



ENHANCING SAFETY AT SEA

03/2016 no.36



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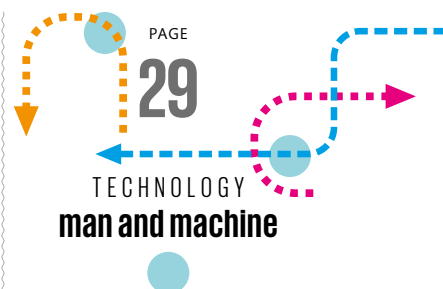
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publisher



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MULTIPLE PATHWAYS TO A REWARDING AND ENRICHING MARITIME CAREER



Singapore's maritime sector offers many diverse opportunities in both sea and shore careers. Whether you are a student, fresh graduate or mid-career professional, there are various programmes available to help you acquire new skills and continually sharpen them at every stage of your career.

 <p>In School</p>	Maritime/Non-Maritime Students		
	Seafaring Careers	Shore-Based Careers	
	Tripartite Maritime Scholarship (TMSS) Scholarships to groom future seafarers.	MPA Global Internship Award (GIA) Sponsored internship with an overseas component for undergraduates.	Industry Attachment Additional allowance for students undertaking maritime internships.
 <p>Starting Work</p>	Fresh Graduates		
	Seafaring Careers	Shore-Based Careers	
	SkillsFuture Earn & Learn Programme (ELP) for Seafaring Deck Officer / Seafaring Marine Engineer Officer Structured on-the-job training with sign-on incentive of \$5000.	Achievement Award \$2000 incentive for cadets who attain relevant certificates.	SkillsFuture Earn & Learn Programme (ELP) for Port Operations Officer Structured work-study programme with sign-on incentive of \$5000.
 <p>Growing your career</p>	Mid-Career Entrants		
	Seafaring Careers	Shore-Based Careers	
	Tripartite Nautical Training Award (TNNTA) / Tripartite Engineering Training Award (TETA) Training programmes to support locals to become seafarers.	Employment Enhancement Programme Shipboard training with sign-on incentive of \$5000.	Maritime Career Conversion Scheme Structured training programme for maritime career converts.
 <p>Growing your career</p>	Maritime Employees		
	Seafaring Careers	Shore-Based Careers	
	SkillsFuture Study Awards \$5000 monetary award for skills upgrading.		
	Achievement Award \$3000 incentive for officers who attain relevant certificates.	Upskill Allowance Training allowance for cadets attending specific preparatory courses.	
SkillsFuture Credit Singapore Citizens aged 25 and above can utilise their SkillsFuture Credit and choose from more than 150 maritime courses to upgrade/deepen their skills.		SkillsFuture Mid-Career Enhanced Subsidy Up to 90% course fee subsidy for Singapore Citizens aged 40 and above taking on WDA-supported maritime courses.	

safety first

Singapore's waters are among the busiest in the world; there are about 1,000 vessels in our port at any one time. Any incident in our waters can significantly impact the efficiency of our port. As a result, the Maritime and Port Authority of Singapore (MPA) takes a serious view of safety at sea and has committed resources to enhancing this aspect of maritime safety.

Two years ago, MPA launched the Safety@Sea campaign to raise awareness of and inculcate a safety-first culture at sea within the local maritime industry. We have built on these efforts since then and seen improved results. There was only one incident in our waters last year – a 75 per cent fall in incident rate compared to 2014.

But we cannot afford to be complacent. To build a safer environment for all, we believe that sharing knowledge and best practices will be pivotal in ensuring safe, efficient and secure navigation. To this end, we are establishing a "Community of Practice", a collaborative platform to share best practices and foster collaboration between international maritime administrations and

other non-governmental organisations.

This issue's main feature

highlights some of these efforts to enhance safety at sea, including the setting up of the National Maritime Safety at Sea Council (NMSSC) last year to drive national efforts for maritime safety.

In the Commentary section, we invite Professor Richard Lim, Chairman of the NMSSC to share how we can build a strong safety culture. For the public who use our port facilities, we also share tips on how to ensure your safety as a ferry passenger in this issue's Back Page.

Aside from such initiatives, institutes of higher learning in Singapore are also leveraging technology to reduce human error in maritime operations and enhance maritime safety. Find out more about these exciting projects in the Technology section.

Safety is a shared responsibility. We hope you will support us in ensuring the safe passage of vessels around the world.



**VICKI LOH
EXECUTIVE EDITOR**



NUS SIGNS MOU WITH KOREAN REGISTER OF SHIPPING

The National University of Singapore's (NUS) Faculty of Engineering, through its Centre for Offshore Research & Engineering, signed a Memorandum of Understanding (MOU) with the Korean Register of Shipping (KR) on July 27.

The MOU, signed by Professor Chua Kee Chaing, Dean of NUS' Faculty of Engineering, and Dr Park Bum-Shik, Chairman and Chief Executive Officer of KR, will facilitate the exchange of scientific, academic, and technical information between the two parties. It will also help identify opportunities for cooperation, and collaboration on R&D projects that create value, such as on noise and vibration on board ships.

Through the MOU, NUS' Engineering students will also have opportunities to take part in attachments and internships, as well as to organise and participate in joint scientific activities like seminars and conferences.



FROM TOP Representatives from both NUS and KR at the MOU-signing ceremony; The MOU was signed by Dr Park Bum-Shik (left), Chairman and CEO of KR, and Professor Chua Kee Chaing, NUS Dean of Engineering.

RIGHT Mr Koji Sekimizu, former Secretary-General of the IMO, delivering his lecture in Singapore.

MR KOJI SEKIMIZU APPOINTED RSIS-MPA DISTINGUISHED VISITING FELLOW

The S. Rajaratnam School of International Studies (RSIS) and the Maritime and Port Authority of Singapore (MPA) have appointed former Secretary-General of the International Maritime Organization (IMO), Mr Koji Sekimizu, as an RSIS-MPA Distinguished Visiting Fellow. The fellowship was established by RSIS and MPA to engage eminent maritime personalities with specialised knowledge, expertise and international experience.

A naval architect by training, Mr Sekimizu was Secretary-General of the IMO from 2012 to 2015; he was also Chancellor of the World Maritime University during that time. He began his career as a ship inspector with Japan's Ministry of Transport, and joined the IMO as a Technical Officer in the Sub-Division for Technology, Maritime Safety Division, in 1989.

At the IMO, he held a number of appointments within the IMO Secretariat, including Director of the Marine Environment Division and Director of the Maritime Safety Division.

He has contributed to the development of several key conventions and initiatives on maritime safety, security, anti-piracy and sustainable shipping. He played a key role in IMO's Protection of Vital Shipping Lanes initiative, which led to the Co-operative Mechanism on Safety of Navigation and Environmental Protection in the Straits of Malacca and



Singapore in 2007, and the conceptualisation of the Marine Electronic Highway initiative, another pillar of cooperation in the Straits of Malacca and Singapore.

As an RSIS-MPA Distinguished Visiting Fellow, Mr Sekimizu will deliver public lectures and seminars organised by RSIS and the MPA Academy, MPA's training arm. He will lecture at the MPA Academy's flagship programmes such as the Advanced Maritime Leaders' Programme and speak at key events during the annual Singapore Maritime Week, a leading international maritime event. He may also undertake research and write policy commentaries for RSIS.

During Mr Sekimizu's first visit to Singapore as a Distinguished Visiting Fellow, he delivered a lecture on Aug 23, sharing his experiences at the IMO as well as his aspirations and hopes for the IMO's future.

The event was attended by close to 150 maritime industry leaders, government officials and academics.

JURONG PORT LAUNCHES COMBI TERMINAL FOR MULTI-PURPOSE VESSELS

Jurong Port commenced operations of its Combi Terminal, a one-stop terminal for vessels carrying a combination of containers and general cargo, on Aug 5.

With this, multi-purpose vessels no longer need to call at separate terminals or berths to load or unload different cargo types. They can now berth at the Combi Terminal to move both containers and general cargo concurrently using quay cranes in an efficient, safe and seamless fashion.

Said Mr Ooi Boon Hoe, Chief Executive Officer of Jurong Port: "The establishment of our Combi Terminal is a significant milestone for Jurong Port in becoming a world-class multi-purpose port operator and a one-stop solution provider integrating berth planning, cargo handling, storage, and supporting services. With our Combi Terminal, customers who carry diverse cargo types on their vessels enjoy the

flexibility of shortened ship turnaround time."

Occupying a total area of 6.6 hectares, the terminal comprises three dedicated deep-water berths of 575m length and 15.7m draft. The terminal is equipped with quay cranes that have been adapted to handle general cargo as well as containers. Mobile harbour cranes can also be deployed for the handling of heavy lift cargo.

Its multi-cargo handling capabilities and expertise has attracted Pilbara Express Lines to initiate a new trade route and commence direct liner service between Jurong Port and the Port of Dampier in north-west Australia.

Pilbara Express Lines, together with ANL and Eng Lee Shipping, are the first three anchor customers for Combi Terminal.

The terminal is expected to increase Jurong Port's throughput from multi-purpose vessels as well as improve its asset utilisation.

PASIR PANJANG TERMINAL PHASES 3 & 4 WIN ACCOLADES

Pasir Panjang Terminal's Phase 3 and Phase 4 developments have been named among Singapore's top 50 engineering achievements in a competition organised by the Institution of Engineers, Singapore (IES).

The Engineering Feats @ IES-SG50 competition aimed to recognise the top 50 engineering achievements that have made the greatest economic, infrastructural or societal impact to Singapore since 1965. Nominees were shortlisted by a panel of judges from both the public and private sectors and voted on by members of the public. The results were announced at IES' Golden Jubilee celebrations, graced by Singapore's Prime Minister Lee Hsien Loong, on July 1.

When fully developed, the Phases 3 and 4 expansions of Pasir Panjang Terminal will add 15 million twenty-foot equivalent units (TEUs) to Singapore's handling capacity, increasing Singapore's overall container handling capacity to 50 million TEUs annually. This will help ensure that Singapore retains its status as a leading container transshipment hub.

Among the many unique and sustainable engineering innovations being used in the construction of Pasir Panjang Terminal Phases 3 and 4 is the use of alternative materials such as marine clay and excavated earth for the reclamation fill, as well as the fabrication of caissons – large concrete blocks that form sea walls and wharf structures – by pre-casting them using specialised machines and transporting them into docking position using a floating dock.

Said Mr Andrew Tan, Chief Executive of MPA: "The Pasir Panjang Terminal Phases 3 and 4 project provides opportunities for our engineers to test-bed innovative construction methods, all the while keeping at the top of their minds the need for sustainable development. We are proud that this project has been recognised by the public for the impact it has had on Singapore's economy. Many of the engineering innovations first deployed in this development are currently being implemented to a greater degree at the Tuas Terminal Phase 1, now in construction."



LEFT Dr Koh Poh Koon (fourth from right), Minister of State for Trade and Industry and National Development, attended the launch of the Combi Terminal.

SHIP'S LOG HAPPENINGS

SAFETY@SEA WEEK



To promote awareness and instil a safety-first culture in the maritime community, the Maritime and Port Authority of Singapore (MPA) organised a host of events, including the first International Safety@Sea Conference and a ferry rescue exercise observer programme as part of Safety@Sea Week, held from Aug 29 to Sept 2.

9TH MARITIME SAFETY MANAGEMENT COURSE



The 9th Maritime Safety Management course, held from July 11-15, was jointly conducted by MPA Academy, the training arm of MPA, and the Japan Coast Guard for maritime administrations from around the region.

