Tugs and wind drift

Choosing a safe approach **p06**

The Nautical Institute

Are we on track?

Are we experiencing a XTE in our approach to maritime education and training?

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"*Cross Track Error (XTE or off course) is the distance that vessel is off the course either to port or starboard. It is usually caused by drift due to environmental factors. Those involved in maritime operation will understand how important it is to be aware of XTE, as it is at the core of corrective action.*"

The maritime industry is experiencing a paradigm shift, operating in an ever changing environment influenced by digitalisation and decarbonisation. Technological developments, particularly the new digital technologies and 'Industry 4.0', also known as the fourth industrial revolution, are rapidly reshaping the maritime industry. As the industry responds to this shift, are we experiencing a XTE in our approach to maritime education and training?

Over time, knowledge that has been useful gradually loses close ties to practice as it becomes more tightly integrated with a body of scientific knowledge – a process that is known as 'academic drift'. Monitoring academic drift is critical to ensuring the skills of maritime professionals are aligned with the changing needs of the industry. Maritime Education and Training (MET) must evolve to provide training, and retraining, that is relevant to practice.

The changing maritime scene
The ongoing pandemic has highlighted the indispensable role that the maritime industry plays in the global economy. Seafarers are at the heart of shipping and are the critical element in operating today's modern and technologically sophisticated ships safely and efficiently. Maritime shipping operates in a complex eco-socio-technical environment, with stringent international regulations that reacts to economic, political, and socially variable conditions.

Safety of navigation services provided by authorities are becoming more digital and complex in their nature. New skills are needed both to consume and to provide such services, which may include highly automated and intelligent aids to navigation and vessel traffic services.

In its Industry Digitalisation Index, Morgan Stanley identified maritime transport as a 'laggard sector'. Recent regulatory and sustainability demands have provided the momentum to fully embrace digital transformation. Within the constructs of global trade, the interactions of producers, manufacturers and consumers are in flux, and consequently, the expectations of maritime shipping are changing.

However, the traditional structured and measured approach of implementing technologies is no longer able to keep pace with the rate of change. This change creates a need for new skills and competencies for maritime professionals – both afloat and ashore. As the IMO explains, shipping requires a quality, motivated and appropriately skilled labour force to thrive, and therefore, requires revision and alignment of the education and training of seafarers to meet the changing requirements. MET must provide appropriate knowledge and expertise to create a 'future ready' maritime workforce to meet the needs of diverse stakeholders (see below).
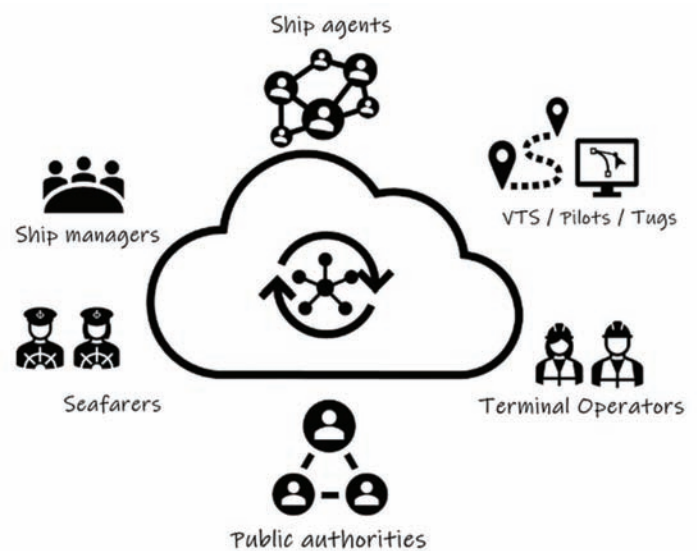

Figure 1: Diverse Maritime Workforce stakeholders

The emerging global maritime landscape is characterised by an enhanced degree of interaction and synchronisation among the multiple players engaged in the self-organised ecosystem of maritime transports. The performance of port community systems largely depends on the capacity, collaboration, and participation of the port community members and on the collaboration of the carriers.

Maritime education is evolving
Augmented reality, artificial intelligence, autonomous operations, and big data are becoming part of maritime operations. Traditionally, MET institutes cater to the requirements of the STCW regulations when developing curricula, focusing on the delivery of IMO Model Courses. The STCW Convention and Code (as amended) sets out the current international benchmark for the training and education of seafarers. The 2010 Manila amendments to the STCW Convention and Code marked a major revision aimed at bringing the Convention and Code up to date with recent and foreseeable developments. However, the

pace of operational and technological advances in maritime operations continues to accelerate. Ships, ports and logistics hubs have become sophisticated sensor hubs and data generators. The ship and shore now digitally interact in real time. While compliance with STCW standards is essential, the industry's diverse stakeholders need maritime education and training that aligns with these ongoing technological changes and raises the industry's capital productivity.

Changing technology and customer expectations requires an MET course correction. Traditional curriculum design influenced by the technological integration needs to reflect, and be inspired by, the ongoing innovation in the industry. The use of simulators in maritime education and training, for instance, has been an essential component for developing seafarer skills and competencies for decades. Emerging immersive technologies, such as virtual reality (VR) and augmented reality (AR) create new and exciting possibilities for maritime training.

