



## AUTONOMOUS SHIPS: KNOWN KNOWNS AND KNOWN UNKNOWNNS

In our August 2021 bulletin<sup>1</sup>, we discussed various developments across the Maritime Autonomous Surface Ships (MASS) industry.

Since then, the UK Department for Transport (UK DfT) has completed a Closed Consultation on the regulation review of maritime autonomy and remote operations.<sup>2</sup> We have also seen the Yara Birkeland, the world's first fully electric and self-propelled container ship, complete its maiden voyage 4 years after it was ordered. We discuss these issues and other commercial developments in this bulletin, including an update on the business venture between HFW and maritime cyber security start-up, CyberOwl, with a view to

<sup>1</sup> <https://www.hfw.com/Autonomous-Ships-Developments-continue-apace-August-2021>

<sup>2</sup> <https://www.gov.uk/government/consultations/future-of-transport-regulatory-review-maritime-autonomy-and-remote-operations/future-of-transport-regulatory-review-maritime-autonomy-and-remote-operations>

assisting the maritime sector prevent and actively defend against commercial, legal, technical and operational risks.

## UK DfT Future of Transport Regulatory Review

On 28 September 2021, the UK DfT published a Closed Consultation paper entitled “Future of transport regulatory review: maritime autonomy and remote operations”<sup>3</sup>, which aims to build on the findings of The Maritime Autonomy Regulation Lab Report discussed in our last bulletin.<sup>4</sup> The UK Government wants to be a world leader in shaping the future of transport, and it sees a “flexible and forward-looking regulatory framework for transport” key to achieving this.

Whilst the MASS industry is still in its early days of development, the UK DfT considers a comprehensive regulatory framework will support existing MASS operators and manufacturers in their continued development and operation of MASS in the UK.

The proposal considers 4 main elements:

1. To identify and determine key definitions and roles for the operation of remotely operated and autonomous vessels;
2. Ensuring that the Maritime Coastguard Agency (MCA) can regulate MASS of any size, including craft not traditionally considered as “ships”;
3. To grant the MCA new powers to develop regulations for Remote Operation Centres (ROCs) to ensure the safe operation and management of remotely operated MASS; and
4. Ensuring that the MCA, DfT and ports and harbours have sufficient powers to regulate health and safety, security and the environmental aspects of MASS and ROCs.

The UK DfT is evaluating the current legal and legislative framework with

a view to using primary legislation to regulate the use of all MASS in UK waters, regardless of size. The report recognises that developing the domestic legal framework now could lead to a divergence from international standards as they are agreed in the future. However, the UK was heavily involved with the IMO Regulatory Scoping Exercise and is well-placed to continue its active role in international discussions that will shape the regulation of MASS internationally and the development of an IMO instrument.<sup>5</sup>

Nevertheless, it will be several years before an IMO instrument is in place and the UK needs regulations in place now to guarantee the safety, security and protection of the marine environment, and to ensure that the MCA has the appropriate powers to perform its current statutory responsibilities on UK-flagged MASS, and MASS operations in UK waters and their associated ROCs. The regulatory framework can be updated by way of secondary legislation once IMO instruments are in place.

The responses to the consultation will feed in to the UK government's Future of Transport programme and a government response will be published in due course. We look forward to seeing how this develops and will keep you updated via future bulletins.

## Update on previous industry developments and projects

### 1. Yara Birkeland

On 18 November 2021, the “world's first electric and self-propelled container ship” *Yara Birkeland* completed its long-awaited maiden voyage from Horten to Oslo. The vessel is expected to commence commercial operations in 2022, transporting mineral fertiliser between Porsgrunn and Brevik. According to Yara, it will cut 1,000 tonnes of CO<sub>2</sub> emissions and will replace the need for 40,000 trips by diesel-powered trucks that were previously used to transport fertiliser.

### 2. Mayflower

As reported in our last bulletin, the *Mayflower's* transatlantic voyage from Plymouth, UK to Provincetown, Massachusetts was cut short by mechanical issues. The vessel re-commenced testing on 7 September 2021 and will most likely undergo trials in UK waters before attempting another transatlantic crossing in spring 2022.

### 3. MADFOX

The UK's Royal Navy autonomous vessel MADFOX, which was delivered in March 2021, fired a missile for the first time during NATO autonomous war games off Portugal. The naval exercise was attended by over 900 personnel, 70 autonomous uncrewed systems and 11 naval ships.<sup>6</sup> The crewless boat fired the missile following receipt of the target information provided by uncrewed systems.