IMO SECRETARY-GENERAL VISITS SINGAPORE



During his visit to Singapore, Mr Kitack Lim, Secretary-General of the International Maritime Organization (IMO), delivered a talk on Aug 30 under the MPA Academy Distinguished Speaker Series to about 200 maritime industry leaders, government officials and academics.

SHIP'S LOG HAPPENINGS

CENTRE FOR LIVEABLE CITIES (CLC) AND MPA ACADEMY JOINT FORUM



CLC and MPA Academy jointly organised a forum, The Future of Ports And Their Relationship With Cities, on July 12. The latest of CLC's series of Urban Systems Studies books, *Port and the City: Balancing Growth and Liveability*, which shares lessons from Singapore's port development, was launched during the event.

INAUGURAL MARITIME YOUTH FESTIVAL (MYF)



Organised by MPA, MYF is a biennial event to cultivate youth's interest in the maritime industry through a weekend of fun-filled activities. Mrs Josephine Teo, Senior Minister of State, Prime Minister's Office, Ministry of Foreign Affairs and Ministry of Transport, opened the inaugural MYF on July 16.

PROJECT PAINTING SMILES



On Aug 26, more than 45 Swire Pacific Offshore (SPO) employees and members of the Singapore Shipping Association joined hands to paint murals for the Peace-Connect Seniors Activity Centre under Project Painting Smiles, SPO's community outreach programme with Central Singapore Community Development Council.

SHIP'S LOG HAPPENINGS

3RD PORT MANAGEMENT PROGRAMME



From Aug 29 to Sept 2, 18 maritime officials from Africa, Asia, the Caribbean, Europe, Latin America, Middle East and Oceania attended the 3rd Port Management Programme, one of MPA Academy's flagship programmes designed for port masters, harbour masters and middle managers from maritime and port authorities.

7TH LEADERS IN URBAN GOVERNANCE PROGRAMME



On Sept 20, Mr Andrew Tan, MPA's Chief Executive, engaged in lively dialogue with participants of the 7th Leaders in Urban Governance Programme, organised by CLC, and shared lessons from Singapore's approach to urban development and management.

Singapore's location at the crossroads of East-West trading routes and along one of the world's busiest waterways has made safety at sea of paramount importance to the Port of Singapore. About two to three vessels arrive at or depart from its waters every minute, and some 1,000 vessels are in the port at any one time.

Through the Maritime and Port Authority of Singapore (MPA), Singapore has invested considerable efforts in enhancing safety at sea within the maritime industry, both locally and globally. In 2014, MPA launched the Safety@Sea Singapore campaign, an industry-wide effort led by MPA to increase awareness of safe practices and inculcate a safety-first culture at sea.

Taking its efforts a step further this year, a two-day International Safety@Sea Conference was held for the first time during Safety@Sea Week in Singapore from Aug 29 to Sept 2. Organised by MPA, the conference, held from Aug 30-31, featured over 30 international speakers and industry experts from different sectors of the maritime industry who shared best safety-at-sea practices with more than 350 local and international participants. International Maritime Organization (IMO) Secretary-General Kitack Lim delivered the keynote address at the conference. This was his first visit to Singapore since assuming the post on Jan 1 this year.

At the launch of the conference, Singapore's Coordinating Minister for Infrastructure and Minister for Transport, Khaw Boon Wan, highlighted Singapore's strong emphasis on

Rahita Elias takes stock of Singapore's efforts to enhance safety at sea through collaborations with industry partners as well as regional and international maritime authorities

spotlight on safety at sea





safety at sea. He said that maritime safety is a critical issue not just within the maritime community but also for the public at large as sea-travelling consumers.

Khaw added that MPA's significant efforts in building a strong safety culture have yielded results. He pointed out that there was only one incident last year – a 75 per cent fall in incident rate compared to the year before.

Even so, Singapore recognises the need to do more. Said Khaw: "Although we have been doing relatively well, we want to do even better."

INTERNATIONAL COOPERATION

Outlining the rationale for the conference, Andrew Tan, Chief Executive of MPA, said: "Singapore hopes to play our part by working with the regional and international community to raise the standards of safety...By building a community on good practice, we hope to disseminate best practices and foster closer cooperation between maritime authorities to prevent and respond to incidents when they occur by adopting an integrated and multi-stakeholder approach."

To do so, MPA will establish a Community of Practice comprising international maritime administrations, national safety councils, and classification societies to share knowledge and best practices as well as collaborate on promoting safety at sea. The Community of Practice will launch in August 2017 and convene biennially.

The Community will complement existing forums such as the Co-operative Mechanism on Safety of Navigation and Environmental Protection in the Straits of Malacca and Singapore and the Tripartite Technical Experts Group that adopt an integrated and multi-stakeholder approach to ensuring safe, efficient and secure navigation in the region and is also applicable worldwide.

MPA has also launched a three-part training resource package, Safe Passage in the Singapore Strait, which was jointly developed by the maritime authorities of Indonesia, Malaysia and Singapore. It comprises two videos and an interactive computer-based training module aimed at equipping mariners with valuable navigational information before transiting the Singapore Strait.

As evidence of Singapore's commitment to safety at sea, the country is a contracting party to major international conventions on maritime safety, including the International Convention

FEATURE

for the Safety of Life at Sea (SOLAS) and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). SOLAS sets out minimum safety standards for the construction, equipment and operation of ships that signatory states need to comply with, while STCW specifies minimum standards on training, certification and watchkeeping for seafarers on an international level.

STEPPING UP EFFORTS

Within its waters, Singapore has also introduced several measures to improve safety at sea.

Last year, MPA established the National Maritime Safety at Sea Council to spearhead the drive for maritime safety on a national level as well as to ensure the sustainability of its safety efforts. Its role is to work with members of the maritime industry both in Singapore and overseas to help raise safety standards while serving as an advisory body to MPA.

To reduce incident risk for smaller vessels, Singapore has made it mandatory for all power-driven harbour and pleasure craft within its waters to be fitted with Automatic Identification System-B transponders and electronic chart systems that are compliant with IMO standards. The systems enable ocean-going vessels to track even small harbour and pleasure craft on their electronic charts, and vice-versa. To support the initiative, MPA is funding the cost of equipment and installation on harbour and pleasure crafts registered before July 1 this year. The ongoing exercise will be completed by January next year.

On the issue of passenger ferry safety, MPA conducts regular inspections on all ferries entering and leaving Singapore. Its officers check the documentation of each ferry and its crew to ensure its seaworthiness and that its crew are trained. They also physically inspect emergency equipment and check to ensure that ferries have enough life rafts on board for passengers.

Over the last few years, MPA has also held safety briefings and workshops for regional ferry operators and their masters and crew.

MPA has also worked to improve the servicing and maintenance of safety equipment on board passenger ferries, as well as increasing the frequency of inspections for regional passenger ferries. It is producing a safety video to be shown at ferry terminals while passengers are waiting to board, to raise awareness of safety procedures on board ferries among them.



FEATURE



HUMAN ELEMENT REMAINS VITAL

A key feature of the Safety@Sea Singapore campaign is its focus on the human element in marine incidents. This was an issue that Lim raised in his keynote address.

He noted that global shipping losses had dropped by a staggering 45 per cent between 2006 and 2015. Even though ships have never been safer, he said that the IMO continues to look for further improvements. One way is through the adoption of modern technology.

Lim said: "Modern technology provides unprecedented opportunities to reduce the chances of human error, and thereby helps enhance safety and reduce casualties further."

While the concept of autonomous ships has become increasingly popular, he said that the human element will remain vital in the safe navigation of ships.

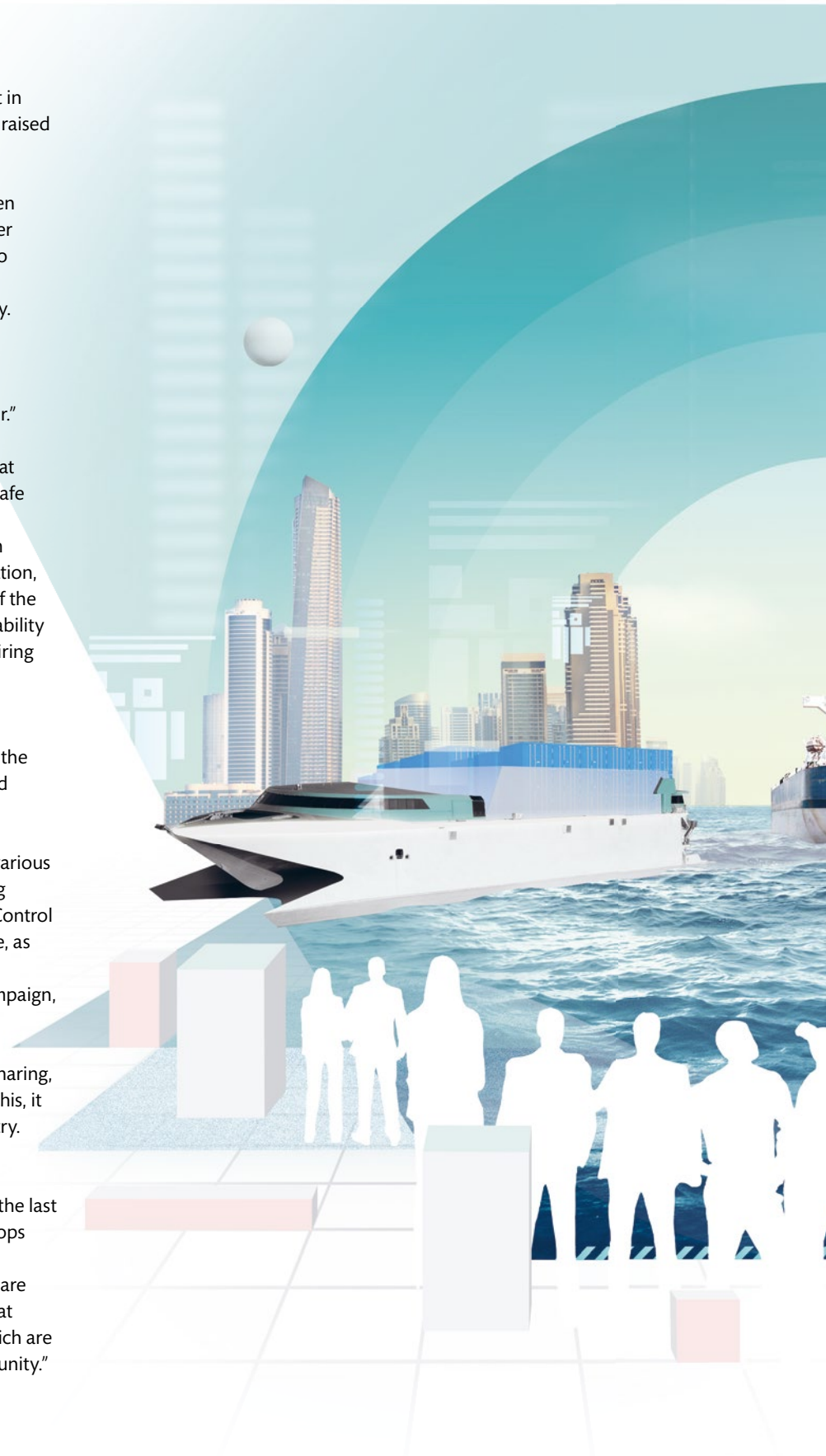
"I do not believe you can take the human away from the ship when it comes to navigation, particularly in busy waters where the eyes of the watch officer are still critical. The unpredictability of the high seas will always be an issue requiring human oversight, no matter how advanced navigational technology gets," he added.

