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(No. YAS202402)

Contributing to the Revision of the STCW Convention and Code

By

Western Norway University of Applied Sciences

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Executive Summary

This research project, titled "Contributing to the Revision of the STCW Convention and Code", was conducted under the IAMU Capacity Building initiative for Young Academic Staff in FY2024. It aimed to support the comprehensive review and future revision of the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), currently undertaken by the IMO's Sub-Committee on Human Element, Training, and Watchkeeping (HTW). The study focused specifically on how emerging simulation technologies integrated into maritime education and training (MET) within the evolving regulatory landscape.

Research question

How do maritime stakeholders perceive the comprehensive review of the STCW Convention and Code?

Research Objectives

The overarching aim of the project was to develop actionable recommendations to inform the STCW revision process and to guide maritime educators in aligning MET programs with anticipated regulatory updates. The specific objectives were:

- To assess the current state of simulator-based education in maritime institutions and identify its benefits and limitations.
- To review the STCW Convention and its provisions related to simulators, focusing on integrating emerging simulation technologies.
- To propose recommendations for effectively incorporating simulation technologies into MET.
- To foster stakeholder collaboration, including IMO's HTW delegations and maritime institutions.

Methodology

A qualitative research approach was adopted, combining document analysis of IMO HTW reports, a comprehensive literature review, and semi-structured interviews with HTW delegates. The project was further strengthened by the researcher's active involvement in HTW sessions, an internship at the IMO, and collaboration with the Centre of Excellence in Maritime Simulator Training and Assessment (COAST), facilitating broad stakeholder engagement and deep contextual insights.

Findings and Outcomes of the research

Key findings from the thematic analysis reveal broad consensus on the benefits of simulator-based learning particularly for experiential training, remote accessibility, and safety and a shared recognition of the urgent need to update STCW provisions to reflect technological and pedagogical advances. Challenges identified

include disparities in simulator access and quality across global institutions, inconsistent national interpretations of STCW standards, and limited regulatory guidance for advanced simulator use.

The project proposes a structured framework for STCW revision that includes:

- Defining minimum standards for simulator types and fidelity;
- Enabling flexible learning pathways, such as modular and blended learning models;
- Encouraging the use of simulators for partial sea-time equivalency;
- Promoting continuous instructor training and institutional audits;
- Standardising the integration of simulation into assessment criteria.

Deliverables and Contributions

The project produced several key deliverables:

- An interim report presented at the IAMU AGA 2024 in Massachusetts, USA;
- A workshop conducted during the Norwegian Maritime Days (NMD) on 26th November 2024, with participation from the COAST consortium institutions (Western Norway University of Applied Sciences – HVL, The Arctic University of Norway – UiT, University of South-Eastern Norway – USN, and Norwegian University of Science and Technology – NTNU);
- A peer-reviewed article submitted to Australian Journal of Maritime and Ocean Affairs in June 2025 (under review);
- A final report to be submitted to IAMU by May 2025.

These outputs contribute directly to IAMU's mission by enhancing the quality of MET, supporting regulatory evolution through evidence-based insights, and strengthening global collaboration among MET stakeholders.

This study aligns with the IAMU Global Maritime Professional Body of Knowledge (GMP-BoK), which defines curriculum focus areas and intended learning outcomes needed to prepare seafarers for emerging challenges in MET frameworks.

In conclusion, the study presents timely and pragmatic recommendations from and for the STCW revision process. It offers a clear pathway for aligning MET with technological progress and the future needs of the maritime industry contributing meaningfully to the ongoing global effort to modernise maritime education and ensure the readiness of future seafarers.

Contributing to the Revision of the STCW Convention and Code

(Stakeholder Perspectives on the Comprehensive Review of the IMO STCW Convention and Code)

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Abstract The Standards of Training, Certification, and Watchkeeping (STCW) Convention and Code are undergoing a comprehensive review by the International Maritime Organization (IMO), intending to adopt amendments by 2031, to ensure Maritime Education and Training (MET) remain aligned with technological and regulatory change. This study investigates how Human Element, Training and Watchkeeping (HTW) delegations conceptualise (i) the integration of emerging educational technologies and (ii) mechanisms to facilitate flexible, high-quality training environments within this review. A qualitative design was employed, combining document analysis of HTW submissions and proposals with semi-structured interviews, which were analysed using thematic analysis.

Findings highlight opportunities to enhance competence development through advanced simulation technologies and to expand blended and flexible training models. However, persistent challenges were identified, including inconsistent interpretations of STCW standards, global disparities in simulator quality and training resources, and the lack of clear guidance for integrating new technologies into MET frameworks. The study offers actionable insights for maritime educators, including curriculum adaptation and instructor development, as well as for policymakers, such as establishing baseline simulator standards and harmonising interpretations of STCW provisions. The results contribute to ongoing discussions on aligning MET with the evolving demands of a digitalised and sustainable maritime sector.

Keyword: *Maritime Education and Training, IMO STCW, Maritime Simulators, Curriculum Alignment, Policy Recommendations*

1. Introduction

The Standards of Training, Certification, and Watchkeeping (STCW) Convention has been a global regulatory framework for Maritime Education and Training (MET) since 1978, with major revisions in 1995 and the Manila Amendments in 2010 (1). Since then, rapid advancements in digitalisation, automation, environmental challenges, sustainability initiatives, and evolving regulatory standards have reshaped the

maritime industry, exposing gaps in the existing STCW framework (2). These changes underscore the need to align training standards with the competencies required for modern seafarers' roles (3).

The STCW Resolution 15 recommends a 10-year cycle for comprehensive reviews (1), but delays in international regulatory processes have widened the gap between training standards and industry needs. To address this, the Maritime Safety Committee (MSC) has mandated a comprehensive review of the STCW framework (4). The Sub-Committee on Human Element, Training, and Watchkeeping (HTW) has been tasked with carrying out this review.

HTW session 9 established principles to guide the STCW Convention and Code review, focusing on a comprehensive evaluation of all provisions and embracing the potential of digitalisation and emerging technologies in ship operations and seafarer training (5).

The methodology decided upon during the HTW session 10 involves a structured approach to the comprehensive review and revision, divided into two phases. Phase 1 focuses on the review, while Phase 2 is the revision to address identified gaps, which is expected to be completed by 2027.

The HTW Correspondence Group identified 22 specific areas for the comprehensive review of the STCW Convention and Code. These include: (1) emerging technologies on ships and ship operations, requiring new competencies for advanced equipment and fuels; (2) digitalisation in certification, including e-certificates; (3) emerging technologies in education and training, particularly digital learning tools; (4) facilitation, flexibility, and quality of onboard, shore-based, and simulator training; (5) efficient implementation of new training requirements with reduced administrative burdens; (6) reconsideration of sea time requirements, including simulation as partial replacement; (7) bullying, harassment, gender diversity, and sensitisation; (8) mental health awareness and support; (9) twenty-first century skills, including communication and adaptability; (10) addressing textual inconsistencies in the Convention and Code; (11) clarifying areas of differing interpretations; (12) harmonising taxonomy and terminology with modern educational frameworks; (13) flexibility in revalidation and renewal of certificates; (14) updating the “white list” of compliant Parties; (15) incorporating lessons learned from previous amendments, casualty investigations, and the COVID-19 pandemic; (16) greater flexibility through electronic documentation and reduced barriers for seafarer mobility; (17) alternative certification under Chapter VII; (18) watchkeeping arrangements and principles in a goal-based format; (19) alignment with other IMO and international instruments; (20) cybersecurity awareness training; (21) practical implementation and transitional provisions; and (22) removal of outdated training requirements. This project focused specifically on Areas 3 and 4, given their direct relevance to simulator-based education and curriculum development, while recognising their interlinkages with the broader set of issues under review. Adopting a qualitative methodology, the study examines proposals submitted by HTW delegations and analyses interviews with HTW representatives. This approach enables a comprehensive understanding of stakeholder perspectives. The findings are intended to inform MET educators and provide insights for decision-makers, contributing to the revision of the STCW framework.

2. Background

The maritime industry is rapidly changing, driven by technological innovations, sustainability priorities, and new regulatory standards (7, 8). Emerging technologies such as digital navigation systems, automation, and alternative fuels have been adopted, fundamentally transforming ships and ship operations (9). The growth in remotely operated vessels and the increasing autonomy of vessels highlights what the future of shipping may look like. With a mixed maritime traffic environment, this necessitates new skills in monitoring and control (10-12). While the extent of automation remains uncertain, assistive technologies, such as artificial intelligence (AI) enabled systems and augmented reality (AR), are expected to alter maritime operations (13). Additionally, integrating information technology (IT) systems now plays a crucial role in bridge navigation, control systems for ship functions, and eLogistics for efficient port transport (13). Cybersecurity has emerged as another critical focus area, requiring specialised training to equip seafarers to recognise cyber threats and respond effectively to vulnerabilities and potential security breaches (13-15). Adopting alternative fuels and propulsion systems has also introduced the need for new competencies (16, 17).

These changes reshape operational practices and require new seafarer competencies (3, 10, 18-20). The Baltic and International Maritime Council (BIMCO) and the International Chamber of Shipping (ICS)' Manpower Report have recently highlighted evolving skill requirements in a growing shortage of qualified seafarers to meet the growing demands of the global fleet (21).

These developments necessitate a corresponding evolution in MET (13, 18, 22). However, MET's response to these advancements has mainly been reactive rather than proactive, with training standards struggling to keep pace with technological demands.

Research highlights the importance of incorporating advanced learning methods into MET to address these challenges, enhance practical skill development, and improve student engagement (23, 24). Integrating advanced technologies into MET is crucial for enhancing training effectiveness and operational readiness. Maritime simulators, in particular, are widely recognised for their ability to enhance seafarers' decision-making, situational awareness, and technical skills by bridging the gap between theoretical knowledge and real-world application (25). For instance, high-fidelity simulators, such as those for advanced navigation, engine room management, and emergency response training, are now used, offering repeatable and standardised learning experiences (26). Furthermore, technological advancements in VR, AR, mixed reality (MR) and AI create new and differing possibilities in MET (11, 27, 28). While simulators offer scalable solutions by standardising training experiences, global disparities in access to advanced simulators undermine the consistency of training outcomes.

