



Medical technology industry workforce and skills review

Commissioned by the Medical Technology Association of Australia
on behalf of the NSW Medical Technology Knowledge Hub
2015

Acknowledgements

This report was commissioned by the Medical Technology Association of Australia (MTAA) on behalf of the NSW Medical Technology Knowledge Hub. The MTAA is the national association representing companies in the medical technology industry. The Medical Technology Knowledge Hub, launched in March 2015, is a collaborative network between academia, industry and government to improve the business environment for all facets of the medical technology industry.



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Glossary

ABS	Australian Bureau of Statistics
CEO	Chief Executive Officer
CFO	Chief Financial Officer
DAE	Deloitte Access Economics
EMA	European Medicines Agency
FDA	Food and Drug Administration
GDP	Gross Domestic Product
ISO	International Organisation for Standardisation
ICT	Information and Communications Technology
IT	Information Technology
MBS	Medical Benefits Schedule
MedTech	Medical Technology
MSAC	Medical Services Advisory Committee
MTAA	Medical Technology Association of Australia
NSW	New South Wales
PC	Productivity Commission
R&D	Research & Development
SME	Small- and Medium-sized Enterprises
STEM	Science, Technology, Engineering and Mathematics
TGA	Therapeutic Goods Administration
US	United States
WHO	World Health Organisation

Executive summary

The Medical Technology (MedTech) industry makes a **significant social and economic contribution in Australia**, improving healthcare outcomes and generating innovation and growth. There are over 500 MedTech companies in Australia, with a combined annual turnover of more than \$10 billion and employing more than 19,000 workers in total.

MedTech is a growing industry in Australia, and there are a number of broader trends that will drive future growth across the sector. **The ageing Australian population** and the earlier onset of chronic disease due to lifestyle choices are expected to increase domestic demand for healthcare in the future. In addition, as the large populations in countries across the **Asia-Pacific** region become wealthier, older and demand more healthcare, export opportunities for Australian MedTech companies are expected to increase. At the same time, rapid and disruptive **technological advancements** are driving changes to existing MedTech products, systems and delivery of care. These changes are also facilitating increased innovation and new product development in both existing and new non-traditional health industries.

The nature of the MedTech industry means that the workforce is required to be **highly skilled, educated and flexible**. Using a three-pronged approach including an industry survey, one-on-one consultations and workshops across Australia, this study found that there is a gap between the levels of current employment and desired employment in the industry. The **overall skills gap is around 3% of current employment**, approximately representing an additional 660 workers on top of a workforce of more than 19,000 employees. While this is not particularly large, the impact across the MedTech industry is significant – **84% believe that skills gaps have adversely impacted their organisation**, with 40% reporting that the impact has become more negative over the past five years.

A key reason for the large share of companies reporting these adverse effects is that the relatively modest industry-wide skills gap masks larger gaps within a number of business areas that are critical in the MedTech industry. In particular:

- There is a **29% skills gap in the product development area and a 15% skills gap in the product research area**, which approximately represents an additional 170 workers on top of the 770 estimated to be working in these areas. Companies highlighted difficulties in finding high quality workers to fill open positions in R&D, with concerns about attracting 'top talent' or people with experience in medical devices. It was noted that engineering graduates looking to work in R&D tended to be technically capable, but lacking in business skills.
- There is a **16% skills gap in the regulatory affairs area**, which approximately represents an additional 40 workers on top of the 230 estimated to be working in this area. Companies reported that there is no single professional talent pool for regulatory affairs and it can be especially difficult to source workers within Australia who have experience in overseas regulations. Small businesses in particular can find this area challenging due to the costs associated with hiring, training and retaining workers with regulatory skills.
- There is a **2% skills gap in the Australian sales and marketing area**. While this is consistent with the industry-wide gap, the large number of workers employed in this area means that it is a significant contributor to the overall skills gap in MedTech, as it approximately equates to an additional 110 workers on top of the 5,300 estimated to be working in this area. Sourcing people with communication and commercial skills as well as technical understanding of products is reportedly very difficult. Unlike in the past, sales and marketing personnel now require business acumen and a real understanding of the commercial environment and the challenges faced by customers (such as hospitals, governments, clinicians and private health facilities), in addition to and beyond the traditional clinical needs.

This study found a number of reasons are behind these skills gaps. There is a general **lack of awareness of the MedTech industry** and its contribution to the economy amongst the Australian population, with the industry as a whole having poor visibility amongst graduates and the broader community and policymakers. Relatedly, career pathways in the MedTech industry are unclear – both with respect to entering the industry as a university graduate and transitioning to the industry from other sectors. There are also not enough **linkages between MedTech companies and education providers** such as universities and schools, meaning that students are not able to gain industry experience or knowledge of the skills in demand while they are studying.

Australian MedTech companies are internally trying to address these skills gaps through training programs, fellowships, transferring skills between business areas and hiring new staff from other industries and countries. However, more could be done across the industry, particularly given that future projections suggest that **the skills gap in MedTech is expected to widen from 3% now to 26%** over the next five years. Industry consultations suggest that a **growth dividend of 15 percentage points** could be gained over this period by ensuring that MedTech companies are able to source the required skills, which would represent more than \$1.5 billion over the next five years.

Recommendations

In light of these factors, this report makes a number of recommendations to assist in addressing skills gaps in the MedTech industry. Implementing these recommendations should be part of the proposed MedTech Industry Blueprint, which will lay the foundation for driving growth and collaboration more broadly across the industry in the future. The recommendations are grouped in five key areas:

- Information and awareness
- Career links
- Learning by doing
- School education
- Reducing red tape.

The key theme underpinning these recommendations is that **collaboration across industry, government, universities and research entities will be required** to ensure that the measures implemented are long term, effective and have a lasting impact.

This is consistent with the direction in which the Australian policy landscape is evolving. A number of state-specific initiatives are recognising that collaboration is required to drive growth and innovation in the MedTech industry in the future, such as the NSW Medical Technology Knowledge Hub, as well as development work and industry investment in other jurisdictions including Victoria, Queensland and South Australia. The same trend can be observed nationally, with the Federal Government's Medical Technology and Pharmaceuticals Industry Growth Centre and the broader activities of the Medical Technology Association of Australia (MTAA) also aiming to facilitate collaboration between industry, government and other relevant stakeholders.

These collaborative and inclusive initiatives are well-placed to be the foundation for coordinating the MedTech community and other related stakeholders, and in driving these recommendations forward over the coming years. Such **coordination is necessary at both a national and state level**, in order to avoid duplication, leverage off of related policies and develop combined initiatives to address skills issues in the MedTech industry.

Information and awareness

1. MTAA and MedTech and Pharmaceuticals Industry Growth Centre to use the proposed MedTech Blueprint, MedTech Virtual Museum and other industry initiatives to raise the profile of the MedTech industry amongst the general public and policymakers.
2. MTAA and MedTech and Pharmaceuticals Industry Growth Centre to hold regular forums bringing together the disparate groups from across the MedTech community in various states to discuss issues relevant to skills and the workforce.

Career links

3. MedTech companies and industry associations (e.g. MTAA) to increase their presence on campus and at careers fairs to ensure students understand MedTech careers options.
4. MTAA to create a map of current professional development opportunities in the MedTech industry, with input from industry and government.

Learning by doing

5. MedTech companies to increase internships and work placements, with a role for the MedTech and Pharmaceuticals Industry Growth Centre or an industry association (e.g. MTAA) to create an Internship Advisor program with an online toolkit of resources.
6. Government and education providers to support smaller MedTech companies in mentoring students and providing internship programs, which could otherwise be prohibitive in terms of resources required.

7. MedTech companies to identify more clearly to education providers what skills are required in graduates, with an updated stocktake of skills needs every three years.

School education

8. Establish a MedTech Careers program (like the Digital Careers program) that brings together education providers, industry and government to promote MedTech careers to school students.
9. Bring MedTech into the science classroom by providing teachers with online resources and product examples that showcase medical devices in the context of the senior science curriculum.

Reducing red tape

10. Government to streamline MedTech industry regulations to enable more efficient utilisation of regulatory affairs workers; for example, by ensuring that tendering is transparent and consistent across Australia.

1

Background

This section provides an overview of the Medical Technology (MedTech) industry in Australia and its position in the Australian economy, as well as summarising the findings of the previous MedTech skills study (undertaken in 2008) and the methodology used in this latest study.

19,000+
employees

\$10b+
turnover



500+
companies



1.1 Introduction to the MedTech industry

MedTech companies supply a variety of products in Australia that are used for the diagnosis, prevention and treatment of diseases.

The MedTech industry is a sector of significant social and economic importance in Australia. MedTech companies supply a variety of products in Australia that are used for the diagnosis, prevention and treatment of diseases, including medical devices and diagnostic tools. This can range from common medical supplies such as syringes, medical gloves and dressings, to highly complex technologies such as hearing implants, pacemakers, defibrillators, ophthalmic devices and medical software. The MedTech industry also includes companies that produce and supply medical imaging equipment, such as ultrasound and magnetic resonance imaging machines.

The industry contributes enormously to the Australian healthcare system and improving health outcomes amongst the population, by enabling earlier detection of diseases, more efficient monitoring of patients and more effective treatment options. A number of Australian MedTech companies are leading manufacturers and suppliers of medical devices and products in their particular areas of therapeutic focus. Some examples of notable Australian MedTech companies which have seen substantial domestic and international success in their respective products are provided in the box below.

Australian MedTech companies

Cochlear manufactures and supplies various sound processors and hearing implants. Cochlear holds around two-thirds of the worldwide hearing implant market (Thieberger, 2012) and was named as one of the world's most innovative companies by Forbes in 2011 (Forbes, 2011).

ResMed manufactures and supplies products that diagnose, treat and help manage sleep apnea and various respiratory conditions. ResMed has a presence in over 100 countries and was also on the Forbes' 2011 list of the world's most innovative companies (Forbes, 2011).

Sirtex develops and delivers treatments for cancer using small-particle technology. Sirtex has successfully pioneered a new medical device to treat patients suffering from inoperable liver cancer, working with leading research institutes to meet clinical needs (Eggleton, 2014).

Ellex Medical designs, manufactures and distributes ophthalmic laser and imaging technology used to treat cataract, retina and glaucoma conditions. There are more than 20,000 Ellex ophthalmic laser and ultrasound systems in use worldwide (ASX, 2015).

MiniFAB develops and manufactures custom-designed microfluidic and microengineered medical devices. The company has been locally and globally successful in micro- and nano-fabrication techniques for areas such as biosensors and blood analysis (Australian Government, 2011).

Anatomics manufactures and markets a range of surgical products, including patient-specific implants and surgical tools. Anatomics pioneered the use of CT scan-derived surgical implant technology to assist surgeons in improving outcomes and saving operating theatre time (Australian Government, 2015).

1.2 The MedTech industry in the Australian economy

There are over 500 MedTech companies in Australia, employing more than 19,000 workers across a diverse range of skillsets.

In Australia, the MedTech industry is a small but growing part of the economy. There are over 500 MedTech companies in Australia, spanning a diverse range of business sizes including small start-ups, large Australian manufacturers and subsidiaries of multinational corporations (MTAA, 2014). At the same time, the Australian MedTech industry is highly globally integrated (IBISWorld, 2015). Many MedTech companies located in Australia are importers and distributors of products from overseas, and the medical devices that are manufactured in Australia are often sold both for domestic consumption and exported to other countries, with the United States, New Zealand, United Kingdom and Germany being amongst Australia's top export markets (Commonwealth Department of Industry, 2015). Overall, the Australian MedTech industry had a turnover of over \$10 billion in 2012-13 (MTAA, 2014).

MedTech companies in Australia range from businesses who conduct their product research, development and manufacturing domestically, to those that primarily import medical devices and only have a sales and marketing team based locally. Because of the technical nature of the products supplied by MedTech companies, the industry has highly specialised skills requirements (IBISWorld, 2015). For example, science and engineering skills are required not only by employees in the research and development area, but also by workers in manufacturing and sales because workers in these areas need to have a technical understanding of the devices being produced and sold. Another example is that due to the tightly regulated nature of the MedTech industry both domestically and globally, knowledge of regulatory affairs is valued across many different business areas. The MedTech industry employs more than 19,000 workers in Australia across a diverse range of skillsets (MTAA, 2014).

The MedTech industry is forecast to grow in future years, both globally and in Australia (Evaluate, 2013 and IBISWorld, 2015). This growth is expected to be partly driven by two key demographic trends: firstly, the ageing population in Australia with increasing life expectancies will lead to a higher incidence of chronic diseases and co-morbidity issues. Secondly, the growing prosperity of a number of developing economies in the Asian region (with population ageing also being a factor in these countries) will see increased demand for health services, providing a larger market for Australian MedTech exports. Further technological advancements are also expected to create new opportunities for the MedTech industry (Deloitte, 2015).

Given the highly skilled nature of the MedTech workforce in Australia, the ability of companies to source the skilled workers required to grow their business will be important in determining the extent of the industry's future growth. A previous 'skills audit' of the Australian MedTech industry – conducted in 2008 – found that a number of skills were in short supply (Deloitte, 2008). However, the rapidly changing nature of the MedTech industry means that skills requirements have evolved over recent years. As such, this study seeks to review the current demand and availability of skills in the Australian MedTech industry, and to highlight where skills gaps presently exist across the MedTech workforce in Australia.

1.3 MedTech compared with other industries

The MedTech industry draws on skills from a variety of study areas – including commerce, law, and the Science, Technology, Engineering and Mathematics (STEM) area.

