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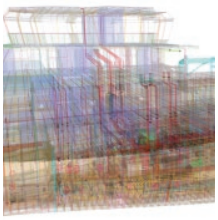

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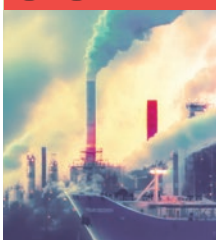


myForesight® is a pioneering national level initiative dedicated to the prospecting of technology for business through the field of Foresight. It provides a common Malaysian based platform for the Government, Industry and Academia to share experiences, insights and expertise on the strategic futures issues, both at the local and global levels.

Its key components to its mission are intelligence, research, competency and community. **myForesight®** raison d'etre is to accomplish the following:

1. Shaping Malaysia's future possibilities;
2. Promoting and mainstreaming of foresighting in national, sectoral and corporate planning;
3. Identification of key technologies to support sectoral development;
4. Identification of key and potential industries from technology perspective.

EDITOR'S NOTE

RUSHDI ABDUL RAHIM
rushdi@might.org.my

Initial Thoughts

Greetings & Salutations,

At present, the country is undergoing change, and as usual some of these changes are anticipated while some are not. Those who are able to anticipate and best react to the disruptions caused by changes will be winners instead of losers.... And I am talking about change brought upon disruptive technology and the phenomenon known as Industry 4.0. That is why we here in MIGHT encourage industry and business organisations to be more *future prepared*, looking at the horizon anticipating and adapting to changes.

One such industry is the Shipbuilding and Ship Repair (SBSR) industry—considered as a strategic industry to the country with more than 100 shipyards nationwide, which builds and undertakes maintenance, repair and overhaul (MRO) of vessels in various types and sizes. The industry generates multiplier effects to the nation's economy through local and foreign direct investments, spurring infrastructure development, promoting manufacturing activities and supporting services.

MIGHT continuously analyses the strengths and weaknesses of the industry, the impact of technology on socio-economy, promoting national high technology agenda, and identifies potential technology solutions particularly those pertaining to cross-industry impacts.

Realising the importance of the SBSR industry to the nation, and how Industry 4.0 will impact its ecosystem, MIGHT is currently embarking on an exercise to assess the SBSR industry's readiness and awareness by gathering feedback from the industry players—particularly their thoughts on embracing Industry 4.0.

Industry 4.0 is no longer a *future trend*. At this juncture it is obvious that with all the tools that are available from the advancement of technologies—such as the Internet, wireless sensors, software and other technologies—they can work together to optimise production processes and improve customer satisfaction. These tools would allow businesses to react more rapidly to market changes, offer more personalised products, and increase operational efficiency in a cycle of continuous improvement.

Prospective Benefits of Industry 4.0

Higher flexibility given by small batches production with the economies of scale of mass production

Higher speed from prototyping to production using innovative technologies

Optimised productivity and efficiencies due to lower set-up time and reduced downtimes

Improved quality and scrap reduction thanks to real time production monitoring through advanced sensors

EDITOR'S NOTE

> *Realising the importance of the SBSR industry to the nation, and how Industry 4.0 will impact its ecosystem, MIGHT is currently embarking on an exercise to assess the SBSR industry's readiness and awareness*

Higher competitiveness of products and businesses with a level playing field through cooperation and confederation of firms

But we must be mindful that Industry 4.0 needs to be driven by the industry as it requires making major shifts within an organisation's internal structure and processes.

Government, on the other hand, will continue to facilitate and provide support in various ways. In fact, the Government has already embarked on several initiatives that will shift the country towards Industry 4.0 via the **National Strategic Roadmap on Internet of Things (IoT)**, the world's first **Digital Free Trade Zone** and setting 2017 as the year of the **Internet Economy for Malaysia**, among many others that are in the pipeline.

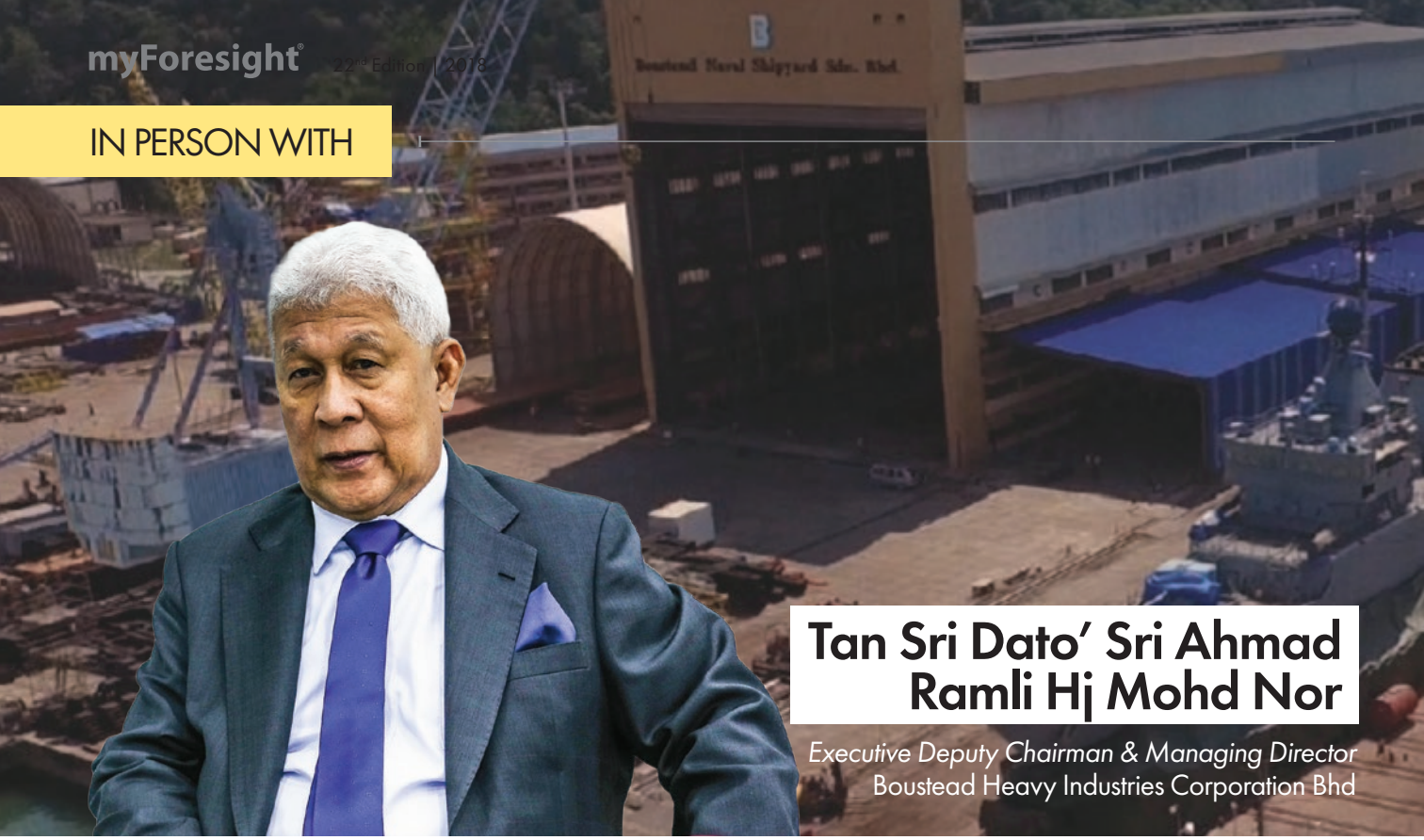
An online survey is also currently accessible to industry stakeholders to gauge the industry's awareness and readiness on Industry 4.0 among the Malaysian shipbuilding and ship repair industry players in Malaysia. All industry players are invited to give their inputs.

Link for the online survey: http://bit.ly/2LIWZ9r
Or scan here:

The **National Industry 4.0 Framework** reveals that we may face roadblocks when it comes to the readiness of infrastructure and ecosystem, lack of funding and incentives, development of critical human capital and harmonisation of standards. However, this should not hinder us to move forward. A roadblock will remain a roadblock. It is how we manoeuvre around these obstacles is what matters most. Nevertheless, by hook or by crook, we need to change to remain relevant in this new age business environment.

RUSHDI ABDUL RAHIM

IN PERSON WITH



Tan Sri Dato' Sri Ahmad Ramli Hj Mohd Nor

Executive Deputy Chairman & Managing Director
Boustead Heavy Industries Corporation Bhd

Boustead Heavy Industries Corporation (BHIC) is one of the largest corporations in Malaysia with a long and established track record in shipbuilding, ship repair and related services., A company listed on Bursa Malaysia, BHIC is primarily involved in shipbuilding and ship repair of naval and commercial vessels, fabrication of offshore structure as well as defence and naval systems maintenance.

Tan Sri Dato' Sri Ahmad Ramli Mohd Nor, the Executive Deputy Chairman and Managing Director of BHIC explains that the company has a diverse portfolio in the defence industry in which it is also actively developing its maintenance, repair and overhaul (MRO) business to leverage on the heavy investment made to expand and upgrade its facilities.

"Our shipyards in Lumut (Perak), Pulau Jerejak (Penang) and Langkawi are capable of undertaking MRO activities for naval and commercial vessels, in addition to fabrication work for the oil and gas sector," he said.

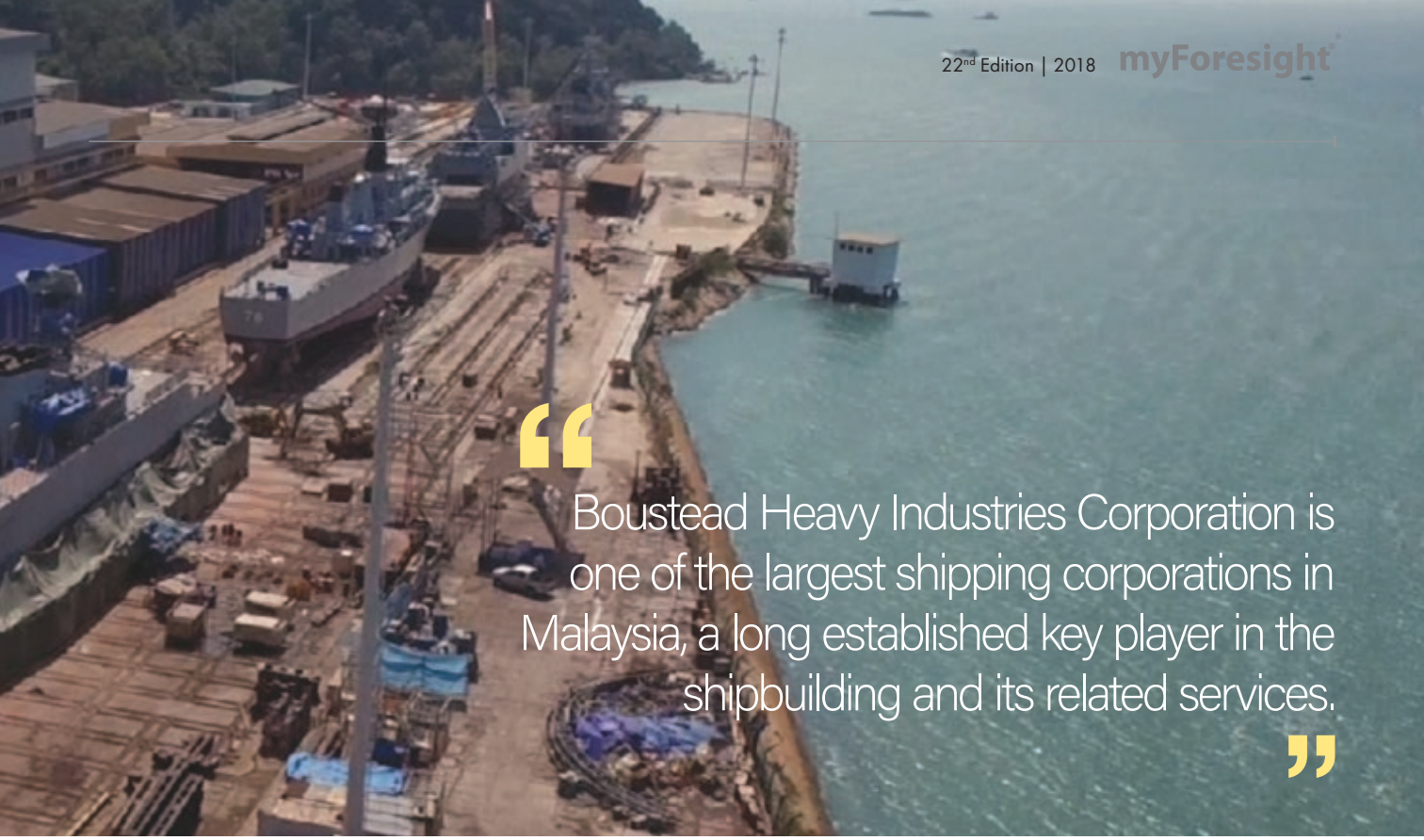
As part of the Boustead Group—which is among the biggest government linked companies (GLCs) driving the national economy—BHIC is working diligently to cement its position in the local defence sector by collaborating with the Royal Malaysian Navy (RMN), Royal Malaysian Air Force (RMAF) and other enforcement agencies such as Malaysian Maritime Enforcement Agency (MMEA) in undertaking MRO works. These include providing MRO for RMN's Fennec AS555SN helicopters and MMEA's AS365N3 helicopters, in addition to the In-Service Support extended to RMAF's EC725 Eurocopters through its JV company, BHIC AeroServices Sdn Bhd (BHICAS). In addition to these contracts, BHIC is also the primary provider of MRO services for Airbus helicopters owned by the Malaysian Government and its agencies. Looking beyond Malaysia, BHIC is trying to penetrate new markets abroad to widen its presence in the aviation sector.

"As a proactive business entity, BHIC has invested in engineering and design to pave the way towards competing in the international arena with our innovative concepts for which we have the intellectual property," said Ahmad Ramli.

Being a local enterprise that places high importance on nurturing local talents and promoting vendor development among local enterprises, BHIC is eager to develop home grown talents who will be able to produce original designs, products, and services and eventually market them internationally, he added.

ON REGIONAL AND GLOBAL EXPANSIONS

Beside nurturing human capital through strategic partnerships with local businesses including SMEs and also local higher learning institutions and training centres, BHIC is not discounting the importance of linking up with reputable foreign corporations from whom the company can learn new technologies. In this regard,



> Boustead Heavy Industries Corporation is one of the largest shipping corporations in Malaysia, a long established key player in the shipbuilding and its related services.

BHIC has established collaboration with renowned French and German companies in the maritime and aviation industries.

With the international market set in sight, BHIC has put in place preparations to provide services to regional airline companies using Malaysia as the base before embarking on establishing an overseas aeroservice base.

According to Ahmad Ramli, "The ecosystem of the aviation industry is fast evolving and becoming more dynamic and competitive. Therefore, one of BHIC's aspirations is to help develop Malaysia to become a regional hub that is capable of supporting the MRO requirements for the industry in the region."

Taking the cue from Singapore, he pointed out that the comprehensive range of aviation and aerospace services available there are assisted by the presence of an established supply chain, making it a competitive regional hub that attracts established internationally renowned players in the aviation and aerospace industries.

To further expand its reach, BHIC has ventured into the submarine maintenance business through a JV company, Boustead DCNS Naval Corporation Sdn Bhd (BDNC) which provides In-Service Support (ISS) to the two RMN Scorpene-class submarines, KD TUANKU ABDUL RAHMAN and KD TUN RAZAK.

"Our involvement in this complex and demanding activity through the ISS contract for RMN's submarines sets us well in our preparation to expand our services abroad," added Ahmad Ramli.

BHIC is also involved in commercial shipbuilding and fabrication of offshore structures, two business segments which are influenced by a multitude of global factors. The company is inevitably feeling the pinch amid d the decade-long downturn in these sectors. Ahmad Ramli stressed that for BHIC to be able to realise its vision and fulfil its objectives, the business in which it is involved must be profitable, thus enabling it to invest more in research and development in order to grow and flourish. However, BHIC is being realistic about entering the markets in developed countries as their technology is far superior to what the company has in its portfolio.

ON HUMAN CAPITAL

On unlocking the full potential of Malaysian skills and talent, BHIC is committed to provide training and industry exposure to engineers and skilled workers. For example, local ship designers are being groomed to boost the company's capabilities in designing and building large and sophisticated vessels.

The company steadfastly believes that investment in human capital especially in highly skilled areas such as design and MRO can contribute to the creation of high income, value adding activities that can boost the nation's

> We have a competitive edge to customers in terms of offering superior products and services at competitive cost sand timely delivery.

efforts towards making the country a fully developed economy. Developing and nurturing human capital among locals is an important part of BHIC's corporate social responsibility initiatives. Its Vendor Development Programme also helsp develop human capital of its vendors and contractors through their involvement in BHIC's projects, some of which are huge in terms of cost and ambition and are complex in nature.

Ahmad Ramli shared an exciting development taking place in the vast network of the local heavy shipbuilding industry, "The diverse nature of the defence and marine industries has opened up doors of opportunity for the female workforce. BHIC, being a company which does not practice gender bias, is playing its part to recognise talent of women professionals and increase their participation in the otherwise male-dominated defence and marine industries. We are now a proud employer of 45 female staff with various technical backgrounds working across the BHIC Group of companies."

Matching market conditions with its staff strength, BIC has embarked on an exercise to attain a mean and lean workforce and enhance operational efficiency as it consolidates its position as the defence contractor of choice in Malaysia and prepares to expand its product and service offerings on the international stage.

MOVING FORWARD

With the full recovery of the commercial shipping and oil and gas industries remaining elusive, BHIC needs to strike a balance among the different businesses in which it is involved to compensate for the weak segments. In this regard, it has undertaken an organisational revamp through an internal transformation programme to increase productivity and operational efficiency, reduce cost, improve project turnaround time and enhance skills amongst its human capital. These have been undertaken as the company expands and upgrades its infrastructures and facilities to undertake big projects and complex jobs and ensure it remains competitive.

With its sight trained on spreading its wings abroad, BHIC is committed to reskill and upskill its human capital to enable it to fulfil growing international defence industry's demands, training its attention particularly to the South East Asian, Middle Eastern and African markets as the potential prospects. It has sent engineers to be trained abroad and also introduces training programmes to expose its technical staff to be trained by its foreign partners, for example in submarine maintenance.

For now, the domestic market is keeping BHIC's shipbuilding team busy especially with the contract to build six units of Littoral Combat Ships (LCS) and Littoral Mission Ships (LMS) for RMNt. However, the company refuses to be buoyed by complacency with the jobs at hand and is stepping up business development efforts in response to the prolonged recession, downturn in shipping and offshore oil and gas industries, and cutbacks in defence spending.

"We have a competitive edge to customers in terms of offering superior products and services at competitive cost sand timely delivery, backed by years of experience and knowledge of our highly skilled and dedicated staff. With these on our side, we are confident of consolidating our position as the leading maritime, defence and energy solutions provider in Malaysia and are ready to soar and reach new heights of excellence," Ahmad Ramli said matter-of-factly.

Touching on Industry 4.0 whose wave is being felt in the industries in which BHIC is involved , Ahmad Ramli said the company is keeping abreast of developments in areas such as Internet of Things, Big Data Analytics, augmented and virtual reality and smart manufacturing to augment its operations and deliver better customer satisfaction. Additionally, BHIC envisions integrating its business operations on an online platform as a means to attract more clients and to maximise the value of its supply chain.

"Being involved in industries which utilise advanced technologies extensively, BHIC, as the leading defence service provider in the country, will strive to be at the forefront of cutting edge technologies and adjust itself accordingly to ride the wave of the Industry Revolution 4.0 and capitalise on the new business opportunities it presents", he concluded the interview.

INSIGHTS

by | Nazery Khalid

Malaysia's Maritime Industry: Transitioning to Industry 4.0

Author's Profile

Nazery Khalid is Honorary Secretary, Association of Marine Industries of Malaysia (AMIM) an association featuring Malaysian shipyards and various enterprises and institutions involved in various activities in the marine industries. Nazery has carried out several consultancy works for various government agencies and private sectors in the areas of ports, shipping, logistics, offshore oil and gas and supply chain, and conducted training on those subjects. He is widely regarded as a subject matter expert in the field of maritime economics and his views are sought after by industry players and the media. The opinion expressed are his own.

