Maritime law is in many ways a conservative area of law, where traditions are not easily discarded. Even so, maritime law has over the years proved itself flexible and able to adapt to face technological developments.

The master and the crew have traditionally been considered instrumental in ensuring the safe operation of the vessel at sea, and many provisions in the maritime law regulatory framework seek to achieve this by imposing duties and responsibility on the master and the crew. The introduction of unmanned vessels represents a significant deviation in the operation of the vessel, and will therefore inevitably require careful evaluation of the existing legal framework to make sure that appropriate regulations are in place to ensure safe operation at sea for all vessels, whether manned or unmanned.

An unmanned vessel is in simple terms a vessel which is not operated by an on board master and crew, and covers all vessels from those remotely operated to the fully autonomous. The different categories of unmanned vessels imply different challenges from a regulatory perspective, in particular with respect to the line of control over the vessel. The legal framework will therefore have to be flexible so as to ensure that the objectives of the various regulations are protected, regardless of how the vessel is controlled and operated.

The introduction of the unmanned vessel and the general digitalization of shipping, also begs the question of whether some of the institutions in maritime law, such as the role of the flag state, are appropriate for meeting the new risks and challenges.

Unmanned vessel projects in Norway and effects on national legislation

Norway is arguably one of the forefront countries in the area of unmanned vessels. Ground-breaking projects are already taking place.
Norwegian authorities have repeatedly stated that they are very positive to the developments of autonomous vessels, and the Norwegian Coastal Administration has defined autonomous vessels as a priority area in the Norwegian National Transport Plan.¹

Projects to test unmanned vessels in national waters are also ongoing. In September 2016 the Norwegian Maritime Authority and the Norwegian Coastal Administration signed an agreement with involved project participants, opening up for testing of autonomous ships in the Trondheimsfjord in Norway, and thereby establishing the first testing area for autonomous ships in the world. The purpose of this test area is to conduct research and development of autonomous vessels. The reason for picking the fjord is easily surveyable, with limited traffic. Trondheim is also a hub for maritime research and development, inter alia, at the NTNU AMOS – Centre for Autonomous Marine Operations and Systems, established in 2013, a centre for autonomous marine operations and control systems. Smaller autonomous vessels are already being tested there.

A second test area will be set up in Grenland, Norway, one of the largest cargo ports in Norway. A formal application for establishing the test area was submitted earlier this year and is awaiting approval. This test project will be of a much larger scale than in Trondheim, and is commercial in nature. Every day, more than 100 diesel truck journeys are needed to transport products from Norwegian company Yara ASA’s fertilizer plant on Herøya to ports in Brevik and Larvik where products are shipped to customers around the world. Yara has estimated that a vessel covering the same distance will reduce diesel-powered truck haulage by 40,000 journeys a year.

The vessel which is planned to be constructed for this purpose, “YARA Birkeland”, is a 100-150 TEU open top container vessel and will be the world’s first autonomous, all-electric vessel for commercial operation, with zero emissions. The project is aiming for the vessel to be delivered during the second half of 2018, with operation to commence right after delivery. The project is planned to take place in three main steps:

- **2018:** Testing with a captain and small crew, placed in a container-based bridge and crew unit, is scheduled to start second half of 2018.
- **2019:** Remote control tests will be carried out in 2019.
- **2020:** The vessel will be fully autonomous in 2020.

General Norwegian national regulations for unmanned vessels have not yet been adopted. Establishing test areas therefore entail some regulatory challenges. According to the Harbour and Fairway’s Act Section 27, any activity that may impact the security or navigation of the local waters requires approval from the Norwegian Coastal Administration or the local municipality. The Coastal Administration has considered that as there will be no permanent installations, the establishment of the test area as such will not in itself impact safety and navigation in the area and that each test should be regarded as isolated

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¹ A number of Norwegian initiatives have been taken with respect to unmanned vessels, including the establishment of interest group the Norwegian Forum for Autonomous Ships (NFAS), established after initiative of the Norwegian Maritime Administration, The Norwegian Coastal Administration, the Federation of Norwegian Industries and MARINTEK (now SINTEF Ocean) in 2016.
activities to be reviewed individually. Every activity must have a person in charge bearing the primary responsibility for ensuring necessary approvals, and the activities in the test area will therefore be subject to a continuous evaluation.

General national regulations for unmanned vessels are not likely to be in place prior to the commencement of the “YARA Birkeland”-project in the Grenland area. As these activities are of a very different scale than in the Trondheimsfjord, there are other challenges in relation to existing regulations. One example is that vessels above 70 meters, such as “YARA Birkeland”, are required to have a pilot on board. Furthermore the Grenland area is a VTS (Vessel Traffic Service) area, which sets out certain requirements for communication with the vessel, for exchange of information with the vessel, navigation assistance service and traffic organisation based on national regulations and international recommendations. Navigation assistance will for example be established either on request from a vessel or when the VTS operator observes irregular navigation and the VTS operator deems it necessary to intervene.

