MARITIME IRC SKILLS FORECAST
KEY FINDINGS DISCUSSION PAPER 2018

The purpose of the paper is to provide industry stakeholders with a summary of the key findings from the recent industry intelligence gathering activities overseen by the Maritime Industry Reference Committee (IRC). The key findings will be used by the IRC in the development of the Maritime IRC Skills Forecast and Proposed Schedule of Work for the MAR Maritime Training Package.

Several targeted strategies were employed to collect industry intelligence about the opportunities and challenges for the Maritime workforce and any MAR Maritime Training Package review work necessary to meet these industry needs. These included:

- A Call for Submissions process inviting stakeholder responses about key issues affecting skills and workforce development;
- An IRC Skills Forecast Survey seeking information on priority skill needs, skill shortages and issues relating to workforce training and;
- A comprehensive review of Data and Research Sources nominated by the Maritime IRC.

Australian Industry Standards has been tasked by the IRC to collect feedback from interested stakeholders about these issues on its behalf.
HOW TO PROVIDE FEEDBACK

Stakeholders are invited to submit their comments on the findings outlined in this paper by close of business on 20 February 2018.

It is acknowledged that the information provided about issues in this paper is deliberately brief. The purpose of this paper is to validate and confirm the findings, which will inform the advice the Maritime Industry Reference Committee (IRC) will provide to the Australian Industry and Skills Committee (AISC).

In considering the key issues and themes identified in this paper, we are keen to have any feedback that either confirms your issue has been covered, or else raises an issue you feel should be addressed in the Proposed Schedule of Work (FY18/19–FY21/22) for the MAR Maritime Training Package to be submitted to the AISC on 30 April 2018.

Responses can be emailed to enquiries@australianindustrystandards.org.au.

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MARITIME INDUSTRY OVERVIEW
The Maritime industry has an estimated annual revenue of $9.08 billion, adding $4.78 billion to the Australian economy in 2017. Ten per cent of the world’s sea trade passes through Australian ports and 99 per cent of Australian exports are transported by sea. Our coastline is over 60,000 kilometres in length and our search and rescue region covers more than 10 per cent of the Earth’s surface. Per capita, Australia has more cruise passengers than any other nation, making it the fourth-largest cruise market in the world.

KEY MARITIME METRICS

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Revenue ($b)</td>
<td>9.08</td>
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<tr>
<td>Profit ($b)</td>
<td>1.08</td>
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<tr>
<td>Average Wage ($)</td>
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<td>No of Businesses</td>
<td>1,403</td>
</tr>
<tr>
<td>Employment Growth to 2023 (%)</td>
<td>6.4</td>
</tr>
</tbody>
</table>


KEY MARITIME FACTS

- **30 per cent of Australian GDP** is dependent on international shipping¹
- **65,591 – Appointed seafarers** with 104,005 certificates in 2016/17²
- **29,000 – ship visits** to Australia in 2016, with 10 per cent of the world’s cargo passing through our ports³
- **Two million – cruise ship visitors** forecast to visit Australia by 2020, increasing from one million in 2015⁴

NOTE: Training data and AMSA active certification figures suggest a considerably larger workforce than the Census reports. Total VET Activity data records approximately four thousand commencing enrolments in Maritime per year which, for an industry that requires recertification every five years, would suggest a workforce that is at least 35% larger than the Census total. An even greater divergence is present when comparing Census and AMSA active certification data but this dataset does not preclude retirees, students and the unemployed nor contributions from related industries such as Fishing, Port Operations and Search and Rescue. As such, workforce figures for the Maritime industry should be taken as representative rather than total, even in a Census year.

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MARITIME WORKFORCE

MARITIME WORKFORCE BY STATE/TERRITORY

![Bar chart showing Maritime workforce by state/territory]


MARITIME SKILL SHORTAGES

75 per cent of employers reported experiencing a skills shortage in the last 12 months. A review of that data suggests the shortage is for primarily Domestic Commercial Vessel occupations, principally those as:

1. Marine Engine Drivers
2. Small vessel (<35m) Masters
3. Deckhands
4. Managers
5. Educators

Reasons for Shortage

Employers identified the following reasons for the shortage with the most frequent response listed first.

1. Cost/time to achieve the required qualification
2. Ageing workforce / current staff retiring
3. Geographic location of the vacancy
4. Competition from other organisations / industries
5. Wages / salaries considered too low
KEY MARITIME SKILL ISSUES

INDUSTRY CHALLENGES AND OPPORTUNITIES

The Maritime industry plays a significant role in the Australian economy and is the primary means for importing and exporting goods to and from the Australian market. Over 30 per cent of Australia’s gross domestic product (GDP) is reliant on international shipping, and it is estimated at least 10 per cent of the world’s trade passes through Australian ports6.