## New developments

### 1. Zhi Fei

China's Brilliant Navigation (Brinav) autonomous feeder containership *Zhi Fei* ('Flying Wisdom') completed its maiden voyage on 14 September 2021. The 300 TEU vessel is similar to the *Yara Birkeland*, but operates with a hybrid electric system. Brinav built the vessel in collaboration with Shanghai Bestway Marine, SDARI, Dalian Maritime University and the China Waterborne Transport Research Institute.<sup>7</sup> Brinav will evaluate the performance of the vessel with a view to potentially scaling up to 500 TEU and 800 TEU vessels.

### 2. Roboat

The City of Amsterdam and the Amsterdam Institute for Advanced Metropolitan Solutions are collaborating with the Massachusetts Institute of Technology (MIT) for the production of a fleet of autonomous vessels called RoBoat.<sup>8</sup> One fully electric autonomous vessel has already been launched and it has been created to allow people, goods and waste to be transported

3 <https://www.gov.uk/government/consultations/future-of-transport-regulatory-review-maritime-autonomy-and-remote-operations/future-of-transport-regulatory-review-maritime-autonomy-and-remote-operations>

4 <https://www.gov.uk/government/publications/maritime-autonomy-regulation-lab-marlab-report>

5 [https://www.wco.org/en/MediaCentre/PressBriefings/Documents/MSC.1-Circ.1638%20-%20Outcome%20Of%20The%20Regulatory%20Scoping%20ExerciseFor%20The%20Use%20Of%20Maritime%20Autonomous%20Surface%20Ships...%20\(Secretariat\).pdf](https://www.wco.org/en/MediaCentre/PressBriefings/Documents/MSC.1-Circ.1638%20-%20Outcome%20Of%20The%20Regulatory%20Scoping%20ExerciseFor%20The%20Use%20Of%20Maritime%20Autonomous%20Surface%20Ships...%20(Secretariat).pdf)

6 <https://www.naval-technology.com/news/royal-navy-madfox-boat-fires-missile/>

7 <https://www.tradewindnews.com/technology/chinas-brinav-wins-the-race-to-launch-worlds-first-autonomous-ship/2-1-1075472>

8 <https://www.maritime-executive.com/editorials/autonomous-vessels-are-becoming-a-commercial-reality>

through the canals.<sup>9</sup> This sustainable transportation option will aim to reduce the city's congestion and, as a potentially profitable green venture, has attracted interest from other cities including Copenhagen, Paris and Tokyo.<sup>10</sup>

### 3. K Line's R&D agreement with JRC and YDK Technologies

K Line has entered into a joint research and development agreement with Japan Radio Co and YDK Technologies to develop an integrated navigation support system that utilises Artificial intelligence (AI) and other technologies to enhance safer manoeuvring decision-making for seafarers.<sup>11</sup> This is part of K Line's efforts to develop a crew support system to reduce the burden on seafarers and prevent serious maritime accidents such as collisions. The system will be developed in trials with a view to using the various technologies in future autonomous ships.

### 4. Fleet operation centre in Japan to provide onshore support for unmanned vessels

Around 30 Japanese companies (including NYK and MTI Co) involved in the field of maritime transport and technology will participate in a new project aimed at establishing a highly advanced fleet operation centre (FOC) for managing crewless vessels.<sup>12</sup> The project – DFFAS (Designing the Future of Full Autonomous Ship) – is sponsored by the Joint Technological Development Programme for the Demonstration of Unmanned Ships under the administration of the Nippon Foundation.<sup>13</sup> A demonstration trial is expected to take place in February 2022 and the project aims to commercialise crewless vessels in Japan's coastal trade by 2025, to

address a crew shortage problem.<sup>14</sup> The centre is located in Makuhari, Chiba city and will employ onshore operators who will gather monitor and analyse the operational status of the ship.<sup>15</sup> In case of an emergency, the operators will be able to remotely navigate the vessel concerned.

### 5. ASKO's autonomous freight ferries

Keels were laid in August at Cochin shipyard, India, for two autonomous, fully electric ro-ro vessels for the Norwegian grocery distributor ASKO. The 16-trailer capacity vessels will operate on a traffic route across the Oslo fjord.<sup>16</sup> The project has arisen as a result of commercial frustration, because the tunnel connecting two of ASKO's distribution centres on either side of the fjord is often shut for short time periods, which requires a number of trucks to be diverted to use conventional ferries in southern Norway. The commercial benefit of these autonomous vessels could be considerable. The vessels are expected to eliminate 1.2 million miles of ASKO's truck traffic on a trip between warehouses on either side of the fjord, resulting in savings of 5,000 tonnes of CO2 annually.<sup>17</sup> The Swedish Club reports that "The vessels will be equipped with the technology required for zero emission and unmanned operations by Kongsberg Maritime, while Massterly will ensure ship management and safe operations from its shore-based Remote Operations Centre".<sup>18</sup> The vessels will be run by a small crew at first and then move towards unmanned voyages.