We are now living in a digital era and operating within an increasingly digital economy. The world's fastest growing and largest corporations are no longer the '*brick and mortar*' type of companies producing and processing raw materials, commodities and manufacturing goods. But the world's biggest and most valuable companies are now tech-based manufacturers and Internet-related service providers such as Apple, Alibaba, Amazon, Dell, Facebook, HP, Lenovo, Microsoft and Tencent. These companies have exceeded the achievements of the traditional brick and mortar companies—in terms of value—amid the global shift towards e-commerce, online communication and cashless B2B and B2C transactions.

Online shopping, banking and learning, telemedicine, ride sharing, cryptocurrencies as well as blockchains, are all the rage now—impacting our lives profoundly while we brace for more new developments and disruptions brought about by the 4th Industrial Revolution (4IR). 4IR is a definite game changer in revolutionising the way business is performed in the digital age. It is a fusion of the digital and physical worlds, thanks to the advent of telecommunications, information technology and the Internet. The convergence of technologies has resulted in faster, more efficient and cheaper transmission, exchange and processing of information and data. This in turn translates into greater competency and productivity, better decision making, increased trade and improved bottom line for companies.

> the world's biggest and most valuable companies are now tech-based manufacturers and Internet-related service providers such as Apple, Alibaba, Amazon, Dell, Facebook, HP, Lenovo, Microsoft and Tencent.

These technologies challenge the status quo, driving businesses to reconfigure their organisational set-up, corporate objectives and strategies. To speed up Malaysia's move towards becoming a truly globally competitive economy and transform its manufacturing sector into a smart and digitalised one, the Government has taken several initiatives at the national, state and regional levels. These initiatives entail working with industries, businesses and the academia to develop tailor-made solutions of respective industries to the meet specific needs of Industry 4.0 (I4.0). The government has been working on a holistic National Framework for Industry 4.0 Framework with a targeted agenda to transform Malaysia's manufacturing sector into a digitalised one. This underscores the acknowledgment by the Government of the sector's importance, as underlined by its 23 percent contribution to the nation's GDP.

Through the framework, the Government intends to position Malaysia as a smart manufacturing destination globally. The framework has been created to attract FDI into the manufacturing sector and move up the value chain in the industry as well as for the world's top manufacturing multinational companies to gain differentiation—in line with the goal of transforming Malaysia's economy into a fully developed nation through high income, value adding economic activities.

Marine Industry in the Digital World

Propelling the 4IR revolution forward through I4.0 implementation is a range of advanced technologies that have made the world a seemingly smaller place, enabling people and businesses to connect instantly and share huge amounts of data in real-time basis—among the technologies are additive manufacturing (or 3D printing), artificial intelligence (AI), autonomous robots, augmented reality, big data analytics, cloud computing, cybersecurity, Internet of Things, machine learning, nanotechnology, quantum

computing, remotely controlled vehicle, social media and virtual reality. These technologies have the potential to alter the way people and businesses reach out to one another, and will continue to reshape the landscape of businesses, industries and trade.

In the marine industry, sub-sectors within the industry such as shipping, port operations and shipbuilding have got into the groove of going digital and surf with the wave of I4.0. Some shipping companies are already using real-time information to send and receive data on cargos transported by their vessels. Autonomous, crewless ships are being tested, and ships with e-navigation features such as electronic charts and technologically-driven environmentally friendly and energy efficient characteristics are more the norm than exception these days.

The world's top shipyards now use sophisticated computer aided design software to design ships and share draft designs through cloud with shipowners, consultants, marine equipment and systems manufacturers and classification societies. Ports use IT extensively to plan container loading and offloading onboard ships and to track containers in port yards. While remotely controlled, autonomous vehicles and robotics are increasingly used in repair and maintenance work at yards to check the integrity of vessels and offshore structures.

While there is a clear trend of the marine industry warming up to I4.0, there remains acres of room for extensive use of technologies and online platforms for the industry to become safer, more efficient, environmentally friendly and cost efficient. These include areas such as cargo tracking, maritime supply chain security, environmental protection, navigating safety, planning, operations, administration and monitoring.

Autonomous, crewless ships are being tested, and ships with e-navigation features such as electronic charts and technologically-driven environmentally friendly and energy efficient characteristics are more the norm than exception these days.

A more tech-savvy and increasingly digitalised marine industry would trigger tremendous multiplier effects which will benefit not only the shipping companies but also the environment and other stakeholders along the marine industry supply chain, such as cargo owners, businesses, industries, logistics companies, marine ancillary services providers, regulators and eventually consumers and economies as well.

Although efforts have been made by players in the marine industry to adapt to I4.0, there is still a slight hesitation by some to be up to speed with the hi-tech world that is changing the industry's landscape. There are several impediments contributing to this, such as lack of understanding about I4.0 and the opportunities it brings, resistance towards technologies, conservative business strategies, lack of regulatory/policy push, absence of financing to invest in assets, solutions and human capital, and even reluctance to spend.

As the wave of digitalisation sweeps forcefully and leaving an indelible mark on the world, it is futile to maintain the *conservative ways* of doing business and expect to remain competitive within the new digital order. With all new things, there is always resistance to change.

As the maritime industry suffers from the downturn, scaling back and refraining from investing in assets not central to their businesses, questions are being asked on whether adopting new technologies in the I4.0 context can create real economic value and generate competitive advantage to their business. In this regard, efforts needed from stakeholders includes educating lead agencies and industry associations about I4.0 and highlighting the need to adopt to it as well as the issues, challenges, threats and opportunities. The forces unleashed by I4.0 are too strong to resist and marine industry players should swim with its tide to be sustainable and remain competitive.

SBSR at the Forefront of I4.0

To this end, the shipbuilding / ship repair sector or SBSR is well positioned to catch the wave of this revolution. The industry has been accorded strategic status by the government, as outlined in Industrial Master Plans, given its importance to the nation's trade, economy and defense. It creates tremendous multiplier effects to the nation's economy and has linkages to many industries and sectors including transportation, steel, plastics, engines and equipment,

To this end, the shipbuilding / ship repair sector or SBSR is well positioned to catch the wave of this revolution.

commodities and a range of services such as financing, classification, naval design, legal, tax, research and consultancy.

The local SBSR industry is heavily influenced by the advent of technologies. It is exposed to developments in the shipping and SBSR industries worldwide, albeit being behind in terms of sophistication and technological advancement compared to the world's major shipbuilding nations. The leading shipyards in the country are able to build fairly sophisticated middle-sized vessels, offshore support vessels (OSV) for clients in the United States, Europe, Australia and New Zealand as well as service large-sized vessels. The top shipyards have cutting edge equipment such as plasma cutters which cut through electrically conductive materials using an accelerated jet of hot plasma, and CNC (Computer Numerical Control) machines using computers executing pre-programmed sequences of machine control commands. Some also use huge cranes and employ processes that use sophisticated computers and even artificial intelligence.

With 4IR seemingly unstoppable now, the SBSR industry uses various types of technologies and equipment, and features many activities, driven by ICT and data. Already we are seeing I4.0 making a mark in leading shipyards in South Korea, Japan, Norway and the Netherlands in areas such as big data analytics, Internet of things, cloud computing, artificial intelligence, robotics, additive manufacturing or 3D printing, and systems integration. These developments are creating exciting new opportunities for shipyards and shipowners, along with the inevitable challenges in areas such as changes to the SBSR workforce, processes and operations, and the end products and services.

Shifting Gears

To prepare marine industry players to adjust to the sweeping changes brought by 4IR, building awareness on the topic is essential. They need to understand what drives the digital revolution, how different technologies inter-operate with one another, what opportunities a tech-driven industry can generate, what economic values I4.0 can unlock and how companies can improve their bottom-line amidst this revolution.

Shipping companies in particular need to understand that value can be created by using IT to automate processes, enhance efficiency and productivity, and integrate certain aspects of the business such as operations and management. Big data analytics can be used to make more informed and precise decisions, for example in route planning, ship deployment, navigation safety, commissioning of newbuildings (new vessels) and laying-up or scrapping of vessels. This would lead to a *smart shipping* strategy in which shipowners can deliver cargo more efficiently through automation of ship operations and efficient management of personnel and shipping fleet.

Regulatory requirements are on the rise and generating considerable demand for players in the industry to invest in assets and personnel, as well as changing their operations and strategies to ensure compliance. While this poses a challenge, there are also opportunities presented by using technologies and innovative solutions—such as e-commerce, satellite communications and online platforms—to meet regulatory requirements. By adopting the technologies, shipowners stand to enhance productivity, and amass quality assets which are more environmentally friendly, have better performance and lower maintenance costs.

Certain activities in the marine industry such as shipping and port operations are cross-border in nature as they involve long supply chains across borders and jurisdictions. As international players in these fields enhance their use of new technologies and increasingly adopt e-commerce in their operations, their Malaysian counterparts must also step up to the plate in tandem so as not to lose out on the opportunities presented by the digital economy.

Big data analytics can be used to make more informed and precise decisions.

Those who hesitate in joining 4IR do so at their peril as the industry shifts to a higher gear to fit into the way of doing things.

PLAN OF ACTION

The following is a plan of action to prepare industry players to adapt to I4.0 thus enabling them to face the challenges and reap the opportunities it brings:

1. **Adopting a comprehensive, inclusive business strategy that adopts I4.0 technologies suitable for the business.** Attaining a 4.0 vision, strategy and roadmap is essential for businesses in today's digital marketplace in order to drive and attain tangible returns on investment from their enterprises. This can pave the way towards optimisation of invested capital, and the unlocking, creation, preservation and enhancement of the company's assets.

2. **Providing skilled, well trained human capital especially in the fields of STEM (science, technology, engineering and mathematics).** Training and education establishments, including specialised maritime ones, should introduce more STEM-based courses relevant to industry needs to prepare a tech-savvy workforce which can hit the ground running and flourish in a digital, hi-tech environment.

3. **Ensuring the availability of necessary infrastructures such as high-speed Internet connectivity to facilitate the delivery, storage and sharing of vast amount of data in a fast, cost effective and secure manner.** The roles of governments and telecommunications companies are crucial in facilitating this.

4. **Reducing the cost of doing business in the digital economy.** The government needs to reduce red tape, develop business-friendly rules and improve service delivery, performance and service standards to facilitate more activities in the I4.0 context.

5. **Putting in place a well-defined, user-friendly and business-friendly digital economy framework for the marine industry to thrive and prosper**. Strategies for the marine industry such as the existing Malaysia Shipbuilding / Ship Repair Master Plan 2020 and the planned Malaysia Shipping Master Plan must be reviewed/developed to include I4.0 as one of their pillars.

6. **Introducing special financing incentive schemes for players in the marine industry, especially SMEs with limited access to financing, to enable them to procure assets, upgrade back offices and technologies, build manpower, establish connectivity and undertake R&D to do business in the digital economy**. In addition, special incentives can be considered to lay out capex to acquire technologies to reduce emissions/noise (for example from ships), use clean fuels/adopt low energy strategy, enhance business performance, expand service offerings and explore new markets.

7. **Creating awareness among industry players of the virtues of the digital economy and the opportunities and economic value waiting to be unlocked and obtained within the I4.0 landscape**. Government agencies such as the Maritime Division of the Ministry of Transport and Malaysia Digital Economy Corporation (MDEC), and industry lead bodies such as the Association of Marine Industries of Malaysia (AMIM) and Malaysia Shipowners Association (MASA) can play a leading role in raising awareness among industry players and stakeholders. The Ministry of International Trade and Industries (MITI)—who is currently preparing the National Framework for Industry 4.0—can act as the lead agency to coordinate and support efforts by respective industries to adapt to I4.0.

A Digital Future

As the world shifts to a higher gear in adopting I4.0 and embracing the digital economy, players in the marine industry must keep abreast with technological trends to stay relevant and thrive in the digital era.
To do so, a holistic approach is needed to bring stakeholders up to speed with the new world order shaped by I4.0. Policymakers, government agencies, users of marine industry services and products, educational and training institutions and other stakeholders must adjust to the demands of intensive use of ICT and the Internet in today's digitalised marketplace. Industry practitioners must work on recalibrating their business strategies, restructuring their organisations, sourcing financing, developing human capital and choosing the right technologies to adopt to the *new normal* that technologies bring.

The so-called *digital future* is already here and it is already making a mark on the marine industry. As such, it is important that industry players swim with the flow. The speed with which the world is changing means industry players can no longer move at a leisurely pace with technology uptake and changes and developments triggered by I4.0.

INSIGHTS

3D Design in Industry 4.0

The Future of SBSR Industry in Malaysia

by | Abdul Razak Ismail, C Eng. FRINA (UK)

Author's Profile

Abdul Razak Ismail graduated in Naval Architecture & Shipbuilding before returning to Malaysia in 1983 where he built his career to become the Executive Director of Ships Classification (Malaysia) Sdn Berhad.

He has been nominated as the Vice President (Related Marine Industries) of Association of Marine Industries of Malaysia (AMIM) for 2012-2014.

Abdul Razak is also a Fellow of Royal Institution of Naval Architects, United Kingdom (FRINA) and registered as a Chartered Engineer with the Engineering Council of United Kingdom.

A prominent figure in the local marine industry, Abdul Razak is an associate to MIGHT and a consultant to Petronas. Currently he is Managing Director of MCTMS Design as well as Deputy CEO of MTC Floating Solution.

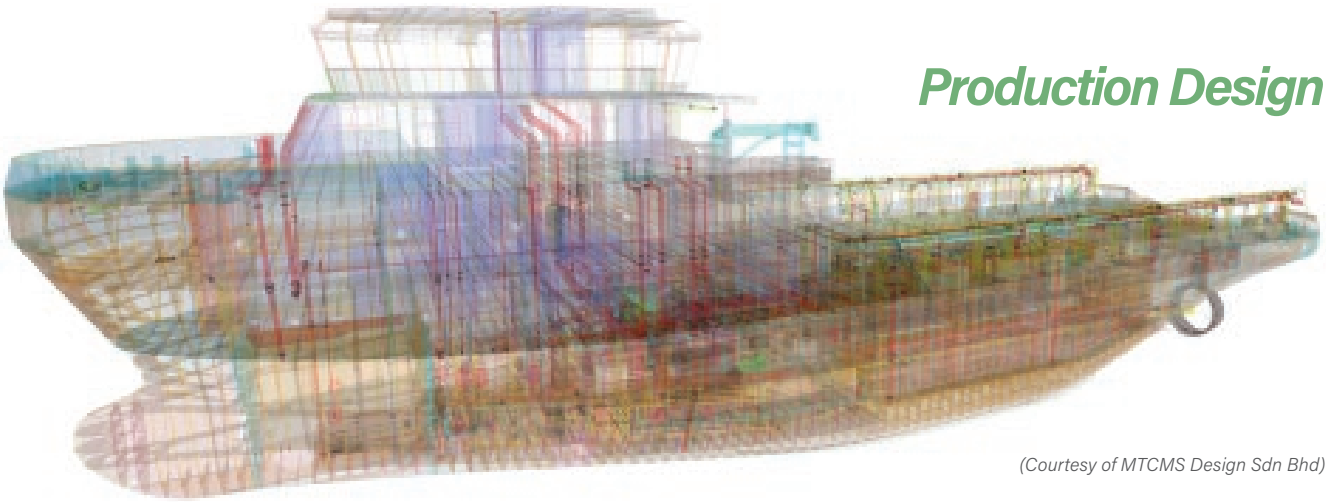
The Ship Building and Ship Repair (SBSR) industry is a strategic industry due to its numerous spill over effects, and is recognised by the Organisation for Economic Cooperation and Development (OECD) as having strategic importance in terms of employment generation, industry capacity, technological capability as well as other benefits (Ref 3). However, the SBSR industry is now in a bearish environment since the oil price dropped by more than 50 percent from its peak of USD 110 per barrel in 2014.

Local shipyard operators, who derive the bulk of their income from energy-related projects, are facing a hard time as oil companies cut down on offshore exploration and production activities amid a slump in global crude oil prices. The effect of the drop in oil price resulted in lesser demand for offshore support vessels that resonated into reduced order book and repair work for these vessels.

For the last 35 years, Malaysia has not achieved being among the key SBSR nations, like China and Korea. This is a curious case considering its dependence on shipping, the number of shipyards it has and the country's strategic location along Straits of Malacca and South China Sea, two of the world's busiest sea-lanes.

On the global scene, China is leading in the shipbuilding industry ahead of Korea and Japan. Between the three nations, they represent 85 percent of the world's order book. Korea started its shipbuilding industry about the same time as Malaysia and in less than 30 years has become the biggest shipbuilding nation in the world overtaking Japan in 2000 (Ref 1).

Locally, attempts have been made to develop and grow the local SBSR industry since the 80's but the initiatives were not well-coordinated and were only concerted towards one direction. The industry needs were based on locality and thus, shipyards are scattered all over the country. This may be one of the reasons the industry has not been recognised globally and, combined with the wrong business models, has remained the same 35 years on.



(Courtesy of MTCMS Design Sdn Bhd)

Lack of Competitiveness

Currently, there are many issues dogging the local yards that have suppressed its growth and curtailed it from realising its true potential. The SBSR industry is facing perennial issues and challenges of high costs and late deliveries of ships built at local yards which are about 20 percent more expensive compared to other SBSR nations. Many ship owners prefer to build ships overseas; particularly in China which can offer vessels at much lower prices.

Further compounding this, many local yards depend on government contracts, which are usually not subjected to competitive bidding. Despite the various assistances and measures offered by the government, which includes incentives and policies to help the local shipyards, their growth is stunted ***because the system that they exist in does not encourage competitiveness***, affecting their production system and methods. Consequently, they will lose orders to their overseas competitors and the job market in the SBSR industry shrinks when economic slowdown occurs.

During one dialogue in June 2015 between Malaysian and Germany business chambers, the Germans proclaimed that their rapid progress in the SBSR industry is without much government assistance. This scenario is similar for the industry in Norway, as stated by one of the speakers at the recent Asia Pacific Maritime 2018 in Singapore that was held on 16th March. Both the Germans and Norwegians have shown that the growth of their industry is basically driven by internal factors and dynamics of the industry players themselves. The local SBSR industry high dependency on the government may be one of the reasons why they remain, as they are—uncompetitive.

It is not too late for the local SBSR industry to follow the steps of countries like Germans and Norway by increasing our competitiveness through looking inwards at our inherent issues and challenges such as high manufacturing cost due to lots of reworks, repairs, modifications and late deliveries.

Another factor contributing to the lack of competitiveness in the Malaysian SBSR industry concerns the local pool of skilled workers. Our continuous dependence on foreign workers in the long term will not serve Malaysia's interests. Although the foreign workers are reasonably skilled and command lower wages than local ones, which is to the economic advantage of local shipyards, their dominance in skills-based works in the SBSR industry is a future threat as they will go back to their countries with the training and skills they acquired in Malaysia instead of sustaining the local yards.

Lack of incentives offered by the federal and state governments to local yards in developing talents and skills to employ skilled workers among locals is also certainly not ideal for the future of the SBSR industry as it marches towards economic transformation.

Since Jokowi became President, the Indonesian government has implemented various SBSR industry friendly policies including an import duty of 5 percent for ships built outside Indonesia. This action is contrary to Malaysia which has implemented 6 percent GST since 1st April 2015. It is a double blow for the local SBSR industry especially on taxation, making it costs 10 percent to 12 percent more expensive thus not attractive for growth.

Main Challenges

While it is best to leave SBSR policy matters to the government to review and evaluate its impact on the industry, the SBSR players should also learn from countries like Germany and Norway to focus on internal issues and challenges and improve competitiveness in the market.

PRICE, DELIVERY and QUALITY, are the key evaluation criteria applied by purchasers or ship owners when placing orders. The number one determinant is PRICE for low sophistication vessels like oil tankers, bulk carriers, general cargo ships and container ships, followed by delivery and quality. The reverse is true for high sophistication vessels like LNG carriers, passenger ships and oil rigs (Ref 1).

Since the local SBSR industry is focused on low sophistication vessels, PRICE is the main issue and criterion used by local buyers. It is hard to get orders even from local ship owners as the average vessel price is 20 percent to 30 percent higher than neighbouring countries.

The target for the local SBSR industry is to reduce their overall costs, thus lowering the PRICE offered. Internal factors affecting costs being with the costs estimating process which includes the design, procurement, production, testing and delivery of the vessel to its supply chain and value management. Every process chain requires re-evaluation for costs reduction, either by adopting a more efficient work process or utilising software and computerised systems. It is pertinent that our SBSR players to improve in these areas of delivery processes.

