

## **ITF Seafarers' Section Automation Working Group (SSAWG)**

**Terms of Reference – February 2017**

### **SHIP AUTOMATION**

#### **Goals**

Significant academic and commercial research and development (R&D) is ongoing on all aspects of maritime automation systems, including remotely-controlled and autonomous navigation, vessel monitoring and collision avoidance systems. Automation in the maritime industry is being led by a number of manufactures who are pushing for a futuristic concept of autonomous or drone ships. “Maritime Unmanned Navigation through Intelligence in Networks” (MUNIN) is a research project funded by the EU with the aim to contribute to the realization of the vision of autonomous and unmanned ships that consists of eight partners with scientific and industrial backgrounds in Germany, Norway, Sweden, Iceland and Ireland. Rolls Royce is the leading manufacturer pushing for remotely monitored and controlled unmanned ships in the future.

The governments of Denmark, Estonia, Finland, Japan, the Netherlands, Norway, the Republic of Korea, the United Kingdom and the United States have submitted a proposal (MSC 98/20/2 ) to the International Maritime Organization (IMO) to place the subject of unmanned Maritime Autonomous Surface Ships (MASS) on its work program. It is expected that the IMO will undertake a regulatory scoping exercise to determine the extent of the need to amend regulations to enable the operation of unmanned MASS in international trades with a target completion date in 2020. On the completion of the scoping exercise it is anticipated that a new regulatory framework for unmanned autonomous ships may be completed by 2025. That date is believed to be optimistic, it may take a decade or more before an internationally agreed regulatory framework is agreed.

At the national level maritime autonomous systems may progress much more rapidly as the controlling regulatory framework need only be adopted by a single nation based on its assessment of its national interests.

It is inevitable that technology will change the nature of work. But, technology does not create its own destiny. Its future will depend upon human management and governance of its development. Given the potential impact MASS will have on the future employment, training and working conditions of seafarers it is of high priority for the ITF and its affiliates to become actively engaged in policy decisions and involved in influencing the path automaton will take within the maritime industry. It may include ships with different levels of automation, from partially automated systems that assist the human crew to fully autonomous systems which will undertake all aspects of a ships' operation without the need for human intervention. The path may follow different levels of automation, as described in Annex 1.

The ultimate goal of the ITF is to influence and shape any technology driven changes in the future nature of work to take into account the human element and preserve safe and decent work both at sea and ashore. And, ensure that autonomous systems are safe, secure and reliable.

The objectives of the ITF over the course of the development of maritime autonomous systems are to:

- Ensure that as technology progresses, there is a holistic approach by regulators and policy makers at the national and international level that considers social as well as technical and maritime safety implications of autonomous systems.
- Promote recognition among seafarers, affiliates, industry regulators, ship owners and other shipping industry stakeholders that the increasing capabilities and introduction of information and communications technology, coupled with robotics, will bring about disruptive changes in the nature of work. Those changes can have negative as well as positive effects on the social contract between capital and labour, society in general and its political institutions.
- Ensure that ships utilizing autonomous systems operate with an equivalent or higher degree of safety than conventional ships and that all risk factors are taken into account that may endanger maritime safety, the marine environment and the general public
- Define in clear terms the different levels of autonomous systems as automation will be implemented in stages with varying impact on labour; requiring clarity as to appropriate responses (*see Annex 1 as a starting point*).
- Generate support for the ITF's policies and assist the affiliates and representatives of labour at the national and international level by supplying information and tools to actively participate in the industrial, social and political dialogue that will influence and shape the introduction of advanced technology and robotics into the seafarers work place.
- Ensure that any benefits from the productivity of advanced technology and robotics are fairly distributed across shipping industry stakeholders to avoid the politically destabilizing effect of increasing inequality of income and an unfair burden being placed on labour.

## Strategies

This campaign builds on the ‘four levers’ approach to build power for ITF affiliates:

The ITF and its seafarer affiliates have already achieved considerable success in influencing major shipping companies, and thousands of vessels are covered by ITF agreements. However, automation is potentially a major threat to seafarers’ job security, conditions and safety, and to union power in the maritime industry.

It’s therefore critical to influence and negotiate with leading maritime industry players – both companies and governmental bodies – to manage the introduction of automation and other technological advances into shipping, to minimize negative impacts on seafarers, as well as to ensure the equitable distribution of its benefits.