### 6. ABS

The American Bureau of Shipping (ABS) awarded Approval in Principle (AiP) to technology in an autonomous tug project called Smart Autonomous

Vessel (SMAV). The SMAV project, run by the Singaporean firms ST Engineering, POSH and M1 Limited, was awarded AiP after successful trials of its autonomous navigation, collision detection, and, collision avoidance (CDCA) technology.<sup>19</sup> The sea trials were carried out on the POSH Harvest harbour tug in 2020, with CDCA installed. The vessel was remotely operated over cellular networks from the Maritime Innovation Lab of Singapore's Maritime and Port Authority (MPA).<sup>20</sup>

### 7. Sea Machines *Nellie Bly*

Sea Machines have recently announced their ocean tug, the *Nellie Bly*, is being prepared for a remotely operated voyage around Denmark to demonstrate that global waterways are ready for autonomous vessels. The tug uses an autonomous system to avoid obstacles, perform route planning, assess nautical chart data and journey domain perception from a long-range computer system.<sup>21</sup>

### HFW CyberOwl

The inherent risk with increased automation is the increased exposure for vessels to cyber risk and hijackers. Incidents such as CMA CGM's 2nd cyber attack in September 2021, which saw the leak of a host of customer data and the threat of releasing a whole database, has highlighted the increased targeting of the shipping industry by cyber attackers.<sup>22</sup> This is now the fourth of the world's major shipping liners to fall victim to a cyber attack:

- In 2017 **APM-Maersk** was hit by NotPetya cyber attack causing losses of c.£300 million
- In 2018 **COSCO** was targeted by a ransomware attack shutting down many of its communication systems

9 [https://www.yahoo.com/entertainment/mit-introduce-autonomous-electric-boat-151512400.html?guce\\_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce\\_referrer\\_sig=AQAAAGIAgr9KblyRCR55XEyft2ZeDIwwbRhmfxoie4STUAvv4sBDW4eLSmIv5E-qogcY8uVLZ1hQ-PTFDp6sBkQBxonskhvV0Uzaki7Jx5u91kY2cuQBdg-1nV8iF65FR3vCgRRDOiN3Edxj7tdR24Tn3YeYKZlXjJQXKc5S7wIG-M&gucounter=2](https://www.yahoo.com/entertainment/mit-introduce-autonomous-electric-boat-151512400.html?guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAGIAgr9KblyRCR55XEyft2ZeDIwwbRhmfxoie4STUAvv4sBDW4eLSmIv5E-qogcY8uVLZ1hQ-PTFDp6sBkQBxonskhvV0Uzaki7Jx5u91kY2cuQBdg-1nV8iF65FR3vCgRRDOiN3Edxj7tdR24Tn3YeYKZlXjJQXKc5S7wIG-M&gucounter=2)

10 <https://www.maritime-executive.com/editorials/autonomous-vessels-are-becoming-a-commercial-reality>

11 <https://www.bunkerspot.com/asia/54669-asia-pacific-k-line-and-partners-working-on-integrated-navigation-system-for-ai-ships>

12 <https://www.autoevolution.com/news/state-of-the-art-fleet-operation-center-for-autonomous-vessels-opens-in-japan-168974.html>

13 [https://www.nyk.com/english/news/2021/20210902\\_02.html](https://www.nyk.com/english/news/2021/20210902_02.html)

14 <https://loydslist.maritimeintelligence.informa.com/LL1138122/NYK-backed-autonomous-ship-project-prepares-for-trial>

15 <https://www.offshore-energy.biz/japan-completes-fleet-operation-center-for-crewless-autonomous-surface-ships/>

16 <https://loydslist.maritimeintelligence.informa.com/LL1137912/Autonomous-shipping-focuses-on-commercial-advantage>

17 <https://www.maritime-executive.com/article/construction-under-way-for-ASKOASKO-s-autonomous-cargo-vessels>

18 [https://www.swedishclub.com/media\\_upload/files/Publications/Triton/Triton22021v.13Finalreviewed.pdf](https://www.swedishclub.com/media_upload/files/Publications/Triton/Triton22021v.13Finalreviewed.pdf)

19 <https://shippinsight.com/articles/singapore-autonomous-project-gets-aip-from-abs/>

20 <https://www.offshore-energy.biz/abs-aip-for-autonomous-tug-tech/>

21 <https://insurancemarineneews.com/insurance-marine-news/ocean-tug-set-to-circumnavigate-denmark-under-remote-command/>

22 <https://loydslist.maritimeintelligence.informa.com/LL1138249/CMA-CGM-confirms-data-leak-after-cyber-attack>

- In 2020 **Mediterranean Shipping Company** was hit by malware causing an outage at its Geneva HQ
- In 2020 **CMA CGM** was hit by a ransomware attack.