The MedTech industry has a unique position in the Australian economy given the highly technical and specialised nature of the industry. At a high level, the sector that is probably most comparable to the MedTech industry would be the pharmaceuticals industry. Both industries are in the healthcare space and are therefore highly regulated, both require technical scientific knowledge for researching and developing products, and both are affected by government and private health insurers' policies on the reimbursement and funding of medical products and services. As such, the pharmaceuticals and MedTech industries tend to experience broadly similar skills issues such as sourcing workers with commercialisation and business skills combined with technical capabilities, and those with experience in regulatory affairs and clinical strategy (Beddie, Creaser, Hargreaves, & Ong, 2014).

However, there are also a number of differences between MedTech and pharmaceuticals which characterise them as two distinct industries – for example, different product life cycles and investment recovery periods (which are shorter for MedTech devices compared to pharmaceuticals), different industry composition (with a relatively greater amount of small companies in the MedTech industry) and different technical requirements (MTAA, 2013). As such, while the skills requirements across these industries are broadly similar, the specific skills demanded and the issues experienced with sourcing these skills can differ.

More generally, the MedTech industry draws on skills from a variety of study areas – including commerce, law, and the Science, Technology, Engineering and Mathematics (STEM) area. This means that the sector shares some of the broader concerns raised by other employers in the STEM area (such as in ICT and other technical sectors) with regards to a sufficient supply of STEM skills in the current and future workforce (Deloitte, 2014). For example, increasing the number of students studying STEM at schools, universities and other education providers could work to increase the potential pool of skilled workers that could be drawn upon by all employers of STEM workers. However, it is also important to acknowledge that the unique nature of the MedTech industry and the fact that it has a relatively lower profile than many of the other technology-related industries means that some of the key issues facing the MedTech industry are more specific than attracting more students to study and work in STEM degrees and occupations.

Finally, consistent with other industries in the science and technology field, there are very few women in leadership positions across Australian MedTech companies. While this is partly associated with the relatively low number of females studying STEM subjects, it is also partly due to the nature of the MedTech industry and the limited opportunities for women to advance. The issue of gender balance is discussed in further detail in Section 3.3, and addressing this will require a concerted commitment by MedTech companies to make systemic and cultural changes to ensure equity in the workplace.

1.4 Previous MedTech skills study

The 2008 skills study of the MedTech workforce found that there were a number of skills gaps across the industry, and proposed a number of recommendations to address these.

The 2008 skills audit of the MedTech industry in Australia, funded by the Federal Government, found that there were a number of skills gaps in MedTech at the time (Deloitte, 2008). Gaps were reported across the industry including in manufacturing and sales roles, which represent the largest areas of employment in the Australian MedTech workforce. However, the greatest gaps between actual and desired employment were found in export sales and overseas market development (with a gap of 33%), clinical scientists (15%), regulatory affairs (13%) and product research and development (10%).

Furthermore, the 2008 study found that skills gaps were especially problematic for certain segments within the MedTech industry, particularly start-ups and other small- to medium-sized enterprises (SMEs). These smaller companies experienced a number of challenges with hiring the necessary skills for their business. Providing a high enough wage to attract quality workers was difficult, and once hired a lack of economies of scale made investing in in-house training costly. Moreover, smaller MedTech companies were perceived by workers to be relatively more risky, due to uncertainty in potential career paths, as well as being thought to provide lower wages.

This earlier report offered a number of options to address skills gaps in the MedTech industry. It was suggested that university courses should be reformed, with more emphasis placed on practical skills, as well as introducing lecturer placement programs in order to inform educators on the current challenges facing the industry. More internships for university students could also improve the job readiness of graduates entering the job market. Furthermore, it was recommended that the industry be promoted, not just at a tertiary level, but to secondary school students as well. In general, the links between the MedTech industry and education institutions needed to be strengthened.

The report also noted that overseas workers could be more effectively utilised in the Australian MedTech industry. Talent from outside Australia could be targeted at overseas trade expos, and programs could be set up to encourage greater enrolment from overseas students in university courses relevant to the MedTech industry.

A number of recommendations were also provided to more effectively utilise existing capabilities and skills in the MedTech industry. This included the development of an industry mentoring program, in which experienced industry professionals could advise individuals going through the early stages of developing a MedTech company. Other recommendations in this area included the creation of a capabilities directory to provide information on the services available to companies in the industry (such as relevant consultancies), and a one-stop website offering commercialisation support to smaller businesses by bringing together the industry's collective knowledge on regulation and commercialisation.

Following the 2008 study, a number of initiatives have been implemented in order to try and address some of the issues that were raised. In particular, the Medical Technology Association of Australia (MTAA) has introduced and facilitated a number of programs relevant to the recommendations that were made. For example, an internship pilot scheme was conducted in 2009, which provided university students with the opportunity to engage in a learning program by completing an agreed project with a host company. In addition, a workplace learning directory has been developed, listing MedTech companies that have volunteered to offer workplace learning programs to students in Australia, with accompanying supportive guidelines.

A number of professional development programs are also available to companies and employees in the industry, including face-to-face and online training modules, MedTech seminars and forums, and broader opportunities for career support. In 2011, a mentoring program was developed to connect high potential aspiring leaders within the MedTech industry with the expertise, insights and networks of leading individuals from other sectors across Australia. This 'Emerging Leaders Development Program' was aimed at supporting workforce development within the MedTech industry and assisting with the professional growth of highly talented individuals.

However, despite the efforts of the MedTech industry since the 2008 study, it is clear that a number of issues still remain with regards to ensuring that the workforce has an adequate supply of skills. In some cases, initiatives were implemented to address particular recommendations, but these were not as impactful as expected due to other factors. For example, the take-up rate of the internship pilot scheme in 2009 was relatively low because of the broader economic environment at the time, with the global financial crisis causing companies to be reluctant to hire interns. In addition, SMEs in the MedTech industry found it challenging to support interns due to the sizeable costs involved.

This current study is therefore an opportunity to assess the current skills gaps and issues across the MedTech workforce, and provides a refreshed set of recommendations to inform the policy agenda in future years. Importantly, this skills study sits within the broader framework of a MedTech Industry Blueprint, a national strategy which is currently in the process of being developed in consultation with industry, government, education and community representatives. This Blueprint presents an overview of the policy priorities and goals in developing and growing the Australian MedTech industry in the future (MTAA, 2015). Once complete and fully implemented, it will deliver strategies to address the MedTech industry's priorities and provide the foundation on which the industry can develop and collaborate, including through building the future workforce and skills that the Australian MedTech will need over the coming years.

1.5 Methodology used in this study

This study uses three main approaches to understand the current MedTech industry and workforce: survey, consultations and workshops.

In this study, three main approaches were used to supplement desktop research in order to gain an understanding of the current state of the MedTech workforce in Australia.



- An **online survey** was conducted to provide quantitative data on skills gaps in the MedTech industry. A total of 175 firms were invited to participate, with 52 companies responding overall (representing a response rate of 30%). A list of questions asked in the survey can be found in Appendix A
- **One-on-one consultations** were conducted with representatives from 21 organisations, a list of which can be found in Appendix B. These were largely an opportunity to engage directly with MedTech companies, but discussions were also held with some universities and recruiters in the industry. Overall, a diverse range of firms were consulted with, varying by size, location and business activities in Australia (e.g. manufacturing, import and distribution, research and development)
- Four **workshops** were held around Australia (two in Sydney, one in Melbourne and one in Brisbane) with 38 attendees in total. These workshops brought together stakeholders from the MedTech community across industry, government and the education sector to discuss the skills issues currently facing the MedTech workforce. Notes on the discussions in each workshop, as well as a list of the organisations in attendance, can be found in Appendix C.

The methodology was designed to ensure that the study would have currency across the MedTech community, rather than providing the perspective of only one or two segments in the industry. Given the diverse nature of MedTech in Australia, it was important to use these interactions to capture information on the skills requirements and gaps of businesses across the spectrum of the MedTech industry.

2

MedTech industry trends

This section examines some of the broader trends that have impacted the MedTech industry over recent years. These trends include demographic change and the ageing population, emerging demand from Asian markets, technological developments and advancements, changes in the Australian regulatory landscape, and changes to healthcare costs and funding and business models.





Demographic
change



Emerging
markets



Technological
advancement



Regulatory
environment



Healthcare
costs

2.1 Demographic change and the ageing population

The ageing population in Australia will lead to increased health risks and comorbidity issues, representing a large opportunity for the MedTech industry.

The number of Australians aged 65 and over has grown rapidly over the past decade. Between 2004 and 2014, population growth for the cohort aged 65 and over grew at an average annual rate of around 3%, compared with growth rates of around 1% and 1.5% per annum respectively for those aged under 14 and 15-64 (Chart 2.1). The average growth rate for Australians aged 85 and over was particularly high over this period, at almost 5% per annum.

Chart 2.1: Australian population by age group, 2004 to 2014



Source: ABS (2015)

While the ageing population provides a number of social and economic challenges for Australia, it also represents a large opportunity for health-related sectors such as the MedTech industry. Increased chronic diseases and disabilities, increased health risks, and increased comorbidity issues are all consequences of an ageing population and will result in greater demand for health care goods and services in the future. This can be expected to lead to a significant rise in Australia’s expenditure on MedTech over the coming decades and therefore represents an important growth opportunity for the MedTech industry that is likely to lead to an increase in demand for skilled employees across a number of areas in the workforce.

Treasury projections suggest that the ageing population trend is expected to continue in the future. Life expectancies are forecast to increase – not just at birth, but also amongst older Australians. The latest *Intergenerational Report* suggests that by 2055, Australians aged 60 or 70 can expect to live for four to five years longer than their current life expectancy (Table 2.1).

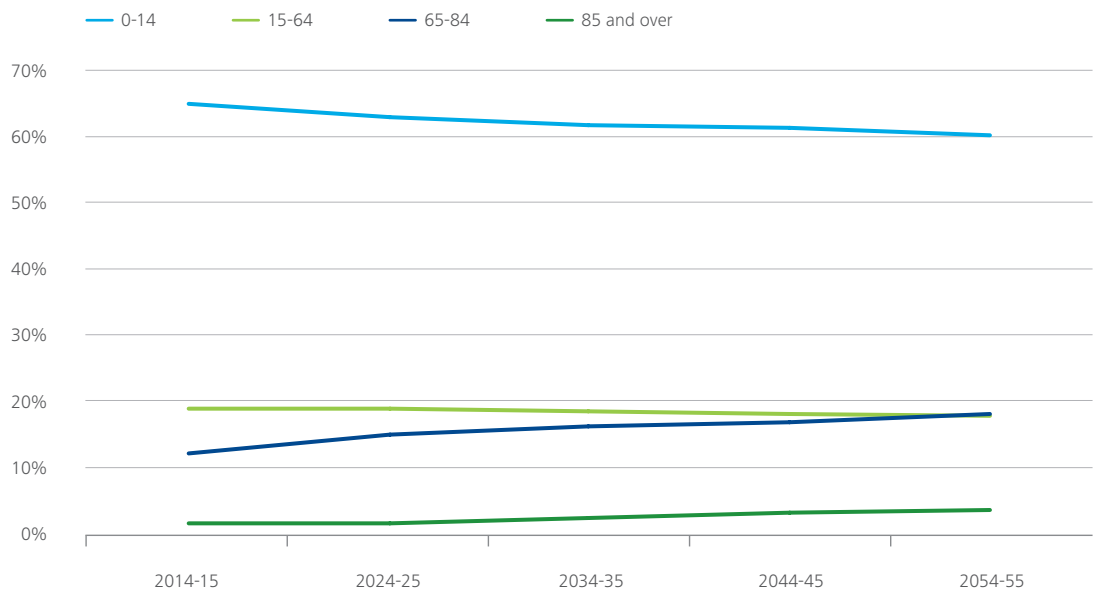
Table 2.1: Projected further years of life expectancy, 2015 to 2055

	2015	2025	2035	2045	2055
Further life expectancy at age 60					
Men	26.4	27.9	29.3	30.5	31.5
Women	29.1	30.3	31.5	32.4	33.3
Further life expectancy at age 70					
Men	16.9	18.2	19.3	20.4	21.3
Women	19.3	20.4	21.4	22.3	23.1

Source: Australian Treasury (2015)

The number of Australians aged 65 and over is forecast to increase substantially over the next 40 years, more than doubling from around 3.6 million in 2014-15 to around 8.9 million in 2054-55 according to the *Intergenerational Report* (Australian Treasury, 2015). Significantly, the sharp rise is also apparent in the proportion of Australians in the 65 and over age bracket – suggesting that the ageing of the population is forecast to continue in the coming decades. In particular, the share of Australians aged 85 and over is expected to be around 5% of the total population by 2054-55, up from only 2% in 2014-15 (Chart 2.2).

Chart 2.2: Age breakdown of population projections, 2014-15 to 2054-55



Source: Australian Treasury (2015)

2.2 Emerging markets in Asia

Increasing demand for health care from developing Asian economies can represent new export opportunities for Australian MedTech companies.

The rise of developing economies in Asia represents another potential source of new demand for Australian MedTech companies. Expenditure on health in developing Asian countries has increased significantly over the past decade or so (WHO, 2015). Some of the largest developing economies in Asia – including Indonesia, Malaysia, Philippines, Thailand and Vietnam – have experienced growth in per capita health expenditure of between 10% and 20% per annum since the year 2000 (Chart 2.3). In particular, per capita health expenditure in Indonesia increased at an average annual rate of 18% between 2000 and 2012. With an estimated population of around 250 million people, this represents a huge increase in demand for health care in the Asian region.

