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red-hot port matters

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Ghent to grow – ‘multimodally’

Ekol Logistics, Transuniverse Forwarding, and North Sea Port have signed a letter of intent covering the development of a 40 ha-big multimodal complex at **Ghent's** Kluizendok. The site will comprise a cross-docking platform (10 ha) and two terminals – ro-ro (10 ha) and rail (20 ha). Transuniverse Forwarding currently operates a cross-dock centre in Ghent for its groupage shipments to and from the whole of Europe, North Africa, and the Middle East. The company handles around 100 trucks and container per week, meaning that the existing 8,000 m²-big facility won't suffice to accommodate the expected growth in volumes (double the number of trucks and containers within five years). According to the plans, the new transhipment building will have been commissioned by end-2021. "We have taken an option to build a new 20,000 m² cross-dock centre on a site covering 10 hectares. According to the preliminary plans, the building will be more than 300 metres long and 60 metres wide and will number 140 loading docks/loading platforms. Because it is so big, some of the transhipment there will be automated or robotised," **Frank Adins**, Chairman, Transuniverse Forwarding Group, highlighted. Because a considerable part of the load will head for the UK, Ekol and Transuniverse will invest in a ro-ro terminal, which will be operated by a third party. Adins said in this regard, "The growth opportunities for cargo transhipment between Ghent and the United Kingdom are considerable. Brexit is expected to cause major congestion in the Channel ports. This will create opportunities to organise transport by ship to more northerly ports in the United Kingdom, in conjunction with rail connections to and from the European hinterland." The rail terminal, once operational, is to take care of 20 Ekol Europe-wide trains/week.

Dredging of Elbe – starts

With the arrival of the hopper dredger *Scheldt River*, the deepening and widening works of the Elbe River have officially kicked off. "We have waited a long time for today and are now hoping for rapid implementation," **Ingo Egloff**, Chairman of the Board, the **Port of Hamburg Marketing**, said. He continued by saying, "The port is already megaship-ready and can handle the largest container ships with a slot capacity of over 20,000 TEU, as well as other mega-vessels. Suitable berths and terminal equipment make that right possible now." Egloff then underlined, "Irrespective of the tide, after the fairway adjustment, ocean-going ships will be able to leave Hamburg with a draft of 13.50 metres; and using flood tide, with one of 14.50 metres. For shipping, the fairway adjustment will provide one extra metre of draft and the related decisive advantages. Container ships will be able to transport around 1,800 more containers (TEU) per call. The 'passing box' downstream from Hamburg will make the Elbe navigable for mega-ships in both directions without the existing restrictions."

LNG SIMOPS in Rotterdam

During her call to the **RST Terminal** in the **Port of Rotterdam**, **Containerships'** box carrier *Containerships Polar* has been bunkered by Shell's *Cardissa* with approx. 200t of liquefied natural gas. According to the parties, it was the first simultaneous operations (SIMOPS) bunkering of a container ship in Europe, which made it possible to load and unload *Containerships Polar* while she was being refuelled.

e-Ottawas to work in California

Cargotec's Kalmar is to supply **NFI Industries** with 25 of its Ottawa Electric T2E Terminal Tractors for use in their selected distribution centres in California. The Kalmar Ottawa T2E Electric Terminal Tractor is designed for trailer handling operations in dispersed warehouses, container terminals, and other applications where short-distance road travel is required. The tractors have a fully electric powertrain, are equipped with lithium-ion batteries, while the onboard inverter charger allows the vehicle to be 'opportunity charged' during work breaks. According to the manufacturer, when compared to a diesel-powered tractor, the Ottawa T2Es generate less noise, vibrations and heat, as well as no fumes. "After testing the demo unit from Kalmar Ottawa for a period of time, it was clear that we needed to collaborate with them to achieve our electric vehicle needs for terminal tractors. Kalmar brought a solution to the table that met our needs and corporate guidelines," **Bill Bliem**, Senior Vice President, Fleet Services, NFI, said. **Matt Napierala**, Regional Manager, Kalmar Ottawa, added, "We are pleased to assist NFI Industries in their proactive and industry-leading approach to utilize the latest electric vehicle solutions to fulfil their emissions initiatives. We are very excited that they were comfortable enough to rely on us, our partners, and our exceptionally strong dealer network to help them achieve their corporate objectives." NFI is a fully-integrated third-party supply chain solution provider with locations across North America. The company operates across approx. 50m ft² of warehouse and distribution space; its drayage fleet consists of over 4,000 tractors and 9,700 trailers.

Tellus enters traffic

The **Swedish Transport Administration** has received from the Estonian **Baltic Workboats** shipyard the hybrid-electric pax-car ferry *Tellus*, said to be Sweden's largest of its kind. The 100 m-long ship, serving the **Uddevalla-Lysekil** route, can take up to 297 passengers and 80 cars per journey. **Danfoss Editron** has supplied the electric power equipment that controls the ferry's propulsion. The power plant is connected to the 12 battery-racks provided by **Corvus**, which have a total capacity of 949 kWh. The batteries are currently charged at night via an on-shore charging station and can also be charged by diesel engines while the ferry is in operation. However, this temporary solution will be replaced by automatic charging stations once the infrastructure is ready. In addition to controlling the ferry's propulsion, the EDITRON load control system automatically supervises the power plant and ensures that fuel consumption is optimised at all times, even when the ferry is not operating fully-electric (when in hybrid-electric mode, the ferry will operate on a single genset, with the rest of the propulsion supported by battery power). "Similar ferries are already in operation in Finland and Norway, so we are thrilled to see Sweden joining the movement. The electrification of the marine industry is a trend which will continue to grow as more countries introduce legislation related to reducing emissions in the sector. The versatility of our EDITRON system means that we can provide fully-electric and hybrid solutions for any kind of ferry. The future of the marine sector is definitely emission-free," **Jani Hartikka**, Project Manager, Danfoss Editron, commented. **Marek Müürisepp**, Electrical Engineer, Baltic Workboats, added, "The *Tellus* ferry is a technical feat, and we are looking forward to seeing more of ferries of its kind enter operation on Swedish waters. We are aiming to scale-up electrification in the marine industry, and we are glad to have found a reliable partner in Danfoss Editron that shares the same vision." **Peter Peterberg**, Environmental Coordinator, Swedish Transport Administration, concluded the thread by saying, "We are delighted to add the *Tellus* ferry to our fleet, which demonstrates that emission-free solutions are as efficient as their diesel counterparts. Our plan is to continue to upgrade our vessels with hybrid-electric systems in order to operate the most sustainable fleet possible in the near future."

Belfast opens a dedicated cruise terminal

Cruise Belfast, a partnership between the **Belfast Harbour** port authority and the tourism promotion agency **Visit Belfast**, has kicked off the operations of a cruise terminal in the Northern Irish port. Belfast Harbour has invested more than £500k in upgrading the quayside which now includes a Visitor Information Centre, part-funded by **Tourism Northern Ireland** and managed by Visit Belfast. "The new terminal is staffed by Visit Belfast's travel advisors and utilises the latest digital and audio-visual technology to showcase Belfast and Northern Ireland's visitor attractions. The newly developed site includes the space required to service the shore side activities associated with cruise tourism for coaches, shuttle buses and taxis, and a berth which has been dredged to accommodate newer and larger cruise ships," a press release from Belfast Harbour read. "Cruise calls to Belfast are now up to 148 calls in 2019, an increase of 31% on last year and this investment in a terminal facility will enable us to offer the anticipated 285,000 cruise visitors a positive welcome and first impression of the region. The new terminal will provide the first dedicated facilities for cruise ships on the island, allowing visitors to quickly connect to Belfast city centre or join one of the many organised excursions tours to a wide range of visitor attractions including the Giant's Causeway, Hillsborough Castle, Mount Stewart and Titanic Belfast," **Joe O'Neill**, CEO, Belfast Harbour, commented. He furthered, "In addition to helping attract more visitors, we've also invested in new gangways and luggage scanners which will enable us to market Belfast as an embarkation port. Depending on the level of demand locally, this opens up the exciting opportunity for local consumers to join cruises directly from Belfast instead of flying to Southampton or other regional ports. Cruise & Maritime has already scheduled a number of departures from Belfast for next summer including Norwegian Fjord and British Isles itineraries. In line with our sustainability ambitions, we have also installed wind-powered quay lighting for the site and a 'smart flower' which will generate solar electricity for the terminal building." Lord Mayor of Belfast, Councillor **John Finucane**, added to this, "Cruise tourism has been one of the city's success stories of the last decade and has become an important part of our tourism mix, contributing significantly to the local economy through attractions, transport providers and retail. I welcome the investment made by Belfast Harbour and Tourism Northern Ireland in Belfast's new cruise terminal and look forward to welcoming increasing numbers of cruise visitors to Belfast and beyond. We're renowned around the world for our warm welcome and these new facilities will enable us to make the best of first impressions." **John McGrillen**, CEO, Tourism Northern Ireland, also said, "Cruise ship visitors contribute footfall to our visitor attractions and provide an opportunity to showcase Northern Ireland to international visitors, many of whom are here for the first time. Allowing cruise passengers to sample Northern Ireland also provides an effective strategy to encourage and generate repeat visits. Our investment in this gateway information centre is part of our growth framework, which will support our overall ambition to double the value of tourism to Northern Ireland by 2030." **Gerry Lennon**, Chief Executive, Visit Belfast, underlined, "Globally, cruise tourism is one of the fastest-growing sectors in tourism. From a standing start of just two ships in the late Nineties, we are now welcoming 285,000 cruise visitors to our shores. This has been down to the sales and marketing efforts of Cruise Belfast and the significant investments in our tourism offering." **Princess Cruises' Crown Princess** officially opened the cruise terminal on 29 July.

EGS re-arranges its Rotterdam-Munich service

The new-old route offered by **European Gateway Services (EGS)**, part of **Hutchison Ports ECT Rotterdam**, links now both Hutchison Ports' **ECT Delta** and **ECT Euromax** at **Rotterdam's** Maasvlakte. Other features – such as the three times/week frequency and the existing arrival schedule in **Munich** (Mondays, Wednesdays, and Fridays) – remain unchanged.

P&O's HU-DE-NL rail service

P&O Ferrymasters, the intermodal arm of **P&O Ferries**, has launched a new six departures/week round trip route from **Budapest** to **Rotterdam** via **Duisburg**. The service will be operated with the use of the company's 45 pallet-wide high cube containers with a maximum payload of 23.5t for all types of ambient goods. "P&O Ferrymasters exists to solve supply chain challenges, and we are delighted to announce our second new intermodal service of 2019, connecting Budapest with the Benelux, Ruhr region and the United Kingdom," **John Freyne**, P&O Ferrymasters' Intermodal Business Development Manager, said.

Yilport moves into Taranto

The Turkish terminal operator has signed a 49-year-long concession agreement with the **Port Network Authority of the Ionian Sea** for running a multipurpose terminal in the **Port of Taranto**. "Being able to enter Italy and work here in Taranto is like filling in the missing piece of a puzzle that we are building globally," **Robert Yuksel Yildirim**, Chairman, **Yilport Holding**, said. He furthered, "The infrastructure was there, but there was no one to take care of it. Our intention is to create another success story in Taranto. From today until the end of this year, we will be fixing cranes to ramp up business, visiting potential customers, and promote the container terminal. The project also aims to cooperate with local operators to improve cargo and ro-ro traffic." Taranto has become the 22nd facility in Yilport's portfolio and the first terminal it'll operate in Italy. The company's multipurpose terminal will also encompass the 100 ha-big **Taranto Container Terminal (TCT)**, able to receive carriers with 16.5 m of draft, offering 160k m² of storage yard as well as a container service area. For some time now TCT was idle; last year Taranto also lost its ro-ro volumes (2,279 cargo units back in 2017). Overall, the port took care of 20.43mt in 2018, out of which dry bulk toted up to 11.70mt, break-bulk to 4.95mt, and liquids to 3.78mt.

Zeebrugge – COSCO's first Navis N4 terminal

CSP Zeebrugge Terminal has become the first facility within the **COSCO SHIPPING Ports** family to complete the installation of the **Navis N4** terminal operating system (TOS). Thanks to the new software, the container terminal "[...] will also be utilizing expert decking for improving yard strategy and prime route for optimal use of available resources [incl. seven super post-panamax ship-to-shore cranes and three 780 m-long each rail tracks]. By automating some of these processes, CSP Zeebrugge hopes that they can be more transparent with stakeholders and help employees focus on their core tasks and deliverables," Navis wrote in a press release. "Based on their past successes and being the leader in terminal operating software, partnering with Navis was the right decision to push our business goals forward. Bringing N4 to CSP Zeebrugge took careful planning and dedication from partners and the migration team, and we are happy at the result we achieved at the end of the project," **Stefan Vanparys**, N4 Project Lead, CSP Zeebrugge, commented. **Mark Welles**, VP Global Partnerships, Navis, added, "CSP Zeebrugge is the first successful N4 rollout in COSCO SHIPPING Ports' TOS standardization program. Navis is continuing joint efforts to roll out N4 in the COSCO SHIPPING Ports terminal network across the globe in the coming months."

Color Line takes delivery of its eco-newbuild



The Norwegian line has received from the **Ulstein** shipyard **Color Hybrid**. The plug-in hybrid cruise ferry entered traffic between the ports of **Sanderfjord** and **Strömstad** on 9 August. The ro-pax is 160 m-long and offers room for up to 2,000 passengers as well as 700 lane metres of cargo capacity. **Color Hybrid** is equipped with a 65t-heavy, 5.0 MWh-strong battery pack, which will make it possible to operate in and out the Norwegian fjord on batteries only. The ferry will be charged (in one hour) in the Port of Sanderfjord from a shore power plant. In addition, the ship has a heating reservoir that will utilise waste heat from both the engine cooling water cycle and exhaust gases for heating purposes on-board (incl. a deck greenhouse where herbs and vegetables will be grown for use in food preparation).

Photo: Color Line

Maersk's first Asia-Europe sea-rail service

The carrier has launched the AE19 dry and reefer container service, linking the ports of **Busan** and **Gdańsk** via **Vostochny** and **St. Petersburg**. The first shipment arrived in Gdańsk on 7 August, carrying cargo loaded in Asia less than two weeks earlier. The containers were sea-shipped from Busan to **Global Ports' Vostochnaya Stevedoring Company** where they were loaded onto a train, operated by **Modul** who also took care of custom formalities, destined for **Petrolsport**, Global Ports' container terminal in the Port of St. Petersburg. There, the load was once again put onto a ship of **Sealand**, Maersk's short sea and feeder arm, which set sail for the **Deepwater Container Terminal Gdańsk**. The service's total sea and rail transit time from Busan to Gdańsk is 18 days, while in the opposite direction – 22.