South Korea's Samsung Heavy Industry (SHI); one of the three largest ship builders in South Korea, together with Hyundai and Daewoo, has the highest level of automation in the industry at 68 percent. (Ref 2). It has its own Institute of Industrial Technology that continuously carries out research and innovations.

In comparison, the level of automation in the local yards is considered very low with only 15 percent of shipyards in Malaysia operating on a medium level of automation, which is limited to having computerised Numerical Control Cutting (CNC) machines and auto blasting shops. Other production processes, such as welding, on-site blasting and painting remain unchanged for the past 35 years. One of the often-quoted reasons is, our country has abundant cheap labour that negates the advantages of automation, which is highly capital intensive. Ironically, we remain uncompetitive despite the cheap labour costs. It is highly recommended that we follow the competitors' business model for us to be able to offer a more competitive vessels pricing.

Industry 4.0 in SBSR

The most common question posed in the local SBSR industry is the level of readiness to adopt Industry 4.0. Speakers at the recent MITI Day National Services Sector Summit 2018 held on 27th February, expressed their doubts and stated that the local SBSR industry is not even Industry 2.0 ready. To assimilate Industry 4.0 in the local SBSR industry, we need the willpower to innovate, adopt, and adapt to new technology. The key nations of SBSR industry are already embracing the move towards Industry 4.0, especially in Korea followed by USA, UK, Australia and Spain.

For our local SBSR industry, the low capital competitive business model available now does not require automation beyond using CNC, thus the industry players remain clueless on facing Industry 4.0. However, with the application of Industry 4.0, automation can be increased and implemented seamlessly throughout the supply chain, thus making SBSR industry more cost effective.

> Another process in the SBSR industry that has remained unchanged for the past 35 years is the design approach and practice.

Flaws of 2D Design

Another process in the SBSR industry that has remained unchanged for the past 35 years is the design approach and practice. Designers engaged by the local shipyards are still using the 2D design system and drawings despite the advent of super-computers and availability of powerful software and big data library.

Studies have shown that the 2D design system has many flaws. First reason being, it is very hard to detect 'clashes' of systems between vessel systems such as piping, HVAC, electrical and structure. The 'clashes' during construction of the vessels will result in modifications, repairs, reworks and wastage of material and man-hours, which will trigger delays. Shipyards will usually be charged a penalty for delays and late delivery, adding on to the overall costs.

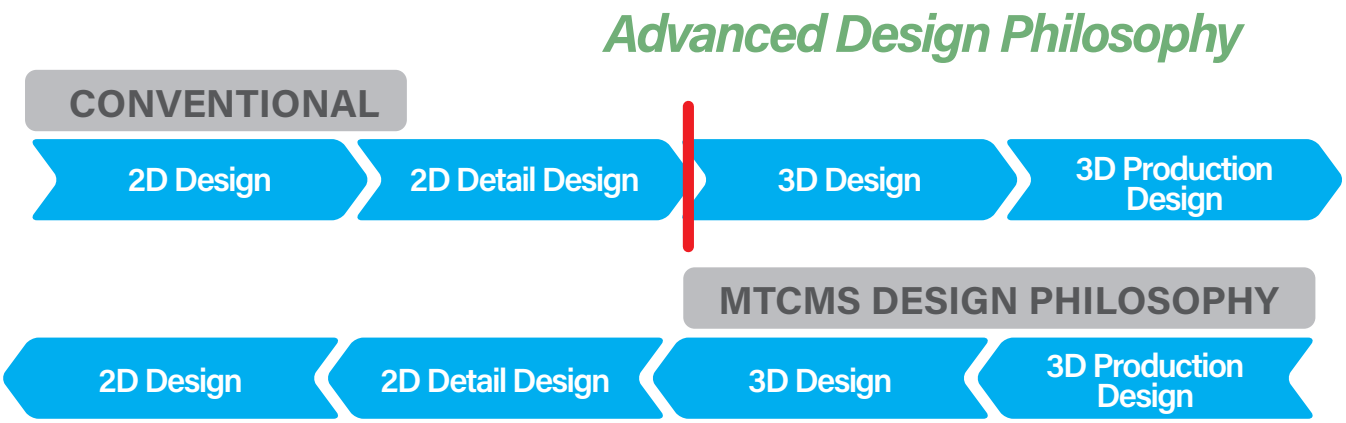
Secondly, the method of ship construction is unchanged whereby the modular method that was introduced in lecture rooms

more than 40 years ago cannot be implemented by local shipyards due to the current 2D design system applied. The local shipyards never gain the advantage of the modular construction method and thus, production time are not reduced.

Thirdly, the 2D design system is unable to provide accurate estimates of materials such as hull and piping for the yards to purchase. It is often overestimated plus 10 to 15 percent contingency margins, resulting in unnecessary costs that need to be borne by vessel buyers. Another example is the wastage due to ship plate nesting with conventional 2D design, which adds 6 to 10 percent more than the optimised nesting of a 3D design solution.

And lastly, is the compromise in quality. With repairs, reworks and modifications during installations of systems (piping, HVAC, etc), the welding quality will not be the same as the work done in the workshop. Corrosion preservation quality is compromised due to restricted work area for surface preparation and coating application.

The final drawback from 2D drawing is the tedious and time-consuming process shipyards must undergo when creating a partial production drawing. This expensive exercise from conventional 2D approach often defeats the purpose of production design, which is meant to reduce production time.



(Courtesy of MTCMS Design Sdn Bhd)

3D Design & Technology for Application of Industry 4.0

All the flaws of 2D design can be overcome by adopting the 3D design system, which includes all the systems on board the vessels such as structures, piping, electrical, HVAC and safety. Currently, this 3D design system is not offered by any ship designers in the region, including Singapore, except one home-grown designer based in Kuching, Sarawak, named Mega Salutes Ship Design Sdn Bhd (MSSD). It took four years of development by MSSD to finally release their first complete 3D design system for a 45.5m landing craft in 2014.

A case study of 61.82m AHTS (Anchor Handling Tug Supply) vessel designed in complete 3D systems by MSSD and built by Sapor Shipyard in Sibu, Sarawak reveals the followings, compared to the traditional 2D design system:

- 60 percent Reduction in Production Time
- 50 percent Reduction in Man hours
- 6 percent Reduction in Steel Wastage
- Approximately RM 4mil Direct Costs Saving

A preliminary exercise carried out with a local shipyard indicates that a total saving of 20 percent is achievable by using the 3D design system. Thus, our local SBSR players can reduce their costs and increase competitiveness to the same level as the yards in China.

More savings are achievable when the 3D design system is adopted by our SBSR industry and implemented in a Industry 4.0 environment. Since the 3D design systems complete the detailed production design before the project starts, quality is built into the production process from the design stage. Mismatches of system resulting in repairs, rework and modification is minimised,

if not eliminated totally. This will subsequently reduce production time and vessels can be ready to be delivered on time or even earlier.

Other benefits of complete 3D design systems are, but not limited to:

- Robotic welding made possible by using 3D design
- 3D Virtual Reality (VR) walk through in the vessel before it is built
- Design for maintenance (data easily retrievable for maintenance purposes)
- 3D VR model can be used for training of ship's crews, as well as for inspection during vessel construction
- Errorless approval drawings from drafting errors and amendments
- Accurate engineering analysis with powerful visualisation
- Precise Bill of Material rather than using estimates

Other technology for the application of Industry 4.0 in local SBSR industry is:

- Use of virtual towing tank for vessel performance analysis
- Hull form optimisation and performance evaluation using CFD (Computational Fluid Dynamics)
- Hull structure optimisation using Finite Element Analysis(FEA)
- Smart ship system
- Remote and autonomous ship technology

With the use of advance computer analysis and state-of-art engineering tools in Industry 4.0, the definition of 'proven hull' as stated in proposal documents can be redefined as 'proven design by engineering and analyses'.

The future of the local SBSR industry critically depends on Industry 4.0 and 3D Design technology to be able to give customers quality, and competitively priced vessels in a timely manner.

In summary, 3D design systems as proposed by MTCMS Sdn Bhd (MTCMS) will enable the local SBSR industry to implement Industry 4.0 at a minimal investment, making the local yards more cost effective, increase productivity and quality, and greatly improve overall competitiveness. In return, the local yards will secure more orders, generate higher revenues, penetrate overseas markets and provide growth for the industry.

Industry 4.0 will propel the local SBSR industry to gain competitive advantage over their competitors through locally developed 3D design system as an enabler. The future of the local SBSR industry critically depends on Industry 4.0 and 3D Design technology to be able to give customers quality, and competitively priced vessels in a timely manner. To achieve this, there must be a conducive and technologically advanced environment to fast-track its growth and development into Industry 4.0.

*(*Note: In September 2017, MTC Floating Solutions Sdn Bhd and Mega Salutes Ship Design Sdn Bhd have formed a JV company, MTCMS Design Sdn Bhd (MTCMS) to promote the 3D design systems in the industry.)*

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Technology Trends in SHIPBUILDING & SHIP REPAIR Towards Industry 4.0

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The growing efficiency of shipping as a mode of transport and increased economic liberalisation, further increase the prospects for the industry's continous strong growth.

The shipping industry is among the most important activites in human development. Historically, it started from people who just wanted to explore the seas and venture into the unknown. Then, as human got better at building bigger and better ships, trading goods and services became a booming activity, creating many economic pursuits and specialisation from each country. Currently, over 90 percent of world trade—the import and export of goods on the scale necessary worldwide—is carried by the international shipping industry. The growing efficiency of shipping as a mode of transport and increased economic liberalisation, further increase the prospects for the industry's continous strong growth. With an industry that old and reliable, we would not expect there to be many new ways to disrupt it. However, technology has helped to disrupt most industries and the shipbuilding and ship repair industry is no different.

Keypoints from Marine Industry 2030

Combining public and proprietary information as the input into a scenario development methodology, Global Marine Trends 2030 (GMT2030) envisions three possible future maritime scenarios; namely Status Quo, Global Commons and Competing Nations. During the session, the main discussion was the interaction between people, economies, and natural resources that will shape the future of maritime.

These three scenarios bring about different impacts on individual marine sectors. The **commercial sector** is influenced by all economy, people and natural resources, while the **energy sector** is influenced by economy and natural resources only. It is discovered that economic power is the primary driver in the **naval sector**.

In all cases, it is projected that the marine industry will grow and play a positive role in international seaborne trade as well as overall expansion of the global economy. Emerging technologies in the shipbuilding and ship repair industry brings significant value and impact on the commercial shipping, naval, and ocean space sectors. Identifying and applying these technologies will benefit policy and decision makers, helping them recognise risks and opportunities as well as making the right investment decision at the most opportune time.

Technology Trends Toward Industry 4.0

In Industry 4.0, technology plays a crucial role in ensuring the maritime industry can optimise opportunities and reduce risks. While in the manufacturing industry, the term 'fourth industrial revolution' or Industry 4.0 describes how 'smart devices' will replace the role of humans for the management, optimisation and control of machinery. Although technology has always benefit the industry players, many do not fully understand its potential to have an immense impact. This explains why some industry players are still behind in implementation, despite the rapid growth of Industry 4.0 technology. UK's latest Industrial Digital Review highlighted in general, how digital maturity is low in shipbuilding and ship repair industry.

The local SBSR industry is undergoing a dramatic wave of change driven by the evolving patterns and increasing volumes of seaborne trade. Growing demands to support offshore activities such as in the exploration and production of oil and gas (O&G) also contributes to the changing landscape of maritime.

Shipbuilding and ship repair technology advancements, the enhancement of yard capacity/capability and availability of financing have combined to enable the construction of larger and more sophisticated merchant ships. The creation of this large capacity ships have also spurred investment in ports, logistics sector, and various trade infrastructures and facilities to meet the insatiable global trade demand. This will continue to influence and shape the landscape of the SBSR industry.

The following trends described here are sub-categories of the major application in SBSR value chain industry which will have a telling influence on shipowners, shipyards, shipping industry stakeholders and seaborne transport and services in general. These technology trends can be grouped into following theme:

- Productivity time-to-market of complex shipbuilding programmes
- Innovation in term of connected ship and the connected fleet
- Reduce costs, lead time and quality issues in design, manufacturing and the supply chain
- Sustainable growth and business effectiveness in operations

DESIGN	ENGINEERING	WORKSHOP SETUP	FABRICATION & ASSEMBLY	OUTFITTING & FURNISHING	TESTING	OPERATION
3D design	Internet of Things	Additive manufacturing	Robotic welding	Automation	Automation	Data visualisation
Software integration	Virtual Reality	Advanced materials	Automation	Sensor communication	Sensor communication (onboard)	Big data analytic
Internet of Things	Simulation	Internet of Things	Internet of Things / Sensor communication	Advanced material	Internet of Things	Internet of Things
Cybersecurity				System Integration		Simulation
						Cybersecurity

Source: MIGHT Analysis

Riding high on R&D activities, the shipping industry has developed some potentially revolutionary technologies. Mentioned below are several important technologies which might help to change the future of shipbuilding.

1. Big Data Analytics

Big data analytics is a term used to describe the process of analysing this big data to uncover hidden patterns, unknown correlations, ambiguities, market trends and other useful information. The huge amount of data produced today is difficult to be processed through traditional data techniques and applications. The scale of the challenge is well illustrated by the current estimate of a 4,300 percent increase in annual data generation by 2020 and the figure is projected to increase even further by 2030.

The management and analysis of big data will become increasingly important and it is predicted to create a major impact on the marine world in the future, driven forward by the demand for information and the need to handle the variety of new data sources that are likely to appear.

However, big data may also face other factors that can threaten its adoption, such as the lack of the necessary data analysis skills required to exploit big data. Most definitions of big data include the three Vs (data of high volume, velocity, and variety) for enhanced insight and decision making. Some organisations have also added a fourth V that represents veracity, which concerns the accuracy and reliability of data.

With these definitions, a greater volume of data will not necessary mean a better output. The more important thing is analysing poor quality data can lead to ambiguous and misleading information, potentially resulting in poor decisions. In the future, new technologies may emerge

The management and analysis of big data will become increasingly important and it is predicted to create a major impact on the marine world in the future.

that can improve big data analytics. Among these will be some of the so-called 'smart machine' technologies and computing systems that process data in a manner similar to the human brain.

What we are seeing in the market:

- BAE Systems Australia plans to transform Australia's shipbuilding industry to a digital shipyard in Adelaide.
- With real-time data collection and exchange across vessels, ports, cargo and land logistics, the digital ship enables Hyundai Heavy Industries to create new customer services and revenue streams across the lifecycle of ships and journeys, removing traditional barriers between different elements of a ship's operation.
- Inmarsat, a global mobile satellite operator has launched a new service in partnership with Samsung Heavy Industries (SHI), called Smart Ship by SHI. Designed to allow commercial ship owners to enhance efficiency by harvesting data from hull-monitors and equipment sensors onboard in real-time, via Inmarsat's dedicated bandwidth for Certified Application Providers (CAPs).

2. Sensors

The term 'sensor' covers the wide range of devices used to measure the physical environment in which a vessel may be operating, the characteristics and state of the vessel, as well as the physiological and mental condition of the ship crew. Sensor technologies are developing rapidly to meet the ever-growing consumers demand for data and information. As an example, The Internet of Things (IoT) allows real-time monitoring, control of systems and also address the need of ever-increasing capabilities to measure the ocean environment, including biological, acoustic and electromagnetic characteristics.

Sensors adoption is driven by;

- Advances in miniaturisation coupled with low-power generation technology
- Moving the intelligence into sensors with closer integration of sensors, actuators and processing power
- Lower production costs to meet the demands of wearable technologies;
- Standardisation, in particular at the junction between device and chip architecture;
- The low-power transmission of data and energy harvesting; and the management and integration of sensor types such as semiconductors and Micro-Electrical-Mechanical-Systems (MEMS).

Sensors act as the enabler for technology developments in improving the interaction between people and machines. Cognitive systems will not necessarily be programmed to anticipate every possible answer or action needed to perform a function or set of task; instead it will be designed to feed the learning loop in an exponential manner through artificial intelligence (AI) and machine-learning algorithms. The widespread use of sensors are already being introduced in areas such as automotive and scientific applications and soon will expand into the marine/maritime domain, enabling better situational awareness and vessel management.

What we are seeing in the market:

- Navantia Australia proposed F-5000 frigate design to the Australian Government's Future Frigate programme. The future frigates' maritime warfare capabilities will feature an advanced, integrated underwater sensor suite, as well as enhanced signature management and noise reduction measures.
- Atlantic premiers and federal ministers to review the Atlantic Growth Strategy's progress and discuss how they can maximise the benefit of the oceans supercluster in Atlantic Canada.

3. Autonomous Systems

As Industry 4.0 continues to gain recognition, autonomous systems, a rapidly expanding technology has attracted considerable interest from transport applications, particularly in air and automotive transport. As the focus in the marine industry at present is on improving safety by taking people out of the 3D (dirty, dangerous and dull) jobs, a significant rise of autonomous system usage in the marine domain is projected for the future. These systems are maturing and cost, robustness, endurance and regulatory challenges are being addressed by a number of initiatives at an international level.

What we are seeing in the market:

- Rolls-Royce has signed a deal with Google to develop further its intelligent awareness systems which are making existing vessels safer and is an essential to making autonomous ships a reality. It allows Rolls-Royce to use Google's Cloud Machine Learning Engine to further train the company's artificial intelligence (AI) based object classification system for detecting, identifying and tracking the objects a vessel can encounter at sea.

4. Robotics

Assembly, inspection, manipulation, and exploration are some examples of tasks that could be programmed into a robot to conduct operations in many industries, from shipping to space missions—with different levels of independent decision-making can be programmed. Apart from being remotely controlled, robots can also complete complex tasks—either supervised, collaborative, or fully autonomous.

Driven by improving safety, security, and productivity, the widespread adoption of robotics has been observed across various sectors. Recently, industrial robots have been dominantly used by the automobile industry and nearly half of professional service robots have been used by the defence sector. Although small in unit number, the construction industry has seen some of the largest growth in the purchase of professional service robots in recent years. While in the marine construction business, the knowledge of technology will revolutionise the future marine service and and robotics will become an integral part for tasks, especially those conducted in severe working environment, such as deep ocean mining and disaster relief.

> Apart from being remotely controlled, robots can also complete complex tasks.

What we are seeing in the market:

- Kleven Industries in Norway, has invested in new robot welding systems that precise and can work 24 hours a day and very quick.
- Automatic lug welding system with an overhead type robot manipulator developed DSME, South Korea.

5. Blockchain/Distributed Ledger Technologies (DLT)

The great potential for DLT is to be used in improving supply chain processes. Any type of supply chain business, either marine, air, or land-based, can take advantage of the Blockchain / Distributed Ledger Technologies (DLT) system due to its easily adaptable interface and a very low entry barrier to existing systems. The logistics industry can expect better visibility, connectivity and cost savings as a result of distributed ledger adoption across the supply chain. The future potential of this ecosystem platform can clearly identify the problems and co-create applications to solve the collective challenges faced by the industry today.

What we are seeing in the market:

- Hong Kong-based company '300cubits' has successfully conducted the first trial shipment under its smart contract deployed through its Ethereum blockchain technology. Malaysian liner company West Port and Brazilian textile importer LPR have taken part in the trial.
- Successful pilot programme, delivered by logistics technology company Marine Transport International (MTI) and summarised in a whitepaper written and verified by the University of Copenhagen and Blockchain Labs for Open Collaboration (BLOC). The container logistics industry will see improved connectivity, efficiency and security.

6. Advanced Materials

Advanced materials refers to all materials engineered to deliver specific physical and/or functional properties in their application. The trend with all metallic, ceramic, polymeric and composite materials is to achieve improved capabilities such as strength, toughness, durability and other useful functionalities by designing it at the nano-scale and harnessing those properties in large structures.

The structure and properties of advanced materials at the nano-scale—i.e. one millionth of a millimetre—is now well understood, and this is leading to the challenge of manufacturing advanced materials to realise capabilities in bulk structures. Termed as nano-engineering and the materials are referred to as nano-materials, the research and commercialisation of nanomaterials will continue to accelerate and large-scale structures with increasingly refined and reliable properties are expected to be in use.

Desirable functionality, such as environmental sensing, self-cleaning, self-healing, enhanced electrical

conductance and shape modification, is anticipated through the development of nano-materials, and, in turn, will deliver performance benefits in the commercial shipping, naval and ocean space industries.

