IAMU Student Forum 2023

11 - 13 July

International Maritime Organization Headquarters, London

IMO MARPOL AT 50 OUR COMMITMENT GOES ON

IAMU International Association of Maritime Universities

日本財団 THE NIPPON FOUNDATION

Table of Contents

Forward

The third IAMU Student Forum was held at the headquarters of the International Maritime Organization (IMO) in London on 11-13 July 2023. It was opened by Mr Kitack Lim, Secretary-General, IMO, Mr Yu Nakahiro, The Nippon Foundation and myself as Chair of the International Association of Maritime Universities (IAMU).

The event was coordinated by Prof. Graham Benton from the California State University Maritime Academy, and was attended by 45 students from 34 countries.

IAMU thanks the IMO for hosting the Forum and The Nippon Foundation for making the event possible by funding attendance and other expenses. We also thank the lecturers and industry facilitators who took part and their institutions for enabling their time away from their primary work.

The theme of the Forum was the same as the World Maritime Theme 2023: "MARPOL at 50 – Our commitment goes on".

During the forum, students were placed into 6 separate workshop groups led by leading academic facilitators, supported by professionals associated with the maritime industry to discuss current important topics that relate to the maritime industry.

The workshops aimed to analyse the biggest challenges for the modern maritime industry. Participants were actively involved in the discussions, exchanging their views and opinions and offering the best possible solutions for specific problems. Students identified and discussed important issues related to their topic, developed ideas, strategies, and solutions that deal with those issues. At the end of the workshop discussion, each group presented the results of their work and answered questions and addressed any doubts concerning their ideas and conclusions. Finally, each group has been obliged to write a short report, which describes the information developed during the workshop in detail.

The aims of the Student Forum were:

- to bring together the IAMU community with a focus on the future and tomorrow's leaders;
- broaden knowledge of the community, breaking down barriers and strengthening communications;
- strengthen education in maritime fields especially the STCW related degrees for officers' licenses, maritime business and logistics, as well as maritime engineering;
- promote the IMO and IAMU community to the world; and
- promote research in and for shipping by maritime personnel.

All participants received certificates of recognition. The event was complemented by a trip to the Royal Observatory and the National Maritime Museum in Greenwich.

Today, in a conflicted world, the Student Forum makes a small step for us to understand each other better – to emphasize that we are all more alike than we are different. So I encourage us all to remain in contact in as many ways as possible and where it is available through social media methods such as the IAMU Student Group.

I hope that all of the students, lecturers, facilitators and staff enjoyed the Forum as much as I did and that it leads to the start of lasting relationships. Finally, thank you once again to all participants for their enthusiasm, activity and hard work. I look forward to hearing of your future successes which may have started here at IAMU Student Forum 2023.

And finally, such a reflection: many of us come to the end of our career (I'm talking about my generation), so it is essential that we include the next generation of seafarers in these discussions. Our leaders of tomorrow are here with us, on our ships, in our offices, our universities, schools, MET centers and in our homes. We must engage in discussions with these younger career specialists and share our knowledge, experience and thoughts with them, because they will lead and manage our maritime industry in the future.

Prof. Adam Weintrit
PhD, DSc, FRIN, FNI Master Mariner
Chair of IEB, IAMU
President, Gdynia Maritime University

Executive Director's Note

The World Health Organization (WHO) ended the public health emergency of international concern (PHEIC) caused by Coronavirus disease 2019 (COVID-19) on 5 May 2023. For 3 years and 3 months since the declaration of PHEIC by WHO, more than 6.9 million people in the world were killed by the COVID-19.

Needless to say, IAMU member universities were seriously influenced with the social distancing measures that were implemented in their countries immediately after the declaration of the Pandemic in March 2020. According to the IAMU survey conducted in May 2020, 83% of member universities that responded to the survey shifted to full-time online/distance learning to continue their academic activities even during the pandemic period.

Soon after the declaration of the Pandemic, IAMU also decided to postpone the Annual General Assembly and the Student Forum that were planned in 2020. In 2021, IAMU held the 21st Annual General Assembly with the hybrid-procedure in which participants joined meetings in person or virtually. However, the Secretariat did not apply the hybrid-procedure for the student forum as I felt that a face-to-face event makes a much stronger and long-term network than a virtual event, especially for the young generation.

To successfully organize the IAMU Student Forum 2023, IAMU had great support from several organizations and individuals, such as The Nippon Foundation, The International Maritime Organization and other maritime organizations in London. My special appreciation goes to those who support this event.

Personally, I was very impressed by what students discussed during the forum. I realized that they would be our successors in the international maritime community and future Global Maritime Professionals. I am looking forward to reading this report edited by the organizer of IAMU Student Forum 2023, Dr. Graham Benton of California State University, Maritime Academy.

Takeshi Nakazawa, Ph.D.
Executive Director
International Association of Maritime Universities

Editorial Notes

The 2023 IAMU Student Forum, held at the International Maritime Organization (IMO) Headquarters in London, United Kingdom, from July 11 – 13, represented a joint effort between the International Association of Maritime Universities (IAMU) and the IMO, with the great support of the Nippon Foundation, to bring students together from around the world to engage with many issues related to the maritime industry and environment. By all accounts, it was a tremendous success. 45 students from 34 different countries were able to participate in a number of workshops, presentations, tours, and speeches. Through the forum, participants had the opportunity to connect and collaborate with educators and experts from across the spectrum of the international maritime world.

This Student Forum had an auspicious beginning: hoping to build on the great success of the 2017 Forum, plans were first developed for a subsequent, follow-up program in 2020; however, the global pandemic necessitated a postponement. Undeterred, the IAMU Secretariat, along with representatives from its member universities, began to develop plans for a virtual forum the following year. For a number of reasons –including the difficulty of hosting a multi-day forum with dozens of people across multiple time zones with different technologies – it was ultimately decided to postpone once again. The wait was worth it, and finally, in 2023 we were all able to meet in person.

This year, the main theme was designed to coincide with that of the IMO World Maritime Day for 2023: "MARPOL at 50 – Our Commitment Goes On." Under this major theme, the forum was broken down into six topics: "Sustainability of Maritime Education and Training," "MET in the Digital Age," "Greener Shipping," Gender Equality and Diversity," "Working and Living Conditions at Sea," and "Marine Resource Protection." Within each topic, a group of approximately eight students was able to work with a primary facilitator from an IAMU member university and a co-facilitator drawn from various maritime organizations and affiliations. This year the students were privileged to work with representatives from the International Chamber of Shipping, The Nautical Institute, INTERTANKO, the Women's International Shipping and Trading Association, the International Transport Workers' Federation, and the International Maritime Organization itself.

A unique feature of this forum was the ability to have students meet with their facilitators several times beforehand in a teleconference modality so that they could begin to engage with each other on their specific topics and come to the forum with concrete ideas and information. After several presentations and a tour of the IMO, students were able to engage with each other in order to produce very sophisticated and professional presentations by the end of the program. The results of these discussions and presentations form the content of the rest of this report.

Thanks to the very generous funding from the Nippon Foundation and support from the IAMU, the 2023 IAMU Student Forum enabled a large number of future mariners, students and scholars of the maritime world to collaborate, communicate, discuss pressing issues, and make international contracts and friendships which will shape our world for the next generation.

Dr. Graham Benton
Workshop organizer
Associate Provost and
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California State University Maritime Academy

Group 1

Topic

Sustainability of Maritime Education and Training

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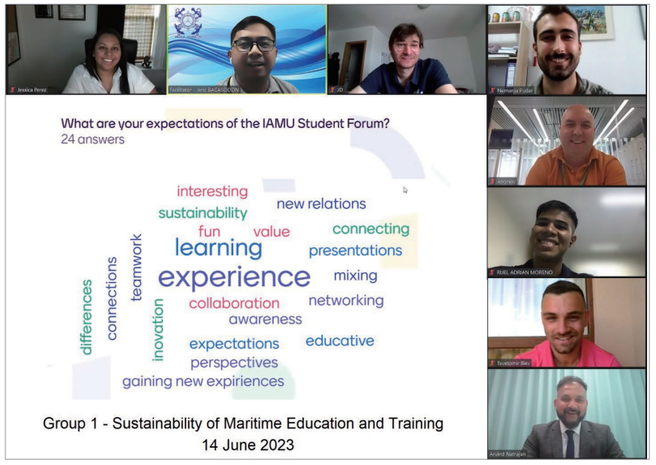
1. Summary

Sustainability of Maritime Education and Training is possible with collaboration

Sustainability of Maritime Education and Training (MET) could be defined in so many ways. The students considered factors that contribute to the sustainability of MET and highlighted three which include quality instructors, seafarer supply and adapting to technology among others. They have presented challenges for each of the factors and included their respective solutions. In conclusion, the students came up with their own definition of sustainability of MET.

2. Pre-Work

The students from Group 1 met virtually through video conference which enabled them to get to know one another. Below are their answers, presented in Word Cloud, when asked about their expectations of the IAMU Student Forum.



They were subdivided into three groups and were sent to breakout rooms to discuss their understanding of sustainability of Maritime Education and Training. Moreover, in preparation for the Student Forum in London, the following guide questions were given to the students:

a. What are the factors that contribute to the sustainability of Maritime Education and Training?
b. Considering the forecast that there will be a lack of supply of seafarers in the future, what should be done to attract the youth to take seafaring as a career?
c. Describe the challenges in attracting and retaining quality workforce (maritime instructors, assessors, etc.) in your institution. How can such challenges be addressed and mitigated?
d. In what ways and among which entities should collaboration and networking be demonstrated to contribute to the sustainability of MET?
e. The Global Maritime Professional (GMP) Initiative of the IAMU is designed to "meet the envisaged needs to industry and a rapidly evolving educational and career context while catering for the processional development aspirations of individual seafarers". Discuss and opportunities and challenges of GMP Initiative.
f. In shipping, technology advancements and other developments are often initiated by the industry. What measures should be taken to ensure that MET keeps with the pace of such advancements and stays relevant to the industry?
g. The maritime industry has experienced disruptions (e.g. COVID-19 pandemic, cyber attacks, etc.) and MET is no exception. What actions should be taken to keep MET resilient to such disruptions?

