Europe for family reasons and to search for new opportunities, while in the same breath we welcomed back Pier-Paulo Scala who returns from Europe for family reasons and new opportunities.

Berth repairs to #5 berth mean we are without our alternative bulk cargo berth. This has meant that the Terminal has had to be reminded that we are all in this together and their prized berth space has been brought back into the fold. Filthy bulk carriers now lay where gleaming MSC containerships once rested.

From rough and tough and once-again oyster-obsessed Bluff, enjoy the coming equinoctials.  (Steve Gilkison)

**LYTTELTON**

After a delivery voyage from Melbourne via Tasmania and Bluff, the pilot boat *Awaroa* has arrived. With the paperwork and training completed it was straight to
work piercing the wind-chop with ease as she heads up the harbour. In all respects she is a step up from the old boat which had served us well for many years but was really showing its age.

The Cruise ship season for us has been a short one, both in the length of the vessels and the number of visits, with a grand total of five. There has recently been a discussion around Akaroa Harbour and its status as a “Pilotage area for future activation”. What started as an alternative to Lyttelton should all the berths be booked has, thanks to the earthquake and LPCs reluctance to commit to a Cruise Berth, become the main destination for cruise vessels seeking to access Christchurch. I would assume most parties involved would be happy for the present designation to continue but this is an interesting situation that could start a few theoretical debates.

It is good to hear that other ports are updating their tug fleets leaving us reading Ports of Call with envy. With our 60 ton tug out of service for maintenance, we are using the Kupe on loan from Taranaki for ten days. This gives us 30T at each end on a calm day on a long line. Time to form a new tug committee. 

(N finlay Laird)

NELSON

It’s been a long, hot quarter. Shipping has been busy, particularly February which saw good export volumes for logs and timber products. Empty reefer boxes fill every free space in the port as the first of the apples arrive at the gate. Container volumes have been very strong (for Nelson) with some 500-box-turnarounds, and up to 1400 moves per week. Although apple figures are forecast slightly lower due to hail damage before Christmas, the early signs are good and wine exports continue to grow.

Plenty of progress has been made with port infrastructure this quarter. The death knell sounds for a couple more sheds and new reefer towers are nearing completion which will free up much needed space in the container yard. Land acquisition continues at the port perimeter where replacement sheds will be located. A new log storage area with easy access to the weigh-bridge is nearing completion which will ease congestion at the main gate as log export volumes increase. The new tanker manifold is under construction at the Southwest end of Main Wharf and along with a new mooring dolphin will be operational late 2016.

The new tug is still scheduled for delivery in August 2016. The hull construction is complete and the first paint being applied. Engine and drive units are now being fitted. In preparation for its arrival, training programs are being compiled for tug crews and pilots. This will be augmented by simulator visits to assess our current piloting methods and operating limits before the new vessel arrives for hands-on training. (Matt Conyers)

AUCKLAND

We seem to have survived another “Silly Season” with everybody apparently behaving themselves on the Harbour, and the weather Gods are so far, treating us benignly, dishing out only a couple of days of ferocious wind, which didn’t coincide with any of the large Cruise Ship arrivals (I may have tempted fate here). We are steadily working our way through the cruise season with another 30 or so visits still to come.

We’ve also had a lot of Super Yachts calling in to the Silo Park Marina. The latest one to arrive is a Ron Holland design with 90m high mast and its own seaplane stowed on the afterdeck. I actually had a chance to talk to the designer himself, who was on board for the trip. He reckoned there was only one bridge in the world that she could actually sail under where the mast would remain the same height throughout the transit.

Congratulations go out to Perry D’Souza who has diligently beavered away through his job numbers and has now achieved his A grade licence (pending issue from MNZ) Peter Willyams will now start training toward his A grade, and Sam Eves is well on track for getting his job numbers for his B-grade.

In an earlier report I had mentioned the good work we had achieved with our ‘Whale Protocol’ which has been established to protect our resident population of Brydes Whales. As I had written earlier, the key to keeping them
dent-free is to convince Owners and Masters of the need to proceed at a reduced speed in the Gulf Approaches, and it seems to work very well. We have included this brief as part of our MPX and for the most part, it is rigidly adhered to by our customers… I mean, what’s not to love about Whales? It’s generally an easy-sell, unless I’m talking to (I won’t pinpoint any nationality here) someone who comes from the general direction of Norway, whereupon some of these folk will openly adopt a look of lip-smacking reverence.

It would be unfair of me to single out just one group though. As I had a recent experience on a certain type of vessel, that had a very annoyed Navigator (I won’t pinpoint any nationality here) of Teutonic lineage, who took great umbrage over her ETAs being affected by the reduced speed requirement. Such was her vitriol that I noticed that even the more senior members of the Bridge team were quietly shuffling away from her into the dark recesses of the unlit Bridge.

When she stopped for breath I had to point out it was all for the greater good of our Cetacean mates, which didn’t have the desired effect, as she rattled off to me her favourite market stalls in Bergen where she would purchase Smoked and Barbequed versions whenever she visited. She then embarked on an entirely unprompted tirade on other ridiculous protocols she had encountered, regarding Seal and Penguin colonies. (Yes…by this stage I did start to wonder what sort of an organisation a Grandparent or two of hers, may have belonged to in their youth)

She was a most intriguing individual who I look forward to meeting again next year. Unless of course she is snapped up by Donald to command the Presidential Yacht! (Craig Colven)

WELLINGTON

After living in Wellington for a few years the old eyes have become sensitive to bright sunlight, never more so than when the midday rays are bounding off a brilliant white dodger. “Whatever happened to the eau-de-nil” I ask. “Yes” is the common reply, accompanied by a slightly quizzical smile. Sadly, the once ubiquitous water-of-the-Nile appears to be another little luxury someone has deemed we can well do without and is perhaps now confined to the soffits of ancient mariners’ seaside bungalows.

