Department for Transport

Future of Transport Regulatory Review: Maritime Autonomy and Remote Operations

Consultation Response

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Executive Summary

Context

The Future of Transport Regulatory Review was launched to ask fundamental questions about how transport is regulated in order to achieve a flexible, forward-looking regulatory framework that is fit for the future.

This consultation on the regulatory review, Maritime Autonomy and Remote Operations, ran from 28 September 2021 to 22 November 2021. It was published by the Department for Transport (DfT) to seek views from industry and the public on proposals to take powers in primary legislation to allow Government to create a comprehensive regulatory framework for remotely operated and autonomous ships.

The consultation was built on findings from the Maritime Autonomy Regulation Lab Report (MARLab) (2019). This report highlighted a number of issues and areas for clarification in the Merchant Shipping Act 1995 (MSA) that Government should address to support the operation of Maritime Autonomous Surface Ships in UK waters.

Key findings in each area

Key findings in each area are summarised here and presented in more detail in the relevant sections of this document.

Definitions and Responsibilities

In terms of the responses, there is a majority support for the following:

- the proposed definition of Maritime Autonomous Surface Ship (MASS) and Remote Operations, and that the definitions adequately cover all types of autonomous and remotely operated ships (hereafter referred to as Maritime Autonomous Surface Ships)[1];
- new legislation should be applied to ships and craft regardless of size;

[1] Maritime Autonomous Surface Ship (MASS) includes every description of vessel or craft used in navigation that can for any part of its voyage, fully or in part navigate or operate autonomously or through remote operations.

- the responsibilities of a Master should be modified for a Maritime Autonomous Surface Ship Master, and majority support for the proposed definition of a Remote Operator;
- Remote Operation Centres (ROCs) (a) should not have to be located within the territory of the Flag State Administration; (b) should be considered an integral part of a Maritime Autonomous Surface Ship; and (c) should be safely manned;
- Remote Operators should not be considered seafarers; and
- our proposal to take powers to regulate all Maritime Autonomous Surface Ships, and that we should create powers to define terms and roles for the operation of Maritime Autonomous Surface Ships and to regulate Remote Operation Centres to ensure the safe operation of Maritime Autonomous Surface Ships in UK waters.

Ports and Harbours

- Respondents were divided as to whether harbour authorities and ports already have sufficient powers in relation to Maritime Autonomous Surface Ships. Most did not know, and of those that were able to give a view, there was a majority that thought existing powers (chiefly in the Harbours Act 1964 and in private Acts and Harbour Orders) would be sufficient.

Autonomous and Unmanned Submersible Apparatus

- A majority were in favour of creating powers to regulate unmanned submersible apparatus in a manner consistent with manned submersibles.

Marine Equipment

- Respondents were divided into three groups, almost equally (answering yes, no, or don’t know), as to whether existing type approval mechanisms are sufficient to assess equipment located in or associated with Remote Operation Centres.
- The majority of respondents did not know whether the existing type approval approach is suitable for approving software programmes or algorithms independently of hardware.

Maritime Security

- The majority of respondents did not know whether additional changes to primary legislation were required, beyond those mentioned, to maritime security legislation to support our proposed approach to regulating Maritime Autonomous Surface Ships. Of those able to give a view on this question, the majority did not think additional changes were needed.

Insurance and Liability

- The majority of respondents did not know whether there were any challenges that the insurance industry would face to implement our proposed approach. Of those that

were able to give a view on this question, the majority thought there would be challenges.

Impact Assessment

- Although respondents were unable to share data or evidence on the impact of the proposals, the majority of respondents did note a key risk that UK legislation may differ from future International Maritime Organization (IMO) legislation. If this was to happen, they said, additional costs may arise from industry having to comply again with different legislation. Respondents were generally supportive of the stakeholders contacted, impacts and assumptions set out in the consultation stage impact assessment.

Other Maritime Autonomous Surface Ship issues

- A majority of respondents did not know whether any additional aspects of primary legislation required consideration in relation to Maritime Autonomous Surface Ships. Of those who were able to give a view on this question, the majority thought there were not any additional aspects of primary legislation that require consideration.
- Respondents suggested a range of positive and negative potential environmental impacts from Maritime Autonomous Surface Ships that may not exist with conventional shipping.
- Respondents suggested a range of ideas that could promote environmental benefits, or limit environmental impacts, from Maritime Autonomous Surface Ships (as distinct from conventional shipping).

Public Sector Equality Duty

- No respondents could provide data or evidence of whether the proposals would positively or negatively impact individuals with protected characteristics. Respondents who commented thought that legislating to provide for Maritime Autonomous Surface Ships would only have positive effects.

Next Steps

We have taken the responses to the consultation into consideration, and they have been used to help develop policy further as appropriate. We believe Government intervention is required in the form of a comprehensive regulatory framework that will support existing manufacturers and operators in the continued development and operation of Maritime Autonomous Surface Ships in the UK and ensure that their evolving nature is adequately facilitated in UK legislation. The Government intends to update primary legislation for Maritime Autonomous Surface Ships when parliamentary time allows.

We will continue to engage with industry, academics, other Government departments and devolved administrations when developing secondary legislation.

Introduction

Background

The UK currently has Maritime Autonomous Surface Ships operating in UK waters. There are also Maritime Autonomous Surface Ships registered to the UK Shipping Register, some of which operate in different countries' domestic waters. To operate in UK waters these ships require statutory certification, permissions from local port and/or harbour masters and must meet all relevant regulations. To operate within the current UK legal framework, after the relevant surveys and assessments via a safety case has been conducted, these ships may be issued with a UK Load Line Exemption. The larger the Maritime Autonomous Surface Ship, and/or the higher the level of autonomy proposed, the more complex this process becomes as regulations must be accommodated through “equivalence” or “exemption".[2]

The Government has promoted an ambitious agenda for Maritime Autonomous Surface Ships, as set out in Maritime 2050 and the Technology and Innovation in UK Maritime (TIUK) route-map.[3] Maritime 2050 outlines the possibilities for how smart shipping[4] and autonomy could make the maritime sector a cleaner, safer and a more efficient place to work, and how this can be achieved through working collaboratively with industry to encourage a culture of innovation. The Maritime TIUK route-map also sets the ambition for the UK to be at the heart of a global Maritime Autonomous Surface Ship industry and the destination of choice for industry leaders pursuing innovative maritime technologies.

The Maritime and Coastguard Agency’s (MCA) MARLab, funded by the Regulators’ Pioneer Fund, was created to fulfil several Maritime 2050 objectives: for the Government to lead efforts to establish an active international regulatory framework for Maritime

[2] Evidence from interviews in smart shipping research funded by DFT, 2020 (unpublished)

[3] HMG ‘Maritime 2050: navigating the future’, 24 January 2019, available at: https://www.gov.uk/government/publications/maritime-2050-navigating-the-future

[4] TIUK defines "smart shipping" as 'a technological pathway for the entire maritime sector. This pathway encompasses the automated, partly digitised equipment of today, the remote operation of equipment, and the development of autonomous maritime systems, both at sea and onshore. Here, ‘shipping’ is understood in its broader sense, rather than just referring to seagoing ships. This broad definition is used because new technologies will have the greatest impact when they are used holistically, as part of a wide-ranging approach that applies to the whole UK supply chain.' DfT (2019). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/877630/technology-innovation-route-map-document.pdf

Autonomous Surface Ships; to work with industry to understand benefits; to find use cases; and to develop proofs of concepts for new technologies.