To ensure the ongoing success of the industry to the Australian economy, and the long-term economic viability and sustainability of the Maritime industry, the workforce will need to be able to adjust to the new and emerging technological skill demands of the industry.

Technology

Technologies will continue to evolve and be further integrated into Maritime operations, providing opportunities for new and emerging specialisations within the industry. The future of the industry will be characterised by integration of software systems, with increasing potential for remote operations, and automation of vessels. This may require a change in the skill needs of the workforce from “on-board” operational based skills, to remote operations, navigation, and interpreting large volumes of data from remote communication systems.

Technological innovations are rapidly changing the shape of the Maritime industry globally. Building on established technologies, companies are employing new innovations at a rapid pace. New technological innovations shaping the maritime sector include robotics and automation, interconnected sensors and big data, remote propulsion and powering, autonomous and ‘smart’ vessels, deep ocean mining, and marine biotechnologies6.

The Australian Maritime industry is poised to be one of the first in the world to test a new Satellite-Based Augmentation System (SBAS). This system will greatly improve the accuracy and integrity of the location of ships in the Australasian region and provide location accuracy to tens of centimetres7.

6 Lloyd's Register, QinetiQ, and University of Southampton (2015) Global Maritime Technology Trends 2030.
7 Geoscience Australia (2016) Satellite Based Augmentation System test-bed Project. Australian Government
Automation

Until recently, the use of autonomous vessels has been to operate underwater for research and exploratory purposes. The prospect of autonomous shipping vessels is fast becoming a reality, with the first autonomous ships due to be launched in 2020.

The first completely autonomous (no human navigation/monitoring) expedition has recently been completed in the Bering Sea. This was an autonomous surface vessel which was able to map a section of the ocean floor on a pre-configured path, requiring minimal human intervention. Researchers have also been using autonomous/driverless vessels to conduct research and inspect infrastructure underwater in remote regions.

Vessels operated remotely have also been used to monitor remote maritime locations. When used in conjunction with high definition cameras, these allow for high resolution detail to be captured and the environmental monitoring to be assessed.

These emergent technologies will have a significant impact on maritime industries, with the potential to reduce human exposure to dangers of the high seas and will require new skills and competencies for the technology to be fully capitalized on. New and unique skills will be identified from the incorporation of new technology that will require ongoing learning and development in future training initiatives.

Vessel operations will likely change dramatically over the coming decades, moving toward remote operation centres, and companies will need to invest in capacity building through education and training of the workforce. The International Maritime Organisation is exploring how existing international requirements can be applied to autonomous vessels. Current maritime law does not provide for a vessel without a crew and master. While the onset of autonomous vessels is anticipated to be within the next 5 years, the regulatory framework surrounding these systems is likely to take longer to implement.

Big Data

Remote operating systems (including SBAS, previous page) utilise a network of satellites to track the movements of ships while at sea. It also provides information on their performance while operating, loading and discharging cargo. The potential of this new technology to influence decision-making and strategy will require specific training to be fully utilised. As automated systems and vessels are introduced, ‘ship intelligence’ will greatly increase demand to diagnose and interface with vessels remotely. Satellite, GPS, and network connections will provide real-time data to control rooms, with Big data analytics becoming a required skill need of the industry.

Cyber Security
Maritime vessels are becoming connected to the internet and networks, with systems used to operate engines remotely and in real-time. Separate networks are often used for different operations within vessels; and remote access to these by unauthorised personal are real risks. These attacks run the risk of causing major economic damage, disrupting logistical operations, displacing stock/inventories, and overriding control of the vessels, as well as disrupting communications with ports and other vessels.

These threats will demand an increased comprehension and maintenance of network security on vessels to provide secure communications between ports and other ships at sea. The skills and pressure to future proof the systems will be a concern for the industry in the near-to-medium future. Planning and implementation of new skills will be necessary to prepare the industry to use these new systems.

Operating Environment and Regulation
Stagnation in the growth rate of the Australian mineral and energy commodities sector has had an immediate effect on shipping activity. To add to this, there is ongoing decline in numbers of ‘blue-water’ Australian flagged ships operating within Australia.

New regulatory changes proposed by the Australian Maritime Safety Authority (AMSA) for blue water and near-coastal crew members are being developed to improve the overall safety of workers on these vessels. AMSA regulatory requirements are being embedded into the qualifications and Units of Competency to ensure safety competence on vessels at sea. These regulatory changes will have training implications for certification.

