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the global seafarer

Volume 6 | Number 1 | January 2022

WHAT WILL IT MEAN TO BE A SEAFARER?

Connectivity

Green technology

Digital skills and training

NAUTILUS FEDERATION
A Federation of Maritime Professionals

the global
seafarer
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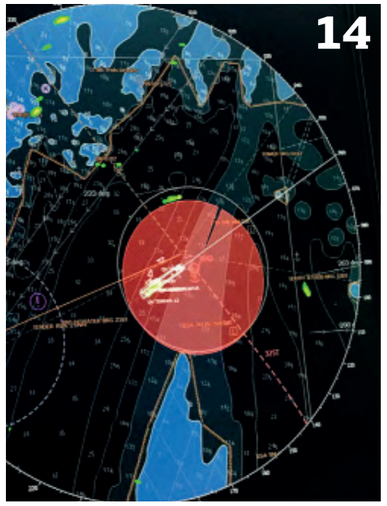

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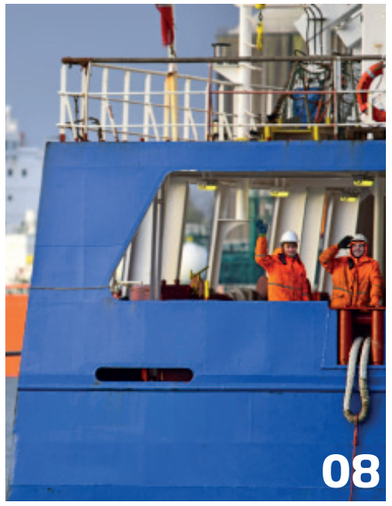

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on behalf of
NAUTILUS FEDERATION
A Federation of Maritime Professionals

FOR **COVID-19 FAQ**

Join the Union at www.nautilusint.org

▲ **Passenger vessels in Basel, Switzerland** Image: Getty Images

Nautilus supports minimum wage exemption for work outside Switzerland

The Nautilus Switzerland branch is supporting an exemption from a new minimum wage of 21 francs (€19.58) for crew aboard inland waterway vessels working outside the country.

The Union is concerned that, because the minimum wage levels in other EU countries remain below that of the new minimum wage in the Swiss canton of Basel City, rivercruise operators would relocate jobs to low-cost flag states such as Malta and Cyprus.

'We are convinced that a possible minimum wage enacted in Basel City – should it then also apply outside Switzerland – would have no positive effects whatsoever for inland navigation operators. Neither for those working on a Swiss ship nor for those working under another European flag,' Nautilus Switzerland national organiser Holger Schatz said.

'In fact, no one would receive such a minimum wage at all, as there would no longer be any companies based in Basel offering river cruises on the Rhine or the Danube.'

Nautilus is further concerned that hard-won benefits of the Swiss social insurance scheme would be further eroded in a move to flag out.

'We and our partners in the ETF (European Transport Workers' Federation) are making great efforts to gradually raise working conditions in this sector in a coordinated manner throughout Europe. Applying a possible Basel minimum wage to Swiss ships abroad would in fact counteract this concern,' Mr Schatz said.

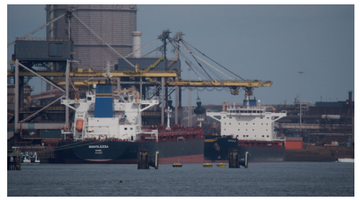
Union involved in reorientation of Swiss flag

Nautilus Switzerland plans a campaign launch in support of the Swiss flag at its branch conference and symposium in October.

For worker protection, safety and environmental standards, ships should operate under a 'reputable' flag and be bound by strict legal regulations.

Switzerland has proven that high standards apply to its ships, but numerous ships of Swiss-registered owner companies now operate under flags of convenience, a process the Union aims to stop..

'It is Switzerland's responsibility to help ensure that good, safe, clean and regulated transport flows exist,' said national organiser Holger Schatz



▲ **The Swiss flagged Suisse Atlantique Diavolezza** Image: Wikimedia Commons

In brief

New NHS guidance on vaccination for seafarers

New guidance on vaccination for seafarers has been published by the UK National Health Service.

The 'FAQs on Seafarers and vaccination' document covers availability for both British citizens and international crew. It outlines which licensed vaccines are available, including Pfizer (Cominarty), AstraZeneca and Moderna, and provides further information on how to access jabs at UK ports.

Covid vaccine information letter
Image: Getty Images

The document acknowledges the special circumstances seafarers experience in accessing vaccinations due to their working conditions: 'Seafarers are a specialised international workforce vital to support national and international supply lines for critical items and general trade.

'It is therefore inappropriate to consider them as one single group which one solution will suit.'

The NHS FAQ document is available in the Resources section of the Nautilus website: **www.nautilusint.org**

Containership's bridge deserted for an hour after officer disappears

A 4,253 TEU containership was left with no one at the controls for around an hour off the coast of China when the chief officer – who had been alone on the bridge at the time – disappeared.

The alert was raised at around 0630 hrs as the Kota Lazim was four days into a voyage from Shanghai to Mexico last September, and the bosun arrived on the bridge to take the work orders for the day.

Extensive searches showed no signs of the officer or any evidence that he had fallen overboard or left a note to explain his disappearance. Fellow crew members and shore staff said there had been no signs that the officer – who had joined the ship just five days earlier – had any problems.

Accident investigators said the ship's safety management system (SMS) for bridge watchkeeping was not being implemented at the time, as there was no lookout with the chief officer. The seafarer assigned to the watch said the officer had told him to rest instead, as he was needed for deck duties on the following day.

However, the master and other crew were unaware of this instruction and there was no evidence of scheduled deck work.

Investigators said the voyage data recorder showed no signs of unusual activity on the bridge, except for the opening and closing of doors to the bridge wing several times.

The Singapore flag state report found that the bridge navigational watch alarm system (BNWAS) had been switched off even though its use was required at all times. The master said this had been an 'oversight' – but the deck logbook showed that all watchkeepers had stated that it was active during their watches.

'This was indicative that the entries were a "paper exercise" to show compliance with the company's SMS and that the intent and purpose of the BNWAS had not been appreciated by the navigating officers,' the report added.

Investigators said the bosun had stayed on the bridge for about 30 minutes after he couldn't find the officer, but he had then left it unattended – in breach of the SMS – while he went to the ship's officer to look for him.

'An empty bridge should have alerted the bosun of the navigational risk and he could have alerted the master while staying on the bridge (such as using the telephone),' the report added.

Ship manager urged to offer crew support after suspected suicide

A ship management company has been urged to offer online psychological support sessions for seafarers following an investigation into a possible case of suicide.

A Filipino rating was reported missing when he failed to report for duty on 6 July last year aboard Cyprus-flagged bulk carrier Ledra. Investigators said the rating was by nature a quiet person but had become increasingly withdrawn. The AB had complained of sleeping problems.

Ledra Image: Wikimedia Commons

The flag state report recommends that the ship's management company should provide 'ad hoc support sessions to crew members with a psychologist' to 'protect crew members who face extreme challenges even without a global crisis'.

Poor safety culture led to fatal crushing aboard cargo vessel Cimbris

The UK Marine Accident Investigation Branch (MAIB) found a poor safety culture onboard and at port resulted in a fatal crushing aboard the Gibraltar-registered vessel Cimbris at Antwerp.