Wellington’s downtown Queens Wharf hosted the Ecuadorian barque Guayas in February. On the final leg of a round-the-world voyage that had taken the vessel to the Americas, Europe, the Middle East, Asia and Australia; the four-day stay offered her crew an opportunity to stretch their legs before the long Pacific crossing. On cue, a 30 knot Nor-Easter developed for her departure and once clear of Aotea Quay the Master yielded to a little cajolery and set sail. The 126 degree leg provided a good reach and with the yeards braced hard up, fore and main lower and upper topsails set she heeled over nicely and romped along at a good 9 knots. Though the gales may lash and harry, pile on all the rags she’ll carry!

Running on the remaining legs was a little less exciting, nevertheless she maintained a good 8 knots to the harbour entrance whereupon the courses and spanker were set. Later in the day the AIS showed her making 10 knots to the southeast on the
first leg of her composite great circle track to Valparaiso, a passage that would take 26 days!

As related in the previous issue the Marine wide working hours management trial saw tug and launch crews switch to the pilot’s 4s and 5s roster in early January. The trial will last for three months, whereupon all hands will meet to review, iron-out issues and decide how to go forward. There are always two pilots on duty but only one tug and launch crew. Those crews’ ability to withstand consecutive busy days on the longer roster was tested recently when we completed 30 movements in a five-day cycle; nearly double the long-term average. On one busy day in January it looked the good old days were back with a total of 1600m of shipping on Aotea Quay leaving just 100m for a couple of fishing boats. Two of the tanker berths were also occupied for part of the day.

Long serving Voith tugmaster Ian Sleigh recently retired after 40 years service in Wellington. Marine staff gathered to wish him well, his long service acknowledged with a presentation from the Marine Manager.

The Dutch coaster Frisian Spring has become something of a fixture on Aotea Quay since New Year. With a cargo of telecommunications cable and parts destined for the Cooke Strait she is awaiting the other half of the act, a cable layer. The accumulated berthage should keep Marine in tea and biscuits for another year.  

(Marsden Bay)

(MARSSEN POINT)
I missed the last Port of Call. Things have been chugging-along well up North: shipping and helping HM at Bay Of Island with cruise ships is keeping us reasonably busy. The Marine team have been trying to address issues like Fatigue Management - especially for Tug/Pilot Boat crew. Also looking at CPD and trying to put some structure around it.

Andrew Baker has slotted into the Pilot roster. He is not far from getting his Unrestricted. Our new Marine Officer Richard Oliver has started his Pilot training having completed tug/craft and other familiarization.

Project regarding deepening the channel in order to bring 17m draft crude ship seems to be going slowly but surely: still in initial clearance and approval stages, but NZ Refining looks keen on it. I wonder how the drop of crude oil prices will change the dynamics!

We have increased our involvement in Cruise ships in The Bay of Islands this year - helping out HM Jim Lyle to cope with ever-increasing numbers

We are looking forward to new changes in the coming year: new bigger coastal tanker, new cement carrier for Golden Bay, for whom Whangarei/Marsden point is the home port. Overall the average ships size has increased: even the log ships are now 190+ mtrs until few years ago 169m was standard!

Our new 25T tug Marsden Bay is slowly settling in with the operators/Pilots. Unlike AZD tugs conventional Twin Screw/BT operation is different: altogether more demanding.

With Editor granting stay of execution, I had better close. Stay Safe.  (Kirit Barot)

NAPIER
It’s already the 9th day of Autumn, today it was around 33 degrees and yesterday it was a cool 36 degrees in the shade on our deck, so the only real indication that summer is supposedly over are the lack of remaining Cruise ships. To be exact we have 6 left and 3 of those are the Noordam finishing off her season. It has been a stop start sort of Cruise season for Napier, numbers were down for us for various reasons but 2016/17 and 2017/18 seasons are already starting to look pretty crazy.

We have had a trip to Tauranga and one to Wellington for two new bridge teams to Napier. Myself to the Carnival Legend in Tauranga and Robbie went down to Wellington for the Explorer of the Seas. Both trips went well and were well appreciated by the respective Captains and bridge teams. Their cooperation in both cases were first class and bodes well for future cooperation with Napier’s Cruise vessels.

Our latest recruit Sven Van Dulm has been doing really well with his training to the extent he will be taking his Orals on 24 March. Sven is currently down in
Wellington with Ruslan doing their BRM courses with Ravi. Trevor, Richard, myself and two of the Tug Masters are off to Smartship on 13 March for 3 intense days of berth development runs for our new (hopefully) No.6 berth. As mentioned in one of our previous entries, the future intention is to bring in larger tonnage on the new outer berth. Unfortunately this in itself is bringing some potentially large problems regarding manoeuvring and operating tugs in swell conditions plus a few more problems with interaction from passing shipping entering the port. Still, it is a challenge that has got to be faced including quite a few ‘3-tug’ moves, a new concept for Napier. I expect there will be a few more grey hairs at the end of it all!

Gus is off to Smartship for his ECDIS course with Antonio in April and Trev and Ruslan are booked in for theirs in June. To round off a busy 6 months for us all, Sven and I are off to the Manned Model course at Port Ash in May to sharpen up the thinking process and hone our basic ship handling skills. I believe the half a day with ‘hands on’ the Azipod model rounds off the course.

Even with the Hawkes Bay apple season running a couple of weeks late the busy apple period is only just around the corner. The boxes are stacking up in the Orchards but are the picker’s numbers stacking-up? Rumours of a shortage of labour will be tested over the coming weeks as will the Pilots and Marine team fatigue which has already been tested as of late.

