MPA ACADEMY SINGAPORE

HORIZON

MPA ACADEMY NEWSLETTER > APR 2020

02

01: EDITOR'S NOTE
Remaining Resilient in Challenging Times

10

03: CONTRIBUTION
IMO's Efforts on Reduction of GHG Emissions from the Shipping Industry

02: FEATURE
Embracing the New Normal: Transformation Through the 3Ds amidst Global Challenges

04

15

04: INTERVIEW
Conversations with MPA Academy Alumni

21

05: INTERVIEW
Steering Digitalisation in the Maritime Industry

29

06: HIGHLIGHTS

31

07: TALK
Transformation and Innovation within the Public Sector

39

08: PEOPLE
Advancing Maritime Digital Transformation

43

09: UPCOMING EVENTS

ISSUE: 07 > 2020

HORIZON
MPA ACADEMY NEWSLETTER > APR 2020
MPA ACADEMY SINGAPORE

01: EDITOR'S NOTE

REMAINING RESILIENT IN CHALLENGING TIMES

We are living in unprecedented times. The outbreak of the COVID-19 coronavirus has thrown the world a black swan scenario and impacted numerous industries severely. The World Trade Organization has warned that global growth is expected to plummet by up to a third in 2020 owing to the pandemic and the shipping sector is certainly not spared. The pandemic has brought on further woes to the maritime industry that is already facing headwinds in the form of slowing growth in global value chains as well as decreasing demand and consumption. Singapore, as with other countries, is facing challenging times.

Even as we battle the virus, Maritime Singapore is preparing for other disruptors that have and will continue to affect the maritime industry even beyond the pandemic. Aside from disruption, two other major developments facing the maritime sector are digitalisation and decarbonisation. In the lead article of this issue, we elaborate on these issues – collectively known as the 3Ds - disruption, digitalisation and decarbonisation – and highlight what MPA and the wider maritime community in Singapore are doing to address them.

REMAINING RESILIENT IN CHALLENGING TIMES

Environmental concerns and priorities are increasingly influencing the way the maritime industry operates. The International Maritime Organization (IMO) has set a target for the international shipping sector to reduce quantitative carbon intensity and greenhouse gas (GHG), aiming for a 50% reduction in total annual GHG emissions by 2050. Singapore remains committed to promoting environmental sustainability in the maritime industry and has adopted strategies that include the Maritime Singapore Green Initiative (MSGI) and Maritime Singapore Decarbonisation Blueprint 2050. In this issue, we are privileged to have an article by Mr Koji Sekimizu, Secretary-General Emeritus of the IMO and MPA Academy's Senior Advisor. Mr Sekimizu talks about developments at the IMO in the area of emissions from ships and expounds on its efforts to reduce GHG emissions from the shipping industry.

As we enter Industry 4.0, the maritime sector will undergo increasing digitalisation. Technological advancements may affect maritime companies as they lag behind in the digital journey but these changes also present opportunities for companies to harness new technologies and reinvent new ways of doing business. With the increasing rate of digitalisation in the maritime sector, organisations would have to transform and embrace the use of automation to drive productivity, efficiency and innovation.

In this issue of HORIZON, we speak with Mr Steen Brodsgaard Lund, Chief Commercial Officer and Group Chief Digital Officer of Executive Ship Management, and Adjunct Fellow of MPA Academy. Mr Lund shares with us his thoughts on digital disruption to the maritime ecosystem and how maritime companies can leverage on this wave to improve their processes and functions. Two alumni will also recount their experiences in the 9th Maritime Public Leaders' Programme and how the knowledge acquired can be translated back to their own countries. On the home front, we interviewed one of MPA's data scientists to understand MPA's digital transformation journey and the challenges encountered along the way.

As the pandemic rages unabated, the shipping industry will need to stay steadfast and adaptable. There has never been a more apt period which necessitates the need for organisational resilience. This issue therefore covers the talk given by Professor Lui Pao Chuen, advisor to the National Research Foundation, on transformation within public sector and how to overcome challenges. The talk was part of the Academy's series of thought leadership events for MPA officers.

We hope you will enjoy reading this issue of Horizon and please do let us know your thoughts at MPA_Academy@mpa.gov.sg.

We wish you safe and well.

Tan Suan Jow
Dean, MPA Academy

02: FEATURE

EMBRACING THE NEW NORMAL: TRANSFORMATION THROUGH THE 3Ds AMIDST GLOBAL CHALLENGES

BY RAHITA ELIAS

The global COVID-19 pandemic is cutting a wide swathe across the world. Apart from its tragic toll on human lives, it is shutting down borders, cutting consumer demand at the knees, and disrupting trade flows. The pandemic is buffeting the shipping industry with gale force winds, exacerbating the already challenging conditions of slowing growth in global value chains and rising environmental concerns.

COVID-19 – the ultimate disruptor

The emergence of the novel coronavirus underscores emphatically the devastating effect of a major disruptor. Disruption, coupled with digitalisation and decarbonisation, makes up the 3Ds that will define the operating environment and drive change in the maritime industry. As the virus continues to wreak havoc on lives and livelihoods, it has undoubtedly become the ultimate disruptor.

EMBRACING THE NEW NORMAL: TRANSFORMATION THROUGH THE 3Ds AMIDST GLOBAL CHALLENGES

Even before the pandemic, the shipping industry was facing slowing global trade expansion amidst a decline in China's production and consumption growth. Since 2019, China has also been embroiled in a protracted trade war with the US which affected trade volumes. Now, the pandemic has added to the decline in trade resulting in market and operational challenges such as supply chain disruption.

International Maritime Organization's (IMO) Secretary General, Mr Lim Kitack, said, "To slow the spread of the disease and mitigate its impacts, travel is being curtailed and borders are being closed. Transport hubs are being affected. Ports are being closed, and ships denied entry."

He urged IMO member nations to "ensure availability of shipping services to the commerce of the world, for the benefit of humanity" when framing their policy decisions in the context of the coronavirus.

The shipping industry has also stressed the importance for trade to continue.

Mr Guy Platten, Secretary General of the International Chamber of Shipping, said: "We urgently need governments and administrations to coordinate their efforts to provide access to berths in ports, to develop consistent measures to facilitate crew changes in ports, ensure measures are put in place to facilitate port and related operations, and to ensure that appropriate health protection procedures are made available in ports."

Meanwhile, in an update to customers in late March, Maersk's CEO of Ocean and Logistics, Mr Vincent Clerc, said, "The measures taken by governments, society and companies to contain and mitigate the crisis will result in an economic slowdown. The many conversations we have with you (the customers) confirm our expectation of lower volume demand in the coming weeks."

On its part, the Port of Singapore has remained open for cargo operations and marine services, including bunkering, ship supplies and shipyard repairs, in order to maintain commerce by sea and not disrupt global supply chains. The Maritime and Port Authority of Singapore (MPA) said in a circular, "Since the onset of COVID-19, Singapore has and remains committed to ensuring the smooth operations of its port."

EMBRACING THE NEW NORMAL: TRANSFORMATION THROUGH THE 3Ds AMIDST GLOBAL CHALLENGES

As more than 80% of goods are transported by sea, including daily necessities, keeping ports open and maintaining maritime connectivity is critical in the fight against COVID-19 and facilitating global seaborne trade. The Port of Singapore has taken active steps to ensure that the port remains safe for working personnel and users, including the implementation of many precautionary measures such as the submission of declarations of health by ships and temperature screening at sea checkpoints. These have allowed cargo operations and marine services such as bunkering, ship supplies and shipyard repairs, to continue in order to maintain commerce by sea and not disrupt global supply chains. Singapore also recognises the importance of appreciating the many maritime personnel, shore-based and ship crew, who contribute to keeping seaborne trade running.

Beyond COVID-19

Even while the global COVID-19 pandemic is taking centre stage in the disruptor arena today, other disruptors will continue to make an impact on the shipping industry.

Going forward, emerging technologies such as Additive Manufacturing, also known as 3D printing, are expected to alter trade flows. A recent study conducted by Nanyang Technological University and National University of Singapore showed that 3D printing could affect between 6% and 23% of global shipping volumes by 2045.