Lim also highlighted the importance of inculcating a safety-first culture throughout the global shipping community, and training and career development.

In addition to the conference, this year's Safety@Sea Week included workshops for various sectors of the maritime industry, networking receptions, visits to MPA's Port Operations Control Centre and the Integrated Simulation Centre, as well as a ferry rescue exercise.

As part of the Safety@Sea Singapore campaign, MPA has worked closely with the maritime community to instil a strong safety culture, enhance communication and information sharing, and improve the safe passage of vessels. In this, it has received strong support from the industry.

Hector Goh, Senior Marine Manager of Hai Soon Ship Management, said: "We have participated in MPA's Safety@Sea Week for the last two years and found that the safety workshops and forums provided opportunities for the maritime community to get together and share information and best practices. We hope that MPA continues with these programmes, which are extremely beneficial to the maritime community."





PUTTING MULTI-AGENCIES' EMERGENCY PREPAREDNESS TO THE TEST

Panic ensued on board when two ferries collided at Singapore's Western Anchorage.

The collision had resulted in a hull breach of Ferry 1, which started taking in water. Some passengers were hurt, while others panicked and jumped into the water. Life rafts had to be activated.

In all, 15 vessels from various Government agencies and private companies were deployed to conduct search and rescue operations, evacuate injured passengers, and recover those who had jumped into the sea.

This was the scenario of this year's annual ferry rescue exercise (FEREX) organised by the Maritime and Port Authority of Singapore (MPA) on Sept 1. The half-day emergency preparedness exercise, code-named FEREX 2016, aimed to test the

readiness of various agencies to respond to ferry mishaps in the Port of Singapore.

More than 450 personnel from 15 agencies and companies took part in the exercise, which included deploying resources at the Western Anchorage for rescue operations and at the emergency operations centre at MPA's Port Operations Control Centre. They also landed casualties and rescued persons at HarbourFront Cruise and Ferry Terminal.

The exercise was observed by Singapore's Coordinating Minister for Infrastructure and Minister for Transport Khaw Boon Wan, maritime safety agencies from around the world, ferry operators, and others.

MPA's Chief Executive, Andrew Tan, said: "Safety remains our key priority...MPA will continue to work closely with the maritime community to strengthen the safety regime for regional ferries."



TAP FOR VIDEO



As one of only three ladies in her batch to be enrolled in the Singapore Maritime Academy's (SMA) Diploma in Nautical Studies course at Singapore Polytechnic, Christina Tan used to draw curious stares from students in other departments when she walked around on campus.

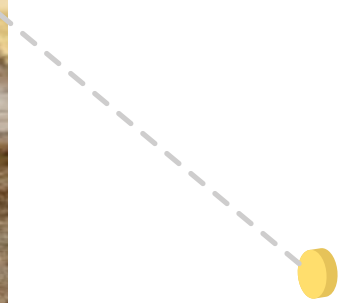
"It's not a popular course among ladies. There are very few female officers sailing on board vessels," says Tan. The International Transport Workers' Federation, an international trade union federation of transport workers' unions, estimates that women make up only 2 per cent of the world's maritime workforce.

But Tan, 21, is neither deterred about joining an industry in which women are a minority nor is she the first woman in her family to take up a seafaring career. Her elder sister and two cousins currently work in the maritime industry. Her sister and a male cousin are both Third Officers with Pacific International Lines (PIL), while the other cousin is currently a female Marine Officer with the Marine Environment and Safety Department at the



earn & learn

Audrina Gan finds out how the SkillsFuture Earn and Learn Programme for the maritime sector gives fresh graduates like Christina Tan opportunities to deepen their skills while working



Maritime and Port Authority of Singapore (MPA); she was previously the first female offshore Master to take command of an offshore vessel.

Says Tan: "Some people think that women are not capable of becoming seafarers. So we have to work doubly hard to change their mindset and prove that our gender does not put us at a disadvantage."

ENHANCED TRAINING

After completing her GCE O levels in 2011, the adventurous Tan took an interest in the maritime industry as she was looking for a career path that was unique and exciting while offering a bright future. Attending career talks at SMA further convinced Tan that a career at sea was the best option for her.

At SMA, Tan underwent an 18-month programme in which she took up modules such as ship and chart familiarisation and meteorology to equip her with the necessary skills to sail on any type of vessel worldwide, before setting off on a 12-month cadet training course on board ships. She graduated with a Diploma in Nautical Studies in September last year, and went on to obtain her Class 3 Certificate of Competency (CoC) for Deck Officer in April this year.

Tan then joined PIL as a Fourth Officer and is currently broadening her skills as a seafaring Deck Officer under the SkillsFuture Earn and Learn Programme (ELP) for the maritime sector. It is one of three new SkillsFuture ELPs for the maritime sector that was launched in June this year. The other two programmes are for Seafaring Marine Engineer and Port Operations Officer.

The ELPs for the maritime sector are jointly developed by MPA, the Singapore Workforce Development Agency, Singapore Polytechnic, and participating companies. The programmes give fresh graduates from local polytechnics a head start in their careers by deepening their skills through facilitated training, in-house structured programmes and mentorship.

Under the ELP, Tan will undergo a 12-month structured sea service programme to deepen her skills and knowledge in shipboard operations, which will enable her to take up management-level responsibilities. She says: "I will receive training in areas such as navigation, cargo handling, stowage and control of ship operations, as well as caring for persons on board."

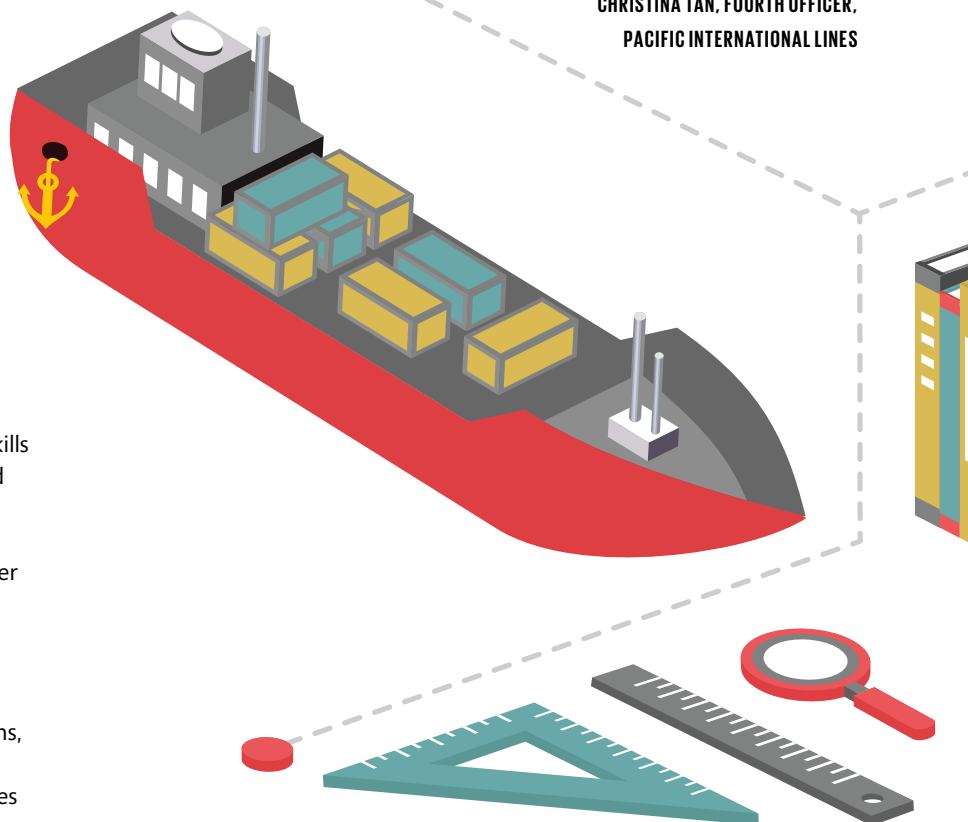
As the Diploma in Nautical Studies only paves

ABOUT PACIFIC INTERNATIONAL LINES (PIL)

Incorporated in 1967, PIL is, today, one of the largest shipowners in South-east Asia and a leading containership operator. Based out of Singapore with a focus on Asia, Africa and the Middle East, it operates a range of businesses, including container manufacturing and other logistics related services. It has worldwide presence in over 500 locations across 100 countries, employing about 18,000 employees.

"THE EARN AND LEARN PROGRAMME IS A VERY USEFUL PROGRAMME AS IT PROVIDES A MORE STRUCTURED WAY FOR ME TO LEARN DURING MY TENURE ON BOARD AND TO PREPARE MYSELF FOR THE NEXT LEVEL OF COMPETENCY. WITH THE ELP, WE GET TO KNOW WHAT IS MORE IMPORTANT FOR US AT OUR LEVEL, WHICH GIVES US BETTER FOUNDATION FOR OUR CLASS 2 AND CLASS 1 COCS IN THE FUTURE."

CHRISTINA TAN, FOURTH OFFICER,
PACIFIC INTERNATIONAL LINES



the way for graduates to be deck officers at an operational level, with no system in place to help them monitor their learning on board ships once they start working, Tan says that the ELP helps to provide a more organised learning process.

She says: "The ELP is a very useful programme as it provides a more structured way for me to learn during my tenure on board and to prepare myself for the next level of competency. With the ELP, we get to know what is more important for us at our level, which gives us better foundation for our Class 2 and Class 1 CoCs in the future."

ATTRACTING LOCAL TALENTS

The ELP has received support from industry partners. Teo Choo Wee, Executive Director of the Fleet Division at PIL says that the ELP will guide local graduates to the next level in their professional careers and certifications as it helps to enhance their employability.

As a home-grown shipping company, PIL is aware of the importance of building a core team

of Singaporean seafarers, says Teo, who also sits on the board at MPA. The company actively takes part in the annual recruitment of SMA students, as well as recipients of the Tripartite Nautical Training Award and the Tripartite Engineering Training Award from Wavelink Maritime Institute.

Says Teo: "Working closely with MPA and the unions, we are confident that with structured training provided by the SkillsFuture ELP programme, we can encourage more local youth to take up seafaring careers and build a sustainable Singaporean core in the maritime industry."

On the challenges of attracting and retaining Singaporeans as seafarers, Teo says that seafaring as a career is no longer viewed as glamorous (it used to be). "In fact, it is considered a 'hardship' these days as one has to be away from home for a long period of time. In addition, there are plenty of shore-based job opportunities available to Singaporeans," he adds.