3. Student Forum Discussions

The discussions formed a critical part of the Forum where the students were able to engage in academic exchange of ideas, arguments and insights on their assigned topic. The students acknowledged the complexity of the idea of what a sustainable maritime education and training is. They started taking the definitions stated in Webster Dictionary and that of the United Nations. They also recognized that there are a lot of factors that contribute to the sustainability of MET. They presented them in a Word Cloud below:

And among all the factors mentioned, the students then proceeded with identifying key challenges, that when left unaddressed will affect the sustainability of MET. These included the following:

Lack of quality instructors

"How do you define quality instructor?" was the guide question to stir the discussion of the students. In the context of instructors teaching technical (some termed it as specialized or professional) courses, specifically for Navigation and Marine Engineering, two key expertise are being considered – **technical expertise**, qualifications for which is the sea service/experience of a seafarer and more importantly, if the lecturer is still being active sailing onboard ships. The students acknowledged that there is a gap between the theoretical aspect taught in MET institutions and the practical aspect actually being done onboard the ships. Active seafarers teaching during their vacation can bridge this gap. The other expertise is **pedagogical expertise**, where teaching experience and the obtained post graduate degrees (Masters and PhD) are being considered.

It is very rare to find instructors, who are PhD degree holders, and at the same time still active in seafaring and during their vacation from sea, they teach at the university. Most of the student's universities either have retired seafarers with PhD degrees or active seafarers with no post graduate degrees yet.

a. Declining seafarers supply

The students were asked to rate in the scale of one to ten, ten being the highest, how attractive seafaring as a career is to the youth in their countries. Most of the students answered average to low (one student even answered one), indicating that seafaring is not as attractive as a career unlike other professions. One exception was the student from the Philippines, who answered nine to ten. The most common reasons were lack of awareness and uncompetitive salary. If the status quo remains, there will be a lack of supply of seafarers in the future.

b.Keeping up with technology advancements

The discussion centered on the delivery of MET which is struggling to keep pace with the technology advancements usually brought by the industry. Keeping pace with such advancements will make the curriculum relevant and up-to-date.

After identifying the challenges, the students proceeded with finding solutions, considering the situations in their respective institutions and MET, in general. They harmonized their ideas and prepared for their presentation.

4. Student Forum Presentation

The presentation was another critical part of the Forum where students were given a chance to talk to the audience, present their output, and answer questions from the audience. The students of Group 1 divided their presentation to all members so that all of them can present. Aside from their identified challenges, they also presented their solutions.

a. For the lack of quality instructors

- **Instructors tandem teaching.** Active seafarers and other industry experts can be invited by the universities to teach specific topics in tandem with seasoned professors. Their collaboration can contribute to the development of both.
- **Professor exchange.** Universities can collaborate to conduct professor exchange programs in order to expose their instructors with the different learning approaches employed by other universities.
- **Institutions collaboration.** Universities can collaborate with the industry (shipowners, shipping companies, crewing agencies, etc.) to teach their students the latest advancements in the industry. Universities can also collaborate among themselves to exchange best practices. One of the best platforms for collaboration is the International Association of Maritime Universities (IAMU) – its organizes events and conferences.
- **Government funding.** The support of the government is also important particularly but not limited to providing funding for such programs.

b. For the declining seafarers supply

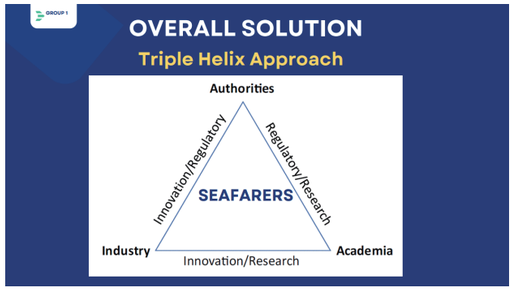
- **Raise awareness.** Raising awareness of what a seafaring career looks like from the early stages of education is key to some countries in order to attract the youth, including those who do not have seafarer relatives, to take up seafaring as a career.
- **Scholarships.** Some universities require high tuition and other miscellaneous expenses which could be relatively higher compared to non-maritime programs. Giving scholarships could attract the youth to take seafaring as a career, which is an effective practice of some universities. The IAMU, through its Fellowship Programs, provides scholarships to selected students from member universities.
- **GMP Initiative.** Implementing the GMP Initiative of the IAMU could make the seafaring profession more attractive. It is described to "meet the envisaged needs to industry and a rapidly evolving educational and career context while catering for the processional development aspirations of individual seafarers".

c. For keeping up with technology advancements

- **Upgrading training facilities and resources.** This includes applying modern training methods as well. However, it was emphasized that no technology can absolutely replace humans and over-reliance on technology may lead to disaster.
- **Engagement of the industry in training delivery.** Industry and academia collaboration will help end-users of technology to be equipped in optimizing their usage in the delivery of MET.

Overall, the students presented an overall solution based on the Triple Helix approach presented below:

They emphasized the need for collaboration between and among the stakeholders which include Academia, Industry, and Authorities for each other's benefit and for the benefit of the main stakeholder – the seafarers.



5. Conclusion

Mainly based from their discussions focusing on the challenges and solutions to MET sustainability, the students presented their own definition of Sustainability of Maritime Education and Training. They defined it as:

"Passing and transitioning knowledge, skills and competencies" which can be achieved with quality instructors. Attracting the youth to seafaring allows that such knowledge, skills and competencies will be passed and transitioned "through generations". This should be done "while improving systems to keep up with contemporary and future challenges using optimum resources", one of which is keeping up with the pace of technology advancements.

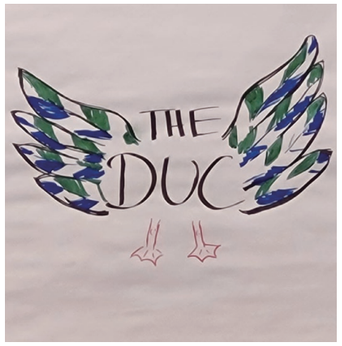
Passing and transitioning knowledge, skills, and competencies

through generations

while improving systems to keep up with contemporary and future challenges using optimum resources.

Student Comments in Topic 1 Group

- "The best part of forum is building connections and building international networks between other students from all over the world. Also learning and knowing the different ideas, stories, and cultures of people from the maritime industries."
- "It was a wonderful chance to work with students from all over the world. I learned so much from wonderful people."
- "Making professional acquaintances and making new friends! Familiarization with different views of the same topic from many different cultures."
- "The international cooperation was most beneficial. I loved making the presentation!"
- "The forum provided us with the opportunity to make something ourselves, instead of just being lectured at. What I learned here will stay with me for a long time."
- "In order to ensure the sustainability of MET it is crucial to foster collaboration and healthy competition within the institution. Through professor exchanges, and government funding we can enhance the quality of maritime education and prepare future professionals for the challenges ahead."



Group 2

Topic

MET in Digital Era

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1. Introduction

The topic given to Group 2 MET in Digital Era aligns with UN's Sustainable Development Goal #9: Industry, Innovation and Infrastructure. The topic title itself has generated extensive and multifaceted conversation before and throughout the Forum. The discussion is much more than the presentation at the end of the Forum.

2. Discussion Overview

The topic questions were handed out to the group about three weeks before the Forum. The discussion was around answering these questions:

- What is your understanding of MET in the current digital era?
- What is the mutual impact between MET in the current digital era and maritime industries?
- What is your understanding of the UN Sustainable Development Goal #9 – Industry, innovation and infrastructure (SDG 9) from the perspective of maritime industries?
- How can MET contribute to achieving the SDG 9?
- What is the role of digitalization in MET?
- Bearing SDG 9 in mind, what are the recommended MET practices and directions in a digital era?

The questions have laid the foundation for the discussion before and during the Forum and more issues and topics emerged from them. When the Zoom meeting was held one week after the questions were proposed, the group members were given a thought on the topic and questions, and even did some research including reading the relevant journal papers.

The discussion started with the first question set for the topic 'what is your understanding of MET in the current digital era?' The question has already sparked with the different understandings and interests from the different perspectives which makes the answers to the rest questions more comprehensive and thought provoking. Basically, two understandings have been indicated from the group for the first question: the current digitalization in MET and how MET can fit the current digitalized maritime industries. The discussion was then based on the understanding of the two aspects. Further, the background of the students and two facilitators are from two areas: seafaring and maritime business. This expands the discussion of the topic in a mutually understanding and coordinating way which also aligns with the opening speech of Mr

Kitack Lim, Secretary-General, IMO in terms of looking at a big picture of extending the maritime industry into the global supply chain.

The group realized the current status of digitalized maritime industries such as the advanced technologies of AI, blockchain, robotics, automated ports and vehicles and automated vessels. The group also exchanged the advanced MET facilities adopted by their institutions or peers including simulators, online courses, virtual and augmented reality, blended learning, and digital platforms for learning materials. Then everyone agrees on a realistic problem that the current MET cannot cope with the rapid growth of digitalization happening in the industries. To solve this problem while bearing the topic and UN SDG #9 in mind, a research goal was established which is to improve the MET through technology and best practices to increase the resilience of maritime infrastructure, encourage innovation and to diversify maritime industry and prioritize the human element in the industrialization. To achieve this goal, an extensive discussion began, and recommendations were proposed.