Chart 2.3: Per capita health expenditure in U.S. dollars, 2000 to 2013

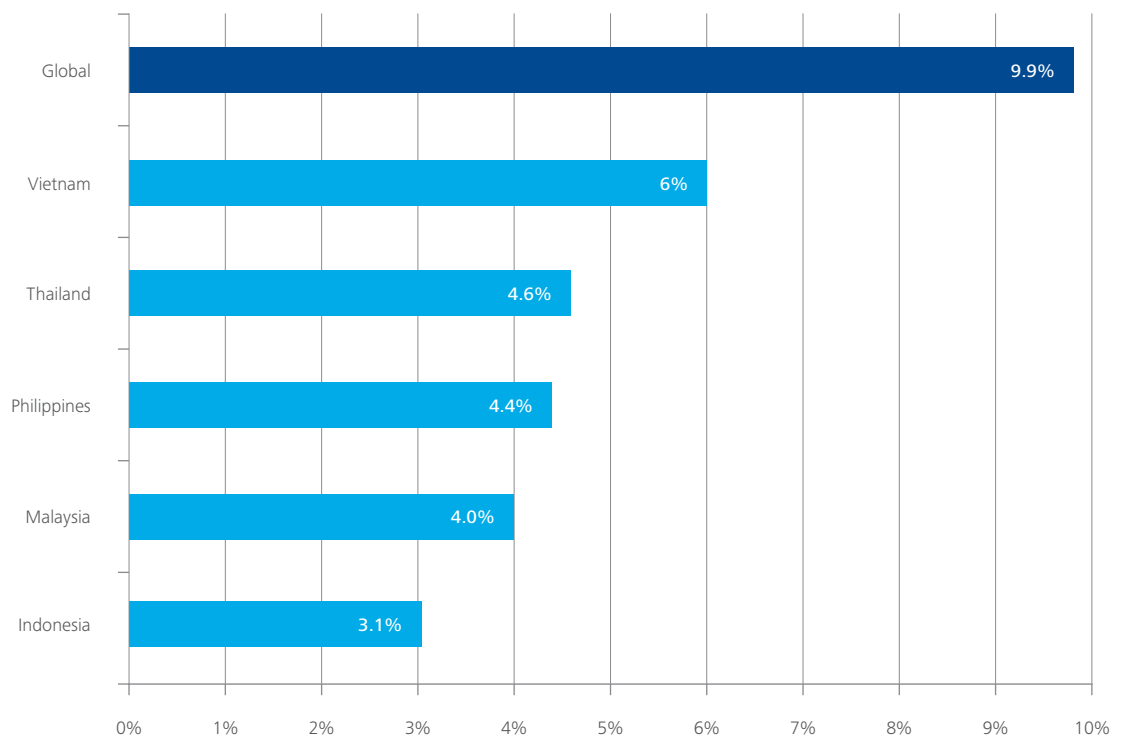


Source: WHO (2015)

The increase in health expenditure across developing Asian economies has been driven by a number of key trends. Firstly, like Australia, population ageing and the accompanying implications for health care are significant issues that are relevant for many developing Asian countries. Secondly, many countries in the region have experienced substantial economic growth over the past decade, and this increase in purchasing power has been accompanied by rising expectations with respect to health care amongst the general population. Relatedly, increased access to information in Asia due to the rise in internet and mobile penetration rates associated with this economic growth is also driving increased consumer demand for health care.

Notwithstanding this increase over the past decade, health expenditure in developing Asian countries is still relatively low compared to elsewhere in the world (WHO, 2015). As a share of GDP, global expenditure on health was around 8.5% in 2012, with this share tending to be lower across a number of developing Asian countries (Chart 2.4). This suggests that there could be significant potential for future growth in demand for health care across the Asian population, particularly as the two trends discussed above continue to unfold.

Chart 2.4: Health expenditure as a share of GDP, 2013



Source: WHO (2015)

Trends in Asia are important for the MedTech industry in Australia because the increase in demand for health care represents a large export market that Australian companies can tap into. Australia's position within the Asia Pacific region means that it is particularly well-placed to take advantage of the export opportunities provided by the expanding markets across developing Asian countries. Furthermore, the potential for future growth in Asia means that these emerging markets could become even larger and more important over the years to come. Again, the growth opportunities presented by emerging Asian markets is likely to result in increased demand for skilled workers in the Australian MedTech industry.

2.3 Technological advancements

Innovation in MedTech is being driven by advancements in technology, providing opportunities to create and develop new MedTech products.

The MedTech industry is highly innovative, with several motivations driving this. Firstly, the average MedTech product lifecycle between improvements is only 18 months, which means that companies need to continuously advance and innovate in order to compete in the industry (Eucomed, 2015). Moreover, advancements in new technologies can allow companies to create new products that deliver significant benefits to patients whose conditions had previously been difficult to treat or manage, which can also lead to wider social and economic gains.

A recent Deloitte report *Next-generation 'smart' MedTech devices: Preparing for an increasingly intelligent future* identified five key building blocks of technological progress that are driving innovation in the MedTech industry (Deloitte, 2015):

- Increased computing power
- Large data storage capacity
- Hardware miniaturisation
- Network connectivity
- Advanced software capability.

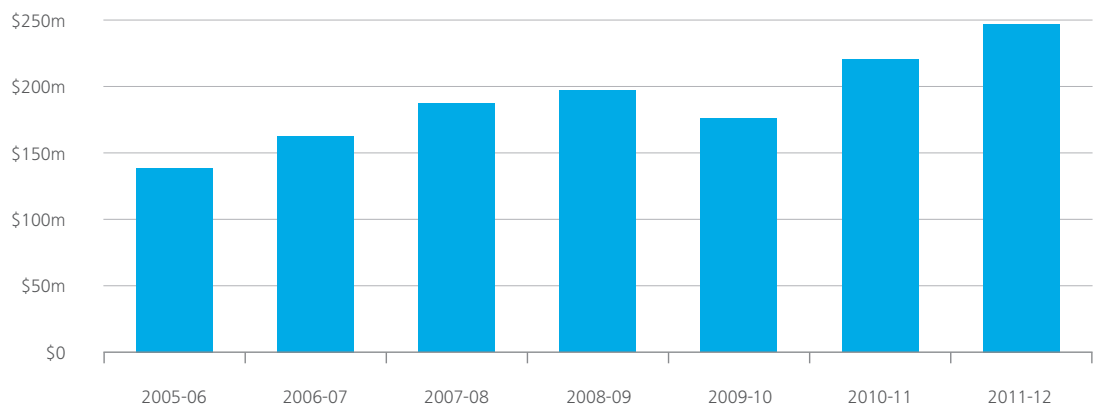
These advancements have allowed MedTech companies to utilise a range of new technologies when developing products, including mobile applications, sensor technology, data analytics and artificial intelligence. This will provide new opportunities for the creation of 'smart' MedTech products in the future, such as applications to remotely monitor patients and artificial intelligence to process information from multiple biometric indicators to provide health insights (Deloitte, 2015). Indeed, consumers are to some extent even driving this type of innovation, given the rapid uptake of diagnostic and monitoring wearable devices

in recent years in relation to health and fitness. It will be important that the MedTech industry is able to source the highly-skilled workers required to take full advantage of the product development opportunities facilitated by these technological advancements.

The potential for innovation and technological developments to drive future growth in the MedTech industry is one reason the Australian Government has identified the medical technologies (and pharmaceuticals) sector as one of five priority Industry Growth Centres in its *Industry Innovation and Competitiveness Agenda* (Commonwealth Department of Industry, 2014). There have also been a number of state-specific initiatives, with the creation of the industry-led Medical Technology Knowledge Hub in NSW in order to drive industry growth, and with other states such as Victoria, South Australia and Queensland following suit.

The rapid pace of technological change is already driving increased innovation in the MedTech industry, and this trend is reflected in the significant expenditure that Australian businesses dedicate to research and development in this area. While data on research and development (R&D) expenditure in the overall MedTech industry in Australia is not available, the ABS does track R&D expenditure in various subsectors of the manufacturing industry – including 'medical and surgical equipment manufacturing' and 'photographic, optical and ophthalmic equipment manufacturing', both of which are part of the MedTech industry. R&D expenditure in these areas was around \$250 million in 2011-12, having increased at an average annual rate of 10% since 2005-06 (Chart 2.5).

Chart 2.5: Research and development expenditure in selected manufacturing subsectors in the MedTech industry, 2005-06 to 2011-12*



Source: ABS (2013)

* Includes 'medical and surgical equipment manufacturing' and 'photographic, optical and ophthalmic equipment manufacturing'.

In addition to allowing MedTech companies to develop new and improved products, technological advancements are also creating new ways for businesses in the industry to interact with patients and the end-users of medical devices. Over recent years, developments in technology have made it much easier for the general population to access information and make purchasing decisions using online tools such as internet searches and e-commerce. This is another trend that is changing the way Australian MedTech companies do business, with digital marketing and greater provision of online information becoming more important features of the industry landscape.

2.4 The regulatory environment

Regulatory requirements and processes have become significantly more complex over recent decades, both in Australia and overseas.

The regulatory environment of the Australian MedTech industry has changed significantly over the past 30 years, with the industry moving from a relatively patchy framework of regulation in which many devices were largely unregulated, to a much more sophisticated level of regulation under the Therapeutic Goods Administration (TGA) (McEwen, 2007). The TGA was established as a regulatory body within the Australian Department of Health under the Therapeutic Goods Act 1989. Currently in Australia, all medical devices supplied domestically or exported must first receive regulatory approval from the TGA before being made available to patients. The increasing complexity of the regulatory framework has meant that regulatory affairs skills have become significantly more important in the MedTech industry over recent years.

Australian regulatory processes for medical devices tend to lag behind a number of comparable overseas counterparts (such as the U.S., Canada, Europe and Japan) with regards to predictability and timeliness. This can be problematic because the relatively short lifecycles of many medical technologies and the nature of the MedTech industry means that regulatory processes need to be timely, simple to navigate and efficient if consumers are to obtain access to technologies before they become obsolete. This has been recognised as an issue in the *Expert Review of Medicines and Medical Devices Regulation*, which is a review of the regulatory framework and processes under which the TGA operates. The review aims to identify opportunities to improve the efficiency and effectiveness of the TGA's operations, including areas of unnecessary or duplicative regulation that could be removed or streamlined (Commonwealth Department of Health, 2014).

In its stage one report, the expert reviewers have made some recommendations that aim to expand the pathways through which companies supplying medical devices can seek marketing approval in Australia, including the use of assessments conducted by comparable overseas regulators, as well as expedited review processes in some defined circumstances (Sansom, Delaat, & Horvath, 2015). The recommendations also include enhancing post-market monitoring of medical devices in Australia, streamlining post-market requirements and improving the transparency and predictability of processes and decisions, to ensure that consumers have timely access to high-quality, safe and efficacious products. If accepted by the Federal Government, these recommendations will enhance the desirability of the Australian market for local and international MedTech companies.

Given that many Australian-based MedTech companies also sell medical devices overseas, changes in regulatory requirements across other countries can also impact the workforce and skills requirements of the industry in Australia. Increasing regulatory scrutiny from other agencies such as the Food and Drug Administration (FDA) in the U.S. and amongst authorities in the European Union means that experience with overseas regulations is an increasingly valuable skill in the Australian MedTech industry (Ernst & Young, 2013). More broadly, the uncertainty associated with the ongoing debates surrounding how and which medical devices and software should be regulated in these areas places additional pressure and financial costs on Australian companies and regulatory affairs professionals.

2.5 Healthcare costs, funding and business models

Changes to the healthcare funding system and business models within the industry could impact the strategies, operations and skills requirements of MedTech companies.

MedTech funding and reimbursement in Australia is complicated, encompassing a number of health technology assessment processes and agencies, multiple pathways and variable levels of economic and clinical evidence requirements.

The ageing population and growth in chronic disease in Australia, discussed above, is expected to result in a significant increase in health expenditure in the future. In light of this, it is anticipated that public funding for health services and products – including MedTech – will become increasingly scrutinised, placing significant pressure on the industry to demonstrate value for money and to provide further services or benefits in addition to providing a device.

There are a number of Federal Government healthcare reviews currently taking place which include the review of the private health insurance landscape (Commonwealth Department of Health,

2015) and the review of the primary health system (Commonwealth Department of Health, 2015). There are also changes to the business model of the traditional MedTech company that are currently taking place in the industry. For example, the commoditisation of some products is driving down unit prices in these areas, which – combined with the cost pressures discussed above – is shifting the focus of buyers from the clinical benefits of a product and the additional support companies give in terms of training, professional development and research to its economic and financial value only.

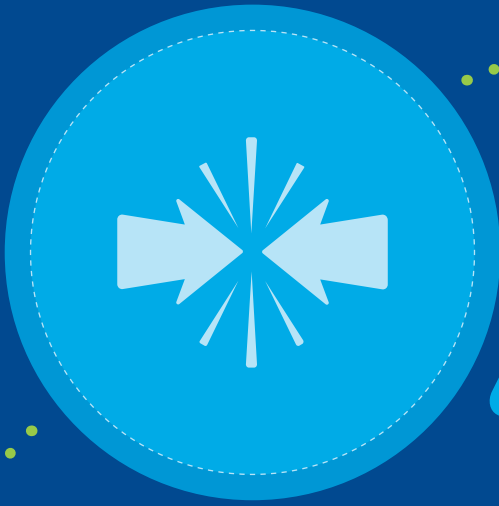
In addition, merger and acquisition activity in the MedTech industry is creating fewer, but larger and more consolidated, players across the sector. These broader changes are affecting the business strategies and operations of MedTech companies, and could continue to have an impact on the type of skills that might be required in the future.

3

Workforce analysis

This section provides an overview of the MedTech workforce in Australia, including analysis on the breakdown of employees by business area and the extent to which skills gaps are affecting companies across the industry. This section also examines educational attainment and gender balance in the MedTech industry.