Singapore understands that these new technologies will reshape the maritime landscape. As a result, MPA is building a strong maritime innovation ecosystem that will ensure Singapore remains at the forefront of this technological revolution. To do so, Singapore has been strengthening linkages across and within the maritime ecosystem that would push the boundary of future capabilities. Its efforts include aligning innovation and R&D efforts between the public and the private sectors, and promoting the digitalisation of the maritime industry through ecosystem partnerships. For example, its Maritime Innovation Lab and Port Innovation Ecosystem Reimagined @ Block71 with NUS Enterprise aim to bring talents together and catalyse innovation opportunities for Maritime Singapore.

At the same time, Singapore is mindful that its maritime workforce must remain relevant as the industry evolves, and continues on in its efforts to develop a quality maritime workforce through initiatives like the Sea Transport Professional Conversion Programme (PCP). This programme helps to equip mid-career sea transport professionals with new skills in automation, data analytics, green shipping and cybersecurity.

To drive digital and workplace transformation, MPA is growing the Circle of Digital Innovators (CDO) and Circle of HR Innovators (CHRO) networks. The main goal of the CDO network is to spearhead digitalisation initiatives in the maritime industry, and uplift the innovation hub status of Maritime Singapore. The CHRO network aims to boost the role of HR as a strategic partner in driving workforce transformation, and preparing the workforce for enhanced and new job roles that are required in the future.

Digitalisation

Digitalisation, the second D, is changing the shipping industry, and how it operates.

MPA's Chief Executive, Ms Quah Ley Hoon, said, "Information and data will be the new fuel of the future that will power our industry as we tap into big data insights. The blurring of lines will happen not just between shore and sea, but also between physical and virtual, between man and machine, and between smart systems. We can tap on digitalisation to improve the efficiency of the maritime industry."

A case in point is the digitalisation of the supply chain, where physical processes are integrated with digital data to create a fully optimised supply chain.

Maritime Singapore is already riding the digitalisation wave. In October last year, Singapore's Deputy Prime Minister, Mr Heng Swee Keat, announced the launch of digitalPORT@SG. This digital portal is Singapore's maritime single window system that serves as a one-stop portal for maritime regulatory and port services transactions.

digitalPORT@SG is being developed in two phases. Under Phase 1, users can use this portal to obtain approval for all arriving and departing ships from MPA, the Immigration & Checkpoints Authority, and the National Environment Agency. The trial, which started on 1 October 2019, was progressively rolled out to the industry.

In the second phase, the system will be enhanced to also serve as a single digital platform for booking terminal and marine services, facilitating just-in-time (JIT) operations for optimal vessel passage planning within Singapore port. These enhancements are expected to start operating next year.

The Singapore government is also helping small and medium enterprises (SMEs) digitalise their operations. Last year, the Sea Transport Industry Digital Plan (IDP) for the ship agency and harbour craft sub-sectors was rolled out. It provides SMEs in these sectors with an easy-to-use guide on the digital solutions to adopt at each stage of their growth. Some $3.7 million has been set aside to assist them over the next three years. IDPs for other Sea Transport sub-sectors will be introduced later.

Decarbonisation

As for the third D, decarbonisation, the IMO has set a target of cutting annual shipping greenhouse gas (GHG) emissions by at least 50% by 2050 compared with 2008, while simultaneously pursuing efforts to ban them entirely.

As a major maritime nation, Singapore is doing its part, and is committed to promoting the industry's environmental sustainability of the industry. It has pledged to reduce emissions intensity (EI) by 36% from 2005 levels by 2030. The Republic is also exploring alternative fuels with lower carbon content such as liquefied natural gas (LNG) for bunkering, biofuels and hydrogen.

In line with this goal, MPA reviewed its Maritime Singapore Green Initiative (MSGI) to keep it relevant. The enhanced MSGI has a new focus on decarbonisation. As a result, new carbon emissions-related incentives have replaced existing sulphur emissions-related ones in the Green Ship Programme and the Green Port Programme. The Green Ship Programme now includes a new incentive to encourage the adoption of engines using alternative fuels with lower carbon content. In addition, the Green Port Programme now has new incentives for the use of LNG bunker during port stay and for ships exceeding IMO's Energy Efficiency Design Index requirements. The two MSGI programmes have been extended for another five years to 31 December 2024.

Another major decarbonisation initiative is the Maritime Singapore Decarbonisation Blueprint 2050, which will map out MPA's strategy for establishing Singapore as a sustainable maritime centre. Among the proposed initiatives is a $40 million Maritime GreenFuture Fund to study and adopt low-carbon technologies.

MPA will also support the Singapore Maritime Foundation in setting up an international advisory panel on decarbonisation in the maritime sector, which aims to provide industry and academic perspectives, and recommend strategies to support global maritime decarbonisation goals. The panel will be a mix of local and international members comprising C-suite leaders representing a cross-section of the maritime industry and academia.

Steadfast in adversity

In today's news, COVID-19 dominates the headlines and the daily lives of people around the world. Just how long this pandemic will last, and how wide-ranging its long-term impact on the global economy remains very much to be seen, with most countries now mainly grappling with how to fight the virus and stop the spread. During these challenging times, the Port of Singapore remains open while its maritime industry continues to operate as smoothly as possible.

However, Singapore has started looking beyond this global pandemic. The 3Ds of disruption, digitalisation and decarbonisation will reshape and transform Maritime Singapore and the global maritime industry. Singapore, with its slew of initiatives aimed at tackling the challenges, looks well positioned to achieve a sustainable Maritime Singapore and establish itself as a responsible hub port and international maritime centre for 2020 and beyond.

03: CONTRIBUTION

IMO'S EFFORTS ON REDUCTION OF GHG EMISSIONS FROM THE SHIPPING INDUSTRY

BY KOJI SEKIMIZU

The International Maritime Organization (IMO) is a global mechanism for maritime governance through the discussion, adoption and implementation of practical measures for the shipping and maritime industry. This article provides an overview of historic developments at the IMO in the field of atmospheric emissions from ships and touches on necessary research and development (R&D) efforts to reduce greenhouse gas (GHG) emissions from the maritime industry.

The IMO began its work of preventing air pollution from ships in 1990. In the late 1980s, the emergence of acid rain and the ozone hole triggered action from the United Nations to reduce atmospheric emissions. Serious discussions also started at the IMO on the need to provide practical and compulsory measures for shipping to reduce emissions of ozone-depleting substances, nitrogen oxide (NOx), sulphur oxide (SOx), volatile organic compounds and on-board incinerations.

The Marine Environment Protection Committee (MEPC) of the IMO – after seven years of intensive and serious discussions within the working group on air pollution and its subsidiary Bulk Chemical (BCH) Sub-Committee – adopted in 1997 a new legal instrument to prevent air pollution from ships in the form of Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL). The NOx Technical Code was established to deal with NOx emissions from marine engines and measures were adopted to limit the amount of sulfur in marine bunker fuel, while SOx emissions controls areas were designated.

The MARPOL Annex VI came into force in 2005 and the stringencies of the measures in the NOx Technical Code and the measures to limit the sulfur level in marine fuels were significantly increased by the adoption of amendments to the Annex in 2008.