The “theory to win” will be identified through the project development research.

However, it is anticipated that key elements of the campaign would include:

1. Investigating the key issues relating to automation that affect seafarers (Specific and targeted research to provide an evidence base);
2. Interrogating the case for automation (Public communications campaign and lobbying in key institutions, supported by research);
3. A leverage campaign aimed at identified targets to deliver the desired policy changes; and
4. Education and training where appropriate

The project will:

- Develop a comprehensive communications and media plan to inform seafarers, affiliates, ship owners and operators, maritime trade media, regulators, policy makers and the general public on the issues raised by autonomous systems from the perspective of seafarers and maritime labor. The plan may include a ITF Maritime Automation Forum web site for exchange of information and a dialogue among stakeholders to present the ITF and seafarers perspective on autonomous ship issues.
- Encourage seafarers and affiliates to become informed on the issues and become politically active in informing and influencing regulators, policy makers and politicians on the issues at the national and international level.
- Develop and implement a response to proposals in international forums, such as

IMO and ILO, and participate in shaping a regulatory framework that would control the construction and operation of autonomous systems.

- Determine the risk factors related to the operation of ships utilizing autonomous systems and require that risks be appropriately managed and mitigated within a regulatory framework.
- Determine the economic feasibility of ships utilizing autonomous systems and the optimum balance between automation and the human element. Not only on the business focus of cost effectiveness, but the impact on social cohesion and political stability.

Develop ITF positions on the issues raised by autonomous systems, taking into consideration, but not limited to:

- Manufacturers' claims that autonomous systems will be more cost effective.
- The alleged shortage of seafarers and their lack of competency and develop fact based arguments.
- Examine the technical issues with the reliability of remote monitoring and communication links controlling onboard automated navigation and engineering systems, and the risk factors involved.
- The risk factors in autonomous systems limited only to information provided remotely by sensors for the operator's situational awareness and decisions. And, the training, experience and qualifications of personnel in shore control centers.
- The human element factors within the supporting infrastructure for ships utilizing autonomous systems.
- The provision of a fallback position to a lower level or a non-autonomous mode in case of a failure in the communication, software or sensor systems.
- The political, regulatory and legal challenges autonomous systems will have both nationally and internationally.
- The legal liability and jurisdictional issues of ships managed or controlled remotely from Shore Control Centers and by personnel outside the jurisdiction of the State where damages occur.
- The impact of automation and robotics in general on society, including social

and political institutions, the social contract between capital and labor, and the capital/free market system.

- Possible solutions to the disruptive effect of automation on seafarers and the wider implications for society in general.

### **Affiliates**

The introduction of autonomous systems will have an impact on all seafarers' affiliates, but especially for labour supply unions. It will also impact other transport sections since the technology could/would be adopted in other transportation modes.

There is a need for a cross-sectional working group covering all transport modes. Representing maritime on the cross-sectional working group, there should be two from the Seafarers' Section and two from the ITF Maritime Safety Committee that can form part of a cross-sectional working group.

### **Targets**

Based on discussions the following have been identified as the initial targets:

- Manufacturers
- IMO and ILO
- Shipowners and ship managers
- Insurers
- National Administrations and Class Societies
- Non-Governmental Organizations (NGO's)
- Labour supply, port, coastal and flag states
- The general public

### **Allies**

Allies will be identified through the project development phase, but possible external allies include:

- Environmental organizations
- Maritime NGO's, such as Nautical Institute, IFSMA, IMPA, etc.
- Labor supply, port, coastal and flag states
- Ship managers and manning agents
- Some governments/authorities
- Humanitarian and migrant NGO's

### **Research**

Research to develop and support the ITF positions may be funded and conducted by organizations with technical expertise, such as:

- Maritime universities/academies
- Maritime training and technical centers
- Maritime professional organizations
- Technical consultants

The research that needs to be conducted may include, but is not limited to:

- The technological feasibility of ship management or control with autonomous systems.
- The comparative capital and operating costs of conventional manned ships and remotely controlled ships with Shore Control Centers and supporting shore based servicing and infrastructure taken into account.
- A risk assessment of ships operating with autonomous systems in various marine environments, i.e, rivers, ports, coastal and transoceanic routes.
- The changes required in the current framework of international Conventions and regulatory regimes that cover the international shipping industry to permit the construction and operation of ships with autonomous systems.
- The impact of automation replacing labor and its potential consequences on seafarers, unions, society in general and its political institutions.

