INSTITUTE OF MARINE
Engineering, Science & Technology

Challenges in the Marine Industry: 2023 and beyond

In 2022, the IMarEST analysed the responses from 700 marine engineers, scientists and technologists and spoke with experts from its Special Interest Groups in answer to the question: **What do you think are the greatest challenges that will impact your sector/area of expertise in the short, medium and long-term future?'**

Interpreting the responses to the survey question shows that challenges align along three main themes: people, technology and the environment. These themes are deeply interconnected and are vital to the future of the sector and a sustainable blue economy.

Steven Palmer
Chair of the Human Element SIG

"The industry is rounding on human factors as the biggest driver for improvement - from SIRE 2.0 methodology to implementation of environmental corrective actions - the human factor is finally being recognised as the critical enabler to complement the previous focus on equipment and procedures."

Gus Jeans
Co-chair of Operational Oceanography SIG

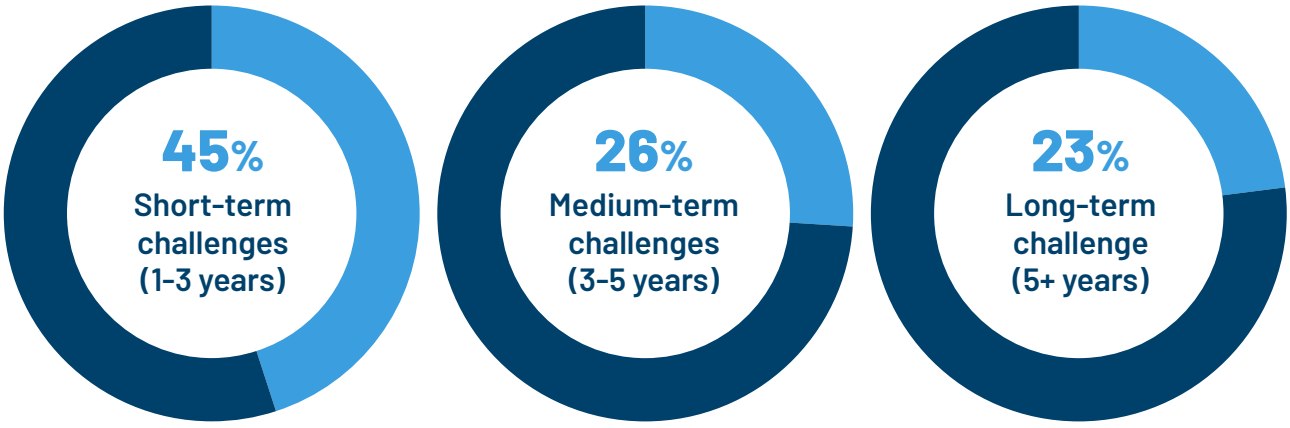
"We need to help people see change as an opportunity, not a threat to their livelihood. IMarEST can support career transitions to ensure a sustainable future."

Captain Matt Bolton
Chair of Naval Engineering SIG

"There is a legacy technology skills challenge but equally we are at the forefront of innovation in digital, cyber and autonomy, and whilst there is a competition for skills across all areas it is an extremely exciting time to be a Naval Engineer."

People

The graphic below shows the percentage of respondents who mentioned a challenge which related to people and in what timeframe they saw this as being a challenge.



Across the short, medium, and long-term, the central challenges focused on:

- attracting people into careers in marine engineering, science and technology
- retaining people and expertise as roles change
- ensuring opportunity for career progression and helping people to develop the skills to progress
- filling existing skills gaps with new and existing talent
- developing skills for future roles

In addition, in the shorter term, spanning 1-3 years, concerns were raised about the impact of the Covid 19 pandemic on the sector, on jobs, and investment and financial secruity. Geopolitics, potential war, and health, wellbeing and safety, were also raised as issues.

The survey took place before the war in Ukraine had started; today many of our members are working in sectors which are being very hard hit by challenges arising from that conflict.

Marine professionals are at the heart of some of the biggest challenges of our time

Gwynne Lewis, *Chief Executive of the IMarEST*

In any sector, being prepared for the future is important, in the marine sector which is undergoing such seismic change and with marine professionals working on some of the biggest challenges of our time, it is vital.

We may not yet know what engineering of the future will look like, how innovation will transform our world, or what the expanding frontiers of science will reveal next, but whatever the impact, the essential and ever-present element is people; professionals working at the highest levels to innovate, adapt and find solutions.