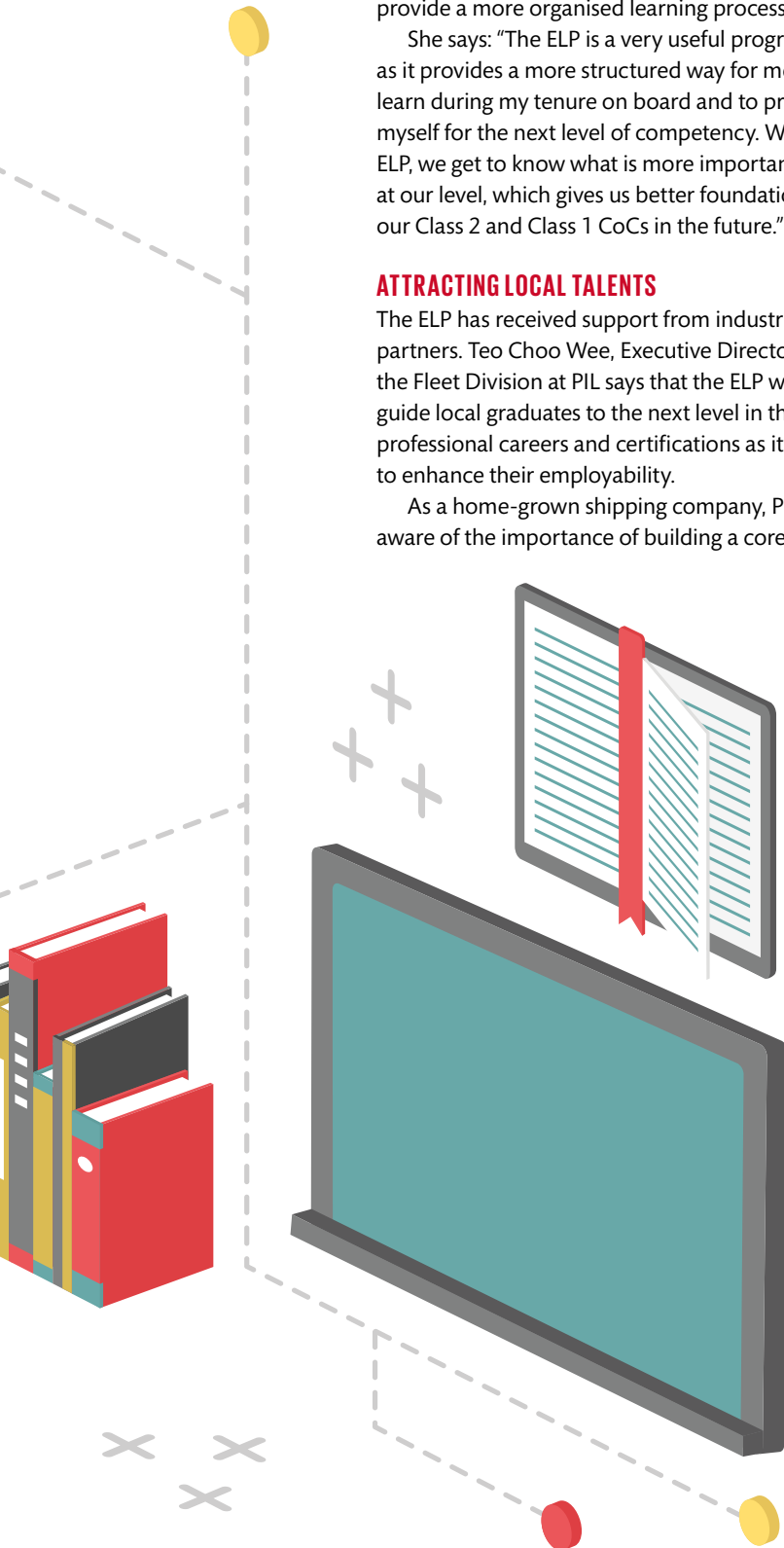
However, various initiatives by the Singapore Shipping Association, the unions, MPA, training institutions as well as shipping companies have somewhat improved the general view and perception of a seafaring career, says Teo. He adds: "We are seeing more local youngsters take up maritime careers."

In order to attract and retain more young Singaporeans like Tan, maritime companies like PIL have improved their on-board work conditions, providing better welfare facilities, shorter contracts, structured training, and faster promotion. "We believe a programme in which a seafarer can be trained to continue his or her career in shore-based maritime jobs will be something that can attract more Singaporeans to join the sea-going career path," says Teo.

Meanwhile, Tan has set sail on her first sea assignment under the ELP on board the container vessel *Hanjin Turkey*. She will spend six months sailing to the port cities of Jakarta in Indonesia, Busan and Incheon in South Korea, as well as Dalian and Tianjin in China.

She says: "It has been 18 months since I last worked on board a ship, so I have mixed feelings – both anxiety and excitement. I hope to learn as much as possible and complete the set of tasks given to me by the company, so that I can be promoted to Third Officer."

Visit www.skillsfuture.sg/earnandlearn to find out more about the SkillsFuture Earn and Learn Programme.



MARITIME SERVICES



ABOUT GARD

Founded in 1907, Gard provides a range of insurance services for the maritime industry, ranging from protection and indemnity (P&I) to hull and energy insurance. It is one of the world's largest marine insurers, insuring about 12,700 vessels with above 1,000 gross tonnage. With over 450 employees in 13 offices worldwide, Gard currently has 17 per cent market share of the International Group of P&I Clubs.

Shipowners looking to manage their risks and their returns will find that the two are complementary strategies, says John Martin, Managing Director of Gard (Singapore). "The irony is if you don't manage your risks properly, you won't be able to manage your returns. These two are not opposing strategies," he adds.

This is where maritime insurers like Gard play a vital role not just in evaluating and handling claims after an incident but also in assessing risks and helping their clients to prevent incidents from occurring in the first place.

Norway-based Gard is one of seven International Group of Protection & Indemnity (P&I) Clubs with offices in Singapore. The International Group of P&I Clubs, a mutual insurance association, comprises a total of 13 clubs providing P&I liability cover for about 90 per cent of the world's ocean-going tonnage.

shipping sectors and understand causality. Its Loss Prevention Executive, Kunal Pathak, says Gard quantifies information mined from the claims it receives every year, and "analyse the data for each member within each sector". He adds: "This provides a solid performance database to benchmark against others in the industry or sector."

The data also helps shipowners and operators understand the particular risks that their sector faces. For instance, within the feeder shipping industry, ships call at several ports within a short period, making crew fatigue a key factor behind marine incidents. Martin says: "Making, say, four port calls in three days is hard on the crew, so you have to ensure you have enough people for watchkeeping. Understanding the safety issues will help one to handle the associated risks."

STAYING AHEAD OF E-RISKS

Another risk that needs to be managed is cyber risk, especially given the increasing reliance on technology in shipping. Increasingly sophisticated and multiple ship-to-shore communication systems provide potential access points for cyber criminals. In addition, crews today have greater connectivity through their mobile devices, which poses further security risks.

While the industry understands the potential risks, the consequences are not quantifiable yet. Martin says: "Unlike with P&I and hull, there is no significant loss history for cyber risk, making it difficult to price."

The good news is that the shipping industry is staying ahead of the game by learning from other industries and industry experts. Both the International Maritime Organization and the Baltic and International Maritime Council (BIMCO), the world's largest international shipping association, have released guidelines on cyber security.

Despite the potential risks, smart and autonomous shipping is here to stay due to its ability to enhance operational efficiency. Comparing smart shipping to past developments in the aviation industry, Martin points out that airplane pilots perform very different functions today than they did 40 years ago.

He says: "Because of the autopilot system, pilots now fly a plane for only relatively short periods. A properly managed autonomous system obviously works. If the shipping industry can replicate this, it will reduce risks and benefit everyone."

risk & return

Rahita Elias speaks to John Martin, Managing Director of Gard (Singapore), on risk management

In addition, Gard offers hull and machinery, loss of hire and other related insurance covers for a broad range of clients, from shipowners and operators to shipyards and oil companies. With this suite of products and services, it helps to manage both present and future risks across the maritime sector, from ship and equipment to people and cargo, and even the environment.

Its Loss Prevention and Risk Assessment Department helps shipowners and operators identify, minimise and control the risks in their day-to-day operations.

Martin adds: "Gard has a 17.8 per cent share of the global P&I insurance market. With between 16,000 and 18,000 claims filed a year, we have a lot of claims experience. With a lot of loss prevention experience to refer to, we can advise shipowners and operators accordingly."

Gard leverages its extensive database to help its members benchmark against different

HOW HAS THE MARITIME R&D LANDSCAPE IN SINGAPORE EVOLVED OVER THE PAST DECADE?

The biggest change is in how we have moved up the value chain. In the past, we were building oil rigs and vessels based on American and European design houses. Today, give us a two-page document with your functional specifications and we can develop the concept design, take care of basic and detailed engineering, produce shop drawings, fabricate, and deliver efficiently. We can even offer after-sales care by seeing to repairs and servicing needs.

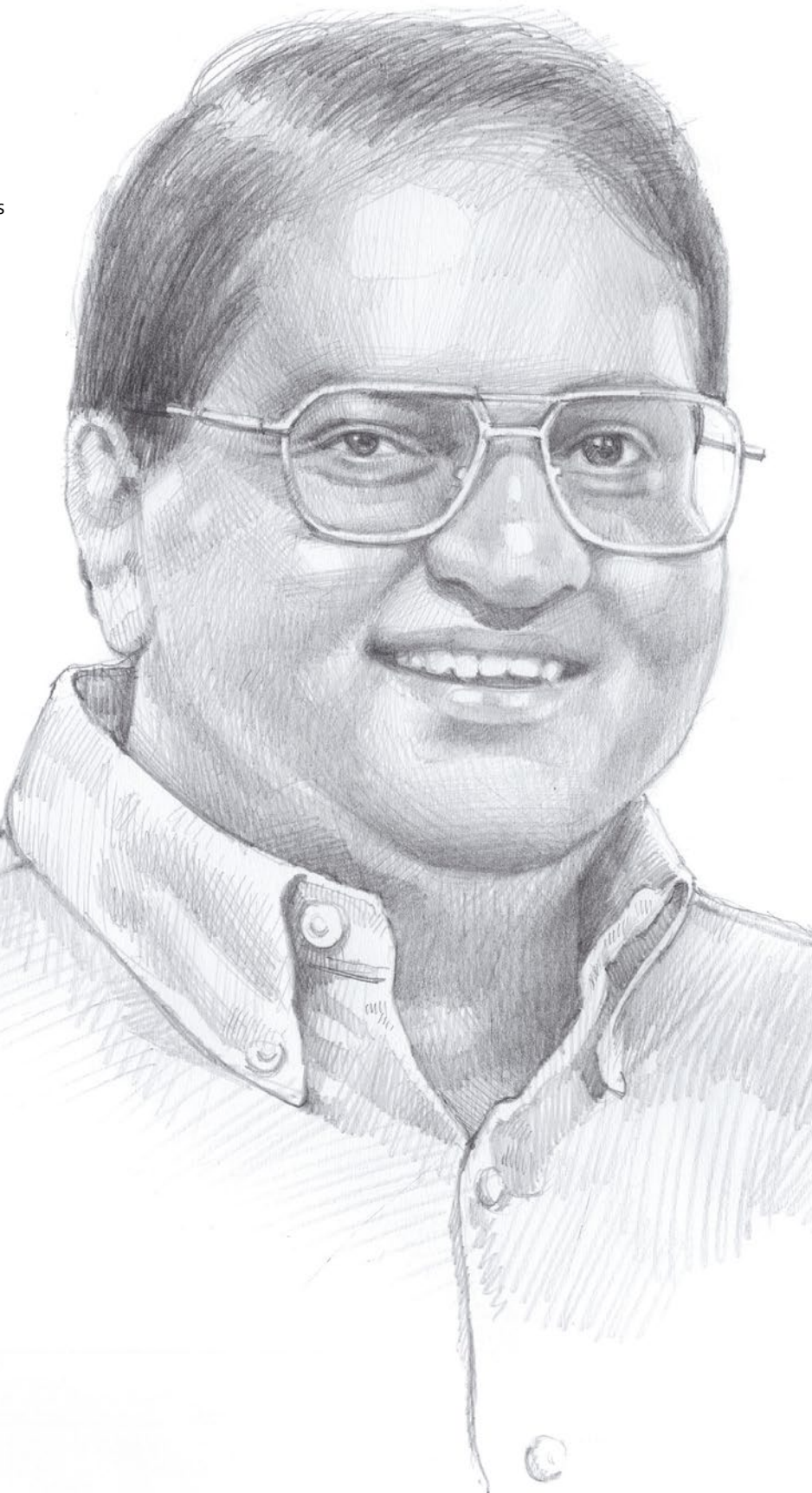
HOW CAN SINGAPORE BECOME A GLOBAL MARITIME KNOWLEDGE AND INNOVATION HUB?

