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red-hot port matters

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ICO expands in Zeebrugge

International Car Operators (ICO) has signed a concession agreement with the Port of Zeebrugge for a 54 ha-big expansion of the Bastenaken vehicle terminal. In total, ICO will cover 300 ha of land in the Belgian port. The expansion will also allow to connect the Hanze and Bastenaken terminals. As a result, handling up to 16 vessels simultaneously will be possible.

Koper buys Konecranes' RTGs

The Slovenian port has placed an order for five electric cable reel auto plug-in rubber tyred gantry (RTG) cranes from the Finnish manufacturer. The new 40t of lifting capacity machinery, scheduled for delivery in summer 2019, will feature a number of eco-friendly and driver-assistance solutions, including regenerative power feedback to the local grid, LED lights, auto-steering, auto-terminal operating system reporting, auto-positioning, and stack collision prevention. "Starting in 2004, Luka Koper acquired over 20 Konecranes RTGs over 15 years of strong collaboration that allowed us to build a trusting relationship. It was a good decision to choose Konecranes as our crane supplier. With each new RTG crane delivery, we received new crane functionality and the sales support is excellent," Edvin Boskin, Technical Manager, the Port of Koper, said. Antti Halonen, Sales Manager, Konecranes Port Solutions, added, "Luka Koper has been our customer for over fourteen years. I'm happy that our relationship with them continues to be strong. Koper has granted Konecranes its Investment Supplier of the Year award, for the second year in a row. It's an honour to receive this vote of confidence in our container handling equipment and how we support Luka Koper in its business."

A shipyard-academia co-op

Meyer Werft, a Papenburg-based group of shipyards, and the Dutch University of Groningen have teamed up to expand the interaction between the business and science worlds. The two will launch the Innovation Lab Papenburg – Groningen 2018-2050, which will focus on issues related to IT, sustainability, and energy efficiency. Among other things, the Lab's first projects will be focused on building an intelligent value chain in the cruise industry, establishing a globally recognised and standardised reporting method in relation to cruise ship sustainability standards, as well as researching the fields of innovative fuels, efficient drive systems, and renewable energy generation. The so-called "future spaces" will be set up in both Papenburg and Groningen from where all the project activities will be coordinated.

Kongsberg to take over Rolls-Royce Commercial Marine

The deal will include the acquisition of the marine products, systems, and aftermarket service businesses, but will not cover Bergen Engines and Rolls-Royce's Naval Business. The parties have agreed on a value for Rolls-Royce Commercial Marine of £500m (on a cash and debt free basis and with working capital at an agreed level). The final purchase price, however, will be determined based on the Rolls-Royce Commercial Marine's cash, debt, and working capital at the time of completion of the transaction, which is subject to clearance by regulatory authorities in several jurisdictions. Rolls-Royce Commercial Marine, represented in 34 countries, has approx. 3.6k employees. Combined, the two companies have the equipment and deliveries associated with around 30k vessels worldwide. "The maritime industry has over the last years experienced demanding market conditions, and even though there is still uncertainty, we expect the market to be facing growth with technology and innovation being key drivers. For more than 200 years Kongsberg has been a pioneer for high technology industrial development with a long-term perspective. The acquisition of Rolls-Royce Commercial Marine is in line with our growth ambitions," Eivind Reiten, Kongsberg's Chair of the Board, commented. Geir Håøy, CEO and President, Kongsberg, added, "The acquisition of Rolls-Royce Commercial Marine makes us a more complete supplier to the maritime industry. The maritime industry is becoming increasingly globalized and is undergoing considerable technological and market-driven changes." He furthered, "Kongsberg is a world leader within automation, navigation and control systems, whilst Rolls-Royce Commercial Marine is complementary with its deliveries of propellers, propulsion systems, handling systems and ship design. Both companies hold leading positions within digitalization, ship intelligence and concepts for autonomy. By bringing together this, we are positioning us as a significant strategic supplier of complete solutions for the future maritime industry." Mikael Makinen, President, Rolls-Royce Commercial Marine, summed up by saying, "This deal is good news for Rolls-Royce and Kongsberg and comes at a time when the maritime industry is at the dawn of a new and exciting era where digital and electrical technologies will transform shipping. Rolls-Royce has been responsible for leading many of those technological advancements, and with combination of great people, market leading technology and a desire by Kongsberg to take this business to the next level, I'm sure that this business will prosper in the years to come."

Marlink-Transmetrics co-op to digitalise end-to-end maritime logistics

The two have signed a partnership agreement aimed at optimising logistics operations for maritime customers with the use of Artificial Intelligence (AI) and big data. The Sofia-based Transmetrics has developed Asset Metrics, a predictive asset management tool; based on applying AI algorithms for data cleansing and demand forecasting, the AssetMetrics software suggests the optimal storage, repositioning, and maintenance strategy for empty containers as well as the optimal levels of 'safety stock' at each location. It is estimated that with the AssetMetrics software, shipping companies can expect about 10-15% cost reduction of empty assets logistics. On Marlink's part, as part of its Smart Connectivity strategy, the Lysaker-headquartered company seeks to support new partners and applications to work together to enable its customers' digitalisation and business efficiency. "Transmetrics will help us to address our cargo & container ship customers' top priority which is to digitalise end-to-end the logistics chain and fix the inefficiency of cargo transport and logistics. Partnering with the best start-ups, we are positioning Marlink as a leading digital company in the industry, creating tangible economic value for customers from their digital enablement strategies through our smart connectivity solutions," Gennaro Faella, Head of Strategic Business Development, Marlink, said. Tore-Morten Olsen, President Maritime, Marlink, added to this, "The maritime transportation industry is experiencing phenomenal changes thanks to new technologies such as big data and predictive analytics. Our agreement will leverage Marlink's satcoms connectivity combined with Transmetrics intelligent software solution to streamline shipping companies' container flows, prevent empty capacities on vessels and ultimately make our cargo customers more efficient." Asparuh Koev, CEO, Transmetrics, also commented, "Marlink's global multi-band network and extensive insight into maritime digital transformation will augment our predictive optimisation software AssetMetrics, ensuring that together, we are positioned to deliver tangible operational and financial efficiencies to end-users."

An autonomous sounding boat in Antwerp

The Port of Antwerp is currently testing *Echodrone* for carrying out unmanned measurements of water depths and inspecting underwater infrastructure, like dock beds. The autonomous sounding boat has been developed by dotOcean, a maritime technology company based in Brugge. Apart from being fully autonomous, *Echodrone* is smaller than its manned counterpart *Echo* which makes it possible to operate in heavy traffic. "This technology is based on assembling detailed information in the cloud. Data from all sorts of devices throughout the port is made available over the internet and then selectively compiled and translated into useful information by algorithms in the cloud. The *Echodrone* is designed to navigate fully independently using this verified data, unlike the previous generation of automatic vessels that had to rely on their own onboard sensors. This makes the *Echodrone* one of the first of a completely new generation of robots," Koen Geirnaert, Co-founder, dotOcean, explained. Wim Defevere, Senior Technical Manager Nautical Access, the Antwerp Port Authority (APA), added, "The *Echodrone* is currently undergoing extensive trials. Once these have been completed it will be based in the Deurganck dock where it will be fully operational alongside the *Echo* to measure the water depth of the available berths at the busiest of the tidal quays for handling containers." Piet Opstaele, Innovation Enablement Manager, APA, also said, "With the help of the *Echodrone* it will be possible in future to carry out other types of measurements, such as environmental surveys, inspecting quay walls and so on. This technology is a real breakthrough for us in our quest for smart solutions for the port of the future. It is also a good example of our role as an initiator and facilitator of innovative initiatives." Opstaele summed up, "As a world-class player we as a port aim to be a leader in developing innovative concepts. In this way we are laying the foundations for the 'smart port' of the future in which digital technologies are used to make the land-based and water-based operations more flexible, responsive and efficient."

VARD to build the world's first autonomous and zero-emission container ship

Yara, a Oslo-based chemical company, has entrusted the Norwegian shipbuilder with the construction of the *Yara Birkeland*. The NOK250m-worth contract (approx. €26.1m) will see the delivery of the 120 TEU of capacity container vessel in Q1 2020. *Yara Birkeland* will be constructed by VARD's facility in Brevik, whereas the hull will be supplied by the company's Braila plant in Romania. Afterwards, Yara together with its technological partner Kongsberg will run the newbuild step-by-step from manned to remote to autonomous operations, the last of which is to become a reality by 2022. *Yara Birkeland* will serve the 32 nautical miles-long route between Yara's plant in Porsgrunn and the Norwegian seaports in Larvik and Brevik. Today, around 100 TEUs loaded with fertilizers are transported with the use of trucks, which make 40k truck trips through urban areas annually. According to Yara, thanks to the all-electric zero-emission *Yara Birkeland*, emitting some 700t of CO_2/year will be avoided. "A vessel like *Yara Birkeland* has never been built before, and we rely on teaming up with partners with an entrepreneurial mindset and cutting edge expertise. VARD combines experience in customized shipbuilding with leading innovation and will deliver a game-changing vessel which will help us lower our emissions and contribute to feeding the world while protecting the planet," Svein Tore Holsether, President and CEO, Yara, commented. Roy Reite, CEO and Executive Director, VARD, added, "We are honoured to be chosen as Yara's partner in this innovative and exciting project. With a longstanding experience in building state-of-the-art and tailor-made specialized vessels, we are excited to be given the opportunity to build the world's first autonomous and electric-driven container vessel. It is a pleasure to welcome Yara and Kongsberg to VARD, and we look forward to working closely with all parties involved." Geir Håøy, CEO and President, Kongsberg, also said, "*Yara Birkeland* represents an important next step for the entire maritime industry, representing a major technological and sustainable advancement. The Norwegian maritime cluster has taken a leading position within technology, design, legislation, testing and all other aspects of the development." Erna Solberg, Prime Minister of Norway, summed up, "This is a good example of how Norwegian industry can collaborate to create new solutions and green jobs. Yara, Kongsberg and VARD have built on their knowledge about technology, logistics and ship building with an ambition to create sustainable innovation together. The result is exciting pioneer projects like this one. I am proud that the Government has supported the development of *Yara Birkeland* through ENOVA and send my best wishes for the construction." The Norwegian government enterprise ENOVA is supporting the project with NOK 133.6m (€14m).

DP World to take over Unifeeder

Once the Dubai-based terminal operator gets the regulatory green light, it'll have a clear path to add the world's second biggest independent feeder company to its logistics portfolio in a deal worth €660m. The transaction will be financed from DP World's existing balance sheet resources and is expected to close in Q4 2018. The Aarhus-headquartered Unifeeder currently disposes of a 50+ chartered vessel-big fleet, offering a carrying capacity of approx. 3.2m TEU. DP World operates across 78 sea and inland terminals worldwide. "We are delighted to add the Unifeeder brand under the DP World umbrella, which supports our strategy to grow in complementary sectors, strengthen our product offering and play a wider role in the global supply chain as a trade enabler," Sultan Ahmed Bin Sulayem, Group Chairman and CEO, DP World, commented. He furthered, "The ever-growing deployment of ultra-large container vessels has made high-quality connectivity from hub terminals crucial for our customers and Unifeeder is a best-in-class logistics provider in this space with a strong reputation in Europe. Our aim is to leverage on the in-house expertise of Unifeeder and to accelerate growth in this scalable platform to deliver value for all stakeholders. Unifeeder operates on the same common-user principle as DP World and adds to the Group's strong value proposition to international shipping lines and end cargo owners in making the global supply chain more efficient and cost effective." Jesper Kristensen, CEO, Unifeeder, also commented, "We are excited to join the DP World Group. Not only is there commonality with our business models but we also share the vision of serving our customers through removing inefficiencies and delivering sustainable shareholder value. We have enjoyed great success over the last five years under Nordic Capital's ownership, and we believe that the Unifeeder brand within the DP World Group has the opportunity to accelerate growth, expand further and take the business to the next level."

Ghent's first roofed sea terminal-warehouse

ArcelorMittal Gent, manufacturer of steel products, PMV, a Flemish investment company, Euroports, a terminal operator, and North Sea Port, a Belgian-Dutch port authority, have teamed up to erect, at the expense of €50m, the first roofed loading bay and warehouse in the Port of Ghent. The 27 m above the sea level All Weather Terminal (AWT) will be 240 m-long and 60 m-wide, of which the roofed quay will be 200 m-long and 25 m-wide. The facility will have a storage capacity of up to 60kt, with the warehouse part equipped with three and the pre-sorting zone with two fully automated travelling cranes. Two cranes will handle ships up to 10k dwt-big. There will be two loading and unloading tracks at the quay. Construction of the AWT – to be carried out by Stadsbader under a design, build, and maintain contract, while the North Sea Port will commission dredging of the mooring basin – will most probably kick off by end-2018. The facility is scheduled to start operating by mid-2020. The new terminal is being built next to the existing multipurpose cargo bay of ArcelorMittal Gent and will be used in the first place to store and ship finished steel coils. It will be possible to use a portion of the storage capacity, up to one-fifth, for the handling of other goods, e.g. paper. The AWT GENT AV, a special-purpose entity, has been established to own the AWT. On behalf of the entity, Euroports will operate the terminal. "Previously, high-grade steel could only be unloaded with dry weather while this can now happen 24/7, irrespective of weather conditions. The AWT allows a more distributed supply of coils from the dispatching warehouse of ArcelorMittal Gent to the quay and thus optimises the internal logistics," Manfred Van Vlierberghe, CEO, ArcelorMittal Belgium, commented. He also said, "In addition, the use of the AWT, in combination with the existing 'open' mixed goods quay, is necessary to realize the growth of the Ghent-based steel company. The AWT is also an investment in sustainability because the higher shipping capacity per ship results in considerable savings in the number of transport truck movements (up to 25,000 trucks per year)."

Bernhard Schulte entrusts Ulstein with a new contract

The German shipowner has contracted the Norwegian shipbuilding company for the delivery of a service operation vessel (SOV). The 93.4 m-long and 18 m-wide SOV, to be delivered in early 2020, will support the maintenance of the 66 turbines-big 396 MW Merkur offshore wind farm that's located in the German part of the North Sea. The ship of the ULSTEIN SX195 type was developed by Ulstein Design & Solutions in cooperation with WINDEA Offshore, Bernhard Schulte's affiliate for offshore wind projects. Among other things, the SOV will have a large, centrally positioned walk, a motion compensated gangway, and an elevator tower for personnel and cargo transfers, all enabling step-less approach to offshore installations. The vessel will also have a 3D compensated 2.0t of max lifting capacity crane. The SOV's drive system will include battery-solutions for improving the efficiency of fuel consumption. The new ship will be able to accommodate up to 120 people. In 2016-2017, Ulstein provided Bernhard Schulte with two other newbuilds for its offshore business.

Kongsberg to furnish Grimaldi's G5Gs

The Chinese Nanjing Jinling Shipyard, which is constructing nine ro-ros of the Green 5th Generation for the Grimaldi Group, has contracted Kongsberg Maritime to deliver the power and hybrid systems. The NOK400m-worth contract (approx. €41.5m) includes the supply and integration of large battery systems, shaft generators, frequency converters, and energy management systems. Deliveries will start mid-2019 and are expected to be completed within 2022. Each of the Grimaldi's GT 54k-big G5G ro-ro ships will be 238 m-long and 34 m-wide, offering 7,800 lane metres of freight capacity. Deliveries will commence from 2020 onwards. Furthermore, the deal can be extended to cover also the three 5,800 lm freighters, increasing the value of the contract to NOK500m (€52m). "This delivery represents introduction of new technology into this market segment. The contract shows that our concepts for hybrid vessels are expanding into new vessel types and positions Kongsberg as a leading provider of hybrid technology in the offshore and marine vessel segments," Stene Førsund, Executive Vice President, Global Sales & Marketing, Kongsberg Maritime, said. He furthered, "Our hybrid solutions deliver tangible benefits. Vessels will have zero emissions while in port, and reduced overall fuel consumption by utilising our peak shaving technology, while the batteries will be charged at sea by using the shaft generators."

Norrköping port upgrade gets the legal green light

The Swedish Land and Environment Court has accepted the development plans regarding the Port of Norrköping's project in the Pampus Harbour. Following the Court's resolution, the port plans to kick off the construction works in 2019. The first phase will cover dredging, while the whole project is to be completed by end-2023. Once completed, the modernised Pampus Harbour will have, among many things, an enlarged by 80-120k m² port area for handling and storing containers, wood, and break-bulk goods; a lengthened port basin with water depths of 10.4-14.2 m; and an extended quay wall by adding 300-600 m to the current 610 m. As a result of the extension, more cargo operations will be shifted from the inner parts of the port to the outer harbour, making room for the city to enter the former port premises. "We have now received the environmental decision necessary to increase the port's capacity. We are of course glad that the valuation done by the Land and Environment Court has delivered a positive result, at the same time when we keep up with the schedule. Now we can start extending the port, which will make it possible to take care of increasing volumes and to handle bigger vessels as well as make manufacturing in the port more effective," Henrik Åkerström, CEO, the Port of Norrköping, said. Pontus Lindblom, responsible for industrial affairs in the Norrköping Municipality, also commented, "It is pleasing to have received the green light so that we can now proceed with such a big and important venture for Norrköping and the region. The port is of great significance for our industry and the upcoming extension will strengthen Norrköping's role as one of the country's leading logistics nodes. We are ensuring that the existing and future companies will have an effective supply chain at their disposal, while in the meantime we can also carry out another exciting and sustainable city development project that will take place in the inner port."