Additionally, variations in the interpretation and implementation of STCW standards result in differences in program structure, content, training methodologies, and quality. Institutions adapt the prescribed curricula based on national regulations, available resources, and educators' perspectives (29). Significant gaps remain in understanding how educational technologies and good practice can be effectively integrated into MET programs.

Focusing on the ongoing comprehensive review of the STCW Convention and Code, this study addresses stakeholders' perspectives on the anticipated changes to the MET and offers actionable insights for

stakeholders. The findings are intended to inform MET institutions, decision-makers, and other relevant stakeholders.

For maritime educators, the study provides insights into the processes and procedures behind the ongoing comprehensive review and revision of the STCW Convention and Code. Additionally, it emphasises the need for curriculum updates to incorporate emerging competencies.

For decision-makers, it provides recommendations to support a progressive and forward-looking update to the STCW framework.

3. Methodology

This study employed a qualitative approach, combining IMO HTW documents analysis, semi-structured interviews, and thematic analysis to explore perspectives on the ongoing STCW review.

Document analysis is a valuable method for understanding and evaluating policies, uncovering historical and contextual influences, and assessing their impact through a structured framework for examining text, context, and consequences (30).

To complement the document analysis, semi-structured interviews were conducted with delegations of the HTW involved in the ongoing STCW review process. Two authors attended HTW10, one as an intern, one as a national delegate. A purposive sampling strategy was employed, targeting focusing on representatives from national maritime authorities and ensuring representation across diverse regions (31). Invitations were extended to twenty 20 delegations contacted during HTW 10; twelve 12 accepted, and two 2 provided written responses. Non-responses were mainly due to limited availability or time constraints. The interviewees were senior representatives of national maritime authorities and policy-level delegates to the HTW, whose institutional roles ensured that the perspectives collected reflected authoritative insights into policy deliberations rather than individual opinion.

The semi-structured format allowed for flexibility, enabling participants to reflect on their areas of expertise and provide detailed insights on STCW revision priorities. The interview guideline is provided in Annex 1 and can be accessed on the Open Science Framework (OSF). The link is included at the end of the paper in the Data Availability Statement. Follow-up questions were asked toward the end of each interview to clarify statements, address ambiguities, and adapt to emerging insights, ensuring a dynamic and responsive data collection process (33).

Ethical approval was obtained from the Data Protection Services of Sikt – Norwegian Agency for Shared Services in Education and Research (Reference number 437481). Informed consent was obtained from all participants, with assurances of confidentiality.

Interviews were audio-recorded with consent, transcribed verbatim, and analysed using NVivo. To mitigate potential bias, a codebook was agreed upon in advance, and peer debriefing was undertaken throughout the analysis. Coding was conducted independently by two researchers, with discrepancies resolved through consensus. The involvement of two authors with extensive experience in MET further strengthened the credibility of the interview data. Reflexive interviewing techniques foster a collective understanding of

interviewees' perspectives, ensuring questions are accurate, relevant, and grounded in context, thereby contributing to a thorough and insightful data collection process (34).

Triangulation enhanced the study's validity by combining data from multiple sources, including literature reviews, document analysis, and interviews (35). This triangulation ensured that HTW documents and delegation perspectives confirmed the findings. Additionally, a peer debriefing process was conducted with the article's co-authors, who are MET experts, to review the thematic development stages, minimise bias, and confirm the relevance of the identified themes (36).

3.1 IMO HTW Delegation Submissions and Documents Review

This study reviewed the comprehensive proposals submitted by HTW delegations to the IMO as part of the STCW review process, covering those submitted until December 2024. These documents comprise submissions from IMO member states, non-governmental organisations (NGOs), and other stakeholders, each offering suggestions for amendments. These documents are accessible to the public through IMO documents and resources webpage (36). It is important to note that additional proposals may be submitted as HTW work is ongoing, so it is possible that not all perspectives will be captured in this study.

The document analysis focused on proposals related to the study's scope areas. Key insights from these documents provided a foundation for understanding the broad policy recommendations, further explored in interviews.

In addition, HTW reports, meeting summaries, and some relevant documents from previous STCW amendments were reviewed to establish a historical context and trace the evolution of regulatory standards. This background research helped frame the discussions on the current review.

Building on the methodology established by HTW session 10, the intersessional working groups (ISWG) prepared documents identifying gaps in key areas targeted for the comprehensive review of the STCW framework. These documents have been analysed and summarised in Table 1, highlighting the gaps identified by the ISWG, focusing on those most relevant to the scope of this study. A total of 65 documents published by the IMO for HTW session 11 and ISWG-STCW session 1, along with 11 proposal documents relevant to the scope of this study, were identified and synthesised.Table 1 summarises the 65 HTW/ISWG documents and 11 proposals analysed in this study. A complete version of Table 1 is presented in Annexe 2, together with the coding framework and anonymised interview materials, which are openly available on the OSF.

Table 1 Summary of HTW/ISWG documents and proposals analysed.

Theme / Review Area	Number of ISWG documents	Number of proposals	Key focus
Emerging technologies in education and training (Area 3)	28	6	Proposals addressed the integration of digital learning tools, VR/AR, and AI-based applications into MET; strategies for simulator networking and remote

Theme / Review Area	Number of ISWG documents	Number of proposals	Key focus
			access; incorporation of e-learning and blended delivery models; and the need to update STCW provisions to recognise technology-assisted competence assessment.
Flexibility and quality of onboard, shore-based, and workshop skills training, including simulators (Area 4)	37	5	Submissions emphasised the variability of simulator standards and fidelity across regions; challenges in ensuring global consistency of training quality; proposals for minimum technical guidelines for simulator approval; recognition of seagoing service equivalencies through simulation; and measures to support cost-effective and flexible training pathways.
Total	**65**	**11**	—

3.2 Interviews with HTW delegations

Two of the study's authors attended the HTW session 10 meetings at the IMO in February 2024, one as an intern at the IMO and the other as a member of a national delegation. This participation allowed them to connect with delegation members, who were subsequently invited to participate in interviews following the meetings.

A total of 12 online interviews were conducted, each lasting between 60–90 minutes. Additionally, two delegations responded to the interview questions in written format. The countries represented in the study included Canada, Denmark, India, the Islamic Republic of Iran, the Netherlands, Norway, Poland, Singapore, South Africa, the Republic of Korea, Sweden, Türkiye, the United Kingdom, and the United States. To ensure anonymity and consistency in the analysis, each delegation was assigned a unique identifier, ranging from D1 to D14. The selection of delegations aimed to be inclusive, representing diverse regions worldwide to capture a broad range of perspectives on the STCW review process.

Interview questions were structured around key themes identified from the IMO document analysis, with additional probes to explore participants' perspectives on changes in MET. Two authors conducted the interviews, one leading the process through a predetermined interview guideline. To protect participant anonymity, identifying information was removed from the interview transcripts, and all data were securely stored in accordance with Sikt data protection regulations. For reliability, all interviews were transcribed accurately, and coding was performed using the qualitative data analysis software NVivo to ensure consistency in the application of codes.

Interview Data Analysis

Thematic analysis was used to interpret the interview data. This method was chosen for its capacity to identify, analyse, and report themes within qualitative data (37, 38), making it suitable for revealing patterns in stakeholders' perspectives on the STCW review. Thematic analysis is particularly useful for exploratory research in policy studies (39). An initial coding process was applied to the document analysis and interview transcripts. Using a hybrid approach, both deductive codes (based on pre-identified themes from the

literature review and document analysis) and inductive codes (emerging organically from the data) were applied (40). For example, as illustrated in Figure 1, Theme 1, "Emerging Educational Technologies," is deductive, derived from documents, with mixed codes: Codes 1, 3, and 4 align with interview questions, while Code 2, "The Impacts of the Pandemic," emerged inductively as participants mentioned COVID-19, despite it not being directly asked. The figure presents four main themes (Theme 1 on the left to Theme 4 on the right) at the top, with their corresponding codes listed below each theme in sequential order.

The four generated themes reflect key areas of focus within the STCW review, capturing stakeholder perspectives on educational technologies, training quality, curriculum alignment, and collaborative processes. These themes serve as a structured foundation for analysing and interpreting the data, enabling a comprehensive understanding of current issues and recommendations related to MET and the STCW framework. Annexe 3 provides definitions of these themes and their associated codes, which are available on OSF.