This afternoon I said cheerio to Peter Bos on the Noordam in 35-50 kts of wind after being caught in the basin with 50 kts of Westerly. We had previously been watching the wind trend on the feed from our Enview weather station software and comparing the information with the instruments on the Noordam Bridge. Prior to letting go the consensus had been that 15 kts gusting up to 28 kts had been steady enough for long enough to encourage us to let go. The initial balance of ship power and our two tugs had been good and was enough to encourage us to proceed further. The old adage of thinking ahead and keeping the vessel in the right place all the time certainly paid off. When the wind hit us a third of the way across the basin we were upwind of track at the right speed with the tugs already in the right place taking the strain. Would I do it again? Not out of choice, but it is nice to know that we could and all that training, including BRM, closed loop, thinking aloud etc. and a good relationship with the Bridge team paid off.

In discussion with Ed about the above he mentioned my topic for our entry could be ‘Risk appetite in light of Costa Concordia’. Not today, Hugh as you would not get our entry for this addition in time (I am already pushing my luck!) I would like to say though that on the Costa Concordia they did quite a lot wrong. Today I like to think we managed to do most things right and lived to fight another day. (John Pagler)

Auckland’s New Pilot Boat: Project “Wakatere”

Our project started when talk upstairs centred on a replacement for Waitemata. Brent (Pilot Boat Skipper) asked if a catamaran could be considered, and an honest reply: not keen to stray from the mono-hull design, but if you want to go out and research it, go ahead.

I was honoured to be asked to part of a team of four, as I was a supporter, the results of what we see on our harbour are obvious. Our Akarana and Fullers ferry Jetraider are the only two high-speed mono-hulls operating in Auckland; everything else is catamaran.

Step one was to interview designers, of which we selected four. Teknicraft became frontrunner, their references were second to none, plus the portfolio of their craft built worldwide. The help we got from NZ Maritime Police, Pine Harbour Ferries, Victoria Water Police, and Auckland Coastguard together with Teknicraft was brilliant. Users of the design have nothing but accolades for this type of craft. We kept an open mind, and our draft
proposal was a package without the foil or Hamilton Jets. Pine Harbour Ferries provided us with Clipper 3 to test with a ship. Allan Drinkrow the owner of the company was enthusiastic to support our proposal, a very helpful man, and a pusher of the foil and Hamilton Jets. The test was successful, but we were convinced to stay with props and rudders, because we have always done it that way. The boss was now sitting on the fence over the project: a good outcome.

Nic de Waal, (Mr Teknicraft ) invited us to view Deodar and 1060 when out of the water to realise how his unique hull design works. Wow! Everything in the hulls is designed to provide low resistance, good sea keeping, and fuel economy. The Police and Allan Drinkrow were only too proud to talk about their craft, and to really sway us toward the foils and Hamilton Jets. Seeing the foil for the first time opened our eyes: it is a single piece of milled High Tensile aluminium - nothing could break it. The jets were starting to warm toward us, and Brent later was in New Plymouth talking to the Mikotahi team, all their results with Hamilton Jets in the mono-hull were good. Hamilton Jet have a brochure of pilot services around the world that use their product: huge in North America and Europe, next to nothing here in Australasia. We were convinced that it had to be the full Teknicraft proposal with the foil assistance and Hamilton Jets.

We presented the concept plans, drawings, and proposal to the CEO and Marine Services Manager, and they listened and asked questions. Our advantages were:

- Fuel savings, reducing 7 lt/mile to 5 lt/mile (actually 4.5 ltr/mile, saves 240 ltr per day )
- Higher operating speeds to meet customer demand - 30kts normal, but 40 kts when we have to deal with multiple shipping movement bookings thus reducing stretching pilot resourcing.
- Stable transfer platform
- Wide side decks for safe movement to pilot ladder
- Well deck behind wheelhouse providing shelter for Deckhand and Pilot before and after transfer
- Extremely manoeuvrable with modern jet unit technology (instant response using buckets )
- Less operating horsepower ( 65% for passage and transfers )
- Dry vessel (nothing comes on deck 95% of the time )
- Minimal wake (at 30 kts, a user friendly wake: boaties love us again )
- Shallow draft - 750mm at rest, 300mm operational
- Jet Units are whale and pilot-friendly, retrieval drills have a pilot out of the water in 2 1/2 mins, Skippers don't have the fear of running us over with props. Propeller and rudder damage from debris strike is also eliminated.
- Very little interaction when coming alongside ships (18 kts has been achieved for transfers, but it's an open book. Even those ugly quarter ladder positions are a thing of the past, the boat comes in and breaks away easily.)
- Safe transfer in a following sea, the bucket stops the boat surging down the wave
- Pilot ladder recess, works a treat, no jammed ladders
- Noise reduction, quieter than current vessels
- Safe transfer in a following sea, the bucket stops the boat surging down the wave
- Towing posts for fender logs and ships lines

The go ahead was given for the concept to become a reality, so the next step was for the team to nail down the Construction Specification. Working with Teknicraft on this was fun and easy: Nic is a guy who listens and comes up with the answers. The design was put out for pricing, and Q West were successful. They gave a start and delivery date, and they were spot-on. A lot of finer detail was decided upon, especially long-term maintenance savings, lack of paint above the waterline, what you see is a decal (repaints are more expensive than the original); garnet-blast instead of deck-tread (will last the lifetime of the boat). The pilot retrieval platform was a bonus based on similar platforms for NZ Police and Coastguard.

Engine servicing with Scania 500 hourly compared to 250 hourly with current ones.