Circle broadens its portfolio

The Genoa-based port and intermodal digitalisation consultancy specialist has grown with a new team tasked with the organisation of transport-related events both in Italy and worldwide. This year's edition of **BiLOG**, taking place between 16 and 17 October in **La Spezia**, will be the first organised with the help of **Circle**, in collaboration with **Blue Hub**, an agency set up by the **Riviera di Liguria Chamber of Commerce**. **BiLOG 2019** will go under The Sustainable, Resilient And Connected Road To 2030 theme, putting the spotlight on issues like the revision of the **TEN-T**, what changes will **Horizon Europe** and **Connecting Europe Facility 2** bring about, market challenges in the context of container traffic development, alternative fuels and bio-products, how to tap into the so-called blue growth, last-mile logistics in rail transportation, how will the port of future look, and bringing digital innovation to logistics. "Circle is expanding its international competences and partnerships, especially about IoT, Big Data Management, Robotics and Digital Twin, and for these reasons the overall organization of the event will pay particular attention to the digitalisation of the maritime and port world, to the new challenges and solutions in the IT world," the company said in a press release.

Volcan de Tagoro on her way to Spain

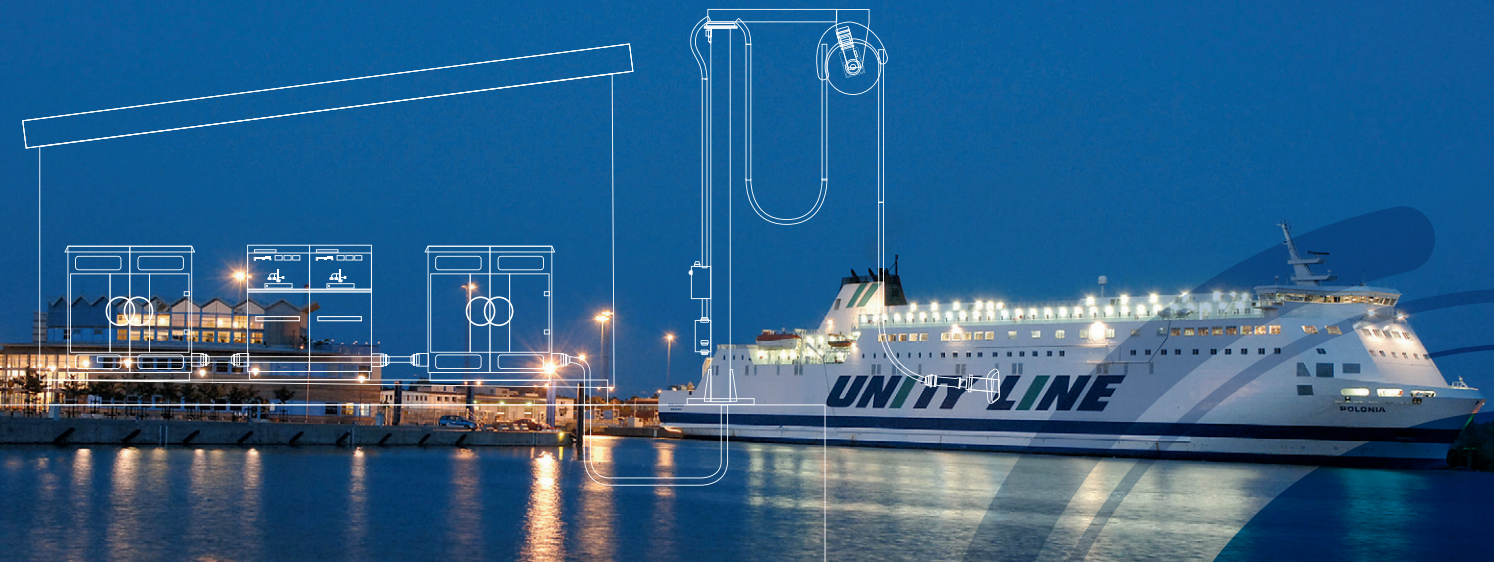
Incat Tasmania's newest 111 m-long catamaran ferry has been handed over to her new Spanish operator **Naviera Armas**. The ferry offers room for up to 1,200 passengers (incl. crew) as well as 595 lane metres of cargo capacity plus 219 cars (or, in the car-only mode, 401 cars). *Volcan de Tagoro* (nameplate 091) departed Hobart on 16 July (her crew arrived in Tasmania late June to familiarise themselves with the ship and participate in the sea trials). The delivery was via Auckland, across the Pacific Ocean to Tahiti and the Panama Canal before crossing the Atlantic on her way to Spain. Naviera Armas has put the new vessel across its Spanish network, including routes to and from the Canary Islands. *Volcan de Tagoro* will be the fifth Incat vessel flying in the company's livery; however, it's their first newbuild from Incat Tasmania, having obtained their other Incat-built vessels on the second-hand market. The ship is powered by four **MAN 20V** diesel engines driving **Wärtsilä** waterjets. The ferry achieved over 42 knots with 600t deadweight during the speed trials. "Our team at Incat has been busy; this is the second large vessel delivered in just six months. [...] We are seeing an unprecedented level of interest in both large and small aluminium ferries at present and have expectation of operating at maximum capacity for a number of years. The contract, in excess of A\$100 million to Incat, has also provided significant income to suppliers and sub-contractors," **Tim Burnell**, CEO, Incat, said.

Automated mooring in Tallinn

The Estonian port will refurbish two of its ferry berths with **Cavotec's** MoorMaster™ automated mooring system. Cavotec will design, supply, commission, and service two multi-unit MoorMasters, which, once operational, will moor the ro-paxes employed in **Tallinn's** traffic to and from **Helsinki** (where the same system has been in use since 2016). According to the manufacturer, by removing conventional lines from the mooring process, hence reducing mooring times and vessel motion, MoorMaster™ improves safety, reduces environmental impact, and increases operational efficiency. To date, more than 80 MoorMaster™ systems have performed some 500k moorings at ferry, bulk, and container ports, as well as lock and ship-to-ship applications worldwide.

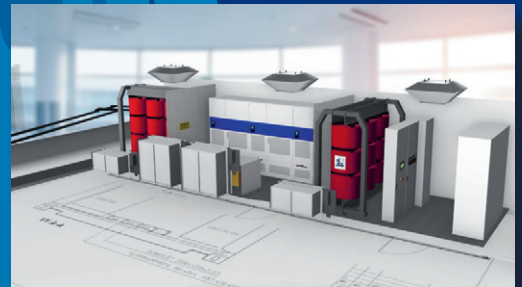
Danish Register of Shipping to go digital

By end-2020, the **Danish Maritime Authority** (DMA) will have developed the digital version of the country's register of shipping. "Today's ship registration includes extensive processes for the industry and is economically heavy for the shipping companies. Original legal documents with records of the ship's ownership and value need to be circulated – often with a courier beyond countries' borders or through face-to-face meetings," DMA wrote in a press release. In the future, reporting and registration of ships will occur digitally, providing, apart from lower costs, also easier access to data. "As one of the first in the world, we are making the move to digital registration with our new register of shipping, which we are now starting to develop. This will definitely reduce the administrative burden for those companies that have their ships registered under the Danish flag. As an extension of our transition to digital ship and seafarer certificates, this is another contribution from the Danish Maritime Authority to a digitalised maritime sector," **Charlotte Ahrendt Steen**, Deputy Director General, CPO, DMA, commented.



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THE PORT OF ROTTERDAM:

240.68mt handled in H1 2019 (+6.4% yoy)

All three major cargo groups noted an increase – general cargo of 4.3% year-on-year to a total of 92.59mt, dry bulk of 2.9% yoy to 38.7mt, and liquids of 2.8% yoy to 110.01mt.

The Port of Rotterdam's volumes

	H1 2019	Yoy
Liquids (thousand tonnes)		
Crude oil	52,166	+2.8%
Oil products	37,981	-5.8%
Other	16,064	+14.4%
LNG	3,801	+93.9%
Total	110,012	+2.8%
General cargo (thousand tonnes)		
Containerised	77,190	+4.8%
Wheeled (ro-ro)	12,336	+2.7%
Break-bulk	3,066	-0.3%
Total	92,592	+4.3%
Dry bulk (thousand tonnes)		
Iron ore & scrap	14,237	+0.9%
Coal	12,492	+1.3%
Other	6,108	+18.8%
Agriculture goods	4,850	-7.2%
Biomass	387	+82.8%
Total	38,075	+2.9%
GRAND TOTAL	240,679	+3.4%
Container traffic		
TEUs	7,529k	+6.4%

THE PORT OF BELFAST:

24.6mt handled in 2018 (+3.8% yoy)

Also more ferry and cruise passengers went through the port's quays, an increase of 0.4% on the result from 2017, up to a total of 1,549k guests. Ro-ro and container traffic rose last year, too, by 3.7% year-on-year and 1.6% yoy, respectively, to 532k cargo units and 128k TEUs. On the other hand, fewer pax cars were transported on-board ferries, a decrease of 0.6% yoy down to 316k vehicles. Among other goods, the port took care of 2.35mt of grains and feeds (+7.5% yoy), 2.21mt of coal (+12.9% yoy), 2.04mt of oil products (+4.2% yoy), 1.55mt of aggregates (+1.9% yoy), 357kt of scrap (-8.0% yoy), 321kt of fertilisers (+2.9% yoy), and 63kt of timber (+14.5% yoy).

DP WORLD:

35,811k TEUs handled in H1 2019 (+0.5% yoy)

"In line with our expectations, we have delivered a broadly stable volume performance in the first half of 2019," Sultan Ahmed Bin Sulayem, Chairman and CEO, DP World Group, commented. He furthered, "Encouragingly, despite uncertainty from the trade war, we have seen robust volumes in Asia Pacific and Indian Subcontinent, while growth in Africa remains strong. In contrast, UAE [United Arab Emirates] and Australia volumes have been soft due to a loss of lower-margin cargo and challenging market conditions. However, we expect a more stable throughput performance in the UAE for the second half of the year."

DP World's volumes (thousand TEUs)

Market	H1 2019	Yoy
Asia Pacific and Indian Subcontinent	16,246	+4.0%
Europe, Middle East, and Africa	15,138	-2.9%
Americas and Australia	4,428	+0.4%
Total	35,811	+0.5%

THE PORT OF ZEEBRUGGE:

21.88mt handled in H1 2019 (+12.5% yoy)

The Belgian seaport noted the biggest handling increase of 93% year-on-year in the liquid bulk segment, which totalled 4.83mt (out of which liquefied natural gas accounted for 3.22mt). With 8.40mt (+5% yoy), wheeled (ro-ro) traffic topped Zeebrugge's cargo turnover, followed by 7.55mt of containerised freight (-2.2% yoy), 619kt of dry bulk (-5% yoy), and 481.4kt of break-bulk (-10.3% yoy). The port also handled a total of 1,527,872 new cars (+4.9% yoy). Zeebrugge served as many as 71 cruise ship calls (337,559 guests), 12 more than in the corresponding period of 2018.

DUISPORT:

1.96m TEUs handled in H1 2019 (-2.5% yoy)

In total, Europe's biggest dry port took care of 31mt in the reported period, a decrease of 4.9% year-on-year. "Global economic activity is slowing down. The IMF [International Monetary Fund] expects that in 2019, the global GDP will be almost half of the 2010 figure. For example, incoming orders for the export-dependent German industry dropped by 8.6 percent in May 2019 compared to the previous year. After years of continuous growth, duisport now operates in an increasingly difficult environment," the port authority said in a press release.

THE PORT OF HELSINKI:

267,354 TEUs handled in H1 2019 (+2% yoy)

Measured in tonnes, containerised freight traffic totalled 2.11mt, marking an increase of 0.5% on the result from H1 2018.

The Port of Helsinki's volumes

	H1 2019	Yoy
Cargo traffic by type		
Unitised, out of which	5,931.0kt	-2.5%
Wheeled (ro-ro)	3,824.9kt	-3.6%
Containerised	2,111.5kt	+0.5%
Dry bulk	708.8kt	-30.6%
Break-bulk	386.2kt	-8.2%
Total	7,139.7kt	-6.1%
Cargo traffic by destination		
Foreign, out of which	7,066.1kt	-5.9%
Exports	3,752.6kt	-2.7%
Imports	3,313.5kt	-9.3%
Coastal	73.6kt	-20.7%
Detailed unitised freight traffic		
Ro-ro cargo units, out of which	299,424	-2.5%
Trucks	199,014	-0.4%
Trailers	93,891	-7.1%
Other	6,519	+4.2%
TEUs, out of which	267,354	+2.0%
Laden	192,991	-0.6%
Empty	74,363	+9.2%
Ferry & cruise traffic		
Tallinn	3,995,374	-1.5%
Stockholm	1,086,746	+0.2%
St. Petersburg	82,720	+5.9%
Travemünde	72,075	+6.3%
Mariehamn	21,261	+9.0%
Other	5,522	+35.2%
Total	5,263,698	-0.9%
Pax cars in ferry traffic	708,135	-0.1%
Cruise	219,885	+13.1%
Ferry + cruise	5,483,583	-0.4%

THE PORT OF CONSTANTZA:

30.74mt handled in H1 2019 (+13.9% yoy)

The Romanian port noted the biggest increase, in absolute numbers, in the handling of grains – up from 6.41mt to 8.2mt (+27.9% year-on-year). Out of the total, sea traffic toted up to 23.64mt (+9.3% yoy), while river transports – 7.09mt (+32.5% yoy). Goods which turnover also rose in the reported period included oil (+11.9% yoy to 3.75mt), iron ore and iron scrap (+52.2% yoy to 2.77mt), solid mineral fuels (+12.6% yoy to 2.06mt), non-ferrous metals and scrap (+1.0% yoy to 2.04mt), fertilisers (+25.9% yoy to 1.99mt), and metal products (+3.4% yoy to 1.23mt). On the other hand, the throughput of goods classified as “other” went down (-0.3% yoy to 3.29mt) as well as of oil products (-2.8% yoy to 3.18mt) and oilseeds (-18.9% yoy to 0.73mt). Containerised freight traffic noted a downtick, too, of 0.3% yoy to 3.28mt.