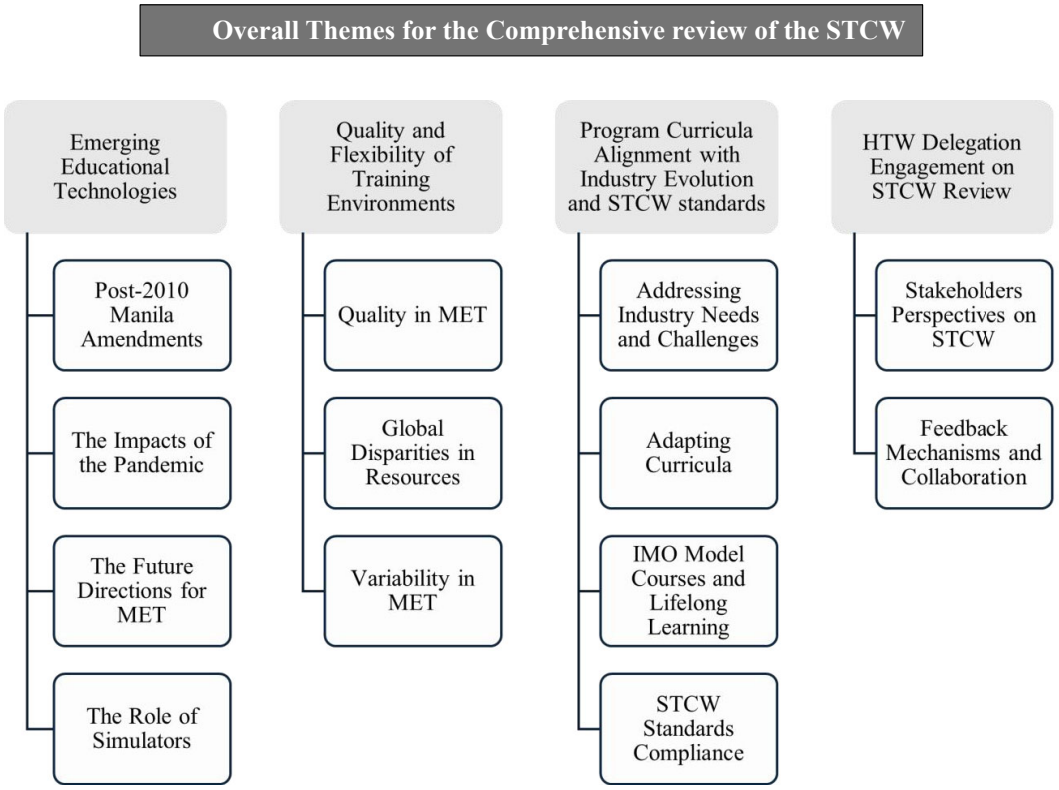


Fig. 1

Figure 1. Themes and codes derived from thematic analysis of HTW/ISWG documents (n = 65, 2022–2025) and interviews with HTW delegation representatives (12 interviews, 2 written responses). Coding combined deductive categories from literature/document review with inductive categories from interview data, using NVivo software.

Abbreviations: HTW = Sub-Committee on Human Element, Training and Watchkeeping; ISWG = Intersessional Working Group; MET = Maritime Education and Training; STCW = Standards of Training, Certification and Watchkeeping

4. Results and Discussions

This section presents a thematic analysis, exploring the implications of technological advancements, challenges in maintaining quality and flexibility in MET, and the evolving alignment between MET program curricula and STCW standards. The discussion adopts a structured approach, progressing from broader themes to specific codes for a detailed analysis.

4.1 Emerging Educational Technologies

This theme examines the evolving role of technology in MET, focusing on changes over the last decade, the impacts of the COVID-19 pandemic, future directions for MET curricula, and the integration of simulators in response to technological advancements. Key codes for this theme include:

Post-2010 Manila Amendments.

The 2010 Manila Amendments brought significant changes to MET but are now widely regarded as inadequate in addressing the rapid pace of technological advancements. D7 remarked, "All the equipment was a bit different than we have now… instead of explaining how a pump works with a drawing on the blackboard, you can show it with some simulation." ISWG-STCW 1/2/16 highlights the provisions' gaps for newer technologies in education and training. As noted, just as personal computing and the internet revolutionised knowledge sharing, modern consumer electronics, like smartphones, tablets, and VR/AR systems, provide accessible and flexible tools for training through virtual platforms and simulations (11).

D3 noted, "After the 2010 amendments, there was a large usage of simulations… now we may use VR goggles to simulate virtually." The increasing reliance on advanced simulation technologies underscores the necessity of revising the STCW framework to incorporate VR, AR, and other immersive tools. As emphasised in ISWG-STCW 1/2/10, VR and AR can potentially transform maritime training.

Additionally, D9 pointed out, "changes happened to separate conventions [which] influence STCW," highlighting the evolving interplay between the STCW Convention and other regulatory frameworks like SOLAS and MARPOL. This evolving regulatory environment requires periodic alignment of training standards, as recognised in ISWG-STCW 1/2/30, which suggests revisiting the STCW framework to ensure it reflects current operational realities. For example, implementing the Polar Code in 2017 led to new training requirements for seafarers operating in polar regions, including amendments to the STCW Convention (41).

The Impacts of the Pandemic.

The COVID-19 pandemic accelerated the adoption of online learning and blended models in MET. D13 noted, "The biggest change in maritime education is a wider acceptance of e-learning. Especially for a

theoretical part due to short technical advancements, but also the pandemic taught us." Similarly, D12 observed, "With COVID, we did things differently… now we use a more intuitive platform. There are mobile platforms, so it is a more blended approach." Blended learning, which combines the benefits of face-to-face and online methods, has been identified as a promising approach for higher education post-pandemic, highlighting the need for flexible and adaptable learning models that address technological access and digital literacy challenges (42). While blended learning has enabled continued education during the pandemic, it still faces general and MET-specific challenges that must be addressed to ensure long-term success (43).

These experiences underscore the adaptability of MET institutions in response to exceptional challenges. The lessons learned during the pandemic align with ISWG-STCW 1/2/16, highlighting the need to formalise e-learning methodologies and remote assessments as part of a resilient training framework. D14 remarked, "The comprehensive review should take into account the lessons learned during the COVID-19 pandemic," echoing the ISWG's emphasis on incorporating these practices into a more robust and flexible MET system.

The Future Directions for MET.

Stakeholders repeatedly emphasised the need for a forward-looking MET framework that addresses emerging industry demands. D6 emphasised, "We need to set up a framework which allows us for training people for… the new situation." Similarly, D2 noted, "Paper charts and other nautical stuff… may not form a significant part of the future."

D5 highlighted the gap in training for LNG ships, while D3 questioned, "What sort of curriculum might we need to build for ammonia as fuel? What sort of simulation do we need to have in place?". These concerns align with ISWG-STCW 1/2/35, which calls for integrating alternative fuel competencies into MET programs, supported by specialised simulation tools to address emerging operational risks. Research highlights the need for innovative approaches and courses that address emerging technologies, such as alternative fuels, within the traditional marine engineering curriculum (44).

D8 emphasised the "social and industrial demand for artificial intelligence and cybersecurity professionals that could not be provided in the maritime and shipping fields." This perspective reflects findings in ISWG-STCW 1/2/26, which advocates modernising MET curricula to include cybersecurity training and other digital skills, ensuring seafarers are prepared for the technological transformations and challenges reshaping the industry. Research also advises implementing continuous cybersecurity training and awareness programs (45).

The Role of Simulators.

Maritime simulators have become vital in supplementing shore-based training methods. Advanced simulators can recreate complex onboard conditions for emergency response, crew resource management, and crisis management training, enhancing the pedagogic value of MET (46). D5 highlighted their importance for specific tasks, stating that "manoeuvring in a storm" or "tanker advanced courses" are scenarios where simulators offer safe and effective training alternatives to real-world replication. D4 added, "Emergency simulators are the best because you cannot create emergencies on the ship."

Simulator selection criteria, encompassing technical, instructional, and organisational factors, often prioritise full-mission simulators as the most preferred option, followed by VR, cloud-based, and desktop

simulators, with sensitivity analyses revealing context-specific preferences (47). Technological advancements are reshaping maritime simulator training. D3 remarked, “The scenarios are getting so real that maybe you can do a large amount of training in a simulator rather than [required] shipboard experience.” D9 cautioned that simulator realism extends beyond visual fidelity. “Decision-making for collision regulations, emergencies, and navigation” remains critical, emphasising the role of simulators in fostering problem-solving and critical thinking skills.

D14 stated, “Increased use of simulation and remote learning will foster changes in how training is provided and competence assessed.” This transformation places new demands on institutions, which must adjust their methods to ensure training remains relevant and accessible, supported by ISWG-STCW 1/2/26.

D10 pointed to innovations like “VR, AR, and AI,” which enhance the realism and effectiveness of training. As emphasised in ISWG-STCW 1/2/46, these technologies lower costs and increase flexibility, particularly with the rise of remote learning. Research shows that VR simulators can offer customised training experiences by adjusting scenarios according to the trainee’s previous performance and specific learning needs with higher enjoyment, motivation, and lower cognitive load than a personal training procedure (48). However, challenges remain, such as an increase in simulator sickness symptoms over time in both VR and AR (49), which may impact their effectiveness in nautical training scenarios.

Resource disparities in simulator quality remain a significant challenge. D9 shared an experience at a training institution where the fire simulator was merely “a hand-drawn ship profile on a board,” underscoring the urgent need for consistent standards to ensure equitable training outcomes across institutions. D10 proposed establishing “a common minimum standard for simulator fidelity, functionality, and interoperability” to ensure consistent training outcomes while allowing for regional adaptations. Such a baseline would support flexibility without compromising quality. This disparity reflects the necessity for updated provisions, as echoed in ISWG-STCW 1/2/16, which calls for revised technical guidelines to standardise simulator use.

Section I/12 of the STCW Code sets general performance standards for simulators, requiring them to achieve sufficient behavioural and physical realism to ensure their relevance to training objectives. However, the regulation does not mandate specific types, fidelity levels or brands of simulators, such as full-mission, desktop, or VR, allowing institutions to select simulators that meet the required training outcomes and competencies.

Additionally, in the third column of the STCW Code’s specification of minimum standard of competence tables, which outlines methods for demonstrating competence, options include “approved simulator training” (1). While parties are responsible for “approving” simulators, they often lack the expertise or resources to conduct in-depth evaluations. In such cases, they may rely on external classification societies, such as Det Norske Veritas (DNV). DNV-ST-0033 Maritime Simulator Systems standards ensure that simulators meet high technical and operational standards and help mitigate disparities in simulator quality across MET institutions. For example, it classifies simulators into five categories, from high-fidelity full-mission simulators to special tasks simulators, ensuring alignment with diverse training needs and STCW competencies (29).

In summary, a forward-looking STCW framework should integrate technological advancements, address disparities in training resources and simulator standards, and establish clear, consistent guidelines to ensure that MET institutions globally can deliver high-quality, standardised, and future-oriented training.

4.2 Quality and Flexibility of Training Environments

This theme addresses quality enhancement, resource disparities, and variability in training practices. The analysis identifies key codes for this theme, including:

Quality in MET.

Integrating advanced technologies, effective instructional methodologies, and the availability of skilled trainers significantly impacts MET quality. A knowledge-based model design has been proposed to assess the compliance of MET institutions' quality management systems with ISO 9001:2015 standards, ensuring alignment with international benchmarks and identifying areas for continuous improvement (50).