HaminaKotka-VRT Finland 3D co-op comes to the surface

The port authority and the Jyväskylä-based company have signed a contract under which the two will jointly work towards building a smart digital port with the use of 3D inspection technology. The two began cooperating in 2016 when VRT Finland surveyed the underwater structures of HaminaKotka's port areas and provided the 3D inspection data via the VRT BIM online service. Now, VRT will do the same with the terrestrial parts. The port authority intends to use the data to streamline its day-to-day operations, including communications, as well as to improve maintenance of the harbour areas and above the water structures. Specifically, VRT BIM will enable the comparison of inspection data collected from the same location, which is to facilitate the predictive planning and execution of repair and maintenance projects. "Our strength is the understanding of the entire 3D production chain from collecting data to reporting. As a result of our outstanding programmers, we have succeeded in creating a solution that is easy to use and especially serves the owners of structures in life-cycle management," Kirsi Hänninen CEO, VRT Finland, said. Saana Vuorinen, Maintenance Manager, the Port of HaminaKotka, added, "Locating and reporting damages as well as finding possible repair needs is easier, while communication with stakeholders is improved. Although VRT BIM is a great tool especially for operational activities of our port, it has plenty of features that are useful for the whole organization. The operating system will be an important part of our daily operations."

market sms

Photo: www.pexels.com

THE PORTS OF STOCKHOLM:

2.35mt handled in Q1 2018 (+4.2% yoy)

A total of over 1.57mt (+2.6% year-on-year) was imported through the harbours in Stockholm, Nynäshamn, and Kapellskär, while 774kt was exported (+7.5% yoy).

The Ports of Stockholm's volumes

	Q1 2018	Yoy
General cargo, of which	2,017kt	+2.0%
Wheeled (ro-ro)	1,671kt	+6.8%
Forest products	196kt	-31.5%
Containerised	88kt	-3.3%
Other	62kt	+72.2%
Dry bulk	203kt	+6.3%
Liquids	129kt	+50.0%
Total	**2,349kt**	**+4.2%**
Unitised freight traffic		
Ro-ro cargo units	119,226	+8.0%
TEU	12,592	-1.9%
Finished vehicle logistics	6,953	+118%
Passenger traffic		
Ferry	2,083,338	+4.0%
Pax cars	172,956	-12.3%

HAPAG-LLOYD:

5,848k TEU carried in H1 2018 (+38.5% yoy)

The sharp increase is a result of adding the volumes of the United Arab Shipping Company, whose business was merged with Hapag-Lloyd's in May 2017. "The first half of 2018 was shaped by clearly increasing fuel costs, higher charter rates and a slower than expected recovery of freight rates," Rolf Habben Jansen, CEO, Hapag-Lloyd, commented. He also said, "For the remainder of the year, we see a slow but steadily improving market environment, but we recognise that there are still significant geopolitical uncertainties that could influence the market. This only reinforces the necessity to be able to react quickly when needed – and we therefore will accelerate some of our digitalisation initiatives and finalise our new strategy until the end of this year."

THE PORTS OF GENOA:

36.22mt handled in H1 2018 (+5.3% yoy)

The Western Ligurian Sea Port Authority – branded as the Ports of Genoa – comprises the harbours in Genoa, Pra', Vado Ligure, and Savona.

The Ports of Genoa's volumes

	H1 2018	Yoy
General cargo	21,162.9kt	+6.2%
Liquids	11,933.9kt	+3.2%
Dry bulk	3,122.5kt	+8.0%
Total	**36,219.3kt**	**+5.3%**
Ports' volumes		
Genoa	19,699.5kt	+1.9%
Pra'	8,653.5kt	+8.7%
Vado Ligure	4,205.3kt	+8.9%
Savona	3,660.9kt	+13.2%
Container traffic		
TEU	1,379,155	+5.4%
Containerised	13,418.4kt	+3.2%
Passenger traffic		
Cruise	739,901	-2.9%
Ferry	693,863	+1.6%
Total	**1,433,764**	**-0.8%**

TRANSCONTAINER:

892.7k TEU carried in H1 2018 (+3.8% yoy)

Alike in the case of the entire container rail traffic in Russia, the company noted the sharpest increase on its transit services, up by 36.2% year-on-year to a total of 72.7k TEU. Exports and imports also rose, by 9.7% yoy and 5.8% yot to 236.6k TEU and 160.1k TEU, respectively. On the other hand, the transportation volumes in domestic traffic went down by 3.7% yoy to 423.3k TEU over 2018's first half. TransContainer's terminals also handled less cargo, marking a decrease by 2.9% yoy to altogether 622k TEU.

RAIL CONTAINER TRAFFIC IN RUSSIA:

2.06m TEU carried in H1 2018 (+12.1% yoy)

Transit traffic, incl. New Silk Road volumes, continues to note the highest tempo of growth – up by 28.5% on the H1 2017 result to a total of 227.4k TEU. With 891.4k TEU (+2.8% year-on-year), domestic transports account for the bulk of the shipments. At the same time, exports totalled 552.1k TEU (+18.1% yoy) and imports 393.6k TEU (+19.3% yoy).

THE PORT OF ROTTERDAM:

232.79mt handled in H1 2018 (-2.2% yoy)

Despite an increase by 5.9% year-on-year in the turnover of containerised freight, up to 73.67mt, Rotterdam's total freight throughput noted a downtick in the reported period.

The Port of Rotterdam's volumes

	H1 2018	Yoy
Liquids		
Crude oil	50,721kt	-7.6%
Oil products	40,307kt	-4.8%
Other	14,039kt	+2.0%
LNG	1,960kt	+123%
Total	**107,028kt**	**-4.3%**
General cargo		
Containerised	73,666kt	+5.9%
Wheeled (ro-ro)	12,007kt	+2.4%
Break-bulk	3,075kt	-12.6%
Total	**88,748kt**	**+4.7%**
Dry bulk		
Iron ore & scrap metal	14,111kt	-10.1%
Coal	12,330kt	-11.9%
Agrobulk	5,225kt	-7.0%
Other	5,141kt	-13.7%
Total	**37,019kt**	**-10.5%**
GRAND TOTAL	**232,794kt**	**-2.2%**
Container traffic		
TEU	7,077k	+6.2%

THE PORT OF ANTWERP:

5.57m TEU handled in H1 2018 (+8.3% yoy)

Container exports amounted to 2.91m TEU in the reported period (+8.0% year-on-year), while imports to 2.65m TEU (+8.6% yoy).

The Port of Antwerp's volumes

	H1 2018	Yoy
General cargo, of which	74,042.0kt	+6.9%
Exports	40,502.9kt	+7.0%
Imports	33,539.0kt	+6.8%
Liquids, of which	38,296.9kt	+6.1%
Imports	24,207.8kt	+11.1%
Exports	14,089.1kt	-1.4%
Dry bulk, of which	6,309.2kt	+3.2%
Imports	3,634.9kt	+2.2%
Exports	2,674.3kt	+4.5%
Total	**118,648.1kt**	**+6.5%**
Detailed general cargo handlings		
Containerised, of which	66,298.0kt	+8.2%
Exports	36,877.0kt	+7.4%
Imports	29,421.1kt	+9.1%
TEU, of which	5,567,905	+8.3%
Exports	2,913,398	+8.0%
Imports	2,654,507	+8.6%
Break-bulk, of which	5,045.2kt	-6.5%
Imports	2,806.9kt	-12.6%
Exports	2,238.3kt	+2.5%
Wheeled (ro-ro), of which	2,699.0kt	+5.2%
Exports	1,387.6kt	+4.3%
Imports	1,311.0kt	+6.1%
Finished vehicle logistics, of which	656,668 cars	+0.8%
Exports	373,785 cars	+0.4%
Imports	282,883 cars	+1.4%

THE PORT OF GDAŃSK:

25.06mt handled in H1 2018 (+34.9% yoy)

The turnover of coal noted the sharpest increase of 66.4% year-on-year in the reported period, up to a total of 3.48mt.

The Port of Gdańsk's volumes

	H1 2018	Yoy
General cargo, incl. timber, of which	11,076.5kt	+38.7%
Containerised	10,266.8kt	+43.7%
Liquids	8,315.4kt	+30.6%
Coal	3,484.7kt	+66.4%
Other dry bulk	1,970.8kt	+21.5%
Grains	217.7kt	-57.1%
Total	**25,065.1kt**	**+34.9%**
Container traffic		
TEU	968,261	+40.5%
Passenger traffic		
Ferry & cruise	59,081	-0.2%

FINNLINES:

388k ro-ro cargo units carried in H1 2018 (+11.5% yoy)

The shipping company also transported 624kt of non-unitised freight over this year's first half, a downtick of 1.9% on the H1 2017 result. In addition, Finnlines' fleet carried 82k vehicles (+26.2% year-on-year; excl. passenger cars). Some 304k private and commercial passengers (+6.7% yoy) travelled on-board the company's ships in the reported period, too.

THE PORT OF BARCELONA:

33.8mt handled in H1 2018 (+17.8% yoy)

The Catalan port marked its best ever half year freight turnover. The port took care of more than 1.6m TEU in the reported period, an increase by 18% year-on-year. Out of this figure, some 125k TEU arrived/left the port aboard a train, more by 10% yoy. Barcelona's H1 2018 ro-ro traffic totalled 211k cargo units (+5.6% yoy). The port's finished vehicle logistics amounted to 458k new cars (+5% yoy), of which 143k were transported by rail (+10.6% yoy). Barcelona also traded 7.8mt in liquid bulk (+17.3% yoy). A total of 1.78m ferry and cruise passengers went through the port's quays (+13% yoy).

THE PORT OF HAMINAKOTKA:

8.32mt handled in H1 2018 (+16.9% yoy)

The double-digit increase was chiefly driven by a 41.7% year-on-year growth of imports, which totalled 2.50mt in the reported period. At the same time, exports advanced by 8.7% yoy to almost 5.82mt. In addition, the Finnish seaports made some 432.7kt in coastal traffic (+5.5% yoy; not included in the ports' total turnover). HaminaKotka's container volumes, on the other hand, noted a downtick of 1.1% yoy. A total of 340,633 TEUs went through the ports' quays. Ro-ro traffic decreased, too, by 3.7% yoy to 7,312 cargo units.

UK PORTS:

112mt handled in Q1 2018 (-3.7% yoy)

While the Top 10 ports in the United Kingdom handled less cargo over 2018's first quarter than in the corresponding period last year, their actual market share rose.

UK ports' volumes (million tonnes)

	Q1 2018	Yoy
Grimsby and Immingham	14.01	+2.0%
London	11.99	+6.3%
Southampton	8.87	-1.3%
Tees and Hartlepool	7.08	+4.1%
Liverpool	6.89	-15.3%
Milford Haven	6.87	-11.6%
Forth	6.81	-7.5%
Felixstowe	6.45	-10.7%
Dover	6.22	-8.7%
Belfast	4.91	+7.7%
Total Top 10	**80.08**	**-3.1%**
	Share of total: 71.5%	
Rivers Hull and Humber	2.59	+13.5%
Hull	2.31	+3.2%
Medway	2.04	-18.3%
Bristol	1.97	-6.2%
Port Talbot	1.65	-9.9%
Clyde	1.60	-8.6%
Manchester	1.44	-4.8%
Sullom Voe	1.40	-8.9%
Holyhead	1.28	+3.2%
Glensanda	1.14	-26.0%
Heysham	1.11	+2.3%
Orkney	1.02	-17.4%
Harwich	0.96	-17.9%
Portsmouth	0.96	-4.0%
Tyne	0.91	+10.9%

	Q1 2018	Yoy
Warrenpoint	0.88	+8.6%
Aberdeen	0.87	-1.2%
Larne	0.71	-0.1%
Cairnryan	0.70	-0.4%
Newport	0.62	-32.1%
Loch Ryan	0.62	+5.6%
Plymouth	0.58	-0.2%
Shoreham	0.48	+8.7%
Londonderry	0.47	+0.5%
Ipswich	0.46	-10.0%
Cardiff	0.45	+13.7%
Goole	0.37	+3.7%
Peterhead	0.33	+29.5%
Great Yarmouth	0.29	+4.6%
River Trent	0.27	-20.6%
Sunderland	0.20	+5.4%
Kilroot Power Station Jetty	0.20	+6.6%
Newhaven	0.19	+0.8%
Boston	0.18	-13.9%
Dundee	0.16	+18.5%
Poole	0.14	-14.4%
Swansea	0.12	-11.8%
Fowey	0.10	-12.9%
Fishguard	0.09	-17.2%
Cromarty Firth	0.03	-68.2%
Ramsgate	0.02	+121%
Total	**112.0**	**-3.7%**

Photo: Port of Felixstowe

THE PORT OF UST-LUGA:

49.11mt handled in H1 2018 (-3.6% yoy)

Both the handlings of liquids and general cargo went down over 2018's first half – by 8.3% year-on-year and 13.2% yoy to 30.11mt and 13.86mt, respectively. The turnover of dry bulk, in contrast, rose by 6.7% yoy up to 17.61mt. Despite the drop in the general cargo segment, Ust-Luga's container traffic advanced during this year's first half – by 8.5% yoy to 38,797 TEUs (incl. 125 reefers, a drop by 72.6% yoy on the H1 2017 result).

SPANISH PORTS:

277.77mt handled in 2018 (+6.1% yoy)

The country's seaports handled a total of 133.05mt of general cargo in the reported period (+8.2% year-on-year), followed by 89.03mt of liquids (+3.5% yoy), 49.52mt of dry bulk (+6.1% yoy), and 6.17mt of other goods (-0.9% yoy).

Spanish ports' volumes (thousand tonnes)

	H1 2018	Yoy
Algeciras	53,818.8	+9.6%
Valencia	37,393.3	+3.0%
Barcelona	33,862.6	+17.8%
Bilbao	17,841.6	+11.9%
Cartagena	16,400.9	-0.6%
Huelva	16,193.6	+3.7%
Tarragona	16,038.5	+0.4%
Las Palmas	13,396.4	+6.4%
Castellón	10,219.1	+10.8%
Gijón	9,319.9	-15.5%
Top 10	**224,484.7**	**+6.4%**
	Share of total: 80.82%	**+0.23pp**
Baleares	8,138.9	+3.2%
A Coruña	7,650.9	+12.4%
Santa Cruz de Tenerife	6,523.2	+0.5%
Ferrol-San Cibrao	6,521.0	-2.4%
Almería	3,309.7	+11.3%
Santander	2,877.0	+13.1%
Avilés	2,570.3	+10.4%
Vigo	2,218.6	+8.0%
Sevilla	2,150.6	+7.8%
Cádiz	1,832.3	-2.9%
Pasaia	1,513.3	+7.2%
Alicante	1,497.4	-15.4%
Motril	1,491.4	+33.0%
Málaga	1,419.4	+6.6%
Marín y Ría de Pontevedra	1,286.3	+12.9%
Ceuta	1,247.1	-0.1%
Vilagarcía	601.5	+7.0%
Melilla	438.6	-25.7%
Total	**277,772.3**	**+6.1%**

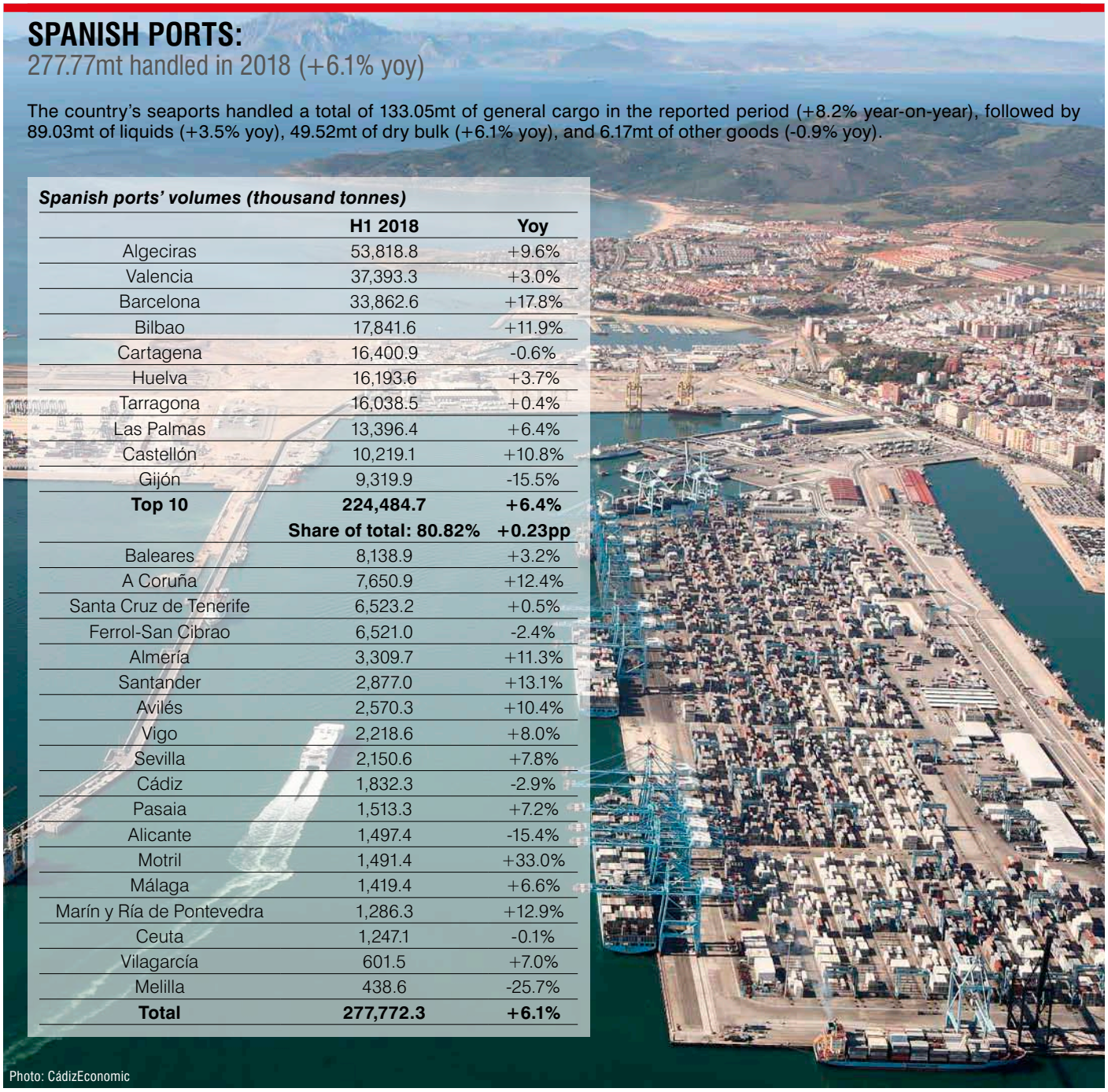

Photo: CádizEconomic

THE PORT OF HAMBURG:

4.33m TEU handled in H1 2018 (-2.7% yoy)

However, the number of containers handled within the port's railway system rose by 5.2% year-on-year to 1.21m TEU altogether. On the whole, the Hamburg port made 66.5mt over this year's first half, noting a drop by 5.0% on the result from the corresponding period last year. Imports contracted by 3.0% yoy and exports by 7.6% yoy to 38.5mt and 28mt, respectively. Out of the total, containerised freight accounted for 44.62mt (-2.5% yoy), followed by 15mt of dry bulk (-8.5% yoy, incl. a drop of 22.7% in the turnover of agricultural products which totalled 3.4mt), 6.1mt of liquids (-14.1% yoy), and 0.78mt of break-bulk (+8.3% yoy).