SWEDISH PORTS:

34.75mt handled in Q1 2019 (+0.5% yoy)

While the turnover of liquids contracted by 7.7% on the result from Q1 2018, down to 8.55mt, the handlings of general cargo and dry bulk rose, by 1.9% and 10% year-on-year, respectively, up to 20.41mt and 5.79mt. The country's ports handled fewer containers, a decrease by 0.5% yoy to a total of 399,711 TEUs. On the other hand, they took care of more ro-ro cargo units, an increase by 0.4% yoy to altogether 805,939 trucks, trailers, and railcars. The vehicle logistics segment lost 11.1% of its volumes, going down to 203,951 units. Passenger traffic also noted a downtick – of 3.1% yoy to 4,562,297 travellers and of 1.8% yoy as regards pax cars in ferry traffic.

FINNISH PORTS:

41.42mt handled in international traffic in I-V 2019 (-1.2% yoy)

While exports rose by 1.5% year-on-year to 22.35mt, imports contracted by 4.3% yoy to 19.07mt. At the same time, a total of 3.51mt was made in transit traffic, less by 3% on the result from January-May 2018. With 688,692 TEUs, slightly fewer containers passed through Finnish ports' quays (-0.1% yoy). Out of the total, imports toted up to 350,355 twenty-footers (+1.4% yoy), whereas exports to 338,337 TEUs (-1.7% yoy).



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- ✓ Improved, faster documentation of damage
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- ✓ Faster work cycles at yard operations
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PortXL's record shakedown

On 20 June, the **Rotterdam**-based port & maritime accelerator held an event to celebrate the conclusion of its latest, fourth, programme. An all-time high of 29 contracts was signed by the 2019 cohort, encompassing in total 16 companies (five start- and 11 scale-ups). Among the corporates that entered in a co-op with the cohort are partners familiar with the **PortXL** environment, such as **Van Oord**, **Vopak**, and the **Port of Rotterdam Authority**. In their first year of partnership with the accelerator, **Mammoet** and **Royal IHC** also put pen to

paper on a number of contracts. "The term 'shakedown' refers to the test of a new vehicle, whether it be car or ship. For PortXL and its cohort, the meaning carries significant emotional weight – it is the coronation of a three-month-long programme full of action, sweat, intense schedules and hard work. The sixteen programme participants of this year could proudly hold their head high as they pitched their solutions in front of hundreds of members of the wide port ecosystem and showcased their successes to roaring applause," PortXL said in a press release.

Verton

The heftiest contract signed – notably the largest to-date in four years of PortXL – was by the Australian scale-up Verton with a corporate consortium composed by Van Oord, Mammoet, and Vestas. Together, they will develop a way to shorten the installation cycle times for wind turbines and make it safer for operators. Verton's R-series is the world's first remote-controlled electromagnetic load management systems, making crane operations considerably safer and about 25% faster. Their remote rotating device uses gyroscopic modules to rotate a suspended load. A new concept has been developed in which this unit is integrated into a lifting yoke for installing wind turbine blades.

www.verton.com.au

Flower Turbines

The US start-up Flower Turbines has created a small wind turbine quiet enough that people can live next to it comfortably. The Port of Rotterdam, Mammoet, and the municipality of Hellevoetsluis have already embraced the solution.

www.flowerturbines.com

Eco Wave Power

The Israeli start-up Eco Wave Power has been turning heads with their wave energy converters, already connected to the grid in Gibraltar, and has collected strong letters of interest from the ports of Rotterdam and Taranto as well as Vopak.

www.ecowavepower.com

sHYp and Keyou

Many see hydrogen as the universal future source of energy, including for the transport industry. The US start-up sHYp's solution creates green hydrogen from water at little to no cost, attracting the interest of Vopak, while the German scale-up Keyou has developed a fast and efficient way to modify a fossil fuel engine to a hydrogen-powered one, catching the Mammoet's investment eye.

www.keyou.de

BigYellowFish

The Indian start-up BigYellowFish integrates the human element in safety matters with its Yellowbox platform, using gamification and behavioural psychology to ensure the crew's stress levels are well documented. Ampelmann has signed a contract to implement the platform in its operations.

www.bigyellowfish.io

Richtlijn Geodesie

Richtlijn Geodesie utilises sensors via its portable Defocube to monitor structures, and the company has landed pilot contracts with Boskalis and the Port of Rotterdam.

www.richtlijngeodesie.nl

Planys Tech

Planys Tech has a fleet of remotely-operated vehicles at their disposal to conduct underwater inspections accurately and without endangering the divers. The Indian team's enthusiasm and expertise have led to three successful pilots with Vopak as well as the Port & City of Rotterdam.

www.planystech.com

Sensar

The company uses satellites to provide, with precision down to millimetres, both current and past data to detect trends in ground shifts, pointing out which soil needs reinforcement. The Port of Rotterdam and Vopak have opted to employ Sensar's services.

www.sensar.nl

Semiotic Labs

Semiotic Labs has a machine monitoring system that detects all upcoming issues, giving ample warning to the repair crew that there is trouble brewing among the gears. Vopak, the City of Rotterdam, and Royal IHC have all signed contracts with the company.

www.semioticlabs.com/en

The impact of autonomous vehicles on ports – scrutinised

The **International Association of Ports and Harbors (IAPH)** has published a study, conducted by **Fraunhofer CML** in collaboration with the **Hamburg Port Authority**, on the impact of autonomous vehicles (sea, air, and land) on port infrastructure needs. In the report, it is recognised, among other things, that rapid advances in vehicle autonomy (especially with unmanned surface, underwater, and aerial vehicles) are creating uncertainty on specific requirements for ports where road, rail, sea, and air traffic intersect. That said, the authors recommend, ports should already now proactively invest in appropriate infrastructure. "The irrevocable advances in autonomous vehicles, especially those in surface ships, mean that ports will have to adapt their systems, processes and land-side berthing infrastructure to safely and efficiently meet their needs," **Patrick Verhoeven**,

Managing Director, IAPH, commented. "However, the story does not end there," he continued, "Currently, at IAPH member ports, drones are being deployed for security and maintenance. Underwater drones are also being used for vessel inspection and maintenance. Autonomous vehicles are already in operation within enclosed areas at some of the world's most advanced ports such as Singapore and Rotterdam, with trials planned by rail and road using 5G networks beyond the yard gates. Our report shows that automation of shipping is just one aspect; ports are confronted with many more elements of automation." In the meantime, the Association is reaching out to its members to receive parallel input from existing autonomous vehicle pilot tests, including the Smart Seaport 5G MoNArch (Mobile Network Architecture) network testbed trialling at the **Port of Hamburg**.

One Sea grows with three new members

The global satellite group **Inmarsat** and **NYK Group's** research subsidiary **Monohakobi Technology Institute (MTI)** have joined **One Sea**, an alliance that brings together leading exponents of autonomous ship technology, as full members, while the **Royal Institution of Naval Architects** has signed a Memorandum of Understanding to become an associate member. "Members have complete freedom to innovate and develop their own cost-efficient autonomous ship solutions inside an alliance which is nonetheless committed to harmonizing technical standards," **Päivi Haikkola**, Lead, One Sea, commented. She added, "Our expectation is that, as member numbers grow, operating solutions will multiply, but members will also work towards integration." **Stefano Poli**, VP Business Development, **Inmarsat Maritime**, commented in this regard, "Inmarsat is joining One Sea in recognition of the special value it sees in initiatives that adopt a targeted and goal-based approach to autonomous shipping and its beneficial technologies. One Sea is emerging as a strong voice on interoperability and standards that the wider industry is listening to. As Inmarsat

continues to roll out the high-speed maritime broadband service that will enable and protect shipping's digital future, it is critical we support the alliances enabling integration." NYK and its Group companies MTI and **Japan Marine Science** have already been working with nautical instrument manufacturers to develop highly automated ship navigation technologies, with a tugboat test for **Wing Maritime Service Corporation**, a NYK company, scheduled for H2 2019. The **Ministry of Land, Infrastructure, Transport and Tourism** envisages autonomous ships operating in Japan by 2025 (the same year is One Sea's target for putting a full set of safety rules and technology standards regarding autonomous shipping infrastructure). One Sea's most recent initiative focuses on autonomous ship piloting arrangements between ports and ships. Earlier, at the end of 2018, the alliance members **ABB**, **Kongsberg Maritime**, and **Wärtsilä** ran separate autonomous ship trials off the Finnish and Norwegian coasts. Finnish regulators have authorized One Sea to oversee future trials in Jaakonmeri off western Finland – the world's first autonomous shipping-dedicated test zone.

K Line harnesses wind power for auxiliary propulsion

The Japanese shipping company has installed the Seawing automated kite system, developed by **AIRSEAS**, on-board one of its dry bulk carriers. The device is mounted on the bow of the vessel and is unfolded from the bridge under favourable wind power and direction conditions. The installation followed a two-year-long research project carried out in tandem with

the kite's manufacturer. According to the parties, Seawing can reduce the vessel's yearly CO₂ emissions by over 20% (about 5,200t). **K Line** and **AIRSEAS** will continue to cooperate to further improve the solution by utilising the data obtained from the Kawasaki Integrated Maritime Solutions ship operation and performance management system.

Inmarsat and Hyundai fast-track maritime digitalisation

The British satellite telecom has signed a business cooperation agreement that allows **Hyundai Global Service (HGS)** – a 2016-established daughter company of **Hyundai Heavy Industries** tasked with providing ship operation and performance digital transformation solutions – to offer shipowners and managers a digital total care solution route to maritime digitalisation. The co-op includes the use of Fleet Xpress Dedicated Bandwidth Services by HGS to support its digital services for shipowners plus recognition of HGS as a Certified Application Partner (CAP) within **Inmarsat's** digital ecosystem. The agreement follows the completion of trials on-board three ships over a quarter of a year-long period, during which a variety of sensor-driven applications were tested, measuring voyage and equipment operating data, including fuel consumption and vibration monitoring, along with HGS analytics and reporting services. The Inmarsat CAP programme allows application and software developers to choose their own route to digital enablement via either a Dedicated Bandwidth Service over Fleet Xpress or FleetBroadband, or through

a dedicated API that allows access to Fleet Data, Inmarsat's cloud-based IoT platform. "The Hyundai-Inmarsat agreement is effectively the first of its kind and marks the commercial service introduction of Inmarsat's Fleet Xpress Dedicated Bandwidth Services as part of our portfolio of solutions for Certified Application Providers. With this new service, HGS is now strengthening its value proposition of applications to monitor and analyse ship performance for existing and new customers," **Stefano Poli**, VP Business Development, **Inmarsat Maritime**, said. Since its launch in March 2016, Fleet Xpress has been installed on-board around 7,000 ships (a 2018 report produced by the market analyst **Euroconsult** indicated that Fleet Xpress was the fastest growing maritime Very Small Aperture Terminal service). HGS has already signalled that it intends to extend its ship digitalisation offering (dubbed the "Shipyard Service Package") into the retrofit market, with discussions continuing with Inmarsat on options to provide a bundle of connectivity, certified hardware, and HGS' Digital Transformation services.

The HYCAS study

MAN Energy Solutions, Corvus Energy, and DNV GL have presented the results of their joint research into the potential of hybrid hydrogen-enabled power solutions. Specifically, the study has examined the cost-effectiveness of two different battery systems in a 1,700 TEUs-big feeder. "There were several factors that went into the selection of a container feeder vessel for the study," **Hans Anton Tvete**, DNV GL, said and further explained, "We were looking at where hybrid systems could offer significant efficiency gains, which pointed to operational states with fluctuating power demand. This typically occurs with large consumers such as cranes, pumps, ventilation fans, or manoeuvring equipment, especially in port. Container feeders, with their frequent port stays and increased time in port, are ripe for efficiency gains through the use of hybrid solutions. Also, as this fleet is ageing, new tonnage is likely to be on order in the near future." Under the first scenario, a 2020-built vessel features a 500 kWh battery system replacing one genset used for peak shaving and as a spinning reserve. In the second, a 2030-newbuild uses an 11 MWh hybrid system for zero-emission port entry and exit. In the former case, with the hybrid power train resulting in an approximately 13% total cost for the vessel, payback times are as low as two-to-three years. In the latter, however, the larger system increases the costs of the vessel significantly, meaning that only with a combination of lower prices for the battery system and higher fuel costs than today would the system be economically attractive. "Focusing on a container feeder vessel, we were able to generate a typical propulsion power profile from vessel speed data, as well as an artificial time-resolved

electrical load profile from the according electrical load table. These are the most important inputs for the MAN simulation tool ECO-ESS. Together with the specific battery and engine characteristics, it is possible to optimize the size of a battery in a hybrid propulsion system for the 2020 and 2030 scenario as an optimum of additional CAPEX and OPEX savings," **Carina Kern**, MAN Energy Solutions, gave additional details. **Sean Puchalski**, Business Growth Strategist, Corvus Energy, added, "It is our hope that these study results will increase cargo shipowner confidence in seeking out new energy solutions, as a good economic rationale already exists for supporting auxiliary loads with a hybrid configuration. As for the future propulsion scenario, perhaps we will not have to wait until 2030. We are already seeing strong demand for high capacity energy storage systems in passenger vessels. With the right leadership from cargo owners, we may see this translate to the merchant sector sooner than later." **Tommy Sletten**, Team Leader Sales Support, Corvus Energy, summed up the thread, "Energy storage has proven to be a highly successful way to reduce emissions for several categories of ships. If we speed up the adoption of green technology for vessels transporting goods, then we will really get results! Container vessels are often 'low cost' vessels and there is a reluctance to invest in green technology without other initiatives in place. To reach the global goal of 50% carbon emission reduction by 2050, strict regulations and various governmental initiatives are required. Initiatives such as funding for newbuildings, slot priority in harbours and reduced port fees for vessels with improved environmental systems will help greatly."