Legal implications of unmanned vessels for international maritime law
The question has been raised in international maritime law whether unmanned vessels, and in particular autonomous vessels, are vessels. There is no uniform definition of the term vessel or ship in international maritime conventions but unmanned vessels will in most cases fall within the scope of the definitions used. Even if the unmanned vessel is covered by scope of the various conventions, the fact remains that most international conventions are drafted without consideration to unmanned vessels, and consequently contain various requirements which presume that the master and crew as key factors in ensuring safe operation of the vessel at sea.

One area where the master and crew are presumed to play a crucial role is the safe navigation of the vessel. To the extent that the international maritime legal framework makes such presumption, a different approach must be considered for the unmanned vessel. An example is the requirement for every vessel to have a look-out by “sight and hearing”. There is of course an initial question as to whether the personnel at onshore control centre together with available electronic surveillance fulfil the requirements of the conventions. However, what is more important is that the end-objective of safe navigation is protected through appropriate regulation reflecting how unmanned vessels are controlled and operated. It seems unnecessary cumbersome to rely on analogies and wide interpretations of current regulations, rather than taking the bull by its horn and adopt rules that reflect the new reality.

Another area which inevitably will be affected by the introduction of the unmanned vessel is international maritime law concerning control of the vessel, including the regulation found in the SOLAS convention. The current regulation assumes that the master has a crucial role in ensuring the vessel’s safe operations of sea, and there are a number of responsibilities and duties associated with the master’s role. In practical terms it is obvious that technological developments already has led to significant changes in the role of the master, including the use of autopilot and other operation technology. This notwithstanding, the master remains an important part of the line of control over the vessel, and his absolute right and duty to act

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3 SOLAS Safety of Life at Sea (SOLAS) 1974
in the interest of protecting the ship, her crew, passengers and the marine environment, remains an important principle. The unmanned vessel will affect the master’s role and the current assumed line of control over vessel. New regulation will have to be adopted to ensure that clear lines of control and authority are preserved, regardless of whether the vessel is remotely controlled or autonomous. Given that operation of the unmanned vessel to a varying degree will be assumed by operation technology, it appears difficult to apply current regulation by way of analogy. The end objective would therefore seem to be better served by adopting new requirements and standards reflecting the various configurations and systems that may be used to operate and control an unmanned vessel.

The unmanned vessel will naturally also affect the international maritime law regulations concerning Manning and crew training. Such regulations are found in a number of international conventions including the STCW Convention and STCW Code. For the unmanned vessel, rules relating to Manning and crew training are in principle not relevant as they concern on board personnel. In order to secure that the overall objectives remain protected also for unmanned vessels, current regulation will therefore have to be amended and new regulations will have to be adopted, with respect to, inter alia, training, qualification of personnel at onshore control centres, as well as operation technology and communication.

A number of international maritime law provisions other than rules implemented to directly secure safety at sea will also be affected by the introduction of the unmanned vessel, and may in the end also prove to have implications for more fundamental parts of international maritime law. This would include the role of the flag state and the port state, all of which should be considered as part of the larger review of the legal framework.

Private law and the unmanned vessel
The unmanned vessel will also have implications for civil law matters, such as liability, chartering of vessels and marine insurance.

In so far as chartering is concerned the current regulations and standard format contracts will have to be amended to reflect new control lines and differences in operation, including division of risk with respect to communication and the operation technology used for the unmanned vessel.

Issues concerning liability will have to be considered and dealt with in a number of areas of private maritime law, including the concept of seaworthiness for the carriage of goods at sea, the concept of duty of care with respect to collisions, and the particular provisions concerning the liability of the master.

The changes in the control and operation of the vessel will also affect marine insurance in so far as standard marine insurance policies, to a large extent, presumes the presence of a master and crew. New risks which arise or are augmented as a result of unmanned vessels and digitalization in general, includes, inter alia, cyber risks, technology malfunctioning and communication risks, and will have to be dealt with either through amendments of the standard marine insurance products or by the insurance industry offering coverage through separate insurance products.

The next step in addressing the required changes in maritime law legal framework
The work to review the legal implications of the unmanned vessel on existing international maritime law regulatory framework is underway. Norway is among the countries that have actively promoted a review of the current international conventions for the purpose of allowing implementation of unmanned vessels. Based on a proposal from Norway, Denmark, Estonia, Finland, Japan, the Netherlands, South Korea, UK and the United States, during the 98th session of the IMO Maritime Safety Committee (MSC), the IMO is now putting the issue of autonomous ships on the agenda. This will be on the agenda of the next MSC session scheduled for May 2018.

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4 The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) as amended, including the 1995 and 2010 Manila Amendments