MARLab undertook a review of the regulatory landscape with regards to enabling the safe testing of Maritime Autonomous Surface Ship technologies and promoting regulatory innovation in maritime technologies. MARLab concluded its work in September 2020, with responsibility for continuing the development of Maritime Autonomous Surface Ships passing to the UK Maritime Services within MCA.[5]

The MARLab review focused on the regulation of ships of under 24 metres operating in the UK; the Workboat Code[6] was simultaneously under review and all companies who had approached the MCA at that time had ships under 24m. In the last two years, the MCA and DfT have been approached by industry regarding at least four international operations and a number of domestic operations. Two projects include ships over 24m and some involve new concepts such as swarm operation. As ships get larger and operate in new ways, they present new policy and regulatory challenges outside of the scope of the work undertaken by MARLab.

MARLab identified a number of issues that would benefit from clarification in the MSA to facilitate and enable the operation of Maritime Autonomous Surface Ships. The recommendations from the MARLab report have formed the basis for the proposed changes to primary legislation.

Consultation purpose

The purpose of the consultation was to consult private and public sector partners to help guide and develop policies that could help direct how Government could appropriately update legislation to accommodate Maritime Autonomous Surface Ships in the UK.

Many industry stakeholders have asked for regulation and guidance in the absence of international regulations in order to allow on-water testing and increased commercialisation of Maritime Autonomous Surface Ships in UK waters.

Overview of respondents

The consultation was open to the public for eight weeks. In total, 50 individuals and organisations responded to the consultation, which contained 65 questions, via an online survey or e-mail. It should be noted that some questions did not receive a response from all 50 respondents. The total number of respondents for each question is noted in the relevant section.

[5] MARLab 'Maritime Autonomy Regulation Lab (MARLab) Report', 11 November 2020, available at: https://www.gov.uk/government/publications/maritime-autonomy-regulation-lab-marlab-report/maritime-autonomy-regulation-lab-marlab-report

[6] A Code of Practice for small workboats in commercial use to sea and all pilot boats, MCA, 5 February 2021, available at: https://www.gov.uk/government/publications/workboat-code

Response Method	No. of responses
Online Form	34
E-mail	16
Total	**50**

Of the 65 questions posed within the consultation:

- 2 questions asked for contact information
- 23 questions were fixed responses
- 36 questions were open to a free text qualitative response
- 4 questions were open to a combination of a fixed and free text response.

The table below shows the types of organisations that responded.

Organisation type	Number of respondents
Academic/Research	4
Combined Authority	1
Government Organisation/Agency	7
Innovation Platform	2
Insurance Company	1
Law Association/Firm	3
Lighthouse Authority	3
Livery Company	1
Marine engineering/technology company	13
Non-governmental organisation (NGO)	2
Not stated	6
Port / Ports group	2
Regulatory working group	1

Organisation type	Number of respondents
Representative body	1
Shipping company	1
Standards organisation	2

We are grateful to everyone who took the time to respond and share their views and suggestions. This document highlights the main issues raised but is not an exhaustive commentary on every response received.

Analysing Responses

To analyse the free text responses, a system of thematic analysis was employed in which specific words or themes were drawn from each response. This helped identify regular and recurring themes in responses, enabling clearer identification of dominant views amongst the respondents that could then be summarised. In addition, where appropriate, the number of positive, negative or neutral responses were calculated.

The analysis of the responses to questions in this document includes, for each question, a broad summary of participants' responses and, where applicable, a discussion of the common themes that occurred. It should be noted that the identification of particular suggestions from respondents within this document does not mean that we will necessarily take them forward. Similarly, the absence of a suggestion in this report does not mean it will not be considered as we develop policy further.

Structure of this document

Respondents had the opportunity to answer 65 questions spread across ten thematic sections. The questions were grouped as follows:

- Section 1: Definitions and Responsibilities
- Section 2: Ports and Harbours
- Section 3: Autonomous and Unmanned Submersible Apparatus
- Section 4: Marine Equipment
- Section 5: Maritime Security
- Section 6: Insurance and Liability
- Section 7: Impact Assessment
- Section 8: Other Maritime Autonomous Surface Ship Issues
- Section 9: Public Sector Equality Duty
- Section 10: Final comments

This document is divided into ten sections as outlined above.

1. Definitions and Responsibilities

1.1 Definition of Maritime Autonomous Surface Ship

Questions 3 - 5:

In your view, is our proposed definition of Maritime Autonomous Surface Ship appropriate? If not, please explain why and what alternative would you propose?

Summary of Responses

Total Respondents: 50

Of the 50 respondents to this question, 27 agreed with the proposed definition, 19 did not agree with the definition and 3 did not know if the proposed definition was appropriate or not. Of those that did not support the proposed definition, a large minority were concerned that the definition was too broad and could cause issues for conventional ships that utilise existing technologies such as autopilot. A small number of those not in support of the proposals were concerned that we had not adopted definitions already in existence within the Maritime Autonomous Surface Ship sector and expressed a concern that it could cause confusion.

Government Response

The proposed definition was crafted taking into account the developments at the IMO and was kept intentionally broad in order to give Government the maximum flexibility to regulate Maritime Autonomous Surface Ships as the industry develops. The definition of Maritime Autonomous Surface Ship and the terminology Government will use in legislation is still under review. Government fully understands the concerns expressed by those who highlighted the burden that over-regulation could pose for the developers and operators of small Maritime Autonomous Surface Ships. As outlined within the impact assessment and supporting document, the intention is to take a proportionate approach to the secondary legislation that will provide detailed requirements for Maritime Autonomous Surface Ships.

However, to ensure the ability to create secondary legislation to allow for the safe and secure operation of Maritime Autonomous Surface Ships now and in the future, it was determined that a broad definition is required in primary legislation. This approach will provide the ability to regulate autonomous ships in all their known and future forms. As the international community gains greater understanding and acceptance of terminology, the proposed approach will enable the UK to further refine definitions in secondary legislation.

The flexibility of the broad definition will allow the UK to not only apply regulations to a range of technologies but also to disapply the requirements depending on how levels of remote operation and autonomy develop as the industry matures. This flexibility and ability to react to international developments would not be possible if a more rigid definition and descriptors for different levels of autonomy were included within the primary legislation.

1.2 Definition of Remote Operations

Questions 8 - 10:

In your view, is our proposed definition of Remote Operations appropriate? If not, please explain why and what alternative you would propose?

Summary of Responses

Total Respondents: 50

30 responses supported the proposed definition of Remote Operations. Of those that did not support the definition, there were a range of suggestions to amend the definition, including changing ‘on MASS’ to ‘of MASS’ and ensuring that the definition was also appropriate for a fully autonomous ship.

Government Response

The comments received are being used to refine Governments policy proposals on this definition.

1.3 Definition Coverage

Questions 6, 7, 11, 12:

Is there any type of autonomous or remotely operated ship that our definition would not cover? If so, please explain.

Summary of Responses

Total Respondents: 50

The majority of respondents felt that the proposed definitions adequately captured all types of ship. The consultation did indicate that a small number of respondents were concerned that the definitions proposed did not adequately capture sub-surface or submersible ships. Comments were also received regarding the application of the proposals to the military and to small ships, and on the use of the term 'in navigation'.

