CfAA MARITIME AUTONOMY WORKSHOP

Summary Report

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Introduction and overview

The Centre for Assuring Autonomy (CfAA) held its second maritime autonomy assurance workshop at the Maritime Museum in Canary Wharf on 2nd October 2024. Following a welcome and introduction the CfAA presented a summary of the previous (March) workshop and progress since then. This includes a review of the International Maritime Organisation (IMO) code for Maritime Autonomous Surface Ships (MASS) which seems to have positively influenced its evolution, and work for national operators and regulators related to autonomous operations which have shaped understanding of assurance of vessels and the maritime autonomy infrastructure (MAI). The workshop included a rerun of the online survey conducted at the March workshop, and four parallel sessions considering key aspects of assuring MAI.

Survey Findings and Workshop Sessions

Many survey findings were similar to the March results, e.g. the biggest barriers to deploying autonomy are safety assurance, regulation, human factors and the business case. The most significant change from March was growing confidence in the development of safety assurance approaches in the maritime sector.

Minimal Assurance Process

This session explored: what is a baseline assurance process for a simple use case, e.g. small survey vessel, that can then be scaled to larger vessels giving a consistent approach across vessel sizes and capabilities? It concluded that key factors include:

- Addressing both the vessel and a remote operating centre (ROC) and connectivity where required for remote operations.
- Standardising context descriptions to support international usage.
- Human performance, noting that not all human actions are recorded.
- Separation of sensor testing from system testing.
- Consideration of cyber-attacks and cyber resilience.
- Collection of operational data for assurance and improvement.

It was also observed that a use case that could satisfy the maritime community should address situational awareness and collision avoidance as these are common to all vessels.

Demonstrator for Assurance Processes

This session explored: how can the minimal assurance process be validated to refine understanding and to de-risk the regulation of autonomy? It highlighted the need for/to:

- A cautious and rigorous path/journey: e.g. desk-based, simulation, controlled deployment (e.g. a lake), operational deployment.
- Cover concept of use (ConUse) and concept of employment (ConEmp) as well as concept of operations (ConOps).
- Consider modes of autonomy, including "full" autonomy, use of a ROC and intermediate situations with reduced crewing.
- Address "operability" of the systems including in degraded modes.
- Draw in a wide range of stakeholders including pilots, regulators, unions and the public, as well as the more obvious industrial stakeholders.

It was agreed that the process should be "fully open" to support the maritime community.

Human Factors

This session explored: how can development and assurance address human factors in human-system interaction and more broadly in terms of organisational change? It concluded that work on designing for and assessing human factors must include:

- Human-AI teaming including developing trust.
- Understanding how to achieve "transparency" of the technology.
- Definition of effective alarms and identifying how systems can mimic the "weak signals" that would be picked up by humans.
- Monitoring systems to enable learning from incidents.
- Skills and training, including the ability to adjust to very different working patterns and/or drawing in those with no maritime experience.

It was also emphasised that there was a need to consider organisational learning as well as issues of human-system interaction.

Safety, Security and Resilience

This session explored: how can development and assurance address resilience including the ability to deal with cyber threats to vessels and other reasonably foreseeable adverse events (RFAE) whilst preserving safety? Some specific issues raised were:

- The importance of dealing with uncertainty and the ability to show/convey that systems are adequately safe (don't represent a degradation vs conventional ships).
- Security would need to cover physical controls, e.g. to prevent tampering, as well as cyber security and the impact of introducing AI.
- The need for enhancements to simulation processes to consider resilience.
- The importance of an assurance case for systems to address safety, security and resilience.

As with other discussions, there was a recognition of the need to ensure international coherence and consistency.

Actions

Based on the workshop findings, the CfAA will work with other stakeholders, to seek to define and obtain funding for an assurance demonstrator. Similarly, the CfAA will seek to take forward work in the other areas, with perhaps the first initiative being an international workshop to refine and "firm up" a minimal assurance process for autonomy. It was also suggested that the CfAA engage more in influencing policy, and the CfAA will explore how this might best be done, e.g. via working with regulators or through relevant organisations such as the Society of Maritime Industries and the Institute of Marine Engineering, Science and Technology.