What we are seeing in the market:

- The Realisation and Demonstration of Advanced Material Solutions for Sustainable and Efficient Ships (RAMSSES) project involves 36 partners from 12 countries, which began working together in June 2017. This project's overall aim is to develop an all-composite ship hull which will measure around 70m in length, which will then be subject to testing under real-life conditions on the high seas.

Manufacturing-technology developments are enabling high levels of innovation in all aspects of product development and support, reducing costs, weight and complexity.

7. Advanced Manufacturing

The development of innovative technologies and materials, coupled with the rise of consumer demand, has led to a transformation in manufacturing processes and more importantly, its economics. Technologies such as additive manufacturing, coupled with the use of robotic systems for assembly, offer the opportunity to bring back manufacturing to high-value economies through increased productivity and competitiveness.

The key to this change is the ability to exploit and integrate adjacent technologies and business innovations, including: informatics which will apply information techniques to the manufacturing and logistics processes; automation and intelligent systems which will enable increased productivity, safety and quality; and simulation and visualisation techniques which will reduce the time from conceptualisation to production.

Manufacturing-technology developments are enabling high levels of innovation in all aspects of product development and support, reducing costs, weight and complexity. In the long term, these developments will enable the production of components and products on or near their point of use. As the technologies develop, the size and complexity of components are expected to increase. Trials are already underway to conduct 3D printing onboard ships and future developments such as 4D printing, coupled with nanotechnologies and robotics, are expected to lead to the printing of autonomous vehicles that can suit specific mission needs.

What we are seeing in the market:

- The first fully 3D printed ship propeller has been approved for use and completed by a team of engineers in the Netherlands. Known as the WAAMpeller, it was unveiled at the Damen Shipyard Group's headquarters in Gorinchem. The completion of the world's first 3D printed ship propeller shows the direction that the industry could soon be heading.
- Index AR Solutions, an augmented reality pioneer in the United States hails its teaming partner, Newport News Shipbuilding (NNS) turning to VR in exploring a new tool called ShipSpace that allows designers, engineers and stakeholders to validate design ideas and communicate effectively about vessel concepts.

8. Human Augmentation

Human augmentation has made considerable advances in terms of enhancing both physical and cognitive human capabilities which include power assisted suits or exoskeletons that enable paraplegics to stand and walk; ocular sensory substitution devices to enable improved vision; and cochlear implants to enhance hearing.

The field of human augmentation extends beyond the use of prosthetics and exoskeletons to include bionic implants (referred to as 'bions') and the development of drugs and administrations that can enhance human biological functions. Alongside these developments, work is also focusing on 'neuro-enhancements' to enable superior memory recall or speed of thought.

Human augmentation's promise of improved human performance and the need for future navies to operate more effectively with fewer crew members will drive the technology's adoption. Exoskeleton technology is expected to be at the forefront of this adoption, but intrusive bions and neuroenhancements will appear much later as they generally augment human strength only rather than replacing it and tend to enhance one part of the body . Without external power, exoskeleton technology can deliver a 10-20 percent boost to the user's lifting power by transferring weight to the ground.

What we are seeing in the market:

- In Japan, exoskeletons are being used for heavy lifting in the shipbuilding industry as well as in large commercial construction projects.

9. Clean Energy

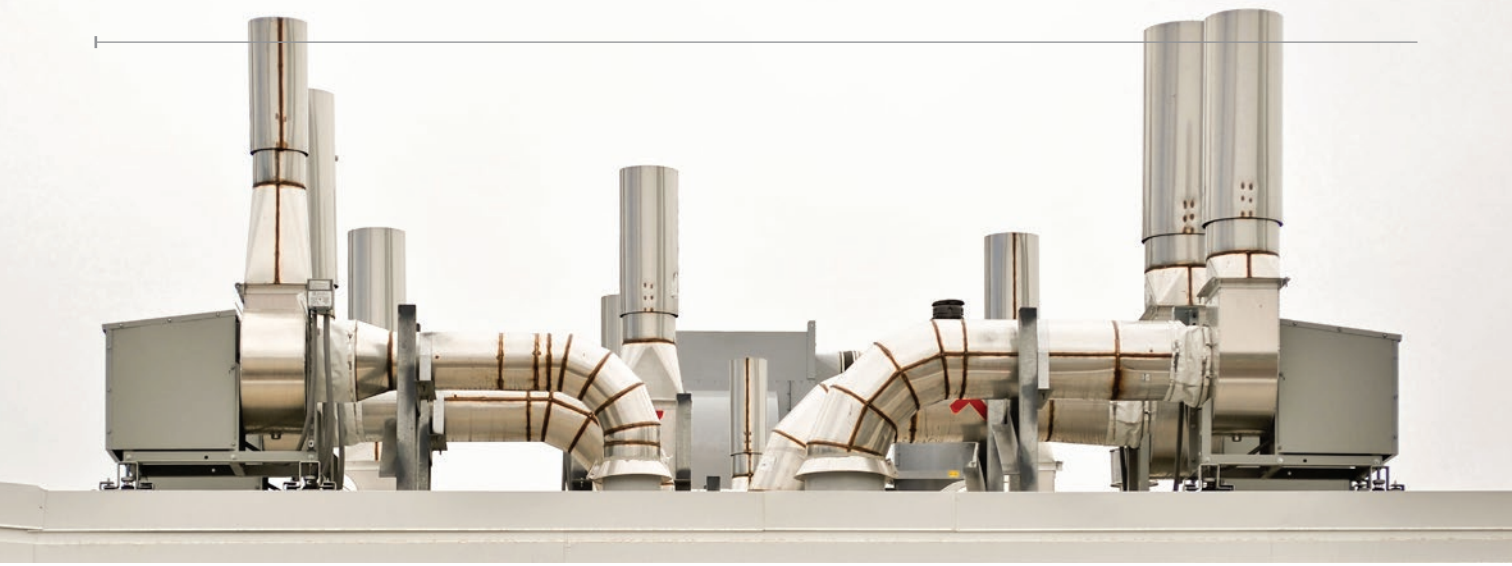
Energy management refers to the efficient production, storage, delivery and re-use of energy onboard vessels at sea. The technologies associated with the whole energy management system are particularly important in naval vessels where the demand for 'high-capacity surges' from energy intensive systems will continue to grow between now and 2030.

In energy production, the technology will be driven by environmental legislation and the need for lower predictable operating costs, to increase the attractiveness of flexible hybrid-power solutions in which adaptable power architectures can manage electricity generated from both renewable and non-renewable sources. In the future, economically viable small-scale nuclear fusion reactors may also be possible and for energy storage, the development of lightweight, high energy density fuel cells which convert hydrogen into usable electrical energy, will continue.

> Increasingly flexible and adaptable power system architectures will enable improved power availability to allow the rapid allocation of power.

The delivery and re-use of energy is equally important, and the combination of improved system architectures and the application of more advanced materials will reduce energy losses and consequently reduce heat onboard. Increasingly flexible and adaptable power system architectures will enable improved power availability to allow the rapid allocation of power according to the dynamically changing operational roles and mission dependencies of naval vessels.

Electric-hybrid technology in Finland has now moved over state-owned operator FinFerries, which carries approximately four million vehicles and ten million passengers a year. Shipping industry moving toward clean energy by using energy storage and renewable energy (solar). In the case of Finferries's Elektra, the 98m-long ferry has 160 lithium-ion batteries on-board, with a combined total output of 1MWh. To further boost the Elektra's green credentials, it is fitted with several solar panels that feed back into its power system.



What we are seeing in the market:

- Scandinavia is bearing witness to a new generation of clean, vibration-less and near-silent technologies, thanks to Siemens' partnerships with national ferry operators.
- More fuel-efficient diesel engines, hull design and propellers, for example like the one used onboard the Maersk Triple-E class container vessels, designed to facilitate slow steaming or sailing significantly below the ships' maximum speed —to attain lower fuel consumption by 37 percent and carbon dioxide emissions per container (TEU) by 50 percent compared to its predecessors, the E-class.
- Fuel celled technology onboard vessels. The world's first—and thus far the only —commercial vessels with this feature is the Viking Lady, an offshore supply vessel (OSV). It is owned by a Norwegian OSV owner/operator, Eidesvik Offshore and is being deployed in an oil field the North Sea.
- Improved heating, ventilation and air conditioning (HVAC) and waste-heat recovery systems that use less energy and produce less emissions.

Conclusion / New Areas

Technology trends will definitely alter business model and propel the SBSR industry to be more competitive in the global market. Although in general, growth is low in any industry adoption of Industry 4.0, the first mover advantage could benefit from early adoption and quickly learn from their experience to be more innovative. Global initiative towards Industry 4.0 will set a new policy and standardisation in the industry for industry players to harness the benefit and reduce risk of the Industry 4.0 adoption.

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VIEWPOINTS

Globalisation of Venture Capital: Opportunities in Shipping Industry

The venture capital industry in Asia clearly marked a turning point of maturity and capital depth in the past few years.

by:

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Investors in the Venture Capital (VC) are being more cautious now—conducting significant due diligence of potential deals particularly at the seed and angel funding stages. This has translated into a global decline of VC deals, as the industry is experiencing a slight waning in completed financings.

Nevertheless, the total amount of VC investment is still massive and remained strong quarter over quarter. The top ten deals globally accounted for almost one-third of total VC funding, highlighting the pivotal role of large deals in the VC market. There is still plenty of money for venture investors to disburse; albeit they are reverting to investing more cautiously which entails the later stages of a maturing investment cycle.

In the US, VC investment still stands at historic highs, significantly boosted by large amount of financings from high-priced environment in the later stages of an investing cycle. The early-stage has become even more competitive, with a significant spread in 2017, resulting in fewer companies being able to meet the criteria investors demand for such sums.

While in Europe, VC investment increased by 9.2 percent. European and international VCs have reframed their focus along more cautious terms taking into consideration general macroeconomic and political variables. However, plenty of capital remains awaiting the right targets.

The venture capital industry in Asia clearly marked a turning point of maturity and capital depth in the past few years, but VC investment easily overtopping $12 billion in Q2 and Q3'17 apiece certainly speaks to the maturation of at least a few key big city areas. The industry remains at its infancy stage with Beijing leading the way, followed by a handful of other cities in China. In India, hosting companies reflects growth from a mix of traditional and non-traditional investors.

Venture Capital in Asia

The final quarter of 2017 saw US$46 billion in venture capital (VC) investment globally, propelling the VC market to a new annual high of $155 billion of investment according to the Q4'17 edition of Venture Pulse – a quarterly report on global VC trends published by KPMG Enterprise.According to data from venture capital tracker CB Insights and accounting firm PricewaterhouseCoopers, amid a relative lull in Silicon Valley deals, VC investments experience a twofold increase in Asia. Led by China and India, Asian investment topped $70 billion yen for the first time, closing in on the North American tally of $74.5 billion. Just a year earlier in 2016, North America's venture capital investment was nearly twice as much as Asia's.

Compared with the rapid growth in investment, the number of funding deals worldwide climbed at a slower rate of 11 percent to 11,042 in 2017, meaning more money was concentrated in each company raising capital.

Led by China and India, Asian investment topped $70 billion yen for the first time, closing in on the North American tally of $74.5 billion.

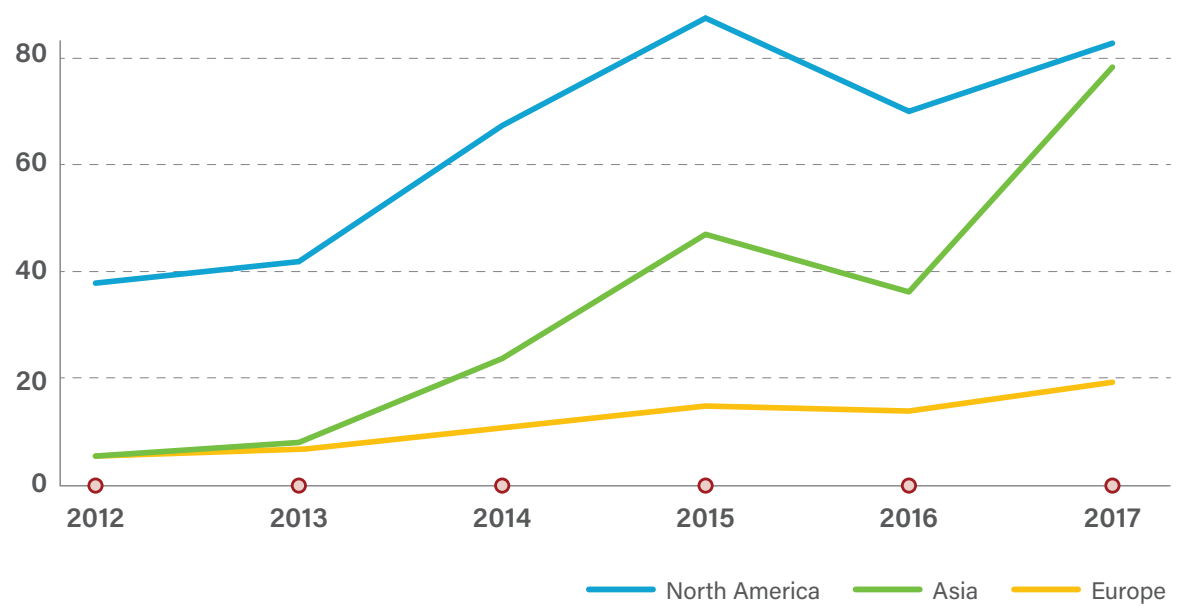
Anand Sanwal, CEO of CB Insights, refers to this trend towards bigger fundraising rounds the '*SoftBank effect*' after the Japanese technology group. SoftBank Group launched the $93 billion Vision Fund last May with partners including Saudi Arabia.

Venture Capital in Malaysia

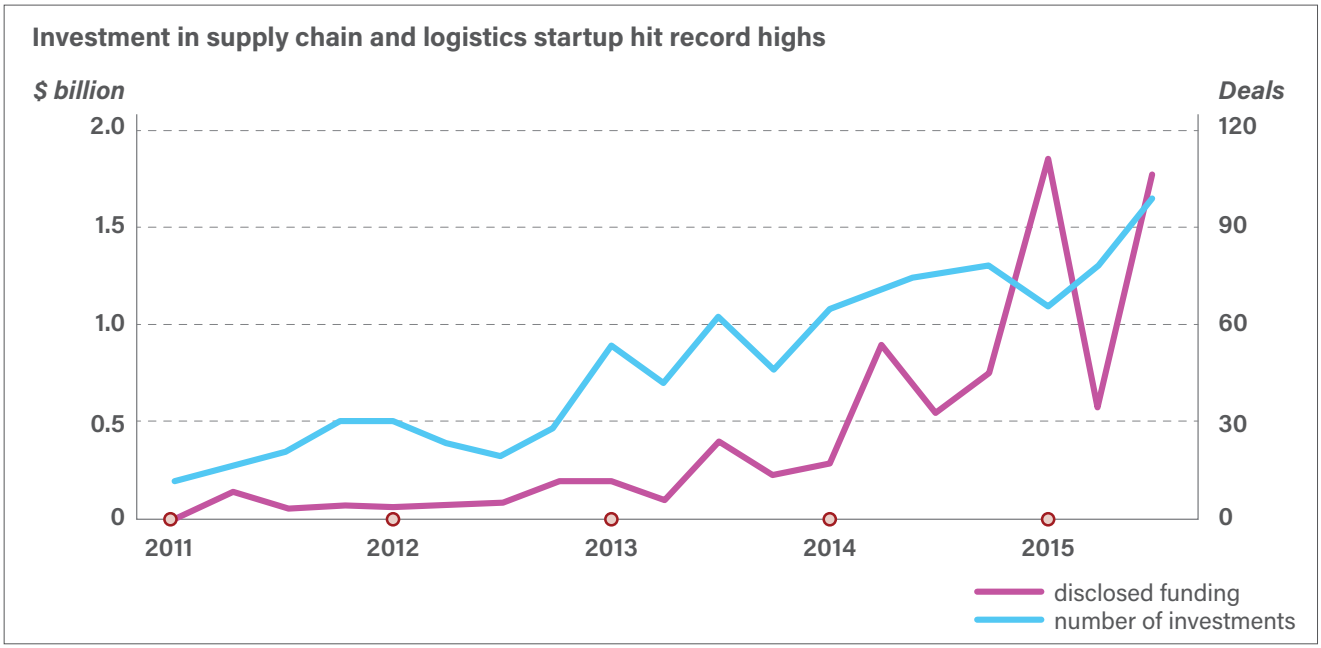
The VC industry in Malaysia is still relatively small considering the number of venture capital companies and the amount of venture capital funds available. When compared to the VC industries in other nations, this small figure is insufficient to provide expertise and capital required to fund and nurture knowledge-based and technology intensive start-ups.

Having realised the importance of venture capital in supporting the objective of spurring the growth of high technology companies, the government has initiated certain steps to assist venture capitalist such as broadened tax exemption, which includes management and performance fees, for tax assessment running from 2018 to 2022. In addition, the minimum investment limit in a venture company will be reduced from 70 percent to 50 percent. Companies or individuals investing in venture capital companies will be given a tax deduction equivalent to the amount

Asia is gaining on North America in the venture capital race
(investment, in billions of dollars)



Source: CB Insights, PricewaterhouseCoopers



Source: Data, CB Insights

of their investments, limited to a maximum of RM20 million ringgit per year. Income tax exemptions equivalent to the amount of investments by angel investors in venture companies will be extended until 31 December 2020.

The Prime Minister of Malaysia announced the government will assist startups that are struggling to raise capital and gain access to a wider market which is visible through the 2018 Budget that introduced some interesting initiatives to boost venture capital activities. Investors from major institutions will allocate RM1 billion for venture capital investments in selected sectors, adding that this effort will be coordinated by the Securities Commission.

Despite the efforts by the Government, the venture capital industry in Malaysia has not yet reached the level of sophistication as compared to its foreign counterparts, the closest being Singapore. The liquidity problem has been a prolonged issue, prompting venture capital companies to shy away from seed or start-up ventures and focusing their investments in less-risky, more established business such as in expansion and mezzanine levels.

The Future of Venture Capital Investment

VC investment is expected to remain relatively steady heading into 2018 barring an unforeseen global catastrophe with numerous companies looking to invest in innovation opportunities. Startups involved in the internet of things (IoT) and artificial intelligence (AI) are expected to drive global venture capital investment this year.

The opportunities related to virtual reality have grown exponentially in recent quarters, and considered to be big bets on the VC investment front. AI, robotics, blockchain and healthtech will likely remain hot areas of investment into the next quarter, while Agtech is expected to gain traction among investors. Greater investment in AI ventures stood out in 2017 with AI-related financing in the U.S. grew 28 percent, reaching $5 billion for the first time.
The technological advancements in a diverse range of sectors—from medical research and retail to manufacturing and **transportation**—is expected to keep them among the hottest VC investment areas over the next few quarters.

The opportunities related to virtual reality have grown exponentially in recent quarters, and considered to be big bets on the VC investment front.

Venture Capital Opportunities in the Shipping Industry

While robotic warehouses, autonomous trucks, and on-demand services such as Uber are rapidly transforming domestic logistics, the unglamorous world of international freight has remained quiet and old-fashioned. The industry, long fixated on building bigger ships, is now turning its attention to the back office and customer experience. Since 1998, half a dozen attempts to digitise the industry has failed because carriers never bought into the idea that they had to change their business processes, not just technology.

Despite being one of the biggest industries in trading goods and services, the logistics and shipping industry have a very low degree of digitisation. Venture capitalists are focusing and investing in the logistics and shipping now as many areas of logistics are fragmented and offline which leaves a lot of room for consolidation and as well as a lot of potential for new entrants to bring in a totally new perspective.

Start-ups companies and Silicon Valley investors are spying on opportunities to solve this problem. Companies like Haven, Turvo, and Flexport argue their cloud-based solutions will displace shipping and logistics companies' SAP and Oracle software the same way Salesforce has grown to dominate sales and marketing solutions.

From an investment view, venture capitalist outlook on making an investment in the shipping sector as a complex topic as the margins are low at the moment and the pressure on all players is high. Industry consolidation will continue in 2018, making it difficult to enter the market without access to the market movers. However, at the same time the market setting is good for disruption and the industry will always continue to exist—after all, goods would still need to be moved around in the next 50 years.