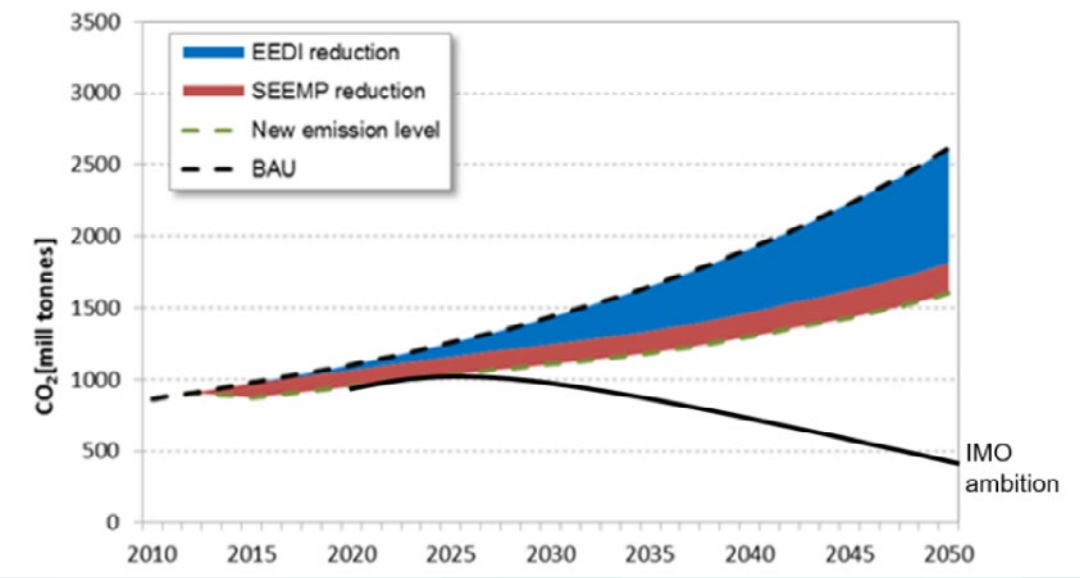
GHG emissions were not included in the original scope of the MARPOL Annex VI. After the adoption of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) in 1997, the MEPC started work on the reduction of GHG emissions from ships with a study on the volume of such emissions, discussions on practical design and operational measures for ships and measures for the shipping market – such as capping GHG emissions, emissions trading or fuel levies. After intensive discussions over the application of the principle of common but differential responsibilities (CBDR) in the IMO's measures, which lasted more than five years at MEPC, amendments to the MARPOL Annex VI were adopted in 2011 to establish a truly global and unique legislation at the IMO with compulsory regulations on technical and operational measures – that is, that the Energy Effciency Design Index (EEDI) and the Ship Energy Effciency Management Plan (SEEMP) were to be applied to virtually all ships around the world. These measures are currently applied to ships regardless of the flag under the "no more favourable treatment" clause of the MARPOL Convention.

IMO's history in the field of prevention of air pollution from ships

- Adoption of MARPOL Annex VI in 1997
- Establishment of NOx Technical Code
- Designation of SOx emission control areas
- 2011 Amendments to MARPOL Annex VI
  - Remarkable achievement after five-year debate and struggle
  - Establishment of truly global and unique legislation at IMO
  - Compulsory regulations on technical/operational measures
  - EEDI
  - SEEMP
  - Applied to ships regardless of flag under the "no more favourable treatment" (NMFT) clause of MARPOL Convention (shall give NMFT to non-party ships)

In 2012, GHG emissions from international shipping were estimated to be 796 millions tonnes, which was 2.2% of global total GHG emissions, according to the IMO GHG study. It is estimated that, by 2050, GHG emissions from international shipping could grow by between 50% and 250%. It is not possible to narrow down the projected figure because emissions from shipping will depend on future global economic growth. It is said that the driver of emissions from ships is the world economy and trade, and past experience has seen the doubling in volume of shipping in two decades.

In view of continuous developments at meetings of the Conference of the Parties (COP) of the UNFCCC and the adoption of the Paris Agreement in 2015 in particular, the Initial IMO Strategy on reduction of GHG emissions from ships (IMO GHG Strategy) was adopted on 13 April 2018 as Resolution MEPC.304(72). This resolution reflects the serious political commitment of the IMO Member States as a whole, but also carries uncertainties. If we carried on as if it was business as usual based on the past patterns of world economic growth and trade, this would mean a projection of the doubling of shipping volume in two decades. But if global decarbonisation efforts were to prove to be successful and effective, that may reduce global trade growth and hence emissions from shipping as well, since shipping depends on the world economy and trade.



Adoption of the initial IMO Strategy on Reduction of GHG emissions from ships
Source: Marine Environment Division, IMO

The IMO GHG Strategy provides two potential fields for the decarbonisation of shipping: operational and technical measures under EEDI and SEEMP regulations, and the development of new low carbon emissions or zero carbon emission fuels. Market-based measures (MBM) are still referred to as a candidate for mid-term measures, but the strategy clearly indicates the need to avoid regional or unilateral measures.

What had been achieved at the IMO can be summarised as follows:

- A global system of compulsory rules for operational and technical measures were established under MARPOL Annex VI.
- The reduction of GHG emissions per unit ship through EEDI applications of 30% by 2030 would be realistic and a 40-50% decrease by 2050 would remain an ambitious challenge.
- The IMO GHG Strategy was adopted to make further efforts under the vision and ambitious target to reduce total annual GHG emissions by at least 50% by 2050 compared to 2008.

What has not been achieved so far at the IMO are:

- mandatory and effective global measures or agreements to limit the overall GHG emissions from ships, such as a global overall capping;
- global MBMs such as emissions trading or fuel levies;
- different levels of standards for technical and operational measures under the CBDR principle and the UNFCCC Kyoto Protocol due to significant diffculties in applying the CBDR principle to international shipping because of its multinational nature; and
- compulsory rules for navigation speed reduction.

The prospects of the established IMO measures in the technical and operational fields are that the EEDI and SEEMP could significantly reduce emissions per unit ship to more than 40% against the 2008 figure. But due to the projected increase of world trade in future, the ambitious target of a 50% reduction in total shipping GHG emissions by 2050 as described in the IMO GHG Strategy cannot be achieved without the availability of new low emissions or zero carbon emission fuels in the shipping industry. This observation clearly indicates the need for further efforts in R&D for new fuels.

Singapore is a maritime nation and a real contributor to the world economy through international shipping. It has gained economic benefits from it and is expected to continue to be a global leader for sustainable international shipping. Singapore is also an island nation that is vulnerable to the potential impact of climate change such as future serious changes to the tropical climate or rising sea levels. Therefore, it is essential for Singapore to carry out a serious study on the impact of climate change to the world economy, world seaborne trade and shipping routes. It is also important to assess the potential impact of global decarbonisation efforts across industries and on the lives of people around the world and on world seaborne trade, composition of the world merchant fleets and the economy of Singapore as a maritime island country and port.

Leading maritime nations such as Singapore should also contribute to global R&D efforts to deal with climate change and decarbonisation of the maritime and port industry. R&D in the fields of new low emissions or zero carbon emission fuels such as hydrogen, ammonia, methanol and liquefied biomethane (Bio-LNG), among others is a real and significant global challenge beyond the maritime and port industry. However, leading maritime nations should be active adopters of new technologies so that the maritime and port industry may be able to join global decarbonisation efforts.

What has been achieved

- Global system of compulsory rules for operational and technical measures under **MARPOL Annex VI**
- EEDI to effectively **reduce GHG emission** per unit ship

30% at 2030: realistic

40%–50% at 2050: ambitious, but need to strive to meet

- IMO GHG Strategy with the vision and ambitious targets **to reduce the total annual GHG emissions by at least 50% by 2050** compared to 2008

What has not been achieved

- Mandatory and effective **global measures** or agreement to limit overall GHG emissions from shipping
  - Such as **global overall capping**
- Global MBMs, such as **emissions trading or fuel levies**
- Different levels of standards for technical measures under **CBDR and UNFCCC Kyoto Protocol** (extremely difficult to apply the CBDR Principle to international shipping because of the involvement of many national players)
- Compulsory **speed reduction** regulations

The IMO is a global mechanism for the drafting and adoption of new conventions, rules and standards for application to the field of international shipping. The implementation of such global measures would require ratification or acceptance by certain numbers of contracting governments before the actual entry into force of such new measures. Furthermore, it will also be necessary to carry out promotion of acceptance of such measures by governments for global implementation. As the only effective international mechanism for the establishment and implementation of global measures for shipping, the IMO must continue working in the fields of climate change and reduction of GHG emissions in the maritime industry, including further operational and technical measures and also for MBMs for shipping.