Government Response

Sub-surface or submersible ships are not captured within the proposed definition of Maritime Autonomous Surface Ship; the current intention is that they will be regulated separately as happens currently with manned submersibles. Questions 25-28 of the consultation addressed the proposals for autonomous and unmanned submersible apparatus.

With regards to military applications, the proposals put forward have been developed for application to civilian, merchant Maritime Autonomous Surface Ships. As such, although it is expected that Maritime Autonomous Surface Ships operated by His Majesty's Navy operate according to the requirements for merchant Maritime Autonomous Surface Ships where practical and practicable, there will not be a legal requirement for them to do so. This is consistent with the current approach to ships in the MSA. With regards to the application of the proposals to small ships and the use of the term 'in navigation', further consideration is being given to the use of this term.

1.4 Craft Types

Questions 13 - 16:

In your opinion is it acceptable to apply this legislation to ships and craft regardless of size, including those that currently fall outside the scope of The Merchant Shipping Act 1995? If not, please explain your reasoning.

Summary of Responses

Total Respondents: 50

On the proposal to ensure the legislation applies to ships and craft regardless of size, six respondents did not know if the proposal was acceptable, whereas 30 indicated that the legislation should be so applied. Of those that did not support this approach, there was concern that the administrative burden for smaller ships and craft could be too high, resulting in a loss of innovation and investment. Alternative approaches suggested included limitations based on tonnage or on the ability of the ship/craft to cause damage.

Government Response

Please refer to the Government Response in section 1.1.

1.5 Definition of Maritime Autonomous Surface Ship Master

Question 17:

In your view should any of the responsibilities of a Master be modified for a 'Maritime Autonomous Surface Ship Master'?

Summary of Responses

Total Respondents: 50

Eight respondents did not know if any of the responsibilities of a Master should be modified for a Maritime Autonomous Surface Ship Master, 23 said they should be modified and 19 said no, the responsibilities should not be modified. It was also highlighted that it should be clearly stated that the Maritime Autonomous Surface Ship Master has command and charge of the ship. Multiple respondents also raised the possibility of a Maritime Autonomous Surface Ship Master being responsible for multiple Maritime Autonomous Surface Ships and whether the Maritime Autonomous Surface Ship Master may change throughout a voyage.

Government Response

A range of comments were received, and where appropriate have been taken into consideration when further developing this definition and policy. A number of respondents commented on the need for there to be a person or entity with overall responsibility for the Maritime Autonomous Surface Ship, which is being taken forward for consideration. Some respondents highlighted requirements that would not be suitable for a Maritime

Autonomous Surface Ship Master. These have been noted and will be addressed when secondary legislation is developed.

Training and certification of Maritime Autonomous Surface Ship Masters was raised on numerous occasions. These elements are under consideration and will continue to be developed in consultation with stakeholders and industry experts. The Government intends that the legislation will include powers to make regulations for the training of Maritime Autonomous Surface Ship Masters and Remote Operators.

1.6 Definition of Remote Operator

Questions 18 & 19:

In your view does our proposed definition of 'Remote Operator' cover the full range of remote manning roles for a Maritime Autonomous Surface Ship? If not, can you propose an alternative definition?

Summary of Responses

Total Respondents: 50

31 respondents felt the definition of Remote Operator covered the full range of the roles. 15 believed the definition was not sufficient. Of the comments received from those that answered yes, no or don't know, a recurring theme was the need for adequate training and certification and safe manning levels. With regards to the latter point it was noted that a Remote Operator could be responsible for operating several Maritime Autonomous Surface Ships. Attention was also drawn to the potential range of operations that a Remote Operator could be involved in, including cargo operations, and the fact that there may be other roles being fulfilled within a Remote Operation Centre, such as network engineers, that may not fit within the definition of a Remote Operator.

Government Response

These comments were used to further shape the policy in the areas highlighted to ensure the Government has the power to make regulations on the training and certification of Remote Operators and adequate manning levels for Maritime Autonomous Surface Ships.

1.7 Remote Operation Centres and Remote Operators

Question 20:

Do you have any views on the following propositions?

a) the Remote Operation Centre should be located within the territory of the Flag State Administration
b) the Remote Operation Centre should be considered an integral part of a Maritime Autonomous Surface Ship (as an alternative version of the bridge of a ship)
c) the Remote Operation Centre should be safely manned in the same way safe manning is applied to conventional ships
d) Remote Operators should not be considered seafarers as they are not on board the ship they are operating but they will require agreed training and certification.

Summary of Responses

a) Respondents: 48

Two-thirds of the respondents did not believe it was necessary for the Remote Operation Centre to be located within the territory of the Flag State. A large majority of these did highlight that this approach could cause jurisdictional issues as there is a need to ensure the Flag State maintains full jurisdiction over the Maritime Autonomous Surface Ship, Remote Operation Centre and Remote Operator.

Of those that stated the Remote Operation Centre should be located within the territory of the Flag State, many went on to say that this was due to the jurisdictional issues that would arise if the Remote Operation Centre was located elsewhere. Many also expressed the opinion that there was a need for Remote Operation Centre location to be flexible to support the global nature of the sector and ensure that trade was not hampered. As a result, this is a case where respondents take clearly opposite approaches to the location of Remote Operation Centres.

b) Respondents: 45

87% of respondents agreed that the Remote Operation Centre should be considered an integral part of the Maritime Autonomous Surface Ship. A number of respondents noted that a Remote Operation Centre should be able to operate from multiple locations, that control should be able to move from one Remote Operation Centre to another or that a single Remote Operation Centre should be permitted to operate several Maritime Autonomous Surface Ships simultaneously.

c) Respondents: 46

41 responses stated that the Remote Operation Centre should be safely manned, although a number of comments reflected the fact that manning levels, training and certification and

hours of work requirements for Remote Operation Centres may not exactly mirror the requirements for a conventional ship.

d) Respondents: 46

35 responses agreed with the statement that Remote Operators should not be considered seafarers, as they are not on board the ship they are operating, though they still require training and certification. A number of respondents indicated that Remote Operators should be required to hold or undertake some seafarers' training and certification. It was also noted that some Remote Operators could also be seafarers and that there would be a need to be clear distinctions as to when the title of 'seafarer' is applicable.

Of those that did not agree with the statement, the main concerns raised were based on ensuring that appropriate rights of employment, safe working practices and safe working environments were upheld.

Government Response

a) The views expressed have been noted. Government is exploring the issues around the location of Remote Operation Centres, including challenges around extraterritorial jurisdiction.

b) Based upon the consultation responses, Government will ensure the regulatory framework for Maritime Autonomous Surface Ships addresses the integral nature of the Remote Operation Centre to a Maritime Autonomous Surface Ship and allows flexibility for the range of operational configurations that were highlighted.

c) The Government intends to include the powers to regulate safe manning for Remote Operation Centres within primary legislation. Further work will be undertaken to determine the appropriate approaches and detailed requirements; this will be carried out in future consultation with stakeholders.

d) The Government's current view is that Remote Operators will not be considered seafarers. Land-based health and safety at work practices would be applicable, but Government also intends that primary legislation should provide the power to make regulations for matters including hours of watchkeeping and working conditions. It is not intended that these powers would override local health and safety laws applicable to Remote Operation Centres and Remote Operators.