Like many other professions, the marine profession is facing enormous skills gaps. We need to ensure that we have enough people with the right skills for now and the future. This is a priority for the short, medium and longer terms; we cannot rest on our laurels. To compete with the other sectors in a bid to fill our skills gaps, we must ensure that we are attractive to new talent, we retain our existing expertise, and we retrain people where we have opportunity.

Retaining our existing expertise is invaluable. One of the challenges raised by our members is the need for clear career progression. I think this, together with feeling respected and valued, are at the centre of good employee retention strategies. Employers need to provide transparency around progression opportunities and career development.

As roles change, as technology and innovation continue to disrupt the world we know, taking advantage of opportunities for professional development is vital. It allows us to keep fully up to date with new knowledge, skills or capability, makes our jobs more enjoyable, opens up new career options, helps our organisations become more successful and equips us to become good role models for the next generation.

Good role models help us to attract more people to work in our sector. We need to inspire young people to want to work in the cutting-edge roles that are currently emerging. We may not yet know what the job titles of the future may be, but we do know that young people want to work in roles that make a difference, and we can demonstrate that working in the marine sector and the blue economy makes a vital contribution to our world.

There is a second element to attracting talented people and that is welcoming and retraining people from other industries who may have relevant experience and be looking for a new challenge. There are many people who work in sectors which have already undergone technological transformation and who could easily bring their expertise and experience to our sectors. In addition, we should also welcome individuals who have taken a break from their STEM careers and are now looking to return. By recognising the importance of transferable skills and valuing experience, we will be able to close the skills gap more quickly.

All in all, there has never been a more exciting time to work in our sector.

Niru Neil Dorrian

Co-chair of Marine Mammals SIG

"Investing in effective environmental management through the recruitment of qualified and competent specialists with appropriate remuneration should be considered a critical and valuable core element of all project planning. In the face of a global climate and environmental emergency, it's vital that clients, recruiters, agencies, and consultancies, implement due diligence in their recruitment processes, including CV, certification, and reference checks. By recruiting the right professional for the role we can ensure professional standards are maintained and the best quality environmental management outcomes and objectives can be delivered."

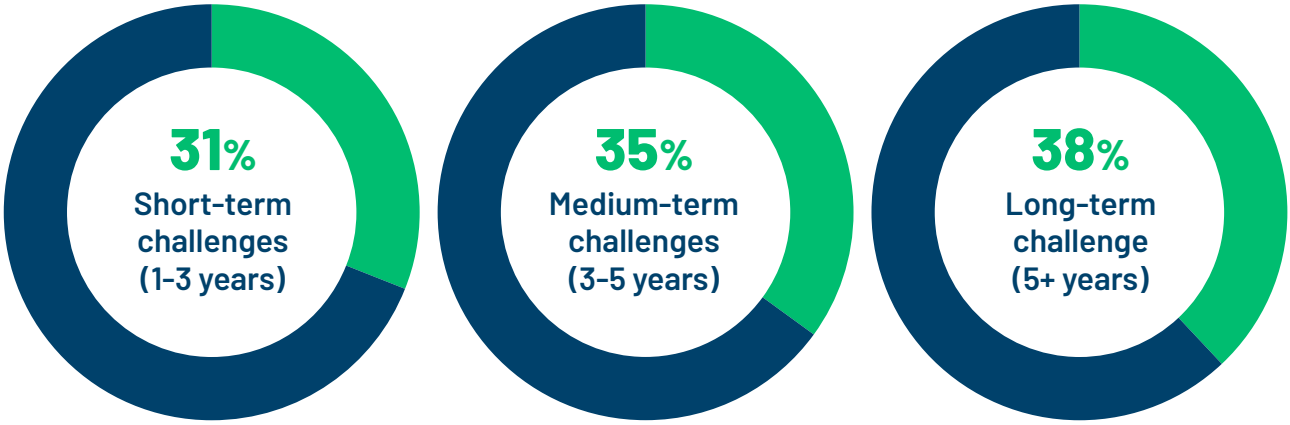
Captain Matt Bolton

Chair of Naval Engineering SIG

"Naval engineering provides great opportunities for social mobility and contributing to the levelling up agenda; diversity and inclusion are also important to help fill the skills gaps with talent, but there are challenges to be overcome."

Environment

The graphic below shows the percentage of respondents who mentioned a challenge which related to environment and in what timeframe they saw this as being a challenge.