Our success to date can largely be attributed to innovation and an attractive combination of rich shipyard expertise and strong design and technology capabilities. Both the public and private sectors need to continue on this track by working closely together, and at the same time, move further up the value chain.

KOMtech works closely with various academia and regulatory authorities such as the National University of Singapore (NUS), Nanyang Technological University, the American Bureau of Shipping, Lloyd's Register, and the Maritime and Port Authority of Singapore to build capabilities and provide innovative solutions to our clients and end users. We are working with Lloyd's Register to build numerical simulation capabilities with computational fluid dynamics on high performance computers. This will be used as a design tool, with model testing used only for verification purposes. Previously, the model basin was used as both a design and validation tool.

"OUR SUCCESS TO DATE CAN
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TECHNOLOGY CAPABILITIES."

AZIZ AMIRALI MERCHANT, EXECUTIVE DIRECTOR OF KOMTECH



investigator- in-chief

Aziz Amirali Merchant, who helms Keppel Offshore & Marine Technology Centre, shares with Low Shi Ping his thoughts on the local research and development landscape as well as ideas to attract and retain talent

It was a visit to the Hitachi Zosen shipyard (now Keppel Singmarine) in the 1980s, while he was in secondary school, that first sparked Aziz Amirali Merchant's interest in the maritime industry. Watching the activity in the busy shipyard, he was convinced that he had a future there. It led him to pursue a diploma in Shipbuilding & Offshore Engineering at Ngee Ann Polytechnic, and a post-graduate degree in Naval Architecture at University College London. Thereafter, he joined Keppel FELS as a graduate engineer, and 23 years later, has risen through the ranks to be Executive Director of Keppel Offshore & Marine Technology Centre (KOMtech), where he is involved in research and development (R&D) work that helps keep the company ahead of its competitors.

HOW HAS THE INDUSTRY LEVERAGED DIGITAL TECHNOLOGIES TO BECOME MORE PRODUCTIVE?

The industry is embracing automation to make itself leaner and more productive. For instance, we are looking into the feasibility of placing sensors onto equipment to help detect possible failure. We will be able to gather and analyse data to help reduce non-productive time, and therefore cost.

WHAT IS ONE CHALLENGE FACING THE DEEPWATER DRILLING SECTOR? HOW HAS KOMTECH HELPED TO OVERCOME IT?

One challenge is in developing cost-effective solutions for the industry, which operates under an increasingly stringent regulatory environment. Standardisation is the key. Currently, as many as half the components of a production rig are customised, making them very expensive. But oil companies are beginning to understand that this cannot continue. At KOMtech, we always think about the end-customer. We develop solutions that meet specific needs while remaining cost-effective.

WHAT WOULD YOU SAY IS YOUR MOST SIGNIFICANT CONTRIBUTION TO MARITIME SINGAPORE AS EXECUTIVE DIRECTOR OF KOMTECH?

That will be facilitating the set up of the S\$75 million Keppel-NUS Corporate Lab, under the National Research Foundation's Corporate Laboratory@University scheme.

The Keppel-NUS Corporate Lab focuses on three research areas: Future Systems to address challenges in deepwater and arctic developments; Future Yards, which looks at productivity enhancements in yard operations using robotics and automation; and Future Resources, which aims to develop core competencies in environmental impact assessment, environmentally benign exploration, and collection of mineral resources deep in the oceans.

WHAT IS ONE IMPORTANT THING THAT SHOULD BE DONE FOR THE BENEFIT OF THIS SECTOR?

We need to get more students interested in engineering. There is an exodus of between 20 and 30 per cent of engineers per graduating cohort as not everyone will take up an engineering job. The Keppel-NUS Corporate Lab, which is physically located in NUS, helps us reach out to the students. It is common for students to walk into the office to find out more about what we do and the industry – it is a good way to inspire them.

WHAT ARE SOME OF KOMTECH'S STRATEGIES TO ATTRACT AND RETAIN R&D TALENT?

We retain our staff by providing them with continuous skills development opportunities that allow them to take on bigger challenges and grow with the company. To attract talent, Keppel gives out scholarships to both tertiary and non-tertiary students to encourage them to join us.

WHERE DO YOU SEE THE INDUSTRY HEADING?

Despite the fall in the price of oil, the demand for gas and renewable energy will increase as they become a substitute for coal. It is possible that over time, gas will be favoured over oil because it is a cleaner alternative. This dovetails with Singapore's plans of becoming a liquefied natural gas hub.

On a macro scale, industry players should use the downturn to make themselves leaner and more productive, and increase efficiency. With a growing global population and increased urbanisation, the demand for energy will only increase, and in time, prices will start to rise again.

WHAT GOT YOU INTERESTED IN THE MARITIME INDUSTRY, PARTICULARLY IN HYDROGRAPHY?

My interest in the sea started when I was a young boy. I used to live in the Katong area, which was near the sea. I have always been fascinated by the sea, especially after reading a book about what lies beneath it. I decided I wanted to sail when I was 14, and I joined the Singapore Navy as a regular when I had to enlist for National Service. It was during that time that I became interested in navigation.

After spending a few years in the Navy, I was told to take on shore duties. However, I wanted to remain at sea. So when I saw a job advertisement for an assistant hydrographer at the former Port of Singapore Authority, I applied; I have since worked as a hydrographer for over 30 years.

WHAT ARE YOUR KEY RESPONSIBILITIES AS CHIEF HYDROGRAPHER AT MPA?

I'm responsible for conducting hydrographic surveying, producing nautical charts, and providing aids to navigation. In addition, we are responsible for monitoring coastal development such as reclamation works to ensure that sedimentation and erosion of the seabed do not impact safe navigation and berthing for vessels that come through our port.

HOW HAS YOUR JOB EVOLVED OVER THE YEARS?

When we first started the hydrography department, we used to send our hydrographic survey results to the UK; they would compile the results and produce nautical charts. We now produce dual badged nautical charts covering Singapore port waters and its approaches. These are then sent to the United Kingdom Hydrographic Office for printing and distribution worldwide.

Safety has always been a key focus, and technology has facilitated changes in our work over the years. We were able to gain access to new technologies that were available to the offshore industry when there was a downturn in the 1980s.

Owing to the use of technology, our productivity has increased and we were able to reduce from the original four-man team to two. Our cartographers are also sent out to sea to verify landmarks, to ensure coastal features are correctly reflected on our nautical charts before we officially release them to users.

WHAT DRIVES YOUR PASSION FOR THE JOB?

I enjoy the teamwork and the technological aspects of the job. The evolution of technology



the safe keeper

Dr Parry Oei, Chief Hydrographer of the Maritime and Port Authority of Singapore, shares with Audrina Gan insights on his role in ensuring safe navigation in Singapore's waters

At 105km long and 16km wide, the Singapore Strait is one of the world's busiest waterways. Dr Parry Oei, Chief Hydrographer and Director of Port Services at the Maritime and Port Authority of Singapore (MPA), has the all-important task of promoting and enhancing navigational safety in Singapore. He is responsible for conducting hydrographic surveys, charting Singapore's waters, and providing and maintaining aids to navigation, such as beacons and buoys. He also has oversight of issues relating to the marine environment, and maritime boundary delimitations that impact Singapore. In July, he was awarded the 2016 Alexander Dalrymple Award by the United Kingdom Hydrographic Office for his outstanding contributions to world hydrography. He shares with Singapore Nautilus how hydrographers like him contribute to safe navigation by incorporating cutting-edge technology in their work and dealing with developments in the maritime industry.

PERSONALITY



“SAFETY HAS ALWAYS BEEN A KEY FOCUS, AND TECHNOLOGY HAS FACILITATED CHANGES IN OUR WORK OVER THE YEARS.”

DR PARRY OEI, CHIEF HYDROGRAPHER OF MPA

has helped to keep my interest. We started off in the early 1980s using sextants (navigational tools to ascertain vessel position) for surveying work before the electromagnetic wave positioning system became available. We subsequently adopted the laser system and the global navigation satellite systems. These were very advanced technologies in the 1980s and early 1990s.

We were one of the first adopters of Acoustic Doppler Current Profilers to measure the velocity of water currents. More importantly, we expanded its use in-house and developed it to measure current on the vessel in the dynamic mode. This not only increased productivity to cover a larger area but we are also able to measure nearly the entire water column.

WHAT ARE THE KEY CHALLENGES OF YOUR JOB?

A key challenge is getting good people who are passionate and committed to join us. Retaining such talent is another key challenge.

WHAT ARE SOME NEW TECHNOLOGIES OR SKILLS BEING INTRODUCED TO IMPROVE SAFETY?

We are trying to introduce e-navigation at sea to reduce the workload of crew members on board because ships are getting bigger and deeper even as crew sizes are shrinking.

E-navigation is about collecting marine information through sensors installed on equipment and integrating and presenting that digital information comprehensively in real time. One of its main aims is to ensure that both ship and shore have the same correct and up-to-date information to further improve safe navigation.

HOW CAN WE IMPROVE NAVIGATIONAL SAFETY IN THE STRAITS OF MALACCA AND SINGAPORE?

Currently, we're over reliant on satellite navigation. The next challenge is to develop a system to complement satellite positioning especially in coastal waters. We have embarked on a pilot project to use radar beacons, which can transmit electronic pulses to provide an accurate terrestrial positioning system. We hope to improve the accuracy of this system and implement it in Singapore as a test bed project before introducing it to the Straits of Singapore and Malacca.

We have also introduced a real-time information system, to provide tidal information through the automatic identification system to ships in our port waters, and those passing through the Singapore Strait.



TAP FOR MORE

COMPANY SPOTLIGHT

With a staff strength of 50 personnel worldwide, a fifth of whom are located in Singapore, BP Marine Fuels had a market share of about 5-7 per cent, or 7.65 million metric tonnes (mt), of the world's demand for marine fuels in 2015.

The BP outfit here, which has roughly an 8 per cent share of the bunker market in Singapore, accounts for about 45 per cent of the group's global sales in marine fuels, or 3.37 million mt, last year. That worked out to about US\$792 million (S\$1.09 billion) at today's bunker fuel prices.

That is quite impressive when you consider that BP does not own or operate refining facilities in the Republic – it sold its stake in the joint-venture refinery, known as the Singapore Refining

Company, to the Singapore Petroleum Company in 2000. Furthermore, except for its ocean-going tankers and gas carriers to transport fuels in bulk, BP Singapore does not own bunker barges here. The bunker barges are operated or chartered by its customers from across all segments of the shipping industry here, from tugs and liners to tankers and cruise ships.