Everyone involved talked to each other, the openness was the formula for a hiccup-free build - Teknicraft, Q West, Hamilton Jet, Scania, as well as our Ports Team. Issues were picked-up early as our representation was once-a-month at Q-West, so issues were small. We were questioning everything we had done, searching for that elusive what have we missed?

Five weeks before delivery, Akarana was broken, she was looking at her 4th engine rebuild in 7 years. Our new Engineering Manager said this is crazy, so the decision was to operate with the aging Waitemata, and re-engine Akarana with Scania’s. We needed Wakatere up and running asap. The training plan was put in place, we were able to contract-in Mike Roycroft, a very experienced Teknicraft user to introduce our team to Wakatere.

Wakatere was launched on time; sea-trials acceptance took place soon after initial testing, she passed everything without too much bother, then hurtled up to Auckland via the East Coast at an average speed of 30 kts in all types of sea conditions. On arrival at Auckland everyone got stuck into the training. Mike was brilliant; everyone picked up the concept of the design and Hamilton Jets very quickly, and loved what Wakatere had to offer. So much so, the team has a big preference toward Jet Units over props and rudders. The first encounter of going alongside a ship was a classic: Mike held Wakatere 30cm off the ladder, and held it, and held it. Are you going to go alongside Mike? His reply, you mean we can touch the ship. He found that eerie. Wakatere was in full service within a week of her arrival, a sign of the dedication everyone put into her.

We achieved everything we set out to do; a lot of the results were better than expected. We have had an issue with the fendering - identified as the weak link in the entire project at the onset, no matter what concept we went with - barring Camarc. Teknicraft and Q West are resolving this. We were getting the Popsure fendering right up until they stopped supplying it to anything unless it was a Camarc design.

Wakatere has been in full time service for almost four months without missing a beat. At the debrief of the project, our outcome was determined as successful is all areas; minor changes were identified for the next boat should Teknicraft receive further interest in the future. Nic always wants the next one to be better than the last.

If anyone is interested in Wakatere commercially or personally, don't hesitate to contact us, our enthusiasm is that of other Teknicraft users.

http://www.teknicraft.com/ qwest.com hamiltonjetnz.co.nz
Tug Training at NZ Maritime School in partnership with SeaWays Consultants

The NZ Maritime Pilots Association was asked to review the inaugural Tug Master training session held in February at the NZMS simulator in Auckland. The course was based on SeaWays Module 1 (ASD - ATD Tug Handling: Basic operations) & Module 2 (Undertaking Harbour Towage Operations).

I joined them on the last two days of the second module at the invitation of SeaWays to view the progress of the students and to evaluate the suitability of the simulator. As a Tug master who had completed the same modules live on board several years ago I was able to compare progress in the simulator to that undertaken on an operational tug.

Firstly, it needs to be made clear that the simulator training is a foundation course and is not intended to replace on board training in any specific port. The Modules take a candidate through a carefully crafted set of tasks to prepare them with a set of skills and tools for them to undertake an on board tug specific, and port specific training plan.

The port used in the simulator is a simulated model designed to best handle the tasks set and to offer visuals that enhance the training given. The Modules can be delivered using any tug model held in the simulator database although this course was completed using the Damen 2411 due to the advanced work SeaWays has completed to authenticate the model at their training and development base in Portsmouth, UK.

I arrived at the Simulator on Thursday 18 February at 0900. I was given a briefing on the plan for the day and discussed the progress of the training with the senior trainer (Steve Sandy), delivering trainer (Chris Strachan), and simulator operator (Kees Buckens).

It was a pleasure to finally meet Steve who I had heard so many good reports. Chris and Kees were helpful in bringing me up to speed on the delivery. The students were engaged in tasks on their own.

We then broke for "smoko" and it was a chance to meet the 4 trainees. It was interesting to hear their backgrounds. From current operators re-skilling to ASD (from RotorTugs), a fellow NZ pilot, and a newbie with no prior tug skills. An ideal group to run a first course with.

I spent the rest of the morning observing the students complete firstly "circuits" to a standard that truly amazed me and then onto new tasks as part of Module 2.

The last task of the day was new to them so was an excellent chance to see how they would handle a task not seen before. It impressed me that with the clear and concise explanation by Chris & Steve and after a demonstration all were sufficiently prepared and skilled to undertake the task on the first or second attempt. The course was able to move forward efficiently due to the core skills being evident as new tasks were introduced.

At the end of the day we retired to a suitable meeting house and had a debrief with Kees and Chris (Steve had a prior engagement). This was most helpful as it showed what the two parties had learned from and how they saw the delivery developing with further courses.

On the Friday morning I had a chance to speak in detail with Steve and felt reassured that all parties were committed to developing both the hardware and the presentation of the course as it matures in this location.

I have to say I was apprehensive in my expectations of the simulator performance. We have used this Sim on several occasions with mixed results. My caution was completely unfounded. The hardware performed without a fault. The controls, although different in the two Sims, were totally suitable and operated as they do on our own tugs. They were not in the habit of sitting to drive, which I find unusual but understandable, with the instructors needing to get in and out frequently to demonstrate.