3. Discussion Findings

3.1 International standardization for instructors and teaching methods

Each nation and faculty impose their own standards on the competence levels of institutions and more specifically lecturers, leading to potentially sub-par education. An international "holistic" approach is required to facilitate an internationally standardized education. An example perhaps well known to many of us is that it might be years, if ever, our instructors have been to sea and as such the lessons learned might be out-dated Instructors should have mandatory sea-time at a minimum of one period, every 5 years and all parties should help to facilitate this. Some other examples include learning on obsolete simulators creates a gap in performance and results in an unrealistic experience and skills and training on sub-standards vessels might result in low-quality skills and knowledge.

The unavailability and inconsistency of standards of new teaching methods create different issues in the maritime industry. The issues include: 1) performance issues, i.e. the inability to perform on new technology creates inefficiency in operations; 2) standardization issues which hinder the ability to standardize maritime practices; 3) maritime functions issues which limit the understanding of the big picture within the maritime industry functions, such as the misunderstanding or no understanding between seafaring and maritime business and management; 4) safety aspects which may make lack of knowledge on new technology lead to hazardous situations; 5) working environment in terms of discrepancy in knowledge create a tense working environment; and 6) career development issues which slow career growth due to the scarcity of resources.

A single, holistic, easily accessible platform is expected which consists of current best practices and lessons learned, created BY ALL and FOR ALL members of IMO. This is due to a recognition that as you leave your school your education continues. You will never be 'finished' learning and your continuous professional development (CPD) is the backbone of the maritime industry. CPD is necessary for the individual to remain current in knowledge and practice and become competitive in this international industry. Therefore, a knowledge management system (KMS) was proposed based on the CPD method.

KMS is the tools and processes used to capture, store, and share knowledge and information. It can be used to manage and leverage of intellectual assets, expertise, and best practices. KMS has two functions: data/knowledge warehouse/database and knowledge/info sharing platform. The key features of KMS include content creation, content management, search and retrieval if information, collaborations between different users and analytics and reporting. A framework of 'APEA' (Act, Plan, Evaluate and Adjust) was suggested as a useful tool and procedure to execute the KMS in MET. 'Act' means establishing the best approach for making knowledge available through KMS. 'Plan' suggests IMO to adopt a KMS and integrate it into IMO memberships that everyone can access it. 'Adjust' the KMS resources based on the evaluation criteria established and 'Evaluate' the effectiveness of KMS through feedback from IMO members and through managerial and operational KPIs.

3.2 Inclusivity in MET

Inclusive means providing equal access to opportunities and resources for people who might otherwise be excluded. If this is the case, then MET has yet to be inclusive since there is still a lack of advanced training equipment in some countries. While it is true that there are available equipment and facilities in these countries, these are inadequate. Hence, students have limited time to utilize such equipment and they would have limited and outdated knowledge of the equipment they'll be using daily on board. To solve this problem, three recommendations were proposed.

First, it is crucial to secure funding from international associations. This may include raising extra funds, setting minimum international standards for lecturers, and continuous professional development through access to regulated digital platforms. Although there are already funds being provided by the IMO through its Integrated Technical Cooperation Program (ITCP), it is important that students continuously learn through all means possible.

> *Note: IMO's ITCP addresses the maritime needs of developing countries by focusing on three priorities that, together, can ensure sustainable maritime development, efficient and safe maritime transport services, as well as effective environmental protection.*

Second, a global standard for lecturers needs to be established to ensure quality education aligns with digitalization across borders. Even the most advanced technologies won't serve their purpose if the instructor is not competent enough to teach. Therefore, we believe that it is important to have an international standard for lecturers as stated above to ensure that students are being taught by competent instructors.

Lastly, it is essential to enable continuous professional development, granting equal access to regulated digital platforms for all countries. The regulated digital platforms will positively impact the learning of students since they would have learning resources that are accessible. Included in these platforms would be information on how shipping works, since we have found that there are gaps between the ship-to-shore understanding.

4. Conclusion

In summary, the discussion and proposed solutions in standardization in instructors and teaching methods and inclusivity in MET can be used to mitigate the challenge that the current MET cannot cope with the rapid growth in the digitalized maritime industries. This can be done through establishing a knowledge management system (KMS) based on the CPD method, securing funding from international associations, a global standard for lecturers and continuous professional development and equal access to regulated digital platforms for all countries. Therefore, it achieved our goal set at the beginning of our discussion, i.e. to improve the MET through technology and best practices to emphasize the importance of building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation in maritime education and training in the digital era.

Student Comments in Topic 2 Group:

- "Sustainability and development of MGT in this very rapidly developing digital era is very important for every party that is included in shipping and the maritime industry itself. I have learned about different situations in other countries which now inform my position on many issues."
- "Digitalization is crucial for MET; maritime studies must be kept up to date with progress and technology."
- "It is important to cope with technological advancements so MET can have a consistent level of high quality. It is also important to digitize MET so that the maritime industry does not fall behind."
- "Digitization is not a vital part of an era and being able to integrate this into our current education system is extremely important."

Group 3

Topic

Greener Shipping

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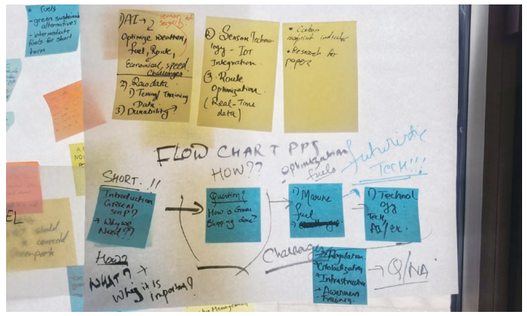

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1. Summary

Shipping can reach net zero by 2050... with help

Shipping moves 90% of traded goods globally making it highly efficient and irreplaceable. To eliminate the 2.7% of global GHG emissions attributed to shipping (more than most nations) by 2050, we need to adopt alternative fuels and leverage technological advances. However, there must also be shoreside capacity building and governmental funding.

2. Pre-Work

What is greener shipping?

In preparation for the IAMU student forum in London, students from Group 3 meet virtually through video conference and social media. To guide these preliminary discussions, the following questions were offered:

Current State of Greener Shipping

- What are some current best practices?
- How might those practices be more widely adopted across the maritime industry?
- What are some impediments to that adoption?

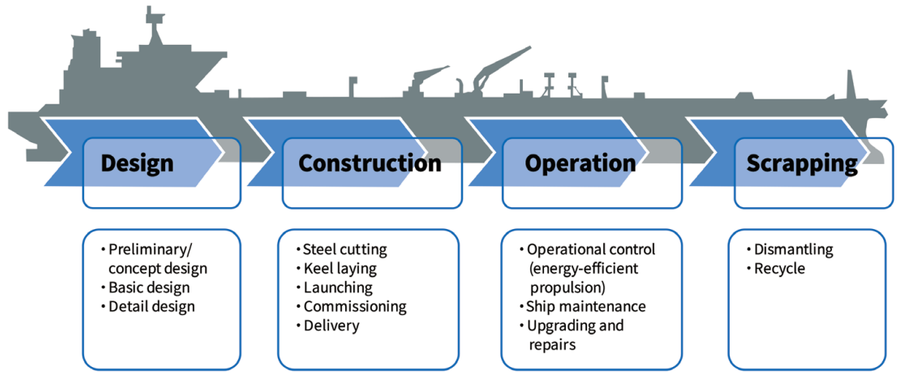
Future State of Greener Shipping

- How might the maritime industry further help regarding climate action through affordable and clean energy?
- What specific actions can shipping companies, regulators, and other stakeholders take to reduce the industry's carbon footprint and promote more sustainable practices?

IAMU Role in Greener Shipping:

- What role can MET institutions play in advancing green shipping and sustainable industry practices?
- How might you be better prepared to address the challenges and opportunities of the changing industry landscape?
- What skills and knowledge do you think will be important as a global maritime professional of the future?

They discussed the concept of greener shipping and eventually adopted a ship lifecycle approach for considering the "greenness" of shipping.



Ship lifecycle and key milestones.

Source: Ang et al., 2017

Students from Group 3 shared various resources on current "greener shipping" initiatives from their own nations – interestingly, these resources spanned all four main phases of ship lifecycle (above). Students also viewed a recent webinar from a maritime Climate Symposium. At that point in the process, Group 3 retained a rather expansive definition of greener shipping.

3. Introduction

What is Green Shipping?