CCPO goes for the latest Tekomar XPERT

ABB has secured its first contract for the ABB Ability™ Tekomar XPERT smart engine performance diagnostics software. The deal covers a 55 vessel-big fleet of the Hamburg-based ship manager **CPO Containerschiffreederei (CCPO)**. The latest Tekomar XPERT for fleet web application launched in June this year incorporates all standard features found in the original solution with the additional fleet functionality specifically developed to support management decisions. The subscription-based Tekomar XPERT for fleet features an easy-access web application interface (there's no hardware to install, and the application can be dropped into the shipping company's normal IT system) that provides accurate insight into engine performance from fleet-to-vessel level through key performance indicators (KPIs) such as engine health, optimisation potential, and fleet performance

benchmarking. These KPIs provide a helicopter view of engine performance across an entire fleet regardless of engine make, type, age, and size. Ships and fleets are listed according to current performance and provide the technical management with an immediate indication of their status. "Poor performing vessels are less cost-effective and emit more pollutants into the atmosphere than necessary. Tekomar XPERT for fleet, identifies the necessary adjustments required to reach optimum engine performance and efficiency at a fleet-wide level, creating both fuel and emissions savings," ABB wrote in a press release. Tekomar XPERT for fleet solution for CCPO was delivered in July 2019 and includes additional e-learning, fleet administration, and multiple access levels functionality. Overall, more than 1,500 vessels have been equipped with ABB's software to date.

PortX-Helm Operations' AI co-op

The parties have signed a strategic partnership agreement to combine **PortX's** Artificial Intelligence (AI)-based port dispatching system, **OptiPort**, with the **Helm CONNECT** dispatching and operations software. In detail, Helm Operations will incorporate OptiPort to provide a new and advanced version of its Helm CONNECT platform, which provides vessel dispatch and operations software for many of the world's largest harbour docking fleets. Using Helm CONNECT Jobs, powered by OptiPort's AI engine, users will receive automated suggestions on the best towing vessel, departure time, and running speed based on the current schedule. Until now, it has been difficult for companies to manually calculate and account for factors such as crew working hours, currents, tides, vessel characteristics, fuel consumption, and availability in a live environment. By using AI, OptiPort is able to dynamically optimise harbour schedules every three minutes. Depending on the port, pilot studies using OptiPort have shown savings of greater than \$1.0m annually per port by reducing fuel consumption and crew overtime, while optimising vessel dispatch to reduce chartering of third-party

tugs; together, these factors allow for savings of up to \$200k/tug/year. "By combining our OptiPort Dynamic Port Asset Optimization software with Helm CONNECT, we can help dispatchers and harbour operators around the world make better decisions on the use of their fleet. With the integration work that we have done with Helm, implementation of OptiPort can be achieved extremely quickly without adding additional hardware on the vessels or in the dispatch control room. This leads to real cost savings that can improve operators' bottom lines almost immediately upon implementation," **Vincent van Os**, Managing Director, PortX, commented. **Ron deBruyne**, CEO, Helm Operations, added, "We've been incredibly impressed by the cost savings offered by OptiPort. We've seen the benefits of AI-driven technology first-hand and believe that this is a major step forward for the industry. Our team has helped implement advanced dispatching systems for many of the world's leading harbour docking companies, and we're eager to enable our customers to successfully realize the cost savings that OptiPort can provide. From initial planning to long-term success, we're ready to help our customers achieve more."

ClassNK gives AOT's SMARTShip its approval

The Chiyoda City-based ship classification society has confirmed type approval certification for SMARTShip, an Internet of Things platform developed by **Alpha Ori Technologies (AOT)** that enables the on-board operation of multiple systems with varying degrees of autonomy. **ClassNK's** certification approves the solution as a 'Computer Based System' which conforms to the society's rules governing a product performing 'Remote Monitoring and Diagnostics', 'Situational Awareness', and 'Decision Support Systems', both off- and onshore. "SMARTShip leverages AOT's proprietary hardware and software and cloud-based infrastructure to collect and transmit more than 5,000 data points from various systems on-board," Capt. **Rajesh Unni**, Co-CEO, AOT, and CEO and Founder, **Synergy Group**, explained. He further noted, "It utilises the data collected to create value for stakeholders, often including additional information such as weather overlay, statutory and regulatory information etc. The front-end user experience includes intuitive applications which facilitate monitoring and diagnostics of operational issues." Features such as the optimisation of total fuel consumption and the creation of intelligent alerts and leading indicators are an integral part of SMARTShip. For example, a quick visualisation dashboard for critical assets and their parameters is available with drill-down options showing all related information in list and graph views. SMARTShip's Situational Awareness Decision Support System (DSS) incorporates applications including SMARTAlert notifications for preventing incidents, TFOC (Total Fuel Oil Consumption) fuel optimization

application, and ASSET AI predictive maintenance applications. "SMARTShip's Remote Monitoring & Diagnostics provides clients with the capability to troubleshoot remotely. This generates huge savings on the usual cost required to send a service engineer to the actual location of the ship for troubleshooting," Capt. Unni highlighted. The solution has already been installed on more than 30 vessels (*Hourai Maru*, a mid-sized gas carrier delivered on 11th March 2019, was the first ship certified with the ClassNK-approved SMARTShip); another 60 ships are at various stages of the set-up process. "With digitalisation disrupting entire industries, we seek to realise the competitive advantage it can bring to BW LPG and, in turn, our customers. The SMARTShip solution from Alpha Ori Technologies enables us to combine our vessel's operational data with a range of external data so that in real-time we can optimize performance on single vessels and across our entire fleet," **Martin Ackermann**, CEO, **BW LPG**, commented on the use of AOT's technology. Capt. **Rajeeva Mathur**, COO, **Southern Pacific Holding Corporation C/O Kumiai Senpaku**, added to this, "Alpha Ori Technology's SMARTShip system has introduced a whole new vision in the approach to ship operations for us at Kumiai Senpaku. We certainly feel that its transparency and the reliability of information it gives us makes it a very efficient and effective tool in improving commercial and operational enhancement. Our expectations have also been met on fuel optimisation and predictive maintenance programmes. Our charterers and managers will continue to benefit from this."

Guide to Container Tracking and Telematics Technology

The publication, produced by the **Container Owners Association (COA)**, provides container operators, leasing companies, and other relevant stakeholders with an overview of the technology issues that they might face and the choices that are available to them. "The evolution from 'wired' to 'wireless' has provided great opportunities – but adds significant complexity, because of the wide range of communication technologies available, how they are used around the world in different countries and communication issues with containers on vessels," a press release from the COA read. Commencing with a glossary of many of the different industry terms and acronyms that are frequently used, the Guide goes on to provide a background of the way that the industry has developed over the past decade. The publication covers some of the issues for tracking dry freight containers,

including such aspects as data flow, required communication frequency, battery life (and installation cost), power consumption, sensor technology requirements, and compatibility with vessel partners. Issues concerning reefer container communication are also tackled, including landside transit, on-board vessels, global use, and telematics technology. The choices available for landside and inland operation, terminals, and on-board vessels are reviewed as well. On vessels, there are a number of different suitable technologies – these are listed in the document, too. The final section covers Application Programming Interface. The Guide explains that this needs to be integrated and agreed across the industry to ensure data can be transmitted by any hardware provider and provide the same standardised information to data users (a project that the COA is currently working on).

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featured article

Autonomous ships are hailed as the future of shipping. The technology is here, but are we ready for it?

Photo: Rolls-Royce Marine

Revolution by evolution

by Filip Koscielecki, *Claims Executive, UK P&I Club*

Autonomous shipping is looking ever more likely to be the future of the maritime industry. The use of robots in shipping is nevertheless not new. Robotics technology has been in use in underwater and surface settings for some time (autopilots and the Electronic Chart Display and Information System) but the rapidly advancing technology towards crewless and remotely controlled vessels has fast-forwarded the need to consider its regulatory framework. The legal perspective concern is only natural bearing in mind that the autonomous shipping market, estimated in 2018 to be worth \$6.1b, is now projected by some to reach a staggering \$136b by 2030.

UKP&I

The UK P&I Club is a leading provider of protection and indemnity insurance and other services to the international shipping community. 2019 marks the Club's 150th Anniversary. The UK P&I Club insures over 240 million tonnes of owned and chartered shipping through its international offices and claims network. 'A (Stable)' rated by Standard & Poor's with free reserves capital of \$505m, the UK P&I Club is renowned for its specialist skills and expertise which ensure 'best in class' underwriting, claims handling and loss prevention services. The UK P&I Club is managed by Thomas Miller, an independent and international insurance, professional and investment services provider. For more details please visit www.ukpandi.com

the benefits of autonomous shipping are many, not least the reduction or elimination of human errors and crew claims where the vessel is wholly unmanned or only sails with a skeleton crew, and from the additional space freed up for cargo. The exciting development of a "smart ship" will revolutionise the landscape of ship design and operations, but this revolution will come with many challenges. This briefing presents an introduction to the subject of autonomous shipping, discusses a number of the legal issues arising from this new technology, and highlights the international conventions and regulations which will need to be adapted to accommodate this new technology.

Definitions

There is currently no international definition of what an autonomous or unmanned ship is, what the various levels of autonomy are and whether an autonomous ship is a ship under international law.

When definitions are in use in various conventions, they tend to be very broad and customs-made to cover the subject matter to be regulated.

Attempting to build a unified legal and regulatory framework is extremely difficult if there are no preliminary agreements on the basic definitions. A proposal on a list of recommended terms was submitted to the International Maritime Organization's (IMO) Maritime Safety Committee (MSC) 101. For example, the "autonomous ship" is defined as, "the operating system of the ship able to make decisions and determine actions by itself. It performs functions related to operation and navigation independently and self-sufficiently. Terms to be reserved to ships complying with degree 4 of automation," and a "smart ship" defined as a "ship equipped with automation systems capable, to varying degrees, of making decisions and performing actions with or without human interaction."

MSC 99 had established the following four degrees of autonomy for the



Photo: UK P&I Club

purpose of the Committee's scoping exercise. Degree 1 – ship with automated processes and decision support: seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated and at times be unsupervised but with seafarers on board ready to take control. Degree 2 – remotely controlled ship with seafarers on board: the ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions. Degree 3 – remotely controlled ship without seafarers on board: the ship is controlled and operated from another location. There are no seafarers on board. Degree 4 – fully autonomous ship: the operating system of the ship is able to make decisions and determine actions by itself.

The European Commission splits this emerging industry into three parts, namely "Remote Ship," "Automated Ship" and "Autonomous Ship," while Lloyd's Register has developed a classification of six levels of autonomy, AL 1 to AL 6. In this legal briefing, we will be referring to MSC 99's degrees of autonomy but it is clear that the existence of all these different classification systems will make it very difficult to transpose/convert regulations uniformly once these bodies have developed their own regulations.

International regulations do not contain any direct requirements for a ship to be manned in order for it to be considered "a ship." The precondition is rather one of functionality, i.e., what the ship needs to achieve and its ability to move on, and through, water. So, it seems that autonomous shipping has not been specifically

excluded by the conventions – at the definitions level at least.

The position under national laws, however, is more complicated. Under English Law, the Merchant Shipping Act 1995, section 313(1), states that "'ship' includes every description of vessel used in navigation." While there is no legal authority for the definition of an autonomous ship, it is expected that an autonomous ship would be a ship under English law. On the other hand, in France, the Code Des Transports 2010 explicitly defines the term "Ship" as "Except as indicated to the contrary, for the purposes of the present Code, ships are: Any floating craft, built and manned for maritime merchant navigation, or for fishing, or for yachting and dedicated to it." It seems therefore that for any craft in France to be a ship, it must be manned. Crucially, under French law, the owners of ships are strictly liable for any damage caused by them.

As a ship is subject to the law of her flag state (based on her nationality) and the law of the coastal or port state (linked to her physical location), the absence of an internationally accepted definition for an autonomous ship could potentially have the consequence of an autonomous ship being considered a ship under the law of her flag state but not under the law of the coastal or port state. A ban on autonomous ships by the coastal or port states will have a negative impact on the growth of autonomous shipping.

Absence of crew

The United Nations Convention on the Law of the Sea provides that all ships must be "in the charge of a master and officers who possess appropriate qualifications." The International Convention for the Safety of Life at Sea, the International Convention for the Prevention of Pollution from Ships, the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, the Paris MoU, as well as the EU directive 16/2009 on Port State Control all presume that the master will be present on board.

Ships operated remotely, regardless of whether they are manned or not, could possibly meet the requirement for a master if the remote controller has the requisite qualifications, albeit that the type of qualifications would be different to that held by the traditional master. As the remote operators will assume a key role in a ship's navigation and management, they would be expected to shoulder a degree of independent liability. It remains to be seen whether such liability could also be attached to a remote operator, which is a corporate legal entity, as well as to private individuals, like masters of today.

There is also uncertainty surrounding the master's obligation to render assistance to persons in distress at sea. It could be more challenging for a ship with a degree 3 or 4 of autonomy to render aid and to rescue people and salvage ships and goods. However, what exactly is the nature of the master's obligation? Is it to have sufficient manning numbers or is it to have capabilities to provide rescue and salvage services at sea? As seafarers tend to rely on equipment on board to provide rescue and salvage, rather than jump into the water, it may be argued that autonomous ships fitted with equipment enabling it to identify distress, send alerts so that search and rescue can be met by services from shore, deploy adequate practical assistance, life rafts, emergency rations and other emergency equipment, are capable of satisfying the master's obligation to render assistance.

There are also requirements for the master, as the shipowners' representative to issue documentation, and for documents to be physically kept on board. These challenges may be overcome if flag states amend their regulations to make digitally issued documents acceptable, and if Port State Controls remove their requirements for certain documents to be kept on board.

The regulatory issues surrounding the absence of crew on board the ship are bound to be one of the most challenging to overcome.

Navigation rules

It is expected that all ships will be capable of executing manoeuvres and steering in accordance with the basic rules of navigation as prescribed by the so called "Rules of the Road" – The International Regulations for Avoiding Collisions at Sea 1972 (COLREGS; overtaking, crossing situation, head-on course, speed, etc.).

However, it will be more problematic for autonomous ships, particularly a degree 4 ship, to meet some of the more open and subjective concepts required by these rules for avoiding collisions. For example, Rule 2 provides that nothing in the rules will exonerate any ship, owner, master or crew from the consequences of any neglect to comply with the rules or of the neglect of any precaution, which may be required by "the ordinary practice of seamen." The same rule goes on to state that an analysis of the situation may require departure from the rules to avoid immediate danger. Rule 8 insists that avoidance actions must have a "due regard to the observance of good seamanship." COLREGS also require that a proper lookout is maintained by sight and hearing (Rule 8).