D5 remarked, "We are going to add a lot of new competencies in relation to the digitalisation and future fuels… then that will have a substantial impact on the program, the curriculum, and the type of trainers." The digitalisation and automation of maritime operations will require substantial changes to MET programs (51). This aligns with ISWG-STCW 1/2/16, which stresses updating curricula and training infrastructure to accommodate new competencies.

D3 added, "The simulation trainer really needs to be trained on [new technologies]..." The ISWG-STCW 1/2/10 supports this, recognising that simulation trainers require specialised training to utilise modern simulation tools effectively. Even advanced simulators may fail to deliver optimal training without proper professional development. The self-efficacy of maritime instructors, particularly in using technology, plays a crucial role in creating effective learning environments (52).

Global Disparities in Resources.

The shift towards emerging technologies, such as simulation-based learning, poses significant financial challenges for many MET institutions, particularly in countries with limited funding. As D12 pointed out, "updating curricula requires investment in new materials, faculty training, and technology," which may strain already limited resources. D6 described the situation as "there is a very great difference on a global scale... they are not standardised, so it is like every state develops its own with their own technologies."

Global resource inequalities present a persistent challenge, with advanced tools like full-mission simulators remaining unaffordable for many institutions. VR and other cost-effective technologies are identified as potential solutions (47).

D9 stated, "Bridge full-mission simulators are becoming too expensive for everyone… virtual reality may be the answer." D4 added, "They do not have the finances to buy this simulator and maintain them." This observation echoes in ISWG-STCW 1/2/26, which highlights VR as an alternative. These financial barriers should be addressed to facilitate international collaboration and funding mechanisms, ensuring equitable access to training technologies across regions.

Variability in MET.

MET practices differ widely due to regional interpretations of STCW standards and national regulations. Training models vary in terms of cadet exposure to real-world conditions. D2 noted that "educational systems in the countries are very different." For instance, D10 explained that "cadets go to sea after 1 1/2 years in campus," gaining practical experience. D1 described a four-year program with "two sea phases," highlighting that sea time periods differ significantly. D5 echoed this, noting that students complete "2 years of in-school training and then go out for a year for their apprenticeship." Further, D13 described, "Phase One is college, phase two is sea, phase three is college." These differences reflect that countries follow different models that require flexibility within MET. As D2 highlighted, "two different approaches of achieving the same thing and basically there's no problem in doing so. It just has to be considered how you do it and why you do it… to ensure the good results." D5 added, "Everybody have their own type of trainings.. to fit in their national legislation so that's why flexibility is so important."

Seagoing service requirements and training approaches also vary widely. In some cases, simulators are used to replace portions of cadets' required sea time (53), sparking debate about whether simulators can maintain the same training quality as onboard practical experience. Concerns regarding the quality of onboard training further complicate the issue (35).

D9 pointed out the variability in sea service requirements, stating, "While some administrations require six months on vessels over 3,000 GT, others interpret it differently." Similarly, D9 observed that "some countries have training ships" to ensure practical training, whereas others lack such resources, creating further variation in cadet preparedness. This aligns with findings in ISWG-STCW 1/2/19, which stress the need for more explicit guidelines to harmonise sea service requirements and reduce inconsistencies across regions.

Variations also exist in assessment practices. D6 explained, "In some countries, the certificate is issued after you have done your examination; in others, it is like you have to go to the administration and be the centralised test there, and so it is all very different". D13 described their approach where "assessment is now digital... previously we used to have full written exams and face-to-face oral exams." Digital exams have introduced flexibility, yet they illustrate how national approaches differ in assessment strategies.

Variability in training models and assessment practices across regions underscores the need for more straightforward guidelines and harmonisation under the STCW framework.

4.3 Program Curricula Alignment with Industry Evolution and STCW Standards

This theme explores the alignment of MET curricula with the evolving demands of the maritime industry, advancements in technology, and the STCW standards. Key codes include:

Addressing Industry Needs and Challenges.

Emerging technologies such as alternative fuels and remote operations necessitate dynamic curricula. D13 stressed the increasing need for and importance of "future fuels" in training; as D5 noted, a significant increase in LNG-propelled vessels, suggesting that future training will increasingly need to cover various

alternative fuels and high-voltage systems. This aligns with the proposal in ISWG-STCW 1/2/35, which stresses the need for more explicit guidelines. Research on alternative fuels education highlights the need to update the curriculum and train seafarers to operate future ships (54).

Remote operations are another area requiring curricular updates. D12 argued, "Autonomous ships and digital systems should be reflected in the STCW framework." Research indicates that the current STCW Code is not fully applicable to Maritime Autonomous Surface Ships (MASS) operations (55, 56). The IMO plans for the mandatory MASS Code to enter into force by 2032, requiring amendments to the STCW Convention (57). D5 also noted that integrating competencies related to digitalisation would "substantially impact the program and the type of trainers." These observations highlight the need to balance general training and specific familiarisation (3).

D10 highlighted the importance of partnerships between training institutions and industry stakeholders to offer platforms that mimic "the various equipment that [cadets] are expected to see when they step on board," ensuring a smoother transition and minimising the risk of "culture shock" for cadets. Such partnerships could also enable the creation of mentoring programs that help cadets understand maritime risks and safety culture (58).

However, integrating specialised competencies into MET curricula is complicated by the conservative nature of the maritime industry, which, as D4 pointed out, operates a diverse fleet where modern, high-tech vessels and older ships continue to share the same ocean routes. Given the vast differences in ship technology, this diversity is a unique challenge in setting training standards.

Furthermore, D6 raised the concern, noting that the average seafarer's career lasts only about ten years before transitioning to shore-based roles. This high turnover worsens the industry's need for recruits, particularly as shipping faces a persistent shortage of qualified officers. D6 reflected that the goal should be to make the profession attractive enough to retain them long-term. A study highlighted that seafarers' career development should be considered when designing the future workforce in the shipping industry (3).

Adapting Curricula.

MET curricula increasingly incorporate interdisciplinary elements to address new environmental and regulatory challenges and advanced technologies. D10 emphasised integrating "emerging technologies, environmental regulations, and safety protocols" into traditional maritime training. To address these challenges, MET institutions must evolve their teaching methods and content to remain relevant (59). D8 described how their MET programs incorporate cutting-edge subjects such as "computer programming, algorithmic thinking, maritime artificial intelligence, machine learning for autonomous vessels, and maritime big data analysis." These curricula prepare cadets for the industry's needs and future demands in areas such as autonomous navigation, remote operations, and advanced propulsion systems.

Furthermore, modern cadets bring different learning behaviours and expectations to MET programs. D13 observed, "Modern seafarers do not learn the way that I have learned... patience and attention spans are low." To attract students, curricula must be engaging, incorporating digital tools while retaining rigour. Understanding students' factors is crucial for aligning program delivery with student needs (29). Over-reliance on digital tools may compromise foundational skills. D5 warned, "We must ensure we do not lose

the critical observational skills required for safe navigation." D7 similarly highlighted risks, stating that younger seafarers, while proficient with technology, may lack practical skills critical for operations.

D3 proposed a modular approach, where foundational skills are taught in the basic curriculum, and specialised competencies, such as those required for operating ships with new fuel types or digital navigation systems, are covered in elective or supplementary modules. Some studies suggest adopting a modular approach to MET, with a specialised course on energy-efficient ship operations (54, 60). D3 suggested, "microlearning, e-learning, gaming technology…can deliver more personalised training."

D10 noted that implementing updated curricula requires faculty members to receive training to stay current with "new technologies and teaching methodologies." D13 described the real challenge as upgrading facilities and transforming "the mindset of the personnel" who may resist new approaches due to a lack of experience with recent technological changes. This highlights the need for continuous professional development to ensure instructors are equipped with the latest skills (61).

Outdated competencies remain another challenge. D13 questioned the relevance of "sextant training," while D2 highlighted the issue of adding new topics without removing outdated ones, creating information overload. ISWG-STCW 1/2/1 suggests phasing out obsolete requirements.

IMO Model Courses and Lifelong Learning.

The IMO Model Courses provide detailed guidance on course content, teaching methods, and assessment criteria to help training institutions align their programs with the STCW requirements. D6 noted that model courses play a more central role in MET, but their non-mandatory nature within the STCW framework means institutions implement them to varying degrees. D7 highlighted that some nations adopt the model courses precisely as provided, while others modify them, striking a balance between standardisation and responsiveness to local industry needs.

One significant advantage of model courses is their adaptability in delivery methods. D3 emphasised the shift towards "blended learning," where courses combine classroom instruction, simulations, online learning, and practical workshops to address specific competencies. Such versatility ensures that model courses can be adapted to diverse educational contexts without losing alignment with international standards.

The importance of lifelong learning was also emphasised. D12 stated, "Continuous professional development is crucial to help seafarers stay current." As suggested by D3, modular systems allow learners to acquire specialised skills while maintaining a strong foundational base. This approach ensures that, even after initial certification, seafarers continue to engage with new practices, tools, and technologies that emerge throughout their careers, addressing both immediate industry needs and long-term professional growth (62).

D10 highlighted the "adoption of flexible learning pathway[s] to accommodate diverse needs and background[s] of seafarers." This aligns with recommendations in ISWG-STCW 1/2/30, which advocate for flexible training structures to support lifelong learning and skill upgrading for diverse learner profiles.

STCW Standards Compliance.

Challenges arise in ensuring consistent standards across regions due to broader contexts. D13 noted, "Different regulatory frameworks complicate efforts to standardise MET curricula." D2 emphasised the Bologna Declaration, introducing additional complexities and highlighting the need for harmonised efforts to align academic and vocational requirements. D10 added that MET programs under the Ministry of Education often blend maritime training with broader institutional modules, including "language and communication, teamwork, and IT skills." D2 explained, "Academic structures may not align with the vocational competencies needed for shipboard roles."