As with most simulators the graphics can always be better. Generally it depends on your budget. The Sim at SmartShip in Brisbane is amazing with 360 deg and good vertical height. But that needs to be matched to the quality of the presentation. In this respect the Transas software was excellent. There were no software glitches and the graphics were realistic. I did find the depth perception a little off when landing head on but that was a matter of getting used to the visuals and I am sure a couple of days use would have sorted that out. The guys gave me several runs on the sticks and I found the model very realistic to our 2411’s. The whole course was run on that model so I was unable to comment of what other models would perform like. The development of this model by SeaWays is a credit to their determination to
set a high standard. It was vastly superior to the Force version I tried in Brisbane (however I acknowledge that this may have been improved by now). Kees was extremely helpful. He was patient with trainers as they gained confidence with his equipment and seemed very knowledgeable of the settings and specifics of the models used. I have to acknowledge the whole package now offered by the NZ Maritime School is well on the way to a top level tug training and skill development facility. The location is always a challenge. You place a Nav School downtown in the main city and it brings problems of access, noise, cost etc, but the alternative if it being out in the sticks raises another set of hurdles. At least the venue is in NZ and can reasonably be accessed from any NZ port. It is great to see the port out the window, especially the tugs across the road, but the cost of accommodation and options in Auckland poses a challenge. Kees indicated they had offered a package with accommodation but this was not taken up by any on this course. They need to work on this. A couple of realistic options nearby with suitable fixed rates needs to be sorted. These options need to deal with busy dates, holiday periods and other unexpected challenges.

I don't have all the answers but using student or sailors home rooms will not cut the mustard with many ports or individuals. However some on a tight budget or paying their own way may need that option. When I look back at my own training, I do feel some exposure to the tug in advance gives an understanding of the importance of position and scale of vessel as they use the simulator. Otherwise it can easily seem just an expensive computer game. However it is clear that those with no ingrained bad habits developed faster than those that had to be untrained before setting those core skills into action.

I see it as a tool in the training package. It can reduce the overall training time, reduce the operational time for plant and crews (and especially fuel costs), reduce the risk for equipment and make that initial part of any in-house training plan safer and easier. It could easily become part of an assessing tool when looking at prospective employees. It also offers a new standard in verifying current skill for our present tug masters. No longer should the Nav School and simulator be the domain just for the pilots. It offers ports the ability to integrate training and standards monitoring across the whole marine team. The individuals on this course displayed a range of skills. The 2 RotorTug drivers had to rethink how it is done. They were challenged and performed more erratically. The pilot with a little knowledge just made it look easy. He was like a machine - his times were so constant it was unnerving. The newbie with basically no previous knowledge just showed how well the package works as he was nearly up to the same level as the others on completion of the modules.

**Conclusion**

It was a pleasure to be able to view this course. In my professional capacity as a Tug Master and Pilot to see training offered to this standard here in NZ is fantastic. With my training and assessing hat on, it is great to see the SeaWays package in operation - it can only enhance the standard operation of tugs and towage through NZ and Australasia. On a personal level I am amazed to see how far the SeaWays package has developed over the 8 years I have had contact with them. There are now a few NZ ports that have adopted the Seaways model. It may not suit everyone, however it is the only comprehensive and industry-backed package to reach this level of acceptance in Australasia and the UK. Without an alternative standard most of our ports fail to use any external verification of their training and operational standards - a challenge which may be forced upon us under closer scrutiny by other sections of the industry and increasingly by the regulator. The next step is to get pilots onto a similar track.

It is my pleasure as a member of the NZMPA to endorse the SeaWays Modules 1 & 2 presented at the NZ Maritime School as meeting our aims of setting the highest industry and professional standards for training and preparation of staff for modern ASD tug operation and port towage.

Lew Henderson
(Vice President - New Zealand Maritime Pilots Association)
NZQA Tug Master Trainer and Assessor (26 February 2016)
PILOTING AT THE ‘EDGE-OF-CHAOS’

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BACKGROUND

Many years of research devoted to trying to understand the underlying mechanics of marine hydrodynamics have been rewarded with the publication of a number of papers that attempt to explain both the resultant theoretical principles and their practical application in a simplistic, easily assimilable, manner. Subsequently, my research has benefited from formal recognition and acceptance by the Royal Institute of Naval Architects (RINA) and accreditation by the global hydrodynamic community. Consequently, I am now regularly called upon to investigate ‘unusual’ occurrences and, where appropriate, give an opinion as to causation. Very occasionally, appointments will prompt questions that require deeper explanations in the field of hydrodynamics, and this article addresses one such event.

For the most part, the maritime community, including pilots, masters and ship-handlers, view water as simply ‘water’ - a stable, incompressible, immutable and generally predictable medium against which we practise our craft. The truth, however, could not be further from this simplistic perception - as explained by research physicists Anders Nilsson (Stanford University, California) and Lars Pettersson (Stockholm University) in their seminal article ‘Water, the strangest liquid’ (New Scientist, 6 February 2010) and as practically applied to the marine environment in ‘Peculiar water, Strange effects’ (McArthur, 2011).

During 2010, I was invited by a Harbour Authority to look into a number or intermittent, apparently unpredictable, and irregularly recurring, phenomena relating to very large container ships. For no apparent reason, when under full control of an experienced and competent pilot, these ships would suddenly, and inexplicably, experience a violent and increasing ‘sheer’ which required all of the pilot skills and the application of all assets at his disposal to effect recovery. Not being a single, isolated, phenomenon, and with no obvious cause, there was naturally some concern as to why this happened.

Upon conclusion of the research, during the report debrief, two fundamental questions were asked: Can you explain what happened? Is there a rule that we can apply in all situations to predict when such an event might re-occur?

The answer to the first question was a simple ‘yes’ - although the reasons were complex.

Answering the second question required a little more consideration.

First, there is the simple commercial response - ‘if the event is predictable in all circumstances, then there would be no need for experienced professional pilots’ - their job would, very soon, fall to computers which, in the long run, cost significantly less than a professional pilot service. Such a prospect was envisioned over twenty years ago by Dr Odd Falstinen, Norwegian mathematician and theoretical hydrodynamicist.