THE PORT OF ST. PETERSBURG:

1,085,042 TEU handled in H1 2018 (+13.7% yoy)

St. Pete's container traffic included 155,582 reefer TEUs in the reported period, more by 25.6% on the H1 2017 result. In total, the port made almost 29.74mt over 2018's first half, an increase by 14.3% year-on-year. The turnover of general cargo rose by 14.7% yoy to 20.79mt, dry bulk – by 2.8% yoy to 4.50mt, and that of liquids by 26.3% yoy to 4.45mt.

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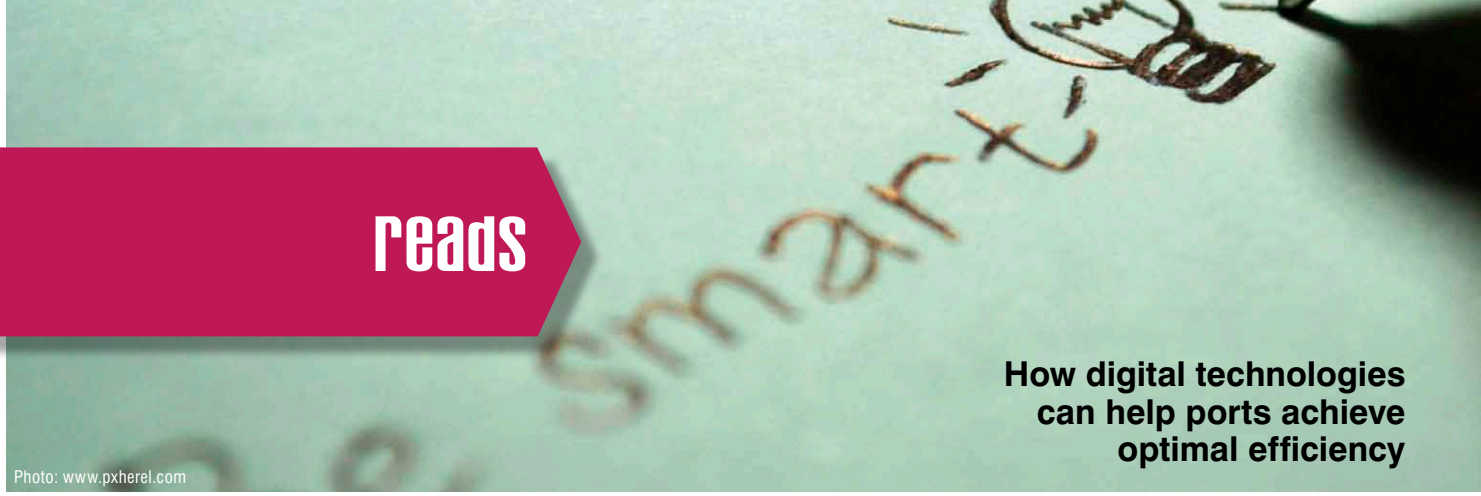


How digital technologies can help ports achieve optimal efficiency

Photo: www.pxherel.com

Be smart

by **Ewa Kochańska**

Leaving aside various marketing & sales shenanigans that attach the word "smart" to virtually anything these days to beef up the price and con consumers, genuine digital solutions give ports of all sizes and purposes the opportunity to do more with less. At the same time, this can have a positive impact on the environment, not to mention providing the investors with a new source of revenue and a tool for cutting down the costs.

> "It's up to the stakeholders and management, not the IT department, to select the right smart technologies.

According to the report *To get smart, ports go digital produced* by The Boston Consulting Group, the adaptation of such technologies like Artificial Intelligence, big data, and the Internet of Things can result in better and more efficient data processing, cargo handling, customer service, and pollution management, to name a few. The paper maintains that these and other smart technologies help port authorities and terminal operators become more resourceful and improve functionality without major infrastructure and equipment investments. This will be of crucial importance when volumes start to peak at the quayside and at the gate as a consequence of the ever bigger vessels calling to ports.

The five steps to becoming a smart port

To boost the investment in smart technology, it's important to use the right solutions for the unique needs of the port. "To maximize return, investors should focus on a limited subset of applications. We recommend taking the following actions that can clarify which smart-port technologies to choose and how to implement them with the least risk," reads the report.

First, link a smart-port strategy to the overall port strategy. It's up to the stakeholders and management, not the IT department, to select the right smart technologies. It is the execs' responsibility to decide what are the port's long-term, big-picture objectives, such as increasing in size and services, becoming more competitive, or using data-based services to generate additional income.

Second, identify pain points that smart-port technologies could fix. Once the objectives are clear, it's important to figure out the port's weakest links and the reasons behind them. Problems, whether structural or behavioural, should be evaluated and prioritized to sort out which ones can be targeted with technological solutions.

Third, generate a portfolio of possible solutions. Having prioritized the issues, the next step is to review the available smart technologies. It can be helpful to also find out what other ports with similar challenges are doing to resolve them. However,

Photos: Port of Hamburg

the report underscores that just because something works in one harbour, doesn't mean the solution can be replicated or be as effective in another. There are no real shortcuts in this process.

Fourth, decide whether to buy off-the-shelf technology or build a custom solution. While the existing smart technologies are usually the most convenient option for smaller or less advanced ports, they do have their limits. Commercial off-the-shelf products might be less advanced than custom ones and have difficulties integrating with the harbour's existing system; they are also likely used by the competition. Custom-made technologies, or at least a customized version of the commercial product, ensure that the solution is uniquely fit to the port's needs. In some cases, establishing a working relationship with a small digital start-up, or even acquiring one, can be the best and most forward-thinking decision.

Lastly, use an agile approach to manage the risk. The report stresses that introducing new technology is not an area where jumping in at the deep end is advised. Rather a careful, step-by-step approach is necessary since the adaptation of any new solution can be risky and costly. Implementing one stage of the system first and reviewing its effectiveness before moving forward is the best approach. Also helpful are pilot programmes which allow for testing of the technology in real-life before adopting the full system.

Not all ports are created equal

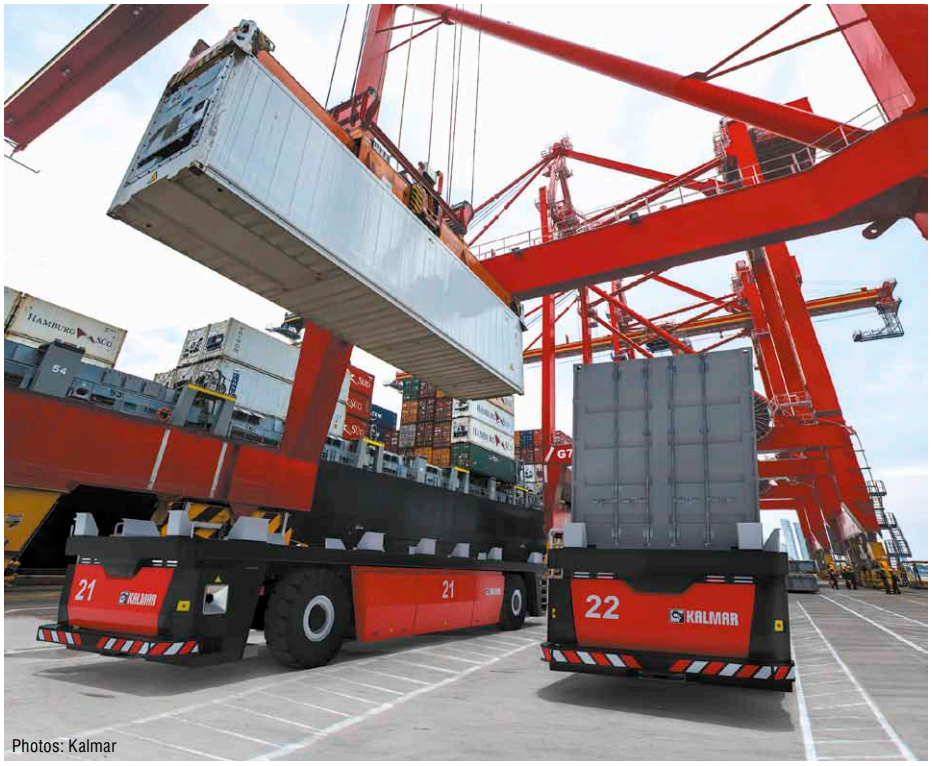
The aim of these technological innovations is to improve the efficiency of the entire port ecosystem. When it comes to infrastructure, installing sensors to monitor the condition of the facilities and roads can save time and money, as well as improve safety. There are also smart tools for cargo-related services such as monitoring systems for freight-handling gear. Regarding intermodal traffic, terminal appointment systems provide an ability for the port to monitor and navigate truck and train movement around the facilities. The blockchain technology can be helpful with customs and collections, easing the processing of cargo information and payments. The digital surveillance systems with advanced video analytics, networked biometric scanners, and sensor all aid in the safety and security of the port. And lastly, smart ports can reduce their energy-use, production of waste, and mitigate hazardous situations by investing in motion activated lighting systems, plants that refine ship slops into resources (e.g. sludge into fuels and light bitumen), and deploy drones to inspect equipment and detect oil-spills.

Depending on the port type, regarding factors such as size, role in trade, financial capabilities, and geography, the technological needs will differ. The report underscores that it's especially important to evaluate these factors before deciding on an adequate smart-technology strategy.

Emerging ports, to start with, should focus on "ease of doing business" to effectively compete with their larger counterparts who likely offer more services but also a more time-consuming process. Therefore, the smart solutions to consider might include port community systems, single-window customs, X-ray scanning, e-office, or biometric access control systems.

For ports that are a local trade hub, high productivity and efficiency will be the main focus. They could benefit from using smart cargo-handling systems, digital equipment management and control, gate automation, and safety management solutions in order to move traffic as quickly as possible through their facilities.

Big intermodal gateway ports serve the biggest vessels and the largest amounts of cargo, so one of their main goals is to optimize traffic movement across all transport modes. For that, helpful solutions include truck appointment systems, sensor- and GPD-based traffic monitoring systems, as well as integrated multimodal air-road-rail-barge platforms.



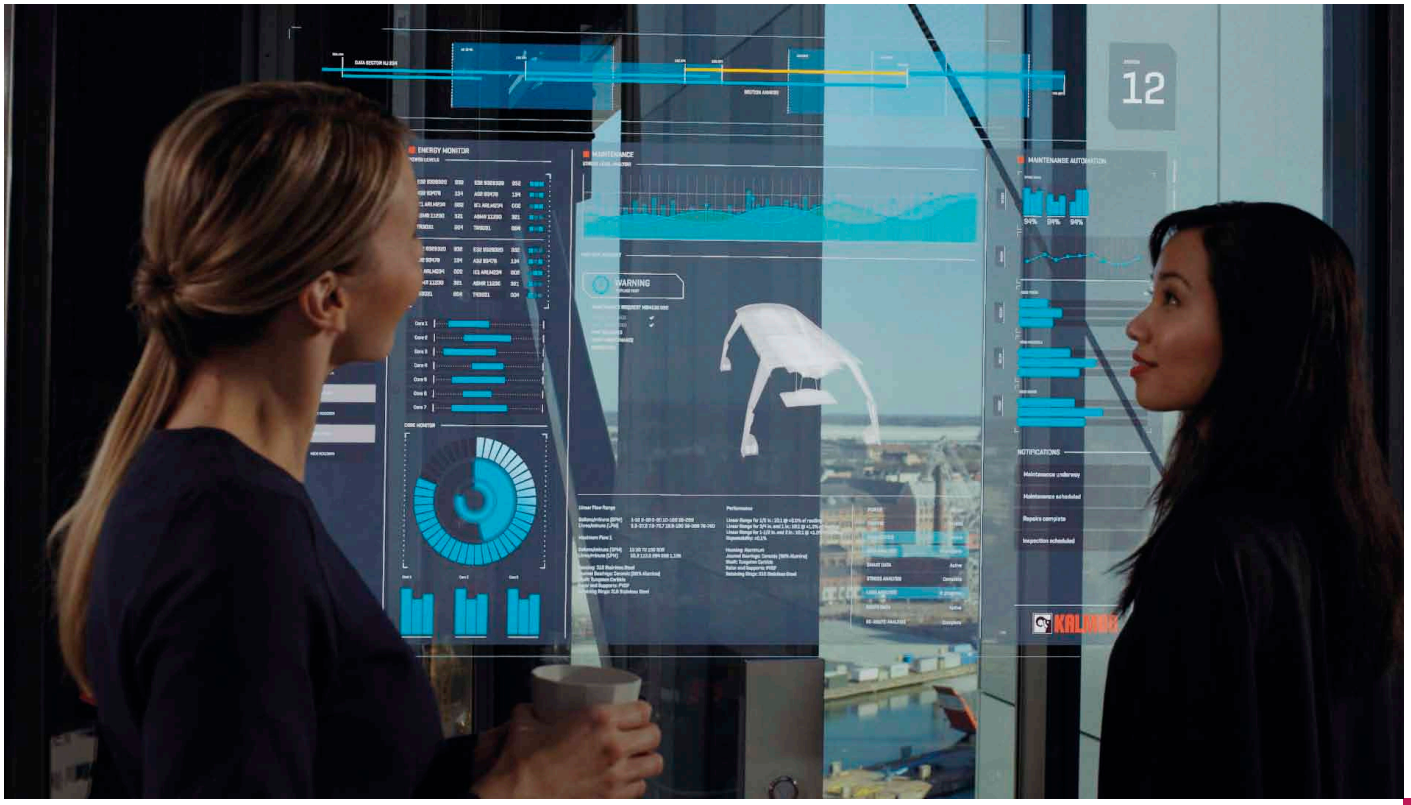
Photos: Kalmar

Finally in this thread, the major in-city ports need to focus on lessening their impact on the environment in terms of noise, water, and air pollution, as well as on monitoring port access roads for possible traffic disturbances. Thus, environmental and energy management systems, road monitoring technologies, and data-enabled platforms for improved operations can serve these ports best.

The report also emphasizes that using data-based services can generate additional revenues. Smart-ports can bring in extra income by selling their data further along the supply chain. In Australia, for example, "container terminals and depots created truck appointment systems that reduced truck congestion and shrank truck turn times from hours to minutes. Because the systems improved productivity, trucking carriers were willing to pay a moderate booking fee to use them." Ports can also use a "port-wide real-time container-tracking services that cargo owners can use to monitor a container's location anywhere in the region." Essentially, the exchange of information about cargo, traffic congestion, vessel arrivals and departures, and other logistics among partners contributes to more efficient and therefore less costly operation.

The "digital thing"

The always evolving world of trade as well as other major global industries are leaving ports with no choice but to "get smart." The right type of technology creates a more efficient and productive work environment with better customer service, new revenue opportunities, and a competitive edge. Equally important is for port authorities to keep their finger on the technological pulse and periodically re-evaluate their smart-strategy. Ragnar Johansson, the Managing Director of the Swedish Orient Line and Chairman of Swedish Shipowners' Association, tied it up in a neat little bow in the *So far, so good* interview in the 3-4/18 issue of the *Baltic Transport Journal*, "You cannot say that you've developed an IT tool and now the 'digital thing' is off your head for the next five years. Instead, you must constantly monitor technological developments because the business world is full of examples of companies that woke up too late only to never wake up again." ■



The fairway to smart shipping

Photo: YARA/Kongsberg

The creeping revolution

by **Andrzej Urbaś**

"Smart." A great word, especially when you're trying to sell someone on an idea. Smart isn't just new and exciting – it is the right thing to do. It gives you the sense of moving in the desired direction. And that's what companies want most – to grow, evolve, and stay competitive in an ever-changing environment. To win, putting it simply. Smart decisions are what you need to accomplish this goal.

"But what if the ocean isn't still? What if there is a storm raging? Seatrade Maritime's report informs us that 46.9% of the surveyed cite exactly this issue as their number one concern.

In this regard, shipping isn't different from any other industry. Smart is a word being thrown around a lot these days. Recently, it has been combined with another powerful notion, namely revolution. This transformative change is usually sudden in nature, completely tipping the state of the game as we know it. In a survey-based white paper published by Seatrade Maritime, a B2B event organiser, titled *The Smart Shipping Revolution*, the authors present the findings along with comments from various senior industry executives on what actually the blend of smart and shipping means to them.