BP's Global Head of Marine Fuels, Carlos Torres, who is stationed in Singapore, explains: "You have to understand that ours is a very global business. The team here does not work in isolation. They are in constant communication with colleagues in other marine fuel hubs in the Mediterranean, the Middle East, Europe, and other ports where



AJ Leow finds out how asset-light BP Marine Fuels, manned by a core team of 10 that are assisted by a support cast,



small outfit, big outreach

pulled off almost US\$800 million in marine fuel sales in Singapore last year



“BP CONTINUES TO VIEW SINGAPORE AS A
AN IMPORTANT STRATEGIC LOCATION...WE
BELIEVE THAT DEEPER AND MORE STRATEGIC
RELATIONSHIPS BETWEEN BUNKER SUPPLIERS
AND SHIPOWNERS IS CRITICAL.”

BP'S GLOBAL HEAD OF MARINE FUELS, CARLOS TORRES

we have presence. The rest of the BP Marine Fuels staff are strategically located based on our operations and customer relationships. We also take pride in having physical operations at the three major bunkering ports in terms of bunker volume sold worldwide: Singapore, Amsterdam-Rotterdam-Antwerp, and Fujairah (in the United Arab Emirates).

“While we don't have a refinery in Singapore anymore, we do have a strong network of refineries in Europe, Australia and New Zealand which, together with BP's trading capabilities, enables us to be a reliable and strong supplier in Singapore. The demand for bunker fuels in Singapore is much larger than the output of fuel oil from local refineries. Hence, a large portion of the bunkers sold in Singapore are based on imports and BP is well positioned to participate in the market via this supply model.”

PREVIOUS PAGE BP owns a fleet of vessels for the safe transport of hydrocarbons around the world, including the double-hulled tanker *British Loyalty*.
ABOVE A BP worker carrying out maintenance work on deck.

The core BP Marine Fuels team here, Torres adds, is supported by four oil products traders in fuel and gas oil, who are part of a 200-strong commodities trading team, as well as two members of the risk management team who specialise in the marine customer segment.

Says Torres: “Our account managers are dedicated marine professionals committed to building sustainable long-term partnerships. They are supported by a wider team with industry knowledge and expertise. BP Marine Fuels' commitment to our customers is a simple one: to consistently deliver quality products with outstanding levels of service throughout our network of strategically based ports. We are continuously improving our execution of the essentials and providing value-added services to meet their specific needs.”

ACCOLADES

BP Marine Fuels has remained the top bunker supplier in Singapore for 11 out of the last 12 years. It also received the Singapore International Maritime Award in 2007 and 2015 for its demonstrated commitment to quality standards, quantity assurances, and customer satisfaction.

That's quite a feather in the cap for a unit that only became a formal business function in 2000 after a global restructuring of BP to become an asset-light and knowledge-based company.

Prior to that, BP Marine Fuels was part of BP Group's Refining and Marketing segment. In 2009, BP Marine Fuels was moved to the group's Integrated Supply and Trading division, and headed by a global manager based in BP's Singapore office.

Looking forward, Torres notes: “The industry is about to face a series of very important and material changes, such as the implementation of mass flow metering in bunkering in Singapore and the International Maritime Organization's sulphur-cap specification. We view these as very positive changes and will work with the Maritime and Port Authority of Singapore to play a leading role in the market by driving process improvements that should provide benefits to the entire industry.

“BP continues to view Singapore as an important strategic location; any opportunities to grow in Singapore and the region are always given serious consideration as we believe that deeper and more strategic relationships between bunker suppliers and shipowners is critical.”

The current trend towards technologically advanced ship structures and systems in the maritime industry presents an unprecedented opportunity to enhance maritime safety through the use of technology to reduce human error in maritime operations.

Recognising the importance of the human element in maritime safety, institutes of higher learning in Singapore have embarked on two projects – funded by the Singapore Maritime Institute – to leverage technology to improve seafarers' performance.

PREDICTIVE MODEL

Researchers from Nanyang Technological University (NTU), the Royal Melbourne Institute of Technology, the World Maritime University, as well as industry collaborators SimPlus and a tanker shipping company are developing a computer-based decision support system to improve maritime safety by creating a model that predicts human error. This will allow shipping companies and seafarers to use preventive and control measures to better plan and prepare for voyages.

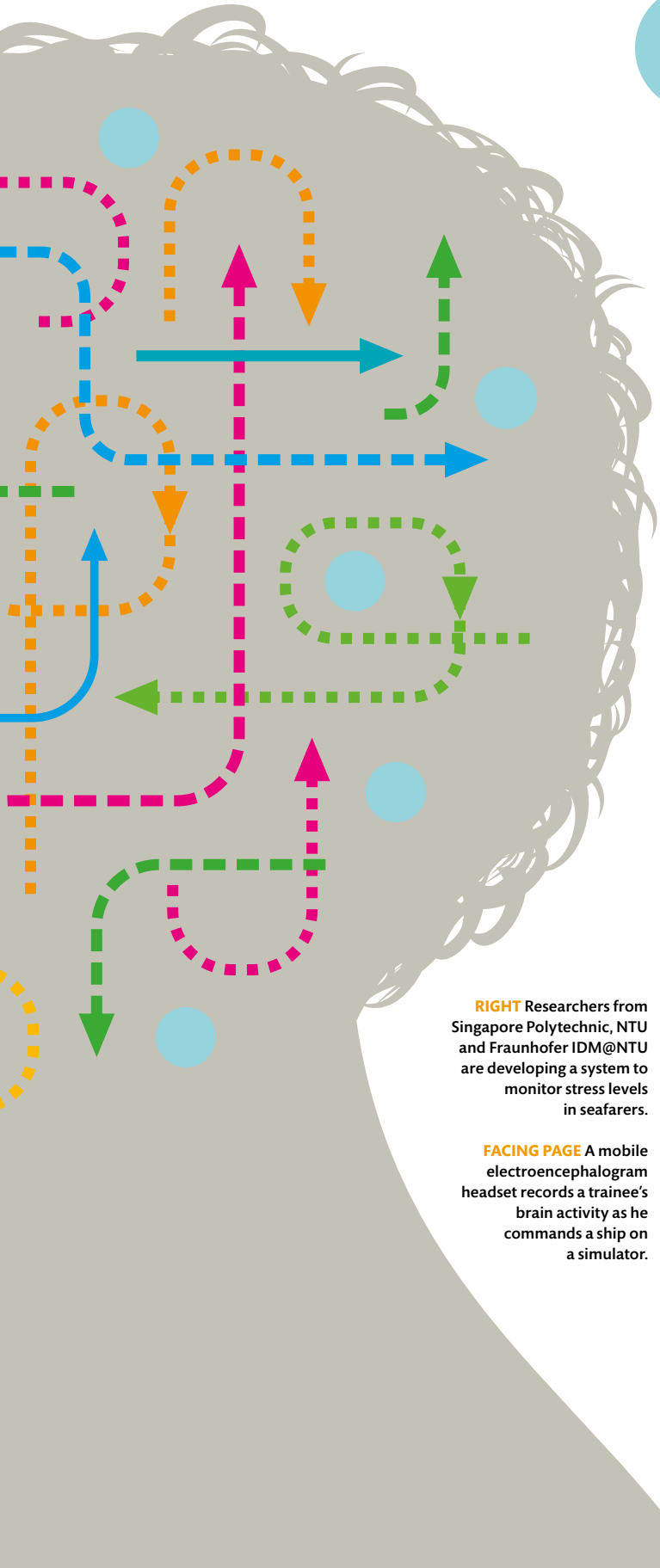
The project takes into consideration various factors, such as the physical environment, the training and experience of crew members and

man & machine

Sol E Solomon finds out how local institutes of higher learning plan to improve maritime safety by leveraging technology to study human behaviour and reduce error in maritime operations



TECHNOLOGY



vessel facilities, to develop a decision support system focusing on predictive health, safety, security and environment (HSSE) risk management for shipping and ship management companies.

The project evaluates seafarers' behaviour by looking into various contexts or factors that affect shipping operations. It identifies potential HSSE hazards and analyses the behaviours of ships and their crew members through incident reports as well as via interviews with and surveys of seafarers from the tanker shipping company.

The results are incorporated into a computer-aided decision support system, which shipping companies can use to guide them to reduce or avoid shipping accidents caused by human error. When completed, the system will allow crew members' error probabilities to be usefully quantified and used in their management.

The project also aligns with the smart shipping trend - the use of technology to identify potential risks and hazards prior to and during a ship's voyage. Smart shipping uses sensors to monitor every aspect of the shipping operation. The data collected from the sensors is processed and transmitted to shipping operators, shipowners and crew members, providing them with timely information with which to facilitate their decision-making.

This sharing of information among various players of the shipping operation, from managers to operators to customers, results in better maritime safety, say two technology experts involved in the project.

Says Dr Zhou Qingji, Research Fellow at NTU:

RIGHT Researchers from Singapore Polytechnic, NTU and Fraunhofer IDM@NTU are developing a system to monitor stress levels in seafarers.

FACING PAGE A mobile electroencephalogram headset records a trainee's brain activity as he commands a ship on a simulator.



"In our view, smart shipping does not replace or lessen the role of human elements in ensuring maritime safety. Instead, it should be viewed as a tool that supports and complements decisions and actions concerning maritime safety."

Dr Tran Huy Duc, Research Fellow at NTU, adds: "Upon completion, our proposed human reliability analysis method and corresponding optimal risk control measures will enhance the quality of practical risk management in the shipping industry."

Now in its final stages, the project is expected to be completed this December.

PREVENTING HUMAN ERROR

For years, the training and testing of seafarers has been based solely on technical competence, overlooking the important operational aspect of how seafarers behave under stress.

Researchers from Singapore Polytechnic (SP), NTU and the Fraunhofer Project Centre for Interactive Digital Media (Fraunhofer IDM@NTU) are looking to plug this gap by developing a computer-based technology that measures trainees' brain activity, making it possible to determine an individual's behavioural aptitude. The technology will gauge how a trainee feels mentally, such as if he's overly stressed or is having an excessive workload, and alert either himself or his seniors to take appropriate measures to mitigate his stress levels, says Dr Olga Sourina, Principal Research Scientist at Fraunhofer IDM@NTU.

The project aims to prevent human errors at

ABOUT SMI FUND

The Singapore Maritime Institute (SMI) is committed to developing the research and development (R&D) landscape in Singapore. Its SMI Fund promotes and supports tripartite R&D efforts between the government, industry partners and local institutes of higher learning across six maritime and offshore sectors. Visit www.maritimeinstitute.sg to find out more.

sea by highlighting situations in which a seafarer's judgement can be affected by his mental state. It involves measuring and recording the electrical activity of a trainee's brain using a mobile electroencephalogram headset with special sensors as he commands a ship on a simulator, says Dr Yisi Liu, Research Fellow at Fraunhofer IDM@NTU, who is in charge of data collection, processing and analysis in the project.

A computer programme then translates the data collected into graphs, which reflect the trainee's mental competence in various situations, says Captain Gopala Krishnan, Head of Advanced Navigational Technologies at the Maritime Institute @ SP.

The technology can be incorporated into the maritime training programme for students at SP. It can also be used to test a person's aptitude for entry into specialised maritime jobs, and possibly for future promotions too, says Dr Dimitrios Konovessis, Senior Lecturer at NTU's School of Mechanical and Aerospace Engineering.

Apart from pre-employment training, the technology can also be applied to training senior seafarers. Among SP's various maritime programmes is a short-term bridge resource management training course for senior ship officers. Capt Krishnan says that it is often hard for lecturers to impress upon senior seafarers attending this course the importance of sharing workloads on the bridge.