"Green shipping" is shipping that avoids resource depletion (and preserves an ecological balance for future generations). While an inclusive definition of green shipping may consider all pollutant pathways, most attention is currently on driving down GHG emissions, ultimately to net zero. "Greener shipping" would be an incremental rather than absolute approach to GHG emissions. Last week, the 80th session of the IMO's Marine Environmental Protection Committee (MEPC 80) adopted strengthened green shipping goals/strategy:

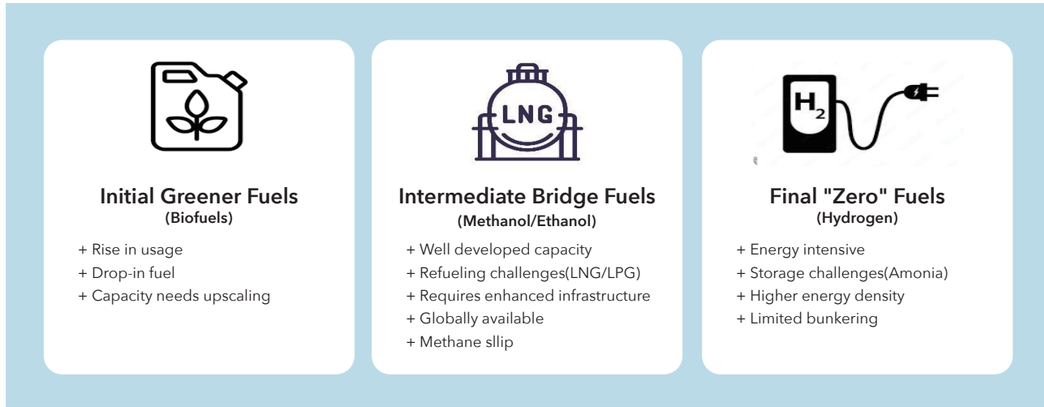
- By 2030, reduce GHG emissions by 20% (striving for 30%)
- By 2040, reduce GHG emissions by 70% (striving for 80%)
- Reach net zero by or about (i.e., close to) 2050

Even though there is considerable leeway in this definition, given time constraints, Group 3 adopted this narrower scope for "green shipping" (focused only on emissions).

Using brainstorming and nominal group techniques, the students identified dozens of issues worthy of consideration and discussion. Given the time constraints, Group 3 used multi-voting to identify the most important topics for further exploration. The top two topics were alternative fuels and technology.

4. Fuels

During several sessions of discussion and group work, the students from Group 3 identified a phased-implementation strategy that aligned with the IMO MEPC 80 green shipping goal/strategy. The following implementation timeline was offered:

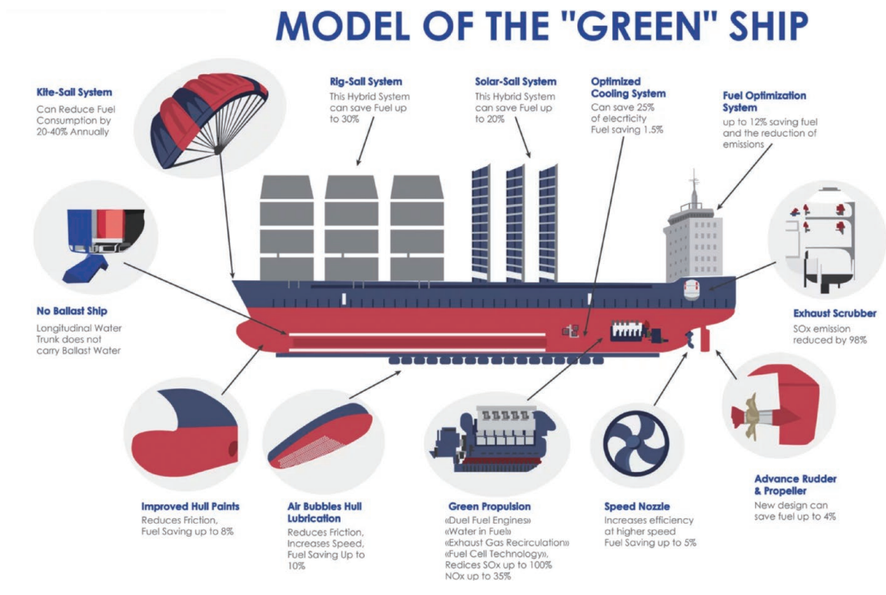


The students examined each of these fuel options and affirmed their potential feasibility. However, despite relative feasibility, the adoption timeline of net zero by 2050 will require significant advances and considerable investment to build out the necessary infrastructure to support the fuels.

5. Technology

Noting the significance of technology and innovation, the IMO chose "New Technologies for Greener Shipping" as its theme for World Maritime Day in 2022. The students explored various improvements to ship design (as depicted below). Green enhancements included:

- Solar-sail systems
- Green propulsion
- Kite-sail systems
- Fuel optimization
- Exhaust scrubbers
- Optimized cooling systems



Source: Marine Digital, 2023

The student group also discussed extensively the need for "tech" advances (e.g. AI and IoT powered by sensors and "big" data) that optimize all systems so as to minimize the fuel usage.

6. Conclusion

In general, there are many strategies for achieving net zero by 2050. These include the following:

- Transition to low- then zero-carbon fuels
- Energy efficiency improvements
- Electronification and hybridization
- Port infrastructure and shore power
- International standards and collaboration
- Financial incentives and support
- Research and development
- Public awareness and engagement

While the recent IMO net-zero goal/strategy is hopeful and technology is emerging to achieve that goal, it will need considerable investment and infrastructure to become a reality. Additionally, a public awareness campaign will be increasingly important given that shipping has the least g CO2 per ton-km of any transportation mode (and almost a factor of 100 less than air).

Student Comments in Topic 3 Group:

- "The discussions with other students regarding their opinions and experiences while sailing were most interesting!"
- "It is important to develop the students' curiosity: I learned a lot about green shipping from the group."
- "This workshop was amazing, and the ability to collaborate with other students was lifechanging."
- "Green shipping is essential to saving the planet and providing sustainable development of the maritime industry. There are many ways to obtain this goal including changes in ship construction, eco fules, and many others."
- "As a result of this forum and this topic, I wand to pursue environmental issues in the shipping industry more deeply in my studies now."
- "Green Shipping is one of the most important aspects of the entire shipping industry. There is little professional knowledge now, but we can help move this topic forward!"

Group 4

Topic

Gender equality and diversity

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1. Introduction

Shipping has traditionally been a strongly male-dominated sector. At present, women represent only 1.2% of the world's maritime workforce. However, according to the BIMCO/ICS 2021 Seafarer workforce report, the trend towards women's participation in the maritime sector is increasing positively compared to the corresponding report in 2015.

IMO aims to support women's participation both in land organizations and on ships. The IMO has contributed to increasing women's representation, for example through its Women in Maritime program, which has the slogan "Training-Visibility-Recognition".

IMO is strongly committed to helping its Member States achieve the UN 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs), particularly Goal 5 "Achieve gender equality and empower all women and girls" (IMO website, Women in Maritime).

2. Preparation before the Student Forum:

A welcome message was sent to the students in advance, providing general information about the student forum and which group they would be participating in. Students were asked to seek some pictures from their student days at university and/or working life in the maritime sector in order to better visualize gender equality and diversity, and thus stimulate debate on this objective of sustainable development in the maritime sector. Students were also asked to do some research on their country's statistics on the gender balance in the maritime sector in order to see what the situation of gender diversity in different parts of the world is.

Students had been sent questions in advance for consideration. The questions were:

- What do we understand about gender and how does it affect our perceptions and behaviors?
- What are the current challenges in respect to gender onboard the ships and elsewhere in the maritime industry?
- How can young people especially women be better attracted to the maritime sector?
- How could MET institutions and the maritime industry support the recruitment and success of female students in the maritime field?

Before the Student Forum, some students were able to participate in an online meeting, the purpose of which was to get to know the group, start networking and go through the objectives of the forum. A Whatsapp group was also set up for students to maintain contact.

3. In the Student Forum:

Work in the student forum working group was started by a presentation by members. Also, a short introductory speech was given on the subject, referring to the Sustainable Development Goals (SDGs) and how these are reflected in IMO work and elsewhere.The group started the discussion by going through the questions sent in advance, and the active discussion was allowed to sprout naturally around the topic. One student was selected to take notes on a computer and one student made notes on a note board. A few issues were raised from the group discussions, which the group started to work with more intensively, first in pairs and later with the whole group. Because the time allotted for the final presentation was limited, the issues raised were included in the presentation to a limited extent.

4. How Can We Support Women and Minorities?

The most important theme in the group's discussions was the question, how to support gender equality and diversity, and how responsibility for it could be shared between different stakeholders. In examining the issue, the roles of actors such as companies, government and non-governmental organizations in supporting women and minorities were examined.

4.1 Education

It is important for global trade, logistics and well-being that people are interested in the maritime sector and that young people are encouraged to choose to build a future career in the maritime industry. In many countries, there is already a shortage of seafarers and it can be seen that the situation will get even worse with retirement. New ways of thinking and ways of attracting young people to the sector are needed and reset the narrative by empowering women and minorities. Maritime universities play an important role in promoting education and creating images, guiding and supporting young people at the beginning of their careers.

4.2 Companies Attitudes, Responsibilities & Policies

The group discussed challenges such as:

- lower chances of employment,
- potential loss of career due to different reasons,
- hard living conditions onboard, women alone onboard.

Also solutions to attract women to the sector, in particular, and ways of supporting careers were raised.

- Parental leave entitlements should be accessible to everyone.
- Adapt policies to cover harassment and discrimination.
- Onshore jobs/training for seafarers who aren't able to work at sea while raising young families.
- Mentors before boarding and during contract.
- Connecting female seafarers with colleagues.

4.3 Governmental Support

In some countries, the government supports women's entry into the maritime sector through various means, such as scholarships, training grants or when in applying for male-dominated education. There are also different ways to improve career continuity and career development opportunities when shifting in from sea to land-based jobs.

The group identified existing actions to support women, for example:

- Safer Seas Act – US
- 'EMBARC – Every Mariner Builds a Respectful Culture' – vessel owners and operators must adopt the EMBARC standards before embarking cadets onboard.
- Women in Maritime campaigns etc.

4.4 Non-Governmental Organizations Support

Support and the role of private actors in improving gender diversity are important. There are many different NGOs with different structures and funding – all have different capabilities (WISTA, AWIMA, Women Offshore etc).