Further, D4 highlighted that vocational training centres and higher education institutions differ significantly in their flexibility to adapt curricula. Vocational centres, which are primarily focused on meeting STCW competencies, can adjust their content more readily to industry changes, while higher education institutions must adhere to stricter guidelines regarding course hours and content.

As highlighted in the study, regular audits and reviews are vital for ensuring compliance with international benchmarks by continuously monitoring and identifying gaps in quality management systems (50). D1 explained, "We do [audit] in every year or two... to ensure the integrity of our certification and training," highlighting the role of audits in assessing course content, teaching methods, and evaluations.

Additionally, collaborative platforms like the "Maritime Syllabus Committee" highlighted by D9 foster alignment between maritime training institutions, simulator manufacturers, and regulatory authorities.

A proactive and collaborative approach is essential to maintaining adaptive, standardised, and globally relevant MET programs.

4.4 HTW Delegation Engagement on STCW Review

Revising the STCW Convention requires collaboration among diverse stakeholders, including national delegations, industry representatives, and MET institutions. This theme captures the perspectives of stakeholders on the STCW framework and the importance of feedback mechanisms and cooperative efforts in reviewing STCW standards.

Stakeholders' Perspectives on STCW.

Emad and Ghosh (63) interviewed maritime stakeholders to identify essential skills and competencies for future operators. Their findings suggest a need to reform the STCW Code to make seafarers future-ready. Stakeholders agree that the STCW framework has struggled to keep pace with technological advancements and evolving industry needs. D3 noted, "Changes are happening, and STCW has not kept pace with the technological advancements."

The nature of the current framework was also critiqued. D6 noted, "The 2010 amendments introduced a rigidity… 78 was too flexible…" D2 described STCW as "quite prescriptive," contrasting it with more flexible and emphasising goal-based approaches like the Polar Code. D3 stated, "STCW, it is generic training. Everybody must go through those same training requirements… time has come to move forward

into more personalised training." This modular system would allow training to be more adaptable to specific job requirements.

Furthermore, varying interpretations and standards across countries add complexity as different states bring their own experiences and regulatory traditions. This can lead to discrepancies, particularly where simulators and non-traditional training methods are concerned, as highlighted by D6, who pointed out the challenge of achieving a "similar understanding" across member states.

Delegation perspectives converge on recognising the limitations of the current STCW framework but address different aspects: one critiques its overarching prescriptive nature, another emphasises the lack of personalisation within the training system, and a third highlights the challenge of balancing rigidity and flexibility, advocating for a middle ground to address evolving industry demands and adapt to unforeseen challenges such as the pandemic.

Feedback Mechanisms and Collaboration.

The success of the STCW revision depends on inclusive and transparent feedback mechanisms. D1 described a national working group model: "We meet every two months to bring together representatives from universities, industry, and regulatory bodies." Similarly, D2 emphasised the importance of collaboration. This underlines a common approach among many stakeholders who believe inclusivity in the feedback process ultimately leads to better outcomes. D1 elaborated on their approach, where regular updates are communicated through policy documents known as technical publications. "We keep them up to date so they can prepare accordingly and will not be surprised," highlighting the importance of transparency in managing expectations and preventing disruptions to training programs.

D3 explained, "Teams are divided into groups, each focusing on different chapters such as certification, engineering, and safety practices." This thematic approach enables in-depth analysis and targeted recommendations, effectively addressing specific challenges.

D10 explained that "a survey questionnaire is distributed to faculty members, students, and industry partners to gather feedback on the current training program and identify areas for improvement." This systematic approach to data collection allows for targeted insights, particularly in areas where training may need to adapt to new technologies or evolving industry practices.

According to the data, it has been observed that delegations employ different methods of working on reviews. While some have more structured and effective ways of working in collaborative and inclusive teams, others lack consultation with all stakeholders, particularly educators. However, it is clear that the success of the STCW revision hinges on transparency and inclusive collaboration among diverse stakeholders. As observed in some examples, feedback mechanisms, such as thematic working groups and systematic data collection, offer valuable opportunities. Active participation and stakeholder cooperation are essential to developing an adaptive, forward-looking STCW framework that aligns with evolving industry needs.

4.5 Summary of Key Proposals from HTW Delegation Document Submissions

This section summarises the document analysis, which is presented in Annex 2, highlighting key points identified from HTW delegation proposals limited to the scope of this study, including:

Seagoing Service Replacement.

The proposals aimed to establish a clear framework for considering the use of simulation as an alternative to a portion of the seagoing service requirement, while maintaining the quality of onboard training. This could include updating tables in the STCW Code to specify competencies that can be developed through simulators, along with their required duration.

Inclusion of Modern Technologies.

The current provisions have not adequately addressed emerging technologies, such as VR, AR, and AI. For example, sections A-I/12 and B-I/12 lack guidance on using modern simulation technologies for training. Proposals suggest revising these sections to include performance standards for new technologies and to incorporate guidance on integrating simulators with remote and digital learning methods.

Standardisation of Simulator Training.

Disparities in simulator quality and application highlight the need for minimum technical specifications for simulators and standards for instructor qualifications and trainee-to-instructor relationships. For example, proposed updates to Tables A-II/1 and A-II/2 emphasise the need for approved simulators in training and assessment, particularly for competencies involving advanced electronic navigation and emergency response.

Flexibility in Training Delivery.

Lessons learned from the COVID-19 pandemic underscored the potential of remote and distance learning. Proposals recommend integrating these approaches into STCW provisions to enhance flexibility without compromising the quality of training.

4.6 Actionable Insights

This study identifies actionable insights for both maritime educators and decision-makers, structured around the four themes presented in Figure 1.

Theme 1: Emerging Educational Technologies.

Stakeholders emphasised the need to incorporate competencies related to alternative fuels, cybersecurity, and automation into MET curricula. Advanced simulation technologies can support these areas. Equipping instructors to deliver such training requires continuous professional development, ensuring they remain competent in using modern tools and pedagogical approaches.

Theme 2: Quality and Flexibility of Training Environments.

Findings highlight the importance of blended and flexible learning models that combine online learning, microlearning to engage learners. Simulators should remain central to experiential learning, but curricula must be regularly updated to phase out outdated competencies. Addressing disparities in access to simulator resources requires collaboration between institutions and targeted support from regulators and funding bodies.

Theme 3: Programme Curricula Alignment with Industry and STCW Standards.

Curricula should be aligned with industry needs by integrating subjects such as alternative fuels, automation, and digital navigation, while maintaining foundational competencies. Modular curricula can support lifelong learning and upskilling, allowing seafarers to adapt to emerging challenges. Partnerships with industry are essential to ensure students gain exposure to real-world operational contexts and reduce transition challenges from training to shipboard roles.

Theme 4: HTW Delegation Engagement on STCW Review.

The active participation of MET educators in national HTW delegations is essential to ensure that institutional perspectives are included in the STCW revision. Formal feedback mechanisms, such as surveys and advisory committees, should be established to strengthen collaboration between policymakers and educators. Lessons learned during the COVID-19 pandemic, particularly regarding remote and flexible learning, should be formalised within the revised STCW framework to enhance resilience.

Cross-cutting Recommendation for Decision-Makers.

Policies are needed to harmonise interpretations of STCW requirements globally, particularly regarding simulator use and seagoing service equivalencies. Clear guidelines on minimum simulator specifications and instructor standards would reduce variability in training outcomes. Regulators should also consider developing a centralised IMO monitoring system to evaluate the effectiveness of revisions and ensure continuous improvement.

Limitations.

This study primarily focuses on policy-level stakeholders (HTW delegations) and documents available as of December 2024. As the HTW review is ongoing, subsequent submissions may change the evidentiary base; therefore, findings should be interpreted as time-bounded.

Additionally, the distribution of interview data across themes was uneven. Some delegates hesitated to respond fully on certain topics, while others provided overlapping input, which reduced the number of distinct comments. To maintain readability, similar remarks were consolidated rather than repeated. In addition, some themes emerged deductively from the analysis and, although supported by fewer statements, were still considered important to reflect the diversity of perspectives.

5. Conclusion

This study provides an in-depth analysis of decision-makers' perspectives and submissions on the comprehensive review of the STCW Convention, highlighting key areas where revisions are necessary. The findings underscore the importance of integrating emerging technologies to enhance training quality and align MET with the operational realities of modern shipping. However, significant challenges persist, including global disparities in resource availability, inconsistencies in interpreting STCW standards, and the lack of guidance for incorporating advanced technologies into training frameworks. This study contributes to the academic and policy discourse by offering actionable insights.

For maritime educators, it highlights the need for dynamic and interdisciplinary curricula that integrate foundational knowledge with specialised competencies to meet modern industry demands. It also stresses the importance of adopting flexible learning models, including e-learning and blended methodologies. Continuous professional development for trainers and investment in state-of-the-art technologies are crucial to ensuring MET remains relevant and effective.

For decision-makers, it highlights the potential of simulators and digital learning tools to improve the practical application of training, addressing regional disparities, and standardising training methodologies to ensure globally consistent competencies among seafarers. The study also suggests that collaborative platforms, effectively involving MET institutions, are vital for ensuring the revised STCW framework is forward-looking and globally consistent.

While this study focuses on two identified areas of the ongoing STCW review, future research should address additional themes for the HTW`s phase 2 STCW revision process. By fostering collaboration and embracing innovation, the ongoing STCW review has the potential to shape a progressive, inclusive, and future-ready framework that equips seafarers with the skills needed to navigate the complexities of modern maritime operations.