ABOUT THE AUTHOR

Mr Koji Sekimizu joined Japan's Ministry of Transport in 1977, rising to Deputy Director of the Environment Division and later the Safety Standards Division of the Maritime Technology and Safety Bureau.

Since 1989, he has worked at the IMO, going on to head the Technology, Marine Environment as well as Maritime Safety Divisions during his tenure. On 1 December 2011, he was appointed the IMO's seventh Secretary-General for the period of 1 January 2012 to 31 December 2015.

Mr Sekimizu holds the appointments of RSIS-MPA Adjunct Senior Fellow and MPA Academy Senior Advisor.

04: INTERVIEW

CONVERSATIONS WITH MPA ACADEMY ALUMNI

BY RAHITA ELIAS

The maritime industry is in the midst of a major sea change on the back of a growing wave of digitalisation, disruption and decarbonisation. Two MPLP alumni relate their experiences on how the knowledge garnered from the 9th MPLP in October 2019 can be applied in their home countries.

Miss Louise Williams
Director of Ports, Maritime Administration Department,
Ministry of Public Infrastructure, Guyana

MPA's sustainability plan offers maritime administrators from other countries an insight into the development of a road map for achieving long-term developmental objectives, says Ms Williams.

The Maritime Public Leaders' Programme (MPLP) provided an opportunity for participants to engage the programme's presenters on their approach in addressing common issues and to share their experiences regarding similar situations in their respective countries. As decision makers in our own right, it was insightful to learn of the various approaches to solving common problems. To this end, I would rate the programme a success in that the topics stimulated meaningful discussions among the targeted group.

Among the topics covered, the Maritime and Port Authority's (MPA) sustainability journey was quite interesting to me, given my own country's Green State Development Strategy: Vision 2040 plan, where: "The vision of the 'green agenda' is centred on principles of a green economy defined by sustainable, low-carbon and resilient development that uses its resources efficiently, and sustained over generations."

The MPA's sustainability journey mirrors, albeit at an organisational or micro level, my country's macro plan for the next 20 years for all modes of transportation. The MPA's plan therefore not only offers us, as maritime administrators, an insight into the development of a road map for the administration's sustainability plan but helps us also to contribute in a significant way to our country's overall long-term developmental objectives.

To apply MPA's plan to our country, it would first and foremost have to be tweaked to align with the specific goals of the Green State Development Strategy. Second and even more critical, as a regulator and an operator, we would need to lead the charge in implementing what we expect of others within the ports and shipping industry. Third, some aspects may require the necessary legislative framework that will ensure effective implementation and compliance. Last but by no means least, stakeholders' engagement is vital so as to encourage participation at all levels of the plan.

Digitalisation, disruption and decarbonisation were also discussed during the programme. I definitely have to say that the main learning point was that these developments are transforming the industry and cannot be ignored since they will have an effect on the efficiency and/or competitiveness of the port.

Therefore we, as maritime administrators, ought to be exploring the opportunities and threats that face the shipping community arising from any or all of these factors.

With the commencement of offshore activities in Guyana, there was an expectation that there would be an upsurge in traffic arising from those activities; this has been realised. The offshore supply vessels already account for approximately forty percent of the traffic calling the main port. Within the next few years, there's going to be a number of additional floating production storage and offloading platforms being installed and undoubtedly more shore-based facilities will be needed to support the oil and gas (O&G) industry. To cater for this growth, I definitely envision Guyana employing drones and augmented reality technology to assist in surveying and inspecting ships, traffic control, security and vessel navigation. This would complement our cadre of marine pilots while we continue to train and build capacity.

Even further, as an operator, we are required to have spares for the maintenance of our fleet of vessels. At any given time, this investment accounts for millions of dollars of funds being tied up in spare parts.

The future looks different however, given the growing feasibility studies on additive manufacturing for marine parts. Using this as a preferred source of procurement would ensure the timely acquisition of spares and provide us with the opportunity to allocate much-needed financial resources to other areas of priority.

In terms of disruptors, the logistical demands of Guyana's fledgling oil and gas industry are the main disruptors.

The current shore bases cannot fully satisfy the demands for components and support systems of the O&G contractors, even if these facilities were to enter into mergers. At present, the majority of support comes from a neighbouring oil and gas country.

This has forced developers to seek developmental opportunities outside of our main port for the creation of shore bases that can provide adequate space and depths to accommodate larger ships. As a result, we will no doubt see the creation of other ports and terminals which would divert traffic from the existing main port. Ultimately, this could mean that the current main port will be relegated to a secondary port.

On the decarbonisation front, we continue to be involved in several pilot projects in the Caribbean region to monitor ship emissions and the use of energy-efficient technologies. The analysis of the data collected will help decision makers craft strategies and policies that will help us comply with our international obligations and achieve our overall low-carbon plan.

Capt Jorge Parga
Deputy Director,
Directorate General of the Maritime Territory and Merchant Marine, Chile

As Chile's ports are gearing up for growth, it is looking at how other countries, including Singapore, are addressing the challenges currently facing the maritime industry. The MPLP provided an excellent opportunity for such a learning experience, says Capt Parga.

The Maritime Public Leaders' Programme (MPLP) is all-around an excellent experience that gives you a great view of the maritime industry, its complexities, challenges, and innovations. On top of this, you have the chance to meet and share with many classmates who occupy important positions in either the maritime industry or maritime authorities from all over the world. It, therefore, is an arena where you can gain a great deal of knowledge while extending your network of maritime contacts around the globe.

One issue covered in the programme that is particularly relevant to my country, Chile, is the current challenges facing the maritime industry, and the innovations being developed to tackle these challenges.

Another interesting topic was Singapore's strategic planning capabilities and its ability to execute its plans correctly and on time. I think that various concepts can be applied in my country as the ability to accurately plan in advance and execute the strategic planning is of great importance for a developing country like Chile.

The programme also covered the issues of digitalisation, disruption and decarbonisation from the programme. From my perspective, digitalisation was the most interesting and enlightening point, considering its incredibly fast evolution coupled with the emergence and implementation of new technologies. Many of these innovations will be extremely necessary for ensuring and enhancing safety and security in fast-growing ports like those in Chile.

To keep up with this growth, it is important for Chile's maritime industry to develop and improve its maritime infrastructure. There is a need for bigger, better, and more efficient ports, in order to improve our maritime trade ratio.

Chile also recognises that reducing our carbon footprint is in the best interest of both the maritime industry and the state. The country's biggest challenge is the high costs needed to realise decarbonisation. Another challenge is Chile's special geographical position. Being far away from our main markets means that slow steaming, sailing at minimum speed, may not be a viable option for ships serving the Chilean market.

05: INTERVIEW

STEERING DIGITALISATION IN THE MARITIME INDUSTRY

BY CHRIS CHUA

This issue, we caught up with Mr Steen Brodsgaard Lund, Chief Commercial Officer and Group Chief Digital Officer of Executive Ship Management Pte Ltd, who shared his thoughts about digitalising the maritime industry, embracing technological disruptions and decarbonising shipping. Mr Lund is an Adjunct Fellow of the MPA Academy and also chairs the Digital Transformation Committee as a council member of the Singapore Shipping Association (SSA). With over 30 years of experience in the maritime sector, Mr Lund has held leadership positions in prominent companies such as Maersk, DNV GL and Radio Holland, with stints in several Asian countries ranging from India to China and Korea.

Q: *What does "digitalisation of the maritime industry" mean?*

Digitalisation refers to the process of converting information in the form of text, pictures or sound into a digital format that can be processed by a computer. When we talk about the digitalisation of the maritime industry, it means integrating digital technologies, leading to the automation of processes and functions to drive enhanced productivity, efficiency and innovation in the shipping sector. Ultimately, it is the pursuit of value and revenue-generating support of the core business, culminating in stand-along ventures that either augment the existing enterprise or becomes a whole new vertical or company onto itself.

Q: *Why is it important for the maritime sector to embrace technological disruptions and digitalisation in the face of Industry 4.0?*

Embracing digitalisation improves productivity and customer experience, while potentially reducing costs. On the other hand, maritime companies that fail to do so risk losing competitiveness and getting left behind in a competitive business environment that is increasingly harnessing the Internet of Things (IoT) and automation, among others, to drive digital transformation in the maritime sector.