On 14 July 2020, a port stevedore onboard Cimbris was fatally crushed when a hatch cover was moved by the ship's gantry crane.

No one saw the stevedore in a hazardous position between the crane and hatch cover, and the chief officer did not have a clear line of sight.

On behalf of the Gibraltar government, the MAIB conducted an investigation, finding these safety issues:

- the hatch cover lifting operation was not properly planned, supervised, or carried out in a safe manner
- banksmen were not used, and the cover was carried over people working below
- communications between stevedores and crew showed a weak safety culture
- stevedore placed himself in danger
- stevedore was unsighted by the gantry crane operator

MAIB recommended that safety culture onboard Briese Dry Cargo GmbH & Co KG vessels be improved.

It also recommended that Centrale der Werkgevers aan de Haven van Antwerpen improve the safety culture among their port workers and review compliance with safe working practices on customer vessels.

Cimbris gantry crane with hatch cover suspended

New IMO domestic ferry safety model regulations

The International Maritime Organization (IMO) has released a video outlining its work to finalise new Model Regulations on Domestic Ferry Safety.

Domestic ferry operations play a crucial role in the movement of people and goods in many regions. About 95% of ferry casualties worldwide occur during domestic work, says IMO.

IMO has identified more than 30 causes of domestic ferry accidents. Key issues to be addressed include: ferries being unfit for purpose; overloading; sailing in bad weather; and the need for clarity over demarcation responsibilities.

IMO ferry safety 2021 video
Image: IMO

Regulations for passenger ship safety in SOLAS do not generally apply to passenger ships on domestic voyages, but many countries base their regulations on the IMO standards.

The development of the new Model Regulations on Domestic Ferry Safety provide framework provisions which can be adapted by interested countries for direct incorporation into national law.

Watch the video on the IMO YouTube channel: (15) Domestic Ferry Safety – YouTube: **bit.ly/2YoWOGC**

ICE WORLDS FESTIVAL
Royal Museums Greenwich celebrates new polar research ship RRS Sir David Attenborough: **bit.ly/ice-worlds**

ITF SEAFARERS TRUST
For **#WorldMaritimeDay**, ITF Seafarers Trust shared the experiences of seafarers during Covid: **bit.ly/itf-seafarers**

In brief

MAIB releases report on dredger Shearwater following barge collisions

The Marine Accident Investigation Branch (MAIB) has released a report on the immobilisation and flooding of the dredger Shearwater following collisions with unmanned barge Agem One.

On 9 April 2020, the Shearwater was immobilised after its propeller shafts were fouled by its own towline. Soon after, Shearwater was damaged and holed, resulting in flooding after repeated collisions with Agem One. Shearwater was stabilised after the intervention of a lifeboat, a workboat and emergency towing vessel.

The MAIB reports the following safety issues:

- Shearwater was not a suitable vessel to conduct a lengthy coastal tow
- there was insufficient planning or safety procedures for the voyage
- Shearwater's crew did not have the necessary competence for the towing voyage and there was no tow master
- safety certification by the flag state did not provide sufficient assurance for safe operation of the vessel

The MAIB recommended that the Shearwater's owner assess all hazards and provide safe systems of work to ensure safe manning and reduce future risks. It further recommends that the Maritime and Coastguard Agency ensures that certification of vessels includes the application of all appropriate regulatory conditions relevant to the vessel's intended function and area of operations.

In brief

Fatal piracy attack in the Gulf of Guinea follows launch of Nigeria's Deep Blue Project

The International Maritime Bureau Piracy Centre (IMB PRC) has confirmed an attack in the Gulf of Guinea, where five individuals approached, fired upon and then boarded the vessel.

The first officer and cook were shot, and the second engineer was reportedly thrown overboard and is yet to be found.

This latest attack occurred less than three months since the launch of the Nigerian government's Deep Blue Project.

The Nigerian Maritime Administration and Safety Agency (NIMASA) director general Dr Bashir Jamoh claimed that there had already been a drastic reduction in the rate

Piracy protection barbed wire on a ship in the Gulf of Guinea
Image: Getty

2021 map of global piracy
Image: IMB

of attacks in the country's Exclusive Economic Zone (EEZ).

The project itself has cost Nigeria $195 million, with Jamoh stating that Gulf of Guinea piracy has cost the country nearly $800 million overall, according to domestic newspaper Vanguard.

Seafarers' pandemic sacrifices noted as IBF seals two-year wage deal

Seafarers working on flags of convenience vessels covered by ITF-IBF collective bargaining agreements will see an increase in wages from 1 January 2022, following an agreement reached by the International Bargaining Forum (IBF).

Unions' and employers' representatives concluded negotiations on 3 September after the pandemic delayed talks scheduled for March.

International Transport Workers' Federation (ITF) Seafarers' Section chair David Heindel was the ITF spokesperson and chaired the talks. 'We are proud we have managed to deliver increases to seafarers' income,' he said.

'Their daily sacrifices to keep supply chains moving, delivering the goods critical to our recovery to billions of consumers and businesses is recognised.'

Nautilus International general secretary Mark Dickinson
Image: Stefan F Lindberg

Nautilus general secretary Mark Dickinson was a member of the ITF negotiation team. He welcomed the deal, saying: 'This was a difficult negotiation, but the case for a decent pay rise for seafarers – the key workers in the global supply chain – was very strong.

'This was a good outcome achieved through a strong social partnership structure that continues to deliver positive benefits to seafarers on flag of convenience vessels.'

The negotiations were successfully concluded with the following agreement:

- an increase on wages and compensations of 3% from 1 January 2022
- an increase on wages and compensations of 1.5% from 1 January 2023
- an increase in JNG members' rebate from the ITF Welfare Fund to 20% to contribute to the IBF Seafarers Support Fund

Sailors' Society secures release and repatriation of five MT Manaman 8 Indian seafarers

Five Indian crew from the MT Manaman 8, who were wrongly imprisoned in Iran, have been reunited with their families thanks to the Sailors' Society.

Deepak Ravi and fellow Indian crew spent six months imprisoned after being arrested on suspicion of transporting illegal oil in March this year.

Deepak's family contacted Sailors' Society's India community development manager Manoj Joy for help. He supported the crew and their families through their ordeal, advocating for their release.

The MT Manaman 8 crew on return home to India

The crew were found innocent of all charges after they were abandoned by their shipping company and agent, but being left without wages for several months meant they were unable to get home.

The Sailors' Society stepped in to organise their release and repatriation, as well as coordinating with maritime partners The Seafarers' Charity, Stella Maris and the Mission to Seafarers to jointly fund their journey home.

Crew member Dheerendra said: 'We will never forget Sailors' Society for this help and I am very happy to be back home with my family.'

#FAIRFUTURE4SEAFARERS

Several UN agencies have developed a tool to ensure a fair future for seafarers: **bit.ly/fair-future-4-seafarers**

SUPPORT FOR SEAFARERS

ISWAN South Asia share helplines for seafarers, their families and a yacht-specific helpline: **bit.ly/iswan-helpline**

Seafarer access to medical care a matter of life and death, says IMO

A joint statement from the secretary-general of the International Maritime Organization (IMO) and the director-general of the International Labour Organization (ILO) highlights the need for easy access for medical assistance for seafarers.