The second, and fuller, answer is - depending on your perspective - far more interesting, significantly more complex, and requires knowledge not only of ship-handling, bridge management systems and some hydrodynamic understanding, but also an appreciation for systems complexity and the mathematical principals that underlie chaos theory. Once understood, it becomes clear that the full answer has implications in many areas that apply to Pilots, Ship Masters and general ship-handlers. Some of these areas include, but are not limited to: law and ship-handler criminalisation; practical management processes; ship-handling training; ongoing professional development;
objective competence perceptions; and the need to retain a professional pilot service.
To begin to understand the second answer, one need only accept that water is anything but ‘simple’. It does, in fact, exhibit a dual structure (tetrahedral and confused) so that it can exist (and co-exist) in both gelatinous and traditional Newtonian states (see Nilsson and Pettersson, 2010). Water tends to become highly chaotic once disturbed, but can eventually organise to exhibit the complex attributes of natural organic systems.

COMPLEXITY THEORY AND PRINCIPLES

Much has been written about ‘complexity’, and many of the theoretical ideas have been successfully applied in the world of commerce. Complexity theory is particularly useful in describing the increasing confusion surrounding international business markets. No one cause can be attributed to complexity - but in the business world there are three underlying ‘drivers’: improving communications describing the interconnectedness of all things; increasing internationalisation and the multiple ‘problems’ this creates; and the increasing dynamic resulting from the range of ‘options and choices’ available to consumers.

Whilst the application to ‘problematic’ ship actions may not be immediately apparent, complexity principles are increasingly applied in understanding how order can derive from turbulent, unpredictable and confusing environments (Mason, 2009).

The underlying idea of complexity is that, from absolute confusion, all things tend to self-organise into systems when simple rules are applied (Kelly and Allinson, 1995). These systems can produce unexpected patterns, behaviours or consequences (Goldberg and Markoczy, 1996) and, because of non-linear feedback systems (Stacey, 1996), the interconnection and interdependent system parts (Bar-Yam, 2000) tend to interact with, and adapt to, each other (Meade and Rabelo, 2004).

Complex behaviour is orderly, yet full of surprises, apparently uncontrollable, but not totally chaotic. The rules that generate complex behaviour cannot be managerially enforced and equally cannot be predicted from any one part of the system. One of the most visible and often cited examples of unpredictable complex behaviour is that of huge flocks of starlings creating incredible but beautiful patterns in the evening sky. It only takes one to change position, even slightly, and the rest will follow momentarily in an ever changing aerial display that is absolutely mesmerising.

Nilsson and Pettersson (2010) show that, because of its duality, water is chaotic in essence, but tends towards a self-organised functionality - as suggested by complexity theory. The evidence lies in the fact that mariners are able to identify discernible patterns, pressure features and physical responses when a ship is under the influence of moving water, or when moving through water where, to a greater or lesser extent, the hydrodynamic effects described as ‘interaction’ might be anticipated.

A second important concept of complexity theory happens when the system parameters change, that is, when a defining or limiting factor alters sufficiently. According to chaos theory, that change need only be very small, and thereafter a ‘feedback’ occurs in one of two ways:

- **Negative feedback** occurs when the system moves away from equilibrium and a ‘corrective’ action occurs to return the system to stability. A good example is the domestic central heating system which, once the controlling temperature is exceeded, will act to re-establish the desired set-value. In the marine environment, there is no better example than that of a ship’s helmsman continually adjusting the helm to maintain a desired course.
• Positive feedback is exemplified in the ‘butterfly effect’ (Lorenz, 1963). In short, the butterfly ‘flaps its wings’ somewhere off the African coast, and sets up a tiny disturbance. There is nothing to moderate that disturbance (no negative feedback) and so it becomes a self-generating system and develops unhindered - achieving the intensity of a hurricane by time it reaches the Gulf of Mexico. This may be an extreme (unproven) example, but it demonstrates the principle.

**CHAOSES THEORY**

Chaos theory derives from mathematical principles. The equations are fairly straightforward, but their consequences can be quite literally world changing. Positive feedback tends to be a feature of chaos theory so that, in the real world, once a system turns ‘chaotic’ the effect grows, perhaps slowly at first, so that it is barely noticeable. Positive feedback, by its very nature, amplifies small changes (McGlone and Ramsey, 1998), pushing the system towards chaos (Doherty and Delener, 2001). It is also a feature of chaos that once one system component changes, becoming subject to positive feedback, that system will impact upon others, so that increasingly more areas of the system become confused (see Figure 1: Positive feedback cycle).

Eventually, the whole system will ‘break-down’, so that a simple correcting measure will no longer be sufficient to re-establish equilibrium.

**Initial conditions**

There is one final element of complexity and chaos that needs to be grasped, that of sensitivity dependence (Briggs and Peat, 1999). In a stable system, small changes have small effects and will generally be compensated for through the process of negative feedback; but in a complex system, and in line with chaos theory, small changes can grow exponentially, making short term accurate prediction almost impossible (Doherty and Delener, 2001; Holbrook, 2003), and consequently small ‘nudges’ at the appropriate time can lead to major effects (Wheatley, 1996).

For the knowledgeable practitioner, discernible patterns and clues will indicate which changes to ‘nudge’ (Morisson and Quella, 1999) and experience will tell then when to ‘nudge’ in order achieve the desired effect (Gladwell, 2000). These patterns - known as ‘attractors’ – have maritime application and relate to what pilots often describe as ‘gut instinct’ - supported by empirical knowledge gained over many years, plus the handed-down accumulated anecdotes that underlie hard personal experience born out of trial and error. In reality, these ‘attractors’ cannot claim to derive from formalised, institution bound, tuition.

**PRACTICAL IMPLICATIONS FOR PILOTS AND SHIP-HANDLERS**

Having touched on the theory and concepts of complexity and chaos, the question arises “of what use is this to ship-handling and pilotage?” The answer is ‘quite a lot’.
There is a place where complexity, chaos, system interaction and practical experience meet – both in the world of commerce and in the maritime industry - a realm where little is quite what it seems, and all manner of strange things can and quite often do happen.