Recently, Maersk, the world's largest container shipping company announced that finding new solutions is a matter of competitive survival, which was seen as a wakeup call for whole rest of the industry. Software may remove massive delays and inefficiencies in an industry that moves 180 million containers around the globe every year. Fundamentally, digitisation of the shipping industry could accelerate global trade in an immense way and more than a trillion dollars worth of goods will arrive faster at ports around the world.

Venture capitalists are focusing and investing in the logistics and shipping now as many areas of logistics are fragmented and offline which leaves a lot of room for consolidation.

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VIEWPOINTS

Industry 4.0 in Malaysian SME Practice

by

Dinesh Ong Beng Keong

About Author:

Project Executive of MDT Innovations, Dinesh Ong Beng Keong has won Merit in MSC Malaysia APICTA 2017 Awards, under Best of Retail & Supply Chain Management organized by PIKOM and MDEC. Having graduated with Bachelor of Law and Commerce from Management and Science University (Malaysia), Dinesh focuses more to Internet of Things (IoT), and how it can be fully utilized by the users. With the revolution of ICT, especially in the IoT industry, Dinesh aims and focuses to learn and provide the most optimal and efficient solution for the end users and to fast track towards Industrial 4.0

A Brief Introduction to Industry 4.0 and MDT Innovations

The industry has changed exceedingly in the past decade, with the existence and rapid transformation of technology. In these days, information can be acquired and managed with just a tap on the screen of a portable device. Under the broad title Industry 4.0, many physical and digital technologies are combining through analytics, artificial intelligence, cognitive technologies, and the Internet of Things (IoT) to create digital enterprises that are both interconnected and capable of more informed decision-making. In the previous decade, the technology was limited and costly. However, due to competitiveness and availability of the technology which we have today, the technology has advanced tremendously and can be easily acquired.

"MDT Innovations (MDTi) is one of the fastest growing technology companies in Asia Pacific. Focusing on entire IoT (Internet of Things) value chains ranging from intelligent wireless communications, IoT as a services, turnkey, to analytics solutions, the company is banking heavily on telecommunications and e-payment, smart retail, and crowd movement in education and aviation. MDTi is proud of its standout engineering achievements mainly the development of world smallest NFC module, MD770R, and NFC in SIM card, which shrunk RF front end and antenna into the size of SIM card, thus empowering all mobile phones to become NFC-enabled.

The immense excitements of IoT and Industry 4.0 mega trends has further put MDTi in the spotlights. MDTi's solutions in crowd movement, work in progress automation, and smart retail solutions are based on its intelligent wireless sensor systems. These solutions are found in Fortune-500 semiconductor firm and retail chains in China, Malaysia, and Australia. With significant amount of smart devices deployed so far, the company envisages its significant involvement in smart city which will ultimately make full use of its existing and future smart devices.

The company has been profitable since inception. MDTi has seen tremendous growth especially in export sales and has grossed more than half a billion of accumulated export sales to date. As of 2015, 97% of total revenues are contributed by export sales, which is an evidence that the company has made successful international presence.

MDTi is a multiple MSC Asia Pacific ICT Award winner in 2006 and 2007 and it is also the winner of Best of the Best, The Prime Minister Award in 2007 and 2013. The company is also Red Herring Asia 100 and Red Herring Global 100 in 2008 awarded by Red Herring Magazine from California, USA acknowledging 100 most innovative and promising technology companies of that year. This recognition put MDTi amongst past winners like Google, Yahoo!, Youtube, Qualcom, and Ebay. In 2011, MDTi adds Deloitte Technology Fast 500 Asia Pacific in 2011 to its

list of accolades and it is ranked 12th. It is also Malaysia's fastest growing company with 3130% from 2008 to 2010.

At MDT Innovations, we exist to help customers to connect to surrounding things, understanding, and making full sense out of its condition with the aim of giving the best business improvements and user experiences. To achieve this, we have created cultures and instilled values to our team in order to fulfill our philosophy of enabling IoT solutions and services that will enable our customers to reach out to "things" that they have always wanted to."

How Industry 4.0 can benefit Malaysian SME

With the advancement of technology, the Small and Medium Enterprises (SME) can be managed effectively and transparently with Industry 4.0. Managing SME with industry 4.0 integration is far different from the conventional management method. Managing SME nowadays can be done effectively and efficiently.

The new SME definition was endorsed at the 14th NSDC Meeting in July 2013. The definition covers all sectors, namely services, manufacturing, agriculture, construction and mining & quarrying. Sales turnover and number of full-time employees are the two criteria used in determining the definition with the "OR" basis as follows:

- For the manufacturing sector, SMEs are defined as firms with sales turnover not exceeding RM50 million OR number of full-time employees not exceeding 200.
- For the services and other sectors, SMEs are defined as firms with sales turnover not exceeding RM20 million OR number of full-time employees not exceeding 75.

In MDT, we provide solutions to enable customers to achieve best business improvements and user experience. Among the solutions we have provided is Staff Tracking. The solution provides identification, instant verification, tracking and unauthorized movement. MDTi does not only provide customers with solutions, we also provide business intelligence to our customers. The

Managing SME with Industry 4.0 integration is far different from the conventional management method. Managing SME nowadays can be done effectively and efficiently.

Data captured can be accessed by assigned personnel via computer dashboard, as well as via mobile apps. This helps organisations to have an overall view on their staff location on their monitor and to manage their staffs effectively and efficiently.

Besides that, we also have solutions which enables customers to keep track on materials from pre-production, which are involved in the production line. Through this solution, the customer will have record on which materials were used during production, and at which stage were the materials being added into the assembly line.

Our solutions also limit the buildup of excess inventory at any point in production. This helps our customers to have better storage management and to fully utilise their storage.

By having and implementing the mentioned solution, customers will have the Kanban solution experience. This is where customers can achieve just in time manufacturing (JIT) in their production line. Our solutions also limit the buildup of excess inventory at any point in production. This helps our customers to have better storage management and to fully utilise their storage. Besides that, our solutions also limit on the number of items waiting at supply points are established and updated into the system dashboard, and the person who is in charge can do necessary arrangements. This is where inefficiencies are identified and be removed by the person in charge, or by the system, whichever the customer prefers.

Whenever a limit is exceeded, the dashboard of the overall system would provide an alert or notification to the management or person in charge within the production line.

The users and customers will have record as to when and what time the materials have arrived in production house, time used to build a specific item as well as data which they can apply in their resource management. In relation to that, unauthorized movement of materials will send an alert to the system dashboard, which at the same time activates nearby cameras to focus on the affected area. In contrast, the system dashboard also provides data for more strategized work in progress (WIP).

Besides the above, our IoT solutions also benefit the supply chain management. RFID has been widely used in retail and supply chain management in many areas; over a decade ago, in many countries. In relation to that, the prices for RFID infrastructure is less expensive now compared to previous times. However, many retails and supply chains still adapt the traditional RFID solutions. The traditional RFID practices are practiced with main purpose of preventing theft on the apparels in the retails or warehouses. As for example, in the retail for apparels, the apparels are tagged with a label tag that is tied via plastic string. However, in today's modern world, the number of theft cases are rising in most areas. This will affect the retail and supply chain as their assets are vulnerable in falling prey to theft.

In MDT, we not only focus on creating a product for reducing theft in retail and supply chain, we also provide value added solutions for our consumers. Our solutions can contribute in the process of planning, implementation, controlling the efficient and effective flow, transaction, storage and delivery of goods and services, resources planning, and structured data flows from the point of origin to point of consumption in order to meet customer requirements and equally addressing business issues and requirements of the retail industry.

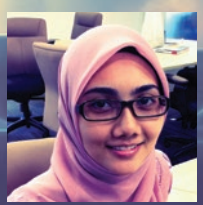
The data collected will be stored in our Rapita RFID Asset Management Cloud System. The Cloud does not only receive and record data, it serves as software support tool to our RFID Tags for the Retail Application. As far as possible assisting Retails in their effective management.

In contrast, we exist to help customers and users to connect to surrounding things, understanding, and making full sense out of its condition with the aim of giving the best business improvements and user experiences and to enable IoT solutions to in pursuit of experiencing Industry 4.0.

VIEWPOINTS

Global Sulphur Cap 2020: A Conundrum in the Maritime Industry

by:



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While industries have a unique opportunity to take advantage from the Fourth Industrial Revolution, they must be aware of the damaging consequences to the environment.

Innovation is rapidly changing and becoming more efficient and interconnected as the world is starting to see a merging of digital, physical and biological realms, which we call the Fourth Industrial Revolution. The new technologies, that comes alongside every industrial revolutions, enables societal shifts by influencing economics, values, identities and possibilities for future generations. Our environment is constantly changing. The world is largely shaped by industrialists and transformed by technologists.

However, Industrial development has led to many of the world's current environmental problems—e.g. climate change, unsafe levels of air pollution, depletion of fishing stocks, toxins in rivers and soils, overflowing levels of waste on land and in the ocean, loss of biodiversity and deforestation. While industries have a unique opportunity to take advantage of the Fourth Industrial Revolution, they must be aware of the damaging consequences to the environment.

Carbon emissions such as nitrogen oxides (NOx), along with particulate matter (PM) and sulphur emissions (SOx), create greenhouse gases that can cause damages to the environment and pose a danger to human health. Although there are many industries that are guilty of contributing excessive carbon emissions, the shipping industry particularly stands out from the rest.

Exhaust gas, produced by diesel powered maritime vessels, has been identified as one of the major contributors to the increased level of SOx emissions in the atmosphere, especially in countries with high activity of maritime trade. As the maritime sector grows, the amount of air pollution from ships increases exponentially as well, intensifying the chemical reactions in the air in which SOx and NOx are converted into fine particles, sulphate and nitrate aerosols. In addition to the particles directly emitted by ships such as black carbon, these secondary particles increase the negative impacts of shipping pollution.

All this can be summed up in one sobering statistic—**it is estimated that the daily emissions of cruise ships are equal to emissions of one million cars**, due to the fact that ships are the largest machines on the planet and that the world's largest diesel engines can be found on cargo ships. This raises concerns related to how shipping activities are having a significant impact on the environment as a whole.

Exhaust gas, produced by diesel powered maritime vessels, has been identified as one of the major contributors to the increased level of SOx emissions.

Critical Environmental Challenges Rising From Shipping Industry

Climate Change

The heat-trapping nature of greenhouse gases was demonstrated in the mid-19th century. There is no question that increased levels of greenhouse gases cause the Earth to warm in response. As a result, climate change is happening and affecting the whole wide world. Today's greenhouse gas level is at a 3 million-year peak.

Therefore, a global approach to reduce greenhouse gas emissions from international shipping—a large and growing source of emissions—is necessary. Maritime transport is a big contributor to climate change as it emits around 1000 million tonnes of CO2 annually and is responsible for about 2.5 percent of global greenhouse gas emissions (3rd IMO GHG study).

Shipping emissions are predicted to increase between 50 percent and 250 percent by 2050—depending on future economic and energy developments. This is not compatible with the internationally agreed goal of keeping global temperature increase to below 2°C compared to pre-industrial levels, which requires worldwide emissions to be at least halved from 1990 levels by 2050.

Biodiversity and Conservation

The marine ecosystems worldwide are suffering a massive decline in biodiversity and irreparable alterations to ecosystem functions. The capacity of oceans to recover from global perturbations and thus to maintain ecosystem goods and services is rapidly weakening. Climate change, pollution and ships-associated impacts have been identified as the principal causes of marine biodiversity loss and thus requires intervention.

Water Security

Demand of fresh water needed to support the global economy is expected to exceed supply by 40 percent by 2030—pollution and climate change affect the global water cycle and threatens the wellbeing and livelihoods of millions of people.

Clean Air

The World Health Organization (WHO) has reported that around 7 million people die annually from exposure to air pollution—one death out of every eight globally. A new air quality model, also produced by WHO, confirms that 92 percent of the world's population lives in places where air quality levels exceed the safety health limits.

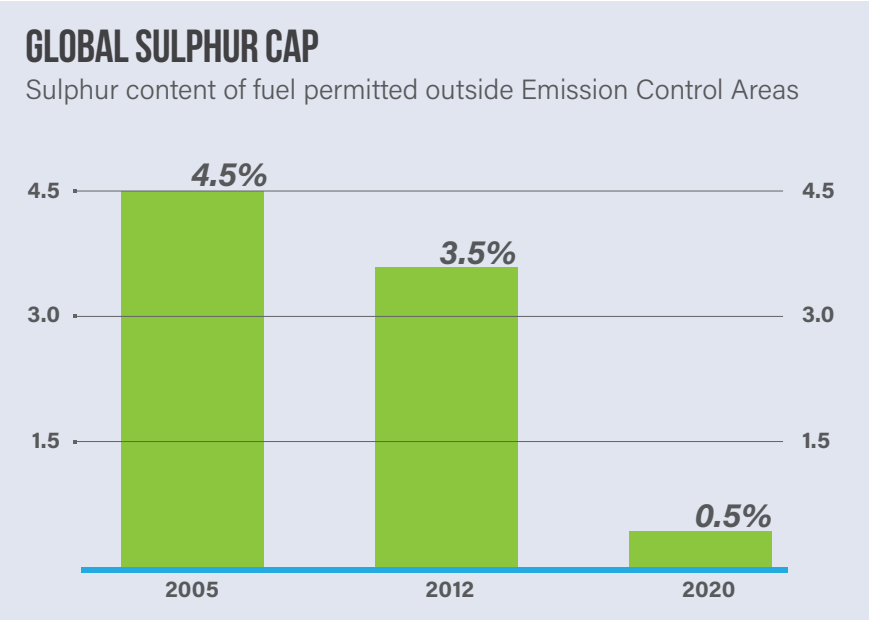
These challenges pose an urgent global threat as the world's current population of around 7 billion is expected to grow to 9.8 billion by 2050. Through this increasing population, the demand for food, materials, transport and energy will further increase the risk of environmental degradation and affecting human health, livelihoods and security.

Due to all this environmental degradation, caused in part by the shipping industry, the International Maritime Organisation (IMO)—a specialised agency of the United Nations responsible for global standard-setting for safety, security and environmental performance of international shipping—has regulated a new set of rules pertaining to sulphur emission for ships in 2005. This stricter rule comes into effect under the International Convention for the Prevention of Pollution from ships (MARPOL) Annex VI, specifically under regulation 14, which covers emissions of sulphur oxides and particulate matter from ships.

This rule was to be the vehicle through which reducing maximum limits on SOx emissions was to be phased in between 2005 and 2020. Under the regulations, there is a set limit to the amount of sulphur emission from vessels from its uncapped levels to 4.5 percent of fuel content. This decision is expected to reduce the world's air pollution and will save millions of lives in the coming decades. This level was reduced in 2012 to 3.5 percent.

In 2016 a new regulation update was announced by IMO stating that under a new global cap, ships will have to cut sulphur limits in marine fuel from 3.5 percent to 0.5 percent and that the effective date for reduction will be in 2020.

What will the new limit mean for ships and ship owners?



Source: IMO : Frequently Asked Questions, The 2020 Global Sulphur Limit

Based on the limit regulation, ships will have to use fuel oil on board with sulphur content of no more than 0.5 percent m/m compared to the current limit of 3.5 percent. The interpretation of 'fuel oil used on board' includes use in main and auxiliary engine and boilers.

This stricter rule comes onto effect under the International Convention for the Prevention of Pollution from ships (MARPOL) specifically under regulation 14, which cover emissions of sulphur oxides and particulate matter from ships.

The emission control areas established under MARPOL Annex VI for sulphur oxides are; the Baltic Sea area, the North Sea area, the North American area covering designated coastal areas off the United States and Canada and the United States Caribbean Sea area around Puerto Rico and the United States Virgin Islands.

To meet this new emission regulation, there are some alternatives that shippers could comply with such as fuel alternatives, which includes Liquified Natural Gas (LNG), Marine Gas Oil or Marine Diesel Oil (MGO), Scrubbers, Waste Heat Recovery, Batteries and Fuel Cells.

Exemptions of the regulation are provided for situations involving the safety of the ship, saving life at sea, or if a ship or its equipment is damaged.

Another exemption is provided for allowing ships to conduct trials for ship emission reduction development as well as control technologies and engine design programmes. This would require a special permit from the Administration(s) (flag State(s)).

What does it mean for Malaysia shippers?

Following the new set of regulations by IMO, Malaysia has ratified the MARPOL Annex VI and is also aiming for cleaner shipping fuel by 2020. The reduction is aimed to reduce major health issues and brings environmental benefits globally, particularly for populations living close to ports and coasts. Malaysia is committed and currently exploring new green alternatives to fuel the growing demand of the shipping industry. This is to ensure that the Straits of Malacca remain open, safe and secure for shipping.

Other Alternatives

To meet this new emission regulation, the shipping industry has a wide range of options and techniques to cut pollution, most of which are already available on a larger scale and easily implementable.

Using low-sulphur fuels:

Low-sulphur fuel is created by an extended refining process, during which a greater percentage of the sulphur content is removed. When used as fuel in ships, it will automatically produce exhaust gases containing considerably less SOx. It also reduces other pollutant emissions, such as black carbon which is a potent global-warming agent.

Scrubbers

Some ships limit the air pollutants by installing exhaust gas cleaning systems, also known as '*scrubbers*'. This is accepted as an alternative means to meet the sulphur limit requirement and helps to remove most of the sulphur oxide from the smoke stack exhaust. Scrubbers can lower the emissions of Sulphur Oxide (SOx) by 99 percent and considerably reduce emissions of other polluting particles. There are, however, concerns regarding wash-water discharges from open-loop scrubbers which deposit them in open seas and closed-water areas. This leads to higher pH levels in surrounding waters causing additional environmental concerns. Hence, open-loop scrubbers are not a sustainable alternative compliance method for marine sulphur standards.

Selective catalytic reduction (SCR)

SCR is a system to treat exhaust gases before they are emitted into the atmosphere. SCR is very effective in reducing emissions and has already been used by many ships worldwide and works better with low-sulphur fuels.

Gas or duel-fuel engines

Ship engines can work with liquefied natural gas (LNG) which doesn't contain sulphur, has reduced NOx emissions and close to zero SOx emissions. Gas engines also dramatically reduce other particulate matter levels. Although it is easier to fit new ships with such engines, a few conversions have already taken place hence providing a good solution for reducing a ship's emission levels.

Alternative energy sources

Experiments with wind and solar power, biofuels and fuel cells are ongoing and could be useful in the future. Although these alternative energy sources are not ready for mass industrial use, these experiments are yielding better results than past efforts due to current technological advancements. Therefore, it is vital that these experiments are sustained to break through the barrier for mass industrial consumption.

Malaysia is committed and currently exploring new green alternatives to fuel the growing demand of the shipping industry.

Conclusion

Now is the time that decisions need to be made concerning how to comply with the 2020 Annex VI requirements. The future is green shipping for efficient marine transport with minimal health and ecological damage. Cleaner practices especially on ship scrapping, emission control and port management are needed and require a collective effort from the industry and its engineers together with regulators, port authorities and communities. Environmental impacts should be considered as the utmost priority in determining optimal routes and modes for delivery of goods.