Both organisations call for port and coastal states to facilitate the prompt disembarkation of seafarers for medical care as a matter of 'life or death,' to prioritise seafarers for Covid vaccinations and to designate them as key workers.

IMO secretary-general Kitack Lim and ILO director-general Guy Rider say seafarers are facing difficulties in accessing medical care 'highlighting the moral obligation to ensure seafarers can access medical care ashore without delay, whenever they need it, and to extend medical assistance on board should the need arise by allowing qualified doctors and dentists to visit ships.'

Image: Getty

The statement notes that almost 14 months later after **Recommendations for port and coastal states on the prompt disembarkation of seafarers for medical care ashore during the Covid-19 pandemic** was issued, seafarers are still struggling to access medical care.

According to the Maritime Labour Convention (MLC) it is the responsibility of member states to ensure that seafarers onboard ships in their territories are given access to medical facilities ashore, should they require it. The legal obligation to render assistance to seafarers in distress, including medical assistance, is also intrinsically part of several IMO conventions, including the International Convention for Safety of Life at Sea (SOLAS).

The statement urges governments to recognise the importance of the maritime sector, and to designate seafarers as key workers and treat them as such by providing them with medical care and prioritising them in their national Covid vaccination programmes.

Nautilus Federation affiliates see progress on seafarer vaccinations after campaigns

Nautilus Federation affiliate unions have secured new vaccine initiatives for foreign seafarers following successful campaigns.

In September this year, the Seafarers' Union of Croatia announced local authorities are now offering Covid-19 vaccines to seafarers entering Croatian ports from countries outside of the EU.

Elsewhere, the Singapore Maritime Officers' Union is part of the Singapore Shipping Tripartite Alliance Resilience Fund Task Force, which announced that from 30 September, international seafarers signing on in Singapore will be able to receive a Moderna dose before joining their vessel.

Image: Getty Images

Meanwhile, the presidents of six maritime unions in the US have issued a statement urging members to get vaccinated.

'Our members aboard vessels remain in grave danger with the Delta variant on the loose,' the union presidents wrote in the joint statement.

The presidents called on members to get the vaccine for the safety of shipmates and family members, but also to mitigate the effects of Covid-19 on the industry.

Volunteer crew sought for world's largest civilian hospital ship

Mercy Ships has an average of 1,185 volunteer crew from more than 60 nations serving onboard its hospital ships each year. Since 1978, Mercy Ships has delivered services to more than 2.84 million beneficiaries. Find out more about how to volunteer or give your support at: **bitly.com/mercy_volunteer**

In brief

British maritime charity awards American master for saving sailor

A master from the International Organization of Masters, Mates & Pilots (MM&P), a Nautilus Federation affiliate union, has been recognized for saving a British sailor in the Atlantic.

Captain Richard Hoey received The Lady Swaythling Trophy for outstanding acts of skill or gallantry from British charity The Shipwrecked Mariners' Society after helping save a yachtsman forced to abandon his vessel in 2019.

The rescue took place in the Eastern Atlantic about 200 miles southwest of Cork, Ireland, when Capt Hoey was master of the Maersk Montana.

ITF close to 'red listing' Filipino crewing agency over alleged rights abuses

Philippines-based crewing agent Able Maritime Seafarers Inc is close to being red listed by the International Transport Workers' Federation (ITF) after a series of incidents where crews' rights have allegedly been abused.

Alleged mistreatment in these incidents included promises of decent wages and conditions which were undelivered, seizure of passports and documents preventing seafarers from leaving, unsafe working conditions and a 'missing' seafarer yet to be found.

ITF Inspectorate Coordinator Steve Trowsdale said his investigation unit is awaiting formal responses from Able Maritime and the Philippine Overseas Employment Administration (POEA), which regulates the welfare and wages of more than 2.2 million Filipinos working abroad. 'At least now we can warn seafarers: steer clear of Able Maritime, avoid this company.'

The ITF inspectorate has asked any seafarers who have been employed via Able Maritime over the last two years to share their experiences via **seafsupport@itf.org**

A lack of leave and poor treatment risk a long-term exodus of seafarers
Image: Danny Cornelissen

Growing risk of seafarer exodus revealed in latest Happiness Index

Seafarer happiness has returned to pre-pandemic levels, but fundamental issues such as leave and poor treatment risk a long-term exodus of seafarers, according to the latest Seafarers Happiness Index from the Mission to Seafarers (MtS).

The 2021 third quarter report suggests that Covid-related impositions on seafarers are beginning to ease, while support measures for seafarer welfare have now had a chance to take effect. However, challenges remain around connectivity.

The difficulty of balancing home life with the uncertainties of the crew change crisis has led many who were tentatively considering a move ashore to accelerate career change plans. The report says many seafarers are not intending to return to sea once they eventually get home.

MtS secretary-general Andrew Wright said: 'It is too soon to say whether this is a start of positive change, or if seafarers are simply more resilient to the situation they are experiencing because of the pandemic.'

IMarEST films target ocean health

The Institute of Marine Engineering, Science and Technology (IMarEST) has released a short programme of films titled **Resilient Ocean**, which emphasises the importance of ocean health on the environment and global economy. The final video in the Resilient Ocean programme features BIMCO's 'Seafarers Deserve Support' video highlighting the importance of seafarers in society calling on governments to recognise this and name seafarers as key workers.

International shipping and aviation are subject to Paris Agreement

A legal analysis of the UN Paris Agreement on climate change has concluded that emissions from international shipping and aviation are covered by the treaty.

Campaign group Transport & Environment (T&E) commissioned the legal analysis because no state has included international shipping and aviation while setting reduction targets.

There has been confusion as to whether shipping and aviation emissions are within the scope of the Paris Agreement, as these emissions are released beyond national borders. The legal analysis found that, contrary to industry claims, shipping and aviation are included in the Paris Agreement.

The author of the legal analysis, Estelle Dehon of Cornerstone Barristers, said that shipping and aviation should be included as nationally determined contributions (NDCs). Based on this analysis, T&E calls on states to revise their NDCs to take into account all their shipping and aviation emissions.

TURNING THE TIDE
How the IMO's Women in Maritime programme supports diversity in the industry:
bit.ly/turning_the_tide

'WE ARE SEAFARER'
A poet and seafarer highlights the heroism, care and sacrifice that often goes unnoticed:
bit.ly/seafarer_poem

THE FAIR WAY TO CLEAN UP OUR WATERWAYS

Environmental sustainability on rivers, canals and lakes must be linked to good quality jobs and conditions, says **Estelle Brentnall** of the European Transport Workers' Federation

Estelle Brentnall of the European Transport Workers' Federation (ETF)
Image: Arnaud Everaerts

Following the communication from the European Commission **NAIADES III: Boosting future-proof European inland waterway transport**, on 14 September 2020 the European Parliament adopted a resolution towards future-proofing inland waterway transport in Europe .

This is another noteworthy initiative that advocates sustainable inland waterway transport, particularly since the interests of the inland navigation sector are not always well represented in the political agenda. Yet, inland navigation is deeply affected by climate change, with widespread changes in weather patterns leading to extreme events in the rivers as we have unfortunately seen in some parts of Europe this summer.

Inland navigation therefore merits particular attention and is among others regulated by the Central Commission for the Navigation of the Rhine (CCNR) as well as at European level. In the declaration signed in Mannheim on 17 October 2018, the transport ministers of the Member States of the CCNR (Germany, Belgium, France, Netherlands, Switzerland) reasserted the objective of largely eliminating greenhouse gases and other pollutants by 2050.