1.8 Proposed legislative change

Question 21 & 22:

In your view, is our proposal to take powers to regulate all Maritime Autonomous Surface Ships the best option for the UK maritime sector? If not, what alternative do you suggest?

Summary of Responses

Respondents: 48

Eight responses indicated that the respondent did not know if the proposals were the best option, ten did not agree with the proposal to take powers, and 30 supported the approach being proposed. Of those that did not agree, concerns were raised regarding the approach to all sizes and types of ship and the potential for innovation to be stifled by disproportionate regulation. A small minority of respondents felt that Maritime Autonomous Surface Ships should not be considered differently to conventional ships and that there are already sufficient powers to regulate Maritime Autonomous Surface Ships. At the same time, they acknowledged that changes to the current legislative framework may be required. There were also comments on the need for a harmonised approach and to reflect international developments.

Government Response

Please refer to the Government Response in section 1.1.

Question 23:

In your view should we create powers to:

- define (a) terms and (b) roles for the operation of Maritime Autonomous Surface Ships
- (c) regulate Remote Operation Centres to ensure the safe operation of Maritime Autonomous Surface Ships in UK waters?

Summary of Responses

a) Respondents: 45

34 respondents agreed that the powers to define terms for the operation of Maritime Autonomous Surface Ships should be created, seven did not support this and four did not know.

b) Respondents: 45

33 respondents agreed that the powers to define roles for the operation of Maritime Autonomous Surface Ships should be created, seven did not support this and five did not know.

c) Respondents: 45

33 respondents agreed that the powers to regulate Remote Operation Centres to ensure the safe operation of Maritime Autonomous Surface Ships in UK waters should be created, eight did not support this and four did not know.

Government Response

The Government intends for there to be powers in primary legislation to define terms and roles and to regulate Remote Operation Centres to ensure the safe operation of Maritime Autonomous Surface Ships in UK waters.

2. Ports and Harbours

Question 24:

In your view, do harbour authorities and ports already have sufficient powers or do they need any additional powers in relation to Maritime Autonomous Surface Ships?

Summary of Responses

Total Respondents: 46

Respondents' views were somewhat divided, with a slight preponderance considering that existing powers (chiefly in the Harbours Act 1964 and in private Acts and Harbour Orders) would be sufficient in relation to Maritime Autonomous Surface Ships. However, a significant number of respondents did not know, indicating a need for careful analysis by Government, and in due course, appropriate scrutiny by Parliament. Some thought that further powers might be needed in order to regulate specific safety aspects of Maritime Autonomous Surface Ships, others that the challenges would be more practical than legal or regulatory. Overall, the balance of opinion held that existing ports/harbour powers and duties should be sufficient.

The issue of a port-wide Remote Operation Centre was noted. The legislative requirements for Remote Operation Centres are dealt with elsewhere in this response and their applicability to UK ports is effectively covered through wider Remote Operation Centre provisions.

Some referred also to the Port Marine Safety Code (PMSC), suggesting that it too was capable of accommodating Maritime Autonomous Surface Ships, though others thought the PMSC might highlight shortcomings in existing regulatory powers.

It was noted that some safety-related provisions were dealt with through individual ports' terms and conditions for access, not necessarily always having or needing a specific

legislative underpinning. The advent of more Maritime Autonomous Surface Ships as part of the traffic mix may, these respondents noted, require ports to review their terms and conditions to ensure that they continue to be fit for purpose.

In their responses to Q24, several respondents took the opportunity to flag some of the other practical and technical challenges for port and terminal operators which, while not necessarily requiring specific legislative changes, would be important in delivering the benefits of Maritime Autonomous Surface Ships in a safe manner right from the outset.

Government Response

In the light of comments received, further scrutiny of the Harbours Act 1964 (in conjunction with private legislation and harbour orders) was undertaken. Broadly, the Government is satisfied that the existing framework will remain appropriate.

At the same time, the Government acknowledges that Maritime Autonomous Surface Ships will present significant challenges and learning requirements for harbour masters and other port managers and employees. These challenges will increase initially as Maritime Autonomous Surface Ships are taken up in more and larger ships. Only after a prolonged period acquiring experience and disseminating knowledge will these challenges abate. We have taken fully on board the message that these practical challenges will require sector-wide action for ports over a period of years.

Government has concluded after some deliberation that it would not be appropriate at this time to use primary legislation for Maritime Autonomous Surface Ships to address wider issues in relation to the extra-territorial enforcement of general and harbour directions, which are relevant to Maritime Autonomous Surface Ships and conventional ships alike. This matter will, however, be kept under review.

We considered, in the light of responses, whether there was a need to amend s.60 of the Harbours Act 1964, which empowers the appropriate Minister to repeal or amend provisions in Acts of local application, such as statutory harbour authorities' private Acts. We have concluded that s.60 as it stands, together with the powers for harbour revision orders to be made at the instigation of ports or of Ministers, will remain sufficient to deal with any such amendments that we envisage may be required for Maritime Autonomous Surface Ship purposes.

3. Autonomous and Unmanned Submersible Apparatus

Questions 25 & 26:

In your view, should we create powers to regulate autonomous submersible apparatus in a manner consistent with manned submersible apparatus? If answering no, please explain why.

Questions 27 & 28:

Should we create powers to regulate unmanned submersible apparatus in a manner consistent with manned submersible apparatus? If answering no, please explain why.

Summary of Responses

Total Respondents: 50

The majority of respondents agreed that Government should create powers to regulate unmanned submersible apparatus, and that this should be in a similar manner and consistent with manned submersibles. Even amongst those who answered no, there was agreement that regulation was needed and that an appropriate body was needed to develop the legislation. Responses highlighted that careful consideration was needed due to the broad range of ships and differences between manned and autonomous submersibles.

Government Response

The Government intends for the primary legislation to include a power for the Secretary of State to be able to regulate autonomous and unmanned submersible apparatus, allowing for more detailed regulations to be developed in the future.

The comments of the respondents have been noted. At this stage Government is seeking the powers through primary legislation to be able to create the detailed secondary legislation to which some of the respondents referred. Any future regulation will be developed in consultation with stakeholders, giving industry representatives and experts the opportunity to shape the regulatory framework.

4. Marine Equipment

Questions 29 - 32:

In your view, if they are extended to include Remote Operation Centres, are existing type approval mechanisms sufficient to assess equipment located in or associated with Remote Operation Centres? If you answered no, what alternatives do you suggest?

Summary of Responses

Total Respondents: 50

Responses were almost equally divided into three groups. One-third did not know if the current type approval mechanisms were sufficient if extended to equipment in or associated with Remote Operation Centres. One-third believed it was not appropriate, noting that equipment at Remote Operation Centres may be associated with more than one Maritime Autonomous Surface Ship, whilst some noted specific standards for relevant equipment would need developing, and some that a new system of type approval was required. The final third agreed that the existing system of type approval would be sufficient.

Questions 33 - 36:

Is the existing type approval approach suitable for approving software programs or algorithms independently of hardware? If you answered no, what alternatives do you suggest?

Summary of Responses

Total Respondents: 50

The majority of respondents stated they did not know whether the existing type approval approach was suitable for software programs or algorithms. Some of these respondents, and those who stated no, noted that approval of software and algorithms needs to cover new risks, and more specialist expertise is required to address this issue.