Ghost ships

The paper identifies two main pillars that smart shipping will be set upon – autonomous ships and big data. The first is fairly self-explanatory. We live in a world that is becoming more and more automated, from robots helping workers build cars on an assembly line, through automated check-in terminals at airports, to self-checkout machines at large grocery stores. Automation in shipping means crew-less vessels operated by a skeleton staff (if any at all), tucked in safely at high-tech headquarters. In this context, the report brings up the problem of the increasing difficulty in finding highly trained ship crews. As such, automated vessels mean less people you need to find and prepare for the job.

According to the report, 35.1% and 41.2% of the surveyed are convinced that it will take five-to-ten years or over a decade for the concept of autonomous ships to really take off, respectively. They see the main area of application in short sea shipping and across fixed, short, and easy to predict routes. The paper gives an example in a very recent project, the first phase of which is about to become a reality in the second half of 2018. YARA, a global fertilizer group, and Kongsberg, a supplier of high-technology systems and solutions, combined their forces to grace the seas with the world's first, fully electric and autonomous container ship, the YARA Birkeland (read more about the project in the *Baltic Transport Journal* 3-4/17's *Destination 2020. The world's first autonomous and zero-emission container vessel*). Still, Kongsberg's CEO, Geir Håøy, is cautiously optimistic. He agrees that there's still some time before unmanned vessels start operating on ocean lines.

While it's evident that the respondents agree on the fact that autonomous shipping is still a thing of the future, they do however clearly see the merit in researching the

technology. A whopping 79.1% of those surveyed believe that there is something to be gained from pursuing the trend and see it as valuable. Even the sceptics regard it as a natural evolution of the current state of affairs. Fully automated vessels might not be their endgame, but they certainly see benefits in the areas of safety or further digital integration. Besides, you don't have to fully abandon the idea of a human crew manning a vessel to understand the financial benefits of having to pay a smaller number of people to operate it.

Using technology to address crewing shortage is already a reality, whether some people like it or not. The number of crewmen needed to bring a container vessel over the ocean has been on the constant decline. An article by *The Economist* from December 2014 cites the all-time seafaring classic *Moby Dick*, describing the great number of hands involved in prepping a ship to sail, from mending and bringing on-board new sails, to loading up the cargo. They set this against the story of John Møller Jensen, the captain of *Marie Maersk*. At the beginning of his career, he recalls, over 30 crew members were needed to operate a container carrier. Then the number went down to 22, while in fact, only 13 would be needed for the job. From here it is not that hard to imagine a "ghost" ship sailing the waters without a single soul present on the bridge.

Photos: Wärtsilä

Nothing ever is "that" easy

Where there are benefits, there are also challenges. For instance, one can easily picture a vessel gliding a calm and peaceful surface of the waters of the Atlantic Ocean, steered by a team of engineers from HQ located thousands of miles away. It is like pushing a button on one of these new fancy cars that results in a perfect parking manoeuvre. But what if the ocean isn't still? What if there is a storm raging? Seatrade Maritime's report informs us that 46.9% of the surveyed cite exactly this issue as their number one concern. Handling complex conditions and navigation at sea is a major hurdle. Extreme weather and a port environment crowded with smaller vessels are situations in which having a crew aboard

can be of immense value. After all, thinking outside the box and improvisation are what humans definitely are better at than algorithms (for the time being).

The regulatory framework comes in as the second thing in line to be most concerned with. Some 19.4% of the surveyed believe that the legal work is lagging behind the development. According to an article in the *Maritime Executive*, published on their website in July 2017, the International Maritime Organization has only just begun to evaluate the need for a legislative update that would cover autonomous vessels in international trade. The necessary changes might take up to 10 years, as they require agreements between the countries involved in a given trade.

Issues of liability and insurance, financial benefits of running a crewless vessel vs. a manned one, as well as questions regarding remote maintenance and repair were all seen as the least problematic, with respectively 14.3%, 9.7%, and 7.1% of the surveyed citing them on their list of potential worries.

Everybody loves big data?

The second main pillar of the smart shipping revolution, as mentioned earlier, is big data. According to the Oxford English Dictionary, the term describes "data of a very large size, typically to the extent that its manipulation and management present significant logistical challenges; (also) the branch of computing involving such data." But even with an apparent lacking of a deeper understanding of big data's inner workings, 56.85% of the respondents saw it as "having a major transformation impact on the industry," whereas 40.1% of the respondents have given it at least a bit of credit as the next big thing (pun intended), with it "having somewhat of an impact." Only 3% decided that they don't see it having any impact at all.

Dictionary definitions aside, according to a report commissioned by Trelleborg Marine Systems, we can identify a few main areas in which big data can be useful for the maritime sector. These include energy saving operations, safety and schedule management, fleet allocation and chartering for the ship's operator. From the point of view of the owner, it offers, among others, benefits in the areas of safety, monitoring and maintenance, environmental regulation compliance, and design optimization. In other words, some clear gains are to be made thanks to big data.

But is the industry really embracing the opportunity presented by big data? Based on Seatrade Maritime's survey, not so much. The inquiry clearly showed a big gap (pun intended, again) between people believing in the tremendous impact big data has on the industry and the actual scope at which the technology is being implemented. As such, 37% of the surveyed declared that their companies are either not making use of the technology at all, while only 25.6% said that they are still in the process of exploring the potential benefits they might gain from its usage. On top of that, only 8.7% of those who revealed that their companies are implementing the technology said that it is a major part of their operations. Lastly, 28.7% of the users said that they are "using it to some extent." In the Trelleborg Marine Systems report, Constantine Komodromos, CEO of VesselBot, offers one particular insight into the reasons behind this state of affairs. According to him, the shipping industry is lagging behind because it usually waits for others to first test the waters.

Is this a revolution at all?

What is then the most important takeaway the shipping industry is looking for when thinking about implementing the two technologies? According to 42.6% of the respondents of Seatrade Maritime's survey, it is the optimization of sea operations. The paper cites Egil C. Legland, Country Manager at ABS Norway, who identified four main issues – managing costs, improving productivity, creating value, and thinking about the future. These are certainly areas in which autonomous shipping and big data can help, even if implemented partially. Digitalisation of processes and customer experience are two other aspects in which smart shipping can come in handy. According to the paper, container shipping is the branch of the maritime industry that can benefit most from the above – 46.2% of the respondents agree that this is the case, with 24.1% naming ports and terminals as the main beneficiaries .

Smart shipping does not seem like a revolution. It's more like a sometimes sluggish but constant process, gradually changing how the maritime industry perceives its future. But that is not necessarily a bad thing. Change requires time and patience. Just don't mistake patience as an excuse for inaction. ■

Photo: INFORM

When humans meet algorithms

by **Dr Eva Savelsberg**
Senior Vice President, Logistics Division, INFORM

Dr Eva Savelsberg is Senior Vice President of INFORM's Logistics Division. She specializes in Agile Optimization Software that renders a wide range of terminal processes more productive, agile, and reliable. Eva is also a lecturer at the University of Aachen (RWTH), where she received her PhD in mechanical Engineering in 2002. Eva has published four books and over 30 papers on innovation in freight transportation.

"You are my creator, but I am your master." These chilling words from Mary Shelley's novel *Frankenstein* were first published on January 1, 1818, amidst the First Industrial Revolution, a period of great social and technological change. Considered by many to be the first work of science fiction, the story influenced not only literature, drama, and film, but also the public's perception of science. This year being *Frankenstein*'s 200th anniversary, and at the dawn of the Fourth Industrial Revolution, the myth of a creature turning on its creator seems more relevant than ever before. Having escaped the laboratories of many tech companies, Artificial Intelligence (AI) is poised to change our society for good.

While human-level AI is not yet looming around the corner, we constantly carry some form of AI in our pockets already today. The irony is that Siri, Alexa, and Cortana, while comparable to the Frankenstein's monster in so many ways, aren't perceived to be frightening characters. Rather, these AI-enhanced assistants have become an ordinary, if not an integral part of our lives and workplaces.

This article will take you on a journey to the past, present, and future of AI. To unpack this story, we need to have a few stops along the way. Firstly, we need a quick reference point of what AI is and how it relates to other IT developments, e.g. machine learning. Then, it is worth identifying why INFORM is qualified to speak on the subject. From here we will explore how AI is being applied in the container terminal market today. Finally, we'll discuss what the role of humans is likely to be in the future and whether any of us will have jobs.

The simple AI-ML-OR truth

Artificial Intelligence is an area of computer science that's concerned with building systems that demonstrate intelligent behaviour. Most people find it difficult to agree on a precise definition of intelligence, so views of what AI means also tends to diverge. For most people, when they hear the term "Artificial Intelligence," they think of a General AI or a human-level AI that can mimic all aspects of human intelligence. The simple truth, however, is that today AI is far from this. Instead, AI vendors have succeeded in building niche, so-called Narrow AI systems that know how to do reasonably specific things very well (for instance, play chess, understand natural language, translate between often very different tongues,

INFORM specializes in Agile Optimization Software to improve operational decision making. Based in Aachen, Germany, the company has been in the optimization business for nearly 50 years and serves a wide span of logistics industries including maritime and intermodal terminals.

Photos: Wikimedia Commons

or drive autonomous vehicles). It is these Narrow AI systems that are now making their way into our industry at a rapid pace as part of the Fourth Industrial Revolution.

In contrast with General AI's goal of mimicking human intelligence, machine learning (ML) tools use algorithms to iteratively learn from and adapt to data, enabling computers to find hidden insights without being instructed where to look. A beginner's example for this can be found in your email inbox in the form of spam filters. Simple rule-based filters are not very effective against junk mail, since spammers can quickly update their messages to work around them. Instead, ML-enhanced spam filters continuously learn from a variety of signals and tailor themselves to the email needs of the individual user.

Operations research (OR), also referred to as "the science of better", uses analytical methods (mathematical optimization, heuristic methods, and so forth) to analyse and consider vast amounts of data to optimize the planning and real-time control of processes. Depending on one's view, OR is either a means to an AI outcome or the two can be complimentary disciplines.

When you think of AI as the area of computer science that is concerned with building systems that demonstrate intelligent behaviour, one could say that OR is part of AI. From a classical research perspective, this is inaccurate because OR and AI are two separate disciplines that have independently developed intelligence-based computing techniques. However, if one takes the broader definition of AI, with building systems that demonstrate intelligent behaviour, OR could be classified as a part of AI. Alternatively, AI is a technique that makes better predictions about the data that is fed into OR optimization algorithms.

Either way you choose to view the relationship between OR and AI, INFORM has been working with AI for over two decades, with commercially available products in use since the early 2000s. More than 20 years ago, we started developing knowledge-based AI systems pertaining to the concept of using fuzzy logic and fuzzy reasoning for representing human knowledge. Over the years, we've added ML as a second area in our AI activities and the two are now working together in parallel.

What's in it for my container?

As described in another place, in the article *Power up your TOS* published in *The Journal of Port and Terminals*, our OR-based Optimization Modules (OMs) work in conjunction with an existing terminal operating system (TOS) to drive terminal efficiency. This "add-on" relationship allows terminals to implement the power of OMs without significant changes. Further, in most cases OMs work in the background without direct user interaction. Workers interact with their existing software environment while benefiting from optimization with no timely retraining required.

To further enhance the decision-making quality, the same add-on relationship can be used to connect a ML platform to the optimization process. There are basically two use cases. First, to analyse data to fine-tune the models and rules of the OM. Second, to analyse data to improve data quality that is fed into the OM.

Optimization Modules typically run on a mixture of different data, e.g., estimated time of arrival/departure of trains and ships, the travel speeds of automated stacking cranes or rubber tyred gantries, container bookings, and truck gate-in registration. Some of these are often based on average or historical values, like the times of truck check-ins or incoming trains prechecks. While this level of quality is sufficient to make the best-informed decisions, values offering higher precision at this stage can improve the calculations. Here's an example: a time slot management system provides shippers the ability to book allocated inbound arrival time slots. However, delayed deliveries are commonplace and actual truck arrival times may vary over the course of a business day (off-peak vs. high-peak). In fact, they may vary on different weekdays, be affected by weather conditions, or even be different for particular hauliers and/or drivers.

The ML will analyse huge amounts of data very quickly and present any findings and correlations in easy-to-digest dashboards to create insights for humans. These, in turn, can form the basis for expert discussions. In cooperation with INFORM, the outcome can be used to fine-tune the models and

rules of the optimization module or, alternatively, the insights from ML may be fed back automatically into the software where they replace previous average or historical values.

Besides data from the TOS and OMs, ML can also be connected to various other internal and external data sources (port community systems, weather apps, etc.) to further enrich the database. Machine learning can be operated all day round, or on a periodic or on an event-triggered basis.

Is it alive?

In the riveting laboratory scene when the monster is brought to life, Victor Frankenstein shouts, "Look! It's alive." Today, computer programmers can have similar moments when they develop chatbots. In fact, these pieces of code are one of the most common AI-based applications. They are designed to sound and type like human beings and continuously learn and develop through AI and ML.

To make the latest technologies and applications available for the terminal industry, INFORM recently released a chatbot add-on for their maritime and inland terminal solutions. It receives both voice and text-based queries from a broad range of input sources, recognizes the request, searches for the answer, and sends the answer back as a text response in real-time. The chatbot quickly allows a status check of key performance indicators (KPIs), containers, and/or equipment without calling anyone. Management, with no previous training in the system, can ask the software directly to quickly access KPI data on the fly and in a manner that is convenient to them.

***Frankenstein* reloaded?**

Two hundred years later, we find ourselves at a prologue to a new Frankenstein story. What are the lessons learned? One of Dr Frankenstein's gravest errors was to neglect his creation. He fled from its presence, giving up on the opportunity to supervise, nurture, and educate his invention. Today, the aim of AI development should not be to make a "digitized being" better than us, but rather to make "it" beneficial to us.

Technology moves ahead, but so does the human mind and our attitude towards technology. A senior operations manager from the baby boomer generation might have a different opinion on the usefulness of chatbots compared to a millennial management trainee. Also, a seasoned straddle carrier driver will be more hesitant to accept decisions and work orders from an AI system than a digital native who is about to start a career in our business.

By 2025, Millennials will make up 75% of the global workforce. They have grown up with very fast communication capabilities and high-tech is woven into all aspects and areas of their life. What's more, the generation born after 2010 – the "AI natives" – will only know a world with artificial technology (read more in the article *Born digital. Millennials in maritime logistics*, featured in the 1/2018 printed edition of the *Harbours Review*).

How we manage this human transition is going to define our industry. At this point, there are more questions than answers, such as how do we best utilize highly skilled staff who are in traditional roles? How do you prepare these staff for the future and how will their roles change? If we retrain them, who bears the financial and social costs? How do we attract a young, millennial-aged workforce that have the new skills we'll need in the future (find out more in the piece *How to hire – and keep – the best. Employee experience* in the same printed issue)?

To position ourselves for the future, it is the role of all stakeholders in the port industry to take a degree of responsibility. The question isn't whether AI is coming or not, but rather will we, as an industry, finds ourselves well-prepared or maybe rather caught off-guard when we realize that AI is here. Or, as Mary Shelley wrote in *Frankenstein*, "Nothing is so painful to the human mind as a great and sudden change." ■

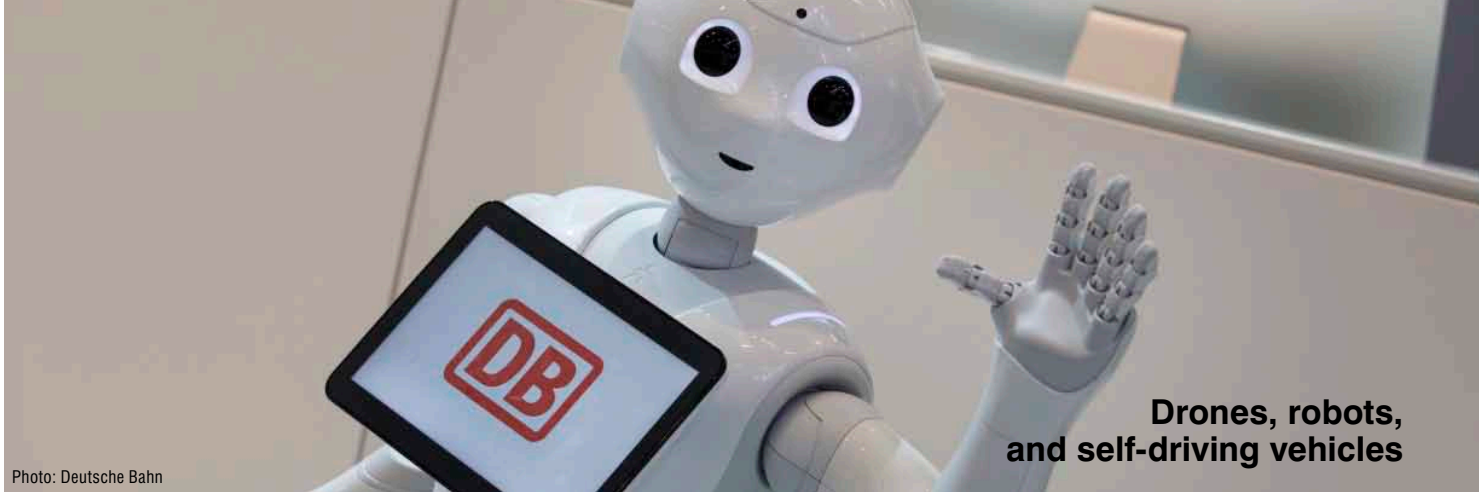


Photo: Deutsche Bahn

Reshaping logistics

by **Matthew Wittemeier**
Marketing and Sales, Logistics Division, INFORM

Matthew Wittemeier brings over 10 years experience in marketing from a breadth of industries, incl. aviation, creative, financial, and software services. He holds a Bachelor in Management and Professional Studies from Southern Cross University in Australia.