84%

of companies report skills gaps have adverse impacts



28%

of employees work in sales and marketing



78%

of employees have a university degree

3.1 Skills and the MedTech industry

Employees in the MedTech industry work across a diverse range of business areas, and skills requirements can differ from company to company.

MedTech companies in Australia operate across the spectrum – from product development through to commercialisation through to sales and marketing. Companies in the Australian MedTech industry also range in size, product type and medical specialisation. The diversity across the industry means that demand for skills, minimum skills requirements and the impact of any potential skills gaps can be very different from company to company.

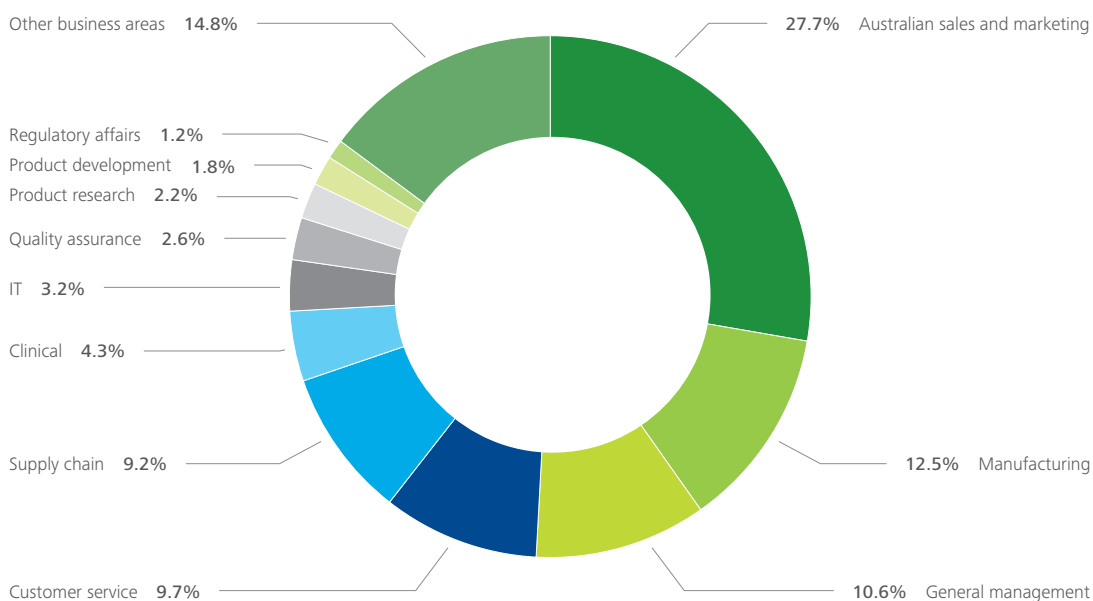
Definition of skills

In the context of this study, 'skills' refer to the ability of employees to perform their work. A 'skills gap' in a particular business area means that companies are facing difficulties sourcing the relevant skilled workers to work in these areas. Given that many aspects of the MedTech industry are quite specialised, knowledge specific to the business area is often a skill that is required to work in that area – for example, regulatory skills for regulatory affairs staff, and marketing skills for marketing staff.

However, the skills requirements for most positions are generally broader than this position-specific knowledge. Examples of this include the commercialisation skills that are required by workers in research and development in order to convert ideas into marketable products; the business and finance skills that are required by sales workers given the increasing commercial focus of customers; and the knowledge of MedTech systems and data requirements that are required by IT workers in the industry. These skills and issues are discussed in further detail in Chapter 4.

As part of this study, survey respondents were asked to provide a breakdown of workers employed at their company into different business areas. The results show that the largest share of employees across the companies who participated in the survey were located in the Australian sales and marketing area, which represented 28% of the workforce amongst survey respondents. Manufacturing, general management and customer service roles also had sizeable shares of employment (Chart 3.1).

Chart 3.1: Employee breakdown by business area

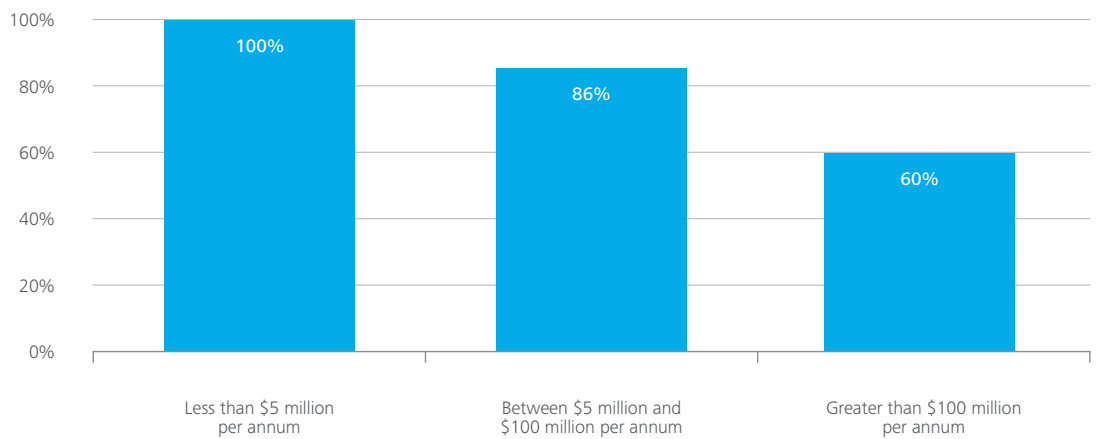


Source: Deloitte Access Economics (2015)

Overall, across the Australian MedTech companies surveyed in this study, the skills gap – measured as the difference between current and desired employment as a ratio of current employment – was around 3% of current employment. While this figure does not seem particularly large, the impact across the industry is significant, with 84% of survey respondents believing that skills gaps have had an adverse impact on their organisation and almost 40% of this group indicating that the impact has become more negative over the past five years. This may be because the 3% aggregate figure masks large gaps in some critical business areas where skills demand is currently not being met across the industry – these areas are discussed in further detail in Section 4 below.

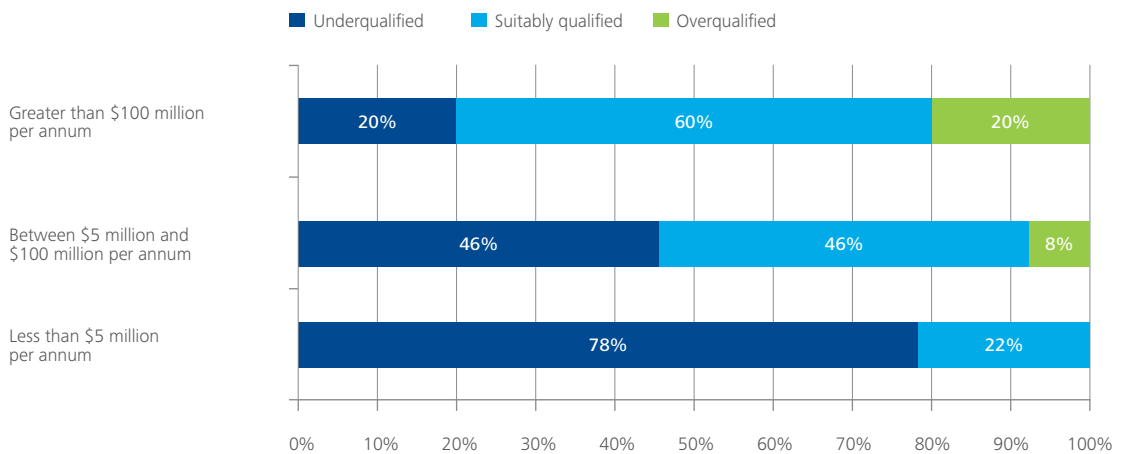
It was also found that a relatively higher share of small companies in the MedTech industry (with annual turnover of less than \$5 million) reported that skills gaps have adversely impacted their business (Chart 3.2). Smaller MedTech companies also tended to have more difficulties attracting suitably skilled applicants to open job positions, with 78% of businesses with an annual turnover of less than \$5 million reporting that recent candidates have been underqualified with respect to relevant education and experience (compared to around half of all businesses surveyed overall) (Chart 3.3).

Chart 3.2: Share of companies reporting skills gaps have adversely impacted their business by company turnover



Source: Deloitte Access Economics (2015)

Chart 3.3: Education and experience of recent job applicants by company turnover



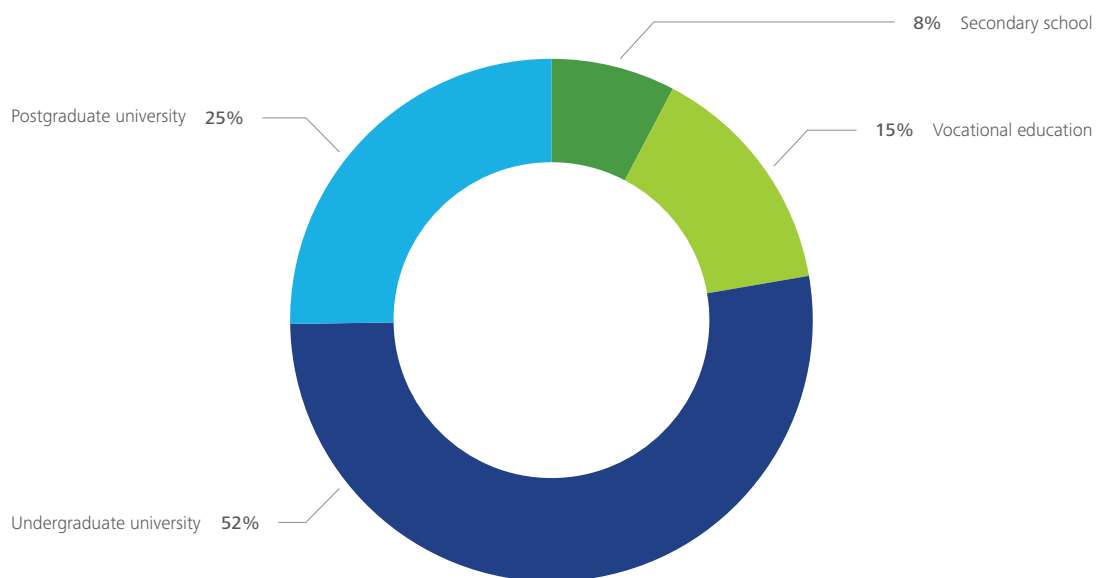
Source: Deloitte Access Economics (2015)

3.2 Education of employees

The majority of employees in the MedTech industry possess a tertiary degree, and workers have studied across a broad range of fields of education.

The Australian MedTech workforce is highly educated, with the majority of employees in the industry possessing a tertiary degree. Survey results indicated that around half of all MedTech employees had an undergraduate degree and around one-quarter had a postgraduate degree as their highest form of educational attainment: in total, 78% of workers had completed a university degree (Chart 3.4). A further 15% had completed some form of vocational education.

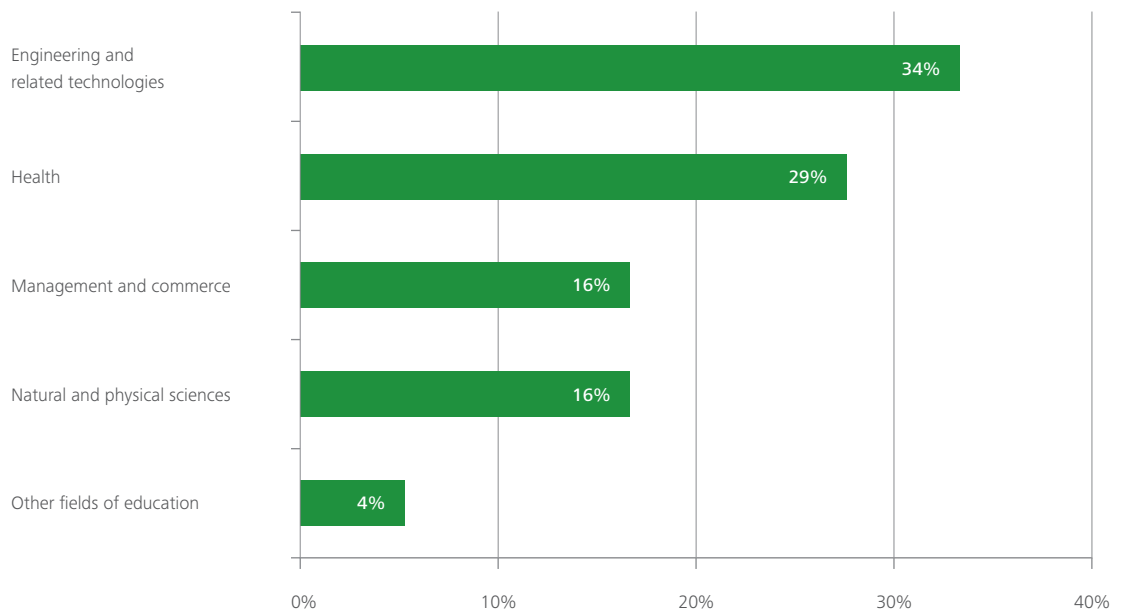
Chart 3.4: Highest level of educational attainment



Source: Deloitte Access Economics (2015)

Employees in the MedTech industry who possess post-secondary education qualifications have studied across a wide variety of areas. The survey found that while engineering is the most popular field of study with 34% of employees with post-secondary qualifications having studied in this area, there were also large shares of MedTech workers that had studied health, commerce and science degrees (Chart 3.5). This again reflects the diverse nature of the different areas and roles within the MedTech industry, and the fact that a large range of skills and backgrounds are required to meet the industry's needs.

Chart 3.5: Post-secondary education fields of study



Source: Deloitte Access Economics (2015)

3.3 Women in MedTech

Female representation is relatively low in senior management roles in the MedTech industry, with a number of factors contributing to this environment.