Data availability statement

We have made our data available in a data sheet on the Open Science Framework: https://osf.io/5qnhd/?view_only=eadf08e8deba434abb12e6d44244decc for evaluating the validity and reliability of our work and to facilitate follow-up research.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT in order to improve language and readability, with caution. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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References

[1] International Maritime Organization, Conference of Parties to the STCW Convention 1978, (2010).
[2] Ghaforian Masodzadeh P, Baumler R, Gonzalez Celis J, Ballini F, Ölçer AI, editors. STCW requirements in a regulatory and technology landscape change2024: Universitat Politècnica de Catalunya. Iniciativa Digital Politècnica.
[3] Baum-Talmor P, Kitada M. Industry 4.0 in shipping: Implications to seafarers' skills and training. Transportation research interdisciplinary perspectives. 2022;13:100542.
[4] International Maritime Organization. Report of the Maritime Safety Committee on its 105th Session. MSC 105/20/Add.2. London: International Maritime Organization; , (2022).
[5] Sub-Committee on Human Element, Training and Watchkeeping. 9th session, Agenda item 15., (2023).
[6] Sub-Committee on Human Element, Training and Watchkeeping. 10th session, Agenda item 6. Report of the Correspondence Group. HTW 10/6., (2023).
[7] Makkonen T, Repka S. The innovation inducement impact of environmental regulations on maritime transport: a literature review. International Journal of Innovation and Sustainable Development. 2015;10:69-86.
[8] Hasanspahić N, Vujičić S, Čampara L, Piekarska K, editors. Sustainability And Environmental Challenges Of Modern Shipping Industry 2020.
[9] Palaniappan M, Vedachalam N. Climate-Resilient and Eco-Friendly Shipping: Mapping the Trends. Marine Technology Society Journal. 2022.
[10] Emad GR, Enshaei H, Ghosh S. Identifying seafarer training needs for operating future autonomous ships: a systematic literature review. Australian Journal of Maritime & Ocean Affairs. 2022;14(2):114-35.
[11] Mallam SC, Nazir S, Renganayagalu SK. Rethinking maritime education, training, and operations in the digital era: Applications for emerging immersive technologies. Journal of Marine Science and Engineering. 2019;7(12):428.
[12] Kim T-e, Perera LP, Sollid M-P, Batalden B-M, Sydnes AK. Safety challenges related to autonomous ships in mixed navigational environments. WMU Journal of Maritime Affairs. 2022;21(2):141-59.
[13] Scanlan J, Hopcraft R, Cowburn R, Lützhöft M. Maritime education for a digital industry. 2023.
[14] Erstad E. Operational training for enhanced maritime cyber resilience: Bridging safety and security through maritime education and training. 2024.
[15] Nganga A, Scanlan J, Lützhöft M, Mallam S. Enabling cyber resilient shipping through maritime security operation center adoption: A human factors perspective. Applied Ergonomics. 2024;119:104312.

[16] Nordeng T. The role of green technology in education of Marine Engineers: University of South-Eastern Norway; 2021.
[17] Venkadasalam S. Addressing the Training Gap for Ammonia-Fuelled Propulsion Systems: A Literature Review and Proposal for a New Job Training Program. Asean Journal of Engineering Education. 2023;7(2):42-50.
[18] Oksavik A, Hildre HP, Pan Y, Jenkinson I, Kelly B, Paraskevadakis D, et al. Future skills and competence needs. 2021.
[19] Kim J, Lee C-h, Jeong M-s, Cho E, Lee Y. Identifying Optimal Approaches for Sustainable Maritime Education and Training: Addressing Technological, Environmental, and Epidemiological Challenges. Sustainability. 2023.
[20] Sharma A, Kim T-E, Nazir S. Implications of Automation and Digitalization for Maritime Education and Training. Springer International Publishing; 2021. p. 223-33.
[21] ICS B. BIMCO, International Chamber of Shipping. Seafarer Workforce Report: A global supply and demand forecast for seafarers in the merchant marine fleet. London: BIMCO & ICS; 2021. Available from: https://www.bimco.org/about-us-and-our-members/publications/seafarer-workforce-report.
[22] Sharma A, Kim T-E. Exploring technical and non-technical competencies of navigators for autonomous shipping. Maritime Policy & Management. 2021:1-19.
[23] Kumar N, Rajini G, Castillo-González DW. Reimaging maritime education and training using latest technologies. Salud, Ciencia y Tecnología - Serie de Conferencias. 2024.
[24] Türkistanlı TT. Advanced learning methods in maritime education and training: A bibliometric analysis on the digitalisation of education and modern trends. Computer Applications in Engineering Education. 2023;32.
[25] Sellberg C. Simulators in bridge operations training and assessment: a systematic review and qualitative synthesis. WMU Journal of Maritime Affairs. 2017;16(2):247-63.
[26] Renganayagalu Sk, Mallam SC, Nazir S, Ernstsen J, Haavardtun P. Impact of Simulation Fidelity on Student Self-efficacy and Perceived Skill Development in Maritime Training. TransNav, the International Journal on Marine Navigation and Safety of Sea Transportation. 2019.
[27] Weissenberger F. Implementation of Virtual Reality (VR) simulators in Norwegian maritime pilotage training: UiT The Arctic University of Norway; 2022.
[28] Kim T-e, Sharma A, Bustgaard M, Gyldensten WC, Nymoen OK, Tusher HM, et al. The continuum of simulator-based maritime training and education. WMU journal of maritime affairs. 2021;20(2):135-50.
[29] Karahalil M, Lützhöft M, Scanlan J. Factors impacting curricula in maritime simulator-based education. WMU Journal of Maritime Affairs. 2024.
[30] Cardno C. Policy Document Analysis: A Practical Educational Leadership Tool and a Qualitative Research Method. Educational Administration: Theory and Practice. 2019.
[31] Adams WC, editor Conducting Semi-Structured Interviews2015.
[32] Robinson OC. Sampling in Interview-Based Qualitative Research: A Theoretical and Practical Guide. Qualitative Research in Psychology. 2014;11(1):25-41.
[33] Rubin HJ, Rubin IS. Qualitative interviewing: The art of hearing data: sage; 2011.
[34] Pessoa ASG, Harper EA, Santos ICS, Gracino MCdS. Using Reflexive Interviewing to Foster Deep Understanding of Research Participants' Perspectives. International Journal of Qualitative Methods. 2019;18.
[35] Vivek R, Nanthagopan Y, Piriyatharshan S. Beyond Methods: Theoretical Underpinnings of Triangulation in Qualitative and Multi-Method Studies". SEEU Review. 2023;18:105 - 22.
[36] Figg C, Wenrick M, Youker C, Heilman J, Schneider C. Implications and Benefits of a Long-Term Peer Debriefing Experience on Teacher Researchers. Brock Education Journal. 2009;19(1).

[37] Braun V, Clarke V. Using thematic analysis in psychology. Qualitative research in psychology. 2006;3(2):77-101.
[38] Clarke V, Braun V. Thematic analysis. The journal of positive psychology. 2017;12(3):297-8.
[39] Herzog C, Handke CW, Hitters E, editors. Thematic Analysis of Policy Data2017.
[40] Fereday J, Muir-Cochrane E. Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development. International Journal of Qualitative Methods. 2006;5:80 - 92.
[41] Engtrø E. A discussion on the implementation of the Polar Code and the STCW Convention's training requirements for ice navigation in polar waters. Journal of Transportation Security. 2022;15:41 - 67.
[42] Imran R, Fatima A, Elbayoumi Salem I, Allil K. Teaching and learning delivery modes in higher education: Looking back to move forward post-COVID-19 era. The International Journal of Management Education. 2023;21(2):100805.
[43] Renganayagalu Sk, Mallam SC, Hernes MS. Maritime Education and Training in the COVID-19 Era and Beyond. TransNav, the International Journal on Marine Navigation and Safety of Sea Transportation. 2022.
[44] Inal OB, Dere C, Zincir B, Deniz C. Hybrid propulsion and alternative fuels education in the course of decarbonised shipping. Australian Journal of Maritime & Ocean Affairs. 2022;14(2):97-113.
[45] Kurt YB, Uflaz E, Akyuz E, Kurt RE, Turan O. Analysis of Human Reliability in Detecting GPS Spoofing on ECDIS in Congested Waterways under Evidential Reasoning and HEART approach. Computers & Security. 2025:104316.
[46] Baldauf M, Dalaklis D, Kataria A. Team training in safety and security via simulation: a practical dimension of maritime education and training. Proceedings of INTED2016 Conference; Valencia, Spain2016.
[47] Tusher HM, Munim ZH, Nazir S. An evaluation of maritime simulators from technical, instructional, and organisational perspectives: a hybrid multi-criteria decision-making approach. WMU Journal of Maritime Affairs. 2023.
[48] Vaughan N, Gabrys B, Dubey VN. An overview of self-adaptive technologies within virtual reality training. Computer Science Review. 2016;22:65-87.
[49] Pettijohn KA, Peltier C, Lukos J, Norris JN, Biggs AT. Virtual and augmented reality in a simulated naval engagement: Preliminary comparisons of simulator sickness and human performance. Applied ergonomics. 2020;89:103200.
[50] Pehlivan D, Cicek K. A knowledge-based model on quality management system compliance assessment for maritime higher education institutions. Quality in Higher Education. 2021;27:239 - 63.
[51] Sharma A, Kim T-e, Nazir S, editors. Implications of Automation and Digitalization for Maritime Education and Training2021.
[52] Sharma A, Nazir S. Assessing the Technology Self-Efficacy of Maritime Instructors: An Explorative Study. Education Sciences. 2021.
[53] Equivalent arrangement accepted under article IX, statement by the Government of the Netherlands. STCW.2/Circ.7., (2000).
[54] Inal OB, Dere C, Zincir B, Deniz C. Hybrid propulsion and alternative fuels education in the course of decarbonised shipping. Australian Journal of Maritime & Ocean Affairs. 2021;14:97 - 113.
[55] Ghosh S, Emad GR. Skills and Competency Framework for Future Autonomous Ship Operators: A Feasibility Study for STCW Code Revision. EPiC Series in Technology.
[56] Kim T-e, Mallam SC. A Delphi-AHP study on STCW leadership competence in the age of autonomous maritime operations. WMU Journal of Maritime Affairs. 2020;19:163-81.
[57] IMO. Autonomous shipping 2024 [Available from: https://www.imo.org/en/MediaCentre/HotTopics/Pages/Autonomous-shipping.aspx.