Drones, robots, and self-driving vehicles seem to have become a weekly discussion topic for the logistics industry. With major players like Amazon, Google, DPD, UPS, and even convenience stores committing serious resources to the development of these solutions, there is a consensus that technology will play a crucial role in shaping the future of the transportation business. If we accept this argument, then we, as an industry, must begin to consider the way that this will impact delivery organizations around the globe, so we can start to prepare our systems, processes, and people for what's to come.

One can easily imagine a future not dissimilar to the current state whereby a parcel is carried between major central hubs by automated trucks before being shuffled to a local depot for dispatch by a driverless van equipped with a team of delivery robots who will facilitate the final leg to the door or parcel drop. While this is certainly a step forward, this is far too simplistic. The real benefit of autonomous technologies lies not in their ability to fit within the current distribution model, but rather to profoundly reshape it! For the sake of this article, these technologies will be divided into aerial (drones), land (robots), and automotive (self-driving or driverless vehicles).

Drones

There is much hype about drones providing a 10-30 minute aerial delivery service for lightweight consumables (generally up to 2.5kg). While this will allow companies to offer a "convenience" service in the future, it is not where they will deliver lasting value. Their real worth lies in their ability to offer pick-up and drop-off at ad-hoc locations. This will enable drones to provide new dynamic services never before possible.

Imagine, for instance, that you've forgotten your office keys at home. In today's world, this would mean that you would have to return to collect them. For many commuters, this means an hour or more of lost time. In the future, you'll use your smartphone to order and pay for a drone to pick up the keys from your home and deliver them to you as you arrive to work. The entire service will be individualized and managed without any rigid logistics frameworks.

Robots

Robots already today come in all shapes and sizes. First, their future versions will offer a very broad range of delivery

INFORM

INFORM specializes in Agile Optimization Software to improve operational decision making. Based in Aachen, Germany, the company has been in the optimization business for nearly 50 years and serves a wide span of logistics industries including maritime and intermodal terminals.

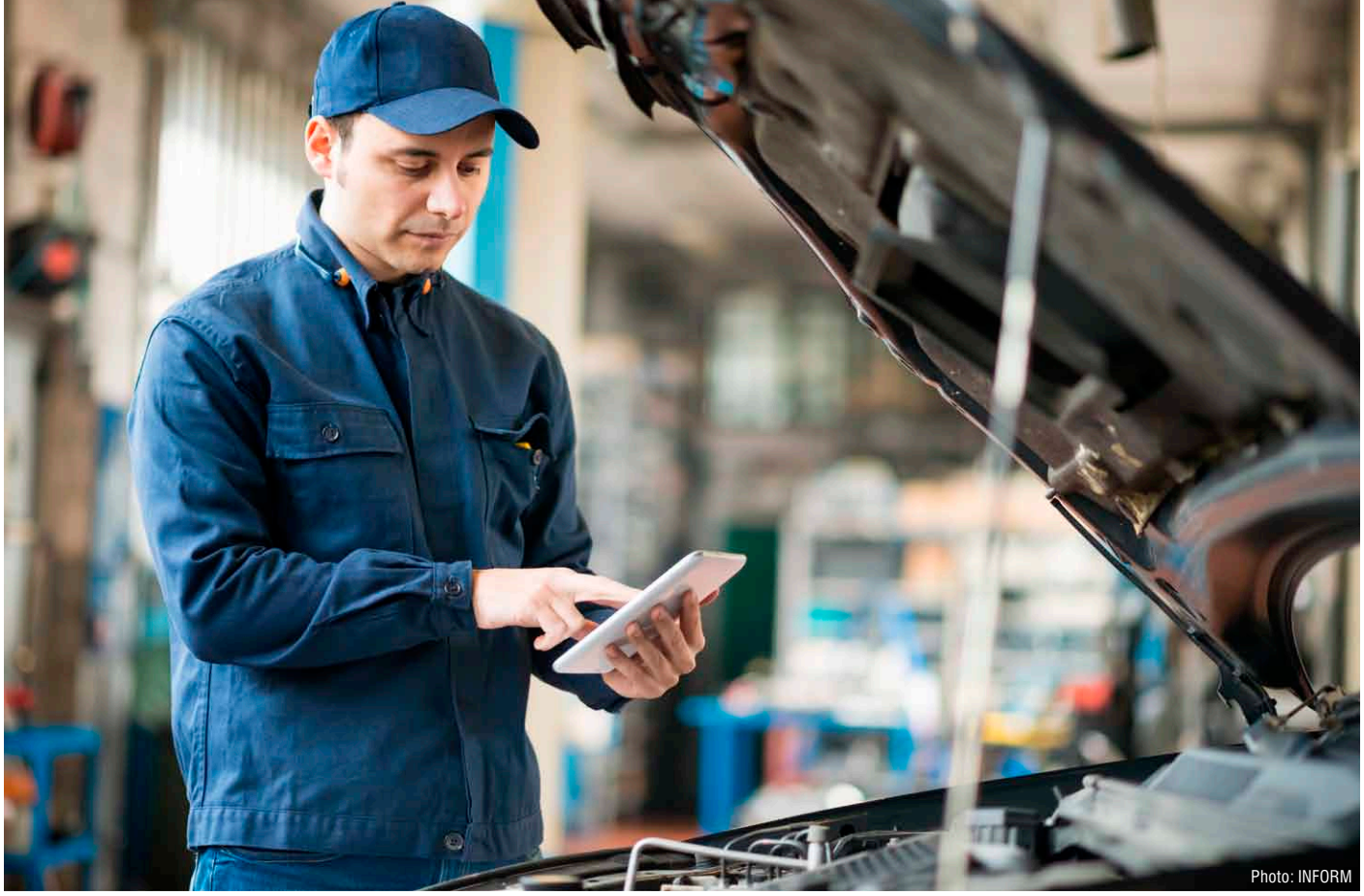


Photo: INFORM

options to logistics companies. From fleets of small- and medium-sized robots delivering standard packages through to larger individual units capable of delivering heavy packages, the future will certainly include these sophisticated mixtures of soft- and hardware. Robots will not only assist their human counterparts, but alike drones, will also open the door to innovative services.

Second, robots will also aid citizens logistically, so to speak. The flexibility to operate 24/7 in order to provide incredibly speedy service will reshape how consumers approach common household scenarios. In the future, when your child comes down with a fever late at night, you won't be rugging them up, packing them into the car, and driving to the hospital. No, you will remotely consult with your general practitioner, who, if need be, will dispatch any required medicines or equipment via a robot from your preferred pharmacy. The entire process will likely take half an hour from start to finish – and anyone with children knows this is a dramatic improvement from today's status quo. Robots will not only open new delivery options to end users; they'll empower a greater shift towards remote services.

Self-driving vehicles

Autonomous cars and trucks have been making headlines for decades; however, it is their recent history that is the most promising. In 2015, Daimler received a license to operate its autonomous truck in Nevada, US. Self-driving vehicles are already challenging the entrenched state of affairs and are making their way into the market.

In the future, self-driving technologies will move from trucks into vans and eventually to cars. As this happens, more and more vehicles will transition to unmanned operations. This adds to the ability of logistics operators to run beyond the standard working hours. Autonomous vehicles will further extend the effective ranges of other technologies from their primary depots, which on their own is often limited. Logistics operators will gain greater flexibility to continuously respond to market conditions, e.g., with mini "pop-up depots".

Once-in-a-lifetime

In short, each of these technologies

Photos: Volvo

allows us to imagine, at least in some respects, a better tomorrow powered by innovation and outside the box thinking. On their own, each technology has the ability to reshape the way consumers interact with logistics operators. Collectively, they present a once-in-a-lifetime opportunity for operators to create truly innovative services that will reshape the consumer-commerce market relationship. When we look at how they could come together to redefine logistics as a whole, things get even more exciting!

End-to-end automation

The technology required to automate logistics exists. Depending on which side of the Fourth Industrial Revolution you're standing on, this is either exciting or just the opposite – it's the first sound of war drums proceeding doomsday. That said, while it's more than likely that certain groups of interest will push back on the idea of autonomous technologies taking over traditionally manned roles – it will nevertheless happen, just as steam engines and the light bulb did.

Automation has already been underway at ports around the globe. Its adoption is spreading rapidly to other industries as well. The legalization of the technology will only continue as it improves. For example, the U.S. Government took a positive position on self-driving vehicles in late 2016, describing a future where autonomous vehicles will save time, money, and lives. To add fuel to the fire, the US entered 2018 with a continuing shortage of 100,000 qualified drivers; a shortage that shows no sign of resolution, also in Europe. Self-driving vehicles are well positioned to fill this shortage, or, likewise, make the trucker profession more attractive by, paradoxically, taking the strenuous driving hours, especially at night, out of the equation.

From there, automation will continue as newer robotic technologies continue to evolve, benefitting from increased real world testing, advances made in Artificial Intelligence (AI) and machine learning (ML), and positive end customer feedback. This last point is crucially important. For instance, robots delivering parcels are an unprecedented change in how consumers interact with parcel delivery. Remember, consumers can either accelerate or break the neck of technology adoption, so almost every parcel operator is looking more intently for consumer feedback data to improve future services. This is true for both parcel logistics and across the broader supply chain.

Dynamic networks

As logistic operators services become more autonomous, so too will the broader logistics network that supports it. The future networks will be more dynamic and nimble than today's. Supply and demand ebbs and flows. What's new here, is that autonomous technologies can be redeployed more easily than their traditional manned counterpart. This flexibility will provide operators with newfound abilities to transform their nowadays static networks into a dynamic, data-driven environment of the future.

Last-mile delivery optimization is already evolving to cater for increasing data that allows for optimized routes. As an extension, if we apply the system logic already available to manage portable assets to autonomous technologies, operators will not only have a system that can react to operational changes, but grow so as to predict them and proactively balance resource requirements in advance. This agile approach is already proven to decrease required asset pools while increasing service levels. Applied to autonomous technologies, it would have a significant impact on managing capital expenditure and improving customer service levels in a dynamic network.

Systems

Technology in general is an enabler of innovative ways of doing business. The systems of logistics operators will evolve in the future from a disparate network of interconnected facilities into a centralized ecosystem that isn't physically tied to any single facility. Core system processes will be managed from a central location with remote presence at each individual facility.

Photo: DP DHL

By centralizing and interconnecting the physical and technological systems, operators will open the door to streamlined and higher quality decision-making, as well as improved efficiency and increased flexibility. By taking as many factors as possible into consideration, planning and execution will improve. Decisions that adversely impact the broader ecosystem will be known in real-time and their effects can be planned for, and in many cases mitigated, leading to an overall improvement in system efficiency. Finally, the dynamic networks of the future will require "light local infrastructure" to enable resilience in the network model. A dynamic model only works if the effort to remain such is minimal.

Processes

The processes of the future will need to be more dynamic, too. This is a counterintuitive point, as drones, robots, and self-driving cars are currently prone to failure in unpredictable situations. However, as autonomous technologies continue to evolve, the range of processes that these technologies are exposed to will as well. In no uncertain terms, the technology will become smarter and better able to respond to unforeseen circumstances on its own through the use of AI and ML technologies.

It is at this point that I make my case for more dynamic processes for the future. AI is on track to reaching a point where it can make decisions on its own within the parameters of acceptable operation that lead to a positive outcome. The processes of the future will need to move from mostly rigid "if this, then that" models to ones focused on goals achieved through acceptable operational parameters.

People

Reading this article, it would be easy to believe that humans have no place in the future of logistics – but nothing could be further from the truth. The future will see a shift in the roles and responsibilities of humans, that's a given. After all, robots are only good at doing what they are programmed for. However, how humans approach traditional roles will need to change. Also, new kinds of jobs will be created. Instead of truck drivers and dispatchers, we're more likely to see technicians, analysts, and strategists. The society has the responsibility to facilitate this transition, which won't happen cost-free, so that vulnerable groups won't be left behind.

As drones, robots, and self-driving vehicles enable an ever-increasing customer specific experience, the way we view and measure success will evolve. Dispatchers will move from managing the mundane to orchestrating a strategy that targets achieving a new era of key performance indicators. This new indicator set will be increasingly customer centric, in a way that enhances individualized experiences and customer journeys.

It has already begun

In this article, we've looked at what drones, robots, and self-driving technologies can achieve, what their collective impact might be on the industry that is constantly changing, and how the business of transport and logistics might have to evolve to better enable these changes to happen. One could easily dismiss this as overly optimistic or futuristic. But the simple fact of the matter is: the journey has already begun.

Operators all over the world are embracing these technologies, relying on the promise of bringing about a future which, although digital, will also create a new, hopefully better, reality. It is worth remembering that with pretty much any technological innovation, the first movers and early adopters get the upper hand in defining the customer experiences of tomorrow against which all operators will be measured eventually. ■

Photos: Inmarsat

Set for lift off

by **Ronald Spithout**
President, Inmarsat Maritime

A new research report commissioned by Inmarsat, a British satellite telecom, suggests that the maritime industry may be more advanced in strategies to adopt the analytic, management, and operational tools available via the Internet of Things (IoT) than many have supposed. Findings suggest that regulatory factors are playing a central role in maritime uptake, with the need to monitor emissions a key driver, but that a distinct group of owners are seeing IoT-based solutions as the gateway to a more efficient maritime industry.

Published in June 2018 as part of the new Inmarsat Research Programme 2018, the *Industrial IoT: land and sea* paper is based on 750 interviews done by researchers at Vanson Bourne exploring the use of IoT-based solutions in the supply chain, among respondents in maritime, transport and logistics, energy, mining, and agriculture.

The new report offers unique insights into prevailing commitments and attitudes towards IoT solutions in the supply chain, with its maritime part allowing 125 respondents (92 from shipping and 33 fishing) to speak for themselves. Respondents came from companies owning a mix of vessel numbers across a full range of types. Owners from Greece made up the largest constituent (25), followed by Japan (20) and Germany (15); container carriers represented the largest commercial ship type, with vessels otherwise split among tankers, bulkers, and offshore.

Cost-fixated laggards?

One of the most striking findings is that maritime respondents expect average expenditure per business on IoT-based solutions will amount to $2.5m over the next three years. While this is less than the figure established for the logistics sector, it nevertheless puts maritime significantly ahead of average spend projected by respondents among clients in the energy, agriculture, and mining sectors. Maritime respondents also say that they intend to invest a larger share of their IT budgets (7.8%) in IoT-based solutions than in any other next generation technology.

Drilling down into the report, owners show themselves as upholding the maritime industry's decade-long fixation with costs. While 51% of respondents say that revenue generation does not figure in considerations, 75% say that they have already realised or expect to see savings using the IoT. Route optimisation is typical and is identified by 57% as in use or on trial.

To view the research microsite and download the full report please scan the QR code or go to

Being probably the most detailed account of attitudes towards the IoT ever undertaken in the maritime sector, the report aligns with Inmarsat's strategy to power the maritime data revolution, via both the high speed Ka-band available on Fleet Xpress and expanded data use on the more established L-band channels. According to Inmarsat's expertise, IoT-based solutions can improve business intelligence, vessel/fleet performance, and crew welfare. As part of Fleet Xpress, the company is supporting a growing portfolio of content-rich management tools through its Certified Application Partners (CAPs) programme.

inmarsat

Inmarsat was set up in 1979 by the International Maritime Organization to enable ships to stay in constant touch with shore or to call for help in an emergency, no matter how far out to sea. Today, the company's fleet of 13 satellites serves not only the needs of merchant shipping, but also governments, humanitarian aid agencies, airlines, the broadcast media, and the oil & gas, mining, and construction industries. For more info please click www.inmarsat.com

However, maritime respondents also exhibit a marked ambivalence towards IoT-based solutions that is unique to the sector: enthusiasm in some quarters is tempered, in that the industry is also home to the largest group of IoT "laggards", a description applied to over 25% of respondents. While 33% of maritime respondents believe that IoT solutions will bring 10-20% savings within five years, 14% believe that – even then – there will be no savings at all.

But direct operational savings are not the only savings available from deploying IoT-based solutions in the maritime sector, according to respondents. Cutting marine insurance premiums is cited by 70% of those interviewed as one of the most important drivers for adoption. The finding is especially interesting, given that the industry self-selects as a "laggard" when it comes to taking steps to remedy its cybersecurity shortcomings.

Regulation is providing a strong prompt for adoption. In line with the global fuel 0.5% sulphur limit that will enter force as of 2020, the target set by the International Maritime Organization to halve ship CO_2 pollution by 2050, and the EU Monitoring, Reporting and Verification for fuel use, 65% of respondents say they already use IoT-based solutions to monitor their bunker consumption. A further 9% say they will do so within a year, with deployment projected as reaching 100% by 2023.

Making up one's (peace of) mind

When it comes to their cyber vulnerabilities, respondents are more concerned about data storage methods (55%), network security (50%), and potential mishandling of data (44%) than they are about targeted attacks (39%). At the same time, though, only 37% report initiatives to improve security training, with just 25% working on new IoT security policies.

This is all the more puzzling because there are solutions already available in the market that can help companies become more cyber-bulletproof. There is, for instance, the Unified Threat Management and monitoring service solution developed by Inmarsat under the Fleet Secure brand and unveiled at the end of 2017. As well as detecting external attacks, Fleet Secure protects vessel networks from infected USB sticks and crew devices connected to the onboard LAN, combats viruses, and blocks access to unsafe websites. It also isolates an infected area of the network so that threats can be contained. Support can either be offered through self-checking, via an online portal, or through different levels of monitoring, analysis, and reporting, all depending on the customer requirements that can include immediate notifications and an escalation to telephone support.