Will software ever be able to understand the meaning of "the ordinary practice of seamen" or have regard to "good seamanship" when making a decision? Some additional thought will have to be given on how best to address these requirements.

Seaworthiness and error in navigation

Section 39 of the Marine Insurance Act 1906 as amended contains an implied warranty that the vessel is "reasonably seaworthy in all respects." This warranty applies to voyage policies of marine insurance at the commencement of the voyage (this warranty is an absolute warranty but it is for the insurer to prove that a breach of the warranty has occurred. While insurers could previously escape liability completely once such a breach has been proven, section 10 of the Marine Insurance Act 2015 now merely suspends the insurer's liability from the time of the breach until the breach is remedied, if the same can be remedied).

The Hague Visby Rules require that a ship is seaworthy at the beginning of the voyage, and the carrier is to properly and carefully load, handle, stow, carry, keep, care for, and discharge the goods carried. To be seaworthy, the ship must be properly manned, be able to sail on the sea, and be able to face the perils of the sea and other incidental risks to which she may be exposed in the course of a voyage.

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If it is the competence of the crew rather than the number of crew that determines the seaworthiness of a ship (as per the 1962 Hong Kong Fir Shipping Co vs Kawasaki Kisen Kaisha case), then a degree 3 or 4 ship may be deemed seaworthy if her land-based remote operators can navigate the ship safely. In time, it is not wholly unforeseeable that the “human” element of an autonomous ship’s seaworthiness, as it is gradually replaced by Artificial Intelligence (AI), might eventually cross over to the ship’s technical ability area and end up being regulated by Class/flag.

The error in navigation defence would not be available if the master is incompetent but may be available if he is merely negligent. The question that arises then is whether any autonomous software navigating the ship (digital master) can be competent (seaworthy) but nevertheless make an error? The software itself possibly cannot but perhaps the solution providers in developing the software and/or the shipowner in choosing the software could? This question requires additional consideration.

Cyber risks

Autonomous ships are highly dependent on computers and other robotic equipment, which could exacerbate the consequences of a cyber attack. If there is no crew on board, there will be no possibility of physically overriding remote or autonomous control. Cyber attacks and the consequential disruption to business, loss of confidential information, damage to reputation, not to mention ransom demands, are important concerns for supporters of autonomous shipping.

The majority of cyber attacks are, however, a consequence of poor “cyber hygiene” such as not using good firewalls and robust antivirus protection, not updating software, poor password policies, failure to identify phishing or social engineering attacks, providing back door entry for hackers. It is important that best practices for cyber resilience are adopted (e.g., BIMCO’s *Guidelines on Cyber Security Onboard Ships* for guidance on how mitigate the potential safety, environmental and commercial consequences of a cyber incident). It may be that “Cyber Safety Regulation” could be fully developed and become part of Flag and Class requirements for autonomous ships. This notion may be considered by the International Association of Classification Societies through their 12 *IACS Recommendations On Cyber Safety Mark Step Change in Delivery of Cyber Resilient Ship*.

The Institute Cyber Attack Exclusion Clause, CL.38011, is a wide blanket exclusion clause incorporated into many marine insurance contracts. This clause, which the market is currently reviewing, can impact negatively on the progress of the autonomous shipping industry.

Insofar as P&I cover is concerned, liabilities set out in Rule 2 of the UK P&I Club’s Rules and the International Group Pooling Agreement are not generally subject to any exclusion for cyber risks. Some maritime cyber risks simply do not come within the scope of P&I cover because they do not arise from the operation of a ship (an example is where a shipping company is held to ransom for the restoration of its IT data following a cyber attack).

If a cyber attack on a ship is the result of commercial sabotage or a malicious act by an individual with a grudge against the shipowner, the shipowner’s normal P&I cover will continue to respond (subject to the rest of the rules and the specific terms of cover including any applicable deductible). It is only if the cyber attack, based on the motive of the attacker, can be said to constitute an “act of terrorism,” when warlike circumstances or a hostile act by a belligerent power exists, will a claim flowing from the cyber attack be excluded from the UK Club’s standard P&I cover under Rule 5E: Exclusion of War Risks.

Liability and its limitation

Generally, civil liability in shipping is regulated nationally, and it can be said that most jurisdictions require a fault-based standard. For ships with a degree 3 or 4 autonomy, the challenge would be to try and determine human fault when ships are navigated without any real-time human intervention, relying only on pre-programmed algorithms operated by AI or by remote operators. The only place(s) where human fault could be assessed would be in connection with a failure of remote operators to monitor or take intervening action or of the shipowner to keep necessary software up to date, maintain the same or possibly in choosing the vendor of the software.

Shipowners can be vicariously liable for their crew’s, employees’ or third parties’ acts and omissions in the course of operating the ship in the interest of the shipowner. The question that arises then is whether the shipowner can be held vicariously liable for the acts and omissions of vendors providing the software technology, the remote operators using the technology or the system maintenance technician.

The status of these individuals and companies needs to be clarified so that

the shipowner’s and these parties’ risks exposures can be better understood and adequately insured against. In the absence of clarification and explicit solutions to clarify the issue of liability, there is a real concern that the application of the current fault-based liability could be replaced with a strict liability standard for shipowners. This development would not be welcomed.

The issue of limitation of liability is also relevant in relation to autonomous shipping. Article 4 of the Convention on Limitation of Liability for Maritime Claims (LLMC) 1976 provides as follows, “A person liable shall not be entitled to limit his liability if it is proved that the loss resulted from his personal act or omission, committed with the intent to cause such loss, or recklessly and with knowledge that such loss would probably result.” In the context of an autonomous ship, questions would naturally arise as to who is to be considered “the person liable” and where the requisite intent or knowledge of probable consequences of a reckless act would lie. Would this be with the shipowner, the vendor of the software or the shore operator?

Conclusion

The technological advancements, which will eventually bring to life the vision of fully autonomous shipping, are gaining momentum. However, the technology is subject to a vast regulatory framework which enables the shipping industry to provide a crucial service to the world’s economy in a safe manner. While supporters of autonomous shipping would like to bring forward the technology faster, a balance must be struck between the speed and the safety of doing so. For autonomous shipping to gain regulatory and societal acceptance, this technology must be at least as safe as traditional ships.

A successful approach to change would be to develop regulations in tandem with technological advancements, always maintaining the focus on the safety of people and property at sea, but this may not always be possible. There is also a risk that too much regulation can throttle innovation. Undoubtedly, however, the present framework will need to be adapted and evolved to accommodate autonomous shipping.

At MSC 100 in December 2018, a regulatory “scoping exercise” was carried out to assess how IMO instruments apply to ships with varying degrees of autonomy. An intersessional MSC working group is expected to meet again in September 2019 with the aim of completing the regulatory scoping exercise in 2020.

Photos: ABB

Electric, digital, and connected

by **Guido Jouret**, *Chief Digital Officer, ABB*

There is a lot of talk about the Fourth Industrial Revolution, with electrification, digitalisation, and connectivity converging across industries. The innovations, visions, and transformations made possible by the most powerful combination of these change enablers is what that the maritime industry has seen for decades.



The Swiss-Swedish ABB, headquartered in Zurich, is a Fortune 500 tech-focused multinational, delivering solutions across its five leading businesses: Electrification, Industrial Automation, Motion, Robotics & Discrete Automation, and Power Grids. For more details about the company's products and services, please go to <https://new.abb.com/>

Electrification is the logical choice for future power systems. Compared to mechanical systems, electricity enables more flexible solutions that require less maintenance. It also allows power to be applied more precisely, including installing more power in smaller spaces.

Digitalisation enables small-scale efficiency, but it also helps to keep costs under control if we want to expand the scope of an application or operation. The level of complexity no longer has to increase when scaling up; operating 100 things does not have to mean that systems become 100 times more complex.

Connectivity has been primarily a consumer-driven trend, enabled by mobile and broadband technologies, but these days it is becoming well established in the industrial space. Buyers of equipment increasingly realize that those who build the machines can also help optimize operations from remote locations, and industrial customers want that help.

There are also examples of industrial digital technology migrating into the consumer space, such as the Global Positioning System. This phenomenon is a lot less frequent but still very significant. Back in the 1970s and 80s, there was a lot of government spending

on military digital technology. These were the early investments that eventually gave birth to Silicon Valley, and the pendulum of innovation swung from the industrial to the consumer space. We already have an example of this in ABB Marine & Ports, where our ABB Ability™ Marine Advisory System – OCTOPUS, originally designed to help guide some of the biggest ships in the world, is now being applied to the SeaBubbles urban water taxi concept. This shows that industrial digital innovations are highly scalable – and that opens the door for application in many different spaces.

Planet 4.0

We are in the middle of a massive change, and we see it all across society. The planetary operating system is being revised. How we manage food processing, water and energy supply, manufacturing of goods, or moving people – all these areas are being reinvented using digital technology.

ABB is well-positioned to be a major player in this ongoing development, and we are experiencing growing momentum. As an indicator of this, the number of applicants for employment in ABB has doubled in the past year. Working with digital technology in a maker company like ABB is different than



Juha Koskela

Managing Director, ABB Marine & Ports

"Electric. Electric. Digital. Connected. These are the keys to a new era in shipping. Together they offer virtually unlimited opportunities for gains in efficiency, safety, and sustainability. The maritime industry continues to explore new energy sources and autonomous operations – and the electric, digital, and connected approach is helping us define a better future, bringing new levels of reliability, efficiency, and sustainability to shipping. We believe that future ships will be built on the foundation of electricity. Hybrid solutions combining sustainable fuels with electric power systems are cleaner and more robust, require less maintenance, are highly programmable, and are easily monitored and managed remotely. Electrical propulsion integrated with automation and control systems is already moving the industry closer to autonomous shipping, with collaborative, remote, and highly automated operations showing the way. ABB has provided electric systems for vessels for more than 110 years. Today, well over 1,300 ships employ ABB electric systems, and close to 1,000 vessels are connected to the ABB Ability™ Collaborative Operation Centers for remote support. It is our role as an industry frontrunner to drive this transformation and equip the marine industry with electric, digital, and connected solutions that maximize the full potential of vessels. To find out more, please check ABB's *Generations* series under the following link <https://new.abb.com/marine/generations>



working in a software company. We get to help solve issues of sustainability, transportation, and electrification. People can see the impact of what they do has on society. In my opinion, this is the reason we are able to attract employees in a highly competitive environment.

With this growing interest in doing things that make a difference, I believe the time is now for industrials to get involved and drive the development of the things that matter for everyone. In the mobility segment, ABB is the title sponsor of Formula E racing, the fastest electric motor-powered racing cars on the planet. This may seem frivolous at first glance, but it is about much more than just fast cars. It is about the electrification of transportation.

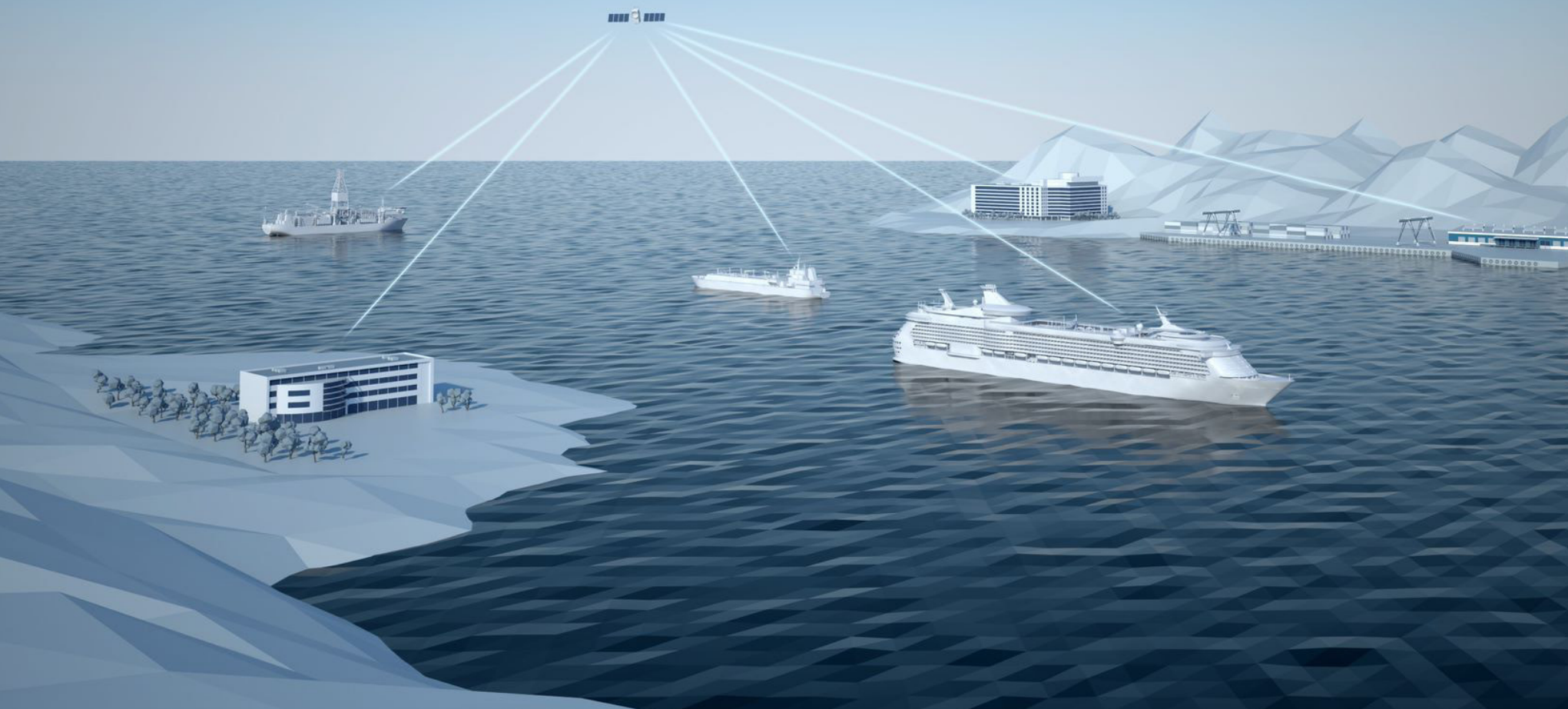
Racing can serve as an incubator for innovation. ABB FIA Formula E Championship racing puts unimaginable stress on the cars and their power systems. The technology has to deal with heat and loads far beyond those in commercial vehicles. Participating in the ABB FIA Formula E Championship allows

the industrial partners to bring this advanced technology into the consumer sphere at a much faster pace.