Government Response

The responses received will be used to further develop the policies concerning the regulation and approval of the equipment in or associated with a Remote Operation Centre and of software programs and algorithms.

5. Maritime Security

Questions 37 & 38:

In your view, are there any additional changes to primary legislation, beyond those mentioned, which are required to maritime security legislation to support our proposed approach to regulating Maritime Autonomous Surface Ships?

Summary of Responses

Total respondents: 46
Yes: 8
No: 18
Don't Know: 20

After providing a fixed response, respondents were then asked to explain what additional regulation they thought was required. The responses have been summarised below.

Summary

Most respondents were concerned with ensuring future legislation around the cyber and physical security of Maritime Autonomous Surface Ships, especially the increased risk of cyber-attack to ships remotely operated onshore. Some measures to protect against attacks were suggested, but these are more likely to be covered in secondary rather than primary legislation. It was also suggested that legislation should be proportionate to the level of risk, and some general changes to primary legislation were put forward.

Cyber and Physical Security

The dominant view was the importance of legislation to protect remotely operated ships from cyber-attacks. Respondents suggested that, with the potential for Remote Operation Centres to be as simple as a laptop with internet connection, it would be very difficult to

enforce hardware, software and physical regulations on a Remote Operation Centre consistently due to the ease of hand-over of ship control via cloud hosted software, for example. It was therefore suggested that regulations should focus on cyber-attack contingency measures rather than specifications of the Remote Operation Centre, such as minimum measures to protect the ship and control software from cyber-attack; the ability of an operator to spot a cyber-attack; and the ability of an operator to establish a secondary means of control when the platform is subject to cyber-attack.

One respondent suggested that the current framework, referring to the International Ship and Port Facility Security (ISPS) Code and related legislation, does not comprehensively address the cyber-security and physical security of the shore-based Remote Operation Centres of Maritime Autonomous Surface Ships and that this must be addressed both at domestic and international level.

Another response suggested that maritime cyber security needs to be regulated better and more consistently but did not provide further details of the regulations they thought were required.

Proportionate Measures

Another key theme was the requirement for proportionate security measures in relation to the size, speed or weight of Maritime Autonomous Surface Ships, and that any measures should preserve research and development operations. One respondent suggested that small, lightweight, and slow Maritime Autonomous Surface Ships have low levels of cyber security vulnerability and vice versa.

Other Themes

One respondent noted concerns around the protection of UK Maritime Autonomous Surface Ships in contested international waters and asked what international regulations would be needed to ensure these ships have the same protections as those afforded to a conventional UK flagged ship with a Master onboard.

Another respondent suggested some primary legislation changes would be required within the Aviation and Maritime Security Act 1990 (as mentioned in the consultation) and Merchant Shipping and Maritime Security Act 1997 to update offences against the safety of ships and expand the power of the port authorities or the Transport Secretary so they are aligned with the proposed Maritime Autonomous Surface Ship legislative framework. The respondent also noted that legislation may need further amendment to align with future IMO regulations or amendments to the International Convention for the Safety of Life at Sea (SOLAS) 1974.

One response mentioned that changes would be required to the Pilotage Act 1987 but did not provide further explanation. Another response said it was important to liaise with other stakeholder states to ensure that UK security requirements are equivalent.

Government Response

The Government notes the importance of the cyber and physical security of Maritime Autonomous Surface Ships. Changes to primary legislation including the Aviation and Maritime Security Act 1990 are being considered as part of the work, and further suggested changes will be considered when developing secondary legislation in the future. As was noted in the responses, Government's approach at this time will be outcome-focused for Remote Operation Centre cyber security, rather than being prescriptive around specifications.

6. Insurance and Liability

Questions 39 & 40:

In your view are there any challenges the insurance industry would face to implement our proposed approach? If yes, please explain these challenges.

Summary of Responses

Total respondents: 45
Yes: 16
No: 9
Don't Know: 20

The most common theme amongst the respondents was the lack of statistical data or historical evidence that insurance companies have available. Respondents commented that as this is a relatively new sector, insurance companies would find it difficult to assess the risks and set realistic premiums. It was also stated that, consequently, the insurance cover could be at a cost that may discourage innovation and adoption of Maritime Autonomous Surface Ships may be restrained by uncertainty rather than true capability.

Another theme was the question of who is liable for a Maritime Autonomous Surface Ship when an incident occurs. Respondents suggested that it is unclear whether technology will shift liability away from shipowners and onto the developers of autonomous systems. It was suggested, however, that the challenges here could be offset by the increased data that could be available around the decision-making leading up to an incident with a Maritime Autonomous Surface Ship.

Linked to this, a couple of respondents stated that policies for Maritime Autonomous Surface Ships currently exist and are in use, and that insurance providers see the technology as an opportunity to improve safety and reduce claims given the high volume of insurance claims relating to humans on conventional ships.

Government Response

We acknowledge that Maritime Autonomous Surface Ships are a new area for insurers. Although insurance and liability information for this is limited, the first movers in this space will, and have been able to, obtain cover by demonstrating they have met or been exempted from statutory requirements through the issuance of a UK Load Line Exemption. The existing process to obtain such an exemption does not appear to be a barrier to gaining insurance. Government expects that during this transitional period, until there is a specific regulatory framework governing Maritime Autonomous Surface Ships, insurers will gain data and knowledge that will help to identify any new issues and can then be used to adapt the existing regime or processes. We will work with industry and insurers as experience is gained to ensure that any risks are assessed and appropriately considered.

7. Impact Assessment

Section 7 of the consultation presented questions that sought feedback regarding the economic, social, and environmental impact of the proposed primary legislation on stakeholders. In particular, it sought feedback on the impacts presented in the accompanying consultation-stage impact assessment.

Responses from the consultation assisted in producing the final-stage impact assessment.

7.1 Stakeholders

Questions 44 & 45:

Are there any stakeholders you believe are missing from the impact assessment? Which ones?

Summary of Responses

Total respondents: 44
Yes: 15
No: 16
Don't know: 13

The majority of respondents either did not respond to the question or did not suggest there were any stakeholders that had not been captured in the consultation-stage impact assessment. However, some respondents mentioned the lack of information on local communities, academic and research organisations, regulators, General Lighthouse Authorities, and insurers and brokers.

Government Response

The Government has reviewed the comments to ensure, where appropriate, stakeholders impacted by the proposed primary legislation are addressed in the final-stage impact assessment. Impacts are presented qualitatively at this stage; however, the comments may also be used to inform a quantitative assessment of impacts alongside secondary legislation.

7.2 Impacts

Questions 46 & 47:

Are there any impacts that are either mispresented or missing? Which ones?

Summary of Responses

Total respondents: 46
Yes: 13
No: 15
Don't know: 18

The majority of respondents either did not respond to the question or did not suggest there were any impacts that had been misrepresented or were missing in the consultation-stage impact assessment. Of the respondents who responded yes, there was a mixed response as to which impacts were mispresented or missing. One key theme was that the impact assessment did not provide a rigorous assessment of impacts, and that respondents may struggle to identify impacts without a clear view of the secondary legislation. The consultation stage impact assessment could have also given more consideration to a scenario in which local UK legislation is different from IMO legislation. Finally, a couple of respondents noted that Maritime Autonomous Surface Ship technology may cause a labour market shift, requiring fewer seafarers and more land-based workers.