Environmental Pressure
World-wide, there is increasing pressure to reduce the environmental effects of CO$_2$ emissions, in line with the Paris Climate Agreement 2016. Within the Maritime industry, legislative pressures, increasing operating costs, and the complexity of shipping are driving the demand to pursue new methods to reduce the fuel demands for ocean transportation. Methods including slow steaming and super slow steaming are being employed to significantly reduce the fuel requirements of these journeys. As remote-operated vessels are implemented, there is further room to improve efficiencies in fuel consumption and reduce CO$_2$ emissions. Training and application of these methods will be a major skill requirement of the industry.
WORKFORCE SUPPLY SIDE CHALLENGES AND OPPORTUNITIES

Ageing Workforce

Australia’s Maritime workforce is one of the oldest in the country, with 49 per cent of workers 45 years or older\(^\text{12}\). In the short to medium term, the ability to successfully attract, train and retain young workers will be critical in meeting the skills’ needs of the industry.

Provision of mentoring and leadership training to skilled operators with comprehensive technical knowledge, will enable them to help develop younger workers and assist employers with retention.

If maritime industries incorporate cutting edge technologies and innovative practices to appeal to younger workers, skill building around these technologies and practices will be required\(^\text{13}\). An increase in the digital literacy of new and established workers will enhance their career progression and contribute to the Maritime industries substantially.

Competition for Skilled Workers

Along with increasing volumes of cargo and value-added activities, including tourism, increasing expectations are being placed on vessel masters and ship’s crew to deliver on deadlines while maintaining efficiencies and compliance. This will further increase the pressure of shipping companies and the workforce.

Furthermore, the risk of a widening skill gap between the workforce and the new maritime technological systems and processes being developed are becoming a concern for the industry world-wide. This is putting pressure on the workforce as the complexity of shipping systems increase. Reviewing and ensuring that competency-based training maintains relevancy in the Maritime industry will be necessary to ensure the workforce is suitably qualified and can meet the demands of new shipping systems.

A strong demand for Electro-Technical Officers within the industry is increasing\(^\text{14}\). Currently, no qualification within the Maritime Training Package provides Australian Maritime Safety Authority (AMSA) certification for this role. To address the industry safety and regulatory requirements, the development of a qualification for electro-technical officers is in progress.

As new technologies are adopted by companies, the skill requirements of the workforce will also change. The provision of specialist skills in robotics, design, engineering and big data analytics will require appropriate training. To develop these projected skills, companies will need to start providing the right education and training programs to ensure that on-boarding of new technologies and operations are adequately resourced.

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Some stakeholders report concerns about potential misalignment between skilled migration arrangements and maintaining viable career pathways for Australian trained seafarers. Improved mechanisms for moving between near-coastal to ocean-going operations via efficient skilling pathways would support enhanced career opportunities for seafarers\textsuperscript{15}.

**International / National Workplace Trends**

The international Maritime industry operates as a globalised network, shipping almost 80 per cent of trade by volume\textsuperscript{16}. The Maritime industry is highly competitive, as organisations compete for market dominance. Locally, these markets also include fishing and aquaculture, tourism, patrol and rescue operations.

Many organisations are seeking productivity gains through improved use of technology and systems. Robotics, big data and biotechnologies are all contributing to new innovations in propulsion and powering, ‘smart vessels’, autonomous systems, ocean mining, and marine biotechnologies. There is global demand for highly qualified personnel who can work and innovate with these technologies.

**Access to Training**

Training for blue water seafarer’s is affected by the scarcity of training berths, due to a decline of blue-water vessels within the Australian fleet. Training within near-coastal, including tourism, fishing and aquaculture, patrol and rescue operations, continues to be strong.

Variations in jurisdictional funding and traineeship arrangements are also reported as impacting the viability of delivering training in a narrow market for specialist technical areas. Longer term, this situation may lead to capacity constraints for industry and Registered Training Organisations (RTOs) alike. These conditions present challenges for RTOs when considering future investment in training infrastructure and equipment, particularly those involved in new technology.

By imparting high-level skills in digital practices, RTOs will have the opportunity to influence the adoption of similar approaches within Maritime industries. The benefits of incorporating cutting-edge technology in education can be seen in the ship and tug simulators. These enable Maritime workers to gain simulated work experience. This technology can be applied to the entire manoeuvring team, providing upkeep and maintenance of skills and knowledge in the industry\textsuperscript{17}.

\textsuperscript{15} IHS Markit (2016) *Five Trends Shaping the Global Maritime Industry*.


\textsuperscript{17} Nico, J. (2017) *HR Wallingford opens new ship simulation centre at Atwell Arcade*. Fremantle Gazette.
PRIORITY SKILLS
The priority skills results are drawn from Maritime stakeholder responses to the IRC Skills Forecast survey conducted between 4 December 2017 and 16 January 2018.

SKILL CATEGORY
In order of priority to the industry, the following skills were identified as the most important for the Maritime workforce within the next three to five years.