While technology in traditional Formula 1 is maturing, there is still a lot of innovation left in ABB FIA Formula E Championship. One clear example of this is that next season they will need only one car to finish a race, instead of the two they had used since the start of the Championship just four years ago. Also, the fact that they race in a city or urban environment, not on isolated tracks, makes electric transportation visible and accessible for everybody.

No end in sight

I honestly don't see any horizon for the electric-digital-connected potential. The revolution is different this time because it's not just one thing. By contrast to previous disruptions like steam power or electrification, the Fourth Industrial Revolution involves multiple elements. In fact, it can be difficult to articulate the current shift, because it is



made up of so many things. Digitalisation, connectivity, and cloud computing are all converging, with machine learning and Artificial Intelligence amplifying their impact. Sensors are getting smaller, and big data is, well, getting bigger. Augmented and Virtual Reality technologies continue to provide previously unattainable perspectives.

But despite these advances, any machine we can make today remains relatively

primitive, compared to the human brain. We are basically trying to make a model of the brain, and what has been achieved so far might even be called baby steps. Computer models have the potential to be a million times better than today, not just faster and cheaper.

Looking ahead to the “Next Big Thing,” I hope we rediscover that small is beautiful. Industrial technology in the 19th and 20th centuries was all about making things bigger

and achieving efficiency of scale. Nowadays, digital technology enables efficiency at any level. 3D printing is a good example of small-scale efficiency, delivering tailor-made components at the point of consumption. By moving bits, not atoms, we are reinventing the way we run the modern economy.

In a way, we are going back to our roots, by enabling smaller, closer, and smarter solutions. Only 30% of our planet remains

jungle and rainforest. If we want to avoid eating into undeveloped land – and clearly we do – cities will have to absorb the bulk of the population growth. That means we will need to think and work in new ways to create dense but sustainable and attractive urban solutions. I believe that the innovative use of electric, digital, and connected technologies will be the key to finding smarter ways to manage our new future. ■

“Doing something”

by **Deanna MacDonald**, *CEO, BLOC*



Maritime Blockchain Labs (MBL) develops blockchain pilot projects together with industry consortia to solve industry-wide problems. Currently sponsored by Lloyd's Register Foundation, MBL is the first industry-led initiative of its kind where we collaboratively source, experiment, prototype, and test new value propositions of blockchain and digitisation in the shipping sector. For more info, incl. on participating as a consortium partner, in sponsoring pilots, or becoming a general member, please click www.un-bloc.com

In several forums last year, blockchain was touted as a silver bullet that could – all on its own – resolve any kind of issues in shipping, from cargo brokerage and emissions tracking to tackling safety concerns. However, the industry is yet to have experienced the fundamental transformation that many predicted. Initial coin offerings are seen as an exciting way to raise capital beyond traditional sources, and regardless of whether it makes any sense, companies scramble over one another to be seen to be “doing something with blockchain.”

That hype curve goes up steeply for the last couple of years, but when we get to mid-2019, it flattens out. There is now a considerable amount of scepticism towards the technology. Many have quite rightly critiqued the rush to use blockchain for everything – leading to an unprecedented backlash towards the technology that, two years ago, few had even heard of. So has it come crashing to a halt?

Given that I'm writing this as part of a blockchain consultancy, it's clear that the answer is going to be “no.” But looking at the trajectory that blockchain has followed, it's possible to learn some important lessons about what those of us who believe in the technology need to do to keep climbing up that hill.

The paradox

A recent report from the Boston Consulting Group (BCG) does a great job of identifying some of the barriers the technology faces in transport and logistics

markets where, initially, the thought of a secure, decentralised store of information seemed to be some of the most exciting and applicable use cases. According to a survey of professionals in the sector, the vast majority of respondents (88%) believe that blockchain will disrupt the industry at least somewhat, mostly within the next two to five years. But nearly three-quarters (74%) say that they are exploring opportunities only superficially or haven't thought about blockchain at all. Why is that?

“The best blockchain networks,” BCG argues (and we agree), “are often the hardest to create”. At the crux of the issue is a fundamental element of blockchain, namely that of trust. The transformational potential of blockchain networks lies in their potential to create trust between parties without intermediation – but this fundamentally runs counter to many of the business models in which we are embedded. “By increasing transparency, these distributed digital ledgers can mitigate the



BLOCKCHAIN

Photo: Pexels

mistrust that often exists among the industry's transacting parties. Yet this same mistrust makes it hard to bring together the industry's diverse participants into a common blockchain ecosystem," the report's authors noted. This paradox is at the heart of blockchain, and an important reason why so many applications in transport and logistics have struggled to find their feet.

Fraught with peril

Instead, we've found the best results come from bringing together industry stakeholders (incl. suppliers, producers, customers, competitors, regulators, and governments) by invitation and aligning interests to address shared friction points across entire value chains. The pain points we've identified are specific but important.

One of these is the handling of dangerous goods. Shipping containers often carry little to no indication of their specific contents. At best, a product code is scanned, traced, and managed by siloed data systems, which rarely interoperate with data systems managed by other stakeholders along the connected value chain. This is compounded by weak enforcement, documentation complexity, and the lack of transparency around the origin and content of containers. When it comes to the declaration of dangerous goods, this want of transparency can literally cost lives. According to the Cargo Incident Notification System (CINS), nearly 25% of all serious incidents on-board container ships were attributable to misdeclared cargo.

In light of this, our latest consortium, funded by Lloyd's Register Foundation, has been set up to explore the use of digital tools for traceability of dangerous goods cargo and immutable attestations and digital audit trails for due diligence with a view to generating more transparency and accountability in tracking dangerous goods; ultimately, reducing incidents. As blockchain is a shared tamper-proof ledger that records the entire history of transactions, it can make information exchange quicker, safer, and easier. In addition to streamlining the process (and saving costs), it provides a high level of visibility and transparency.

Let's look at how this could apply to carrying dangerous goods cargoes. A recognised ploy of some shippers is to declare the cargo as non-dangerous at the time of booking but then amend it at the very last minute to declare that it is, in fact, a dangerous goods cargo. The shipper hopes that the changes are not processed in time and the carrier fails to be informed at loading, therefore carrying the cargo as if it were non-dangerous. But using a system based on blockchain, the rapid exchange of information could result in the carrier being better positioned to make the necessary changes and compliance arrangements. A further benefit is that all of the data related to the nature of the dangerous goods cargo is securely stored in one ledger, immediately accessible to any "permissioned" party participating in the transaction (this can include material safety data sheets and emergency response procedures).

Fuel up

Much is made of the tamper-proof qualities and transparent nature of blockchain. However, it does not readily solve the problem of unscrupulous shippers wilfully misdeclaring the cargo at the time of booking. It would still be possible to knowingly submit false information. Tackling this aspect requires other measures and incentives in addition to a blockchain-based system.

This is where we see the value of our consortium-based approach. By bringing together stakeholders, we aim to not only combine both physical and digital tracking but examine the incentives that underpin the entire value chain, thus using blockchain as a digital foundation that lets us tackle the bigger governance questions.

Working in a consortium-based way, we believe, is how blockchain is going to grow in shipping. It's already starting to show results; last year, we launched our first consortium, looking at tracking fuel quality. Right now, we're in the process of launching BunkerTrace, a product that combines synthetic DNA tagging technology with blockchain to trace marine fuel throughout the supply chain.

With a critical perspective on blockchain, and if we start with consortia and make sure we're building with the industry to genuinely solve problems, it doesn't matter if the blockchain adoption curve has a few peaks and troughs – ultimately, the solutions it enables will speak for themselves. ■

How to use blockchain to optimise supply chains

Photo: Rawpixel

A blockbuster

by **Marie Pavesio**, *Deputy Director for Projects, Audits and Business Development, MGI*



As a recognized expert in Cargo Community Systems (CCS), MGI innovates to streamline and speed up cargo data exchanges between all private and public stakeholders. The company's vision – to connect supply chains using a smart information system offering smooth door-to-door goods tracking – is the backbone behind the development of the Cargo Intelligent System Ci5. Thanks to incorporating innovations enabled by the use of big data, the Internet of Things, smart container technologies, blockchain, or Artificial Intelligence in the company's systems (as in the Channel 5 information and decision-making tool used to avoid congestion in port terminals) MGI is a provider of choice for smart port solutions. The company is certified according to the ISO 27001 (Information Security Management) standard, and works with ports of the future and logistics professionals, providing them with solutions to improve their competitiveness. For more info about MGI, its products and services, please head to www.mgi-ci5.com

Ports are key entry & exit nodes in the global supply chain. The less time goods spend in transit – the more performant and attractive the port will be. However, gone are the days when ports competed solely among themselves. Nowadays, entire logistics systems are battling for who'll take care of the freight traffic. Providing greater cargo visibility is one of the measures to take the lead.

Blockchain is a relationship of trust between partners exchanging the required information throughout the shipment transfer process. This sharing of technology speeds up cargo flows, improves tracking, and ensures the reliability and security of shared data, all of which are much sought-after edges in the logistics competition race. The logistics sector is starting to see the benefits of blockchain technology as it is aimed at improving the operational performance of a compound of players. In other words, we've finally got a technology that facilitates cooperation. With our latest innovation, Ci5, we already offer the transport & logistics market one blockchain application, while another is in the pipeline.

The faster the better

Ci5 stands for the latest development of our Cargo Intelligent System (CiS), a digital cargo management system for smart ports. The solution links various actors throughout the logistics supply

chain – port authorities; customs; veterinary and plant health services; terminal operators; shipping agents; vessel owners; freight forwarders; shippers; road, rail, and barge transport providers; owners and managers of empty container depots; and freight consolidators/deconsolidators – in order to give them visibility on cargo statuses and events in order to speed up the transit of goods.

In detail, the Ci5 generates releases so that import goods are handed over for picking-up at a shipping terminal or loading onto a ship for export. As regards the former, the system produces the Shipping Release/Release Order (shipping agent authorization), the Forwarder Release (freight forwarder authorization), and the Customs Release (clearance issued by customs). Once these releases have been obtained, Ci5 automatically generates the Final Release – or the green light for goods pick-up at a terminal. At the Marseille Fos Port, where Ci5 has been in operation since October

The screenshot displays the Ci5 Tracking interface. On the left is a navigation menu with options: Administration, Dashboard, Tracking (selected), Monitoring, Data Analytics, Vessel, Cargo, Terminal, Customs, and Inland transports. The main header shows 'Agent Maritime, Marseille-fos' and 'Martin Bortal'. The tracking section for 'DAL19123' includes a 'Container / RoRo / Breakbulk number or Booking / Shipping' field with 'MB 2018955'. Below this, a 'Bill of Lading : CSA0235725' and 'Quantity : 11998' are listed. A timeline of events is shown with columns for date, time, event type, status, and agent. The events include Pre arrival notification, Discharge, Gate in, Release order, Forwarder release, Customs release, Final release, Gate Out, and Load. The interface also features a 'Dangerous' and 'Transfer' toggle, and a 'Tracing <>' button.

Date	Time	Event	Status	Agent	Reference
26/03/2019	16:37	Release order	CREATED	SHIPPING AGENT	#GHI9123
27/03/2019	09:16	Release order	DELETED	SHIPPING AGENT	#JKL4567
27/03/2019	09:29	Release order	CREATED	SHIPPING AGENT	#MNO8912
28/03/2019	08:04	Release order	UPDATED	SHIPPING AGENT	#VSL6054
28/03/2019	08:04	Customs release	CREATED	CUSTOMS AGENT	#GHI9123
29/03/2019	12:23	Customs release	UPDATED	CUSTOMS AGENT	#XSQ3174
29/03/2019	12:23	Final release	CREATED		#HIR0185

2018, some 80% of goods are leaving the port in less than 48 hours.

Working in partnership with Thales Services, MGI is now offering to use blockchain technology to record transactions in Ci5 to generate the Shipping Release/Release Order, the Forwarder Release, and the Customs Release by a consortium of system users acting as trusted third parties. As soon as these are validated, Ci5 generates the Final Release. Each event that creates a new status is tracked and cannot be altered or falsified. Through Ci5, the blockchain technology adds the tracking and security features in obtaining the cargo release status. This innovative blockchain-enabled module makes MGI the world's first provider of Cargo Community Systems/Port Community Systems-type of a solution to offer integrated blockchain technology, and it's now available to all clients who want to make use of it.

End-to-end shipment tracking

The MeRS (Mediterranean-Rhône-Saône) blockchain project is working on finding the best way of sharing logistics information with shippers and carriers when goods are transiting to a port terminal. Led by the French Inter-ministerial Delegation for the Development of the MeRS Port and Logistics Route, the project is looking to improve the route's supply chain in order to increase the competitiveness of the Marseille Fos, Sète, and Toulon ports.

This is the second blockchain application MGI is working on, this time focusing on the cargo export leg. Our

company is providing its expertise in connecting logistics professionals and optimising and tracking goods flows via Ci5, whereas two other project partners, Keeex and Buyco, specialise in secure and augmented data as well as booking services and cargo tracking respectively.

Ci5 has already several features that have been developed to enable information access and sharing for export cargo. For instance, the system records cargo events and statuses such as Pre-arrival Notification (cargo announcement prior to arrival at a maritime terminal), Gate In (cargo enters the terminal), Shipping Release, Forwarder Release, Customs Release, and Load (confirmation that the cargo has been loaded on a ship). However, diverse and unstructured data is still being exchanged between shippers and carriers, which affects the performance of inland logistics. The pilot phase started six months ago based on a use case for carriers and shippers. These entities (shippers, carriers, and multimodal operators) have also formed a consortium in order to join this project and provide their expertise.

This solution works with a range of data, including cargo statuses, geographical positions of shipments and means of transport, predictions on the estimated time of arrival in a terminal, and sequences that guarantee that all logistics processes have been integrated. Documents are also recorded, such as delivery slips, CMRs, or loading reports involved in pre-routing. It improves collaboration between pre-routing players by structuring, optimising,

and securing their data exchanges, with a specific focus put on facilitating sustainable transports, especially by rail or inland waterways.