Government Response

The Government has reviewed the comments to ensure, where appropriate, respondents' comments are addressed in the final-stage impact assessment. The final-stage impact assessment qualitatively describes the indirect impacts of primary legislation, without making speculative forecasts about the total impacts of both the primary legislation and future secondary legislation that is yet to be determined. The Regulatory Policy Committee have also agreed the final-stage impact assessment is 'Fit for Purpose'. The Government acknowledges there is a lack of clarity over the magnitude and direction of some of the impacts and has committed to quantifying more impacts when secondary legislation is proposed using the powers set out in the proposed primary legislation. The consultation responses will assist with this.

7.3 Costs to Businesses of Current Approach

Questions 48:

What, in your view, is the cost to businesses of the current approach to surveying, registering, and inspecting autonomous ships?

Summary of Responses

Total respondents: 11

Most respondents provided an indication of costs, relative to other ships in the sector. In particular, several respondents noted that the cost of surveying and inspecting autonomous ships is slightly higher than other ships in the sector. The cost of registering autonomous ships is similar to other ships. Some respondents indicated that the difference in costs might be due to increased administrative time and a lack of clarity associated with the current Maritime Autonomous Surface Ship requirements.

Government Response

The Government has noted the comments and they are being considered in relation to quantifying the impacts associated with secondary legislation.

7.4 Current Baseline

Question 49:

Supply any further evidence you have to support the baseline (or counterfactual) for maritime autonomy in the UK.

Summary of Responses

Total respondents: 6

This question received few responses. A couple of responses mentioned the high regulatory burden placed on companies under the current approach, which can fall disproportionately on small businesses. Other responses were concerned about the impact of new technologies on the General Lighthouse Authorities.

Government Response

The Government has acknowledged impacts to small businesses in the final-stage impact assessment. These comments will be considered further, alongside the impact of new technologies, when details of the final regime are established later through secondary legislation.

7.5 Options Appraisal

Questions 50 & 51:

In your view are there any alternative options (including non-legislative options) that could achieve the same policy objectives?

Summary of Responses

Total respondents: 45
Yes: 5
No: 17
Don't know: 23

The majority of respondents either did not respond to the question or did not suggest there were any alternative options to those in the consultation-stage impact assessment. A minority of respondents (11%) commented that there could be alternative options. These included more guidance and support to the sector. Some respondents raised that more engagement with stakeholders needs to happen to consider further options.

Government Response

Suggestions from respondents on non-legislative options have been considered. The Government has decided not to take them forward at this time, as they only partially meet the intended policy outcomes as set out in the final-stage impact assessment. Stakeholders will also have the chance to comment on the secondary legislation as it is developed through further consultations.

7.6 Costs to Businesses of Proposed Approach

Question 52:

What, if any, regulatory costs/savings to businesses associated with the preferred option 2 of legislate in advance of the IMO?

Summary of Responses

Total respondents: 12

Most respondents noted that there is a large risk if the subsequent IMO legislation is different to any legislation already in place in the UK. In this scenario, businesses may experience re-certifying or modification costs.

In terms of benefits, a couple of respondents noted that benefits are uncertain due to not knowing what the impact of the secondary legislation would be. Other respondents noted savings in terms of the environment and reduced market uncertainty.

Government Response

The risk of IMO legislation differing from the UK legislation is acknowledged as a key risk in the final-stage impact assessment. Benefits mentioned by respondents are also addressed in the final-stage impact assessment and are expected to be developed further alongside future secondary legislation.

7.7 Impact Assessment Assumptions

Questions 53 & 54:

Do you agree or disagree with our assumptions about the time, direction and scale of expected impacts for option 0 (do minimum)?

Summary of Responses

Total respondents: 43
Agree: 26
Disagree: 5
Don’t know: 12

The majority of respondents either agreed with our assumptions set out in the consultation impact assessment or did not know. A minority of respondents (12%) stated that they disagreed with the assumptions. Explanations as to why they disagreed were vague and sometimes focused around the policy options rather than the underlying assumptions of the analysis.

Government Response

As the majority of respondents agreed with the underlying assumptions, these have remained unchanged when producing the final-stage impact assessment.

Questions 55 & 56:

Do you agree or disagree with our assumptions about the time, direction and scale of expected impacts for option 1 (wait for IMO)?

Summary of Responses

Total respondents: 42
Agree: 25
Disagree: 3
Don't know: 14

The majority of respondents either agreed with our assumptions set out in the consultation impact assessment or did not know. A minority of respondents (7%) stated that they disagreed with the assumptions. One respondent noted that there is a risk the IMO will deliver behind the technological curve.

Government Response

As the majority of respondents agreed with the underlying assumptions, these have remained unchanged when producing the final-stage impact assessment. The risk that the IMO may legislate too late to keep pace with technological innovation has been addressed as an uncertainty in the final-stage impact assessment.

Questions 57 & 58:

Do you agree or disagree with our assumptions about the time, direction and scale of expected impacts for option 2 (legislate in advance of the IMO)?

Summary of Responses

Total respondents: 43
Agree: 23
Disagree: 5
Don't know: 15

The majority of respondents either agreed with our assumptions set out in the consultation impact assessment or did not know. A minority of respondents (12%) stated that they disagreed with the assumptions. These respondents highlighted risks associated with legislating in advance of the IMO. In particular, the UK Government may be forced to undo changes that are not eventually supported/agreed internationally.

Government Response

As the majority of respondents agreed with the underlying assumptions, these have remained unchanged when producing the final-stage impact assessment. The risk that the IMO legislation may differ from UK legislation has been noted as a key risk throughout the final-stage impact assessment.

7.8 Small and Micro Businesses

Questions 59 & 60:

In your view will 'Small and Micro businesses', up to 49 employees, be disproportionately adversely affected by the proposed legislation? Why?

Summary of Responses

Total respondents: 43
Yes: 16
No: 13
Don't know: 14

Respondents provided a wide range of comments noting that small and micro businesses may, proportionately, face higher compliance costs if a blanket approach to ship certification is adopted. However, in the long-term small businesses may benefit from having the resource in place and from available wider research and development resources in the UK.

Government Response

The Government has taken onboard these comments and included them in the final-stage impact assessment under the ‘small and micro businesses’ section. The Government has also committed to further developing and testing impacts on small and micro businesses in impact assessments that will accompany future secondary legislation.

7.9 Other Comments

Question 61:

What, if any, other comments do you have on the accompanying impact assessment?

Summary of Responses

A few respondents commented on the impact assessment’s development of the 'do nothing' scenario. In particular, they noted that the current lack of governance around Maritime Autonomous Surface Ships is increasing operating risk in the maritime sector and uncertainty is driving costs and delays. One respondent also noted the pollutants Maritime Autonomous Surface Ships might emit.

Government Response

Some of the impact assessment suggestions from respondents are covered in the previous consultation questions. Other provisions mentioned, such as pollutants, were not within the scope of the final-stage impact assessment but are noted by the Government and may inform impact assessments alongside future secondary legislation.

8. Other Maritime Autonomous Surface Ship Issues

8.1 Designated test areas for Maritime Autonomous Surface Ships

Question 41:

What views do you have on our proposal not to designate test areas, to support the development of Maritime Autonomous Surface Ships in UK waters?

Summary of Responses

Respondents: 42

Respondents provided a wide range of responses noting the importance of being able to test in real environment situations, but also noting that early testing can result in the unexpected and therefore needs to be done at suitable locations or within a safe framework.