He adds: "With this technology, we can now see in graphical form when the captain is actually experiencing high levels of stress and should delegate some of his work. In this way, safety is enhanced because we can now scientifically show the trainees their stress levels and get them to understand that they should delegate their responsibilities when they are stressed."

Currently, the project's researchers are establishing baseline competency levels based on three sets of student profiles to form three proficiency benchmarks. For the first benchmark, researchers will work with 36 trainees who have completed their Certificate of Competency (CoC) Class 3 training but have yet to receive their certificates from the Maritime and Port Authority of Singapore. The second set of students will be those training for their CoC Class 1 or 2 licences. The final group will be PSA Marine pilots.

The project is supported by industry partners PSA Marine and the American Bureau of Shipping, and is expected to be completed in early 2018.





a culture of safety

The Port of Singapore is one of the busiest and safest in the world. Where safety is concerned, it is here that systems and behaviour are tested to the utmost. This means two things: If any new type of safety issue is going to surface for the maritime community, chances are the antecedents will debut here. Second, being in the vanguard of port safety as we find ourselves to be, we have to take on the role of global leader in driving innovation in thought and practice for maritime safety even as we extend the envelope of operational capacity and efficiency.

ELEMENTS OF SAFETY

Three elements stand out when we consider the safety scenario in our port and waterways.

First, this is a sphere of activity in which there is a high concentration of energy. Consider a

Professor Richard Lim, Chairman of the National Maritime Safety at Sea Council (NMSSC), argues that while enforcement can change behaviour, sustained improvement in safety standards takes a change in mindset

200,000-tonne vessel travelling at 15 to 20 knots. That's a lot of energy, and if uncontrolled, it can lead to much destruction of the environment and property, and endanger people's lives.

Second, there is a high concentration of hazardous materials involved, say, in the vast volume of petroleum products being shipped through our waterways in today's huge tankers.

Thirdly, there is the high concentration of people. Some 130,000 ships call on our port every year, around seven million people arrive and depart on regional ferries and cruise ships annually, and around 170,000 people work in the maritime industry – many of whom board ships and floating structures as part of their work, whether it is to make repairs or provide services.

People warrant special attention because while we may tackle maritime safety from a systems approach – addressing structure, facilities, regulations, practices and mechanisms – it is the people at the heart of the system who are inherently unpredictable; an individual human reading of a particular situation is unique and personal, even if one's behaviour is affected by a host of broader factors like training.

Indeed, even as we think of maritime safety as a single, all-encompassing concept, we have to take into account that the maritime industry is diverse. For instance, the crew members on board ships, the people who are shore-based but go on board ships as part of their work, cruise and ferry passengers, and those who use port facilities and waterways for recreation, are very different communities. Crew members on ships and rigs usually have to meet very high levels of competency and safety standards. But the latter groups can be considered vulnerable groups who may not be very cognizant of the hazards at sea. This has to be addressed through more publicity and training, so that these groups are more aware of the potential hazards, and know how to react appropriately in an emergency.

Compounding these elements is the operating environment. The backdrop of an economic downturn is cause for concern because there are now additional pressures to achieve higher efficiency with cost cuts. In this climate, investment in and attention paid to safety can be compromised, with trade-offs made in the wrong places. We have to ensure that this does not happen.

ONE-YEAR MILESTONE

Set up to spearhead the drive for maritime safety at the national level, the National Maritime Safety at Sea Council (NMSSC) is not an executive body but an advisory one. We draw upon the commitment and expertise of a diversity of stakeholders. Now, a year from its inception, much remains to be done, not least because safety is not a goal to be reached, but rather a state of preparedness that has to be maintained.

It is an ongoing process.

That said, important achievements include the introduction of near-miss reporting.

We learnt this from high

“THE NMSSC IS CURRENTLY WORKING...TO INCULGATE A CULTURE OF SAFETY...ONLY WHEN SAFETY IS VALUED AT THE CULTURAL LEVEL WILL IT BE SUSTAINABLE IN THE LONG TERM.”

PROFESSOR RICHARD LIM, CHAIRMAN, NMSSC

reliability organisations like Formula One racing teams; for them, similar safety issues abound, but they have a relatively low accident rate. A near miss should not be treated just as a source of relief, but as a learning opportunity to study where the system came close to failing.

We are also using data analytics to study traffic through our waterways to reduce the bunching up of ships in our daily operations. This significantly reduces the potential for accidents to happen due to congestion, especially since we have such a high density of maritime traffic. We have also produced a maritime safety video to provide guidance and information to mariners transiting the Singapore Strait. For shipmasters and officers, it provides very useful information on the local environment and traffic conditions, and helps familiarise them with local conditions – especially if they have not called upon the Port of Singapore in recent times.

We can introduce these and other measures, but the long-term goal is really to improve our safety culture. The Workplace Safety and Health (WSH) Council has made significant progress in this area in its work with companies in Singapore. The NMSSC is currently working with the WSH Council to adapt its methods and lessons to the maritime environment, to inculcate a culture of safety from organisational leadership right down to individual workers, such that every individual is personally motivated for and committed to operational safety.

Only when safety is valued at the cultural level will it be sustainable in the long term.

ABOUT RICHARD LIM

Professor Richard Lim is Chairman of ST Logistics and an Adjunct Professor at the School of Mechanical and Aerospace Engineering at Singapore's Nanyang Technological University. He is also Chairman of the NMSSC, which was set up in August last year to spearhead the drive for maritime safety on a national level, and to ensure the sustainability of safety efforts.



COMMUNITY TALK



from crisis to opportunity

Panellists of the Offshore Marine Forum, held during Singapore Maritime Week, tell Audrina Gan how the offshore and maritime industry can seize opportunities despite the current downturn

CLOCKWISE FROM TOP LEFT

Chow Yew Yuen, President of the Association of Singapore Marine Industries and Chief Executive Officer of Keppel Offshore & Marine; Jarand Rystad, Managing Partner of Rystad Energy; Ron Mathison, Managing Director of Swire Pacific Offshore; and Geir Sjurseth, Managing Director at DVB Bank SE.

SINGAPORE NAUTILUS (SN): 2015 WAS A DIFFICULT YEAR FOR THE OFFSHORE AND MARINE INDUSTRY, AND 2016 HAS BEEN AN EVEN MORE CHALLENGING ONE. ANALYSTS HAVE WARNED THAT RECOVERY WILL BE SLOW AND UNPREDICTABLE. WHAT IS YOUR OUTLOOK ON THE RECOVERY OF THE INDUSTRY?

CHOW YEW YUEN (CYY): This is the fourth downturn for the offshore and marine industry in Singapore since it ventured into the offshore market in the early '70s. The present cycle is expected to be more protracted compared to the earlier ones. The impact of the current downturn on industry members both globally and locally is severe, and there have been retrenchments, consolidations, mergers and acquisitions, as well as negative growth and losses for some.

Despite the global economic slowdown and uncertain market environment in 2015, Singapore shipyards secured some S\$4.9 billion in new orders during the year. A majority of the new orders secured in 2015 were for non-drilling solutions. But the offshore and marine market remains challenging.

Moving into 2016, there were project deferrals and cancellations as oil companies sought to conserve cash to ride out the downturn. The continuing mismatch between a global supply glut and sluggish demand in a fragile world economy is expected to keep oil prices subdued in the near future.

JARAND RYSTAD (JR): We expect the market to be balanced towards the end of this year. There have been 10 quarters of oversupply. But year-on-year, supply for this year will be lower than last year because global oil production has been going down this year.

Demand is also increasing, so that will create a shift in market sentiment and could even lead to a hike in oil prices. We will also see an increase in shale oil production. The rig segment will be on a decline for another two years.

RON MATHISON (RM): It is going to take a number of years before we see a recovery in the offshore support vessel market. The issue is not just about low oil prices. It is about the oversupply of anchor handlers and platform supply vessels.

I spoke about this during the panel discussion. I asked the audience whether they think we have reached the bottom for the industry. Half of the audience thought that we had already hit the bottom, while some were not sure that we have.

For the industry to go from bottom to recovery,

COMMUNITY TALK

we are talking about two to three years. But if we haven't hit the bottom yet, recovery is going to take a much longer time.

I don't know if we have hit the bottom yet but our view is that recovery is going to take at least two to three years. I am not referring to recovery of the oil price here, but a recovery in the utilisation and charter rates for anchor handlers and platform supply vessels.

GEIR SJURSETH (GS): We are in the third year of the offshore recession and markets are still deteriorating. Most severely hit is the drilling sector. The subsea sector was impacted later but has actually seen the largest number of bankruptcies so far. The offshore support vessel sector, in which South-east Asia has many players, has seen a more continuous slowdown since 2014, and is still experiencing a negative impact. I believe recovery is being pushed back.

This downturn is more than a demand-supply imbalance, although large capacities of rigs and vessels have to be permanently removed from the market. I see a turnaround when oil companies' exploration and production spending growth turns positive again.

This can happen as early as 2017. However, a key condition to trigger more capital expenditure is a perception of a regained and sustainable oil price at around US\$60 (\$\$81). If this can be

established, keeping in mind the volatility and political contents of the oil price, we may see a positive cash flow impact on owners and operators from 2019.

SN: WHAT CAN THE INDUSTRY DO TO PREPARE ITSELF FOR THIS TURNAROUND?

CYY: The long-term fundamentals of the industry remain strong. Industry analysts believe that the current low oil prices are not sustainable in the long run as oil and gas remain key energy sources. No one can predict with certainty when oil prices will eventually reach a new equilibrium.

Nonetheless, companies should brace themselves for a longer downturn by staying prudent and ensuring that overheads are under control, as well as by rightsizing their operations to stay optimal. Despite the current challenges, this also represents an opportunity for the industry to review its operations, develop new capabilities and explore new markets.

JR: Even as the industry engages in cost-cutting, they must understand the difference between trimming fat and losing muscle. They need to find ways to maintain their key competencies. They also need to formulate plans to ramp up their capacities when the market rebounds.

They should also seek out new businesses that complement their existing business. The offshore and marine sector is a cyclical business so they should not depend on just one business.

RM: Our first priority is to cut costs and conserve cash so as to ensure that we can manage our business as effectively as we can during the downturn. But in doing so, we will not compromise on safety and quality.

Over the years, Swire Pacific Offshore has built up a good reputation in delivering a good safety record and service excellence; it is important that we maintain and protect this reputation.

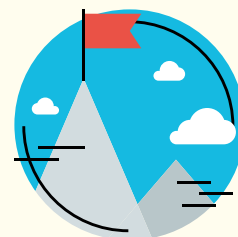
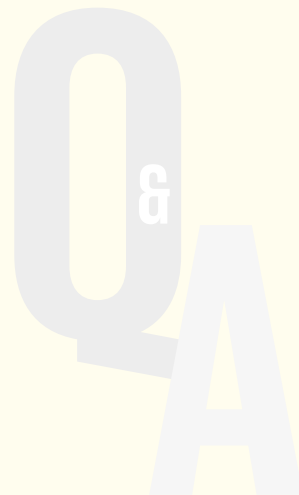
Safety is of paramount importance.

Despite cutting costs, we continue to invest in our people and provide training to our seafarers and shore-based employees because retention and nurturing of talent is very important. Oil companies have laid off hundreds of thousands of people and there is concern about how quickly the industry can steer its way to recovery as these retrenchments have led to a mass exodus of talent.