At HFW, we have joined forces with maritime cyber security firm, CyberOwl, with a view to help the maritime sector prevent and actively defend against commercial, legal, technical and operational risks. Our incident response drills and techniques, coupled with CyberOwl's specialist products and expertise, ensure that safety onboard vessels is being constantly monitored with advanced security analytics systems and specialist knowledge.

Our commercially driven approach consists of:

- Marine Cyber Security Review
- Vessel Operational Technology risk assessment
- Vessel cyber security monitoring system deployment and review.

With insurers still reluctant to cover malicious / war cyber attacks, it has never been more important to have pragmatic and effective solutions to the exposures that more remotely operated technology presents.

### Cyber Coverage for Automated Technology

The marine insurance market tends to exclude the following when providing products to vessels:

- H&M underwriters generally exclude both war and cyber risks;
- Cyber underwriters and P&I Clubs exclude war risks; and
- War underwriters exclude cyber risks (with a few limited exceptions).

However, companies such as Astaara have begun plugging the gap for malicious cyber attacks through risk management-based solutions and loss prevention. Recognising that the existing insurance market does not meet the needs of maritime businesses subject to cyber threats, Astaara offer underwriting services tailored to covering all cyber

associations in one place, making businesses aware of what they need to do to be insurable.

### Autonomous Shipping Conference - 27 October 2021

Tom Walters, partner in HFW's shipping litigation team in London, chaired a session at the Autonomous Shipping Conference held at UCL. Academics and practitioners convened to discuss the complex private law liability and contractual issues associated with the use of autonomous ships, in the context of the carriage of goods and marine insurance. One particular focus included how an owner/carrier can best evidence that a vessel was seaworthy at the commencement of the voyage if they are required to examine individual lines of machine code.

It was suggested that 'proper manning' can be linked to several functions including; i) the level of training of the shore-based controllers monitoring the ship and 'equipment', ii) the suitability of the hardware and software on board the vessel and iii) the systems enabling safe autonomous navigation. There were concerns by some of the delegates that there should be a move away from fault-based liability to strict liability, resulting in potentially bigger and more expensive claims for insurers. Other highlights included an analysis of the reconceptualization of the nautical fault exception, and whether we should think about 'machine-learning' algorithms to be used for autonomous vessels as a 'thing' or 'person'. The concepts of 'intention', 'prudent master' and 'deviation' within the autonomous shipping context were emphasised, along with a legal case analysis of *Volcafe Ltd and Others v. CSAV* [2016] EWCA Civ 1103 and *Alize 1954 v Allianz Elementar Versicherungs AG* (The CMA CGM LIBRA) [2019] EWHC 481 (Admlty) (8 March 2019), which involved consideration of whether it would have made a material difference to the findings if the vessels had been fully autonomous.

### Known knowns

Developments in technology and the autonomous shipping sector are happening very quickly and at an exponential rate. The increased threat from cyber risks are also growing at similar rates. Whilst regulations and the legal landscape is being shaped behind these technological advances, there is a danger that cyber risks will outpace the law. As a firm we are working to support the maritime industry and our clients to address these risks, in collaboration with CyberOwl and HFW Consulting.

### Known unknowns

The insurance market covering cyber risk is still relatively nascent. Whilst there are a number of providers now offering cover for cyber risk, there is still some uncertainty amongst the users of such insurance as to what liabilities these insurance products will cover. Furthermore, there are differences of opinion regarding whether or not a manufacturer of software or hardware should be exposed to strict liability in the event that they are at fault and the loss can be demonstrated to have been caused by a failure in their product. We will keep providing updates, as opinions are shared, and as the legal, insurance and maritime industry evolve, in response to the technological advances.

### Upcoming Events:

1. March/April 2022: Autonomous ships 2022: [https://www.rina.org.uk/Autonomous\\_Ships\\_2022.html](https://www.rina.org.uk/Autonomous_Ships_2022.html)
2. April 2022: The 4th International Conference on Maritime Autonomous Surface Ships (ICMASS): <https://nfas.autonomous-ship.org/arrangement/mtec-icmass-2022/>
3. June 2022: Autonomous ship expo: <https://www.autonomousshipexpo.com/>

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