The European Parliament resolution, however, is not only about environment and economic sustainability, but also, and of utmost importance for our members, about working conditions.

The report notably underlines the importance of guaranteeing good working conditions and decent salaries in inland waterway transport, and calls on the member states to ensure adequate social security coverage for all workers onboard, in line with the European Union's social legislation.

The resolution further highlights the need for unambiguous labour and social security law in the inland waterway transport sector. It also stresses the need to safeguard social protection and rights for both European and third-country crew members.

As explained in a previous Telegraph article, some segments of the river industry (cruise mainly) are characterised by international and rather complex company structures.

Our affiliates have reported a growing number of Dutch companies using a Swiss 'letterbox' company and providing Swiss labour contracts. We understand there is no real link to Switzerland and that those constructs lead to problems, as it transpires that the Dutch management has absolutely no knowledge of the functioning of Swiss social security.

Switzerland has the largest average number of persons employed per company in inland waterway transport. Both Switzerland and the Netherlands have a high share of foreign inland waterway transport workers (see **The European inland navigation sector labour market**, February 2021).

One of the main principles of EU policies is social cohesion, which also means guaranteed social security protection for all workers. We support our affiliates in affirming that in such cases as described, the employer should be the Dutch company and not the Swiss construct. The employees should receive Dutch employment contracts and be covered by social security in the Netherlands.

It will soon be make or break time for inland waterways in the EU. Fair working conditions and a level playing field are critical pillars for a sustainable and resilient inland waterway transport sector across the continent.

Read the European Parliament resolution at
bit.ly/waterways_resolution

Willem van der Wel of Windcat Workboats explains during a Get Set For Workboat 2050 webinar how tube trailers could assist with hydrogen bunkering Image: Courtesy of the Workboat Association

WHAT'S HAPPENING WITH HYDROGEN?

Hydrogen has been hailed for some time as a clean marine fuel that could help the shipping industry meet its carbon reduction targets. But it comes with significant challenges which we must all address together. **Sarah Robinson** reports

As the world attempts to reach its goal of 'net zero' greenhouse gas emissions by 2050, there has been a major push towards electrification. In the UK, for example, no new petrol and diesel cars can be sold from 2030 onwards, and all new cars and vans must be fully zero emission at the tailpipe from 2035. A ban on domestic gas boilers is also in the offing.

Of course, using electricity for vehicles and water heaters only truly cuts carbon emissions if the energy is generated from renewables such as wind and solar power, so electrification around the world is being accompanied by a phasing out of coal, oil and gas fired power stations.

Electrification can be applied to short journeys on sea as well as land, and a few battery-powered island ferries and tour boats are already in operation, but we will probably never see giant cargo or cruise ships with shore-charged batteries capable of crossing an ocean.

It's likely, instead, that a mixture of solutions will be needed to replace diesel and heavy fuel oil on these deepsea routes – including biofuels, ammonia and wind propulsion. But hydrogen stands out as arguably the cleanest fuel, as when it burns, it produces only water as a waste product.

Working towards hydrogen

There are a great many pieces that need to be put in place before hydrogen can play a significant role as a marine fuel. The 2021 edition of the DNV Maritime Forecast 2050 shows that hydrogen is only at 'demonstration project' stage at the moment, with commercial adoption perhaps a possibility in the 2030s.

This contrasts with 'drop-in' alternative fuels such as bio-diesel or LNG, which are not as clean but are ready to use now, because the supply infrastructure is already here, and only moderate changes are needed to ships' engines.

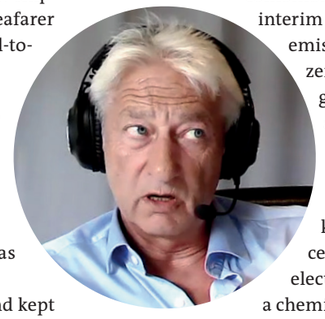
With hydrogen, we are not quite starting at the very beginning, but there is a lot to do. The shipping industry must consider fuel storage and bunkering facilities, new ship designs and engine types, seafarer safety and training, and end-to-end CO2 abatement. Not to mention developing regulations that cover all of these.

Fuel storage and bunkering

Hydrogen is usually found as a gas, but needs to be compressed into a liquid and kept under high pressure and at a low temperature for use as a fuel. 'High pressure storage takes up a lot of space and can be expensive, because you need a compressor unit and a special tank made of high-strength steel,' says Odd Rune Malterud, assistant director and technical manager of the Norwegian Union of Marine Engineers.

'Hydrogen can also be highly explosive,' he points out, 'which you must consider when bunkering; there must be a very wide exclusion zone when the fuel is transferred. When we have planned it out as a marine fuel in Norway, it has to be bunkered in an empty fjord with no one living there.'

Nevertheless, plans are being put in place reporting on the feasibility of hydrogen bunkering facilities in ports such as Antwerp and Grimsby, as reported in the interesting Get Set for Workboat 2050 webinar series earlier this year. Options include 'tube trailers' carrying hydrogen in a series of pressurised canisters – trailers which could be driven to a suitable bunkering location.



Odd Rune Malterud of the Norwegian Union of Marine Engineers, a Nautilus Federation union

Engine types and ship design

The use of hydrogen in an internal combustion engine (ICE) has been explored, particularly in combination with fossil fuels as an interim measure to reduce emissions on the path to net zero. However, the eventual goal is to change the way a ship is powered by introducing an electric engine run off hydrogen fuel cells. Essentially a kind of battery, these fuel cells would generate electricity onboard through a chemical reaction within each cell – with water as the only waste product.

This would necessitate new ship designs, in large part because the fuel cell set-up would take up a lot of space. 'First you need hydrogen tanks to supply the fuel cells, with the accompanying compressor systems to keep them under pressure and cool,' says Mr Malterud. 'Then you have the fuel cell battery itself, and then the propulsion machinery.'

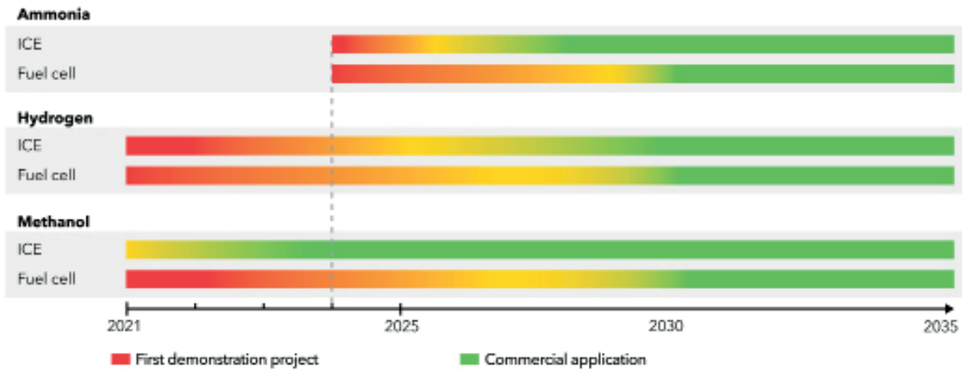
Another important consideration is the safe positioning of the fuel cells and hydrogen tanks. 'If something goes wrong, you will not get a slow-burning engineroom fire, you will get a massive explosion with no time to evacuate. The only solution is to put the hydrogen equipment on the open top deck with a thick steel blast wall protecting the wheelhouse.'