Members identified challenges related to the environment as a key area of growing concern. The results suggest that these challenges will increase over the medium to long term and include such topics as:

- Managing energy and fuel transition
- Decarbonisation
- Managing emissions
- Meeting regulations and legislation
- Achieving net zero
- Climate change
- Skilling up the renewables and offshore wind sector

Sustainability

Alastair Fischbacher, *119th IMarEST President*

It is no surprise to see that environmental issues are among those keeping IMarEST members awake at night. The issue of sustainability has become mainstream and particularly so in the marine sector. From being a fringe topic, it has now taken centre stage and there is increasing interest, participation and, importantly, expectation; in time it will become ingrained.

However, we have to recognise that sustainability means different things to each of us and there are a variety of definitions among different organisations too. I am focusing on the broader application of sustainability as contemplated by the three pillars model of environmental, social and economic impacts and the description of meeting the needs of the present while not compromising the ability of future generations to meet their needs. All of which relate to the creation of a sustainable future for the planet, the ocean, the economy, and the role that our professions and sectors play in that future. So, it is not all about the environment – we need to ensure that we take each other pillar into account when we look at development and solutions in one.

One of the biggest challenges we all face is the balance of sustainable change with commercial needs. Short-term gains versus the longer term aims often see us defaulting to the short-term priorities. We can see this reflected in the results of the survey where challenges relating to people outweigh environmental issues in the short-term.

This is probably not surprising given the additional challenges many of our professions are facing now with the impact of the pandemic and conflict in Ukraine. However, as hard as it may be, while reacting to these short-term pressures, as we must in meeting the needs of the present, we urgently need to plan now for the medium to longer term so that we do not compromise the future.

By doing so, I hope we will be able to achieve a holistic consideration of sustainable criteria as part of the approach and decision-making process in all areas of marine so that development, operations, research and innovation can accelerate the shift to an industry that is demonstrably sustainable and is continuing to progress to meet the evolving expectations.

The breadth, depth and importantly the multi-disciplinary nature of our Institute is unparalleled in giving us the capability of not only a range of knowledge, skills and expertise but also a variety of viewpoints that can bring together these disciplines. This gives greater insight and understanding of the issues, challenges and potential solutions. A sustainable maritime sector and marine environment is in all of our hands.

Steven Palmer

Chair of the Human Element SIG

"Given the pace of environmental change maintaining the current life cycle of a ship becomes increasingly challenging. Unless vessels are made upgradeable, perhaps in a modular way, they may not be able to maintain their trade for as long as historically has been the case."

Captain Matt Bolton

Chair of Naval Engineering SIG

"We need a whole enterprise approach towards sustainability. The challenges in naval engineering are in balancing what is achievable in terms of net zero targets with the potential impact on military capability and the importance of maintaining interoperability with allies."

Martin Shaw

President Elect

"There is a current expectation that 30% of vessels will be zero carbon by 2030. A recent DNV report suggests that the current number is 1% with 10% on order. New fuels such as hydrogen and ammonia need fuelling supply chains which can slow take-up as happened with LNG fuelled ships. In the early days these ships will be short haul and therefore not huge producers of carbon. Is there an opportunity for IMarEST, with our multi profession multi discipline thinking, to think more deeply about this? We all dream of a zero carbon world - its marine engineers that will have to build it."