Chaffney and Smith (2002) refer to this place as the ‘edge of chaos’ – where conflicting systems are in balance, where knowledge of positive feedback and the judicious application of negative feedback work in harmony to achieve a temporary equilibrium and where, unfortunately, any undue distraction or overwhelming of the principal actor can result in the rapid onset of chaos, deterioration and disaster.

The ‘attractor’ at the ‘edge-of-chaos’ has the rather curious title of ‘strange attractor’ and is the gift of years, trial and error, knowledge, practice and experience. Lewin (1992) describes this place as ‘reflecting the area where maximum creativity and innovation happens’.

In the maritime context, I am referring to the act of pilotage. But why should it be so that Holbrook (2003) is able to state that the ‘strange attractor’ confines within certain boundaries yet, according to Doherty and Delener (2001) such complex chaotic systems cannot be predicted but can, nevertheless, allow change whilst maintaining some order (Frederick, 1998).

Figure 2: Some of the concerns pressing on the pilot operating ‘at the edge of chaos’

**Edge of chaos applications and acts-of-pilotage**

To understand why the act-of-pilotage can be such a chaotic place to operate, we need only consider the factors pressing on the attention of the pilot. Bridge resource management courses, whilst touching on many of these factors, to a greater or lesser degree, tend to look at individual areas of concern and not the whole picture. Figure 2 is by no means complete and can justifiably be criticised for being little more than a two-dimensional representation of a four-dimensional construct (5 or 6 dimensions if you prefer to include human and maritime factors as separate spheres, but this is a matter of choice and makes the point about complexity). Many of the elements, naturally, involve numerous sub-elements.
Taking this as nothing more than the simplest construct, the mathematics is quite simple. There are no less that $4^5$ (or 1024) factors that the average pilot is attempting to balance whilst he is working. Complexity theory says that interaction between factors will always be imperfect and are little better than barely balanced at any instant. Chaos theory suggests when any one factor goes ‘wrong’ and positive feedback results, others may follow in quick succession, and the situation deteriorates exponentially. It only takes ‘one thing in a thousand’ to start the downward spiral into chaos - or disaster. Is it any wonder then that when something goes wrong during an act of pilotage, it happens quickly, without warning and rarely, if ever, can be attributed to a single event? Coincidentally, it may be of some interest that the factors of ‘chaos’ and ‘complexity’ and their interaction in confined waterways go a long way to explaining why ‘squat’ rarely, if ever, perfectly corresponds to calculations or why new-build ships undergoing sea-trials so often fail to perform as predicted by computer modelling and simulations. The reasons for this will become clear shortly. The more astute reader will realise that the odds are weighted against the pilot who encounters problems ‘at the edge of chaos’. Furthermore, not all pilots are emotionally, mentally or psychologically suited to operating in this environment. There are, however, factors that can mitigate the risks and pressures:

- **Management Support.**

Management support and understanding, rather than criticism, condemnation and a ‘blame culture’ are an essential component in building confidence to carry out the task. Where the pilot is certain of condemnation or (possible) criminalisation, any willingness to try things out, to push the ‘envelope of chaos’ and test the bounds of possibility decreases dramatically. Yet pilots are still subject to commercial pressures that require them to work quickly, in all weathers, with a variety of nationalities and cultures and to make sense of it all. Oliver Williamson (1999) argues for pre-emptive positive mechanisms to support those who work in complex systems by adopting a contingent approach and developing a range of coping strategies. This process begins by carrying out a frank organisational analysis, determining where there are systematic weaknesses – including management attitudes and ‘poor leadership’ - dealing with them honestly and sympathetically, then developing a robust, integrated and supportive structure that allows pilots to operate with confidence. Management ‘groupthink’, an ‘us and them’ attitude, ‘blame culture’ and a ‘closed mind policy’ - when combined with situational complexity – can only exacerbate the likelihood of incidents in such an environment.

- **Legal**

As a lawyer I have particular issues with the way that pilots and ships’ masters are increasingly criminalised on an isolated error or a single point of law. Few today, legal or otherwise, can honestly claim to have met a master or pilot who knowingly, deliberately, recklessly or with malice aforethought, endangered their ship or the personnel aboard. In my experience, those who have been involved in incidents, most of which were not explainable – although many could quite easily be attributable to the effects of complexity and chaos - have suffered absolute agonies in trying to understand what happened. The professionalism of such men has always been paramount in their minds, as has the thought that, for reasons unknown, they may have let down their colleagues and profession. It is easy, after the fact, to dismiss the multitude of conflicting elements that were successfully dealt with, only to alight on a single factor - often only provable after lengthy legal wrangling - then convict a man who did not understand how complexity
or chaos played their part in his misfortune. The courts should take appropriate account of the issues by demonstrating some understanding of the principles. As far back as 1949, the learned Lord Justice Porter commenting on the hydrodynamic related collision between Queen Mary and Curacao, said that ‘the forces of interaction are imperfectly known, but in any situation [at least] some allowance should be made for their coming into play’. Since that statement, ships have become considerably bigger, we understand a lot more about hydrodynamic forces and the effects of interaction, plus we have the added knowledge that chaos and complexity must be considered as part of the causal matrix. Lord Porter’s statement, therefore, remains as valid today as it did then.

Training

Having already touched on pilot qualifications, empirical knowledge, experience and the practical implications of ‘strange attractors’ when working at the ‘edge-of-chaos’, surely there is some justification in the argument that at this level of expertise the imparting of institutional knowledge offers little value.