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VIEWPOINTS

Shaping the 4th Industrial Revolution Workforce

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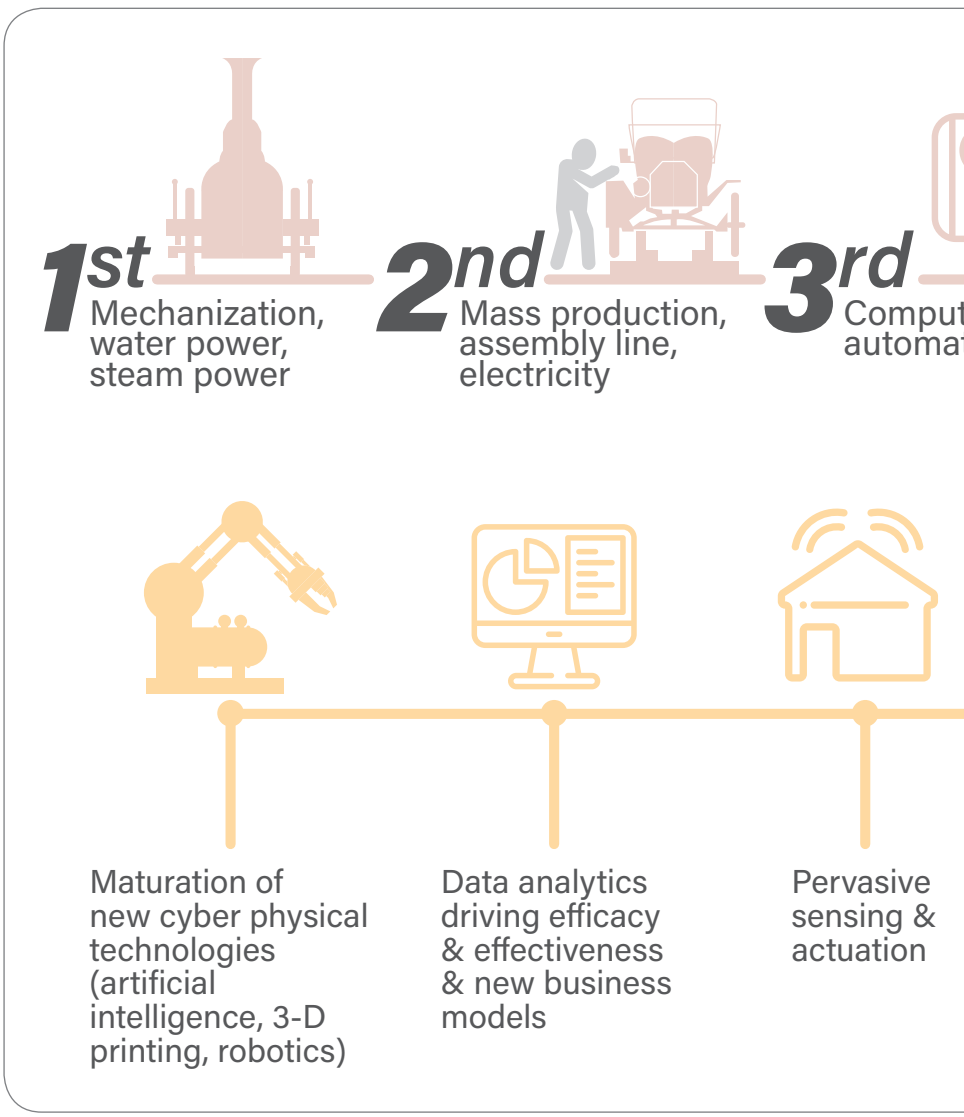
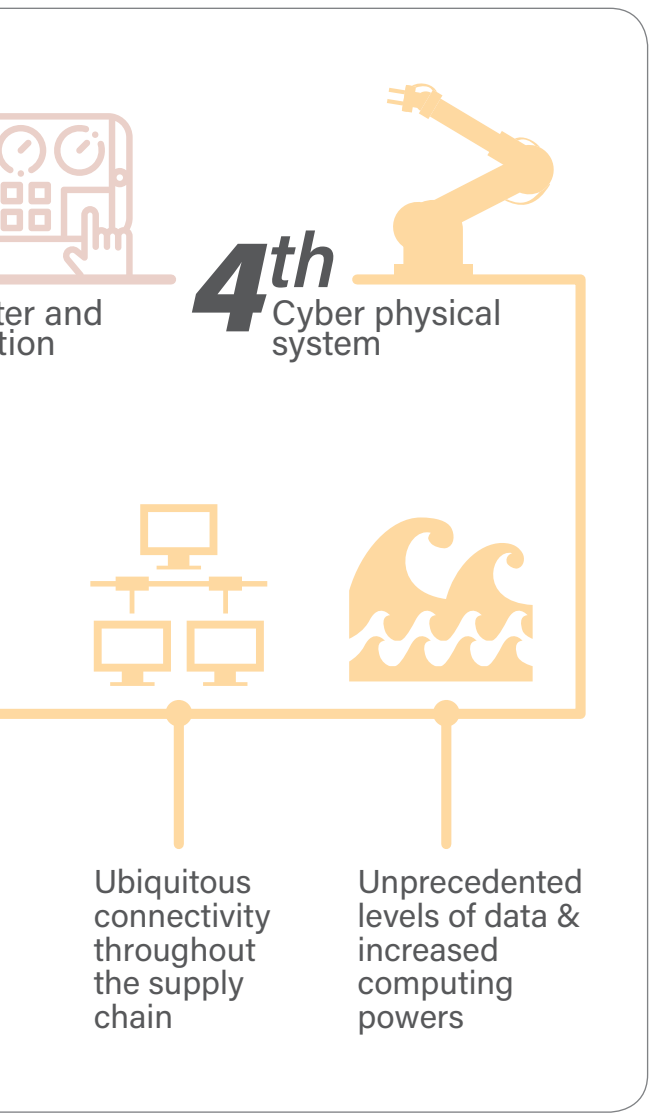
Dr. Ahmad Faisal Mohamad Ayob

Author's Profile

Dr. Ahmad Faisal Mohamad Ayob is a Senior Lecturer at the School of Ocean Engineering, Universiti Malaysia Terengganu (UMT). He received his B. Eng. (Honours) in Mechanical Engineering from Universiti Malaya in 2006 and his PhD in Mechanical Engineering in 2011 from the University of New South Wales @ Australian Defence Force Academy. His research interests include shape design, water robotics and multidisciplinary design optimization. His membership includes C.Eng. of The Institute of Marine Engineering, Science and Technology (IMarEST), Board of Engineers (BEM), The Royal Instititution of Naval Architects (RINA) and Institute of Electrical and Electronics Engineers-Oceanic Engineering Society (IEEE-OES). Industrial collaboration includes activities with PETROSAINS and PETRONAS.



McKinsey & Company | Source: Forbes; World Economic Forum



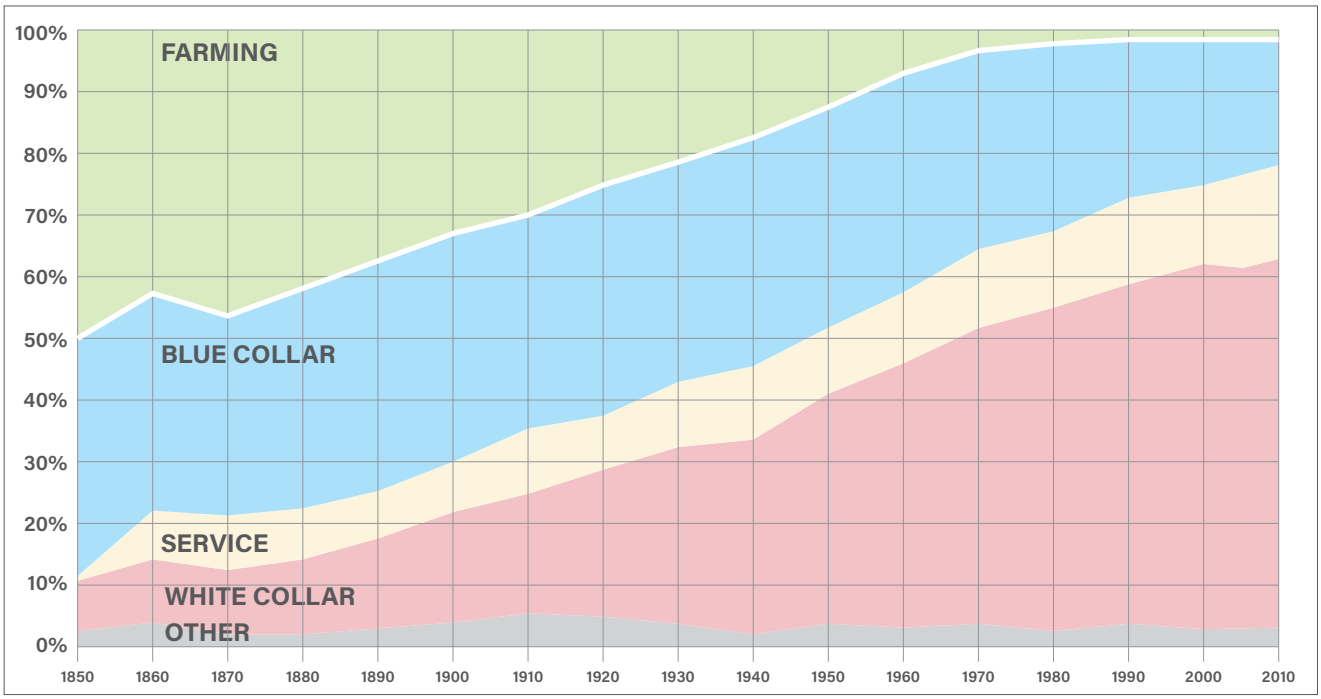
The Tale of Farmers and Blacksmiths

The first industrial revolution occurred at the end of 18th century when mechanical automation began to take shape in the form of steam engine. During this period, skilled workers such as **farmers** enjoyed the benefits of the revolution via the use of steam engines that replaced their working dependencies on cattles and horses. Owing to the rise of mechanisation, the role of manufacturers such as **blacksmiths** became very important to cater for the rising demand in machineries and tools.

Between the first and second Industrial Revolution, the world saw a sharp increase in mechanisation in which creation of machines such as mowers, tractors and harvesters allowed for a **single farmer** to harvest more agricultural produce. The same concept applies to the blacksmiths—a **single blacksmith** is able to produce more machines and tools via the use of conveyor belts and bigger manufacturing machines. In short, both industrial revolutions have both positive impact and negative impact; the industrial mechanizations allows for a greater output in a shorter period of time but at the same time diminishes the number of job opportunities for workers.

As the world moves onwards to the 3rd Industrial Revolution, an interesting observation begins to take shape. In 1850's during the first Industrial Revolution 51 percent of workers in the US were in farming jobs, while only 1 percent of workers are focused on the service jobs. As the years progressed, an inverse trend indicates that at present only 1 percent of workers are in the agricultural industry whereas the percentage of service jobs has increased to 16 percent.

From another perspective the loss of jobs in the agricultural industry are balanced out by the increase of job in the services sector. As the shift towards the use of automation and robotics plays out in the 3rd Industrial Revolution, the workforce have moved towards the non-physical aspects of the industry which caters for data management and decision making. Towards the end of this period, the blue-collar jobs (machine operators, manual labor, assembly and construction) has shown a declining trend due to the emphasis towards white-collar job (professionals and technical, managerial, sales and clerical jobs).



Source: IPUMS-USA, University Of Minnesota, Credit: Quoctrung Bui/NPR
https://www.npr.org/sections/money/2015/05/18/404991483/how-machines-destroy-and-create-jobs-in-4-graphs

Now with the confluence of computing power, greater inter-connectivity between mobile computing and machines and massive data generation, the dawn of the next industrial revolution, termed the 4th Industrial Revolution brings together the automated discovery of knowledge and decision making.

The 4th Industrial Revolution

Driven by four major themes—massive amount of data, increasing computational power, automated discoveries of new knowledge via AI and faster digital to physical object creation/action—the 4th Industrial Revolution is starting to take shape. The impact is now slowly experienced by the current workforce in many industries, akin to the case of the farmers and blacksmith in the previous industrial revolutions. Though the white-collar career path in management offers the chance to progress further, more optimal decision making can be made via the use of AI, in which fundamentally the machines learns and mimic human autonomy in a more efficient fashion.

Taking an example from supply chain management (SCM), Tungsten Network [1] has estimated that valuable time and money is wasted in trivial supply chain related-task that are conducted operationally by humans. The report accounts that a loss equated to 6500 hours per work year, which covers for manual paper-based process, manual, invoice process (chase, discrepancies and errors) and manual response to supplier inquiries.

It does sound like a nightmare for the white-collars workforce when AI is fully operational, eliminating all the inefficiencies due to time taken to finish routine works. However, the use of AI does not necessary eliminates the number of people in the workforce, but rather opens up the opportunity to do more with the current capacity of people in the organisation. In this perspective, there are two main strategies than can be adapted [2];

a. Using AI to assist executives in terms of virtual assistant, data analysis and software solution to remove human bias,

b. Complete automation of task that does not require any human intervention, but rather targeted monitoring by human.

Similarly with the case of the farmer in the 1st Industrial Revolution, it can be hypothesised that via the use of AI, one white-collar executive may be able to run multi-disciplinary tasks that traditionally will require multiple person for execution, hence in return enhancing productivity and profits of the company. As an example in the case of ship design, a naval architect are able to generate multiple candidate designs upon receiving the client requirements via

the use of AI and automation. The extended case would be a single naval architect handling multiple projects (containership, high speed craft, yachts) through the assistance of AI.

Winning and Losing in the Cyber-Physical Era

Although the discussion above offers two strategies on how to reposition humans in the 4th Industrial revolution workforce, an Oxford study conducted by Frey and Osborne in 2013 [3] predicted that 47 percent of jobs could be automated by 2033. In January 2017, McKinsey has reported that AI-driven tasks contributed to 5 percent of job losses in the market. The most affected industries are Operations (Manufacturing, SCM and R&D), Information Technology and Customer Service.

Apart from that, in 2016 Google has announced that their self-driving car has clocked 3 million miles driving on public road, while their competitor Waymo recorded 2.5 billion miles of self-driving data in 2017. In a nutshell, based on the reported evidence, there exists some potential threat to human workforce where AI and automation will replace jobs involving routine work.

However to date, the adoption of cyber-physical activities involving automation of tasks to replace humans are still in its infancy. While inter-connected devices via internet are ubiquitous, data security and understanding the underlying AI black box is still a major concern that hinders the adoption of the four themes offered by the 4th Industrial Revolution. There are still serious concerns on this as recently in March 2018, Reuters reported a self-driving Uber car hit and killed a woman crossing the street in Arizona, marking the first fatality involving an autonomous vehicle possibly dealing a potential blow to the AI technology that is expected to transform transportation [6]. Studies between the last 3 years indicate that most of the adoption of AI and automation are targeted on improving the efficiency and profits of the company while retain the current workforce. To this end there are several key strategies that can be adopted:

a. Incorporate AI on activities that have immediate impact on revenue and cost. This is particularly useful for mapping the catalog to potential customer based on the habitual browsing record e.g. online shopping (Amazon, Lazada) or music services (Apple Music, Spotify).

b. Producing more outputs from the same number of staff using AI. At the current stage of infancy, one of the implementation of AI are in the form of IT support. Through the availability of Natural Language Processing, a single support staff may deploy tens or hundreds of chatbots to cater for live questions and answer activities between the staff and customers.

c. Focusing on the computer-to-computer interactions in IT, finance and accounting. Although the integration between different systems is not a trivial task, process such as contingency analysis, resource allocation and project management can be scheduled dynamically via the use of AI, in which all every possible facet (weather, sentiment analysis, geopolitical situations) can be considered to assist in decision making.

Just like the previous Industrial Revolutions, the 4th Industrial Revolution would take some time to stabilise. This is contributed by several factors, namely; ambiguous economic incentives, the need to invest in new grounds, skill gaps to cater for the bleeding edge of current technology, lack of confidence from investors, and lack of standardisation [7]. These are the elements that revolve around mature-stage businesses which cling to the tried and tested paradigms, *if it's not broken, don't fix it.*

However, observing the fast-paced behemoth of the Internet era such as Google and Facebook, the rise to expansion began with the slogan, move fast and break things. Regardless, the tale of Farmers and Blacksmiths shall hold true in the current Industrial Revolution and beyond.

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7. *myForesight Magazine, MIGHT, June 2016*

VIEWPOINTS

Realising SBSR Industry 4.0 BV Project Management Tool

by:

Noor Asha Bin Abdul Rashid

Author's Profile

Mr. Noor Asha graduated with B. Eng (Hons) in Mechanical Engineering (Marine Technology) from Universiti Teknologi Malaysia. He started his career as a Mechanical Engineer with the Sime Sembawang Engineering, in 1993. In 1995, he started the journey as a Class Surveyor by joining Lloyd's Register (LR), involved in the Classification & Statutory Surveys of ships in operations, new ship constructions, pressure vessels and other industry related inspections. He was part of the project team for the construction of 2 MISC LNG ships (GTT No.96 membrane Cargo Containment System) at MHI Nagasaki in 2002~2003.

He joined BV in 2004 as Senior Marine Surveyor and was sent to South Korea in June 2006 as the BV Project Manager for construction of 3 MISC LNG ships (GTT Mark III cargo containment system) at Samsung Heavy Industries (SHI) at Geoje, Korea and 2 MOL LNG ships (GTT III with DFDE engines) at Hyundai Heavy Industries (HHI) at Ulsan and Mokpo, South Korea from 2006~2009.

Upon returning to Malaysia in July 2009, he was entrusted to be in-charge of all BV new shipbuilding projects in Malaysia and was promoted 2 years later as the New Construction Manager for BV Malaysia.

He is a Chartered Engineer (C.Eng) with the UK Engineering Council, a committee member of the MJB RINA-IMarEST since 2010, Hon. Treasurer of the MJB (2012~2015) and a Fellow of RINA (UK).

These past few years have seen a steady introduction of technological advancements in the manufacturing environment. Industry 4.0 is helping to reinvent the sector with data-rich, streamlined and efficient smart production processes with the increasing rise of '*smart factories*'. Within this shift, new technologies such as *IoT, Cybersecurity, big data, virtual reality, cloud computing* and *autonomous robots* are slowly making their presence felt in the manufacturing industry. The ship building and ship repair (SBSR) industry is also poised to follow the same trend in embracing Industry 4.0.

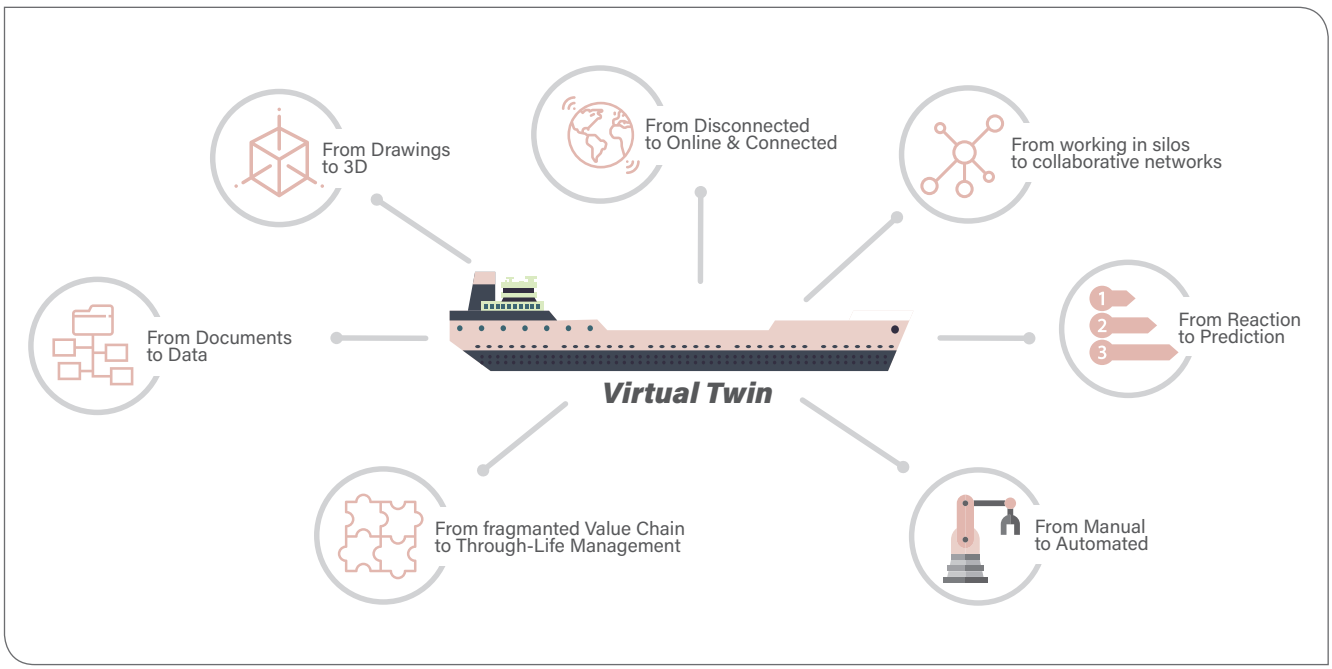
Industry 4.0 In The Shipyard

The benefits of implementing *Industry 4.0 technologies in any industry, specifically in the SBSR industry are very encouraging*—it is projected to reduce 50 percent of execution time, lower engineering costs by 30 percent, and provide up to 50 percent higher throughput across a particular organisation.

Thus, the potential of *Industry 4.0* cannot be ignored. It is vital for the SBSR industry to join this revolution in keeping pace with the competition and demands of the industry across the entire lifecycle of the ship building–from design to its decommissioning or scrapping.