Regulations

Designing and building vessels suitable for hydrogen fuel cells is challenging but manageable, and the environmental imperative to do so is very strong. The DNV report argues that there will soon be a financial imperative, too, predicting: 'We can expect ships and shipping companies that perform poorly on emissions to be less attractive on the charter market'.

But to ensure all hydrogen-powered ships are built and operated at the necessary safety standards, we need a framework of national and international regulations, enforced by inspections. There is already the IGF Code – the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels – but this initially focused on LNG and needs updating. Mr Malterud will be involved in these revisions at the International Maritime Organization (IMO) but is concerned at how much important regulatory work at the IMO has been delayed by the Covid-19 pandemic, potentially leading in the near future to dangerous unregulated experimentation in countries less watchful than his native Norway.

He also wants to see a shift in focus in all regulations relating to new marine technology, to put the safety and welfare of seafarers front and centre. 'We cannot accept developments that take care of the environment without taking care of our members, and that is why we go to the authorities and argue for safety and competence for the crew, as well as measures like blast walls on the deck and 200m evacuation zones during bunkering of hydrogen.' →



Key: Internal combustion engine (ICE)

How the hydrogen timeline compares to two other alternative fuels
Image: from the 2021 edition of the DNV Maritime Forecast 2050

Green credentials

There's one more issue to address before we go all-out for hydrogen as a marine fuel: it is not always as green as it seems.

The DNV report notes that 'current IMO regulations only address onboard tank-to-propeller CO_2 emissions from fossil fuels'; in other words, the requirements for decarbonisation over the coming decades only apply to emissions from the ship itself. What about the way the hydrogen is produced and transported?

'In Norway, the hydrogen for the ships we have been trialling is made in France and transported here by diesel trucks!' says Mr Malterud. 'We need significant investment by governments in larger-scale local hydrogen production if this is going to work – we can't leave it to the market.'

There are also cleaner and dirtier ways of making the hydrogen itself. 'Grey hydrogen' has been produced for many years by splitting natural gas into hydrogen and carbon dioxide, releasing CO_2 into the atmosphere from the splitting and from the fuel burned to power the process.

'Blue hydrogen' is like grey hydrogen, but with more efforts to use renewable electricity as a power source and a process in place to stop the CO_2 from the splitting process from reaching the air using carbon capture.

'Green hydrogen' is the ideal, using renewable energy such as wind and solar to power electrolysis that splits water into hydrogen and oxygen.

What next?

Encouragingly, a move to significant production of green hydrogen in the UK is set out in a government policy document published at **www.gov.uk** in August 2021, which also acknowledges the importance of 'end to end' decarbonisation regulations that consider production, supply chain and decommissioning as well as vehicle emissions. Other countries, such as Norway, are also considering these issues, and Mr Malterud notes that 'good national strategies and regulations can provide a model for international regulations.'

Meanwhile, the DNV report has been very widely disseminated and is providing important data analyses for shipowners and maritime regulators. It also contains the strong message that the transition to cleaner fuels such as hydrogen – with all that entails – must now take place at a much faster rate if we are to meet global decarbonisation targets. Nautilus International, the Norwegian Union of Marine Engineers and all the other Nautilus Federation unions will be closely involved to make sure that seafarer safety and training is not left behind as the pace picks up.

The 2021 edition of the DNV Maritime Forecast 2050 is available to download on request at: **bit.ly/DNV_fuel_report**

What's the alternative?

In addition to hydrogen, we are likely to see a 'basket' of different marine fuels in the coming years – as remarked on by Magda Kopcynska of the European Commission at the launch of the 2021 edition of the **DNV Maritime Forecast 2050**. The time when one fuel fits all is coming to an end, she stressed. With that in mind, what are the pros and cons of different fuels that seafarers are likely to encounter over the next 30 years?

Liquefied natural gas (LNG)

Pros: Reduces nitrigen oxide (NOx) emissions by up to 80% and almost eliminates sulphur oxide (SOx) particles. Non-toxic and non-corrosive. LNG spills cause little marine environmental damage unless ignited before evaporation can occur. Safer than current liquid fuels.
Cons: Still produces emissions (though could be useful in the transition). Converts to highly flammable gas when in contact with air, carrying risk of fire, explosions, etc. Engine room, motor rooms and cargo compressor rooms are most likely points.
Timeline: Environmental benefits (and fuel costs) have driven uptake in recent years. LNG is already available in most major shipping hubs.

Batteries

Pros: Zero emissions (if power is produced through green technology). Quieter for crew members. Scent free. Less maintenance. Practical for vessels that dock often and have time to recharge, such as ferries, or as part of a hybrid system.
Cons: Still not efficient – cannot store enough energy for their size and weight. Production can cause environmental damage. Emissions from power produced using fossil fuels.
Timeline: Some inland vessels which can use smaller batteries already exist, with plans for larger vessels (e.g. cruise ships). However, there is no sign that batteries will be a practical solution for large cargo vessels in the near future.

Methanol

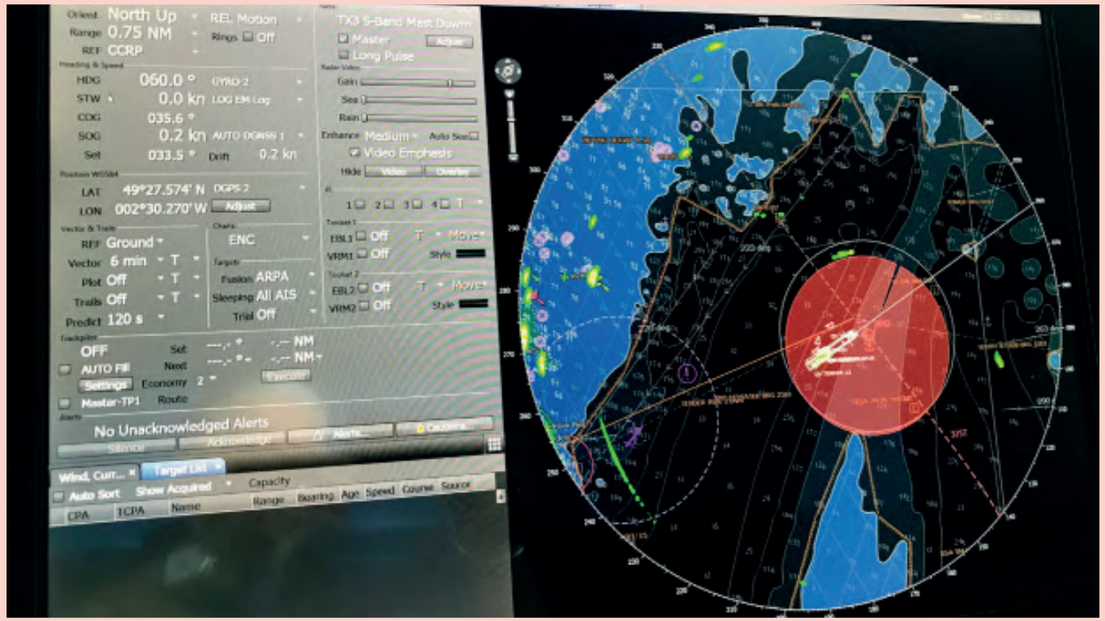
Pros: No NOx and SOx emissions. Particulate emissions very low. Compatible with most engine types. Currently cheaper than hydrogen and ammonia. Liquid, therefore easier to handle than some alternatives.
Cons: Not emissions free (but could be useful in the transition). Toxic – it must be safely handled onboard the ship and during bunkering, though it is less toxic than heavy fuel oil or diesel.
Timeline: Methanol fuelled ships are already being used and built. Existing infrastructure means that methanol is available in more than 100 ports globally, but production would need to increase to meet extra demand from shipping. Drewry expects half of all vessels ordered after 2025 to have dual-fuel engines, with a large percentage using methanol as a marine fuel.