In today's digitalised world, there are greater demands for transparency in data and communication and nimble business-to-business integration to drive low-cost operations. Consequently, the ecosystem of customers, suppliers, integrators and government agencies will increasingly demand a minimum degree of standardisation on such matters. Companies that hold on to old-school, legacy models face the prospect of not being able to fulfil these minimum standards and risk becoming obsolete.

Q: *Can you share some examples of how the maritime industry can benefit from leveraging disruptive technologies to digitalise its products and services?*

There is rampant technological disruption in the maritime space. Technologies have matured and many more are being adapted from other businesses for application in the shipping sector. 3D-printed marine parts and digital crew certificates are two such examples of digitalisation leading to large transformations of the traditional business model.

3D-printed marine parts allow for on-demand, localised additive manufacturing of shipping parts. This results in vastly reduced lead times and a substantially lower carbon footprint compared to the traditional supply chain, which involves carrying inventories of marine parts and shipping these from factories around the world. The industry is moving closer to realising 3D printing of marine parts, having progressed from an initial exploration and identification stage to the laboratory testing and certification stage.

To this end, the Singapore Shipping Association (SSA), together with the MPA and the National Additive Manufacturing Innovation Cluster (NAMIC) launched a Joint Industry Programme (JIP) to explore the feasibility of 3D-printed marine parts as a sustainable alternative to the traditional business model. In addition, six users, including Executive Ship Management, subsequently embarked on an early adopters' programme together with Wilhelmsen Ships Service and Ivaldi – an additive manufacturing company – to test 3D-manufactured parts on board vessels that are in operation.

Building on this, an initial demand mapping had been augmented by digital scanning of original parts on board ships. This will allow tailor-made additive printed parts to be produced at scale in strategic locations around the world, which will be matched with ports where high demand for spare parts exists. Alongside this, the trial phase will ramp up the use of 3D parts and build a catalogue of some 10,000 additively manufactured parts over the next year.

In addition, 3D-printed marine parts foster greater environmental sustainability. For example, a 1kg package containing shipping spare parts shipped by air from Europe to Asia produced 7.75kg of carbon dioxide (CO_2), while only 0.02kg of CO_2 was emitted when it was 3D-printed in the location of use. Beyond improving supply chain efficiency, additive manufacturing of marine spares is better for the environment.

Meanwhile, digital crew certificates employ blockchain technology and artificial intelligence to enhance the security and transparency of seafarers' certification, while reducing the costs and the manpower required to produce and deliver these electronic certificates (e-certs). Today, some 1.7 million crew carry physical paper certificates. By converting these hardcopy certificates to e-certs, it lowers the risk of seafarers losing or damaging them, which would cause much inconvenience. At the same time, e-certs eliminate the risk of fraudulent certificate issuance, while providing digital records of sea-going service and health data, among others, all in one seamless application for seafarers.

For crewing and ship management companies, digital crew certificates offer a streamlined platform that eliminates the time-consuming analogue processes of identifying the right crew for a vessel. By allowing for instant crew selection, identification of training and planning for deployment, e-certs drive greater productivity, transparency and safety.

Q: ***How can digitalisation in the maritime sector contribute towards decarbonising shipping?***

Ship owners and operators globally are increasingly adopting digital technologies that allow operational data on vessels to be shared between the crew and staff in shore-based operations centres through IoT-enabled machinery and equipment. This enables real-time insights into onboard operations and allows instantaneous adjustments to be made 24/7. At the same time, it facilitates reduced bunker consumption and emissions that contribute towards decarbonising shipping.

For example, sophisticated route optimisation systems reduce a vessel's fuel consumption by taking into account weather conditions, such as ocean currents, to determine the ideal course to minimise the time that a ship spends in transit. With less time on the seas, this means less fuel burned, leading to lower emissions.

Another example involves utilising ultrasound transducers to prevent marine growth, such as algae and barnacles, on the vessel's hull and propeller. By helping to keep these submerged surfaces clean, it reduces the ship's resistance with the water, thereby reducing bunker consumption and CO_2 emissions. These are just some of the many digital technologies available to foster green shipping by helping to reduce bunker consumption and bring about lower emissions of CO_2, sulphur oxide, nitrogen oxide and particulate matter.

Q: ***While there are challenges in decarbonising shipping, what potential growth opportunities are available to firms that invest in this sector?***

The greatest challenge in decarbonising shipping lies in transforming the sector's reliance on heavy fuel oil to a more sustainable energy source to power ship engines. This is important if we are to attain the International Maritime Organization (IMO)'s 2050 GHG emissions target of a 50% reduction compared to 2008 emission levels. While ammonia had been identified as a possible zero-carbon substitute for fossil fuel, other fuels such as hydrogen or synthetic methanol may potentially displace ammonia's projected dominance.

A recent study by the University Maritime Advisory Services and the Energy Transitions Commission for the Getting to Zero Coalition estimated that the scale of investment needed to decarbonise shipping could reach US$1 trillion to US$1.4 trillion. Of this, about 85% of the investments would be needed for land-based infrastructure for production, storage and bunkering facilities for low carbon fuels. Meanwhile, the remaining 11% to 15% of the investments would be related to the ships themselves, including the machinery, retrofits and on board storage for the ship to run on low carbon fuels. The major initial challenge remains the scale required for the industry to come together to address this challenge. To this end, a number of industry groups such as the International Chamber of Shipping have taken the lead in structuring dialogue with the IMO.

Notwithstanding this, the sheer scale of the challenge of decarbonising shipping makes it an immensely investable problem to address, given that larger problems have the potential to trigger significant rewards.

Q: *What can companies in the maritime sector do to embark on digitalisation or enhance their digitalisation process?*

Firstly, it's important that the companies take a holistic view and review current operating processes to determine key areas where a change is warranted, in terms of obtaining business sustainability or potentially reaping benefits to the core business through digitalisation.

Subsequently, a second step could be formulating a digitalisation strategy that ultimately can lead to the company generating new, standalone business lines that can be monetised separately from its historical activities. Thirdly, it would be wise for companies to adopt a "think big, start small" approach, where they initiate digital transformation through bite-size projects. By starting with low-hanging fruit type of projects, companies can then extend these further to enhance their digital transformation efforts.

Q: *What key priorities should companies in the maritime sector focus on as they embark on digital transformation?*

The key priorities could be around decarbonisation, business sustainability, cyber security and operational efficiency. However, each sector and company will find unique opportunities that make the most sense for them to address.

Q: ***What role does the SSA play in promoting digitalisation in the maritime industry?***

The SSA had undertaken many initiatives to promote digitalisation and digital transformation in the maritime industry. This includes creating awareness of affordable digital solutions to member companies, in order to help them kick-start their digitalisation journey or linking them up with funding agencies to help them realise their digitalisation aspirations.

In addition, the SSA plays an active role in promoting a collaborative culture across the maritime industry and with industry stakeholders and technology start-ups to drive digitalisation. Bearing testament to this, a Memorandum of Understanding (MOU) was signed between the MPA, SSA and NAMIC to explore the use of additive manufacturing of marine parts.

Apart from this, the SSA acted as a bridge for a technology start-up to develop a shipping agency tool that applies Robotic Process Automation (RPA) technology to automate manual processes such as data entry and validation. With the time saved from these repetitive tasks, the roles of ship agency staff were transformed, enabling them to take on higher-value jobs in functions such as data analytics. Furthermore, the SSA successfully launched its biannual Tech & Demo Day, which aimed to help shipping companies adopt digital tools by connecting them with technology start-ups, in areas ranging from maritime cybersecurity to smart supply chains. On top of this, the SSA formed the Digital Transformation Committee (DTC) in June 2019 in order to provide support to local maritime businesses that sought to integrate technology into their operations.