[58] Nicolae F. Mentoring Seafarers for Understanding Maritime Risks and Safety Culture on Board. Scientific Bulletin of Naval Academy. 2023.
[59] Johnson EMS. Exploring the effects of technology and innovation on changing market requirements and the evolving maritime curriculum. Worldwide Hospitality and Tourism Themes. 2020;12:69-79.
[60] Banks C, Lazakis I, Turan O, editors. An approach to education and training of seafarers in low carbon – energy efficiency operations2011.
[61] Vujičić S, Hasanspahić N, Gundić A, Hrdalo N. Assessment for Ensuring Adequately Qualified Instructors in Maritime Education and Training Institutions. American Journal of Sociology. 2020;7:115-26.
[62] Sogor A. Lifelong learning: the 21st century skill to guide maritime training and development. Proceedings of the International Maritime Lecturers' Association Seas of transition: setting a course for the future. 2021.
[63] Emad GR, Ghosh S. Identifying essential skills and competencies towards building a training framework for future operators of autonomous ships: a qualitative study. WMU Journal of Maritime Affairs. 2023:1-19.

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Attachment

Attachments

Annex 1: HTW Interview Questions

Annex 2: Table 1 HTW ISWG Documents

Annex 3: Thematic Analysis of HTW Interview Data

Annex 4: Ethical approval and Consent Form

Annex 1

Sub-Committee on Human Element, Training and Watchkeeping (HTW)
Interview Questions for Delegations

1. At HTW 10, 22 preliminary specific areas were identified for the comprehensive review of the STCW Convention and Code. To be comprehensive, the scope should include all pertinent issues and provisions of the STCW Convention and Code, including the articles.

   Q. Which specific areas are of particular interest to your delegation?

2. The last comprehensive review of the STCW resulted in the 2010 Manila Amendments reflecting emerging technologies advancements, introducing new training and certification requirements and methodologies, and improving mechanisms for enforcement of its provisions.

   Q. Could you outline how maritime education and training have changed since then?

3. The dynamic nature of maritime training and education constantly introduces new practices and methodologies. Witnessing these changes firsthand provides valuable insights into what could enhance the STCW framework.

   Q. Which of the changes that you have witnessed in maritime training and education do you believe should be formalised into the STCW framework?

4. The role of research in aiding policymakers and comprehending how maritime higher education and training institutions can adjust their programs to conform to emerging standards is vital.

   Q. What mechanisms are in place to gather feedback before, during and after the review and revision process from maritime higher education institutions in your country?

5. The upcoming STCW revisions are expected to bring significant changes to maritime education programs, particularly in the areas of curriculum development and pedagogical approaches.

   Q. How do you foresee the upcoming revisions will impact education programs, particularly in terms of curriculum?

6. Considering the anticipated amendments to the STCW and the evolving landscape of maritime education, implementing these changes into existing curricula poses its own set of challenges.

   Q. **What challenges do you anticipate in integrating the upcoming STCW amendments into maritime higher education institutions curriculum?**

7. With emerging technologies becoming increasingly prominent in maritime education and training, the STCW's preliminary review list rightly includes a focus on these areas.

   Q. Do you think changes to the STCW framework are necessary to better facilitate the use of simulators?

8. Simulators offer a unique and immersive learning experience, and as discussed in previous HTW meetings, they potentially can serve as an alternative or supplement to traditional seagoing service requirements in training.

   Q. Do you think the use of simulation could be an alternative to a portion of a requirement for seagoing service?

9. Given the growing importance of maritime simulator-based education, it's crucial for research to target specific areas that enhance its effectiveness and relevance.

   Q. Considering maritime simulator-based education, what aspects should researchers particularly focus on to ensure research remains relevant and contributes effectively?

   (Ethical approval was obtained from the Data Protection Services of Sikt – Norwegian Agency for Shared Services in Education and Research (Reference number 437481) - Annex 4)

Annex 2

Table 2 HTW- Intersessional Working Group (ISWG) Documents

Gap Existing provisions	**Review of Proposals** Key recommendations:	**Document No**
Regulation I/1, I/12, II/1, III/1 Sections A-I/1, A-I/12, A-II/1 and A-III/1 Sections B-I/1, B-I/12, B-II/1 and B-III/1	➢ Revise technical specifications for simulators, instructor qualifications, and methodologies to ensure consistency and effectiveness. ➢ Seagoing time can be replaced with time spent in simulators (e.g. Collision Avoidance, Emergency Management, Communication). Creating an agreed framework for maintaining flexibility for Parties that replacement is an option rather than a requirement. ➢ Incorporating additional tools such as distance learning and digitalisation to complement simulator-based training.	ISWG-STCW 1/2/10
Regulation I/12, paragraph 1.1	➢ The term "mandatory" in section A-I/12 does not clearly define whether it refers to training required under national provisions or training explicitly specified in the STCW Code to be conducted using simulators. Some Parties interpret mandatory training as aligned with national regulations. Others believe it refers strictly to training requirements explicitly detailed in the STCW Code. ➢ Clear definitions and harmonised interpretations are required to avoid inconsistencies in how mandatory simulator-based training is applied and enforced across Parties. ➢ Consider revising section A-I/12 to: - Specify the scope of mandatory simulator-based training. - Define whether it applies universally or is subject to national discretion. ➢ Provide explicit examples or a list of training areas that require simulator use.	ISWG-STCW 1/2/11
Regulations II/1-II/5 Sections A-II/1 - A-II/5 Regulations III/1 -III/7 Sections A-III/1 - III/7 Regulations V/1-1 - V/4 Sections A-V/1-1 - V/4	➢ Establish clear guidelines in the STCW framework to permit the use of simulator-based training as a partial alternative for seagoing service, targeting specific competencies that can be effectively developed through simulation. ➢ Amend relevant sections of Part A in the STCW Code to set a maximum allowable proportion of simulator-based training that can replace seagoing service.	ISWG-STCW 1/2/16
Section A-I/12 Section B-I/12	➢ Amend paragraph 1 of section A-I/12 to include provisions for non-mandatory simulator training to meet specific training requirements. ➢ Revise section A-I/12 to incorporate performance standards for modern simulation technologies.	ISWG-STCW 1/2/16

IAMU International Association of Maritime Universities (HVL)

	➢ Update section B-I/12 to reflect changes made to section A-I/12, ensuring comprehensive and consistent guidance on the use of modern simulation tools. ➢ Assess whether specific provisions for simulator use should be made mandatory based on their effectiveness in addressing identified training gaps and competencies. ➢ Create updated guidance for types of simulators not currently covered under the existing provisions, ensuring that the STCW framework remains relevant and includes emerging simulation technologies.	
Section A-I/6 Section B-I/6	➢ Develop specific provisions to formalise distance learning and modern educational technologies. ➢ Integrate proven practices and insights gained during the pandemic, such as online platforms and blended learning approaches, to enhance training delivery. ➢ Revise relevant sections of the STCW Code to account for advancements in distance learning techniques, including interactive e-learning and virtual classroom training methods.	ISWG-STCW 1/2/16
Regulation II/1	➢ Retain the requirement for a minimum of 12 months of seagoing service, with a provision to include a combination of simulator-based training and onboard experience. ➢ Ensure that no less than 6 months of seagoing service is conducted onboard as part of an approved training programme meeting the requirements of section A-II/1 of the STCW Code. ➢ Integrate VR simulation technology into the certification process to enhance training efficiency, reduce logistical challenges, and maintain high-quality outcomes. ➢ Propose VR-based simulation as an alternative to fulfil part of the current requirement of one month of approved seagoing service, specifically for the three mandatory bunkering operations on ships subject to the IGF Code.	ISWG-STCW 1/2/23
Regulation V/3	➢ Leverage highly realistic VR simulators and immersive technologies. ➢ Add an optional provision to Regulation V/3, paragraph 8, allowing approved simulator training to fulfil part of the existing requirement of one month of seagoing service, specifically for three mandatory bunkering operations. ➢ Develop simulation-based training modules that include scenarios for: ➢ Road tanker to ship, Bunker ship/barge to ship, Port terminal to ship ➢ Update training standards to include immersive technologies and detailed bunkering operation replicas to ensure comprehensive and realistic training experiences. ➢ Ensure alignment with existing requirements in Regulation V/3 while providing flexibility for institutions and administrations.	ISWG-STCW 1/2/24
Regulations II/1, III/1 and III/6;	➢ Review the "Knowledge, Understanding, and Proficiency" (Column 2) and "Methods for Demonstrating Competence" (Column 3) in the relevant STCW tables. Define the minimum content and duration of onboard training and evaluate the	ISWG-STCW 1/2/25

Sections A-II/1, A-III/1 and A-III/6; Sections B-III/1 and B-III/6. Section B-I/12	effectiveness of these requirements to determine an optimal balance between simulator-based and onboard training. ➢ Provide detailed guidance and supporting documents to assist Parties in implementing the provisions for onboard training effectively, ensuring global consistency and compliance with standards. ➢ Amend simulator guidance to incorporate the latest performance standards for radar, GMDSS, and ECDIS technologies. Align this with updated recommendations, including the "Guidance on Good Practice for ECDIS" (MSC.1/Circ.1503/Rev.2).	
Section A-I/11 Section A-I/12, part-I	➢ It is proposed that simulator-based training and assessment be included as options to establish continued professional competence to revalidate certificates. ➢ 'Additional performance standards' provisions have not addressed ECDIS simulation operational capacities. It is proposed that ECDIS simulation operational capacities, as per all applicable performance standards adopted by the Organization, be included in the section.	ISWG-STCW 1/2/26
Regulation I/12 Section A-I/12 Section B-I/12	➢ Expand the definition of simulator training in Section A-I/12 of the STCW Code to include Augmented Reality (AR), VR, Mixed Reality (MR), and the Metaverse. ➢ Update the 'Standards governing for the Use of Simulators' in section A-I/12 to include performance standards, training, and evaluation procedures for modern digital technologies, including radar, ARPA, and ECDIS simulation, but do not include content on education and training based on new digital technologies. ➢ Enhance the 'Guidance regarding Training and Assessment' to include detailed methodologies for applying new digital technologies in education and training.	ISWG-STCW 1/2/30
Regulation II/1 Regulation III/1 Regulation III/6 B-III/1 B-III/6	➢ There are no clear standards on the exact duration or methods for approved seagoing service in the STCW framework. ➢ Review how simulation-based training and other alternative methods can replace portions of the approved seagoing service for onboard training, ensuring alignment with competency requirements. ➢ Assess the need for specific guidelines on the use of training ships, including: - Minimum standards for ship facilities and equipment. - The duration of training onboard these ships. - Competency areas where training ships offer unique advantages over simulators. - Evaluate whether experience gained on training ships should carry additional weight or be given special consideration compared to simulator-based training or traditional seagoing service. ➢ Develop clear and consistent guidelines for all methods of meeting seagoing service requirements, ensuring global uniformity and fairness in certification.	ISWG-STCW 1/2/30