4.5 The DUC – Designated University Contact

The group presented the idea of the DUC (Designated University Contact) program, which would allow maritime universities to play a new role in supporting students during their internships.

A DUC program would be similar to a company DPA – but provided by the University for its students. This could be a health, safety and wellbeing measure put in place to help protect their students working in industry. The idea is that the DUC provides assistance to university students who are facing difficulties in the workplace when undertaking required work placements/internships throughout a course of study. The DUC should be a trained University staff member who is readily contactable for students to seek assistance or advice when needed. The DUC should be able to liaise with companies that employ their students.

The training required for a DUC should include a comprehensive understanding of the maritime industry, crisis counselling, cultural dissimilarities, local rules, regulations, and reporting requirements.

5. Conclusion

All in all, group 4 worked actively together, giving plenty of space to different ideas and opinions to understand the gender issues and to promote gender equality and diversity. The group also discussed many of the students' own experiences of ship training and gender encounters and treatment in the maritime sector. One of the conclusions of the discussions was that a great deal of work and a change in attitudes is still needed to make the position of women in shipping more equal and the sector more attractive. Role models and examples from working life are also still needed to raise awareness among children and young people planning their future at work. More information is also needed about the career opportunities and positive aspects of the sector.

Together, the group summarized the discussions and its main findings in the final presentation. Pictures requested from students in advance were used in the illustrations of the presentation.

Student Comments in Topic 4 Group:

- "Gender equality is a very broad topic: it is important that the possibilities for working are being improved for minorities – the topic is concerning for everyone at all times."
- "I wanted to take part in this specific group before the forum even started, but I have learned so much more about this issue and the government support for increasing female seafarers."
- "I learned that there is a shared experience for women in the industry and there is an existing bias in this male-dominated sphere. It is important to consider equality on all fronts, while not discounting differences between individuals.
- "Gender equality and diversity is a very important topic and I believe now there is sufficient momentum to see real change in the coming years."
- "As a woman, I experienced so much while being on board. Good things and bad things. This forum gave me an opportunity to finally speak up, share ideas, and hopefully bring change."

Group 5

Topic

Working and Living Conditions at Sea

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1. Introduction

Seven students from six different countries had chosen the topic of working and living conditions at sea. They spent 2 days on discussing potential problems and finding solutions on living and working at sea. Though some of the students did not have a comprehensive experience at sea the discussions were fruitful for both the students who are going to sail and for the students aiming at a career ashore. This combination of students was a perfect match, especially in order to close the gap between sea and shore.

In the end, the students presented their discussion, including potential solutions to the problems. The students ended up with 3 main topics: (1) Health, (2) Internal factors, and (3) External factors. The three topics will be presented in the following sections:

2. Health

2.1 Mental Health

The students initially shed light on the glaring lack of attention that mental health has received within the maritime sector. Recognizing the gravity of this under-researched topic, they collectively emphasized the urgent need to address mental health challenges faced by seafarers.

The consensus within the group underscored the pivotal role of training and awareness in dispelling the stigma surrounding mental health. They recognized that comprehensive training initiatives are essential for creating a culture of understanding and support. This training, they emphasized, should be seamlessly integrated into seafarers' education, promoting mental health awareness from the very outset of their careers.

The discussion further emphasized the significance of extending mental health training to those in shipboard supervisory positions. Acknowledging that supervisors play a critical role in fostering a supportive environment, the students proposed specialized training that equips them with the tools to identify and address mental health concerns among their teams.

The group collectively highlighted the undeniable impact of overall mental health on seafarers' retention rates. They delved into the profound relationship between positive mental well-being and positive physical health. By establishing this link, they emphasized the interconnected nature of mental and physical wellness.

In a noteworthy discovery, the students presented a clear correlation between mental health and seafarers' safety. They pointed out that seafarers grappling with depression or anxiety are twice as likely to experience injuries and illnesses while at work. This revelation underscored the urgent need to prioritize mental health initiatives not only for the well-being of individuals but also for the overall safety of maritime operations.

2.2 Relation between Mental and Physical Health

Central to their conversations was the consensus on the urgent need for standardization and regulation across the industry. Recognizing the disparities that currently exist, the students advocated for uniform guidelines that address both the mental and physical well-being of seafarers. This standardization, they believed, would set a precedent for improved conditions and comprehensive care.

In a nod to the technological advancements of the modern era, the students proposed the digitalization of medical assistance as a solution. They explored the potential of telemedical assistance, integrating real-time monitoring and video consultations. This approach, they argued, could bridge the gap between medical professionals on shore and seafarers at sea, enabling swift medical interventions and support.

Accessibility to medical assistance ashore emerged as another key theme in their discussions. The students recognized the need for efficient protocols that ensure seafarers can easily access medical care when required. By streamlining the process and establishing clear communication channels, they aimed to mitigate health-related concerns and improve the overall well-being of seafarers.

The group was steadfast in their commitment to preventive measures. They emphasized the importance of proactive initiatives to safeguard seafarers' health. One noteworthy suggestion was distinguishing between free time and sleep time. By clearly defining and respecting these periods, they believed that seafarers could experience better rest, leading to enhanced mental and physical health.

Quality of life was a significant focus of their deliberations. The students acknowledged the stark contrast between sterile and comfortable surroundings. They contended that enhancing the living conditions on board could have a substantial impact on seafarers' mental and physical well-being, leading to improved overall quality of life during their time at sea.

3. Internal Factors

3.1 Working and Resting Times

The initial focal point of the discourse centred around the distinction between rest time and actual sleep time for seafarers. The students recognized that the existing practices often fail to align with the actual restorative needs of the maritime professionals. This disparity shed light on the urgent need for a revised perspective on Minimum Rest Hours as outlined in the Maritime Labour Convention (MLC). The students proposed that these standards should transcend mere everyday requirements and instead be elevated to a minimum benchmark to safeguard the well-being of seafarers.

One of the core issues identified was the rigidity of port schedules, which often contribute to inadequate rest periods for crew members. In response to this, the students collectively envisioned a multifaceted approach that involved the deployment of additional crew members, such as port officers, to alleviate the strain imposed by tight schedules. This approach not only aimed to mitigate the workload burden but also to enable smoother operations by having dedicated personnel to manage port-related tasks.

To further streamline working time management and enhance the quality of rest for seafarers, the students emphasized the necessity for greater clarity in regulations.

3.2 Accommodations

Central to the deliberations was the recognition that the prevailing approach often revolves around meeting the bare minimum requirements for social accommodations, often neglecting the crucial aspect of human-centred design. The students identified this as a fundamental issue and proposed a paradigm shift towards a more holistic approach. Rather than merely satisfying basic needs, they envisioned accommodations that prioritized the overall well-being and social needs of seafarers.

In their pursuit of comprehensive social accommodations, the students explored the realm of celebratory events. Recognizing the significance of maintaining social connections and enhancing crew morale, they suggested the incorporation of various occasions such as birthdays, holidays, and other festive events into the ship's calendar. This would create opportunities for seafarers to bond, relax, and feel a sense of community despite being away from home.

Taking their vision further, the students brainstormed an array of engaging activities to foster camaraderie and alleviate the isolation often felt at sea. They proposed a spectrum of events, ranging from tournaments and barbecues to movie nights and even the time-honoured tradition of an Equator baptism. By introducing such diversions, they aimed to not only provide entertainment but also create cherished memories that enhance the overall well-being of the crew.

Cultural awareness emerged as another pivotal theme during the discussions. The students acknowledged the diversity among seafarers hailing from different cultures and backgrounds. Considering this, they emphasized the importance of intercultural communication and understanding. They proposed training programs that would equip crew members with the skills to navigate cultural differences, fostering an environment of respect and cooperation.

Lastly, the students recognized the vital role of effective communication in nurturing the social fabric on board. They underscored the need for designated channels and platforms that cater specifically to the social aspect of ship life. By creating avenues for open dialogue and facilitating the exchange of ideas and experiences, they aimed to strengthen the bonds between crew members and promote a more cohesive and supportive environment.

4. External Factors

4.1 Internet Connectivity

The students discussed the challenges faced by seafarers due to the constraints of internet connectivity provided by numerous shipping companies. The discourse focused on the prevalent restrictions on both time and access to the internet, which have posed significant limitations on the seafarers' ability to connect with the outside world. Through collaborative efforts, the students identified a series of pertinent issues, including the restriction to work-related websites only, thereby disallowing essential video calls that facilitate communication with loved ones.

These deliberations were greatly influenced by a study conducted by Nautilus, revealing that a staggering 2/3 of surveyed seafarers expressed their willingness to switch companies if they were offered a more robust internet connection. Recognizing the broader implications of this issue, the students fervently explored potential solutions. One central proposal emerged - the urgent need for an enhanced internet infrastructure on vessels. They concluded that such an improvement not only addresses the immediate need for connectivity but also has the potential to alleviate the mental fatigue seafarers experience due to the isolation caused by poor internet access.

A notable discovery during these discussions was the strong correlation between improved connectivity and enhanced sleep patterns. The students realized that better access to online resources, entertainment, and communication platforms could contribute to the overall well-being of seafarers by fostering healthier sleep routines. Furthermore, the students recognized the significance of optimizing external connections between port states and shipping companies, acknowledging that a collaborative effort involving stakeholders from both sides is crucial to addressing this challenge effectively.

In essence, the students' collective brainstorming sessions yielded a range of thoughtful insights and potential remedies for the existing internet connectivity predicament faced by seafarers. Their exploration not only shed light on the importance of technological advancements but also underscored the dire need for holistic support to improve the quality of life for these essential maritime workers.