Gender diversity is a major issue in the MedTech industry. In aggregate, the breakdown between men and women in the industry appears to be quite balanced – for example, the average female workforce share across the companies surveyed for this study was 48%. However, industry consultations suggest that this figure is likely skewed by particular areas within MedTech, such as a large number of nurses in the workforce. Companies highlighted that there is a particular shortage of women in senior management roles in the MedTech industry, and that remuneration gaps, gender discrimination and ‘glass ceilings’ continue to work against achieving gender equality.

Several other reasons were raised as to why female representation is relatively low at the upper levels of the industry. As seen previously in Chart 3.1, sales is an important area within the Australian MedTech workforce, and traditionally the sales environment involves a male-dominated salesperson mentality. While this environment is gradually changing as companies begin to recognise the importance of gender diversity and the different skills that women can bring to sales roles, there continues to be a lack of flexibility across many sales management roles that can deter women from applying for positions (for example, see Surgical Specialties box).

Surgical Specialties

Surgical Specialties is an importer and distributor of medical devices including products in orthopaedics, biologics, specialty trauma and critical care. The company operates in both Australia and New Zealand, with around 80 employees across its Australian offices.

While males have traditionally dominated the sales workforce in the MedTech industry, Melissa Booth – Human Resources Manager at Surgical Specialties – has noticed a shift in recent years. ‘Women are getting more opportunities, and we have more female sales staff than ever before.’ However, she notes that ‘there is still a reluctance to have women in part-time sales roles. The nature of sales opportunities in the MedTech industry means that there can be early starts, late finishes and long-distance travel requirements – this can be a problem for women if they have to pick up the kids from school; the industry is not family friendly’.

More generally with regards to women in senior management roles, Surgical Specialties has a sizeable part-time female workforce made up of working mothers, including the company’s CFO, finance manager and general manager of marketing. Melissa believes that this flexibility has been made possible in part because of the support of the company’s leadership team: ‘we are fortunate to have a CEO who supports increasing the number of women in the MedTech industry. But in some other companies if women want to work part-time, this is viewed as unacceptable’.

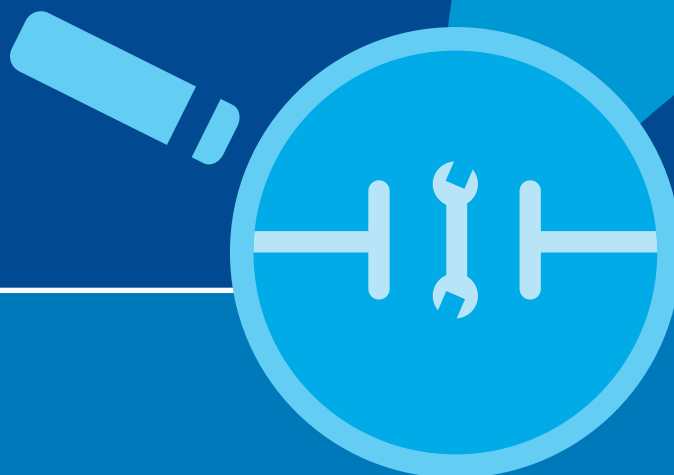
The lack of women in senior management positions was seen to be a particular concern by companies in the MedTech industry because female leadership and executive talent was viewed as important in building a workforce with diversity of experience and thought. Two related factors were highlighted in particular: firstly, females represent half of all medical procedures and therefore MedTech companies – particularly customer-facing staff – need to think more about their product proposition from the perspective of women. Secondly, customer centricity is a big component of many businesses' strategies and having women in decision-making roles can bring different customer insights compared to a leadership team comprised solely of men. As such, companies consulted for this study generally acknowledged that there was a need to attract more females to work in the MedTech industry.

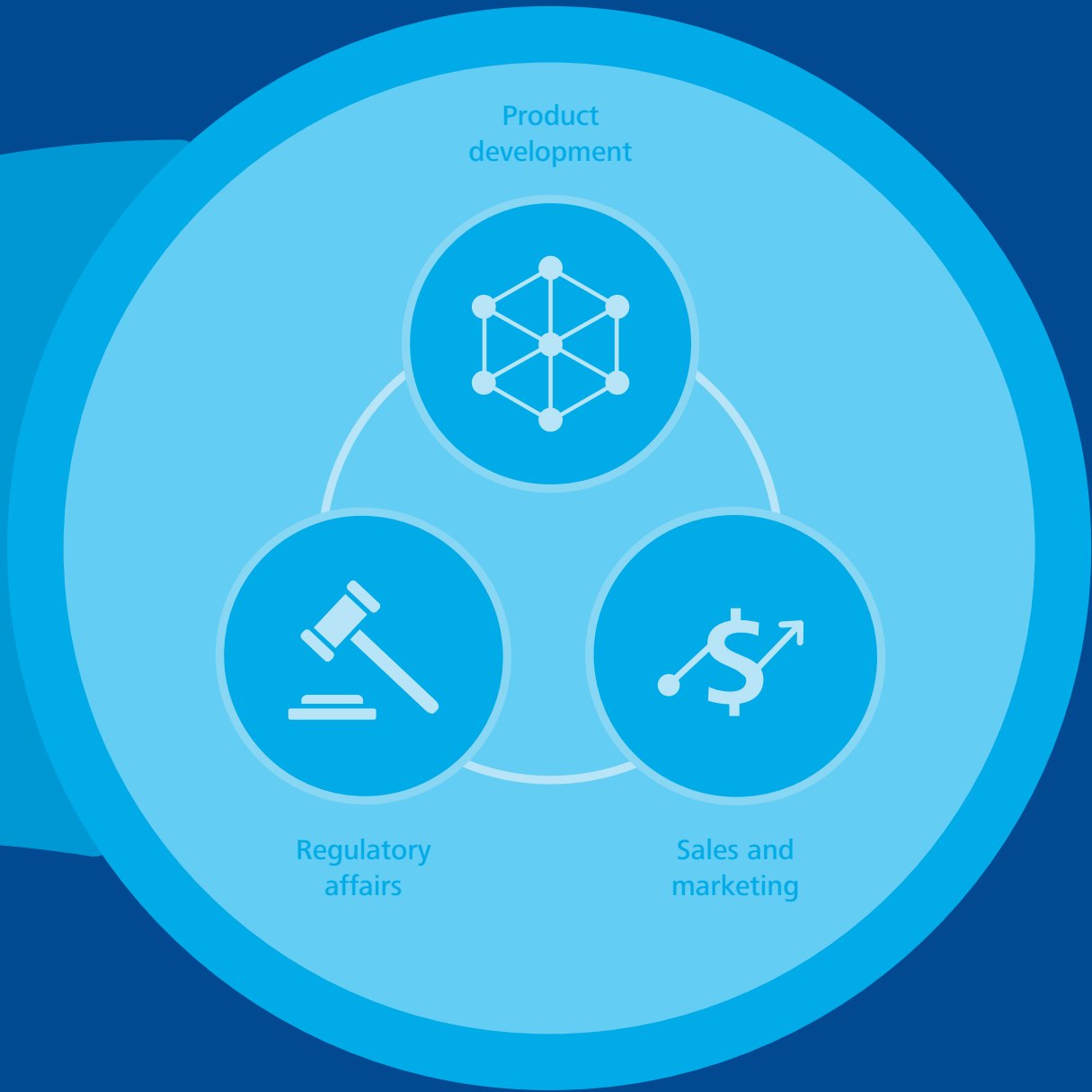
This gender balance issue amongst leadership positions has been acknowledged by a number of stakeholders in the MedTech industry. In July 2015, the MTAA launched a national Women in MedTech initiative with the Sex Discrimination Commissioner, Elizabeth Broderick, to improve gender diversity and facilitate the development of women throughout school, further education, the workforce and company leadership positions (MTAA, 2015). This initiative includes a series of events and educational forums designed to increase gender diversity in the MedTech industry by providing information and networking opportunities to discuss solutions to the lack of women in MedTech management positions.

4

Where are the skills gaps?

This section examines the key business areas in which Australian MedTech companies are experiencing difficulties sourcing skills. The areas where skills gaps were identified to be most prominent were in product research and development, regulatory affairs and Australian sales and marketing.





Product development:

29%_{gap}

Regulatory affairs:

16%_{gap}

Sales and marketing:

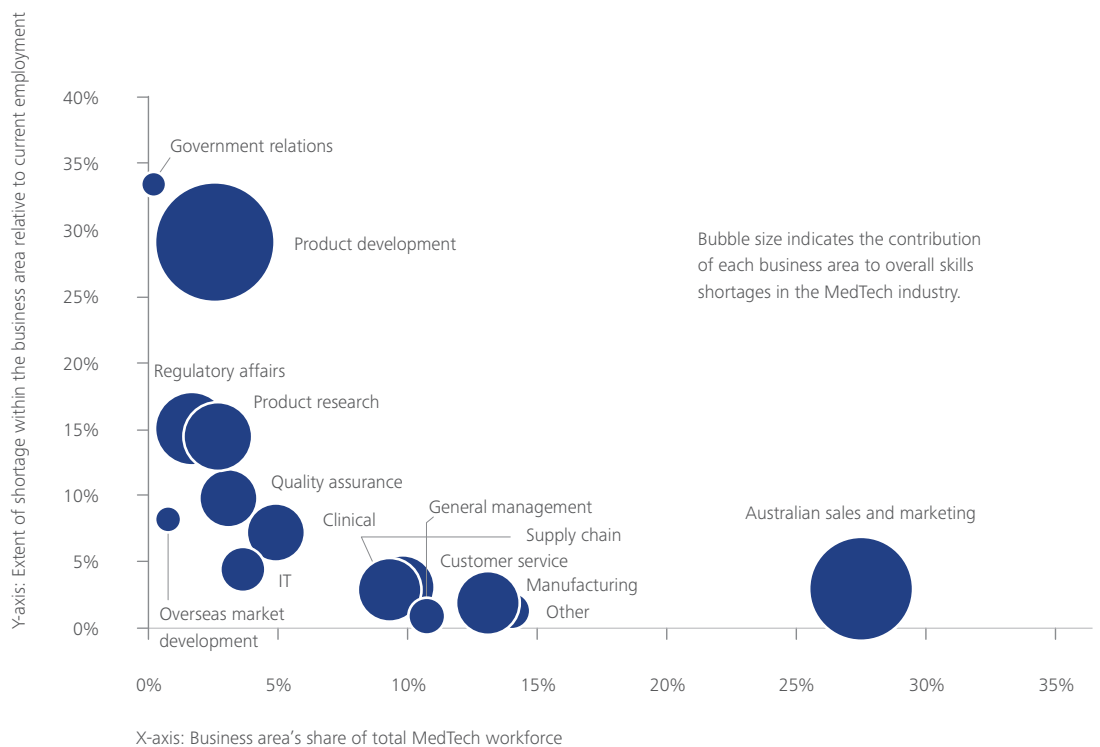
2%_{gap}

4.1 Overview

Significant skills gaps were reported in the product research and development; regulatory affairs; and sales and marketing areas within the MedTech industry.

The skills requirements of the Australian MedTech companies surveyed and consulted for this study were diverse. Two main factors have been taken into consideration when using the survey data to assess which business areas across the overall industry were most impacted by skills gaps. Firstly, the extent of the skills gap for a particular business area is represented by the difference between current and desired employment within the segment, as a ratio of current employment (represented by the y-axis in Chart 4.1). Secondly, the relative size of each business area with respect to workforce is also important to understand the scale of any skills gaps (represented by the x-axis in Chart 4.1).

Chart 4.1: Skills gaps by particular business areas



Source: Deloitte Access Economics (2015)

Survey responses suggest that product research and development and regulatory affairs are business areas in the Australian MedTech industry that employ a moderate number of workers, but that are experiencing relatively large skills gaps. In particular, the skills gaps in the product research and development areas were 15% and 29% of current employment respectively, while the skills gap in the regulatory affairs area was 19% relative to the level of current employment. Despite the fact that these business areas comprise a relatively small portion of the MedTech workforce, the extent of the skills gaps is adversely impacting many companies' operations given the critical importance of these skills.

Furthermore, Australian sales and marketing was highlighted as a business area that is experiencing a relatively small skills gap, at 2% of current employment levels.

However, given the large share of the workforce employed in sales and marketing in the Australian MedTech industry (more than one-quarter of workers employed by survey respondents worked in this area), in absolute terms the extent of the skills gap is quite significant.

The findings from the survey results are consistent with the concerns most frequently mentioned by participants in the consultations and workshops that were run as part of this study. Within these forums, the key skills commonly raised by companies as areas with gaps were sales and marketing skills specific to the MedTech industry, people with an understanding of the complex MedTech regulatory framework, and skills relevant for developing new products in a rapidly changing market.

4.2 Product research and development

Skills gaps in product research and development were highlighted by a wide range of MedTech companies, with many noting that engineers with both technical and business skills are difficult to find.

While not all MedTech companies in Australia conduct product research and development in Australia, those companies that do operate such functions in Australia tended to report skills gaps in these areas. Furthermore, the 29% skills gap in product development reported by survey respondents is considerably larger than the 9% gap that was found in Deloitte's previous skills audit (Deloitte, 2008), while the 15% skills gap in product research compares with a 10% gap from the previous study. This suggests that it has become harder for MedTech companies to find these skills over recent years.

Of the MedTech companies who are involved in product research and development in Australia, more than 40% of respondents were not confident in hiring workers with the required specialist research and development capabilities. This compares with an average of 20% in the previous skills audit, indicating that the industry's difficulties in sourcing research and development skills have worsened over recent years. This is particularly concerning given that product development capabilities will not only be necessary for sustaining growth in the MedTech industry, but also to ensure that advances in medical technology continue to improve health outcomes in Australia in the future as it has done in the past (PC, 2005).