The industry's lack of cyber preparedness raises a deeper malaise over more full-blooded commitment to IoT-based solutions in some quarters. Overall, the industry's lack of decision-making skills is the most frequently cited impediment to uptake (by 56% of respondents). Maritime also identifies itself as behind the curve when it comes to planning skills, where 42% of respondents believe their organisations would benefit from additional cyber-competence against a figure for all respondents expected to amount to 37%.

Full deployment – in-house or outsourced?

A different frustration appears to be thwarting ambitions among those already fully engaged in IoT-based solutions. Here, 51% of the maritime audience cited the time lag between data collection and its availability as an obstacle blocking their optimisation of IoT-based solutions: this was 11% ahead of any other explanation. This is despite the finding that only 20% of maritime respondents cite connectivity issues as a barrier to adoption of IoT-based solutions within their organisation – lower than any other sector.

However, to assess the maritime industry's readiness to adopt IoT-based solutions on owner testimony alone is to overlook the fact that much of the technical expertise historically held in-house has been outsourced to ship managers and equipment suppliers. Marine equipment can contribute 70% of the value of a new ship, meaning that it has been suppliers – rather than owners – making the running on connectivity, big data analytics, and app-triggered remote diagnostics and preventive maintenance. Some 64% of maritime respondents said that they would use an external partner to facilitate either "some" or "as much as possible" of their efforts to develop IoT-based solutions.

Nevertheless, in one of the most thought-provoking aspects of the report, early analysis also places maritime ahead of energy, agriculture, and mining when it

comes to attitudes towards IoT-based solutions, with 34% of maritime respondents equating their position as one of "full deployment". This compares to a share of 21% among all 750 respondents and just 2% in the mining sector.

Driving the maritime "leaders" is the need for ships to be more cost efficient, cleaner, and safer than ever before, with 56% of maritime respondents already using or trialling smart asset monitoring. For the moment, fishing lags marginally behind commercial shipping, but the disparity may be short-lived: 57% of the 33 fishing organisations polled envisage uptake over the next 24 months.

The Inmarsat report debunks the well-entrenched mantra that the maritime industry is too far behind in the rear-guard to really embrace the digital revolution. It has its set of challenges, that's true, but there are both internal and external factors pushing sea shipping in the arms of the Internet of Things as well as other next-gen devices and software. ■

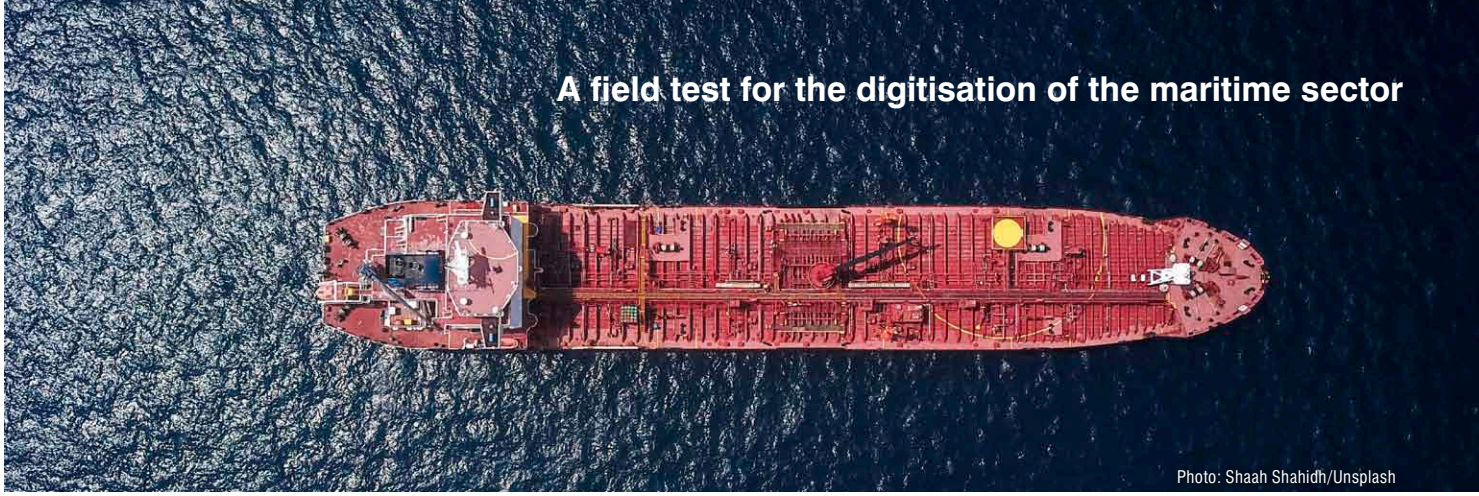


Photo: Shaah Shahidh/Unsplash

The Baltic Sea sandbox

by **Kevin Hohmann**

Every innovation needs a prototype at some point as still computer simulations in a lot of cases cannot prove whether a solution actually works. The same holds true for software that's specifically designed to improve hardware operations, sea shipping among many. Here one also needs a tangible environment to put the product to the test. That's why innovative software companies venture into real-life sandboxes, sometimes as big as an entire sea, to see if their solutions really dig it.

aquaplot

aquaplot was established in 2015 in Karlsruhe, Germany. The company develops web-based technologies for maritime route planning. In addition, Aquaplot supports other innovators in this area with app components, like user interface modules, and offers data and information services via an application programming interface (API). Since September 2017, the start-up has been located at the Centre of Satellite Navigation Hesse in Darmstadt. For more info please visit www.aquaplot.com

The German start-up Aquaplot is now establishing such a test field in the Baltic. There, the company will examine all extensions and new developments of its web-based services prior to rolling them out internationally. "The Baltic Sea region is an ideal 'sandbox' for us. We can test our applications there in an isolated sea area that meets all requirements for an informative analysis of our products. This is how we collect information about the functions of our applications in real operation," Henning Grimm, Founder and CEO, Aquaplot, explains the rationale standing behind this screen-to-reality project.

His start-up company has been developing innovative software solutions for the maritime sector since 2016 (read more in the *Baltic Transport Journal 6/17's Through the eye of the storm. Nature-inspired software for optimising the maritime supply chain*). Now, Aquaplot is about to run a pilot study to estimate and continuously monitor the estimated time of arrival (ETA) in a port, possible delays, and other crucial data for all dry bulkers and tankers plying in the Baltic Sea. The goal of this study is to provide this information in near real-time as well as in a more accurate and completely automated way to the broader maritime community.

Completely new possibilities

The first application Grimm and his team brought to the market was a route planning software, a kind of Google Maps for the shipping sector. This piece of computer code is able to plan complex sea routes in milliseconds, in contrast to previously existing solutions which only use the composite data of historical ship routes. The Aquaplot's solution uses nature-inspired Artificial Intelligence (AI) – composed of particle swarm and evolutionary algorithms that cooperate in a virtual network – to address this problem. "We achieve positive effects that can also be observed in a well-rehearsed team with division of labour and effective consultation. This is unique in the industry and allows us to plan routes in real-time without them having to be sailed by numerous ships. In addition, there are completely new possibilities for simulation and scenario analysis," says Grimm. Patent applications are pending in EU, USA, China, Singapore, and Japan.

Together with integrated data feeds, dynamic factors – such as wind, flow conditions, draft restrictions – can also be included in the calculation. The safety- and navigation-related marine data is integrated into the algorithm to get distances, ETAs, and other data that's specific to a particular vessel or ship category.

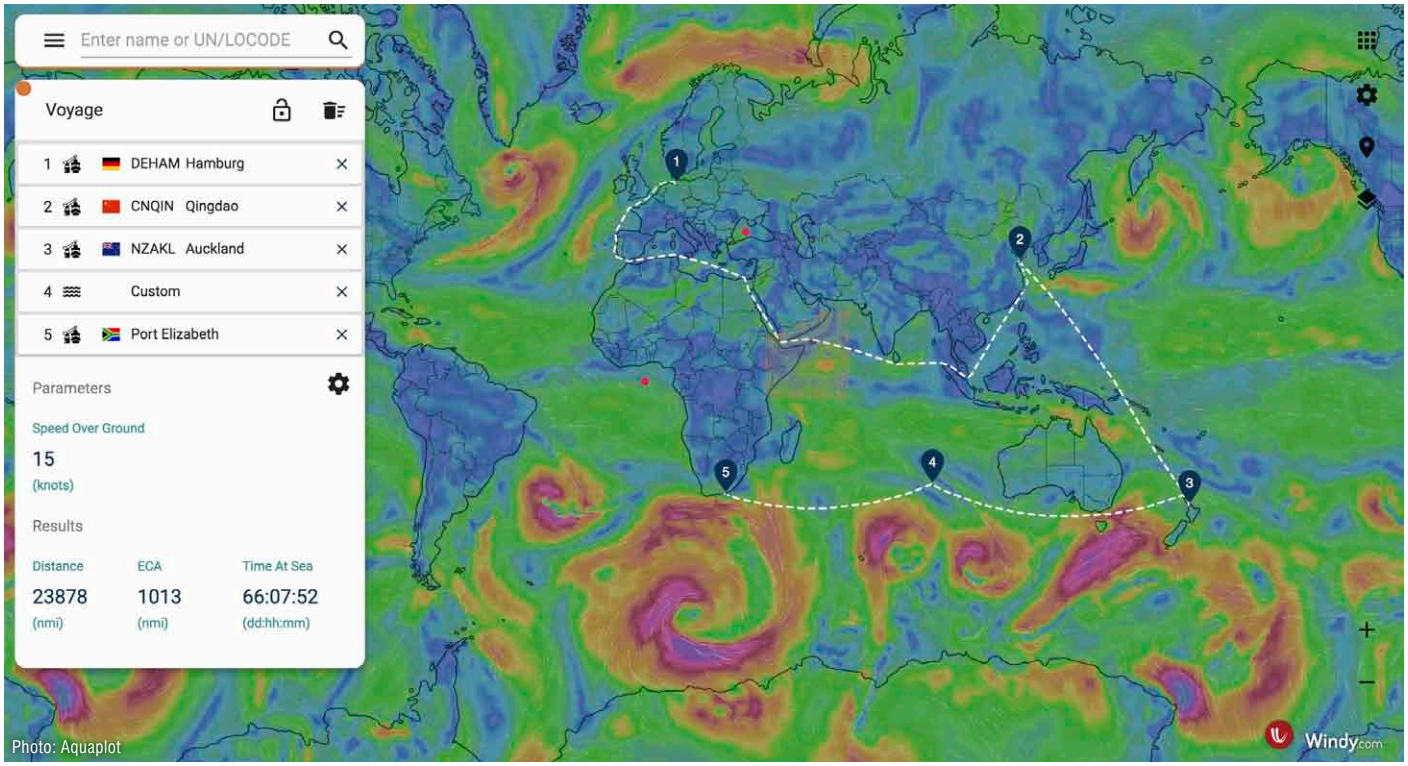


Photo: Aquaplot

This not only enables real-time monitoring of fleets but also gives the opportunity to carry out various simulations or make forecast scenarios. Besides cost-benefit advantages, resulting from greater fleet visibility and flexibility, taking this approach can also help improve safety in shipping, as meteorological developments can be immediately taken into account when planning or adjusting the route. All things rounded up, the 17,000 port database-rich app is already used by over 8,000 users from 130 countries.

In the market

But the route planning software was only the beginning of an ongoing innovation process. Grimm and his development team are currently working on a digital marketplace, where apps for the maritime industry are supposed to be accessible from autumn 2018. In the future, numerous e-solutions will be available on the marketplace to make everyday work easier for all the parties involved in the business of seaborne trade, be they ports, brokers, shipowners, and other. "The marketplace is a neutral platform for data and apps. Every developer of maritime solutions can make his applications available to business customers of all sizes. The maritime industry needs a platform where users, data and applications can come together to drive innovation and reduce the cost of bringing new solutions to market," says Grimm. "With the marketplace, customers do not all have to solve the same problems again and again," he adds.

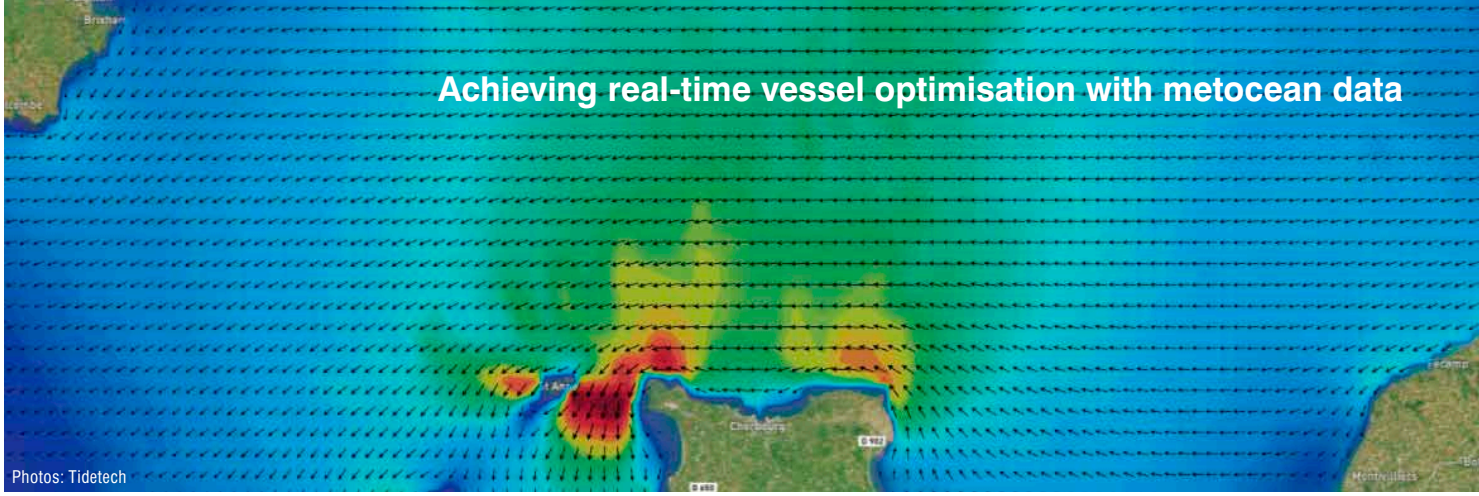
Then again, argues Grimm, "Even today, the sea route is still a major factor of uncertainty for logisticians and project planners worldwide, a problem that would improve with the digitisation of the industry. But the use of digital solutions in the maritime sector often fails because the existing ideas for improvement fail to be implemented technologically." With its marketplace, Aquaplot wants to establish a platform that enables innovators with good ideas to easily develop new solutions for the industry and make them available to as broad an audience as possible without them having to collect countless datasets themselves beforehand. In other words, the marketplace aims to cut the time it takes between crafting and then making a solution available to end customers. "We already have several thousand users, routing and AIS data on the platform and will continue to work on adding further sources and services, such as weather forecasts or ship databases. The idea is to make all these parts compatible so that applications can use the existing infrastructure without having to reinvent the wheel for each application," underlines Grimm.

The young company from Karlsruhe is not afraid to cooperate with other start-ups either. Recently, the collaboration with Vendola Solutions, a 2017-founded start-up offering efficiency and competitiveness-enhancing business intelligence to the maritime sector, was announced. "With Vendola Solutions, we are integrating a third-party app for the first time with the aim of creating a marketplace for specialized applications for the various areas of the maritime industry. This allows us to combine our technical expertise and infrastructure solutions, for example for routing and vessel tracking, with the market and industry knowledge gained from decades of practical experience of our partners," says Grimm about the cooperation.

How to distribute innovation over the industry

Aquaplot's ambition is to promote digitisation in the maritime shipping in order to make this mode of transportation more efficient and safer. "New offers in the market are not attracting enough attention at the moment and the sales process is becoming too expensive. Currently, most of them are moving towards the enterprise sales model, which is very expensive and secondly, the product remains difficult to be mass-produced because the individual but large customers require too many small adjustments and the companies do not retain sufficient flexibility," says Grimm. With the Aquaplot marketplace, he wants to reduce what's called the "distribution problem". "Our service is open for everyone. It can be a catalyst for the whole industry." This is why the start-up not only positions itself as a supplier of components but also continuously keeps developing its own applications.

Grimm and his team want Aquaplot to make the movements of the entire global shipping fleet realistically predictable in the future. This is crucial for having a 21st century-digitally fit supply chain management; a tool that's powerful enough to forecast market disturbances, e.g., the emergence of bottlenecks but which will also facilitates coordination efforts among the numerous actors within the logistics domain, such as ports and their land and sea clients. ■



Photos: Tidetech

Tides and currents go mainstream

by **Penny Haire**, *Manging Director, Tidetech*

We are hearing a lot at the moment about the future of shipping and it certainly makes for some fresh, thought-provoking perspectives. The potential of digitalisation to radically affect some entrenched ways of working in shipping is undeniable. For the most part, the conversations we're having with owners and operators revolve around near-term issues, like dealing with the reality of impending regulation and the need for better performance on existing vessels.