GS: The industry needs to take measures to preserve and build up cash, cut costs, keep utilisation up, and compromise on rates. Players with too much debt and poor fleet employment

"INNOVATION WILL BE KEY TO FUTURE SUCCESS. TO ENCOURAGE THIS INVESTMENT IN INNOVATION, WE NEED TO SEE MORE RISK REWARD SHARING BETWEEN SUPPLIERS AND OIL MAJORS BECAUSE THAT WILL HELP TO EVEN OUT THE CYCLICAL NATURE OF THE INDUSTRY."

RON MATHISON, MANAGING DIRECTOR OF SWIRE PACIFIC OFFSHORE



may not succeed. Most companies are currently in discussions with their banks to provide debt service relief which could provide two to three years of runway before recovery may be seen.

However, all stakeholders need to contribute. In many companies, equity is gone. Processes to adapt started in 2014 and 2015, but this year and next year may be the years of largest impact. Vessels and rigs are being laid up and people are being laid off. So downsizing and going back to a necessities-only strategy is what companies are offering their clients now.

SN: SINCE FLUCTUATING OIL PRICES WILL ALWAYS BE AN ISSUE FOR THE OFFSHORE AND MARINE SECTOR, HOW CAN THE OFFSHORE SECTOR BETTER CONFRONT CHALLENGES BROUGHT ABOUT BY OIL PRICE VOLATILITY?

CYY: The local offshore and marine industry needs to diversify and tap into new markets for growth. The global trend towards green shipping presents significant potential for the industry.

Liquefied natural gas (LNG) is widely recognised as the alternative marine fuel for shipping and its use is on the rise due to emission reduction requirements set by the International Maritime Organization. The shipping industry's demand for cleaner fuels and greener solutions is opening up new opportunities in the emerging LNG market.

JR: Volatility is needed so that supply and demand can be adjusted. It is painful but the best thing companies can do is to have deep pockets and invest in building new capacity during downturns.

RM: We need to make a distinction between the short-term volatility of commodities like oil, and the cyclical nature of the industry.

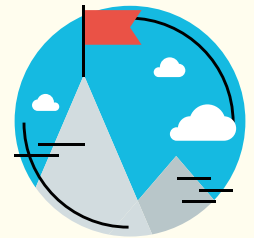
The short-term volatility of commodities is not the key issue. The main issue is whether this downturn is just another cycle, or if we are seeing a structural shift in the industry. The structural shift could be that people are moving away from oil as a key energy source, with alternative cleaner sources of energy being brought into the market. That's the key issue now.

Whatever happens though, the oil and gas business needs to become much more cost efficient. Currently, there is a lot of inefficiency in the industry mainly due to the lack of standardisation, which creates redundancy and excess capacity. There is a fragmented supply chain and no significant economies of scale.

There's also the complexity cost of local

“THE CURRENT MARKET LULL PROVIDES BOTH SPACE AND IMPETUS FOR COMPANIES TO INVEST IN RESEARCH AND DEVELOPMENT TO DIVERSIFY AND EXPAND THEIR SUITES OF PRODUCTS AND SERVICES, ENHANCE EXISTING SOLUTIONS, IMPROVE OPERATIONAL EFFICIENCY, AND DEVELOP NEW CAPABILITIES TO INCREASE THEIR COMPETITIVE EDGE.”

CHOW YEW YUEN, PRESIDENT OF THE ASSOCIATION OF SINGAPORE MARINE INDUSTRIES AND CHIEF EXECUTIVE OFFICER OF KEPPEL OFFSHORE & MARINE



COMMUNITY TALK

content requirements and protectionism of national oil interests, which does not allow for scalability and efficiency to be built up. So we need to move towards standardisation and consolidation of the supply chain in order to gain scalability and efficiency.

GS: A key factor driving the current pain is high growth financed by bank and bond debt. Limited-risk capital is also a contributing factor. Most, if not all, companies expanded heavily through contracting newbuildings with shipyards too eager to take part in the bonanza.

There is little companies can do to forecast oil prices. However, a sustainable offshore industry should be able to provide services regardless of whether oil prices are high or low. This means that strategies, not least how a capital-intensive industry is financed, must be “de-risked” to allow companies to weather the storm.

SN: ASIDE FROM OIL PRICES, WHAT DO YOU SEE AS THE GREATEST CHALLENGE THAT THE OFFSHORE AND MARINE INDUSTRY IS FACING?

CYY: The twin challenges of intense international competition and internal manpower constraints have compelled many industry players to step up efforts to leverage technology for productivity gains. They have embarked on mechanisation and automation as well as information and communications technology-based projects to improve work processes, optimise production, and reduce reliance on manual labour.

JR: In a high oil price environment, companies don't usually have much to spend on research and development (R&D) so there are few innovations. They may then face the challenge of not being able to take on new and bigger projects when the market rebounds.

RM: One of the biggest challenges is the environmental pressure on the industry. The industry needs to find more ways to reduce its carbon footprint.

As it is, there have already been some initiatives from the industry to do so. For instance, the industry is now moving towards more fuel-efficient vessels, and more use of bio fuels and LNG-powered vessels.

But we haven't really seen a real step change in terms of technology deployed that can make a meaningful difference in reducing carbon footprint. For instance, we don't yet have hydrogen-powered rigs or vessels or electric boats.

GS: Right now, it is in rebalancing its resources to allow companies to come out of the recession stronger. This requires stronger management, better capital structure, and cost-efficient vessel and rig solutions for oil companies.

SN: WHAT LONG-TERM STRATEGIES DOES THE INDUSTRY NEED TO BUILD A MORE ROBUST FUTURE?

CYY: The current market lull provides both space and impetus for companies to invest in R&D to diversify and expand their suites of products and services, enhance existing solutions, improve operational efficiency, and develop new capabilities to increase their competitive edge. Diversification is important and companies will need to develop other product segments within the offshore and marine and oil and gas value chains to take advantage of similar skill sets and technologies that are already in place.

To maintain its market leader position, Singapore – and its shipyards, including those in the supply chain – will have to continuously invest in R&D and technologies to offer more options and solutions to meet customers' needs and create better value for its customers. We need to look at areas in which we can continue to improve to enhance our core competencies and build up new strengths to prepare ourselves for the upturn. Technology and innovations are the key differentiating factors in the face of intense competition from overseas.

JR: The industry needs to be prepared for downtimes by having robust funding, diversified client segments, as well as a flexible cost structure, with core competence being kept in-house. Companies should also seize opportunities for value creation, and buy assets during the downturn as cycle management and timing is key.

RM: Innovation will be key to future success. To encourage this investment in innovation, we need to see more risk reward sharing between suppliers and oil majors because that will help to even out the cyclical nature of the industry.

Currently, suppliers and oil majors have a contractor type of relationship rather than a long-term business partnership.

GS: It is apparent that there are far too many players in the market.

Going forward, there is no doubt that the industry needs to consolidate – larger and more balance sheet robust entities are needed along with good, long-term client relationships.

getting in deep

Who says diving is only a leisure sport?
Low Shi Ping speaks to commercial diver
Yong Teck Ann about making his passion his career

Commercial diver Yong Teck Ann is among the lucky few who can say that he has landed a dream job, which combines both his interest in marine biology and his penchant for scuba diving.

Yong, 27, picked up diving as a hobby while pursuing a degree in Marine Science at university. But he had not considered making a career out of his passion until 2014, when he learnt about the profession from a friend.

He now works for Singapore Salvage Engineers, a Singapore company that provides marine services and marine emergency response solutions such as salvaging of vessels, underwater welding and fabrication, and repair of ships, tankers and other vessels, both locally and internationally.



TO BE A GOOD COMMERCIAL DIVER YOU MUST:



TAP FOR MORE

1.
HAVE
PASSION
AND
DRIVE

2.
Have a positive
attitude, common
sense and good
problem-solving
skills.



3.
Be physically
fit and a good
swimmer.

4.
HAVE THE RIGHT
TRAINING TO QUALIFY
AS A COMMERCIAL
DIVER.



three and four days a week in the water. His other primary responsibilities include educating shipowners about vessel maintenance and marine conservation. He also performs various underwater diving tasks, such as underwater hull cleaning, propeller polishing, underwater vessel photography, collecting biofouling samples, and writing reports that include cleaning recommendations.

Being able to play a part in protecting the marine environment has been an important draw to the job for him. He says: "The introduction of invasive marine species, such as the Asian green mussel which can cling onto a ship's hull or reside in its ballast tanks, can affect the marine food web, biodiversity, and the economy of a country.

"Fouling corrodes a vessel hull and its internal layer if they are not cleaned. This is known to cost the shipping industry millions of dollars."

Given Yong's broad job scope, no two days are the same, and that is precisely what has kept him on the job. He is especially grateful to be able to learn new skills as part of his on-the-job training. He says: "I can be doing salvaging work today, hull cleaning tomorrow, and writing a report the day after. Every day has something new to offer."

Yong acknowledges that he has personally grown since embarking on this role. Working outdoors has made him step out of his comfort zone, and he is grateful for having a good team that works hand in hand with and supports each other. He adds: "I have also learnt that the factors that determine a person's success are having a good attitude and the skills and responsibility to complete a job. These three traits are interconnected."

Although working underwater comes with a certain degree of risk, from physical injury to hypothermia, Yong is unfazed. He says that such risks can be mitigated through adequate preparation to deal with potential situations, as well as proper training and work practices and the use of reliable and appropriate equipment.

With Singapore being a strategic hub that connects ships from around the world, Yong also realises that his job allows him to contribute to the maritime industry.

He says: "Commercial divers are needed to perform underwater maintenance and vessel repair. With such a community available here, it will attract more ships to Singapore and generate revenue, which can be used to upgrade and further advance Singapore's maritime industry."

Some of the interesting salvage works he has undertaken include being part of a team that salvaged four shipping containers from the seabed, following a collision between two vessels in August. Earlier that month, he had also salvaged a sunken tugboat. Fortunately, it had already been relinquished of its cargo – a barge carrying boars – before it met with its accident.

His most challenging and memorable underwater operation to date took place last December, when he was tasked to salvage a rigging wire that had dropped into the water. Yong found himself 26m below sea level – the first time he had dived so deep – in waters with zero visibility. Relying on touch, he had to attach a shackle onto the wire so it could be hoisted to the surface. He completed the task after an hour underwater and returned safely to shore. He recalls: "Not only could I not see anything, it was also cold. But when you're already down there, you just have to focus on what you need to do, and finish it as quickly as possible."

PRESERVING THE MARINE ECOSYSTEM

But such projects with conditions of zero visibility are the exception rather than the norm for Yong, who spends, on average, between



FAMILIARISE
YOURSELF
WITH THE
LOCATIONS OF
EMERGENCY
EXITS.



playing it safe

The annual Safety@Sea Week is an industry-wide collaborative effort to raise awareness of safety practices and inculcate a safety-first culture in the maritime community in Singapore. Here's how you can do your part as a ferry passenger:



KEEP
YOUR
LUGGAGE
CLEAR OF
PASSAGEWAYS
AND EXITS.

**EXERCISE
CAUTION WHEN
EMBARKING
AND
DISEMBARKING.**



**Pay
attention to
announcements
made on board.**



**TAKE NOTE OF THE
STORAGE LOCATIONS
OF LIFE JACKETS AND
THE INSTRUCTIONS ON
HOW TO WEAR THEM.**

Remain seated
until the ferry is
safely berthed
and follow the
instructions of
crew members.



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