Companies reporting skills gaps in product research and development ranged across a variety of respondents. Some were small businesses that were either manufacturing firms with a strong research and development focus, or companies in the pre-manufacturing segment. Others were medium-sized businesses or even large companies with global operations that also reported difficulties in finding product development skills when required in Australia.

Organisations in the MedTech industry that are involved in product research and development in Australia tend to specialise in biomedical engineering, with 44% of survey respondents identifying with this area as a primary field of specialisation. However, companies across the industry have a wide range of engineering skills requirements – in particular, software engineering was highlighted as a key skills gap by a number of businesses.

The increase in demand for software engineering skills over recent years has been driven by technological advancements, as discussed in Section 2.3. New technologies have allowed MedTech companies to develop new products that would not have been possible in the past, such as in the informatics and data analytics areas (for example, see ResMed box). To take advantage of the opportunities provided by these technological advancements – for example in the areas of patient data and remote monitoring – companies need new skills, such as software engineers with an understanding of the MedTech industry and the specific skills required to work with medical devices. This is a trend that is expected to continue in the future, with many in the industry predicting that new and innovative uses of healthcare data will continue to transform diagnosis and treatment options over the coming years (Deloitte, 2014).

ResMed

ResMed is a global manufacturer of products that diagnose, treat and manage sleep-disordered breathing, chronic obstructive pulmonary disease and other chronic respiratory conditions. The company employs 4,500 workers globally including 1,200 in Australia, around one-third of which are engineers working in either product development or manufacturing.

With Healthcare Informatics being a major growth area for ResMed, a key area where the company sees ongoing high demand is in software engineering positions, particularly within the product development area. Engineers with a strong ability to create cloud-based support systems to enable physicians to capture patient data and conduct remote monitoring will be key to the company's future success. Equally, software, mechanical, mechatronics and electrical engineers are required to work on designing and developing the company's range of cutting-edge CPAP devices and mask technologies. Pearl Daly, Director for Global Talent and Succession at ResMed, says that 'finding engineers who are familiar with designing high-quality, high-volume systems that bring together the IT interface and product development is challenging – finding people with these skills who can work in a highly-regulated medical devices industry and that fit our dynamic and driven culture is even harder'.

Pearl believes that 'the MedTech brand is traditionally associated with the life sciences or biomedical engineering not with the software engineering or similar such disciplines per se – better communication of MedTech career paths to these students could equally encourage software engineering graduates to enter the industry'.

Another area where ResMed has a focus is in their high-tech manufacturing environment. Pearl states that 'manufacturing, mechatronics, mechanical and software engineers with capabilities in state of the art processes, systems and development within a high-volume manufacturing environment are critical to operations. Given the shrinking manufacturing space in Australia, it is becoming increasingly challenging to find strong talent in this area. To address this gap, ResMed has looked to engineers from other highly-regulated manufacturing industries such as the automotive and defence industries'.

Importantly, many companies that were consulted with for this study noted that the issue with hiring engineers for product development roles was primarily the quality of applicants, rather than the quantity. In addition to a shortage of applicants with the required experience and specialist skills, this study found that engineers with both technical skills and business skills were difficult to find. In particular, engineering graduates tended to be lacking in areas such as commercial capabilities, the ability to work in a highly regulated environment, and 'soft skills' such as communication and teamwork. These broader skills are considered to be essential for working in a MedTech research and development environment, but are reportedly in short supply.

The previous skills audit (Deloitte, 2008) found that 'engineers recruited from university were reported to lack job readiness'. Companies raised similar concerns for this study, pointing out that many job applicants have good technical qualifications, but little commercial acumen or business skills. This suggests that the gap in these skills has been an ongoing issue within the MedTech industry that needs to be addressed to ensure that companies are able to source the product development workers that they require going forward.

In addition to these existing skills gaps in product research and development, a recent Deloitte report *Australia's innovation imperative* found that a risk-averse business culture has been developed in Australia,

resulting in an expanding innovation gap between Australia and other economies that are more willing to take risks (Deloitte, 2014). And yet innovation is increasingly being recognised as a necessity for generating growth in the Australian economy in the future. With the MedTech industry being recognised as an Industry Growth Centre in the *Industry Innovation and Competitiveness Agenda* (Commonwealth Department of Industry, 2014), both government and businesses will work to drive more innovation in MedTech in Australia in the future. This is likely to increase demand for research and development skills in the MedTech industry over the coming years.

4.3 Regulatory affairs

As regulatory affairs skills are in high demand across the MedTech industry, it can be hard to hire workers in this area, particularly amongst small businesses due to the relatively high costs of recruiting and retaining regulatory specialists.

The increasingly sophisticated regulatory framework has meant that regulatory affairs skills are in demand across most companies in the MedTech industry. The 16% skills gap reported by survey respondents in the regulatory affairs and compliance area is broadly comparable to the 13% gap that was found in Deloitte's previous skills audit (Deloitte, 2008), suggesting that regulatory skills have been difficult to source for a number of years now.

With many Australian companies operating or selling in a global environment, the skills that are in demand in this area not only include experience with the regulatory framework in Australia, but also overseas. Familiarity with the Therapeutic Goods Administration (TGA) in Australia, Food and Drug Administration (FDA) in the United States, and International Organisation for Standardisation (ISO) standards for medical devices and an understanding of how to work within these processes were identified by companies as being important skills that are difficult to source. In addition, a combination of an engineering or manufacturing background and an appreciation of these regulatory requirements was highlighted as valuable, but hard to find in one individual.

Businesses listed a number of reasons as to why regulatory skills are in high demand in the MedTech industry, including the increase in the sophistication of the regulatory framework over recent decades (discussed above in Section 2.4) and the significant impact that understanding complex regulations can have on revenue when it comes to new products. However, many companies stated that there is no single professional talent pool in regulatory affairs in the MedTech industry. Instead, these skills need to come from a variety of areas – both through investing in developing skills internally and by leveraging off relevant experiences from others (for example, see Cochlear box).

Cochlear

Cochlear designs, manufactures and supplies a number of different medical devices, including sound processors and hearing implants. The company has around 2,700 employees globally including 1,300 workers in Australia, most of which are based in Sydney.

The regulatory space is described as a 'classic issue', not just for Cochlear but across the MedTech industry as a whole, both in Australia and globally. Anne-Marie Leslie, Senior Vice-President – Human Resources at Cochlear, says that there are two main reasons driving the demand for these skills. 'Firstly, it has become more strategically important, as there has been an increase in regulatory activity amongst governments. Different countries have different regulatory structures that can be constantly changing, making things more difficult to navigate. Secondly, given complex regulatory environments, a good knowledge of regulatory affairs can have a big impact on the revenue generated from new products.'

For international regulatory knowledge, Cochlear has used its global network to find the necessary experience – for example, FDA regulatory experience is rare in Australia, but can be found in the U.S. Some of the larger companies in the Australian MedTech industry have also worked together to bring experts from the U.S. to Australia to educate local staff on FDA regulatory requirements. Anne-Marie says that 'this shared learning experience means that we can bring the expertise from the U.S. to Australia, rather than sending staff individually to the U.S. We can therefore upskill our regulatory capabilities at a lower cost which is shared across all the companies involved'.

In Australia, Anne-Marie believes that 'the government can assist by simplifying the complexity in the regulatory space'. For example, the TGA can take longer to approve products going into the Australian market compared to Europe and the U.S. Reducing regulatory burdens can assist in mitigating the impacts of the domestic skills gap in regulatory affairs.

While large companies were found to be adversely impacted by the gap in regulatory affairs skills given the extent to which they demand these skills, small businesses in the MedTech industry also highlighted significant concerns in sourcing the required regulatory skills. This was particularly apparent in the survey results, where around 80% of those reporting a skills gap in regulatory affairs were SMEs employing less than 60 Australian staff.

Industry consultations suggest that small businesses are often those that need the most guidance in the regulatory affairs area, because they can have difficulties winning tenders due to significant regulatory requirements (such as the TGA or state regulations). However, it can be too expensive for these smaller businesses to have a dedicated regulatory affairs officer, and consultants in the regulatory space can also be prohibitively costly. Those who can afford to hire an in-house employee specialising in regulatory affairs face similar issues to those described above – in addition to competing with larger companies, which may represent more attractive employment opportunities. A reduction in 'red tape' and other regulatory burdens for small MedTech companies could therefore be one means of addressing these issues and ensuring that small businesses remain competitive.

4.4 Australian sales and marketing

Changing sales models as hospitals become more sophisticated in their procurement of medical devices is leading to changing skills requirements in sales representatives, with an increased focus on commercial and financial skills.

Given the nature of the MedTech industry in Australia, with many larger global companies choosing to base their product development and manufacturing facilities overseas and then importing these products into Australia, sales and marketing staff represent a sizeable share of Australian MedTech employees. While the skills gap of 2% in this business area does not seem large, the large number of workers already employed in the Australian sales and marketing area means that this relatively small share is a significant contributor to the overall skills gap in the MedTech industry. This figure is broadly comparable to the 4% gap found in Deloitte's previous skills audit (Deloitte, 2008).

Industry consultations suggest that sales and marketing workers are hard to find in the MedTech industry because they are required to have a combination of technical skills and the ability to operate at a corporate level and communicate technical issues to a variety of other stakeholders – such as customers, developers and government decision makers. Companies often also require marketers and salespeople with experience in and understanding of highly specialised areas, so that they have the capabilities to handle specific questions from customers as well as being able to provide feedback to the development process as customer needs evolve. This is particularly the case as the role of MedTech sales and marketing workers is shifting from a product-centric view to one that is more consumer-centric. There is also now an increasing focus on providing sustained patient outcomes proven with evidence, rather than simply showing that a device cures an illness or responds to an incident.

A number of companies highlighted the fact that the conventional model of sales in MedTech is changing as hospitals become more sophisticated in their procurement of medical devices, and this is leading to changing skills requirements in sales representatives. Rather than dealing directly with only surgeons and traditional clinical buyers who are more knowledgeable about the technical benefits of particular products, there is now greater interaction between sales representatives and the commercial side of hospitals. For example, some hospitals are using procurement professionals or engaging in group buying to ensure that they receive value in their purchases of MedTech. Importantly, this means that sales and marketing staff now need to have more experience in business and finance and more commercial nous, so that they are able to understand the financial and management requirements and challenges of their customers.

More broadly, one issue that was commonly raised by MedTech companies in this study was that poor perceptions of sales and marketing jobs in Australia tended to discourage people from taking up careers in these areas. This cultural resistance in Australia was contrasted with the U.S., where sales roles in the MedTech industry are viewed as more prestigious careers. MedTech companies in Australia are concerned about the lack of visibility that sales and marketing roles have in Australia, with many people unaware of the interesting and dynamic nature of these jobs. As a result, even graduates and experienced workers who are aiming to enter the MedTech industry often do not choose to go into sales and marketing positions. Providing more information to the broader population about the sales and marketing roles available in MedTech and the necessary skills required could help to increase awareness and dispel the negative misperceptions surrounding these areas.

5

Why are there skills gaps?

This section discusses the reasons that might be causing skills gaps to arise in the Australian MedTech industry. The concerns raised by companies in this study include unclear career pathways into the MedTech industry and a lack of broader industry awareness amongst the general population, as well as insufficient linkages between MedTech companies and Australian universities.

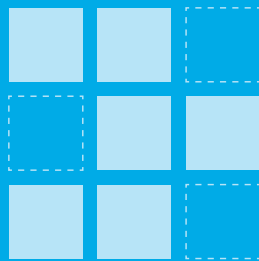


50%

of companies see unclear
career paths as an issue

43%

of companies could not
fill jobs due to lack of
suitable experience

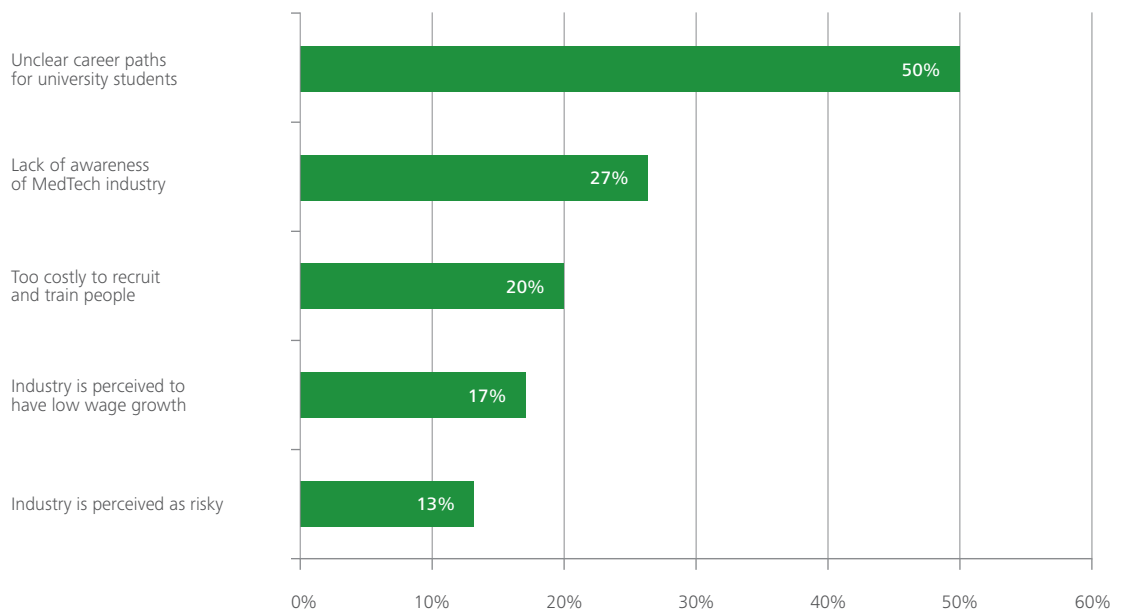


5.1 Unclear pathways into MedTech and lack of industry awareness

A lack of awareness about the MedTech industry in Australia and a lack of clarity surrounding potential career paths into the industry are key drivers of skills gaps in the MedTech workforce.