Penny Haire, Manging Director, Tidetech

tidetech
Applied Oceanography

tidetech is an Australian company based in Hobart, Tasmania, and operating since 2008. The company provides a one-stop-shop for detailed, accurate, and validated metocean data, incl. tidal and ocean currents, weather, waves, sea temperature, and more. Tidetech's data is used by thousands of ships worldwide to save fuel and reduce emissions. Customers include major shipping lines, weather routing companies, and vessel efficiency software and service providers. For more insights please check https://tidetechmarinedata.com/

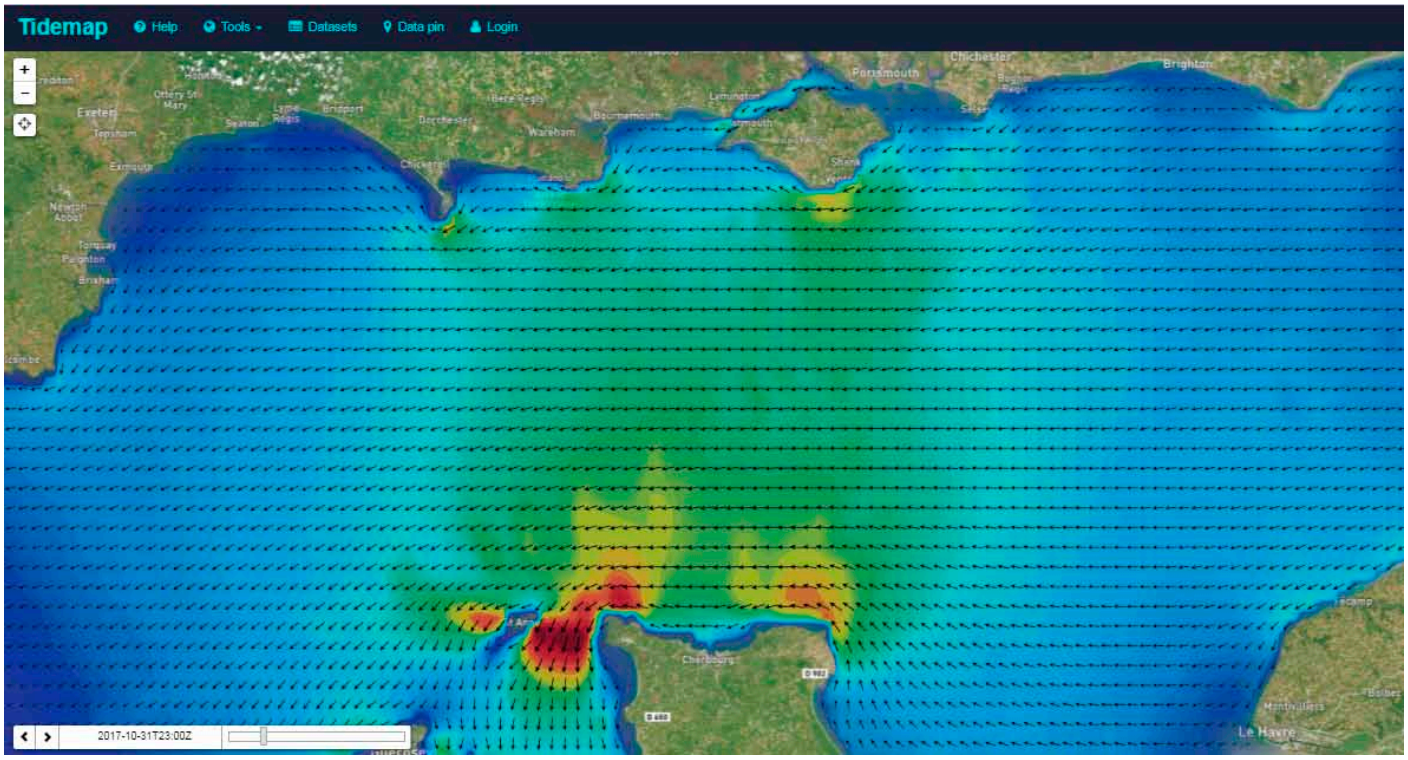
This suggests there is a shift of focus taking place towards how shipowners improve performance and profitability without huge investment on retrofits to assets which in some cases have only recently begun making money again. In addition, while many owners and operators are interested in the potential of digital business, the data they are getting at present is often obtained inefficiently and sometimes of questionable quality.

The ability to provide tangible improvements to vessel performance at a reasonable cost is a way to bridge this gap if it can be shown to have a positive impact – and it has more value than dreaming about the autonomous ship of the future.

Global issues

There has been a solid growth in interest across the last six-to-nine months in the use of metocean data in voyage optimisation, from both the bigger players and smaller ones focused on understanding vessel performance. The tailwind behind what we do has been driven by the regulatory-operational scenario and is also pushed along by the exponential growth in satellite bandwidth. Another driver is the increased use of management systems that can combine layers of information to display a complete fleet operation on one dashboard. A superintendent who manages 20-30 vessels can easily integrate weather, tides, and currents with piracy risk or compliance zones.

In this sense, the futurists have it right: the days of the "autonomous ship master" are disappearing as attention (and funds) shifts to managing the voyage from the shore. This in part reflects changes in the skills base and the trend towards smaller crews, but for a ship manager, the

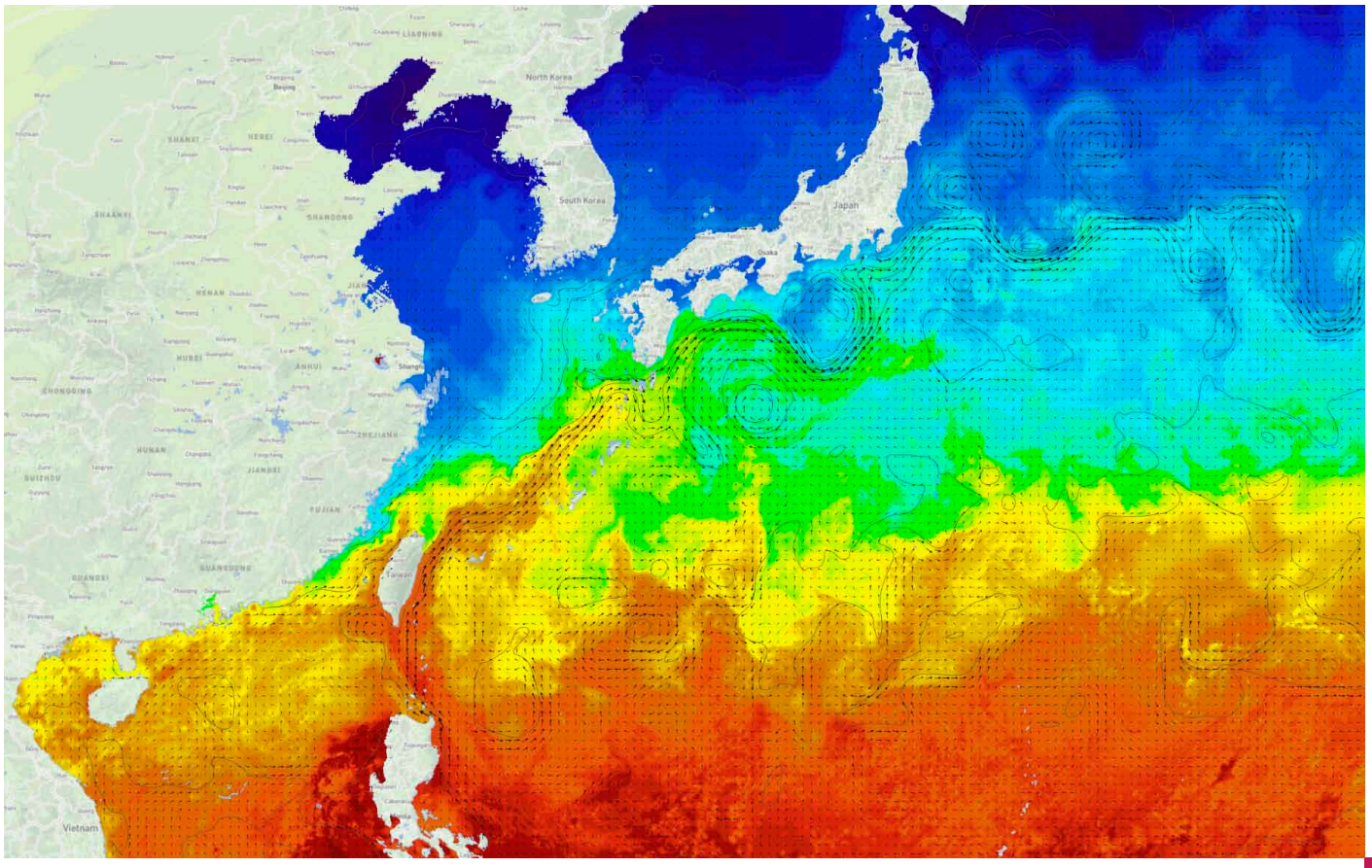


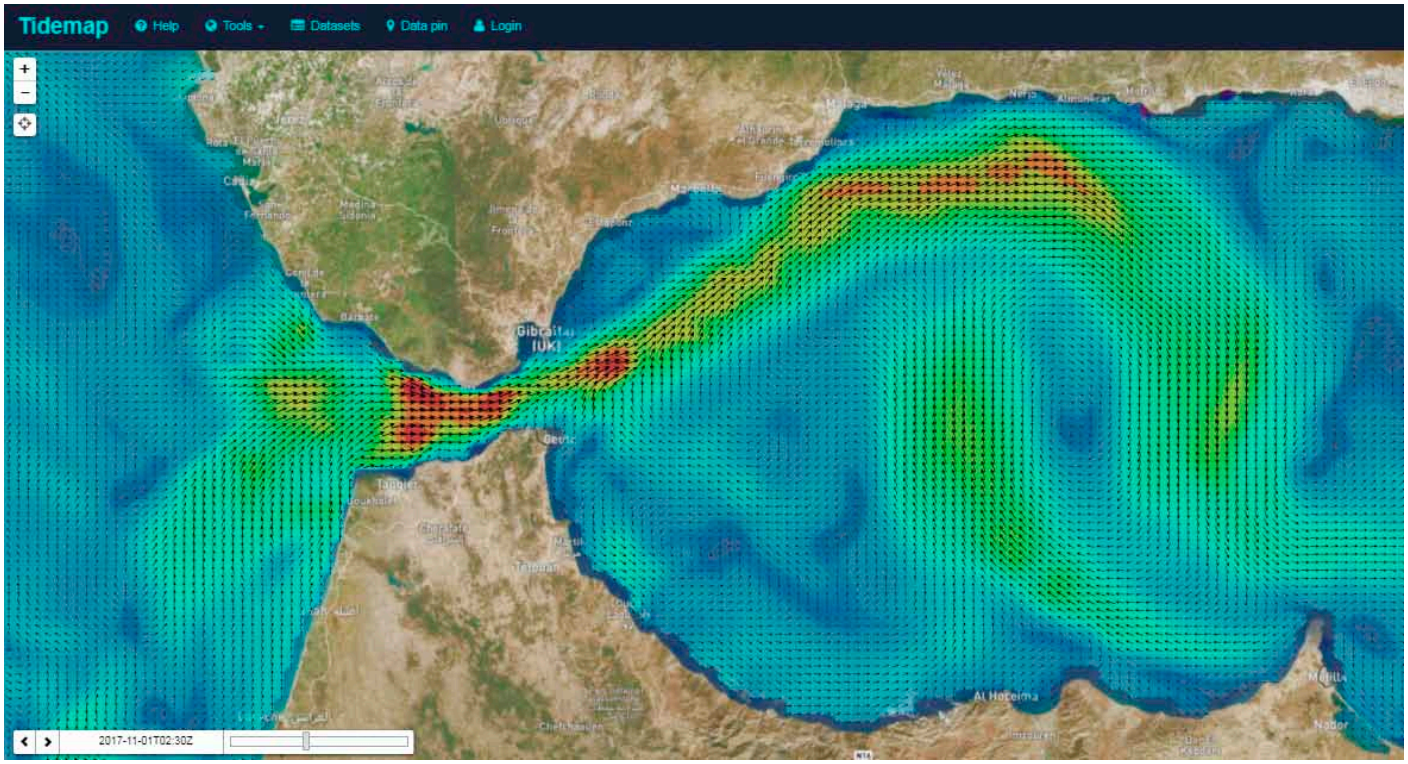
ability to judge how a vessel is performing against the fleet can be crucial.

For much of the last decade, the price of fuel has had less of an impact on profitability but this will soon change. A lot of the interest in our services is driven by the EU's Monitoring, Reporting, Verification Regulation and after that the International Maritime Organization's Data Collection System. In between comes the 2020 0.5% sulphur cap, which is expected to have a strong impact on the fuel price. It's not just owners trading to Europe that need to understand their ships' fuel consumption and operational profile – these will be global issues before long.

In all weather

Tidetech has been providing high resolution coastal tidal data since 2012, and it sometimes seemed to us that





there were only a handful of leading operators that recognised what the service could offer them. When integrated into the navigation and passage planning processes, it can have a positive impact not just in reduced fuel consumption and emissions but also in voyage time.

However, while it seems obvious that weather can have a big effect on performance, often the total benefit that can be derived from this data is not always understood. The confusion stems in part from the misconception that weather services are only of benefit when sailing in blue water. There is an assumption in many operators' minds that once they are in coastal waters or traffic separation schemes this part of the voyage cannot be optimised.

From our own simulations run for shipowners on their routes, we have proven definitively that on the North Atlantic there are more potential cost savings from optimising against currents in the UK coastal and Northern European waters than there are across the whole Atlantic. Armed with that information, operators can predict estimated time of arrivals (ETA) more accurately and use vessel speed and power settings to arrive on schedule, even when the ETA changes. This also offers them the ability to save a lot of money; yet, too often this opportunity is unrealised because there is a focus on the route rather than the speed of the vessel.

Not limiting one's thinking to the idea that voyage optimisation is only about deep sea shipping means that there is a whole different class of ships that could benefit, including coastal and short sea shipping, ferries, workboats, and offshore support vessels. The job of servicing the growing number of offshore wind farms can also be made easier and safer if the operator can identify the optimal windows for maintenance.

A rising tide lifts all boats

Tidetech is the only provider of high resolution modelling of coastal tides and currents, including in critical locations, such as the Malacca Strait and English Channel, where there is a significant concentration of and interplay between shipping, currents, and tides (the company also provides combined ocean current and tide data at a slightly lower resolution on a global basis and has designed its delivery systems to minimise satellite bandwidth consumption). Using enterprise-grade cloud-based servers tidal models can be generated in minutes, something which would have previously taken a day on a supercomputer, while group files can be delivered for ingestion into on-board systems. Data can also be generated at any given waypoint to provide weather wave and current values along the whole voyage track, information that can be used for commercial post-voyage analysis and as evidence in charter party disputes.

Most recently, Tidetech has announced a partnership with Weather Decision Technologies, a US-based weather content provider, to combine our current and tide data with their weather information system to help manage risk, delivering very accurate hourly weather forecasts to maritime users. As communications costs continue to fall and the need for accurate, reliable data increases, it makes perfect sense for officers and superintendents to use the cloud to generate passage plans and share navigational data in real-time. We think this strategy will make Tidetech a very powerful platform for a future in which the industry will continue to benefit from a concerted move of navigation-related data into the cloud.

> **"There has been a solid growth in interest across the last six-to-nine months in the use of metocean data in voyage optimisation, from both the bigger players and smaller ones focused on understanding vessel performance.**

For owners and operators, better data and information can feed directly into enhanced fleet and voyage management, whether this is driven by compliance or commercial reasons. Leveraging the cloud to share that data and optimise vessel performance is a very logical way to create the roadmap which leads to smarter shipping. All in all, it seems that the tide is starting to turn in favour of the more innovative ways of managing one's fleet. ■

Photos: Briese Schiffahrts

Truly online

Globecomm VSAT and Briese Schiffahrts – crew wellbeing and real-time fleet visibility

by **Gregor G. Ross**,
Sales & Marketing Director – Europe, Globecomm

Briese Schiffahrts – a German shipping company managing a 130+ multipurpose heavy-lift vessel fleet and a real pioneer in provision of crew welfare services – has a vision. To support its growth strategy and ensure that its new and existing ships are connected to shore 24/7, Briese selected the global Ku-band very small aperture terminal (VSAT) service from Globecomm Maritime.

BRIESE SCHIFFAHRT

The Leer-based Briese Schiffahrts GmbH & Co. KG was founded in 1984 by Captain Roelf Briese. Today, the 225 highly qualified employee-rich company manages a fleet of over 130 multipurpose vessels, fit to take care of various project cargo, dry bulk and containerised freight. The company also engages in the design and creation of intermodal logistic models and helps with designing and construction of ships and floating equipment. For more info please go to www.briese.de

GLOBECOMM

Globecomm, headquartered in Hauppauge, NY, is the leading engineering-driven, global connectivity provider serving media, maritime, enterprise, and government markets in over 100 countries. The company develops smart connectivity solutions to address customer issues across a broad spectrum of areas, such as system design and integration, managed communication services (incl. mobile and Internet of Things), media services, and mission critical networks. To find more please visit www.globecomm.com

The working relationship between Globecomm and Briese dates back 16 years to the delivery of the first narrowband satcom systems and has relied since then on consistent service provision, competitive pricing, and strong after-sales support. As technology has evolved, through higher speed L-Band systems to the agreement to supply the VSAT service, Globecomm has remained a trusted partner. “Our communications strategy goes back some years to a company meeting that discussed the challenge of attracting and retaining good crew,” says Holger Börchers, IT-Manager, Briese Schiffahrts. He continues, “Nowadays you hear this story widely, but back then there was less recognition that it was about more than just the salary, we had to improve crew welfare by keeping them in touch with their friends and families.”

Getting the crew aboard – and online

Briese operates sophisticated multipurpose vessels, some with heavy-lift capacities and moveable decks, a task that is carried out by the crew not by stevedores, meaning it must acquire and retain well-trained and highly competent sea staff.

From the first installation, Briese crew saw the value in the technology, prompting successive upgrades to meet the growing demand for bandwidth. Internet access is included as a benefit in kind, with Briese paying the airtime bill and issuing vouchers for crew with unlimited data, subject to a fair use policy. “My argument to management has always been this: don’t think of it just as a cost, think of it as being an additional seafarer onboard who takes care of the welfare of the other guys. Having Globecomm VSAT onboard makes managing demand for crew and our business communications simpler and more efficient,” Börchers explains.