4.2 Shore and Ship Disconnection

At the crux of the conversation was the acknowledgment that individuals ashore often inadvertently overlook the reality of life for crew members spending months at sea. The students recognized the concerning trend of increased workloads being imposed on fewer crew members in a bid to cut costs. This prompted them to strategize ways to counterbalance this imbalance. To address the situation, they explored innovative technologies and practices that could streamline operations on board. These innovations aimed not only to enhance profitability but also to allocate a fair share of the earnings toward the welfare of seafarers, ensuring that their well-being remains a priority.

A vital facet of the discussion revolved around equitable compensation. The students astutely noted that salary increments

should be more than just a token gesture; they should be proportionate to cover inflation and rising living costs. This would ensure that seafarers can sustain their quality of life while being dedicated to their demanding profession.

The students were equally committed to fostering an environment of tolerance and respectful treatment on board. They proposed comprehensive training programs that promote cultural sensitivity and open-mindedness among crew members from diverse backgrounds. This initiative, they believed, would foster camaraderie, and prevent misunderstandings, contributing to a harmonious shipboard atmosphere.

In their quest for enhanced support for seafarers, the students advocated a paradigm shift from punitive measures to proactive assistance from companies. They advocated for comprehensive support systems that address the challenges seafarers face, both professionally and personally, with the intent of fostering mental well-being and overall job satisfaction.

Lastly, the discourse delved into the vital aspect of multinationalism and equitable compensation. The students championed fair salaries that reflect the international scope of the maritime workforce, acknowledging the different living standards across various nations.

4.3 Autonomous Shipping

The conversation ignited with an exploration of the benefits that autonomous shipping could offer. One prominent advantage that resonated deeply with the group was the potential for a substantial reduction in working hours for crew members. Recognizing the toll that extended shifts can take on seafarers, the students acknowledged that this shift could significantly enhance the well-being and quality of life for those on board.

In alignment with this perspective, the group delved into the potential of autonomous systems to alleviate physical stress among crew members. By delegating routine tasks to automated technologies, seafarers could concentrate on more intricate responsibilities, thereby diminishing the physical strain they regularly contend with during arduous tasks.

A consensus emerged on the notion that autonomous shipping could also create more time for vital maintenance activities. The students highlighted the challenges often faced by crew members in terms of fitting maintenance into tight schedules. By allowing technology to handle certain operations, seafarers could redirect their attention towards proactive maintenance tasks, ultimately prolonging the longevity of ship systems and bolstering operational safety.

The students further articulated the significant role that autonomous systems could play in predictive and preventive maintenance. With the ability to analyze vast datasets and identify patterns, these technologies could forecast potential issues and address them before they escalate into critical problems. This proactive approach was hailed as a transformative step towards ensuring the reliability and security of maritime operations. On the other hand, the students also came up with several potential drawbacks associated with autonomous shipping. One prominent issue that resonated deeply was the apprehension that fewer crew members on board could result in diminished accommodation space. The students recognized the delicate balance between optimizing crew size for efficient operations and ensuring adequate living conditions, thus highlighting the need for careful planning and design to reconcile these opposing demands.

Delving further into the complexities, the students acknowledged that while autonomous systems might alleviate physical stress, they could potentially introduce a distinct form of technostress. The students collectively voiced their concerns about the heightened vigilance required to oversee the autonomous technologies, as crew members would need to be ever ready to intervene in case of unexpected situations. This newfound burden of constant vigilance, they contended, could impact crew well-being and performance.

The discussion took a technologically informed turn as the students grappled the looming danger of spoofing, wherein false information is introduced to these systems, was acknowledged as a genuine risk that could compromise vessel navigation and safety. This threat underscored the significance of fortified cybersecurity measures to safeguard against such malicious activities.

Furthermore, the students collectively raised an issue of paramount concern—possible blind spots created by autonomous systems. While these technologies offer advanced capabilities, there was a shared concern that they might inadvertently lead to a failure to detect or respond to certain targets. This risk was scrutinized within the context of safety and collision avoidance, highlighting the need for a comprehensive understanding of the limitations inherent in these systems.

5. Summary

A group of 7 students hailing from 6 different countries dedicated themselves to probing the complex realm of working and living conditions at sea. Over a span of 2 days, they immersed themselves in discussions to identify challenges and devise solutions, creating a valuable exchange for both aspiring seafarers and those eyeing shoreside careers. This blend of perspectives proved instrumental in bridging the gap between sea and shore.

Their collective efforts culminated in three key themes: Health, Internal Factors, and External Factors. Addressing mental health, they highlighted the under-researched yet paramount issue within the maritime sector. Stressing the role of training and awareness, they emphasized integrating mental health education into seafarers' learning journeys and extending it to shipboard supervisors.

The students recognized the link between mental and physical health, advocating for standardized guidelines to ensure comprehensive care. They proposed digitizing medical assistance, facilitating telemedical support, and streamlining access to onshore medical aid. Proactive measures, such as distinguishing free time from sleep time, were proposed to enhance overall well-being. They spotlighted the impact of improved connectivity on sleep patterns and advocated for optimizing external connections between port states and shipping companies.

In the realm of Internal Factors, the discourse centred on distinguishing between rest and sleep time for seafarers, leading to a call for revisiting Minimum Rest Hours. The students identified rigid port schedules as contributors to inadequate rest, suggesting additional crew members to manage tight schedules and ensure proper rest periods.

Addressing accommodations, they pushed for a shift from minimalistic design to human-centred spaces. They envisioned a calendar enriched with celebratory events to foster camaraderie, tackling isolation at sea. Cultural awareness training was advocated to encourage respectful communication, and creating channels for open dialogue was deemed vital for onboard social cohesion.

The dialogue transitioned to the chasm between ship and shore, highlighting the unintentional disconnect between those at sea and those ashore. The students proposed balancing increased workloads with fair compensation, advocating for salary increments in line with inflation. They championed tolerance and respectful treatment, underlining the importance of support systems over punitive measures.

In the realm of Autonomous Shipping, the benefits of reduced working hours, decreased physical stress, and more time for maintenance were illuminated. However, they also delved into potential pitfalls, including reduced accommodation space, vigilance stress due to monitoring, and the threat of spoofing impacting navigation and safety.

In summary, these students' discussions showcased profound understanding and dedication. They tackled the diverse challenges of the maritime world, charting a course towards holistic well-being for seafarers, efficient operations, and a stronger bridge between sea and shore.

Student Comments in Topic 5 Group:

- "Working and living conditions at sea are important to keep stable for the seafarer's mental health. I have learned a lot of new things, but especially I found out from other students what life at sea looks like from their perspective."
- "Seafarers are the lifeblood of the industry, and thus good working and living conditions at sea are important. As with the constant development of technology across the globe, it is always important to update regulations and practices to ensure vitality."
- "Working and living conditions at sea is a major topic for the seafaring community. By improving their mental health, human-centered living surroundings and social life, you can make living at sea much easier and in turn improve the overall safety at sea."
- "Our surroundings always have a significant impact on us and on our mental health. This is especially true for those who live at sea. Better working conditions are better life conditions."

Group 6

Topic

Marine resources protection (Biofouling, Ballast water, Marine litter)

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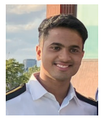

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1. Introduction

The topic of Group 6 generated interesting and well-argued discussions in the forum; our group included eight students from all over the world, including countries such as Italy, India, Panama, the Netherlands, China, Egypt and Georgia.

2. Overview of the discussion

2.1 Basis for discussion

The session started with a short presentation from each member of the team; thus, the fields of study were quite varied, from navigation to engine room to management. This aspect, together with that of the many nationalities present, allowed us to create a complex picture of the topics we discussed.

As a starting point, we had a few questions and a discussion previously launched by email, on our topic, such as:

- Is biofouling a real problem on board ships?
- What would be the methods to reduce biofouling and what is the economic impact on shipowners regarding these methods?
- Do you consider that ships (via ballast water) is the main polluter of the world's oceans?
- Do you consider that stricter/innovative measures should be imposed on ballast water discharge from ships? What would they be?
- What methods do you think could be used to reduce the amount of marine litter worldwide? What measures could be implemented on board ships in the short, medium and long term?

These questions were a starting point for further discussions and research, which continued after the speech of the IMO Secretary General, Mr. Kitack Lim, the Senior Program Director of the Nippon Foundation, Mr. Yu Nakahiro and the IAMU Chair, Mr. Adam Weintrit, on the importance of seafarers around the world, especially in the context of the increasing challenges of recent years, and the need to adapt to the technologies implemented.

A general discussion then followed on the subject of "Marine resources protection", in which the following were mentioned the major steps have been taken in this direction, such as Sustainable Development Goals, Paris Agreement and Kyoto Protocol. Under the mandate given to IMO, for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships, has undertaken major work in this field. IMO also has been actively working towards the

protection of the marine environment and resources with the introduction of various regulations and conventions. Some of the major conventions which address these issues are MARPOL with all its annexes, the Ballast Water Management Convention, the London Convention, Hong Kong Convention to name a few. The work that Group 6 has undertaken in these two days tries and address some of the topics that address the issues discussed above like biofouling, ballast water management and marine litter. The group has tried to come up with the present status of the issues, the challenges that the shipping industry is facing and what can be the possible long-term solutions to resolve such problems.

2.2 Current status, challenges, opportunities and recommendations on the protection of marine resources

Based on the preliminary discussion, the group decided, by mutual agreement, to form three working groups, each to deal with one of the topics of our topic: biofouling, ballast water and marine litter. At the same time, the group agreed that, at the end, the group would put together all the ideas and research to get feedback from the others; however, the final presentation was to be made.