Nuclear fission

Pros: Small modular nuclear fission reactors produce zero emissions. Vessels are 50% faster than oil-fired ships of the same size. Highly reliable, with low fuel use. United States nuclear naval vessels have an excellent safety record – nuclear sailors have lower cancer death rates than the age-matched group in the general population.
Cons: High cost to produce. Fission reactors produce contaminated waste and long-term, safe storage options are rare.
Timeline: Small nuclear reactors are already in use on submarines and surface vessels such as the aircraft carrier USS Dwight D. Eisenhower. Also used successfully aboard Soviet icebreakers. However, societal opinion of nuclear is poor, which could slow civilian uptake, and construction is expensive. Other nuclear options, including fusion and thermal power from spent fuel rods, are being explored.

Ammonia

Pros: Zero CO_2 emissions when combusted. Green ammonia (from renewable electricity, water and air) causes no CO_2 emissions during production either. Easy to store and transport. Can be kept in liquid form under atmospheric pressure, and at a higher temperature than hydrogen. High energy density, so storage aboard is feasible.
Cons: Most ammonia is produced from natural gas, and is therefore not zero carbon. Requires mix with pilot fuel for combustion. Green ammonia will initially more expensive. Highly toxic in comparison with current fuel oils – even small volumes in the air can be fatal. Highly corrosive, especially when mixed with water. Different requirements compared with current fuels could require redesigns and new training/safety procedures.
Timeline: Dual fuel ammonia engines are being developed. Major companies such as Maersk are exploring the use of ammonia and pilot projects are in development. However, supply, infrastructure and safety related challenges must be solved. Large-scale investment in green ammonia production may be needed to reduce costs.



ECDIS shortcomings outlined in MAIB and DMAIB review

A key report on the application and usability of ECDIS may reignite simmering debates over the need to modernise training. **Deborah McPherson** reports

Shortcomings in the way Electronic Chart Display and Information Systems (ECDIS) are used by watchkeepers have been flagged up by two national marine investigation bodies.

The findings of interviews with 155 deck officers – including masters and chief officers – and other data gathered are the result of a collaborative study on ECDIS use carried out by the UK Marine Accident Investigation Branch (MAIB) and the Danish Maritime Accident Investigation Board (DMAIB).

They show that while ECDIS does contribute to safe navigation, its introduction over the last 20 years has been problematic.

Looking at investigations of groundings since 2008 – in which ECDIS was the primary means of navigation – the MAIB and DMAIB identified a mismatch between the way ECDIS was used and the intention of performance standards and system design. This prompted the two organisations to study ECDIS use from the perspective of practitioners.

The report does not make recommendations, but its aim was to generate an understanding of the practical application and usability of ECDIS and support future ECDIS design, training strategies and the development of best practices. The study used a qualitative methodology, primarily based on semi-structured interviews with 155 ECDIS users and observation data gathered between February and July 2018 during sea voyages in European waters on 31 ships of various types.

ECDIS: Radar Image Overlay (RIO)
Image: MAIB/DMAIB

In a joint statement, the head of the DMAIB, Oessur Hilduberg, and MAIB's chief inspector of marine accidents Andrew Moll said: 'Investigation of groundings since 2008 have repeatedly shown that where ECDIS was the primary means of navigation it was not being used to its full potential. There was a significant mismatch between the intention of the performance standards and system designers, and the way the watchkeepers were using the system. This study set out to understand whether the findings of accident investigations could be extrapolated as representing the wider marine industry and, if so, why.

'Unsurprisingly, the study found a wide spectrum of ECDIS integration and usage, and users were unanimous that the real-time positioning provided by ECDIS was a major contributor to safe navigation. However, thereafter the picture was bleak.

'Despite being in service for nearly two decades ECDIS could, at best, be described as being in its implementation phase. Specifically, most of the automated functions designed to alert the watchkeeper to impending dangers were not easy to use and lacked the granularity for navigation in pilotage waters. The consequent high false alarm rate eroded confidence in the automated warning, and most operators disabled the alarms or ignored alerts.'

In an apparent nod to type-specific training, Mr Hilduberg and Mr Moll added: 'To be an effective tool for safe navigation, ECDIS needs a high degree of operator input, but many watchkeepers appeared to have limited understanding of the systems they were using, and in the main only used them to the extent they felt necessary.'

In a reference to autonomous ships, they said: 'Current system shortcomings, compounded by limited bathymetry data, make safe navigation challenging and do not augur well for future automation of the navigation function.'

3/O, cruise ship: 'On ECDIS you wouldn't tend to get the publications out, you would tend to jump straight in there and do the planning and maybe pass the appraisal system which you generally wouldn't do on a paper system'

2/O, ro-ro cargo ship: 'It saves a lot of time. For example, when you have to change route when we are sailing'

C/O, passenger ship: 'Yes, I have sometimes experienced anomalies. But then I investigate it, and it is usually about me not knowing enough about the system'

Master, passenger ship: 'if we are talking position accuracy, I find it very reliable, and I actually use it for my harbour-manoeuvring, so I find it very reliable'

C/O, container ship: 'To maximise the reliability of the ECDIS it is important to challenge the data by all available means'

2/O, container ship: 'Passage planning in the old days was much harder because you had to take a general chart and then transfer onto the smaller charts, now on ECDIS'

Nautilus professional and technical officer David Appleton said the report backed up the findings of the recent UK Maritime Skills Commission Cadet Report which highlighted the need to modernise training: 'It goes without saying that cadets need to be taught traditional methods which they can use as back up in the event something goes wrong.

'However, at present we have a situation where cadets are spending weeks on traditional techniques and then have a week long ECDIS course tagged on the end of the training. We need to look at the emphasis to ensure that seafarers are adequately trained in the equipment that they will use every single day of their careers.'

Another key issue is that while type-specific ECDIS training onboard is now mandatory, in addition to generic ECDIS training at college, there are doubts on how well the type-specific training is carried out due to the sheer number of ECDIS manufacturers, he said.

In summing up the issues, Mr Hilduberg and Mr Moll said: 'Most importantly, if improvements are to be made, digital navigation needs to become the primary means of navigation across the industry.'

Download the full MAIB/DMAIB report: **bit.ly/ecdis_study**

WHAT WILL IT MEAN TO BE A SEAFARER?

Big changes are on the horizon in terms of green technology, automation and regulation, but how will these trends actually affect maritime professionals on the job over the next 20 years? **Rob Coston** takes a look

Futurist Gerd Leonhard has a positive message for those who work aboard: 'I think the job of being a seafarer is going to become attractive again.'