At the same time, active engagement between SSA and the Singapore government allows a dynamic exchange of views between maritime community and the public sector to drive digitalisation efforts. Additionally, the SSA plays a role in championing the upskilling of talent, with labour unions and institutions of higher learning proactively engaging SSA members to jointly develop future-ready skillsets among maritime professionals and prospective maritime talents.

Collectively, this strong collaborative relationship between the government, industry stakeholders and technology start-ups helps to bolster digitalisation in the maritime sector.

Q: *What are the challenges to embracing digitalisation in the maritime industry?*

One of the key challenges is driving the people part of digital transformation. People tend to be apprehensive about change. When individuals are moved out of their comfort zone, or in some cases, face job displacement, most feel fearful and anxious and resist the unknown. Digitalisation brings new challenges which require fresh skillsets, such as cyber risk management and data analytics, among others. To this end, it is of paramount importance that maritime professionals are equipped with competencies that enable them to keep pace with the developing technological environment.

As people become more familiar with digital processes, they may feel less daunted and more ready to embrace digitalisation in the maritime industry. Companies will do well to focus on skills building early in their digital journeys, as little progress will be made if their key assets – their people – are not fully supportive of this process.

Q: *Looking ahead, how do you think digitalisation will impact the maritime industry in the areas of productivity and transparency?*

We live in an age where we are continuously handed new technology, which allows the transformation of business models at a speed and depth never possible before. By fusing the knowledge of the core business model with the possibilities that these innovative technologies offer us, the maritime sector has a tremendous opportunity to generate meaningful knowledge-based jobs for the workforce of tomorrow. At the same time, the industry can look forward to benefitting from improved productivity and achieving enhanced security and transparency in its journey ahead.

06: HIGHLIGHTS

TRAINING COURSES FROM NOVEMBER 2019 TO APRIL 2020

Q4 2019

Shipping Officers

Robotic Process Automation

Engineers

Value Engineering & Management Course

Marine Surveyors

Operational Use of Electronic Chart Display and Information Systems (ECDIS)

Engineering & Project Management Officers

Professional Certificate in Project Management

TRAINING COURSES FROM NOVEMBER 2019 TO APRIL 2020

Q1 2020

Shipping Officers

Blockchain : Embarking on the Journey

Responsiveness in Frontline Customer Service: Making Customer Satisfaction a Daily Pleasure

Process Improvement 101

Leading and Motivating Multi-Generational Teams

IT Officers

Writing Effective Minutes of Meetings for Senior Officers

NICF – DevOps Foundation with BizOps

NICF – Cloud Native Solution Design

NICF – Certified ScrumMaster

Operations & Marine Services Officers

Incident Investigation and Root Cause Analysis

Vessel Traffic Officers

VTS Operator Course V103-1 Module 3 & 6

Marine Officers

USCG Search and Rescue

Marine Surveyors

Investigative Interview Techniques

Engineering & Project Management Officers

One Day Training Course on Value Engineering and Value Management

Project Risk Management

Hydrographers, Cartographers, Survey Officers

Supervise Safe Lifting Operations

Work at Height Course for Workers

Perform Rigger & Signalman Tasks

Managing Work at Height Course

Others

i3Bar Certificate in Business Analytics & Reporting

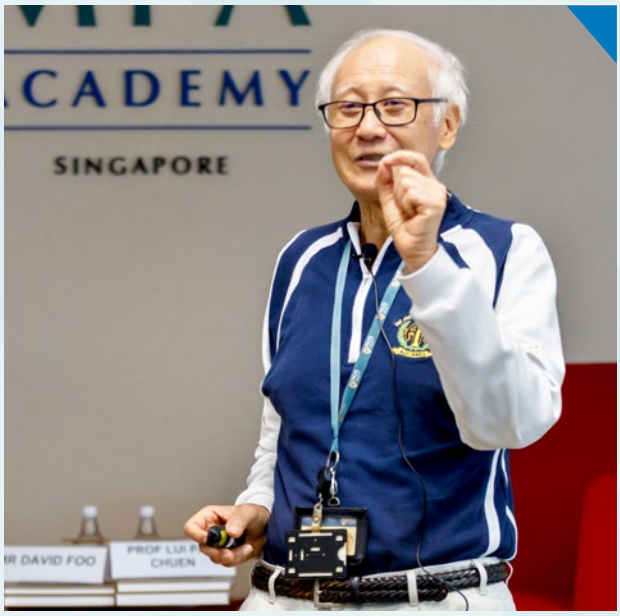
Tableau Fundamentals and Intermediate

07: TALK

TRANSFORMATION AND INNOVATION WITHIN THE PUBLIC SECTOR

BY PROFESSOR LUI PAO CHUEN

About 90 MPA staff came together on 1 Nov 2019 for a talk organised by the MPA Academy. The event featured Professor Lui Pao Chuen, advisor to the National Research Foundation, who shared about "Transforming Singapore into a nation of innovators: MPA's opportunities". The talk was part of a series of informal sessions for prominent professionals and experts to share their experiences and thoughts with MPA officers on how Singapore and the maritime industry has developed over the years and how to overcome challenges to move things forward.



OUR FUTURE IS DETERMINED BY THE IMAGINATION AND DARING OF OUR PEOPLE

As a small country, Singapore has to constantly strive to be ahead. We cannot survive by following others. It is crucial that MPA dreams big, dares to be first and goes beyond world class. Roughly half of Singapore's 1,400 sq km territory comprises the sea, which MPA oversees. The amount of land in Singapore is increasing and is projected to expand to 766 sq km by 2030, but the amount of sea is decreasing. In seeking to optimise space, we need to be creative in our land use. Integrated developments, such as the Jurong Lake District, allow people to connect, learn, live, work and play, while fostering a green, healthy and smart nation.

For Singapore to survive and thrive, we need to be thrifty, fast, open and integrated. Our future is determined by the imagination and daring our people, not by the size of our territory. Confidence in Singapore lies at the heart of our system, which requires stability. Stability depends on national security, social development and economic development. These in turn are underpinned by racial harmony, labour harmony and a corruption-free society. National security remains a top priority for Singapore, with defence taking up the biggest portion of our budget and the largest proportion of our land use. Besides the addition of digital defence as the sixth pillar of our Total Defence framework, climate change defence can be considered a new seventh pillar, given that rising sea levels pose an existential threat to Singapore.

FOSTERING TECHNOPRENEURSHIP IN ISRAEL AND SINGAPORE

Apart from ensuring stability and daring to dream, it is crucial for Singapore to thrive economically by championing technopreneurship. In this area, Israel and Singapore have adopted different approaches. Since the 1990s, Israel's software products have grown exponentially, enabling it to emerge as a cybersecurity powerhouse by the mid-nineties. Meanwhile, sectors such as artificial intelligence and quantum computing are projected to drive Israel's high-tech growth in the years ahead. Fuelling this expansion in Israel's high-tech industry is the Israeli Defence Force's two programmes, ATUDA (Academic Reserve) and the Talpiot programme, which are instrumental in grooming engineers and leaders in this field. The Academic Reserve allows Israeli high school graduates to earn their university degree before serving an extended term of military service. Meanwhile, the Talpiot programme is an elite 40-month training programme for the top 1% of the Academic Reserve, who study mathematics and physics while taking military courses between semesters.

In Singapore, championing technopreneurship requires more than just employing money as a lever, but also promoting mindset change. To this end, the education system was revamped to infuse in our people a culture of innovation. In our efforts to transform our economy through research, innovation and enterprise (RIE), the RIE budget was raised from S$2 billion in 1995 to S$19 billion by 2020. Recognising the importance of top leadership support on this, the RIE council was established and helmed by the Prime Minister. The case of Dr Mark Lim – a teacher whose space research led him to establish a startup that develops plasma-thrusters for the small satellite market – shows that people in Singapore have the capacity to do greater things if they have self-belief. In addition, this demonstrates that mentorship and talent development are critical investments.