2.2.1 Biofouling

Biofouling, which is a fairly common problem for all ships, allowed the group that approached it to identify some challenges such as: increasing the forward resistance of the ship, reducing its speed, increasing consumption simultaneously with increasing the amount of noxious emissions and finally reducing the life of ships.

As opportunities, in order to reduce the hydrodynamic friction due to the ship's volume increasing and to prevent the ship's speed reduction from biofouling formation shipping companies should invest in new ship projects dealing with new shapes and materials for hull construction. This might be reached by using modern simulating software such as "Ansys Fluent". Furthermore, a good opportunity for shipowners to invest in new projects could be represented by shipyards through competitive shipbuilding contracts in order to realize the best product at a lower price.

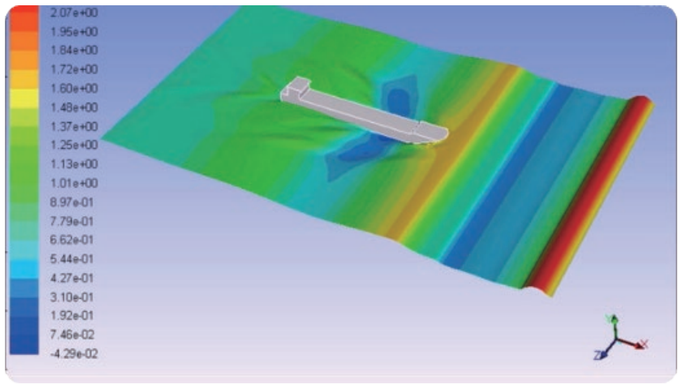
Recommendations for shipping companies should focus more on investigations and research against the biofouling issues.

Since copper-nickel alloys eliminate the biofouling formation problem and offer excellent corrosion resistance, the application of copper-nickel hull to small ships represents a good solution to save money and reduce maintenance and downtime. The benefits of applying this alloy include also the fuel consumption reduction, with a consequent fuel emission reduction.

An example of copper-nickel hull ships is the Asperida, the world's oldest ship and the Italian fire boats.

A possible solution for hull construction could be the use of metal after the thermal spraying process to increase the corrosion resistance property and avoid biofouling formation.

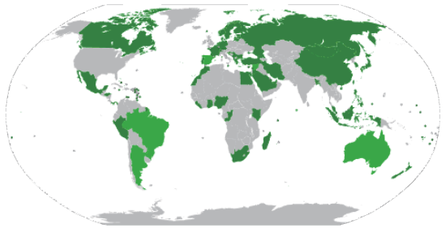
The ultrasonic system is a good method to prevent marine growth, but at the same time it may impact the marine environment, thus we need to study its impact on the environment in addition to the system sustainability.



2.2.2 Ballast water

If we're talking about ballast water, along with seawater, the local organisms such as fishes, crustaceans, molluscs, polychaetes & algae are also taken onboard, which are then transported with the vessels and enter in the marine ecosystem as Non-Indigenous Species. This act has a harmful impact on the existing marine life.

If we are talking about the challenges related to ballast water and the ways to reduce the effects on marine resources, we can specify the following aspects resulting from discussions and searches:



- Non-ratification and domestication of the convention by member states, especially developing countries.
  An incentive-based approach for more ratification is the best way forward.
  Capacity building of the member states towards technological infrastructure and training of professionals for the industry should go a long way in better ratification and implementation rate for the convention.
  Subsidies for installation of BWMS onboard ships.
  NMFT clause of the conventions makes it more effective in implementation even to the non-ratifying states.
  Assistance by the technical cooperation committee of the IMO by the member states for domestication of the convention.
- Ineffectiveness of about 50% of the existing approved BWMS.
  A study for the cause of the ineffectiveness of the system across different settings and in different environments; then depending upon the results of the study, the guidelines and mechanism for type approval of the system should be reviewed and updated to ensure consistent compliance and implementation of the convention.
  Performance reporting of the system on an annual basis for analysis and corrective measures.
- Lack of consistent monitoring and sampling of BWMS.
  The monitoring of any measure is the most critical part for the evaluation of the policy and further need for improvement/amendments. Presently, no global and consistent measures exist for monitoring and sampling of the effectiveness of the BWMS.
  The inclusion of the inspection of BWMS with PSC inspection is the most apt way to address the issue.
  Training of PSCO in the collection and handling of samples.
  Establishment of regional and national agencies for analysis of the sample and mechanism for reporting the same to IMO.
  Introduction of automatic monitoring devices for the BWMS onboard ships, which can keep the logs for inspection by the PSCO.
- Technical and operational challenges onboard in implementation of the convention.
  Training of the seafarers in the operations of BWMS.
  More investment in R&D for development of better system.
- Future and How to Tackle.
  The review of the convention is already in progress and a report of the correspondence group was submitted via MECP 80/4/4 dated 17 Mar 23 by the United Kingdom. However, the basic principle of impact on States of any measure adopted; especially SIDS and LDCs needs to be taken into consideration so as to ensure that implementation of such measures can be consistent and uniform across the globe. Transfer of Technology, Capacity building of developing states, especially SIDS and LDCs, collection and sharing of information and technical cooperation at global and regional level are some of the keys on which improvement in implementation of BWM convention depends.

2.2.3 Marine litter

The 3rd topic the group discussed was marine litter. If we look at the present status, MARPOL Annex 5 has prohibited all litter discharge with a few exceptions like cargo residue & food waste while also mandating port reception facilities, keeping in mind the objective of zero plastic waste discharge to sea from ships by 2025.

However the world's oceans contain around 2.4 million metric tons of plastic and it's still increasing Although the sources of

plastic pollution in the ocean are both land and marine-based, estimates indicate that between 60 and 80 percent of ocean pollution comes from land-based sources and 20 to 40 percent from fishing.

There are a number of existing challenges that obstruct the goal of plastic free oceans which are as follows:

- Firstly, the public and crew members tend to neglect the waste management guidelines and end up throwing litter onto beaches and riverbanks that get carried away into seas and oceans.
- Secondly, port reception facilities are not readily available everywhere and often an economic burden on developing countries.
- Lastly plastic pellets also serve as hazard to ocean in case of spillage or accident as they are considered as general cargo, as witnessed for MV Xpress Pearl that caught fire in Sri Lankan waters spilling 1.6 tonnes of plastic pellets.

By reducing the marine litter, we can protect the environment, improving the economy and health.

Facing the challenges and the opportunities, our recommendations include carrying out public awareness campaigns, educating and training the crew about the same.

Organizations and international agreements can help developing nations to work on their port reception facilities collectively.

Also cleanup strategies by projects like "The ocean cleanup" receive less recognition and support so they should be supported and appreciated.

Plastic pellets should be considered under IMDG Code Class 9 and classified as hazardous cargo to increase the safety measures for them reducing risk in case of spillage.

At last, the food agriculture organizations control the commercial fishing vessels, so IMO and FAO should jointly work towards tracking and controlling the plastic pollution caused by fishing gear and nets.

3. Conclusion

Marine Resources provide us with a sustainable means of nutrition and some other valuable outputs. There has been a lot of work already done by agencies like IMO towards the protection and preservation of the marine environment is the form of regulations, conventions, codes and protocols. Some of which we have discussed in the presentation, it is pertinent to mention that the existing framework for the protection of marine resources is a complex mix of many instruments and is working to a level that can be considered acceptable. However, as it has been brought out, room for improvement exists and a global effort can help achieve much better results. Cooperation and collaboration is the key for success and the way forwards for ensuring that natural resources of the ocean are utilized sustainably and in a responsible manner, so as to ensure that the world we leave for our future generation is worth living.

Student Comments in Topic 6 Group:

- "The topic we discussed during the forum is one of the most important matter that shipping companies are facing with at the moment. It represents an essential goal to be reached by the shipping industry so that to create a sustainable future. More players in the shipping industry should be sensitized (not only seafarers, everyone working in contact with the marine environment should know local, national and international regulations concerning marine resource protection. Nowadays, it's essential to follow all guidelines and mandatory rules, in addition to new ship's project developments and investments. Probability, a good way to do so, is to set new stricter regulations to minimize as much as possible environment pollution."
- "There are still many challenges to overcome in order to protect our marine resources to the best of our ability. It is important to keep addressing the issues that pose a threat to the environment because we need our oceans and seas in the future. There is still plastic pollution happening on a very large scale. Ecosystems are still being ruined by foreign microorganisms. That is why our topic remains important."
- "With the rapid development of the shipping industry, pollution of marine resources has emerged, which is a very serious problem. If this issue is not taken seriously, it will have serious and irreversible consequences. Therefore, discussing this topic is very meaningful and necessary to provide valuable suggestions and ideas on these issues. Protecting marine resources requires our joint efforts and unremitting efforts, and in this situation, we can have a sustainable future."
- "There are various perspectives of marine resource protection. Our's dealt with biofouling, marine litter and ballast water, which majorly revolves around the technical aspects of a ship's maintenance and operation."
- "The above subjects lead to ecological imbalance, human health hazards, reduced fuel efficiency, pollution, and lastly - also affects the economic stability."
- "So keeping in mind so many threats and hazards associated with our marine resources, international cooperation is crucial along with - encouraging research and development, imposing stricter legislations where required and also advocating crew & general public awareness - to collectively protect our marine resources for a better future."

Acknowledgements

The International Association of Maritime Universities would like to express our utmost gratitude to Mr. Kitack Lim, the Secretary General of the IMO, and the following organizations that gave us valuable support to organize this wonderful event.