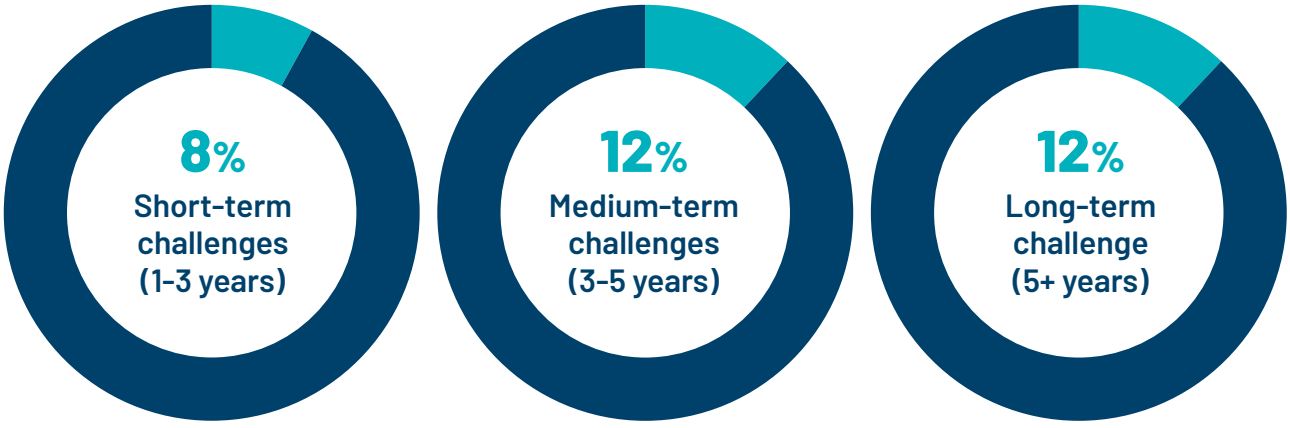
Tristan Smith

Member of the Marine Fuels and Emissions SIG

"Sustainability is driving change and it's going to accelerate. The pressure will increase before it gets better, because we are not yet on track to avoid dangerous climate change and ambition and commitments will keep ratcheting up until we are. This means we are going to see change happen very quickly in the shift from fossil fuels."

Technology

The graphic below shows the percentage of respondents who mentioned a challenge which related to technology and in what timeframe they saw this as being a challenge.



Challenges related directly to technology increased slightly over the medium to long term and included topics such as:

- The impact of AI
- The introduction of autonomous vessels
- Modernisation
- Digitisation
- Tackling security and cyber-crime issues

A Tide of Technology Changes Are Sweeping In

Kevin Daffey, *Chair of the IMarEST Board of Trustees*

As our members have clearly identified, our sector is entering a decade of rapid technological change and investment. Technological innovation is helping to make ships more efficient, emit less pollutants, lower the capital costs, make operations safer and we are starting to see technology help transfer jobs from the sea to the shore. There is much more to come across all areas of marine, not just shipping. It is an exciting time and one of much opportunity for all of us. We also have to recognise that it will bring disruption and challenges. First and foremost, in all of this, we must remember to put the human front and centre.

COVID created a huge foundation for change and has shown us that we can adapt and do many things that were previously thought impossible, including working from home, relying on technology for effective communication, co-working, and much more. We should be emboldened by this and use the experience as a basis from which to learn.

There is much discussion around autonomous vessels and if we look to the next ten years, it is anticipated that we'll see them initially adopted around coastal and inland waterways. Autonomy has the potential to help remove humans from the risker scenarios in certain roles, making life safer. However, we need to balance human and machine. One of the greatest fears is the idea that we are all going to be replaced by robots. The reality is more likely robots, artificial intelligence and autonomous vessels will be our 'colleagues' rather than our replacements.

Remote operations that are based on land enable us to access a far more diverse workforce, such as people with physical disabilities and working parents who may not naturally be attracted to a career at sea.

There are other challenges that we will need to work through such as increasing trust in technology, overcoming new unforeseen hazards that may arise from the introduction of new technology. So we need investment and commitment to industrialise technology so that we can build and benefit from scale. This industrialisation will be the game-changer for the marine industry and lead to greater roll out of technology.

Crucially, we need to think carefully about who may be disadvantaged by the lack of access to technology as it advances and carefully consider the ethics and law related to the introduction and use of technology. We can look at the discussions relating to driverless cars to see the challenges that lie ahead in this area.

Other industries have already gone through similar experiences, and this gives us an opportunity to learn from each other and trade skills and expertise. We can also attract the innovation we need by welcoming those with transferable skills and experience.

As our members have identified, the strands of technology, people and environment are heavily interwoven and reliant on each other to create future success; by keeping humans at the centre of technological change, we can build a bright future for our profession.

Marcie Merksamer

Co-Chair of Ballast Water Management SIG

"As implementation continues, the ballast water industry faces potential regulatory challenges as manufacturers' modify and innovate their technologies to support shipowners. Regulations will need to keep pace to support innovation and making approved BWMS technology available to shipowners in a timely manner."

Gordon Meadow

Chair of Maritime Autonomous Surface Ships (MASS) SIG

"Maritime is yet to maximise the potential of new innovative business models and novel operating models offered by the collaborative economies brought about by human and machine partnerships. This is both in decision support and in shared decision making.

There is a very real skills gap, but there is also a skills lag. The key to innovative technology adoption is not solely dependent upon creating and training for entirely new roles. The key to success is in helping current personnel to adapt too. To circumvent the threat in failing to adapt, the current workforce requires retraining and the assimilation of new skills to perform new functions through continuing professional development [by those who have first-hand knowledge of the sector and its challenges as it currently is].

This can be achieved, but it must be done using a focused and collaborative approach that recognises the importance of the workforce. This must be understood across the global maritime community as well as those involved in the growth of the MASS sector. We must provide essential skills in working with decision support technology so that we combine our expertise with established rules and the use of analytical tools to deliver objective, repeatable actions, with the human working in, on and off the loop."

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