TAKEAWAYS FROM THE SAF'S TRANSFORMATION

In fostering innovation, lessons can be drawn from the SAF's transformation as it evolved into an advanced networked force. In the past, soldiers required visual line of sight to engage the enemy. But in the integrated knowledge war of the future, soldiers fight with information, automation and precision. Designed for soldiers 20 years into the future, the Singapore Armed Forces' (SAF) next-generation armoured fighting vehicle (NGAFV) employs sensors and electronic displays to locate the enemy, engage in precision fire, while providing safe mobility. The design and development of the Hunter armoured fighting vehicle took over 18 years and involved staff from the SAF, Defence Science and Technology Agency (DSTA) and ST Engineering Land Systems (SELS). It was critical that the different parties prioritised the interests of the project and that there was integration of people and organisations over time. Alongside this, embracing an iterative process in project planning and implementation – where the multiple processes of mapping the operational requirement, considering the technology, planning and implementation are done concurrently – ensured quick response to changes.

Similarly, Singapore's Navy adopts a knowledge-centric approach in its operations. The integrated bridge and combat information system enables captains to perform both functions seamlessly, while unmanned aerial vehicles and unmanned surface vessels help monitor the air and sea surface.

When former leaders from the defence sector move on to other companies and industries, their knowledge of the military system can be applied to new sectors, which in turn facilitates sharing of knowledge and experience. This was the case for the Land Transport Authority's (LTA) Electronic Road Pricing 2 project, and the collaboration project between SELS and BYD (a Chinese manufacturer of electric vehicles) on self-driving buses – where both LTA and SELS were led by former military leaders.

In the 1990s, the brightest young officers were deployed for planning the SAF Transformation. On top of this, the SAF Future Systems Directorate was established, with 1% of the annual defence budget set aside for military experimentation. These resources ensured that the directorate was not constrained when it came to testing ideas and creating the capacity to change. Similarly, in PSA, former Executive Director James Leo brought in young, motivated and enthusiastic staff into his Project Team in 1991 to reexamine how port operations could be improved and automated. Almost a decade later, this led to the PSA Pasir Panjang Terminal embracing automation in areas ranging from wharf supervision to rail mounted gantry cranes.

TRANSFORMATION OF THE MARITIME ECOSYSTEM

Similarly, the maritime sector needs to transform as it rides the wave of change facing the industry based on a culture of innovation and enterprise. Beyond promoting an inter-generational culture of innovation through education, it is important to build an enabling ecosystem where innovation can thrive. Maritime systems engineers have to navigate political, social, environment, technology, legal and economic factors within external environmental boundaries in their quest to develop optimal solutions. Through it all, two essentials are necessary for innovation. Firstly, people – particularly T-shaped innovators with broad understanding across various disciplines, depth of knowledge in one discipline as well as analytical thinking and problem-solving skills. Secondly, infrastructure and diversity of talent. Together, these result in innovations that matter.

While digital modelling had been done on land, such as the Urban Redevelopment Authority's geospatial urban planning analytics system and the Housing and Development Board's Integrated Environmental Modeller, not as much has been done for the sea. More can be done in this area. One such example is the development of a digital twin of Tuas mega port by the Centre for Excellence in Modelling and Simulation for Next Generation Ports (C4NGP) – a collaboration between the National University of Singapore and the Singapore Maritime Institute. Besides this, other organisations contribute to the digital modelling of the sea, including the St. John's Island National Marine Laboratory and the MPA Hydrography Department, in addition to GeoSpace-Sea – the national marine spatial data infrastructure.

RAISING THE VISIBILITY OF THE MARITIME SECTOR

Beyond the transformation the maritime ecosystem, it is also key to heighten the visibility of this sector to draw young talents to the industry. In this regard, Changi Airport enjoys much better visibility than PSA's cargo terminals, with Jewel Changi Airport attracting 50 million visitors within six months of its opening. PSA port terminals however have less visibility to the general public. We need to find ways to attract more young people into the maritime ecosystem. This includes bringing vibrancy to the Tuas Maritime City by considering enhancing transport connectivity, innovative uses of land for phase 3 of the Tuas mega port beyond port operations and weighing options for land use above ground and underground, among others.

DEVELOPING AN INTEGRATED, INNOVATIVE APPROACH TO CLIMATE CHANGE DEFENCE

To sustain Singapore's continued success as a maritime hub, we need to defend our nation against the existential threat of rising sea levels from climate change. Underscoring its importance, the government has budgeted S$100 billion over the next 100 years to mitigate this. One option is to build polders – a piece of land in a low-lying area that has been reclaimed from a body of water by building dikes and drainage canals – to protect our eastern coastline and boost our eastern anchorages. With climate change, MPA will be impacted too, as it may have to deal with tide changes, bigger storms and possibly typhoons in the future. To this end, the Technology Centre for Offshore and Marine, Singapore (TCOMS) embarked on a model-test-model methodology to plan defences against rising sea levels. In adopting a system thinking approach to this issue, a digital model of the Singapore Straits and the Malacca Straits that integrates the land, air and sea is necessary to meet the need for holistic solutions for flood control and protection, future space needs, port operation optimisation, navigation safety and anchorage optimisation.

FACTORS THAT FOSTER INNOVATION

As we promote innovation to drive a future-ready Maritime Singapore, it is important to adopt a systems approach – which comprises deliberating and deciding, doing, observing and learning, in an iterative manner. Alongside this, it is critical to share information and knowledge, of which the MPA Academy plays a key role in this. Furthermore, to sustain the innovation and enterprise spirit of our maritime ecosystem, it is crucial to foster integration across organisations – between MPA; PSA and Jurong Port; and businesses, maritime and offshore industries and institutes of higher learning.

To sum up, the five factors that foster innovation are, firstly, speed of action, as precious time can be lost in the layers of approval process. Secondly, an iterative approach for planning and implementation. Thirdly, it is vital that everyone in the team runs towards the same goal, much like the analogy of passing a rugby ball. Fourthly, decide quickly. Keep in mind that information is never complete and that there is an advantage to move first, observe and adapt. Finally, dare to be first, and strive to be the first to think and the first to act.

Q&A SESSION

In response to a question about changing mindsets regarding the stigma of failure from taking risks in entrepreneurship, Professor Lui said it was debatable whether failure was a stigma, a by-product of doing nothing or whether the stigma was real. Recounting how he had failed many times, he said that sometimes ideas did not gain traction because the timing was not right yet. When a project failed, it was important to capture the knowledge gained and move on to another project. He noted that Singapore had yet to create an ecosystem that allowed staff with failed projects or companies to move on to other companies in a self-sustaining manner. In taking the risk to venture out, Singaporeans should have self-belief and strive to create something that will make a difference to Singapore and the world.

When asked about his views on China as a high-tech innovation country compared to the U.S. in the future, Professor Lui's sensing was that China would overtake America. He said that while China started at a lower base, they have a long history of learning and knowledge and were catching up fast. On the U.S. front, a sizeable proportion of the PhDs come from outside the country, such as China and India. But with strict restrictions on foreign talent entering America, Chinese PhD students were not keen to go there as they faced discrimination in a

climate that lacked opportunities and funds. Instead, they would rather head back to China, where there are opportunities and money available to turn their ideas into products that will drive the market, such as facial recognition software, among others.

On how local companies can seize opportunities to shape the maritime sector in Industry 4.0, Professor Lui said it was a chicken and egg issue. If the maritime industry was not forthcoming about such projects, then local firms may divert their attention to other opportunities. There should be opportunities for them to look into certain areas and to get them excited in the first place. For research and development (R&D) efforts, it is best to start on a small scale and then scale up at a later stage. It is important that R&D efforts focus on long-term solutions that look more than 10 years ahead and deal with problems that have no workable solutions currently.

On whether Singapore would retain its success and stay ahead of its neighbours or whether they would catch up with us in the future, Professor Lui assessed that Singapore would still stay ahead of its neighbours. He said that our neighbours like Indonesia, with all its resources were unlikely to be able to move faster than Singapore, as its large size meant it would take an enormous effort for them to agree and do something. In contrast, Singapore's competitive advantage was that we are small, nimble and can do things in an integrated manner.