- Legal Affairs and External Relations Division, International Maritime Organization
- The International Chamber of Shipping
- The Nautical Institute
- INTERTANKO
- Women's International Shipping and Trading Organization
- The International Transport Workers' Federation

A special appreciation goes to the Nippon Foundation for the continuing support to the IAMU.

Appendix 1

Workshop Basic Information

Date: 11 – 13 July 2023

Theme: MARPOL at 50 – Our commitment goes on
The theme of the World Maritime Day 2023

Venue: IMO Headquarters
4, Albert Embankment, London SE1 7SR, United Kingdom

Participants: 45 students from IAMU member universities

Time Schedule:

Arrival Day **Monday 10 July 2023**

Day-1 **Tuesday 11 July 2023**
0900 – 0930 Workshop Briefing /Conference room 11 – 13
0930 – 1000 Presentation by IMO / Plenary room
1000 – 1100 Opening Ceremony/ Plenary room
Opening Remarks
- Mr. Kitack Lim, Secretary General of IMO
- Mr. Yu Nakahiro, The Nippon Foundation
- Dr. Adam Weintrit, Chair of IAMU

1130 – 1300 Workshop/Conference room 11 - 13
1300 – 1400 Lunch
1400 – 1700 Workshop
1700 – 1830 Dinner at Pico bar/ 74 Albert Embankment, London SE1 7TL

Day-2 **Wednesday 12 July 2023**
0900 – 1300 Workshop/Conference room 11 - 13
1300 – 1400 Lunch
1400 – 1700 Workshop, Presentation and Closing Ceremony
1800 – 2000 Farewell dinner at IMO

Day-3 **Thursday 13 July 2023**
1000 – 1230 Technical Tour in Greenwich
- Observatory Visit followed by Highlights of Greenwich.
- Walk through Royal Naval College
- Short visit of the Maritime Museum

Departure Day **Friday 14 July 2023**

Appendix 2

Workshop Topic and Focus Questions

Group	Topics	**Suggested focus questions** *Students will be expected to discuss inter alia, their views and perceptions of the items in this column. Students are encouraged to also identify and discuss other items not on this list but relevant to the topic area. Students are strongly encouraged to think "outside the box" and be creative in their discussions.*
1	Sustainability of Maritime Education and Training	• How do you understand sustainability of Maritime Education and Training? • What are the factors that contribute to the sustainability of Maritime Education and Training? • Considering the forecast that there will be lack of supply of seafarers in the future, what should be done to attract the youth to take seafaring as a career? • Describe the challenges in attracting and retaining quality workforce (maritime instructors, assessors, etc) in your institution. How can such challenges be addressed and mitigated? • In what ways and among which entities should collaboration and networking be demonstrated to contribute to the sustainability of MET? • The GMP Initiative of the IAMU is described to "meet the envisaged needs to industry and a rapidly evolving educational and career context while catering for the professional development aspirations of individual seafarers." Discuss the opportunities and challenges of GMP Initiative. • In shipping, technology advancements and other developments are often initiated by the industry. What measures should be taken to ensure that MET keeps with the pace of such advancements and its relevance with the industry? • The maritime industry has experienced disruptions (e.g. COVID-19 pandemic, cybersecurity, etc.) and MET is no exception. What actions should be taken to keep MET resilient to such disruptions?
2	MET in Digital Era	• What is the scope of maritime industries that MET can apply? • What is your understanding of the SDG 9 from the perspective of maritime industries? • How can MET contribute to achieving the SDG 9? • What is the role of digitalization in MET? • Bearing the SDG 9 in mind, what are the recommended MET practices and directions in a digital era?
3	Greener shipping	• Current State of Greener Shipping o What are some current best best practices? o How might those practices be more widely adopted across the maritime industry? o What are some impediments to that adoption? • Future State of Greener Shipping o How might the maritime industry further help regarding climate action through affordable and clean energy? o What specific actions can shipping companies, regulators, and other stakeholders take to reduce the industry's carbon footprint and promote more sustainable practices? • IAMU Role in Greener Shipping: o What role can MET institutions play in advancing green shipping and sustainable industry practices? o How might you be better prepared to address the challenges and opportunities of the changing industry landscape? o What skills and knowledge do you think will be important as a global maritime professional of the future?
4	Gender equality and diversity	• What do we understand about gender and how does it affect our perceptions and behaviours? • What are the current challenges in respect to gender onboard the ships and elsewhere in maritime industry? • How can young people and especially women be better attracted to the maritime sector? • How could MET institutions and maritime industry support the recruitment and success of female students in the maritime field?
5	Working and living Conditions at Sea	• What does a perfect day on board look like? o What aspects are essential for the day to be perfect? • What role does connectivity to "the outside world" play in the community amongst the crew? • What challenges might exist in a multicultural crew? • What would you wish your company CEO knew about the working and living conditions at sea? • What would you do concerning the working and living conditions at sea if you were the CEO?
6	Marine resources protection (Biofouling, Ballast Water, Maine litter)	• Are biofuels a viable alternative for the shipping industry? What would be the benefits of using them on board ships? • What would be the economic impact on shipowners of implementing the use of biofuels in marine vessels? • Is electric propulsion also a solution for the maritime industry? • Do you consider that ships (via ballast water) is the main polluter of the world's oceans? • Do you consider that stricter/innovative measures should be imposed on ballast water discharge from ships? What would they be? • What methods do you think could be used to reduce the amount of marine litter worldwide? What measures could be implemented on board ships in the short, medium and long term?

Appendix 3

Technical Tour

Following the work at the IMO, the students were able to travel by boat down the Thames to visit the world famous Greenwich Observatory and Maritime Museum. They were given professional and informative tours of the observatory, the grounds, and the amazing museum itself.

Appendix 4

IAMU Student Forum 2023 Participants

Universities	Countries	Students
Academy of Maritime Education and Training (AMET) University	India	Kashish
Arab Academy for Science, Technology and Maritime Transport	Egypt	Karim Nabil Ahmed Al-Habash
Australian Maritime College, University of Tasmania	Australia	Kathryn Inez Marshall
Barcelona School of Nautical Studies - Polytechnical University of Catalonia	Spain	Héctor Iniesta Martínez
Batumi Navigation Teaching University	Georgia	Giorgi Jintcharadze
Batumi State Maritime Academy	Georgia	Otari Tvaradze
California State University Maritime Academy	USA	Micah Warren Frisch
Constanta Maritime University	Romania	Scarlat Marian
Dalian Maritime University	China	Kaisen Yang
Department of Mechanics and Maritime Sciences, Chalmers University of Technology	Sweden	Olivia Isa Hutchinson-Kay
Faculty of Maritime Studies Kotor, University of Montenegro	Montenegro	Nemanja Pudar
Fisheries and Marine Institute of Memorial University of Newfoundland	Canada	Bradley Christopher Barker
Gdynia Maritime University	Poland	Alicja Krawczyk
HSB - City University of Applied Sciences, Centre of Maritime Studies	Germany	Rayna Heupel
Indian Maritime University	India	Sayak Sen
International Maritime University of Panama	Panama	Eduardo McCoulley
Istanbul Technical University, Maritime Faculty	Türkiye	İsmail Karaca
Italian Shipping Academy Foundation	Italy	Davide Bombelli
Jade University of Applied Sciences Wilhelmshaven Oldenburg Elsfleth, Faculty of Maritime and Logistics Studies, Elsfleth	Germany	Jan Wegener
John B.Lacson Foundation Maritime University	Philippines	Franzesca Mari Brillantes Bautista

Universities	Countries	Students
King Abdulaziz University Jeddah, Faculty of Maritime Studies	Saudi Arabia	Mohammed A Ageeli
Kobe University, Graduate School of Maritime Sciences	Japan	Jiayi Luo
Korea Maritime and Ocean University	Korea	Nuri Lee
Liverpool John Moores University	UK	Andrew Richard Bourton
Maine Maritime Academy	USA	Jillian Ava Dow
Maritime Academy of Asia and the Pacific	Philippines	Ruel Adrian Foronda Moreno
Maritime Department, University of Dubrovnik	Croatia	Toni Dragan Stojanović
Maritime Institute Willem Barentsz NHL Stenden University of Applied Sciences	Netherlands	Lars Finnema
Maritime University of Szczecin	Poland	Jakub Zbigniew Białkowski
Massachusetts Maritime Academy	USA	Thomas Edward LaCourt
National University «Odessa Maritime Academy»	Ukraine	Anastasiia Katkova
Nikola Vaptsarov Naval Academy	Bulgaria	Tsvetomir Evgeniev Iliev
Piri Reis University	Türkiye	İsmail Furkan İleri
Satakunta University of Applied Sciences	Finland	Michael Subiir Singh Romana
Shanghai Maritime University	China	Han Jiang
Svendborg International Maritime Academy	Denmark	Anders Pedersen
Texas A&M Maritime Academy,Texas A&M University at Galveston	USA	Jessica Melina Perez
Tokyo University of Marine Science and Technology, School of Marine Technology	Japan	Yusei Onuma
University of Kyrenia, Faculty of Maritime Studies	Cyprus	Furkan Kuyucak
University of Ljubljana, Faculty of Maritime Studies and Transport	Slovenia	Jure Demšar
University of Rijeka, Faculty of Maritime Studies	Croatia	Stefano Veverec
University of Split, Faculty of Maritime Studies	Croatia	Dora Semren
Vietnam Maritime University	Vietnam	Pham Thi An Thu
Western Norway University of Applied Sciences	Norway	Tommy Normark Rønning
World Maritime University	Sweden	Rahul Lodhi

IAMU Student Forum 2023

11 - 13 July

International Maritime Organization Headquarters,

London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