This is also a positive message for the maritime industry, which is coming to terms with a predicted shortage of officers, as revealed in the 2021 edition of the International Chamber of Shipping's Seafarer Workforce Report. An additional 17,902 need to join the workforce each year to keep up with demand, but retention is dropping due to poor conditions aboard during the Covid crisis.

One reason that things might start to improve is connectivity, according to Mr Leonhard, who spoke about the future of maritime at London International Shipping Week (LISW) 2021. This will be needed for the increased use of services aboard such as real-time monitoring and remote inspection, but will provide new opportunities for crew as well. 'It has been a very specialised thing; you would do this job if you could tolerate being lonely, but in the next 10 years there'll be very few places left we cannot connect, not just from 5G but because of all the satellite projects. Connectivity becomes like water, or like sunshine. We're going to have a multimedia environment where you can work on a ship and then go to a room to meet your family with seamless video communication – you're still gone, but it will be much better than what you have now.'

It is likely that seafaring in future will require mastery of a range of technical roles
Image: Getty Images

Feeling more connected to loved ones is just a small part of the way in which the experience of being a seafarer is likely to change over the next few years – and the transformation is already beginning.

When will the changes occur?

David Appleton, Nautilus International's head of professional and technical, runs through some of the technologies that are already making an impact because of connectivity. 'Generally, there's a trend towards remote monitoring – engine manufacturers can monitor engine performance on a ship; companies definitely know where their ships are at any given time and give feedback to seafarers. The London Hydrographic Office is talking about the new standards for electronic charts and how they can be updated live with the connectivity you have now, so rather than updating every two weeks you can have live information on tides, currents and wind.'

He also highlights the fact that Nautilus members in particular are likely to work in the high-technology, skilled areas of the maritime profession, and are therefore going to be exposed to change earlier than some other seafarers.

Mr Leonhard is bullish about when further changes will occur – not just in connectivity but other areas too. He points out that technological change is exponential – meaning that we are likely to see very rapid uptake of green and IT technologies that have been gradually developed over the past decade.

Mr Leonhard also foresees rapid social change, as companies increasingly have to deal with regulatory and public pressure over pollution and mistreatment – which translates into shortages of staff and difficulty raising investment.

This is likely to lead to rapid adoption of a whole range of new fuels, which will require seafarers to become familiar with different technologies for different vessels.

Another question is how evenly distributed this future will be. Given the lifespan of the average vessel, could we see newer ships →

Maritime tech analyst Nic Gardner

Coming soon to your ship

If seafaring is turning into a tech profession, what kind of IT equipment or devices will seafarers be expected to use onboard? We asked master mariner – and Nautilus Champion – Nic Gardner, a maritime technology analyst for Thetius consultancy.

MULTIMODAL DRONES

What: Remote-controlled craft carrying cameras and sensors that can both fly in the air and act as submarines.
Why: Can be used for checking the draft on both sides of a vessel, which would be safer than using a ladder and boat. Likely to play a part in tank inspections. In underwater mode, could be used for emergency hull inspections in the event of a collision.
When: ROVs (submarine drones) have been used for decades on oil and gas platforms, but multimodal drones such as the US brand Naviator could provide a more flexible solution. I haven't come across them onboard cargo or passenger ships for professional use yet, but many seafarers bring aerial drones along for recreational uses such as photography. I think it will just take a few leading companies to put the devices onboard, and then seafarers will get the hang of the tech very quickly and we'll see them more widely.

EXTENDED REALITY HEADSETS

What: Also known as virtual or augmented reality, the headset either puts the user in entirely different virtual surroundings or overlays what the user can see in front of them with additional images or information.
Why: This has the potential to greatly improve on existing tech that seafarers use each day. For example, you could have your ECDIS chart in your headset so it overlays what you can see out of the window. And in the case of needing to make urgent onboard repairs, we could have live connections where a seafarer onboard and a tech support person ashore are both wearing headsets.
When: These devices are already being trialled onboard by industry leaders such as Wilhelmsen, and can be bought from maritime tech providers like Fostech and Luminous. Widespread recreational and professional use in land-based settings is bringing the cost down, and I think we could see the devices onboard pretty soon even in smaller companies.

ALTERNATIVE FUELS AND PROPULSION METHODS

What: Ways of powering a ship that don't involve burning fossil fuels onboard. They include shore-charged batteries, hydrogen fuel cells and wind propulsion devices. It's important to see these alternatives for what they are: new onboard tech that will be operated by seafarers.
Why: Urgently needed to curb vessel emissions and meet carbon reduction targets.
When: Ideally, right now. The industry is starting to commit to a 'green industrial revolution' [see recent Telegraph articles], but it's likely to take a few years to see which alternative propulsion options come out on top and get seafarer training in place.