The key reasons highlighted by Australian MedTech companies as contributing to skills gaps in the industry were related to a lack of knowledge about the MedTech industry amongst university students and Australian society more broadly. The survey found that half of respondents saw unclear career pathways for university students and graduates as a driver of skills gaps in the industry, while 23% believe that a general lack of awareness of the MedTech industry is a contributing factor (Chart 5.1).

Chart 5.1: Contributing factors to MedTech skills gaps in Australia



Source: Deloitte Access Economics (2015)

On the issue of awareness, the Australian environment was often compared to the U.S., where the MedTech industry is much more prominent and represents a target for university students as a future career option. This was linked to the fact that many MedTech companies' head offices are located in the U.S., and the big industry brands tend to be household names in the U.S. In contrast, MedTech doesn't have the same level of brand awareness as an industry in Australia, which means that MedTech companies need to actively promote opportunities in the industry to university graduates. Yet even with such promotion, the candidate pool of potential entrants into the MedTech industry tends to be relatively small, with the general lack of awareness in Australia (particularly compared to other occupations such as doctors or medical researchers) presenting a significant barrier to sourcing talented graduates into the MedTech industry.

Even once students gained a general awareness about the MedTech industry, a lack of clarity surrounding potential career pathways in the industry was viewed as deterring graduates from entering MedTech. A range of factors were highlighted as contributing to this perception of unclear career paths, including:

- A lack of definition surrounding the MedTech industry, including a lack of clarity on the areas of the economy and society where MedTech operates in
- Uncertainty about entry points into different areas of MedTech
- How students could translate university degrees into jobs in MedTech
- Graduates being unsure of directions for career progression in the industry.

There was broad agreement that better communication on career pathways in the MedTech industry is necessary to encourage more people to enter the industry, and to provide information on the depth and diversity of potential careers in MedTech. Many of the companies, universities and other stakeholders consulted with suggested that this would require deeper engagement with the broader population, rather than simply presenting students with 'brochures of people in lab coats standing near big machines'. Potentially, interacting with students at a younger age (such as in high school) and their parents and careers advisers could assist in increasing the community's understanding of pathways into the MedTech industry. In recognition of this, the industry is currently working with state education authorities in NSW to incorporate more MedTech-related content into the school curriculum.

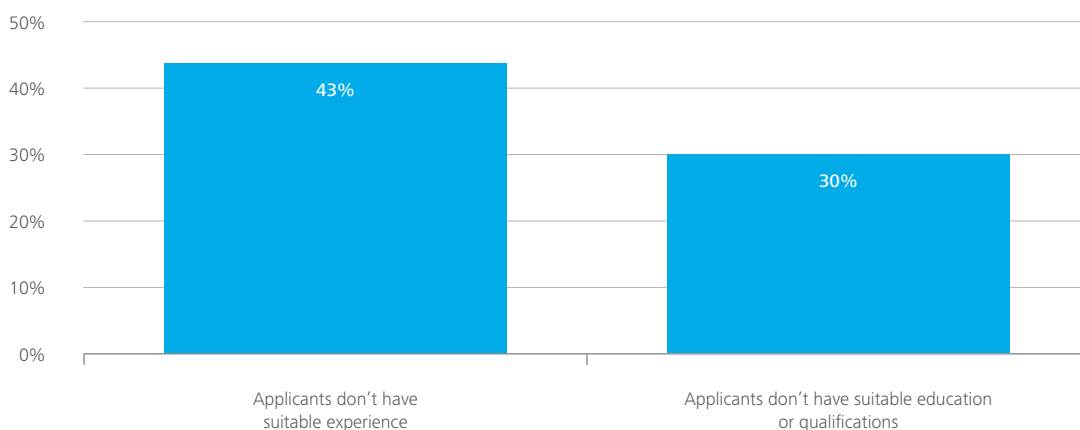
Promoting increased awareness and providing information on career pathways is particularly important to address skills gaps in areas that are not typically associated with the MedTech industry. Examples of these include the skills in software engineering or marketing discussed above which, combined with technical knowledge of medical devices and an ability to work in a regulated environment, are in high demand in the MedTech industry. Having students understand that these cross-disciplinary capabilities can create huge opportunities for them in the MedTech industry could be one way of ensuring that the 'right' combination of skills are coming out of Australian universities (this is also discussed in the following section).

5.2 Insufficient linkages between industry and universities

There is a disconnect between the skills that are demanded by companies in the MedTech industry and the skills being supplied from universities, due to insufficient linkages between these groups.

This study found that in many cases, MedTech companies in Australia had difficulties filling open positions because the applicants they received were unsuitable. 43% of survey respondents said that their difficulties were due to a lack of suitable experience, while 30% described a lack of suitable education or qualifications as being an issue (Chart 5.2). This reinforces the notion that the quantity of workers applying for jobs in the MedTech industry is not the biggest problem – it is the quality of the skills possessed by potential employees that need to be developed further. In particular, companies are often reluctant to take on new graduates who lack the experience or job readiness required.

Chart 5.2: Reasons for hiring difficulties in the Australian MedTech industry



Source: Deloitte Access Economics (2015)

As previously discussed, promoting cross-disciplinary studies to university students can encourage them to develop skills in areas that are demanded by industry. However, it is not sufficient to only communicate this to students alone – the process must also be facilitated through closer connections between companies in the MedTech industry and relevant education institutions. An ongoing theme that emerged throughout the consultations conducted for this study was that there is a disconnect between the skills that are demanded by industry and the skills being supplied out of universities, with a key driver of this being too few linkages between the MedTech industry and universities across Australia. Some organisations have begun to address this issue; for example, three Australian universities across different states have worked with industry partners and the MTAA to design a program for PhD graduates, which aims to focus their transition into the MedTech industry towards areas with significant unmet market and clinical needs.

A widely acknowledged method of building closer industry and university linkages was the provision of more internships and work placement programs for students to experience working in MedTech as they complete their degree. While these are already a requirement within many university degrees (for example, see Flinders University box), various difficulties were raised regarding how more opportunities can be created from the perspective of industry. Universities need to allow for flexibility in placement lengths in order to encourage industry involvement, as too short a placement (e.g. only 1 or 2 months) can restrict the ability of students to do meaningful work or contribute to the company following the initial training period. Conversely, longer placements (e.g. 12 months) may represent too large a commitment for SMEs in the MedTech industry to offer a position.

Flinders University

Flinders University, located in South Australia, offers a range of undergraduate and postgraduate courses relevant to the MedTech industry in its Faculty of Science and Engineering. Flinders has a particular strength in biomedical engineering, with the university's biomedical engineering degree, first offered in 1993, being the first undergraduate course in this field to be accredited in Australia.

The university requires engineering students to complete a 20-week industry placement in the second semester of their penultimate year. Professor Karen Reynolds, Deputy Dean of the School of Computer Science, Engineering & Mathematics and Director of the Medical Device Research Institute at Flinders, says that 'the placement program allows students to gain experience working in industry, developing capabilities such as business and communication skills. A number of MedTech companies are involved in the placement program both locally and overseas, and the length of the placement allows employers to get value from having the students at work, while students also feel they are a part of the company'.

Professor Reynolds believes that 'many biomedical engineering students don't connect their degree with the idea of the MedTech industry' – they may be familiar with working as a biomedical engineer in a hospital or as a researcher, but are unfamiliar with career pathways in industry. The breadth of potential career paths means that different skills are required, but an understanding of industry and business is important for all students to ensure that they can engage with industry even if they do go on to work in hospitals.

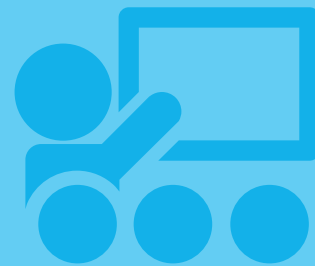
Universities can help to build this knowledge – for example, Flinders University has offered an 'Innovation in Medical Devices' subject to teach students about commercial viability for new technologies, including writing commercial assessments and business plans. Within this subject, Flinders' large network with the local MedTech industry was used to invite guest lecturers to speak to the class on topics such as business experiences, intellectual property and commercialisation.

Smaller companies in particular tend to require more support in building connections with universities and offering access to students, as many do not currently have the capacity to take on university students as interns or through work placements. This is partly due to limited resources, but a larger issue is that small businesses often don't have the skills and knowledge required to mentor a university student. In light of this, there could be a role for universities or government organisations to provide mentoring support to small MedTech companies who are interested in working with students.

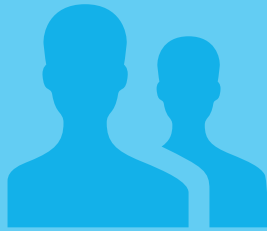
6

How are skills gaps currently being addressed?

This section looks at how Australian MedTech companies are currently addressing skills gaps in the industry. Strategies that were highlighted by businesses in this study include internal training and transfers to fill gaps within the company, as well as hiring skills from other industries and overseas.



Training and professional development



Internal transfers



How are skills gaps currently being addressed?



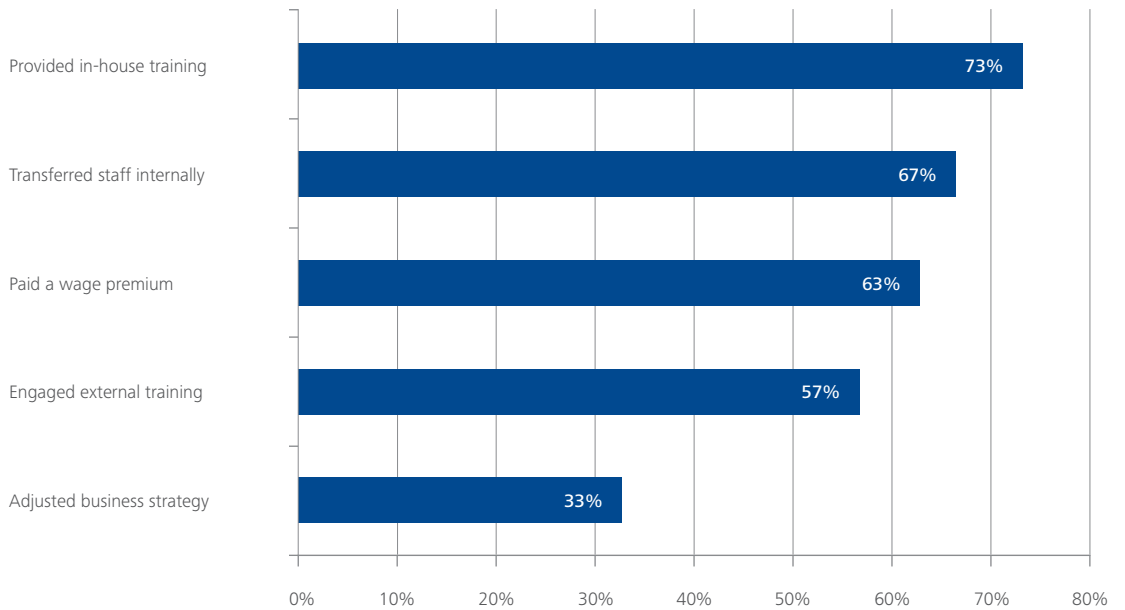
Hiring from other countries and industries

6.1 Internal training and transfers

The provision of in-house training and professional development, as well as internal staff movements, can help to ensure that employees are equipped with the right skills for the business.

Companies in the Australian MedTech industry have employed a number of approaches to address skills gaps within their organisation. Survey results show that 73% of respondents have provided in-house professional development or training programs in order to upskill their staff, while 67% have transferred staff internally to fill skills gaps and 63% have paid a wage premium to attract suitably skilled staff (Chart 6.1).

Chart 6.1: How companies have addressed MedTech skills gaps



Source: Deloitte Access Economics (2015)

The provision of in-house training options is one way that a company can ensure that their employees are equipped with the right skills to meet their business requirements. Indeed, many MedTech companies provide training specific to a particular product or technology even when new employees have qualifications or experience relevant to the broader area, because of the specialist nature of the different technologies and devices sold by each company. To address concerns about gaps in business skills particularly amongst university graduates, some MedTech companies encourage crossovers in their training programs to ensure that employees are equipped with a combination of technical expertise and commercial acumen. Companies can also engage with training programs developed by external providers and industry associations such as the MTAA, which has training modules across a range of relevant topics such as regulation, funding, sales and ethics.

Moving staff around the organisation internally can also help employees develop skills across multiple dimensions. An example of this is in the sales and marketing space discussed in Section 4.4, where product manager positions are difficult to fill because these positions – which represent the link between the product developers and the customers – require both technical understanding and marketing skills. Instead of sourcing these skills from the outside job market, some companies have moved engineers who are looking to explore cross-functional career paths out of their product development team and into product marketing roles. While moving people out of technical disciplines in such a manner also requires some internal training and upskilling, many companies in the MedTech industry are adopting less siloed workforce models in order to fill their skills gaps (for example, see Baxter box).

Baxter

Baxter International Inc. provides a broad portfolio of essential renal and hospital products, including home, acute and in-center dialysis; sterile IV solutions; infusion systems and devices; parenteral nutrition; biosurgery products and anesthetics; and pharmacy automation, software and services. The company employs around 900 workers in its Australian operations.