Digitalisation and automation are transforming the shipping sector. Ships, ports and maritime logistics are increasingly data enabled and need a work force that can use data analytics to turn data streams into information for enhanced decision making. Employees at all levels need new competencies to effectively manage a digitally enabled sustainable transport system.

A curriculum for the future

The theme of maritime informatics is uniting practitioners and academics to jointly contribute towards upgrading the human capital required by an increasingly digital industry. Environmental and technological changes demand a series of perspective transitions to training, as depicted in the diagrams on the opposite page.

Developing economies

A significant percentage of the world's seafarers come from the developing economies. Due to the lack of institutional infrastructure and capacity, MET institutions in these economies struggle to meet even existing standards. It is imperative to address this lack of capability along with ensuring that knowledge transfers are nurtured through multilateral relationships that cross the digital divide. There are opportunities to develop cooperative endeavours, making effective use of tools and technology to close the existing gap. It is time to facilitate a truly global digital revolution in the maritime sector to build a maritime workforce that has the skill set to embrace the range of environmental, social, and technological developments.

Education in transition

The world's maritime educational institutions need to respond to the current eco-socio-technical disruptions by producing relevant, industry-ready graduates with 'future ready' skill sets. Training must evolve to be cognizant of the impacts of the fourth industrial revolution on the maritime industry and the role of MET in enabling the adoption and implementation of relevant technology and addressing new expectations. Harnessing these capabilities is critical to deliver digitalised and decarbonised future-ready ships and ports. Revolutions are an abrupt change in past practices, and we assert that the maritime sector's future will be determined by its willingness to redirect the course of established MET patterns to get on track for a productive future.

A fully referenced version of this article is available on request from editor@nautinst.org

About the authors

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Sandra Haraldson is Senior Researcher at Research Institutes of Sweden (RISE) and has driven several initiatives on digital collaboration, multi-business innovation, and sustainable transport hubs, such as the concept of Collaborative Decision Making (e.g. PortCDM, StationCDM, YardCDM) enabling parties in transport ecosystems to become coordinated and synchronised by digital data sharing.

Omar Frits Eriksson has over 30 years' experience of working with safety of navigation. He is the Dean of the IALA World-Wide Academy and deputy Secretary-General of IALA, which provides model courses for Aids to Navigation managers and VTS training.

Illustrations: Sandra Haraldson

Learning Strategy – *From* Fragmented learning *to* Learn to learn

You have to be on watch to learn how to be on watch.

Training only works in a classroom or during a sea phase.

Every new piece of equipment needs to have a training program.

For the Future

Focus on learning to learn, rather than learning to know or do; focusing on continuous learning, rather than stand alone programs. With so many new 'bits of kit' coming out, we can't be spending time training on each new tool – we need to learn how to learn, know how to decide what we need to know.

Learning Perspective – *From* Imitative learning *to* Continuous learning for the future

I learned it, so they need to also (the crushing cadet syndrome – when I was a cadet I had to… so you need to too).

I need to teach what I know, so they know it too (comfort zone – I know this, it was good for me, you need to know this too – it doesn't matter if it is for something that doesn't exist or is not used anymore…).

For the Future

Recognise that industry is changing continously at a higher pace. We need to provide skills for the future, not the past.

Evolving roles – *From* Back to basics *to* Basics of the future

What happens when technology fails? You have to know the old ways! Nothing like looking out the window, mark-one eyeball.

Need to keep up the basics – like using paper charts, set and drift, Astro, manual calculation for UKC/ADC, sketch and describe engines.

For the Future

We need to focus on the outcome of using new 'tools' – using the tools for safe navigation and efficient propulsion.

Focus training on the tools in use now, not the tools that were.

Change the 'basics' by increasing the ability to adopt to changing systems without losing the relationships to existing technologies.
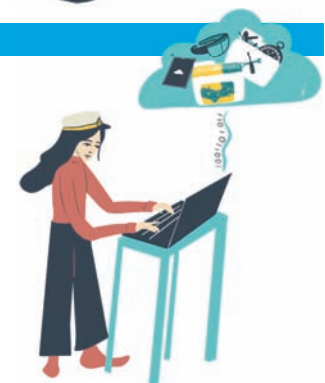
Battle of the Ss – *From* Exclusion *to* Inclusion

Ship is better than shore … no, shore is better than Ship …

Ship: Why is the shore interfering? They live in that ivory tower and don't understand the 'real world'.

Shore: What are they trying to do on the ship? They don't understand the limitations or the equipment.

For the Future

Collaboration, information sharing, making use of digital data to support vessel resource management (VRM); port resource management (PRM) and beyond. Working to ensure physically and psychologically safe working environments.

Understand your role in global supply chain, there can be no shore operations without the ship, and ship operations need to work with shore.

Digesting Data – *From* Data ingestion *to* Data analytics

My role is operational. Data is not for me.

Data analytics isn't required for my role – I'm a mate, an engineer, a rating, a wharf worker…

Data is for the office boffins, the bean counters – not for those doing the 'real' work.

For the Future

Understand the role of data in improving decision making. Identify and develop skills not only as data providers but also as data consumers.

Utilise data analytics to enhance operational and capital efficiency.

Understand the data being generated, its use, what to trust and the relevance of data to the need for information.