Regulation II/1 Regulation III/1	➢ Add new paragraphs to Regulation II/1, which allows substituting approved seagoing services with alternative measures such as simulator training.	ISWG-STCW 1/2/43
Table A-II/1 Table A-II/2	➢ Revise Table A-II/1: - Update Rows 1–10 and 13 to emphasise the use of approved simulators during training. - Incorporate provisions for integrating modern technologies. - Highlight the importance of addressing the Human Element. ➢ Revise Table A-II/2: - Amend Rows 1–9, 15–16, and 19 to reflect the increased reliance on approved simulators for training. - Highlight position fixing accuracy and ensure seafarers' awareness of spoofing and jamming. ➢ Include guidelines for electronic resources and cutting-edge technologies specific to modern maritime operations. ➢ Revise the table to emphasise the need for more use of approved simulators during training.	ISWG-STCW 1/2/46
	Concerning the various proposals for simulator training and seagoing service, the Group noted the following views expressed: *.1 simulator training cannot cover the essence of shipboard experience, i.e. time-pressure management, multicultural training environment and movement of ships;* *.2 maximum period for simulator training/minimum period for seagoing service should be established;* *.3 careful consideration should be based on risk-based analysis;* *.4 flexibility should be given to the Administration;* *.5 simulator training can be applied only for initial certification for operational level and should not be used for qualifying for management level certificates and revalidation;* *.6 simulator training can be used for assessment;* *.7 clear criteria for equivalency should be established; and* *.8 simulator training should not downscale the existing requirements.* *The Group agreed that the use of simulators to meet a portion of seagoing service requirements was only appropriate for the first issuance of certificates of competency at the operational level, for certificates of proficiency issued under Chapter V and for revalidation.*	HTW 11/6

Annex 3

Table 2 Thematic Analysis of HTW Interview Data: Key Themes and Associated Codes

Theme 1		**Description**
Emerging Educational Technologies (3)		This theme captures the stakeholder views on technological advancements and post-2010 amendments, including responses to COVID-19 disruptions and predictions for the future of MET.
Nu	**Codes**	**Descriptions**
1	Post-2010 Manila Amendments	Reflections on developments since the 2010 Manila Amendments.
2	The Impacts of the Pandemic	Perspectives on impacts of COVID-19.
3	The Future Directions for MET	Perspectives on future directions of maritime education and training.
4	The Role of Simulators	Perspectives on maritime simulators and recent advancements.
Theme 2		**Description**
Quality and Flexibility of Training Environments (4)		This theme focuses on maintaining high training standards. It addresses challenges related to resource disparities, quality, and the flexibility needed to adapt to diverse MET environments.
Nu	**Codes**	**Descriptions**
1	Quality in MET	Perspectives on quality in MET.
2	Global Disparities in Resources	Resource availability across countries and the implications for uniform standards.
3	Variability in MET	Variations in methods and practices through MET programs.
Theme 3		**Description**
Program Curricula Alignment with Industry Evolution and STCW Standards		This theme explores the alignment of MET curricula with industry demands and STCW standards.
Nu	**Codes**	**Descriptions**
1	Addressing Industry Needs and Challenges	Aligning curricula with the evolving competencies demanded by the maritime industry while overcoming barriers to implementation.
2	Adapting Curricula	Adapting curricula with modern maritime operations or technologies.
3	IMO Model Courses and Lifelong Learning	Using IMO model courses as guiding frameworks for curriculum content and incorporating lifelong learning to keep seafarers updated with industry advancements.
4	STCW Standards Compliance	Ensuring MET curricula alignment with STCW requirements to maintain global training consistency. Balancing compliance with broader educational frameworks.
Theme 4		**Description**
HTW Delegation Engagement on STCW Review		This theme covers the perspectives on STCW and feedback mechanisms and collaborative efforts within delegations during the STCW review process.
Nu	**Codes**	**Descriptions**
1	Stakeholders' Perspectives on STCW	Perspectives on the content of STCW standards.
2	Feedback Mechanisms and Collaboration	Processes within each delegation for gathering, discussing, and formalising feedback on STCW revisions. Cooperative efforts between countries and organisations to ensure a globally harmonised approach to STCW updates.

Annex 3

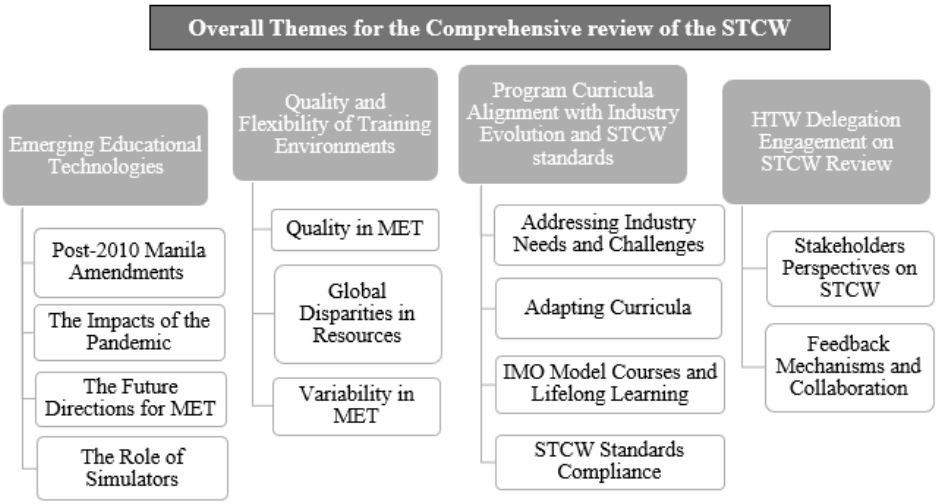


Figure 1 Themes and codes from the Thematic Analysis of HTW Delegation Interviews and Submissions (2022-2025)

Annex 4

Interview Consent form

Are you interested in taking part in the research project

"Contributing to the Revision of the STCW Convention and Code"

Purpose of the project

The International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) is a fundamental element in the global maritime sector, setting comprehensive standards for the training and certification of seafarers. The continuous and thorough review and revision of the STCW Convention and Code are essential to meet the evolving requirements of the maritime industry and to integrate technological advancements. This study aims to explore the comprehensive review process of the STCW Convention and Code, with a particular focus on its impact on maritime simulator-based higher education. It examines the implementation of the review process and evaluates the potential implications of revisions in the STCW provisions for the curriculum in Maritime Education and Training (MET) institutions. Additionally, the study explores the advantages and challenges associated with the use of simulators, as highlighted in the HTW10/6 report, the preliminary list of specific areas identified for the comprehensive review of the STCW.

The objective of this research is to present a comprehensive analysis of the STCW review process. The findings are intended to contribute to this process based on the existing relevant literature, offering suggestions for effectively navigating and adapting to these developments.

You are cordially invited to participate in an interview designed to gain deeper insights into the various delegation approaches and their contributions. The information obtained from this interview will solely be used for research purposes, and participant data will be presented using anonymous, fictional names for confidentiality.

Which institution is responsible for the research project?

Western Norway University of Applied Sciences (Høgskulen på Vestlandet (HVL)) is the institution responsible for the project.

Why are you being asked to participate?

The participants expected to have experience in the process of the comprehensive review of the STCW.

What does participation involve for you?

If you choose to take part in the project, this will involve that you will be interviewed. It will take max. 1 hour. Your answers will be recorded electronically for the transcription and data analysis.

Participation is voluntary
Participation in the project is voluntary. If you choose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you choose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data
We will only use your personal data for the purpose(s) specified here, and we will process your personal data in accordance with data protection legislation (the GDPR).

This projects' HVL leader will have access to the data from this interview.

I will replace your name and contact details with a code. The list of names and contact details will be stored separately from the rest of the collected data; I will store the data on a research server encrypted. The interview analysis will be used for project scientific articles.

What will happen to your personal data at the end of the research project?

The project is scheduled to end 01.09.2025. The personal data and digital recordings will be deleted at the end of the project.

Your rights
So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
- send a complaint to the Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?
We will process your personal data based on your consent.

Based on an agreement with HVL, The Data Protection Services of Sikt – Norwegian Agency for Shared Services in Education and Research has assessed that the processing of personal data in this project meets requirements in data protection legislation.

Where can I find out more?
If you have questions about the project, or want to exercise your rights, contact:

- HVL via Prof.Dr.Margareta Lützhöft
- Our Data Protection Officer: Trine.Anikken.Larsen@hvl.no, by telephone: +47 55 58 76 82
- The Data Protection Services of Sikt – Norwegian Agency for Shared Services in Education and Research, by email: (personverntjenester@nsd.no) or by telephone: +47 55 58 21 17.

If you have questions about how data protection has been assessed in this project by Sikt, contact:

- email: (personverntjenester@sikt.no) or by telephone: +47 73 98 40 40.

Yours sincerely,

Project Leader Research Fellow Meric Karahalil

Consent form

I have received and understood information about the project ”Contributing to the Revision of the STCW Convention and Code” and have been given the opportunity to ask questions. I give consent:

☐ to participate in *interview*

I give consent for my personal data to be processed until the end of the project.

(Signed by participant, date)



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