Government Response

The Government will not introduce designated test sites at this time but has noted the comments, which are being considered in relation to current processes for supporting the testing of Maritime Autonomous Surface Ships in UK waters.

8.2 Consideration of additional primary legislation

Questions 42 & 43:

In your view, are there any additional aspects of primary legislation (acts of Parliament) you think need to be considered in relation to Maritime Autonomous Surface Ships? If yes, please explain your response.

Summary of Responses

Respondents: 45

26 of the respondents stated they did not know and 14 stated there were not additional aspects of primary legislation that needed to be considered in relation to Maritime Autonomous Surface Ships. Of those six who provided comments, it was noted that liability, cyber security and the interface between land-based and maritime regulations needed careful consideration for Maritime Autonomous Surface Ships.

Government Response

The Government has reviewed the comments and the Acts mentioned to ensure, where appropriate, issues impacting Maritime Autonomous Surface Ships are addressed in the regulatory framework.

8.3 Environmental Impacts

Question 62:

Are there any environmental impacts from Maritime Autonomous Surface Ships that may not exist with conventional shipping?

Summary of Responses

Total respondents: 32
No impact: 5

Summary

Most respondents suggested either positive, negative or both positive and negative environmental impacts from Maritime Autonomous Surface Ships in comparison with conventional shipping. The removal of onboard crew was a key theme where respondents recognised a broad range of both positive and negative environmental effects. A recurring positive impact noted was how cleaner fuels and zero emissions propulsion systems are well suited to Maritime Autonomous Surface Ship applications, whereas a recurring negative impact was the increased likelihood of Maritime Autonomous Surface Ship equipment being lost and causing damage to the marine environment.

Removal of Onboard Crew

The most common responses were about the environmental impacts associated with the removal of onboard crew that is possible with Maritime Autonomous Surface Ships.

Respondents suggested that removing the crew and the associated SOLAS requirements provides opportunity for reduced ship size, reduced hotel loads and hence a reduction in power requirements, immediately reducing emissions without changes to conventional propulsion methods. Alternatively, it was suggested that with crew facilities removed, higher operating payloads could be achieved, which could result in higher overall efficiencies. It was also said that there could be more space available for fuel storage, which would be useful for less energy-dense clean fuels such as hydrogen.

It was also noted amongst the responses that removing the crew could have a negative environmental impact. Respondents suggested that in the event of a ship malfunction there would be no crew on board to quickly attend to the issue, leading to a higher likelihood of a pollution incident such as a crash or fuel leakage. In addition, it was said that an uncrewed ship has a reduced ability to assist another ship in distress.

A couple of respondents noted that crewed ships would usually have operations and maintenance in place for cargo safety. With respect to environmental concerns, they said, this relates to dangerous cargo and one respondent added that it may be unlikely insurance companies will allow the transportation of dangerous cargo by Maritime Autonomous Surface Ships.

One respondent suggested that removing the crew could make it economically viable to operate Maritime Autonomous Surface Ships more frequently, increasing shipping mileage and emissions. Another response highlighted a potential issue at ports, where crew will not be available to connect remotely operated ships to shore power leading to more air pollution at shore.

Propulsion Systems

A dominant view was that Maritime Autonomous Surface Ships are a prime target for zero emission propulsion systems due to the lower power requirements.

One respondent stated that zero emission propulsion technology will struggle to meet the powering requirements of conventional shipping in the next few years. However, this is not the case with small Maritime Autonomous Surface Ships, so regulations would need to be proportionate to the size of the ship to advance innovation and provide a more suitable first

step to clean fuels. The respondent also said that Maritime Autonomous Surface Ships powered by zero emission technology would be more suitable for short sea shipping, reducing emissions at sea as well as taking freight off the roads.

Other respondents suggested that as Maritime Autonomous Surface Ships are modern, the propulsion technology used is likely to be more energy efficient, and that clean technologies are already being specifically developed and used to power them.

Lost Equipment

Some respondents suggested that Maritime Autonomous Surface Ship operation will lead to an increase in lost equipment at sea, with small ships less likely to be recovered after a failure scenario. It was said that this could lead to more removal operations of wrecks or abandoned ships. One respondent also noted that underwater remotely operated ships may require seabed nodes or gateway buoys to facilitate communication, cluttering the water space and damaging the environment if lost.

Other Themes

A couple of respondents noted opportunities for reduced noise pollution with Maritime Autonomous Surface Ships, whilst some highlighted potential issues with battery disposal (without further explanation on these items).

One respondent noted that as Maritime Autonomous Surface Ships can be smaller in size, ports can be made smaller and there would be less demand for dredging.

Government Response

It is clear from the responses that there are a range of potentially positive and negative environmental impacts from Maritime Autonomous Surface Ships, in comparison with conventional shipping, that need to be considered. Although not a green technology as such, we believe there is potential for Maritime Autonomous Surface Ships to lead to reduced emissions from shipping.

Question 63:

In your view, is there anything that Government can do to promote any environmental benefits or limit any environmental impacts from Maritime Autonomous Surface Ships, as distinct from conventional shipping?

Summary of Responses

Total respondents: 30

Summary

The response to this question had a variety of suggestions from respondents, with one clear theme being a desire to see the introduction of mandatory provisions to ensure that potential environmental benefits of Maritime Autonomous Surface Ships are achieved. Respondents also suggested other routes to promote the environmental benefits which are explored below.

Mandatory Provisions

A dominant view was that the Government should include provisions within legislation to ensure that the proposed environmental benefits of Maritime Autonomous Surface Ships can be realised, and the risk of negative impacts are mitigated. Suggestions included:

- A mandatory provision that Maritime Autonomous Surface Ships can take shore power at ports, including the regulation of harbours and ports to increase availability of shore power outlets;
- A mandatory global speed limit;
- Regulation of maximum carbon emissions with respect to displacement tonnage;
- A mandatory provision for recycling to be integrated into design and operational business plans;
- Mandate all ships use marine gas oil for fuel rather than heavy fuels that are more polluting;
- Ensuring smaller companies and operators can still afford to operate under new legislation (as zero emission propulsion systems are more often suited for small autonomous ships);
- Ensure remote operators are highly trained to reduce the likelihood of accidents that could damage the marine environment; and/or
- A strict approval process for Maritime Autonomous Surface Ship and Remote Operation Centre equipment to avoid technological errors, hence reducing the likelihood of an accident that could damage the marine environment.

Other Themes

A couple of respondents said that Maritime Autonomous Surface Ships are an ideal platform for research and monitoring, including oceanographic monitoring where it could help achieve net zero oceanographic capability. One respondent stated that this is already being promoted in the UK and globally.

One respondent said that Government could promote the benefits by showcasing the surveying work that is carried out by small USV (Unmanned Surface Vessels) and ASV (Autonomous Surface Vessels) with net zero impact. Another respondent said that an assessment should be conducted into the environmental impact of different sizes of Maritime Autonomous Surface Ships.

Government Response

Some of the suggestions from respondents on the mandatory provisions are covered in the previous consultation questions. In addition, there are other policies under development for all shipping, which we envisage will encompass some of these points and be considered when developing relevant secondary legislation.

9. Public Sector Equality Duty

Question 64:

Do you have data or evidence about whether any of the proposals would positively or negatively impact individuals with protected characteristics (as defined in section 4 of the Equality Act 2010)?