1. Health/Safety
2. Navigation/vessel handling
3. Operational
4. Compliance
5. Automation

GENERIC SKILLS
Ranking of the 12 generic workforce skills in order of importance to the Maritime industry.

1. Managerial / Leadership
2. Design mindset / Thinking critically / System thinking / Solving problems
3. Technology
4. Learning agility / Information literacy / Intellectual autonomy and self-management
5. Environmental and Sustainability
6. Science, Technology, Engineering, Mathematics (STEM)
7. Communication / Virtual collaboration / Social intelligence
8. Data analysis
9. Language, Literacy and Numeracy (LLN)
10. Customer service / Marketing
11. Financial
12. Entrepreneurial
BACKGROUND INFORMATION

INDUSTRY REFERENCE COMMITTEES

New arrangements for training product development commenced in January 2016. These arrangements consider the needs of employers of all sizes, across all industry sectors, and ensure the delivery of high quality Training Packages that are nationally endorsed and internationally regarded.

Industry References Committees (IRCs):

- Provide a forum for industry engagement
- Direct the review, development and implementation of Training Package content relevant to the industry sectors they cover
- Act as a conduit for industry feedback to the Australian Industry and Skills Committee (AISC) and governments on industry trends

IRCs are composed of individuals and industry members with the experience, skills and knowledge of their specific industry sector. IRCs are supported by independent and professional Skills Service Organisations (SSO) to develop and review Training Packages, and to inform Training Package development priorities.

IRCs have a direct relationship with the AISC, and are charged with identifying industry's skills needs, developing Business Cases setting out the Case for Change, and providing the sign off on training products before they go to the AISC for consideration.

Each IRC will perform the following functions:

- Gather intelligence for their industry sectors to inform advice on Training Package development and review
- Direct the work of its SSO in the development of industry proposals, Cases for Change and Cases for Endorsement
- Oversight the development and review of Training Packages in line with the requirements of the AISC
- Provide sign off for industry proposals, Cases for Change, Cases for Endorsement and other submissions for consideration by the AISC
- Direct the work of the SSO in preparing the support materials where funding for additional activities is provided
- Report to the AISC on progress of its work
- Promote the use of Vocational Education and Training (VET) in the sectors they represent
MARITIME INDUSTRY REFERENCE COMMITTEE (IRC)

The Maritime Industry Reference Committee (IRC) has been assigned responsibility for the MAR Maritime Training Package.

**Chair:** Steve Moon

**Deputy Chair:** Henning Christiansen

The MAR Maritime Training Package provides the only nationally recognised Vocational Education and Training (VET) qualifications for occupations involved in general purpose hands, coxswains, marine engine drivers, marine engineers, marine surveyors, cooks, integrated ratings, deck officers, ship’s masters and marina operations. The MAR Maritime Training Package comprises 26 qualifications, 16 Skill Sets and 199 Units of Competency and associated assessment requirements and covers near coastal and ocean going maritime operations. The MAR Maritime Training Package is in the Scope of Registration of 73 Registered Training Organisations.

IRC SKILLS FORECAST AND PROPOSED SCHEDULE OF WORK

The IRC Skills Forecasts focus on the prioritisation of the skill needs of the industry sectors each IRC has responsibility for. They are developed and reviewed annually in consultation with industry stakeholders and submitted on behalf of the IRC to the Australian Industry and Skills Committee (AISC) for approval.

IRCs are required to consult broadly with stakeholders to ensure a whole-of-industry view about the opportunities and challenges for the workforce and the Training Package review work necessary to meet industry needs.

The IRC Skills Forecast is submitted to the AISC and informs the development of a four-year rolling National Schedule for Training Package development and review work. More information on the National Schedule can be found at www.aisc.net.au/content/national-schedule.
AUSTRALIAN INDUSTRY STANDARDS

Australian Industry Standards (AIS) provides high-quality, professional secretariat services to the Maritime IRC in our role as a Skills Service Organisation. AIS provide services to eleven allocated IRCs which cover Aviation, Corrections, Gas, Electricity Supply (Generation and Transmission, Distribution and Rail), Electrotechnology, Maritime, Public Safety (including Police, Fire and Emergency Services, Defence), Rail, Transport and Logistics, and Water industries. AIS supports these important industry sectors using our world class in-house capability and capacity in technical writing, quality assurance, project management and industry engagement in the production of Training Packages.

AIS was established in early 2016, 20 years after its predecessor the Transport and Logistics Industry Skills Council (TLISC) was established in 1996. More information about AIS can be found at http://www.australianindustrystandards.org.au.

• We support industry growth and productivity through our modern innovative approach to establishing skills standards.
• We provide high-quality, professional secretariat services to help our allocated industry reference committees develop the skills that industry needs.
• We partner with industry to shape the workforce of the future.