Professor Lui was asked whether it was important for MPA to retain specialists such as hydrographers and port chemists, or if these functions should be outsourced given Singapore's persistent low birth rate. He said that the paradigm of outsourcing as much as possible would mean buying, rather than possessing in-house capability. For example, the government's decision 10 years ago to privatise its engineering capability led to the loss of its in-house capability in this area. He opined that this outsourcing paradigm should be changed. Perhaps MPA could start by aiming to raise the maritime sector's contribution to Singapore's GDP from the current 7% to 10% and thinking through what was needed to achieve this. Following this, it would need to make a strategic case for it at the political realm for the necessary resources to achieve this vision.

When asked about how climate change would impact Singapore and what limitations would have to be overcome on this issue, Profesor Lui said that dealing with climate change in Singapore was something very doable as we were so compact. But the biggest challenge was how we can influence our neighbours, such as Malaysia and Indonesia, to help them be more resilient in dealing with climate change. For if the region is not happy, they would make Singapore unhappy.

08: PEOPLE

ADVANCING MARITIME DIGITAL TRANSFORMATION

BY CHRIS CHUA

Harnessing technology to drive greater efficiency and innovation, the Maritime and Port Authority of Singapore's (MPA) Data Science and Artificial Intelligence (DSAI) Department under the Operations Technology Division plays a key role in driving digital transformation within the MPA and the maritime industry.

Understanding the importance of equipping staff with the technical competencies needed for the job, MPA Academy, the training arm of the MPA, works together with the MPA line divisions to organise relevant training courses. These include the DevOps Foundation with BizOps course arranged by the MPA Academy and conducted by the National University of Singapore Institute of Systems Science (NUS-ISS), among others.

In this issue, we caught up with Jeffrey Chai, an Assistant Manager at the DSAI Department and a recent graduate of this course, to get a behind-the-scenes look into the training and what it takes to steer MPA on its digitalisation journey.

Q: *What made you pursue a career at MPA?*

My interest in the maritime industry began during my university days when I got to know some of my peers who were majoring in maritime studies. Then, after attending the Maritime Heritage Exhibition in 2015, I was amazed at how Maritime Singapore had transformed from a fishing village to a global shipping hub. When I found out that the MPA was the lead agency behind these efforts, it really sparked my interest in wanting to pursue a career here.

Q: *What do you do as an Assistant Manager in the DSAI Department?*

My colleagues and I develop and manage data science and artificial intelligence (AI) systems, projects and services for MPA's digital transformation. In addition, we design data science and analytics capability development roadmaps for MPA staff to be equipped with digital skills so that we can shape our future workforce to harness the capabilities of these advanced technologies.

Q: *Why are data science and AI important for MPA?*

Harnessing these new technologies will allow MPA to provide better services to the maritime industry's stakeholders and help to strengthen our global port competitiveness. The use of data visualisation and analytics with real-time information can streamline workflows and augment decision-making processes. On top of this, AI capabilities such as video analytics and natural language processing have potential applications for future port systems that will enhance productivity, operational efficiency and safety.

Q: *What does it take to be good in your job?*

You need to have an inquisitive and forward-thinking mind. Apart from this, you should constantly equip yourself with updated skillsets in your area of specialisation, so that you have the know-how to keep MPA ahead of other global ports in terms of digital transformation and technological innovation.

Q: *What do you like most about your job?*

I like that it is a hybrid of both project management opportunities and technical skills application, which allows me to gain insightful learning points for my work. This continuous improvement approach is like how data science and AI solutions are developed – they perform better and better with every iteration.

Q: *What are the challenges you face in your job?*

It may get challenging to translate a business problem into a data science and AI solution. But we can overcome this by working closely with the respective business users, who provide the necessary domain knowledge to help us better understand the problem and develop feasible solutions.

Another challenge is encouraging everyone to adopt a digital-to-the-core culture. This includes equipping them with the necessary skillsets to use the digital tools that are available in their workplace.

Q: *How is the environment at work?*

My colleagues are very approachable and helpful. I really learnt a lot from them. In fact, part of the reason why I could adapt well was because my colleagues warmly welcomed me to this huge Ops-Tech family and made me feel so much at home!

The management has been very supportive and understanding of what I do. They always encourage me not to be afraid to make mistakes and emphasise that what matters more is using the lessons learnt to be a better contributor in the future.

Q: *How have your training benefitted you in your work?*

The training has upgraded my skills and knowledge. The three-day NUS-ISS course on DevOps Foundation with BizOps gave me a better understanding of key lean and agile practices across all information technology (IT) services that I can apply to my work.

Q: *Where do you see your career going in the future?*

I see myself carrying on in the DSAI department and continuing to drive MPA's digital transformation which is a multi-year effort. Through this, I hope to hone my knowledge and gain a better understanding of how data science and AI capabilities can bring about transformation and innovation to the organisation.

BY INVITATION:

Maritime Innovation Programme
Venue: MPA Academy
Date: Q3 2020
Participants: Senior maritime officials

Maritime A.I Forum
Venue: MPA Academy
Date: Q3 2020
Participants: Maritime industry

7th Port Management Programme
Venue: MPA Academy
Date: Aug 2020
Participants: Port masters, harbour masters, middle management personnel

10th Maritime Public Leaders' Programme
Venue: MPA Academy
Date: Oct 2020
Participants: Senior maritime officials

13th Maritime Safety Management Course Conducted by MPA and Japan Coast Guard
Venue: MPA Academy
Date: Q1 2021
Participants: Maritime officials

World Maritime University Study Visit for MSc Students Specialising in Shipping Management and Logistics, as Well as Port Management
Venue: MPA Academy
Date: Q3 2020
Participants: WMU MSc students specialising in Shipping Management and Logistics, and Port Management

FOR MPA STAFF:

IT Officers

Q3 2020:

NICF – Certified ScrumMaster

Q3–Q4 2020:

Public Sector ICT Procurement

Q4 2020:

NICF – Cloud Native Solution Design

Operations & Marine Services Officers

Q3 2020:

Incident Investigation and Root Cause Analysis

Oil Spill Clearance LEVEL 2

Oil Spill Clearance LEVEL 3

LNG Shipping and Operations

Q4 2020:

LNG Value Chain

Incident Investigation and Root Cause Analysis

Others

Q2 2020:

Tableau Fundamentals and Intermediate

Q3–Q4 2020:

Design Thinking

Media Training for Senior Management

Hydrographers, Cartographers, Survey Officers

Q2 2020:

Managing Work at Height Course

Supervise Safe Lifting Operations

IALA Level 2 Technician Course

QGIS Foundation Course

QGIS Intermediate Course

Q3 2020:

Perform Rigger & Signalman Tasks

IALA Master AtoN Management Course

IALA Level 1 AtoN Manager Course

IHO Cat 'B' Marine GeoSpatial Information

Q4 2020:

IHO Cat 'B' Marine Cartography and Data Assessment

Vessel Traffic Officers

Q3 2020:

PFSO Course

ABOUT US

As the training arm of the Maritime and Port Authority of Singapore (MPA), the MPA Academy was repositioned in 2014 to be a full-fledged academy with a dedicated premise with a focus on global maritime leadership training. The academy's vision is to be a global learning centrefor maritime and port administration. The academy's mission is to enhance the specialist skills and knowledge of MPA officers and to conduct flagship training programmes for overseas port and maritime officials, including supporting the training needs of the International Maritime Organization (IMO) as a Council member. The MPA Academy's dedicated facility is located at PSA Building and was officially launched in October 2015.

SUBSCRIBE

To subscribe, please email MPA_Academy@mpa.gov.sg

EDITORIAL TEAM
Tan Suan Jow, Peter Tan, Sharon Wong

WRITERS
Angela Chew, Chris Chua, Rahita Elias

ADDRESS
460 Alexandra Road #25-04/05 PSA Building
Singapore 119963

CONTACT
Tel: (65) 6375 1239
Fax: (65) 6375 1709
Email: MPA_Academy@mpa.gov.sg
Website: www.mpa.gov.sg/web/portal/home/mpa-academy

DESIGN
Green House Design + Communications