The solution creates a string of secure, virtual documents, enabling data sharing between various bodies without the need for a trusted third party superstructure, all thanks to the certified interface the blockchain technology delivers. This blockchain approach, implemented by MGI, supplements Ci5's transactional or Electronic Data Interchange services with a hybrid solution that organises data transfers and integrates them into current processes so that any future users can tap into them trouble-free.

Cargo and data handled intelligently

These two examples of blockchain use do not interfere in current processes but document the flow of export/import goods. Our solution allows to achieve process improvements and save costs by connecting logistics systems and players who previously found it difficult to effectively and reliably share data.

As we approach the even more digitalised decade of the 2020s, the most feasible way for ports to boost their performance – and for that matter the efficiency of the entire supply chain they're part of – is to speed up the flow of information they're handling. "Show me how quickly you can process your data, and I'll tell you how good is your port," will be the new attitude. Ports that combine smart blockchain-leveraged systems will get a head start.

Photo: PortXL



**Addressing the excuses
of not using hydrogen
as ship fuel**

One shot, multiple hits

by **Carl Fischer**, *CEO & Co-Founder, shYp B.V.*



The maritime industry is at a crossroad. Having sailed under the radar for decades, it has recently found itself in the spotlight for its emissions, most visibly in the public eye the cruise ships whose auxiliary engines massively contribute to air pollution in port towns, with container ships, tankers, and bulkers in the background, burning heavy fuel oil for decades. The industry, which globally contributes to greenhouse gas emissions more than Germany, will have to clean up its act sooner or later.

during his impressive career, Carl worked, i.e., as a Fellow of JHU City Lab on novel affordable housing concept in Baltimore based on a CLT plus renewable energy microgrid (he also structured a Social Impact Bond against homelessness in Baltimore back in 2013); worked on an investment vehicle to employ people diagnosed with ASD as investment analysts; launched a quantitative model for foundations and endowments to improve their investments in SRI ETFs; developed a concept for an Entrepreneur Revenue Structure; developed the Baltimore "Hatch" Fund (the first Impact Investment fund for unaccredited investors); created the first Public-Private Impact Investment project "Green City Clean Water Impact Investment Fund" in 2015 for the Philadelphia water department; and assisted the Nobel Prize Laureate Prof. Yunus on his Rockefeller Foundation. Carl's also a Board Member of Refugee Cities, having worked with Rutgers Graduate School on solutions to address refugee-related issues, entrepreneurship for students, and job creation in deprived neighbourhoods.

many approaches are being debated: the use of scrubbers to clean the exhaust so as to continue sailing on cheap bunker, the introduction of biofuels, and, of course, liquefied natural gas (LNG). All of these solutions, however, will be a temporary fix at best – whether the industry likes it or not.

The only solution to be truly emission free – as Maersk stated as its 2050 goal – will be to use hydrogen as fuel. When burned, it produces nothing more than clean water. It is highly energy efficient and lightweight. The main reason – or rather an excuse – it hasn't been used so far was storage and lack of refuelling infrastructure. And, of course, the cost. New technologies render these "alibis" worthless.

The road(s) not taken

Modern technologies such as Liquid Organic Hydrogen Carrier (LOHC) or metal hydrides allow its safe storage at room temperature at no risk of explosion. Existing combustion engines can

be converted to burn hydrogen just as efficiently as diesel or even run in the dual fuel mode, allowing to switch from one to the other should hydrogen not be available (as demonstrated by CMB's ferry *Hydroville* in Antwerp). The good ol' fuel cells are naturally another possibility for smaller vessels (though cruise shipping heavyweights are also putting the technology to the test on-board their luxury over 200 m-long newbuilds).

Hydrogen is produced by splitting water using an electrolyzer. In order to do so, electricity and pure water are needed. However, the latest technology – a membrane free electrolyzer – even allows the splitting of the sea or ballast water without having to purify it, thus saving extra energy. That same process can also harvest some of the minerals inherent in seawater, in such a way creating an additional revenue stream (our start-up, which has just hopped out of the accelerator programme PortXL, is championing this approach).

Going forward, it is not unthinkable to have this technology installed on-board

ships, allowing vessels to produce hydrogen from ballast or seawater while sailing. While this cannot be achieved quite yet, it is certainly worth aiming for as it would hit two birds with one stone – the need to treat ballast water and provide hydrogen refuelling infrastructure. What requires sorting out, of course, is finding a way of tapping into greater flows of renewable energy already on-board the ships, since the current efforts in this regard (Flettner rotors, sails, kites) are directed towards aiding propulsion and reducing fuel consumption.

Let the numbers do the talking

Currently, the price of low sulphur bunker hovers around \$600/t. One tonne is equivalent to approx. 260 gallons. One kilogram of hydrogen offers energy equivalent to one gallon of fuel. Therefore 260kg of hydrogen can replace one tonne of fuel. Dividing \$600 by 260 leads to a price of \$2.30/kg for hydrogen to be competitive.

Modern electrolyzers can produce one kg of hydrogen by using approx. nine litres of water and 56 kWh of electricity. Therefore, if you divide \$2.3 by 56, you arrive at the necessary price per kWh in order to achieve that – some \$0.041 per kWh.

Renewable energy has lately been priced a lot lower than that. Prices in the range from 3.0 to as low as 1.75 cents were offered, and due to the fact that offshore wind farms produce electricity even when there is no demand, i.e., surplus energy prices dropped to or even below zero at times. And of course, there is always the possibility to hedge your exposure via electricity exchanges.

But hydrogen has more to offer. When you burn it, the result is water vapour which can be cooled down on the spot to get hold of the water (nine litres

out of one kg of hydrogen). Moreover, in the process, seawater is turned into desalinated water – a boon to cruise ships or nations that are struggling with water scarcity. In such countries, desalinated water is priced at approx. 35 cents per litre. Again, do the math: \$0.35 times nine litres per kg of hydrogen results in \$3.15/kg. Your hydrogen production just created another revenue stream which will allow you to offer it competitively even if your electricity prices are higher than 4.3 cents per kWh.

And then, there may well be another incentive, namely carbon tax credits. The International Maritime Organization has calculated that each tonne of fuel burned produces approx. 3.1t of carbon dioxide. On the EU Emissions Trading System (EU ETS) one tonne of CO₂ has averaged approx. \$25. The math again: \$25 times 3.1 equals \$77.5, divided by 260 equals \$0.30. That's another 30 cents per kg earned. Rumour has it that the EU ETS, following its reset and restructuring, will raise the price to \$75/t of CO₂.

The dots connect

Overstated costs can no longer be used as an argument as hydrogen can be priced competitively and still turn a profit (and yes, profits are necessary to incentivise the maritime industry to make the transition and bear the costs attached to it). Storage technology has improved significantly, too, and will be ready to move onto ships – if it hasn't already. Refuelling infrastructure will be made available across berths just as with LNG (once players like Maersk push for it, the ports will scramble to offer it). And the recent investment by Royal Vopak into Hydrogenious and its LOHC storage technology demonstrates that the maritime service sector is preparing itself for that moment. ■



The sHYp B.V. start-up was included into the PortXL selection days and accepted into its 2019 cohort.



Companies-turned-freelancers and what it could mean for the shipping industry

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Photo: Container xChange

Deconstruction of the value chain

by **Dr Johannes Schlingmeier**, *CEO, Container xChange*



The Hamburg-based company stands behind xChange, an online platform enabling container users to find third-party equipment for their freight and container owners to supply their equipment to save on empty repositioning costs. For more info as well as to book a free demo how the whole solution works, please check <https://container-xchange.com>

In the past, companies tried to optimize and unearth efficiency gains through value chain integration. The reason was that it is easier to communicate and optimize within a company than with external partners. Examples from container logistics include Maersk Line acquiring Damco as part of the P&O Nedlloyd acquisition, or Amazon's aim to consolidate the entire value chain from factory to last-mile delivery.

In the literature, the explanations focus on lower transaction costs when communicating within an organization compared to the outside, and the risk of “holdups” being more manageable with the ability to observe the entire value chain compared to just a small fraction. In fact, one could argue that these factors and risks are the only reason why we have companies at all, a way for humans to work together and communicate efficiently. In a sense, a company is just a collection of specialists who work together on a “platform” called a company.

Power to the platforms!

Today, technology and digital platforms reduce transaction costs and remove risks. This makes the traditional “company borders” obsolete. We see that in the so-called “gig” economy. Here, specialists, from highly paid professionals such as lawyers and consultants to poorly paid, uneducated “hands,” chose

not to get a job in a company; instead, they offer their workforce on platforms like Uber, Fiverr, and even Deliveroo. Interestingly, this does not quite fit into the B2B vs B2C vs C2C logic of the past. Rather, we're dealing with a P2B/C model: as a company/consumer, I only have to join a platform to get access to a wide range of services without further needing to search, compare, or contract.

As such, mergers & acquisitions are likely to lose their status of the only logical way to increase efficiency along the value chain and to achieve economies of scale. Instead, platforms and digital technologies allow companies (no matter how small or specialised) to work together across company borders. On successful platforms, this is not only powered by efficient online processes, but it is supported by platform activities that increase trust such as peer reviews, performance information, always-on troubleshooting, or payment handling (the last one, again, through impartial blockchain-enabled

platforms). Examples include a “simulated large, consolidated company” which operates equipment in an efficient, market-driven pool or platforms focused on the optimisation of intermodal traffic thanks to improved communication between container carriers, freight forwarders, and truckers.

Deconsolidation

Thinking about the future of the shipping industry, we’ll witness further deconstruction taking place. Multiple “neutral” platforms will link together specialised actors along the value chain. This will be the reverse of what’s currently the state of play, namely carriers pushing for vertical integration. The future value chain will comprise many more parties, not only the all-mighty carriers but also niche lines, shipowners, vessel operators, equipment owners, slot marketer, port agents, technology suppliers, ports, terminals, truckers, depots, etc.

From an economic viewpoint (and when removing transaction costs/communication barriers and “holdup risks”) it makes only very little sense to have “vessel operation” and “equipment ownership” done by the same party. In the case of equipment, managing a pool allows to even out company-specific imbalances and, e.g., reduce empty container moves. Container leasing companies are a prime example of an area where this has already started to happen.

Why shouldn’t forwarders or shippers bring their own containers and only book the vessel slot? The so-called shipper-owned containers (SOC) increase flexibility and create a win-win for shippers and carriers: forwarders save demurrage charges, while carriers avoid time-consuming planning and can focus on what they’re good at, i.e., moving goods between continents and the sale of vessel slots. More and more shipping companies increase their SOC activities because online platforms provide them with access to global capacity and streamline processes of booking containers separately to the vessel slot.

Of course, this does not need to be fragmented down to the individual micro-service at all stages. There will be companies taking care of multiple “chains,” so to speak. Some clients will continue to prefer buying from a consolidated entity instead of plugging-and-playing services on a platform. In this instance, think of a large shipper who wants to have a reliable long-term contract with stable rates and a single point of contact. That said, deconsolidation makes sense by and large, because in

the wake of the digital revolution individual on-demand platform freelancing companies promise greater efficiency, be it cost- or performance-wise. The question is whether the trend will be potent enough to deconsolidate even the strongest of today’s transport & logistics integrators.

Eco-systematisation

The “race to be the largest and most integrated actor” could be stopped. In the future of shipping that we’re painting, one will need to be super specialised and able to play multiple platforms, with no room left for “conglomerate cover-ups,” as every activity will have to be performed on par with, or better than, the best. Because markets will be so efficient, customers won’t be willing to pay for sub-optimal solutions anymore.

This will be a “battle for services” or to put it differently – who’ll have the upper hand when deciding on the shape of the future business eco-system. Just imagine parties like Amazon or Alibaba rekindling the shipping industry. Will we see more companies disinvesting what used to be their core activities, as when COSCO had let go of its shipbuilding arm? What to leave in the portfolio and what to drop or outsource has already become a major headache, not to mention the need to design, implement, and follow through new not only technical but also business plug-and-play architectures and practices (e.g., shorter duration contracts). Atop of that lies interoperability – being sure the value chain speaks the same language. Zapier is a really good example in this regard, as the company is an online service that “connects” distinct services of other parties to provide additional user value. Easyjet is another illustration of “unbundling” an offer into micro-services; the platform allows to book virtually everything for holidays (incl. the vacation package itself) but gives the possibility to pick the individual items at the user’s pleasure.

Lastly, going full circle to the transportation business, we as Container xChange are also an example of how companies can work together on a neutral platform and share capabilities/assets. It is also possible to add further services from third parties to a transaction, such as container insurance or surveying, to further drive down transaction costs. It is not necessary anymore to take over your competitor to leverage a shared pool of containers. More than 300 companies use this chance to access the world market and to have eyes and ears across the entire globe. ■

Photo: Rawpixel

Don't let it turn to dust

by **Manit Chander**, *CEO, HiLo Maritime Risk Management*

Following significant and ongoing operational advances in the aviation, rail, and road transport sectors, more organisations within the shipping industry are waking up to the value of data sharing as a safety resource. In fact, leveraging shared data is the most effective way to reduce risk and improve safety at sea.



hiLo (High Impact Low Frequency) Maritime Risk Management is a not-for-profit joint industry initiative – founded in 2016 by Shell Shipping and Maritime, Maersk Tankers A/S, and Lloyd's Register Consulting – which uses a predictive mathematical model to enhance industrial safety. By reading and analysing several precursors (weak signals), HiLo can predict the likelihood of more serious events. HiLo works across multiple asset types, with models currently available for liquid and dry bulk carriers. A container model is under development and ferries will follow later in 2019. For more info, please visit www.hilomrm.com

at a recent event staged by the Open Data Institute, a broad range of professionals discussed the challenges of convincing the shipping world that sharing data reduces risk. Some ship managers are already developing a more open and collaborative culture through the understanding that technical and operational data delivers a safer platform for marine operations. In contrast, ship managers that choose not to share data within a structured setting can only develop safety practices based on their own experiences.

The event also highlighted the continuing need for more investment, development of regulations covering vessel data, and updated standards and best-practice guidelines to deliver robust data infrastructure. The clear inference is that the industry needs to be more open if accidents are to be reduced.

Previously unobtainable insights

A great deal can be learned from investigating incidents in retrospect, but looking at data from ships proactively can prevent them from happening in the first place. The collection, pooling, and structuring of data enable trends to be identified, analysed, and acted on. This is already happening, with vessel operational and technical data

provided by ship managers put through High Impact Low Frequency (HiLo) predictive models. Developed using peer-reviewed statistics, the models enable HiLo Maritime Risk Management to share data-derived insight and industry best practices in risk dashboards for each company.