Whilst the design and construction activities can be integrated with Industry 4.0 technologies in a straightforward manner, the operational activities will require a different approach or treatment. The appropriate name can be *Shipping 4.0* and will encompass amongst other topics such as:

- Lower OPEX: less crew, improved fuel efficiency, reduced maintenance.
- Improved safety: lower probability of human failure, less crew exposure to hazardous situation.
- Reduced environmental impact: emissions, probability of spills.



- Fleet management optimisation (Asset Integrity Management)
- Cyber-security

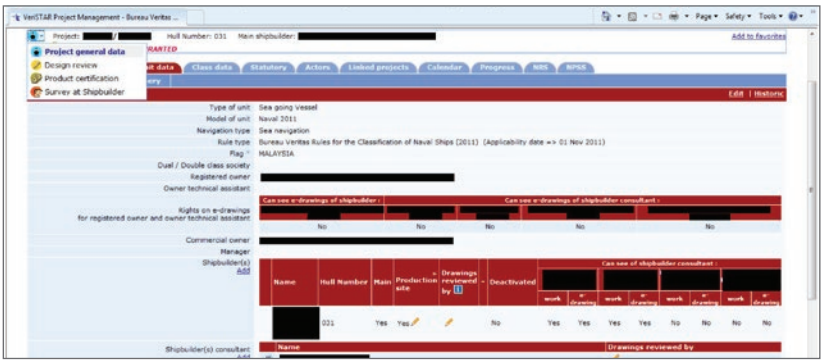
Design Appraisal With Digital Twin

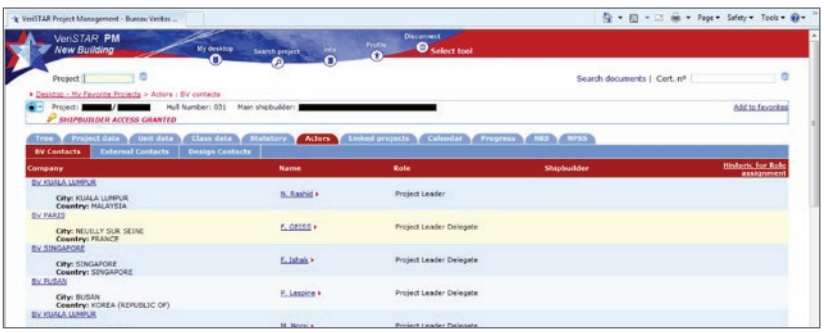
An example of the Industry 4.0 application in the SBSR industry are tools developed by Bureau Veritas to support the aspirations of *Industry 4.0* and *Shipping 4.0*. Known as *Digital Twin*, it enables a design appraisal of plans and documents to ensure accuracy and ensure efficiency in all aspects of ship building.

VERISTAR Project Management (VPM)

Bureau Veritas designed a project management tool named **VERISTAR Project Management (VPM)** due to an increasing number of stakeholders involved in new construction activities, multiplicity of rules and regulations and client request for transparency in all related activity. A web-based collaborative platform for project management, all stakeholders can review and exchange information during the project lifecycle—such as design review, product certification and survey of construction. All data is available online in real-time through a single tool and a centralised database for the internal project team (project managers, surveyors, administrative staff) as well as external clients (shipyard, ship owner, manufacturers/suppliers).
For each project, based on the contracts, the system can identify

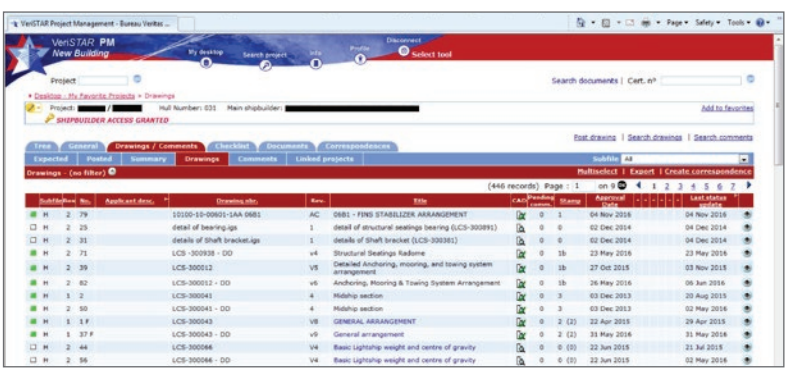
and generate all project actions. The project manager, based on additional clients' requirements and/or specific conditions, may customise the project. The project manager will have ownership of the tool to manage the assignment of different actors and follow up of the process.
When using VPM, access to the projects' files, status of design review, product certification and survey of construction is available to authorised persons through a personalised desktop. Meanwhile, access to comments and their status are subject to a previous agreement between the three concerned parties (shipyard, owner, Bureau Veritas).

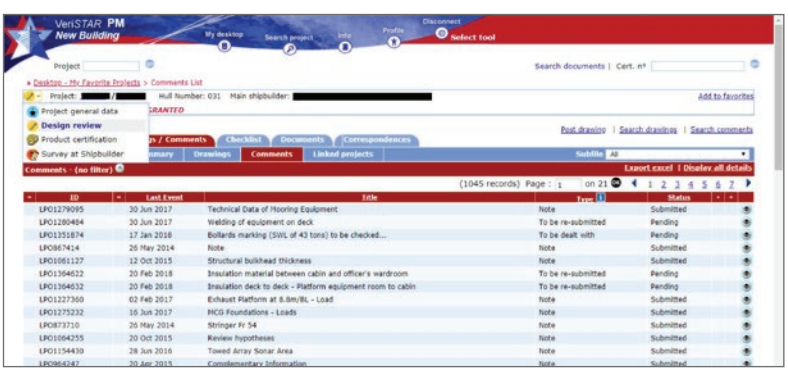




Design Review

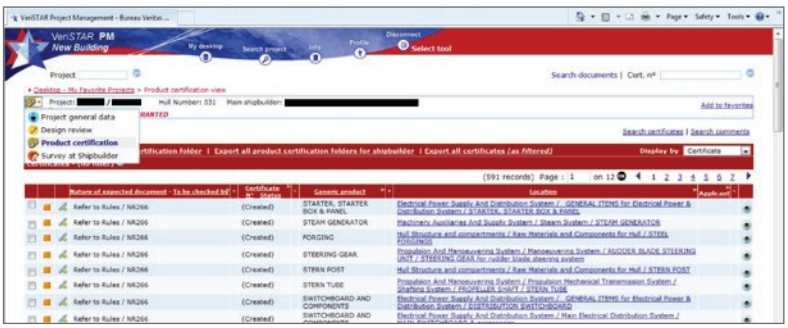
All drawings submitted by shipyard/designer, either through the system (e-drawing) or by mail, are individually identified by incoming/outgoing references and its approval status. During the review process, all comments on drawings transmitted to shipyard/designer, are identified within the project and will be followed until a final decision has been reached. All required drawings are clearly identified and indicated once the review has been completed.

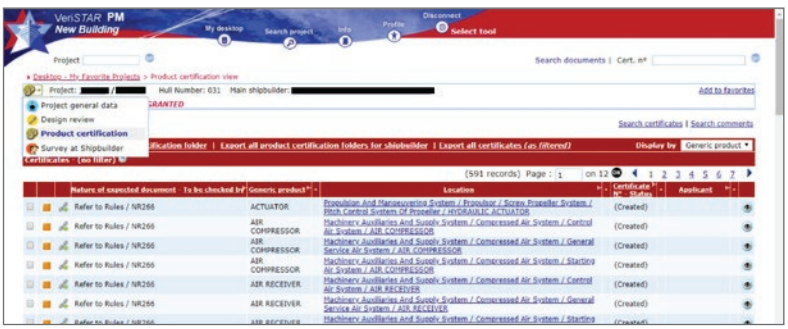




Product Certification

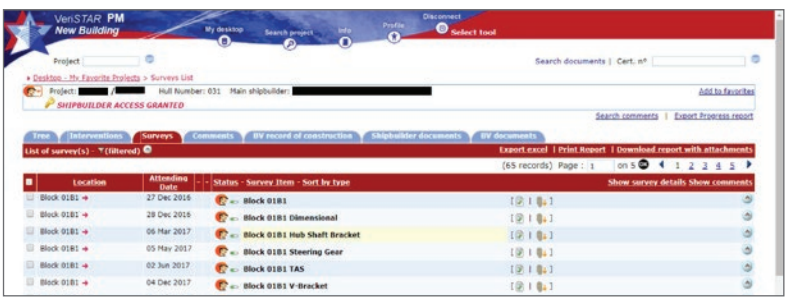
For each product (material, equipment) that is subject to product certification, an individual file is created. The file contains definition of the product as well as the rules/requirements. The certification may be initiated either by the project manager by assigning the relevant BV Centre or the local office when informed by the manufacturer/ supplier. In case the products are subject to design review, then it will follow the same procedure as for the ship's drawing. During the procedure, the different milestones may be indicated, periodical report issued and at the end an electronic certificate is issued.





Survey Construction

The system identifies all surveys and actions to be carried out. The status of attendance as well as eventual comments (by the attending surveyor), issued to the attention of shipyard, is registered in an individual file. For follow up purposes, comments including design reviews are available in a dedicated view. The handling of comments follows the same procedure as in design review. Unscheduled surveys or patrolling are also recorded accordingly in the VPM.



Conclusion

The *importance of the Industry 4.0* and its application in the Shipbuilding and Ship Repair Industry is something that needs to be nurtured and embraced by all the relevant parties involved. With the correct approach, consistent utilisation and continuous improvement, the positive effect could be achieved and felt by those in the marine industry.

Patent Search:

Ship Building & Ship Repair Technologies

by:

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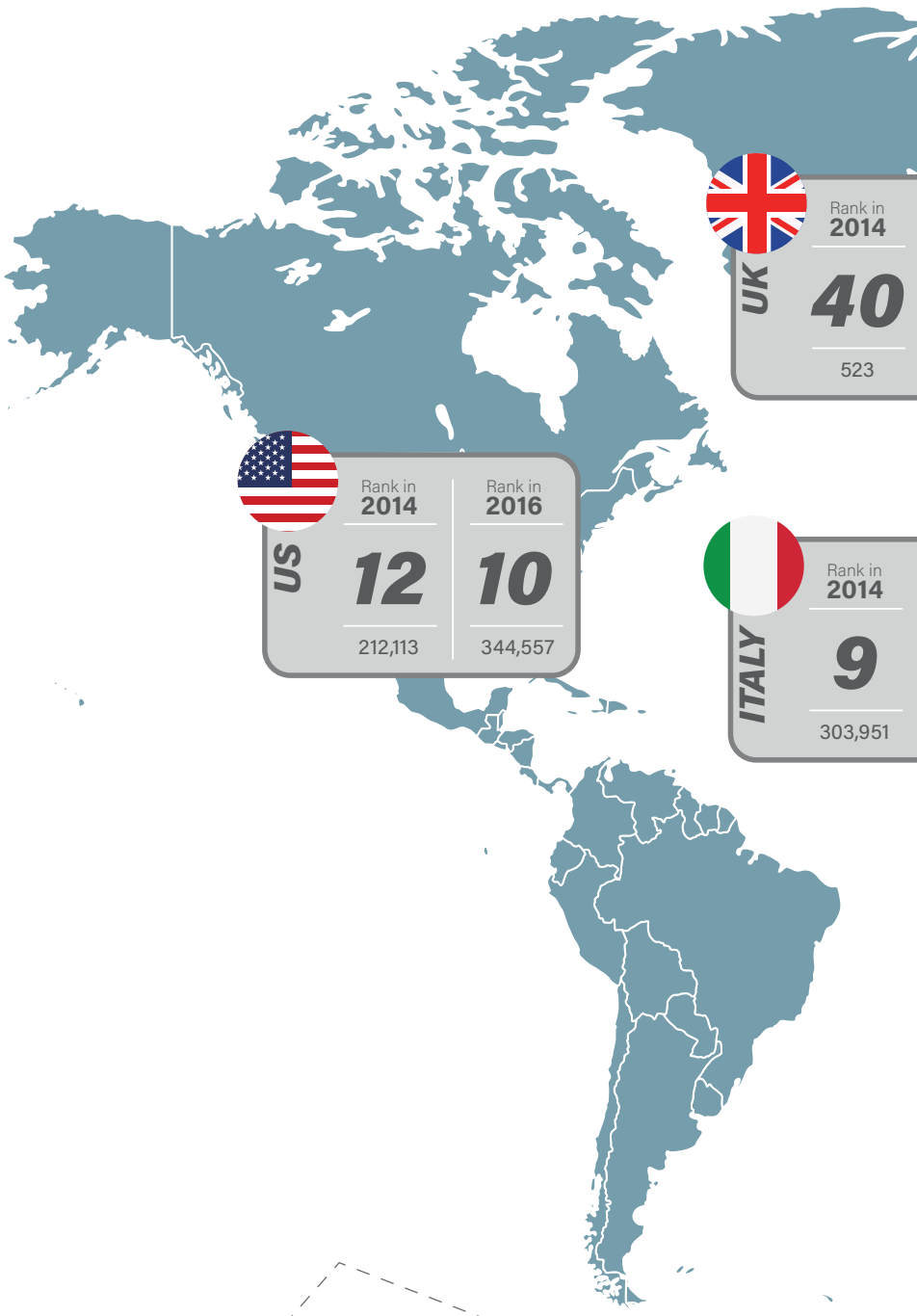
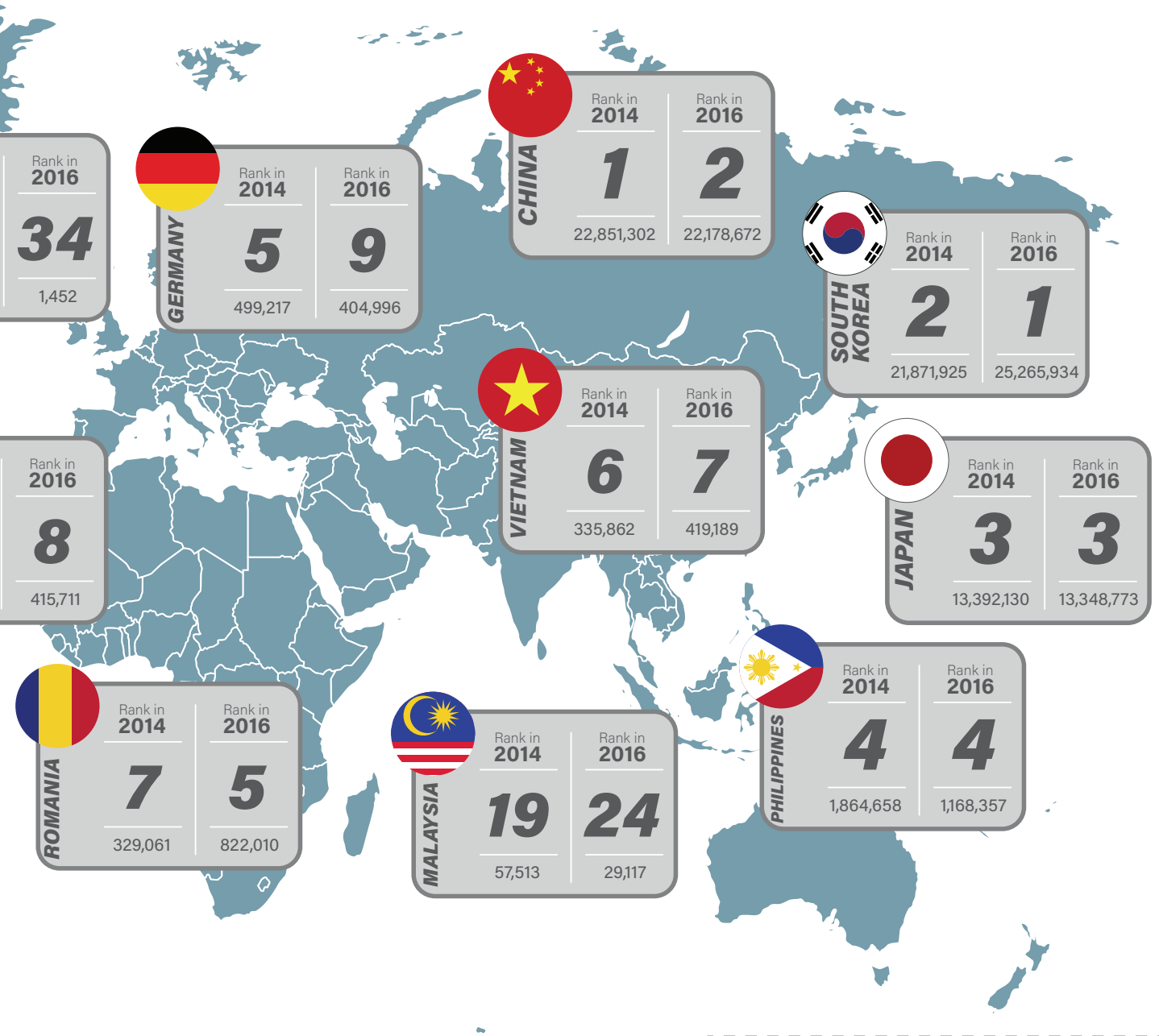
Patent is a way to protect inventions for the benefit of its creator. Utilising patent documents in bibliometric analysis helps in understanding the past and present and ultimately help in anticipating future inventions.

In shipbuilding & ship repair industry, there are movers that are already embarking on inventions that is related to fourth industrial revolution technologies. Bibliometric analysis on the patent documents filed have identified future technologies that are being developed in shipbuilding & ship repair industry. The analysis indicates technologies like big data, IoT, cloud computing, robotics, virtual reality & augmented reality and 3D printing are slowly being adopted.

This infographic is intended to identify fourth industrial technology trends and their application in shipbuilding & ship repair industry.