Summary of Responses

Total respondents: 13

Question 64 asked respondents to provide evidence to support their comments on how legislating Maritime Autonomous Surface Ships would impact groups with protected characteristics. This information would assist policy on assessing the impact of the proposals and how they could advance the equality of opportunity, foster good relations and eliminate unlawful discrimination for groups of people with protected characteristics.

We received no supporting data or evidence to the question, though 11 respondents suggested an overall positive impact and two suggested no or neutral impact.

Summary

Despite not receiving any supporting data or evidence, there was general agreement amongst the respondents that legislating in respect of Maritime Autonomous Surface Ships would have a positive effect on individuals with protected characteristics such as disability, sex, pregnancy and maternity, age and gender reassignment. Respondents suggested that, in comparison to traditional maritime careers, a UK Maritime Autonomous Surface Ship sector has the potential to be more inclusive of individuals with one or more of the aforementioned protected characteristics.

It should be noted that the protected characteristics around marriage and civil partnership, race, religion/belief and sexual orientation were not mentioned by respondents, though Government has considered these as part of its own Equalities Impact Assessment.

The fundamental reason stated for the positive impact on people with protected characteristics is the result of the potential for more land-based roles in the operation of Maritime Autonomous Surface Ships, as there will not be the need for people to be onboard and spend periods of time away from home. This also opens up opportunities for those who may have been excluded on medical grounds. A very common theme amongst the responses was that employment in the Maritime Autonomous Surface Ship sector may be more suitable for people with childcare duties and those who may require flexible working. Respondents suggested that, even though 24-hour shift work will still need to be maintained, the introduction of Remote Operation Centres will allow for different work models and more normal shift patterns, allowing home life to continue with increased flexibility. This will, respondents suggested, open up the sector to people who could not previously commit to long periods of time away from home (as is currently required by industry).

Pregnancy and maternity

The most common response was the positive impact on individuals with the protected characteristic of pregnancy and maternity. Respondents said that with the introduction of Remote Operation Centres on land, pregnant women could continue their employment beyond the usual time limit imposed for physical onboard work and would not be required to pass the seafarers medical. One respondent also suggested that Remote Operation Centre operations would enable ease of breastfeeding, post-natal checks and other caring responsibilities.

Disability

Another common response was the positive impact on people with disabilities. Respondents said that with the introduction of Remote Operation Centres on land, the physical requirement of carrying out duties onboard a ship will no longer be required, providing opportunities to disabled people who would not normally pass a seafarers medical to work in the maritime sector onboard ships.

Age

A few respondents said that it would allow people of older age to work in the sector, primarily because they would not need to pass a seafarers medical. Other reasons given were the reduced physical demands, the lack of international travel and the potential shorter shift patterns that would come with the introduction of Remote Operator roles.

Sex

One respondent stated, on behalf of their organisation, that they employ a significantly higher proportion of female mariners than the industry norm and it is at least partially reflective of the fact that mariners operating Maritime Autonomous Surface Ships can maintain a more balanced lifestyle with regard to family. They believe that their mariners choose to work with them so that they can spend more time with family which, they said, tends to disproportionately and positively impact female mariners.

Gender reassignment

One respondent said that there would be a positive impact on people undergoing medical treatment such as gender reassignment or other treatments. It was said that onshore shift patterns make it easier to attend regular medical appointments in comparison to working onboard a ship.

Government Response

Whilst not receiving any data or evidence on the impact of the proposals on people with protected characteristics, we agree with stakeholders that legislating in respect of Maritime Autonomous Surface Ships could lead to an increase in non-traditional maritime careers that are more likely to be inclusive of individuals with protected characteristics. The Government supports a diverse and inclusive maritime sector, and a strategic ambition of Maritime 2050 is to transform the diversity of our maritime workforce.

10. Final Comments

Question 65:

Are there any final comments you would like to make?

Summary of Responses

Total respondents: 20

The most common response was that the individuals and organisations who took part in the consultation would like to engage in further discussion around the proposals and help support in developing legislation. Respondents highlighted the importance of Government working with industry and academia to achieve the best outcomes through utilising their experience in the development and deployment of Maritime Autonomous Surface Ships.

Some respondents also stated that it was important not to stifle innovation by over-regulating. One respondent, on behalf of their university, stated the importance of ensuring education, research and development can still occur under the legal framework. Another respondent said that whilst the UK needs to be a global leader for defining standards, it must also provide an appropriate framework for UK-based Maritime Autonomous Surface Ship organisations.

Respondents made a range of other comments, including:

- The importance of ensuring that SOLAS is respected
- The importance of aligning strategies for Maritime Autonomous Surface Ships and the decarbonisation of maritime
- The importance of ensuring the physical and cyber security of Maritime Autonomous Surface Ships in ensuring its safe and effective operation
- The importance of a cross-domain approach for efficiency of resources and early realisation of autonomous systems

- The importance of strengthening the definitions in the proposed legislation
- The opportunity for the enhanced capability of autonomy to enable a level of safe operation that could not previously be considered due to human constraints

Government Response

Most of the final comments made have been addressed in previous questions. We will continue to work closely with industry and academia, especially when we start developing secondary legislation, to ensure that regulation of Maritime Autonomous Surface Ships is appropriate and proportionate.

Next Steps

The Department's proposals to amend legislation to accommodate Maritime Autonomous Surface Ships in UK waters will be considered when parliamentary time allows. The responses we received to this consultation will help inform the detail of the amended legislation. This will be complemented by secondary legislation in due course; a consultation will be carried out before secondary legislation is made.

Regulating Maritime Autonomous Surface Ships supports Ministerial priorities and the Government’s aims of being a leader in maritime autonomy by enabling HMG to support innovation, growth and jobs in the UK maritime sector.

Glossary

Aviation and Maritime Security Act 1990 The Act that gives effect to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation and to the Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms Located on the Continental Shelf.

Convention for the Safety of Life at Sea (SOLAS) An international maritime treaty that sets minimum safety standards in the construction, equipment, and operation of merchant ships. The Convention requires signatory Flag states to ensure that ships flagged by them comply with at least these standards.

International Maritime Organization (IMO) A specialised agency of the United Nations that is responsible for measures to improve the safety and security of international shipping and to prevent marine pollution from ships.

Maritime and Coastguard Agency (MCA) An Executive Agency of the Department for Transport with responsibility and accountability for the UK Merchant Shipping Regulations and their enforcement.

Merchant Shipping Act (MSA) 1995 The main Act governing merchant shipping in the UK (being a consolidation of a number of statutes on merchant shipping).

Merchant Shipping and Maritime Security Act 1997 This Act amended the Merchant Shipping Act 1995 in a number of ways, including by making further provision about the protection of wrecks and providing for the continuing application to the International Oil Pollution Compensation Fund of section 1 of the International Organisations Act 1968. It also amended Part 3 of the Aviation and Maritime Security Act 1990 to make provision about piracy.

Pilotage Act 1987 The Act that governs the system and operation of marine pilotage.

Port Marine Safety Code Safety code for harbour authorities with statutory powers and duties in the UK.

Public Sector Equality Duty This is a requirement of the Equality Act 2010. It requires the Department to have due regard to the need to eliminate discrimination, advance the equality of opportunity and foster good relations between different people when exercising its functions.