The Globecomm’s solution is a high capacity end-to-end VSAT service integrating premium shipboard hardware and monitoring tools to provide maximum service performance across the broadest coverage footprint. Built, managed, and supported by Globecomm, the service supports a broad range of applications over a robust, scalable, managed network that’s

designed specifically to deliver shared services and private networks to customers in the maritime and energy markets. Crew access is prepaid via the Nimbus smartbox, and the service supports a full "Bring Your Own Device" experience via selected Wi-Fi access points. Added value services include firewall and content filtering, advanced email management, and a prepaid crew management portal, with proactive network monitoring and a 24/7 global support.

But ship-shore connectivity is much more than just crew welfare; Briese's specialist vessels are also driving increased demand for applications such as navigation chart data, with the use of other applications expected to increase in the future. Specifically, using Nimbus together with its Cirrus shoreside portal enables Briese to segregate network traffic and employ performance monitoring and enhanced safety services in a cyber-secure environment. Working with the Globecomm development team in Munich, Briese has developed a system for automatically updating electronic chart display and information system (ECDIS) navigation chart data with specially-defined firewall permissions.

Using Nimbus also means that whenever Briese needs to install a new PC, it can be pre-configured and delivered ready to use, avoiding the need to follow a complicated network or software set-up by the crew. Describing Briese as "a large fleet with a small IT department," Börchers says the company's aim is to get all its ships visible on the Cirrus portal so it can recognise any problem with communications or software.

Unlimited data

"When you have a fleet of 132 ships you need visibility," explains Börchers. "The next step will be for us to have better access to the vessel systems. It's hard for a small IT department to monitor everything that is happening, but we want to be able to respond not just after we are aware of any potential problems." Asked what he would like to see from vessel communications in the future, Börchers mentions the usual items of better value and higher bandwidth, but he says the over-riding need is for better access to Briese's assets: "For us the target is to make it possible to connect vessels in real time to the office using our in-house software solution. With higher quality and more reliable VSAT bandwidth we would like to see that available to vessels at sea. That's the next step; to be truly online in real time."

At present, Briese Schiffahrts is undertaking a fleet renewal programme, constructing a series of eight Open Top Eco 5000 multipurpose vessels, designed to consume 30% less fuel but with increased crane and cargo capacity. The first of four ships was christened in mid-April 2018 at the Chinese yard of Zhejiang Zengzhou Shipbuilding, with three more of the 90 m-long, GT 3,415, Dutch flag, ice-class 1A ships slated for delivery later this year. Another newbuilding, the project cargo carrier *BBC Russia* – a sister ship to the 12,500 dwt *Jan* – was delivered from the Chinese Hongqiang Heavy Industry also in April 2018.

As such, Briese is engaged in a global rollout of the Globecomm VSAT system across its owned and managed fleet, upgrading L-Band systems on a continuous basis to around 60% of vessels to date. The shipowner assumed management of six craned project cargo vessels of 12,780 dwt in 2015 and 2016 and a further four vessels of this type were taken over in March and April 2018, which will also be equipped with Globecomm VSAT. All the vessels feature a combination of Sailor 900 VSAT terminal, one or more Iridium OpenPort L-Band as a back-up, and the Globecomm Nimbus network management 'smartbox'. As a result, Briese will enjoy unlimited data for enterprise users and crew members. ■

Photo: www.pexels.com

Building the supply chain blocks

by **Jim Beveridge, Cordelia Wilson, and Danielle McDonald**
ERTICO – ITS Europe

Most people, if they have heard of blockchain at all, they did so in relation to cryptocurrency. However, the technology has more to offer than just bitcoin and the likes, with solutions that can be put to good use in logistics and supply chain management. As an incorruptible digital ledger of economic transactions, blockchain can potentially also resolve many of the challenges created by the complexity of today's global supply chains, often fragmented and lacking transparency.

The good news is that supply chains are changeable by nature – they quickly incorporate and adapt to new technologies. For those managing them, Internet-based technologies have particularly modified their task – from being a matter of keeping the machines fed and dispatching the finished product to something more complex altogether.

As clear as black and white

Managing today's supply chains involves controlling a tangled logistics nexus that spans over multiple locations and counts hundreds of stages and various actors. Among other things, this process requires making different payments and issuing invoices, a task that seldom takes less than several months to successfully finalise. This obviously presents a serious challenge for supply chain managers. For a growing number of consumers, it is also important to know that all of the elements of the purchased products have been ethically sourced with respect to environmental and labour standards and norms.

However, it is difficult for managers and consumers alike to accurately trace the provenance of each and every piece all along the supply chain. Because there is a significant lack of transparency in the current system setup, it's difficult to quickly react to problems that arise related to the shipment's quality or even illegality.

As one of the technologies that enabled the globalisation of manufacturing, it is fitting that computer networks should also offer a solution to better manage this complexity. Blockchain – which sees information held in a distributed database that is simultaneously hosted by multiple computers – can provide efficient solutions that are both verifiable and permanent. With every transaction recorded across numerous copies of the digital ledger and distributed over multiple computers, blockchain is by default transparent. It is also highly secure, as every block in the chain is linked to the preceding one. Information is distributed across the network, so there is no centralised hub that is vulnerable to

25TH ITS WORLD CONGRESS COPENHAGEN 17 – 21 SEPTEMBER 2018 Quality of life

Blockchain will be a key topic for discussion at the 25th ITS World Congress in Copenhagen this September. The ITS World Congress is the world's biggest event, solely focused on the digitalisation of transport and smart mobility. Experts in the field will tackle a number of issues that target blockchain and cybersecurity, incl. enhancing cybersecurity & resilience of transport infrastructure; cybersecurity for public-facing ITS systems; assessing next-gen technologies for emerging future transportation environments; and blockchain and distributed ledger technologies for transport and mobility. For more info and the Congress' agenda please visit www.itsworldcongress.com

ERTICO ITS EUROPE

ERTICO – ITS Europe is a public/private partnership of over 100 companies and organisations across eight different sectors advocating, and actively working on, the deployment of Intelligent Transport Systems and Services (ITS) through a wide range of activities, such as events, projects, and interest groups. Go to http://ertico.com for more details.

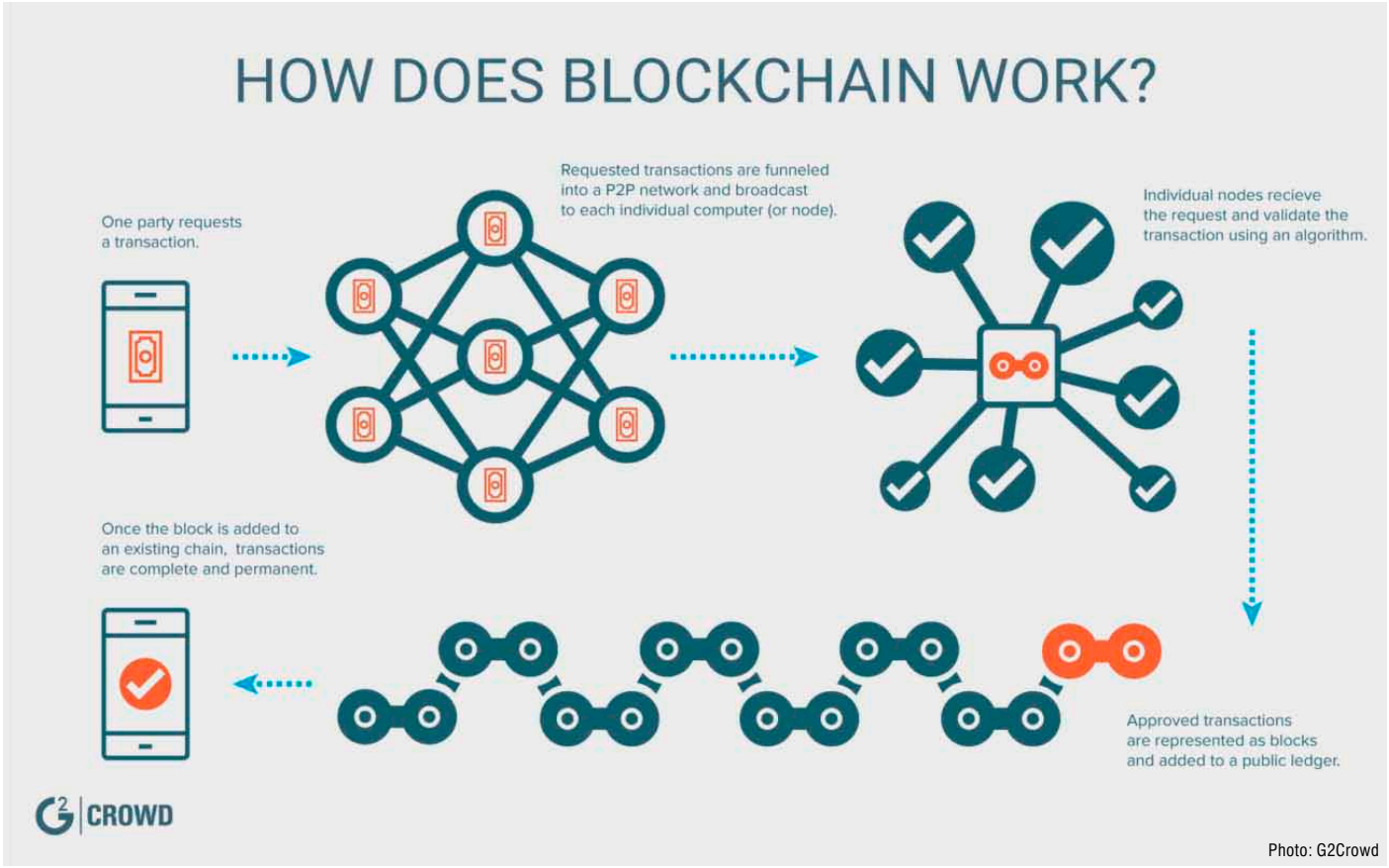


Photo: G2Crowd

cyber-attacks. By enabling smart contracts, blockchain helps to make supply chain management more efficient and cost-effective than current solutions, because the contracts are trackable, while actions are executed automatically, and they do not require the involvement of third parties.

"Despite the current tendency to overhype its use, blockchain will become an increasingly important element in the digital transformation of transportation logistics. Its potential to support this transformation will be measurably enhanced when architected with forthcoming advances in the Internet of Things, low-power wide-area networks, 5G and network edge processing," said Jim Beveridge from ERTICO – ITS Europe, a private-public partnership that regards blockchain as an alternative for smart contracts and transactions in mobility and logistics, complementing advanced data exchange networks, such as the Architecture for EurOpean Logistics Information eXchange (AEOLIX). ■

Photo: www.pexels.com

Photo: www.pexels.com

How the Maritime Module tackles Slow Steaming Strategy

by **Roberto Accardi** and **Chiara D'Ambrosio**

Synchro-NET

Co-funded by the Horizon 2020 programme of the European Union

Synchro-NET is a logistics project aiming at developing an innovative tool set, to find the best possible succession of carriers between the sender and the consignee, and compare several multi-modal solutions, including ship, train, and road transportation. Key Performance Indicators and Key Risk Indicators are assessed for each alternative route, so the end-user is helped to choose the route that best suits his/her needs among a restricted selection.

Unlike road, maritime traffic is not limited in terms of space or speed. And although many areas near the coast can be found with strict regulations, there are many different routes on which a ship can sail between two sufficiently distant ports. In addition, environmental conditions, such as the state of the sea, currents, and wind have a significant impact on the hydrodynamic resistance, hence on fuel consumption, so that the best road either in terms of speed or costs is rarely a straight line between two ports. Last but not least, speed and fuel costs are strongly coupled. Then different ways to operate a given oceanic line can be chosen according to user's requirements.

To assess the costs and speed of a maritime route, and then choose the correct way to operate this route, the Synchro-NET project brought together a consortium of actors from the maritime sector. The expertise of each partner is integrated in a software solution called Maritime Module.

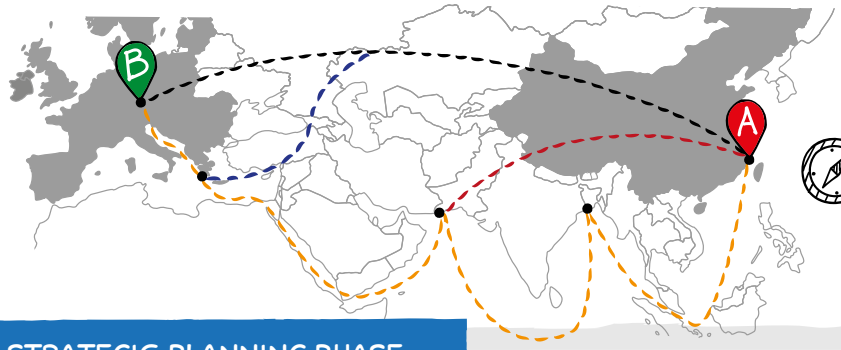
This module is an assembly of several sub-modules working together and includes a weather routing module, a "real-time speed pilot" module which consists mainly in a cost assessment tool, and a route management module. The main issue tackled by Maritime Module is the Slow Steaming Strategy, a premiere in the maritime world.

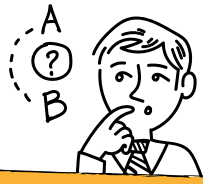
To optimize a route in terms of speed and trajectory regarding the required propulsion power (proportional to fuel consumption), Crain Technologies developed a weather routing algorithm that includes an advanced energy model of the considered ships developed by Bureau Veritas. This module can operate in four different modes. First, it can compute a fully optimized route, in terms of speed and trajectory, from a given Estimated Time of Departure (ETD) and Estimated Time of Arrival (ETA). Second, it can perform only a speed optimization on a given trajectory, from given ETD and ETA. Third, it can evaluate a pre-defined route between two ports at constant speed. And finally, it can evaluate the fastest route between two ports. The algorithm takes the weather into account and returns the required power on the final route, which is used to calculate fuel costs. This module allows to evaluate the impact of slow steaming on the fuel consumption.

Kongsberg Maritime is developing then a "real-time speed pilot" that compares the overall cost for different berthing time, according to the different slots available at port. To this end, it calculates the cost of the trip, for the different slots the ship can reach and returns to the logistics partners of the project the cost of each alternative, so they can select the final route. As this module works in real-time, it also allows if there is a change at berthing time during the trip to "smartly" re-route the ship, either to speed up to catch the next slot, or to slow down to catch the following one. ■

Synchro-NET

THE NEW SYNCHRO-NET APPROACH
TO MULTIMODAL INTERNATIONAL LOGISTIC CHAINS





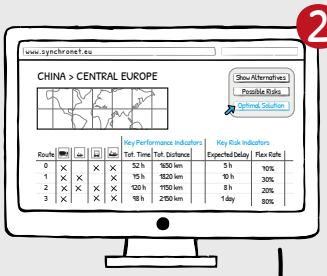
A major shipping line is planning its own deep sea services plus hinterland connections for connections between **China** and **central Europe**, analysing slow/smart steaming options that offer the best solutions for their customers.

STRATEGIC PLANNING PHASE

Determining the clients' preferences and the services that shipping line would offer.

1 DYNAMIC STAKEHOLDER ASSESSMENT MODULE

Using the Dynamic Stakeholder Assessment module, the shipping line approaches its customers (from different industry sectors and therefore with different needs) and asks them to determine their own preferences in relation to the different routes (cost, time, risk, environment).



2 SIMULATOR MODULE

These routes are passed to the Simulator Module that is used to compare the different routes and select the schedules to be operated.
(e.g For example a slightly slower Shanghai-Piraeus route, which saves a lot of money/CO2 and then a range of faster and slower options for the hinterland service).

2a MARITIME MODULE

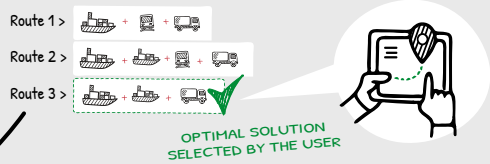
Using the Maritime Module, the shipping line can simulate all the different parameters associated with each route.

2b RISK ANALYSIS MODULE

Based on historical risk profiles, Key Risk Indicators (KRI) are calculated for each alternative route that provide additional information for decision makers.

3 ROUTE SELECTION

The user/client/dispatcher selects the optimal soultion according to his preferences.



OPERATIONAL PLANNING PHASE

Now the shipping agents and freight forwarders use **SYNCHRO-NET** to plan and schedule synchro-modal freight movements, using the optimised maritime slow/smart steaming services identified above.

4 SYNCHROMODAL BOOKING MODULE

Now the Synchromodal Booking Module is used to plan and operate a "real" order.
The user enters the locations, dates, etc. The module requests the best options from the Supply Chain De-stresser and presents them to the user. The user chooses the preferred option. Let's imagine it is ship + feeder + truck. The trip from the port in China can start.

DURING THE TRIP, THE SHIP IS DELAYED BY 1 DAY

5 REAL-TIME SYNCHROMODAL BOOKING MODULE

The Real-time Synchromodal Booking Module alerts the user, and proposes a new solution e.g. switch from feeder vessel to train, so that the new route is:
ship + train + truck.

6 HINTERLAND LOGISTICS OPTIMISER

When the ship actually arrives at the European port, the Hinterland Logistics Optimiser creates the detailed hinterland logistics plan.

7 RISK PROFILER

Finally, the Risk Profiler processes the information about the delayed ship and stores the resulting risk profiles, so that the KRI calculation for future orders can be refined.

Co-funded by the Horizon 2020 programme of the European Union

MOM!
YES, HONEY?
IS IT READY YET?
NO, SWEETIE, YOU HAVE TO WAIT A BIT.
WHEN?!
SOON.

PROBABLY THE WORLD'S MOST COMPREHENSIVE MAP OF THE **NEW SILK ROAD** RAIL CORRIDORS IS JUST AROUND THE CORNER…

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