In the UK at least there is some recognition of this reality - evidenced by an increasing trend towards pilots training pilots. On the down-side, so long as there is a defensive attitude within pilotage services that ‘we don’t want others coming in here and teaching us our jobs’ there will be industry stasis, with little to be gained from one pilot sharing his experiences (positive and negative) with his fellows. The positive benefits of shared industry knowledge are clearly demonstrable in the world of commerce, and because of the unique attributes and characteristics of each district, pilots should not fear usurpation by their industry contemporaries - some of whom have given many years of their own time to undertake research and promote safety and industry professionalism.

Returning briefly to the mathematical concepts of chaos and complexity and their impact on the marine environment, the more perceptive reader will realise that there is one particular area of training that relies heavily on mathematical constructs: computer simulations and bridge training simulators.

Simulators portray a perfect electronic world constructed from known algorithms that are capable of carrying out unchanging and infinitely repeatable exercises. You should consider, ‘does this represent the real world of ship-handling?’ Paradoxically, it is the mathematics used to construct the simulated environment that prevents chaos and complexity from being part of the training experience.

Sections 5.2, 5.5 and 5.5.5 of IMO A960(M) on the training of pilots, states that professional training can be ‘supplemented’ (not replaced) by simulator training - as part of a pilot’s continuing professional development (CPD) – but prudently it stops short of suggesting simulator training in relation to hydrodynamic interaction.

Simulators undeniably offer a viable facility - being useful for practising bridge resource management exercises, equipment familiarisation and integration techniques and for enhancing district familiarisation (as stated by IMO A960). Nevertheless, an awareness of their inherent limitations predicates caution if using simulators for practising interaction exercises.

Using the same logic and applying knowledge of algorithmic confinement we learn that where simulators are used to ‘reconstruct’ an incident - particularly where the results might be applied in evidence to prosecute a ship-handler - utmost caution must be exercised when relying upon a simulated reconstruction. I have actively engaged with some of the world’s leading computational fluid dynamicists who generally acknowledge that simulators are not perfect and, no matter how advanced their programming, simulators simply cannot replicate the marine environment with all its chaotic complexity. Dr Odd Falstinen over twenty years ago pronounced that
mathematical algorithms and computational fluid dynamics (CFD) would eventually do away with pilots - suggesting that they would be replaced by computer programmes. Although not a mariner, he is now a respected professor at the Marine Technology Institute in Norway. When addressing the Second International Conference on Hydrodynamic Interaction at Trondheim in May 2011, he made a number of defining statements. Key among these was his conviction that ‘computer prediction may be pretty good but it is not, and cannot be, completely satisfactory’ and ‘there is always likely to be a difference between computer modeling and reality, no matter how good the computers and models are’.

Professor Falstinen’s argument, like my own, is that simulation takes place in an idealised medium of perfectly performing algorithms. What results is a ‘tidy’ representation, arising from perfectly performing formulae, portraying a wonderfully predicable world – an electronic utopia. Simulated results will always be perfectly explainable mathematical constructs showing what ‘should’ happen in a perfectly ordered environment. However, they cannot stand up under the microscope of chaos and systems complexity. Consequently, simulations should never be used to try and convict a ship-handler or pilot.

Introducing complexity and chaos into simulator equations does not work. Both (or either) of these factors, operating inside an ideal mathematical world results in uncertainty, confusion, unpredictability and more chaos. Logic fails, the CPU rapidly becomes overwhelmed and the programme ceases to operate.

CONCLUSION

If chaos and complexity are introduced into a rational system there are no rules that can predict the eventual outcome. Whereas bridge operations and mechanical/electronic systems may be rational and fairly predictable, the same cannot be said of water: where one element tends to chaos and complexity, the whole becomes subject to the same trend. The interacting factors at best balance or, through careful management, are held in temporary equilibrium at ‘the edge of chaos’.

Responding to the first question ‘can you explain what happened?’ my answer was a simple ‘yes’ - and that was the end of the matter.

To the second question: ‘is there a rule that we can apply in all situations to predict when such an event might re-occur’. Hopefully, readers will realise that the answer is complex, involving disparate areas of social science, commercial theory, mathematical principles, hydrodynamic theory, ship dynamics, environmental considerations, local knowledge and personal skill sets. My answer, therefore, has to be a resounding ‘No!’ But that is not the end of the matter.

Will the effect under investigation re-occur? Possibly. Chaos and complexity theories suggest that it could, but not necessarily arising from the same unique combination of factors.

Perhaps the penultimate word should go to Lord Justice Porter who averred that ‘each [hydrodynamic] event can only be explained with reference to those factors prevailing at the material time’.

For as long as the second answer remains unchanged, competent ship-handlers and exceptionally skilled pilots, each having an intimate knowledge of their own district, with all its nuances and idiosyncrasies, will be fundamental to maritime safety. Managers, legal practitioner’s and well meaning ‘educators’ who, perhaps unwittingly, undermine that specialist competence, unknowingly enact an immense disservice upon professionals who must, however imperfectly, balance the numerous variables they face.
Yet pilot professionalism prevails and the pilots’ unchanging creed remains the maintenance of an unflinching mindset directed towards safety, security, good conduct and the well-being of the world’s most congested waterways.

About the Author

Peter McArthur is: an experienced Pilot; a Master Mariner; an experienced Lawyer, expert-witness and advisor to the courts; marine technical consultant; maritime arbitrator; Chartered Marine Technologist. He holds Fellowships of the IMarEST and Nautical Institute and is a Liveryman of the Honourable Company of Master Mariners. Peter is also the series editor for Lloyds Practical Shipping Guides.

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“...This is one more way to ensure greater security, so that we can make a manoeuvre in conditions and in confined spaces such as we have in the Port of Santos”

- Bruno Roquete Tavares