### **Key messages**

- The vast majority of the world's population depends on labor to sustain themselves and give life meaning. The introduction of autonomous ships is part of the much broader issue of automation and robotics replacing human workers. If there is wide spread elimination of work through automaton it will have profound consequences on society and its political institutions if the transition is not managed in a manner that takes into account and protects the human element.
- Automation and autonomous transport will result in job redundancies in traditional trades like seafaring, which are unlikely to be replaced by an equal number of new positions. This will contribute to the continuing degradation of social cohesion and political stability in many countries.
- That ships operate in a dynamic high risk environment often requiring decision making under time constraints. This requires full situational awareness that cannot be accomplished by remote monitoring and control systems dependent on the

limitations of communication links and sensors.

- That the risks inherent in remotely controlled ships is a threat to maritime safety and the marine environment.
- That any new jobs are unionized to avoid damaging the formal industrial relationship between employers/employees and the social contract between capital and labour.
- The project plan will include a professional and comprehensive communications strategy that will include:
  - Internal:
    - Seafarers
    - ITF affiliates
    - Other ITF sections
  - External:
    - Governments
    - Politicians and policy makers
    - Regulators
    - Shipowners and operators
    - Maritime professional organizations
    - Trade media,
    - Port authorities,
    - Other industry players
    - The general public.

### **Timeline / milestones**

- By June 2017, in time for the ITF maritime meetings in Capetown, have the ITF Maritime Automation Forum website established with basic information, and begin developing and loading more advanced content.
- By the end of the first quarter of 2018: conduct a comprehensive assessment of the use and challenges of autonomous ships. Involve other affected ITF sections and establish cooperation with other organizations/companies, such as ICS, IMEC, IFSMA, IMPA, P&I clubs, with similar concerns.
- In time for the Singapore ITF Congress in 2018: develop factual arguments to support the ITF positions and identify key governments to lobby in at least 5 major maritime countries.
- By the end of 2018: participate in an automation cross-sectional conference.
- From 2017-2020 participate in the expected IMO scoping exercise on autonomous systems to advocate for provisions consistent with ITF policies and

positions.

- From 2020-2025 participate in the expected IMO sessions amending, revising and drafting a new international regulatory framework for ships utilizing autonomous systems to advocate for provisions consistent with ITF policies and positions.

## **Evaluation**

The transition from conventional to autonomous ships becoming a wide spread disruptive force in international maritime trades will be evolutionary rather than revolutionary; it may progressively occur in stages over a time frame of decades. Although it is anticipated that the debate on the development of the necessary regulatory framework that will shape the future of autonomous ships at the international level will begin in 2017 and be finalized within the next decade. At the national level it may occur much more rapidly.

Given the anticipated progressive nature of change the ITF goals and strategies need to be reevaluated periodically. The debate in international and national forums on the crucial issue of the controlling regulatory framework will be a dynamic dialogue advocating for different outcomes among competing and conflicting interests. There is a need for the ITF to maintain flexibility in its budget, strategy, time lines and responses to address the varied challenges as they arise.

## **Team**

The project team will be led by the Chair of the Ship Automation Working Group in coordination with the Chair and members of the ITF MSC Steering Group and the ITF IMO Permanent Representative on IMO matters, and the Secretariat (Seafarers' Section Secretary) for administrative support.

The project will include:

- ITF's IMO permanent representative
- 4 representatives from the Seafarers Section
- 4 representatives from the Maritime Safety Committee Steering Group
- Strategic and leverage researchers
- Social media and communications campaigner
- Communications (media) consultant
- Lawyer (as needed)

The campaign team will have the capacity to deliver:

- Strategic research and leverage activities
- Proposed ITF positions and action on ship automation
- Coordinated affiliates national lobbying
- External Communications with stakeholders
- Internal communications with affiliates and workers



The Project lead will work with the Head of Maritime Training & Development to identify opportunities for ITF Inspectors to be engaged in the campaign.

## **Budget**

Discussions will take place with the relevant departments within the ITF (research, legal and communications) to ensure that there is no duplication of work and that any extra positions supplement/complement existing staff.