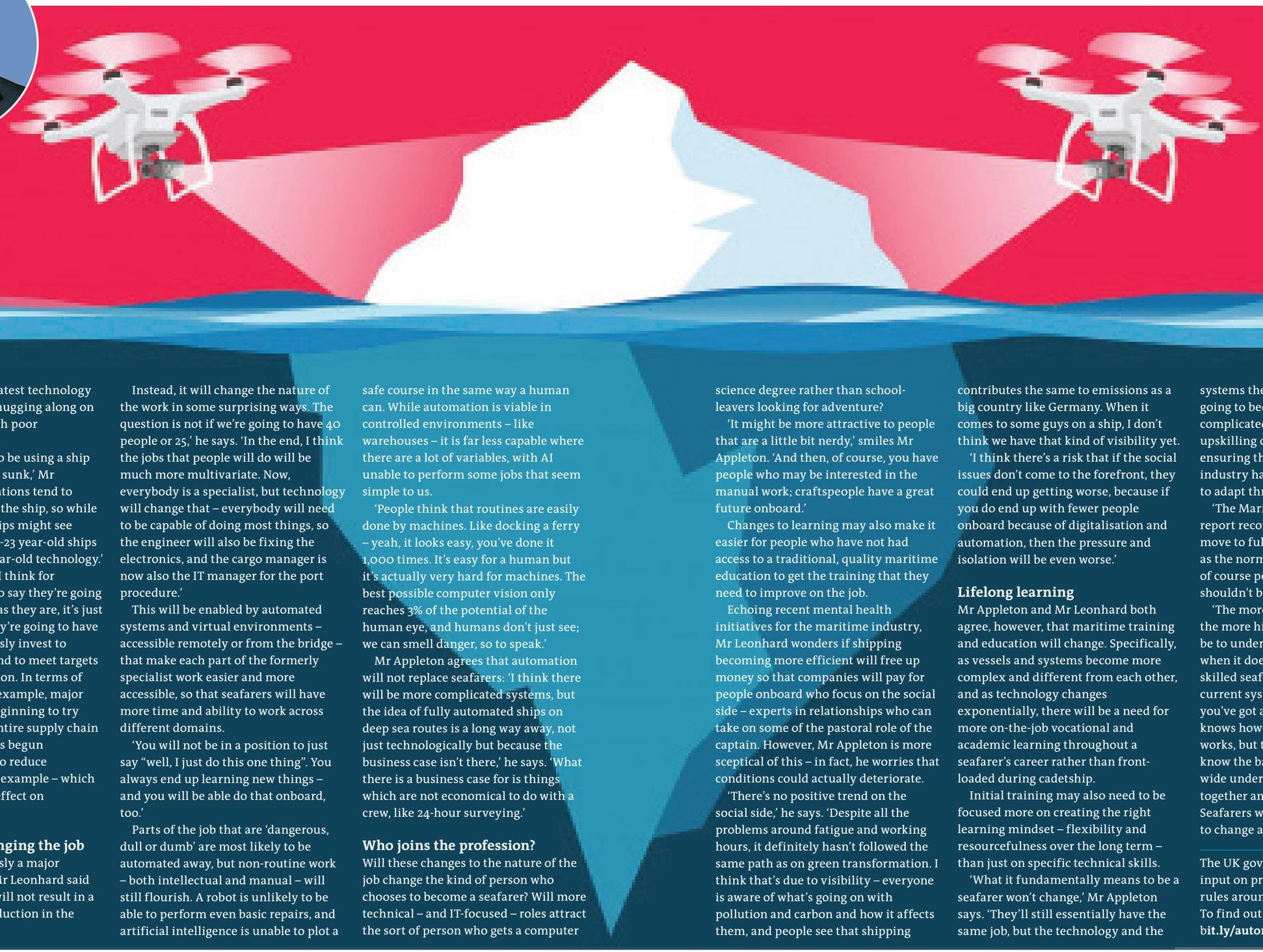
DECISION SUPPORT SYSTEMS

What: This is essentially artificial intelligence (AI); it's what would be going on in the 'brain' of a fully automated vessel. But it produces a suggestion rather than an action, and the seafarer can choose whether or not to accept.
Why: Some seafarers are wary of anything to do with AI, but with today's small crews and busy shipping lanes, having this additional resource onboard could be very useful for quick decision-making, and could build confidence in AI systems.
When: It's in the trial stage at the moment for onboard use, and it's starting to play a role in remote-controlled vessel operation [see feature, page 36]. Like other onboard tech, I think it's a question of a few leading companies getting it onto their vessels. If it works well – and especially if it saves the company money in some way – we could really see it taking off.

Is any of this tech already onboard your ship? What about other new devices? Let us know what you think of them in a letter to the editor: telegraph@nautilusint.org

Nautilus head of professional and technical David Appleton

Gerd Leonhard, the futurist who spoke at LISW



outfitted with the latest technology but older ships still chugging along on heavy fuel oil and with poor connectivity?

'Someone is going to be using a ship for 35 years if it hasn't sunk,' Mr Appleton says. 'Regulations tend to apply when you build the ship, so while seafarers on newer ships might see advances, those on 20-23 year-old ships will be using 20-30 year-old technology.'

Mr Leonhard says: 'I think for shipping companies to say they're going to leave the old ships as they are, it's just not going to work; they're going to have to upgrade and seriously invest to attract more people and to meet targets for the energy transition. In terms of polluting vessels, for example, major businesses are now beginning to try decarbonising their entire supply chain – recently Unilever has begun pressuring suppliers to reduce emissions by 50%, for example – which will have a knock-on effect on shipowners.

Automation – changing the job

Automation is obviously a major change, but at LISW, Mr Leonhard said that he believes this will not result in a large-scale further reduction in the workforce.

Instead, it will change the nature of the work in some surprising ways. The question is not if we're going to have 40 people or 25,' he says. 'In the end, I think the jobs that people will do will be much more multivariate. Now, everybody is a specialist, but technology will change that – everybody will need to be capable of doing most things, so the engineer will also be fixing the electronics, and the cargo manager is now also the IT manager for the port procedure.'

This will be enabled by automated systems and virtual environments – accessible remotely or from the bridge – that make each part of the formerly specialist work easier and more accessible, so that seafarers will have more time and ability to work across different domains.

'You will not be in a position to just say "well, I just do this one thing". You always end up learning new things – and you will be able do that onboard, too.'

Parts of the job that are 'dangerous, dull or dumb' are most likely to be automated away, but non-routine work – both intellectual and manual – will still flourish. A robot is unlikely to be able to perform even basic repairs, and artificial intelligence is unable to plot a safe course in the same way a human can. While automation is viable in controlled environments – like warehouses – it is far less capable where there are a lot of variables, with AI unable to perform some jobs that seem simple to us.

'People think that routines are easily done by machines. Like docking a ferry – yeah, it looks easy, you've done it 1,000 times. It's easy for a human but it's actually very hard for machines. The best possible computer vision only reaches 3% of the potential of the human eye, and humans don't just see; we can smell danger, so to speak.'

Mr Appleton agrees that automation will not replace seafarers: 'I think there will be more complicated systems, but the idea of fully automated ships on deep sea routes is a long way away, not just technologically but because the business case isn't there,' he says. 'What there is a business case for is things which are not economical to do with a crew, like 24-hour surveying.'

Who joins the profession?

Will these changes to the nature of the job change the kind of person who chooses to become a seafarer? Will more technical – and IT-focused – roles attract the sort of person who gets a computer science degree rather than school-leavers looking for adventure?

'It might be more attractive to people that are a little bit nerdy,' smiles Mr Appleton. 'And then, of course, you have people who may be interested in the manual work; craftspeople have a great future onboard.'

Changes to learning may also make it easier for people who have not had access to a traditional, quality maritime education to get the training that they need to improve on the job.

Echoing recent mental health initiatives for the maritime industry, Mr Leonhard wonders if shipping becoming more efficient will free up money so that companies will pay for people onboard who focus on the social side – experts in relationships who can take on some of the pastoral role of the captain. However, Mr Appleton is more sceptical of this – in fact, he worries that conditions could actually deteriorate.

'There's no positive trend on the social side,' he says. 'Despite all the problems around fatigue and working hours, it definitely hasn't followed the same path as on green transformation. I think that's due to visibility – everyone is aware of what's going on with pollution and carbon and how it affects them, and people see that shipping contributes the same to emissions as a big country like Germany. When it comes to some guys on a ship, I don't think we have that kind of visibility yet.

'I think there's a risk that if the social issues don't come to the forefront, they could end up getting worse, because if you do end up with fewer people onboard because of digitalisation and automation, then the pressure and isolation will be even worse.'

Lifelong learning

Mr Appleton and Mr Leonhard both agree, however, that maritime training and education will change. Specifically, as vessels and systems become more complex and different from each other, and as technology changes exponentially, there will be a need for more on-the-job vocational and academic learning throughout a seafarer's career rather than front-loaded during cadetship.

Initial training may also need to be focused more on creating the right learning mindset – flexibility and resourcefulness over the long term – than just on specific technical skills.

'What it fundamentally means to be a seafarer won't change,' Mr Appleton says. 'They'll still essentially have the same job, but the technology and the systems they're expected to use are going to become more and more complicated, which will require upskilling of the current workforce and ensuring the people coming into the industry have the soft skills they need to adapt throughout their career.

'The Maritime Skills Commission's report recommended that we should move to full Honours degrees in the UK as the norm for ship's officers – though of course people who don't have one shouldn't be shut out.

'The more complicated a machine is, the more highly qualified you need to be to understand what's gone wrong when it does fail. We'll need highly-skilled seafarers. I don't think the current system is sustainable, where you've got an ETO and that person knows how all the electronic stuff works, but the rest of the crew don't know the basics. You'll need a system-wide understanding of how things go together and how the algorithms work. Seafarers will also need the willingness to change and up their skillset.'

The UK government is seeking seafarer input on proposed changes to the rules around maritime automation. To find out more, visit: **bit.ly/automation_feedback**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