Building from an early base of ten ship managers who shared their fleet data to the HiLo platform, there are now 42 companies providing data, and new organisations are subscribing regularly. HiLo currently analyses data from more than 3,000 vessels and operates predictive risk models for tankers and bulkers. As subscribers to the platform, ship managers help to enhance their own and others' operational safety by supplying vessel data already collected according to their internal company procedures. The process is, therefore, of little burden. By feeding data from multiple sources through the HiLo models, previously unobtainable insights can be revealed.

With HiLo, analysis of the data is a continuous, dynamic process, informing and improving risk models for specific vessel types. HiLo can accordingly identify critical areas of action to avoid serious incidents. These insights are communicated in dynamic Risk Rankings, regular Deep Dive



Photos: HiLo

reports, and specific alerts for individual subscribers, enabling them to act before minor issues become major incidents.

By way of example, HiLo predicted that the risk of an engine room fire was high for a particular subscriber's vessel. The subscriber investigated the weak signal – small leaks of fuel – and discovered a link to inadequate bolt tightening, with some bolts being the wrong size. Corrective actions were taken to significantly reduce the risk of an engine room fire. As another example, the risk of lifeboat accidents was pinpointed as a high potential impact area for one company. The precursor to this was identified as a lifeboat brake failure: company action showed that eight unapproved service providers had crept into their system over the past couple of years.

Overall, the maritime industry is starting to recognise that shared data can be secured and can generate real value by reducing the cost of minor and major accidents. In fact, predictive models based on real data from HiLo subscribers have had an immediate and demonstrable impact on safety. Between August 2017 and June 2018 alone, HiLo was responsible for reducing the risk of lifeboat accidents by 72% on 900 ships. In the first six months of 2018, meanwhile, engine room fires and bunker spills on 1,800 vessels were reduced by 65% and 25%, respectively. The data-sharing platform's successes were recognised when HiLo won the Lloyd's List Global Safety Award 2018.

Two steps to data sharing

With more data sources, HiLo modelling can deliver deeper insights, so to improve

the safety processes industry-wide, it's important to break down preconceptions about the risks of sharing operational data to such a platform.


The first step is to demonstrate a secure system where all data is anonymised and held in a secure environment with stringent information security and IT compliance practices. The second step is providing ship managers with something worthwhile in exchange for their data. Existing HiLo subscribers are willing to share their internal reports because the platform creates tangible improvements for the safety of their seafarers and vessels, which translates to providing a more effective service to their customers.

Additionally, looking ahead, there is tightening of regulatory compliance in the tanker sector, which will inevitably filter through to the container and bulk carrier sectors. With its ability to see early warning signals, HiLo will be able to identify the effects of these regulations on the maritime industry as a whole.

Saving lives and ships

A new HiLo container ship model is coming soon and will be followed later in the year by a risk model for ferries. These have been created through close collaboration with individual experts and organisations with exceptional operational knowledge.

Ultimately, leveraging the power of data will save lives and ships, so it's essential that the industry focuses on working together. With such high stakes, locking data away to gather dust is simply not an option. ■



Why ports should transform themselves into digital data platforms

Photo: NASA/Rawpixel

The new fuel

by Bartosz Dąbrowski

It appears that digitalisation has penetrated every nook and cranny of our everyday lives. Thanks to going digital, many businesses have reached new heights. No wonder then that the maritime industry, though conservative by nature, wants to make sense of this all-embracing change and jump on the e-bandwagon. Yet, going down the digital lane isn't as easy as ordering the IT guys to buy and install new software. Even the most well-established parties, like seaports, have to re-invent themselves. Easier said than done, but there're ways of, e.g., transforming ports into real digital platforms, argue the authors of the Port of Rotterdam's *Move Forward. Data as Fuel for the Digital Port* white paper.

Future ports will have to invest in both hard- and digital infrastructures to maintain and develop sound relationships with their clients. They will have to approach the issue carefully and consequently, in order to avoid the fate of such businesses as the hotel industry, where properties no longer retain a direct relationship with customers due to the emergence of online booking agencies. As such, ports should transform into digital platforms on their own, without the need for intermediaries. That does not mean ports will need to become software houses but rather open, transparent platforms interconnected with other parties along the supply chain to add value (e.g., eco-benchmarking by gathering data on CO₂ emissions or optimising berth and yard usage by collecting data on vessels' waiting times and the containers' location).

"It's the data, stupid!"

The availability of data and its proper use are pivotal in simplifying port operations as well as making them more efficient

and safer. So far, data have been either under- or unused in the maritime industry. However, ports, just like other platforms and industries, could welcome numerous innovative products and services with the proper management of data. For instance, similarly to the software industry, port platforms could become open to third parties and their developments with the use of such methods as Application Programming Interface stores. One such example is Port Insight, a joint venture between the Port of Rotterdam and the Dutch company TWTG. Their project aims to develop Internet of Things-enabled solutions. Since its launch in November last year, its first achievement was a service through which barges can be tracked across a large part of Europe. Effectively, this solution spares the barge operators a lot of mundane, manual tasks, including paperwork such as invoicing.

Next, in its move towards becoming a smart port, Rotterdam introduced this year a hydro-meteo monitoring system, which uses a network of sensors to provide accurate

and up-to-date water and weather data, used particularly for the planning and management of shipping. In total, 44 sensors installed across the port feed data on the height of tides, tidal streams, salinity, wind speed and direction, and overall visibility.

Making use of digital twin technology is another promising avenue worth exploring. Building a quay wall, for instance, can be very costly and even the best blueprint is as good as its designers and the historical data they have at their disposal. On the other hand, testing the structure's functionality before it is constructed offers a much clearer insight into what impact a major investment like this could have. In addition to technical benefits, money saved through digitisation can be used elsewhere to fund other projects.

In control

Customers, including terminals, shipping lines, and forwarders also take part in the digitisation process. They can optimise their own processes should ports provide them with quicker handling of cargo, smarter applications, and better access to data. Customer satisfaction brings increased sales opportunities, especially when we think about new players on the market, like the growing e-commerce business.

Ports must be aware of the impact the so-called platform economy has made globally.

Platform giants like Amazon plan to expand their shipping arm by entering the maritime business, and it's only a matter of time before they disrupt the status quo in port logistics. Third parties collect vast amounts of data for the platform economy, but if ports want to become powerful digital platforms themselves, they need to remain in control. They should be creators and moderators of such platforms and help third parties optimise their processes by proper data sharing.

Apart from current opportunities, ports need to anticipate future developments. Transport is undergoing radical changes, with new fuel types making their way onto the bunkering market and autonomous vehicles being slowly but steadily introduced. Concerning the latter, successful operation of self-sailing ships depends on the proper handling of infrastructure and event data. The vessels need to 'know' what's happening in and around them to decide whether it's safe for them to berth as well as what's the most optimal time to call a port. A central platform managed by port authorities would be an ideal response to the need for such data.

Safe and sound

It isn't enough to come up with new ideas to transform a port into a real digital platform. Close cooperation with the port community is key as well. Only then is it

possible to support the analysis of shared data collectively, and it is easier to face any serious economic, technological, and legal issues when the parties work hand-in-hand.

No solution will be adapted by a port if it is only a brilliant concept that is not capable of generating revenues or savings. A future-fit solution must serve a common aim for both the port and its community. One example would be Rotterdam's Pronto – an application for port call optimisation. It has already started bringing the planned economic benefits by reducing the average port waiting time for ships by 20%.

Even if economic requirements are met, ports will have to face technological challenges. One thing is ensuring the unified standards and definitions so that a neutral digital platform can be used by many players. Here, the International Taskforce Port Call Optimisation brings together standards from the nautical sector. The organization is represented by such bodies as shipping lines, oil tanker owners, terminal operators and ports, and co-operates with the International Harbour Masters Association, the United Kingdom Hydrographic Office, and GS1.

Another challenge lies in ensuring that the technology used is safe. In an interconnected digital platform, any lack of proper security measures on the part of a single organisation can jeopardise the whole pack.

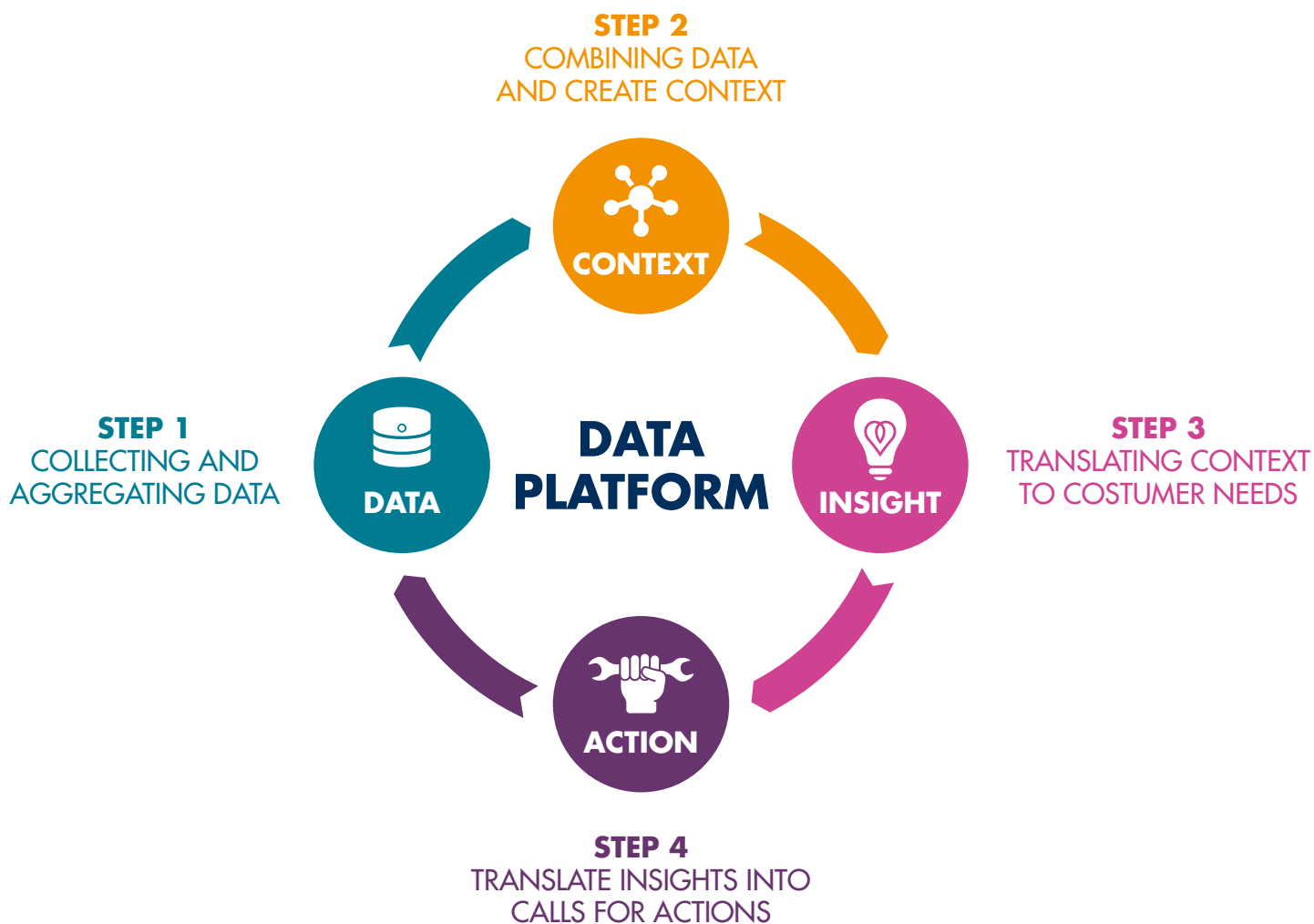
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Cybersecurity requires companies to invest financially, technologically, and culturally, and needs to be prioritised as the connectivity of assets – the Internet of Things – grows.

Even if the data is safe, its accessibility and reliability remain a concern. On a digital platform, data must be available all the time. Even temporary interruptions in data flows may have a major impact for all of the platform's members, so ports need to invest in reliable business continuity protection.

Accessible and reliable data should be available but only to the intended recipients. The aspect of privacy is even more important now, after the introduction of the General Data Protection Regulation across the EU in May 2018. In the maritime industry, these rules are applicable to the automatic identification system (AIS) signal from inland vessels, among others. Because many such vessels are private, the use of AIS data to facilitate cargo handling or to collect port dues automatically should be used only with the consent of the vessel owners.

This shows that there is a need for rules on data ownership, and access and user rights to be laid down. Terminals and

vessels carry confidential and commercially sensitive data, which should be limited only to the authorised parties. Another example is the information on completion times of terminal operations, which in some cases is commercially sensitive, too. In such digital databases as the Port of Rotterdam's systems PortInsider and PortBase, security is prioritised by requiring identification, authentication, and authorization from its users. Sure, it requires going through a few more security steps, but that's still nothing compared to the time and effort saved thanks to the digital solutions made possible by PortInsider and PortBase.

The best time

When the tools are available, the funds are there, and the process is secure, it is time to display the skills necessary to make the digital future happen. Ports will need employees with strong data capabilities, who have IT background and are capable of handling smart digital applications. Analytical skills will also come in handy to work on historical data as well as create new/alternative models and forecasts.

Before any set of data is transformed into action, it goes through a cycle. First,

the data are collected from the port community before being combined with other available data to create a context. Only then can the collected data be properly analysed and translated so that the consumer can start taking action. Such actions can bring about tangible effects, just like the one-off potential savings of €1.0m in Rotterdam, resulting from more efficient dredging based on combined operational and historical data (the solution has been transformed into the Optimised Dredging Application).

Before ports complete their conversion into data platforms with ongoing data use cycles, they need to lay solid foundations. To remain competitive and achieve greater efficiency, they have to start building the platform around talented employees, innovative ideas, and comprehensive troubleshooting.

There's no turning back from the digital revolution. The good news is that ports, be they big or small, can be leaders of change in the maritime industry, not victims of the inevitable. So, the modern version of the well-known Chinese saying would go like this, "The best time to go digital was 20 years ago, the second-best time is now."

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