*\* Partnership agreements will be developed with all unions that receive resources as part of this campaign.*

As the project will continue over a number of years provision should be made for an annual budget. It is anticipated that the project budget will need to cover the following items:

1. Consultants to support research and campaigning activities where there is insufficient capacity within the ITF, either in terms of availability or technical expertise/ experience.
2. Travel expenses for the Ship Automation Working Group (SAWG) meetings. The SAWG should meet twice a year in conjunction with, and two days prior to, the ITF MSC Steering Group meetings to reduce travel costs as four members of the SAWG are also members of the ITF MSC Steering Group.
3. Travel expenses of the Chair of the SAWG, or designated SAWG Vice Chairs, members or consultants, to attend IMO/ILO sessions relevant to automation; and meetings with ITF Secretariat, industry NGO's, ITF affiliates and consultants, principally in London, but may include Malmo, Geneva or other locations, up to 12 times a year.
4. Registration fees and travel expenses for the Chair of the SAWG, or designated SAWG Vice Chairs, members or consultants, to attend industry conferences on maritime automation up to 8 times a year.
5. Travel expenses of ITF Secretariat to attend SAWG meetings.
6. Travel expenses of consultants.
7. Expenses of setting up, maintaining and monitoring a ITF Maritime Automation Forum web site.
8. Expenses for data bases, software or other research material for use by SAWG or consultants.
9. Ad hoc lobbying and other meetings with industry stakeholders.
10. Communications materials and publications, including cost of designing, production and distribution.

A detailed budget will be submitted for consideration following discussions on the items mentioned above.

## **Governance**

The Secretariat (Seafarers Section Secretary) in conjunction with the Chair of the Ship Automation Working Group and in coordination with the parent body, the Chair of the Seafarers Section Committee, will:

- Designate and oversee secretariat staff responsible for providing administrative support
- Communicate with the Ship Automation Working Group and the cross-sectional working group when/if established
- Regularly engage with Paul Goulter, ITF Strategic Change Consultant and Rob Johnston ITF Assistant General Secretary, to ensure that the project strategy and implementation remains aligned with the ITF Strategic Goals and Plan
- Meet with the ITF London Departments and Sections as required to ensure integration of project activities and identify broader communication opportunities
- Engage directly with affiliates and unions who are interested in supporting the project or taking a lead in the project
- Provide reports to the Seafarers' Section Committee as required
- Provide reports to the ITF Elected leadership or ITF Sections and Departments as required.

## ANNEX 1

### **Lloyd's Register ships autonomy levels**

For a cyber-enabled ship, an autonomy level (AL) is to be assigned at the earliest possible stage, and is matched to the extent that the design will use smart ship capabilities. This minimises costs and ensures that risks to safety and to business needs are identified and mitigated.

#### **AL 0) Manual – no autonomous function.**

All action and decision making is performed manually – i.e. a human controls all actions at the ship level.

**Note:** systems on board may have a level of autonomy, with 'human in/on the loop'; for example, pms and engine control. Straight readouts, for example, gauge readings, wind direction and sea current, are not considered to be decision support.

#### **AL 1) On-ship decision support**

All actions at the ship level are taken by a human operator, but a decision support tool can present options or otherwise influence the actions chosen, for example DP Capability plots and route planning.

#### **AL 2) On and off-ship decision support**

All actions at the ship level taken by human operator on board the vessel, but decision support tool can present options or otherwise influence the actions chosen. Data may be provided by systems on or off the ship, for example DP capability plots, OEM configuration recommendations, weather routing.

#### **AL 3) 'Active' human in the loop**

Decisions and actions at the ship level are performed autonomously with human supervision. High-impact decisions are implemented in a way to give human operators the opportunity to intercede and over-ride them. Data may be provided by systems on or off the ship.

#### **AL 4) Human on the loop – operator/supervisory**

Decisions and actions are performed autonomously with human supervision. High impact decisions are implemented in a way to give human operators the opportunity to intercede and over-ride them.

#### **AL 5) Fully autonomous**

Unsupervised or rarely supervised operation where decisions are made and actioned by the system, i.e. impact is at the total ship level.

#### **AL 6) Fully autonomous**

Unsupervised operation where decisions are made and actioned by the system, i.e. impact is at the total ship level.