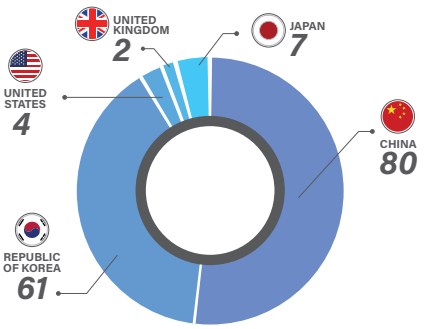


LARGEST SHIPBUILDING NATIONS BASED ON COMPLETIONS IN GROSS TONNAGE (IN 1,000s)

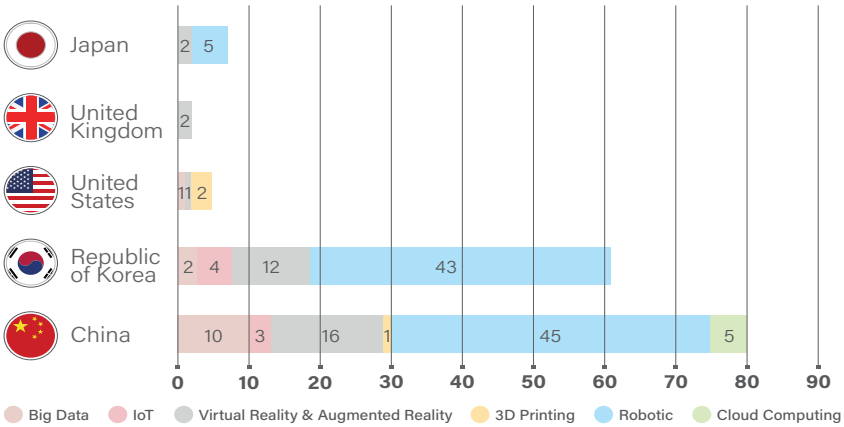


Source: UNCTADSTAT database, MIGHT

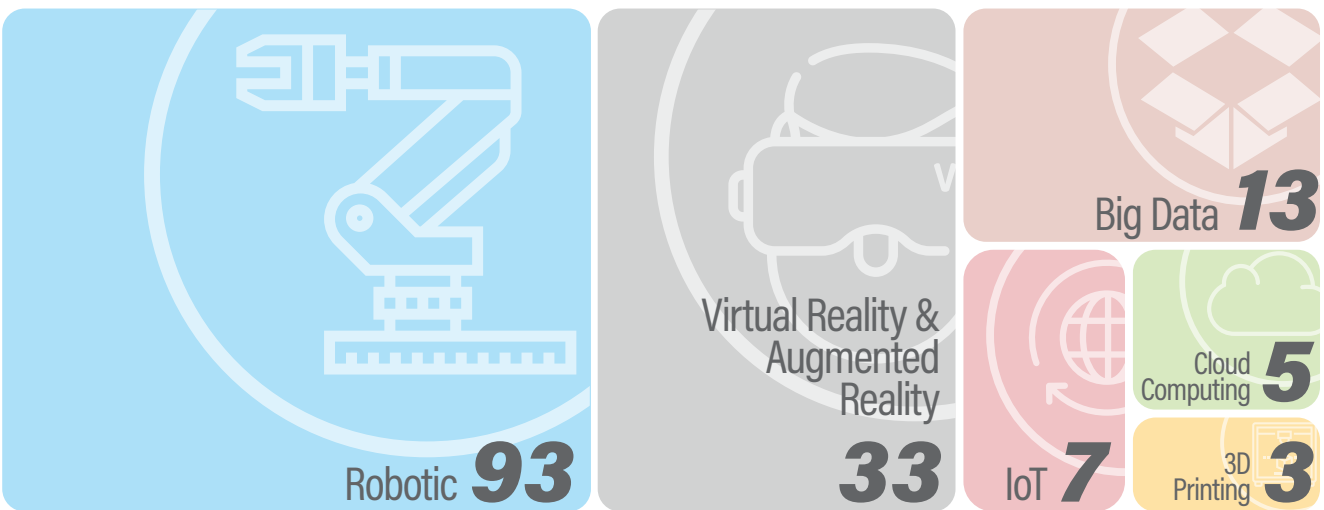
LARGEST SHIPBUILDING NATIONS WITH PATENTS IN 4TH INDUSTRIAL REVOLUTION TECHNOLOGY



COUNTRIES THAT HAVE STARTED TO INVENT TECHNOLOGIES RELATED TO 4TH INDUSTRIAL REVOLUTION



Identified SBSR Technologies related to 4th Industrial Revolution



THE INVENTIONS ARE SPREAD ACROSS MANY AREAS WITHIN SBSR INDUSTRY

Robotic

1. Welding robots
2. Inspection & monitoring
3. Cleaning & rust removing
4. Equipment sorting

Internet of Things

1. Safety management platform
2. Save navigation
3. Satellite communication - to improve ship and shore communication

Cloud Computing

1. Transmission of digital information

Virtual Reality & Augmented Reality

1. Training & simulation - life saving, cabin simulation, complex operational training, ship motion control testing moderate the magnitude of oscillation of the ship
2. Information & entertainment
3. Ship design - to improve quality of construction, operation, maintenance, and job design
4. Equipment for shipping

3D Printing

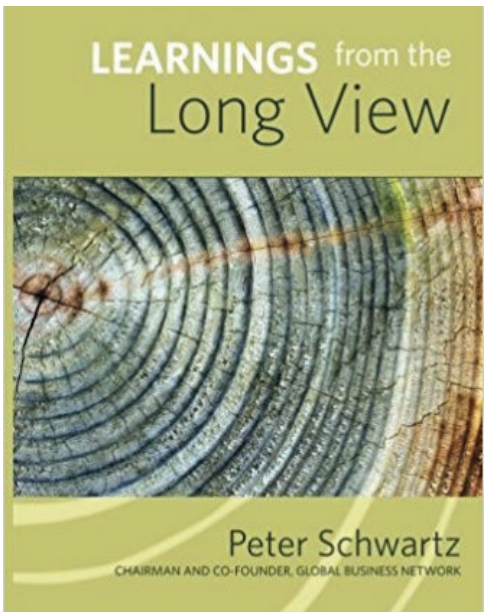
1. Method to print the whole ship
2. Research on materials that are suitable for 3D printing application in context of SBSR industry

Big Data

1. Improve communication system e.g. Traffic command, ship and shore interconnection, acquisition efficiency, traffic control ship ad-hock network
2. Monitoring ship system & energy efficiency
3. Data processing
4. Storage & structure for managing ships materials

Source: WIPO database, MIGHT

myForesight BOOK CLUB



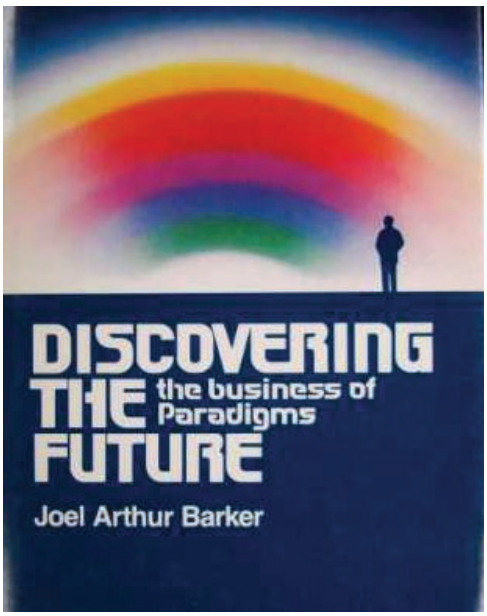
Learnings from the Long View

ISBN-10 : 1466305045
ISBN-13 : 978-1466305045
Author : Peter Schwartz
Publisher : CreateSpace Independent Publishing Platform, 2011

Learnings From the Long View, a new, short and illuminating book by Peter Schwartz, an American futurist and co-founder of the Global Business Network (GBN) looks back to Schwartz's 1991 book, *The Art of the Long View* (Doubleday, 1991) which is considered by many to be the seminal publication on scenario planning, voted as the best all time book on the future by the Association of Professional Futurists.

While his first book helped spur the widespread adoption of scenario-planning methods, his second book shares GBN's mistakes as well as successes, what turned out right in the original "The Art of the Long View," (e.g., the rise of the global teenager, two out of the three scenarios for 2005), wrong (e.g., the transformative power of the Web) and what may be to come: "the next great global driving force" and "three scenarios for the year 2025."

Peter's fresh view of the future focuses on systemic crises in a complex and interconnected global economy. Once again he does a wonderful job of offering three alternative views that get your mind working.



Discovering the Future:
The Business of Paradigms

ISBN-10 : 0932183018
ISBN-13 : 978-0932183019
Author : Joel Arthur Barker
Publisher : ILI PRESS, 1989 (third edition)

Change is the key ingredient for shaping the future and trends have been the most common focus for the discussion of change: Joel Arthur Barker shares his insights on another kind of change that is equally important. *Discovering the Future: Business of Paradigms* examines that type of change—that causes revolutions, stops trends in their tracks and creates whole new trends.

Barker is president of Infinity Limited, Inc., a company that has developed state-of-the-art strategic exploration tools for corporations and institutions and he has been studying and speaking on this kind of change for the past 12 years. In this book he defines the concept of paradigm and elaborates at length on its key characteristics and effects. He also highlights the importance of paradigm shift, pliancy and anticipation.

This book is *not* just a list of predictions. It is a discussions about a key change concept that can be put to work immediately and improve our ability to shape our own future.

Courtesy Visit by Director of INTAN

MIGHT Partnership Hub, Cyberjaya

2nd May 2018

MIGHT-myForesight® received a courtesy visit from Datuk Dr. Rose Lena Binti Lazemi, Director of National Institute of Public Administration (INTAN) and delegations today. The visit followed by a kick-off meeting on collaboration between both organisations on the upcoming Civil Service Conference planned to take place in October this year.

With the theme '*Negaraku*: Creating the Future', the Conference aim to gather and share insights from public service practitioners and the stakeholders. This first of its kind event is expected to create and alleviate awareness towards materialising Digital Government of the future.

Want to be part of the team? Feel free to contact us at Foresight@might.org.my.

MYApprenticeship: 4th Industrial Revolution & Future of Work

PWTC, KL **20th April 2018**

MyApprenticeship is a brand-new initiative from NBOS aimed and focused at the placement of youth, women, diploma and/or degree graduates and current workers to take part in the public and private apprenticeship training in order to acquire knowledge, skills and valuable working experience whilst increasing their employability to enter, stay and progress in their line of work. Apart from this, employers stand to gain increased access to recruit potential workers for their organisations.

During the launching of MYApprenticeship at PWTC, myForesight® shared insights on how the youth can leverage on Industry 4.0 through presentation entitled '*Industri 4.0 - Cabaran dan Peluang Golongan Belia*'.

UNITAR Economic Forum

UNITAR, Selangor **9th April 2018**

In line with the government's effort on sustainable development, UNITAR's Faculty of Business Technology and Accounting recently organised the UNITAR Economic Forum, a platform to raise awareness and understanding among their students.

Present were Plus Malaysia Bhd chairman Tan Sri Mohd Sheriff Mohd Kassim, Telekom Malaysia Bhd chairman and non-independent non-executive director Tan Sri Dr Sulaiman Mahbob, Institute for Democracy and Economic Affairs president Tunku Zain Al-'Abidin Tuanku Muhriz and MIGHT Senior Vice President Rushdi Abdul Rahim. They were panel speakers for the forum. The session was moderated by Universiti Kebangsaan Malaysia's Institute of Ethnic Studies principal research fellow Professor Datuk Dr Denison Jayasooria.

The panel speakers discussed and deliberated on the situation, challenges and advancements relating to sustainable development, including economic growth in the country.

Digital Government for Transformation towards Sustainable and Resilient Societies

Singapore **5th April 2018**

Digital Government for Transformation towards Sustainable and Resilient Societies was organised by UNDP Global Centre for Public Service Excellence with GovTech Singapore and United Nations Department of Economic and Social Affairs (UNDESA) Division for Public Administration and Development Management (DPADM) United Nations Project Office on Governance (UNPOG). The event was held from 2nd to 6th April in Singapore and focuses on the importance to build a resilient society against the increasing risks and shocks of various kinds—including economic, social, environmental, and security.

Panel Discussion on Technology Foresight and Government Strategy with the title 'Foresight and Government Strategy', myForesight®, represented by Mr Rushdi Abdul Rahim, shared the Malaysian's experience on foresight, connection to digital transformation and how Malaysia is responding on the 4th Industrial Revolution.

Presenting on myForesight® activities to MBA students from China Europe International Business School

MIGHT Partnership Hub, Cyberjaya

28th February 2018

As part of the EMBA programme, 38 Global EMBA students from China Europe International Business School (CEIBS) and IESE Business School, Barcelona organised a visit to MIGHT-myForesight® for their overseas modules. The overseas modules offer participants first-hand knowledge of the respective country, in terms of the economic landscape and challenges faced by selected companies.

MIGHT-myForesight® shared our experience on high technology outlook and our partnership spirit in bringing in collaborations between government and industry to develop and strengthen the local high technology ecosystem. MIGHT-myForesight® are represented by Mr Abdul Halim Bisri and Mr Norsam Tasli Mohd Razali.

ForesightClub@UTHM 2018 Series

MIGHT Partnership Hub, Cyberjaya

2nd March 2018

The 2018 academic year is kick-started with the briefing session for 20 pre-selected students of Department of Technology and Management, Faculty of Technology Management and Business, UTHM. ForesightClub is part of myForesight® outreach program with undergraduate students that aims to spread the knowledge and understanding of Foresight, the tools and its potential usages.

This time around, we introduce the usage of 'Future Deck' to assist and stimulate thinking on selected research topics that will be undertaken by the students for their Final Year Project. Future Deck is a compilation of megatrends with supporting keywords, facts and figures classified under the five perspectives – Social, Technology, Economic, Environment, Politics as well as Values. These megatrends expected to assist in developing and strengthening the research findings and discussions.

SHIPYARD 4.0:

Adapting to the Advancement and Convergence of Technologies

by:

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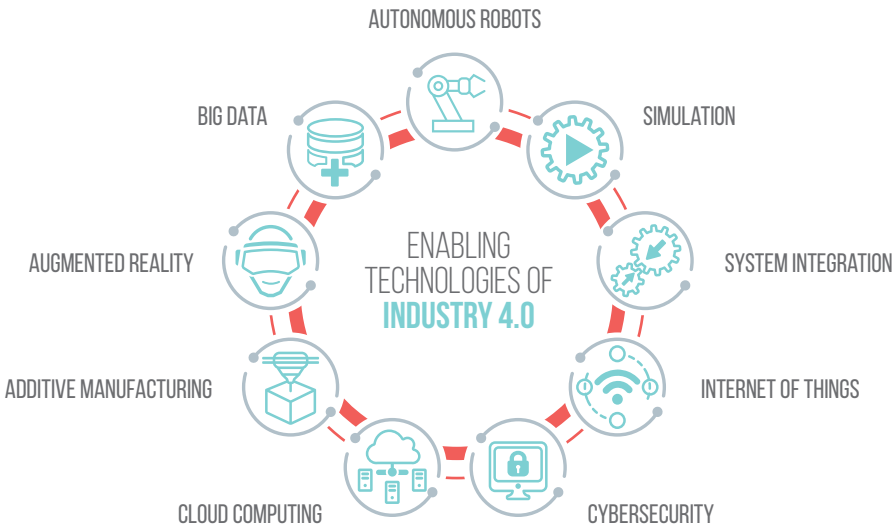
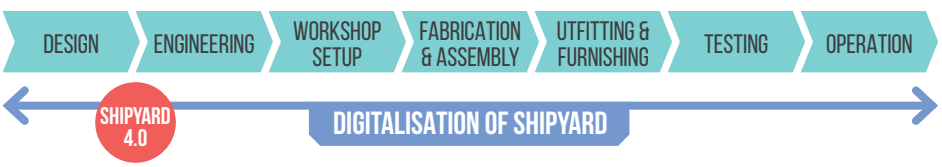
Shipping organisations face intense pressure to operate in a more efficient and profitable manner while catering to the increasingly sophisticated demands of their customers. The advent of Industry 4.0 has introduced a new way of work for the ship building and repair sector, allowing the integration of physical and virtual world to optimise production within the industry. The digitalisation of the shipyard has the potential to be a revolution for the industry.



Value Chain of Shipbuilding & Ship Repair Process



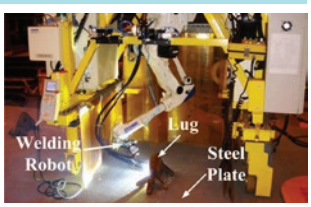
Industry 4.0 in SBSR

Examples in Leading Countries

Advancements in IoT, Work Automation, System Integration and other I4.0 enabling technology will further elevate productivity of the workers.

ROBOTICS WELDING SYSTEMS

Kleven Industries in **Norway**, has invested in a new robot welding systems that is precise and can work 24 hours a day.

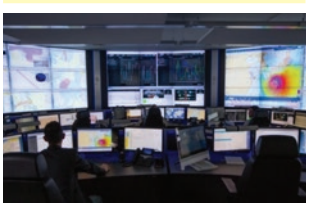


Automatic lug welding system with an overhead type robot manipulator was developed by Daewoo Shipbuilding and Marine Engineering DSME, **South Korea.**

DIGITALISATION OF SHIPYARD

BAE Systems Australia plan to transform **Australia**'s shipbuilding industry into a digital shipyard in Adelaide.

IOT, SENSOR COM. & BIG DATA ANALYTIC



2MB of data are collected everyday for each vessel by Carnival Corp, in Hamburg, **Germany**. The system monitors 37 cruise vessels. The data are then are used for immediate and longer-term analyses to identify trends and optimise forecast models. This allows for predictive analysis to improve maintenance of vessels and their engines, optimizing resources and automatically predict efficient routes.

VIRTUAL REALITY

Tsuneishi Shipbuilding in **Japan** is using virtual reality simulations to upgrade the coating process.

3D PRINTING

South Korea has invested in a five-year, $20 million research project for 3D printed ship development in Ulsan.

SYSTEM INTEGRATION

Lurrsen Shipyard in **Germany** put a complete system integration on board of their defence ship.

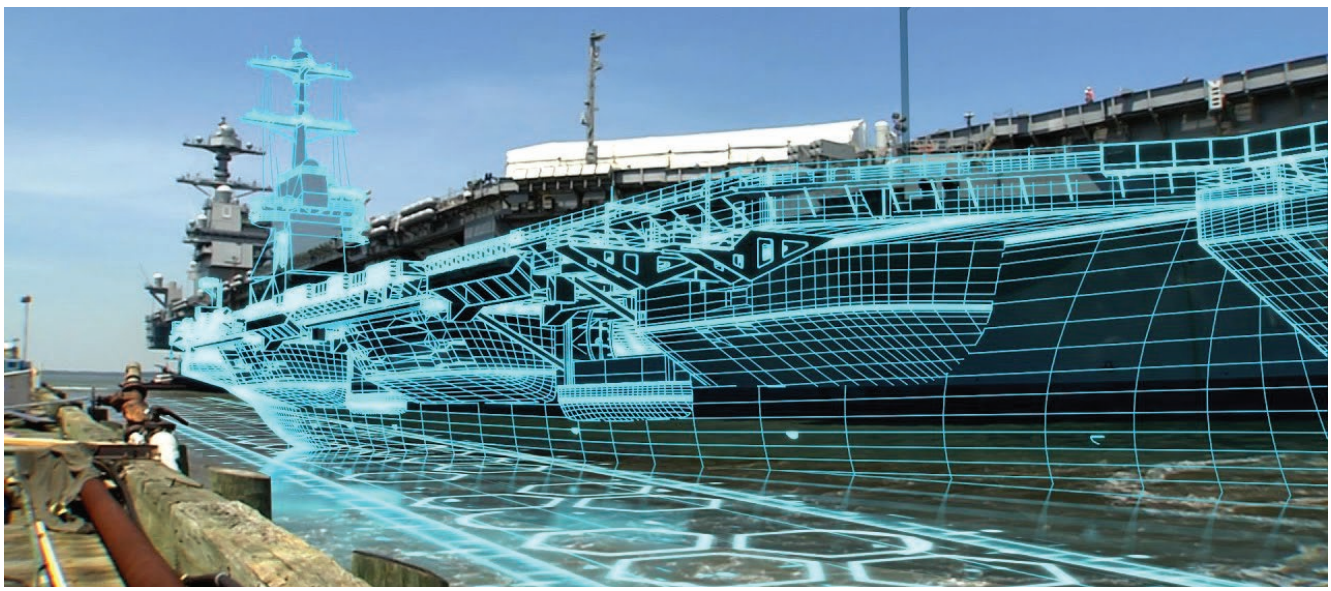
Shipyard 4.0 Concept:

Australia:

Ship design software and shipyard production software facilitate digital simulation and optimisation of shipbuilding operations and processes.

The Siemens Product Lifecycle Management (PLM) for Shipbuilding solution enables a holistic approach to optimising shipbuilding. PLM for Shipbuilding improves total enterprise collaboration, synchronisation and productivity, as well as lifecycle ship service and support, by optimising shipbuilding processes.

Source : Siemens



SHIP DESIGN AND ENGINEERING

PLM for Shipbuilding takes advantage of the latest design technology to accelerate development of modern ships and offshore platforms, driving shipbuilding innovation and facilitating global collaboration. Using **ship design and engineering software**, designers and engineers can create and maintain 3D models in context of key workgroups, such as major ship modules, compartments, systems and locations.

DIGITAL SHIP CONSTRUCTION

By deploying **shipyard production software** it is digitally simulating complete ship assemblies and their associated processes and can optimise process flows across the shipyard before production begins, implement lean practices at the start of new programmes and avoid the cost of building expensive physical models.

SUPPLY CHAIN MANAGEMENT

Shipyards rely on a global supply chain of partners and suppliers to help design, develop, manufacture and test new ship concepts. PLM for Shipbuilding allows shipbuilders to exchange data reliably and flexibly with suppliers and partners, some of whom may use a different authoring tool. It also **synchronises supply chain operations** by ensuring the right parts are available at the right time.

SHIP SERVICE AND SUPPORT

Shipyards are also focused on managing sustainability requirements and achieving continuous improvement in fleet availability, reliability and overhaul cycle reduction. PLM for Shipbuilding enables shipyards to easily develop and publish all handover documentation included in the vessel specifications and contract. Fleet owners and repair yards can better manage all maintenance and regulatory reporting requirements, service planning, execution, service processes, and metrics monitoring and reporting in a **single environment/single source of knowledge.**

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Map The Future

As a strategic policymaker or stakeholder, you can help map out a desired future for Malaysia.

This is an invitation by myForesight to build a collective future. Do you find this magazine thoughtprovoking? Do you think we could have done better? Perhaps you would like us to cover a specific angle in the study of Foresight.

Or maybe, you would like to contribute articles to myForesight magazine? Send your feedback and articles to foresightinternal@might.org.my

Website: www.myforesight.my

We look forward to hearing from you.

myForesight team