As with many companies in the Australian MedTech industry, it can be a challenge finding top talent for the organisation. The focus at Baxter has increasingly turned to their internal inventory of skills when positions open up at the company. According to Anne Meredith, Human Resources Director at Baxter, 'internal appointments increased from 6% in 2007 to 42% today. We aim to hire from within wherever possible, using external talent to complement this strategy. The shift from mainly sourcing skills externally to having a good combination of internal and external sources has been a very positive change, made possible by our focus on developing our people.'

Sourcing skills internally requires working closely with employees to identify their interests and career ambitions, and matching these against the gaps and opportunities available in the business. Baxter is very open to exploring cross-functional opportunities and career changes within the organisation. Anne acknowledges this involves extra effort in terms of training and development: 'More than ever before, we are placing people in roles that they might only be 80% ready for, but we complement this by making sure they have the support and training they need to grow stronger in the role. We are being very proactive to fill our talent needs from within the organisation – not only does this allow employees to gain a broader experience at Baxter but also helps us retain people in the company.'

6.2 Hiring from other industries and overseas

Recruiting workers from related industries and applying their skills to MedTech and filling open positions with workers from overseas are other potential options for addressing skills gaps.

When looking externally to fill skills gaps in the MedTech industry, companies often look to other sources beyond the domestic medical technology space. With many of the skills that are in high demand becoming increasingly more difficult to find locally, businesses are turning to alternative areas such as sourcing the relevant skills from other industries or other countries.

Recruiting workers from other industries was found to be a strategy used across various business areas in the MedTech industry; for example, companies hiring from the telecommunications industry for broader IT skills which could then be applied to their digital marketing area. For more specific technical skills, it was suggested that displaced workers from other industries are a good source of potential workers for the MedTech industry – in particular, the declining manufacturing industries across a number of Australian states was seen as providing a large potential talent pool for MedTech companies with domestic manufacturing operations (for examples, see Cook Medical box and previous discussion in ResMed box).

Filling open positions with workers from overseas was another option employed by Australian MedTech companies to fill skills gaps. Importing skills from other countries was the most commonly cited 'other' approach to addressing skills gaps, including transferring staff from international offices within the same company, as well as hiring new staff from overseas. Larger companies were generally more likely to recruit internationally, as the costs associated with visa sponsorship and sorting through large volumes of job applications from overseas candidates tended to be prohibitive for smaller MedTech companies.

Cook Medical

Cook Medical is a global manufacturer of medical devices across a range of different medical specialties. The company's Australian division manufactures and distributes medical products across Australia and over 64 countries around the world, employing around 500 employees including 180 employees in manufacturing.

Barry Thomas, Director – Asia Pacific at Cook Medical, believes that reskilling displaced workers from other industries is a potential source of skills for the MedTech industry. 'In Brisbane [where Cook Medical's Australian manufacturing facility is based], there used to be a large clothing manufacturing industry. As companies in this industry have closed down over the years, we have provided an opportunity (where we can) to reapply the dexterity and sewing skills of displaced workers to making medical devices. The skills that we require are very specific. We produce stents that need to be sewn by hand as the stents are customised on a per-patient basis. Similar examples of reskilling from other industries can be found across the Australian MedTech industry.'

This is in line with Cook Medical's broader strategy for recruiting staff in Australia, which involves identifying the skills are required and then recruiting based on the identified attributes rather than with a view to filling a particular title. Barry notes that this approach has also been useful in finding skills in the regulatory area: 'because the MedTech industry is quite small, people with medical device experience in a regulatory sense are rare. Instead of recruiting to fit a specific job description, we thought about the actual skills we were looking for, such as project management and attention to detail. We then hired people with these attributes and trained them on the regulatory environment'.

7

What will the impact of skills gaps be in the future?

This section examines the impact that skills gaps in the Australian MedTech industry could have in the future. It looks at the size of the potential skills gap given the expected increases in demand for skilled workers over the next five years, and the effect that this gap could have on the future growth of MedTech companies.



62%

growth over 5 years
given current skills gaps

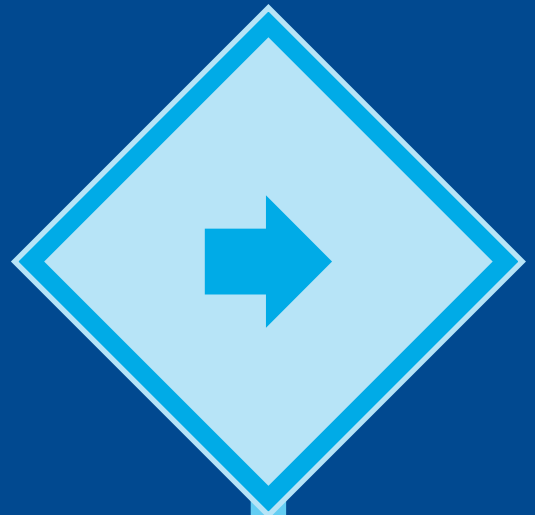
77%

growth over 5 years
if no skills gaps



Growth dividend:

15ppt

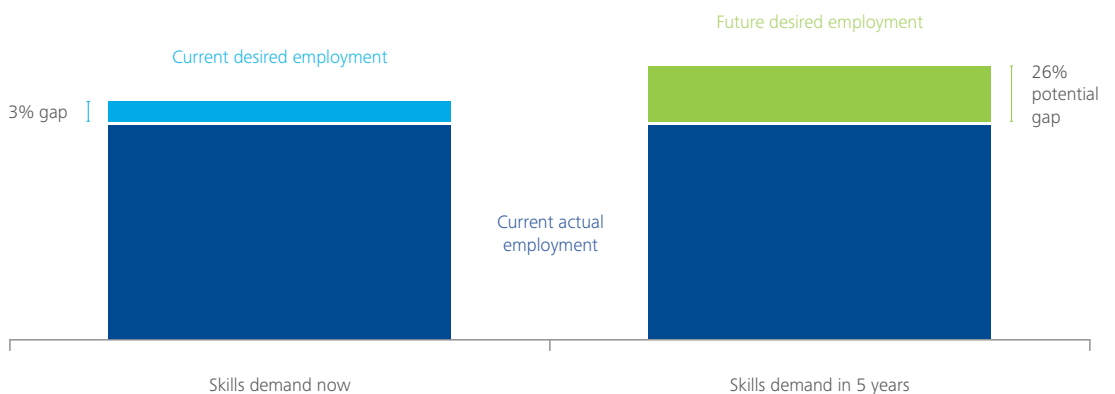


7.1 Future skills demand

A variety of factors are expected to increase demand for skilled employees in the MedTech industry, and skills gaps could increase significantly if employment remains at current levels.

Demand for skilled workers in the MedTech industry is expected to increase significantly over the next five years. Survey results suggest that the current skills gap of around 3% could increase to a potential gap of around 26% if employment levels remain at current levels (Chart 7.1). Particular business areas which are expected to see an increase in demand include general management and IT, as well as the sales and marketing and product development skills discussed previously.

Chart 7.1: Current and future skills demand in the MedTech industry

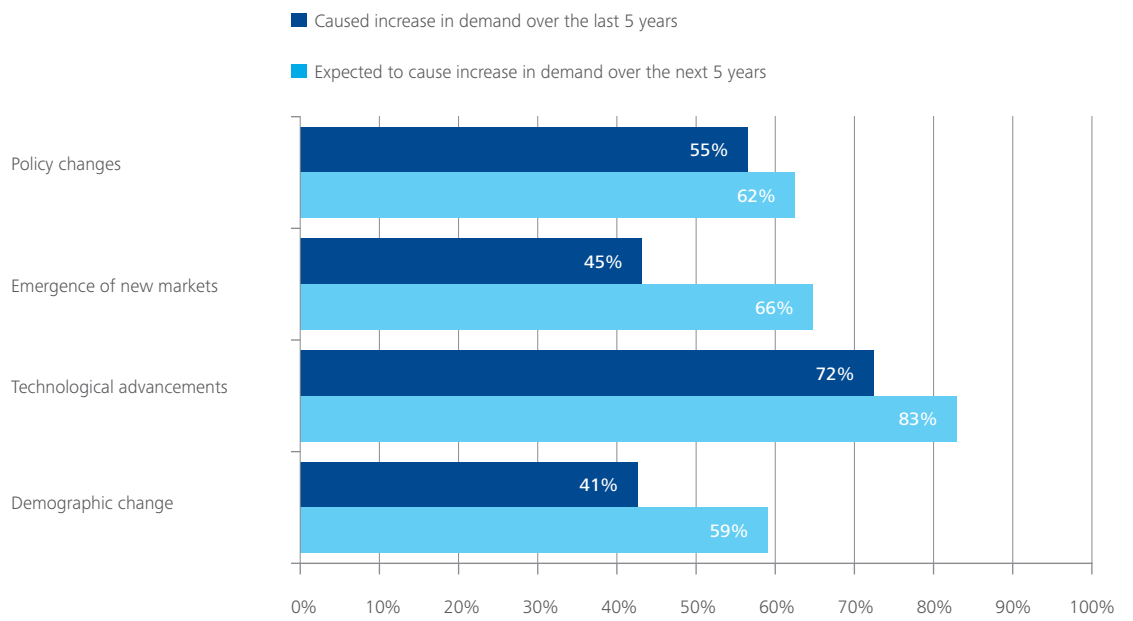


Source: Deloitte Access Economics (2015)

This study found that there are a variety of factors that are expected to increase Australian MedTech companies' demand for skilled employees over the next few years. Technological advancement was highlighted by 83% of survey respondents as a likely driver of increased skills demand in the future. Consultations with businesses in the industry indicated that new technologies are not only driving changes in the products and devices being developed, but are also providing new opportunities for MedTech companies to interact with customers. Technological advancement is therefore resulting in an increase in demand for skilled workers across a variety of business areas, from product development to marketing.

Around 60% of respondents believe that other factors such as policy and regulatory changes, the ageing population and the emergence of new markets in Asia will also result in increased skills demand over the next five years. The latter two factors in particular are expected to have a larger impact on skills demand in the future compared to their impact on MedTech companies' demand for skilled workers over the last five years (Chart 7.2).

Chart 7.2: Factors affecting MedTech companies' skills demand



Source: Deloitte Access Economics (2015)

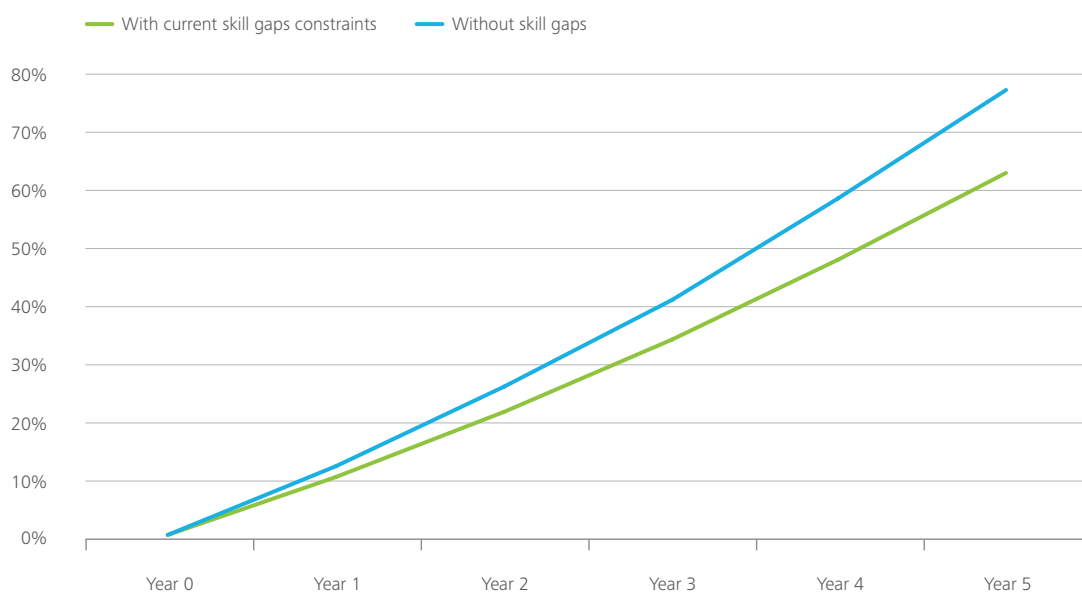
7.2 Impact on future growth

While there is a generally positive outlook for the Australian MedTech industry in future years, industry growth could be negatively impacted if businesses continue to be constrained by skills gaps.

The outlook for the MedTech industry in Australia was generally viewed as positive, with future growth seen to be driven by Australia's strengths in innovation and increased demand from the population both locally and overseas. However, skills gaps in the MedTech industry could represent a barrier that prevents companies from achieving their full growth potential. 63% of survey respondents believed that growth in their business would be higher if there were no skills gaps in the industry.

Taking into account business size, average growth in turnover reported by survey respondents was forecast to be 62% over the next five years (10% per annum) when operating within the constraints of current skills gaps. This growth forecast rose to 77% (12% per annum) if skills gaps were to be eliminated in the MedTech industry (Chart 7.3). This suggests that a growth dividend of around 15 percentage points could be gained over the next five years by ensuring that the demand for skilled workers by MedTech companies is met with an adequate supply of skills, both on a quantity and quality level.

Chart 7.3: Projected MedTech industry growth over next five years




Source: Deloitte Access Economics (2015)

8


Recommendations to address skills gaps

This section outlines the recommendations to address skills gaps in the Australian MedTech industry that have emerged from this study. These recommendations fall into five broad categories: information and awareness, career links, learning by doing, school education, and reducing red tape.





Information
and awareness




Learning
by doing



Career
links



School
education



Reducing
red tape

8.1 The evolving policy landscape

Collaboration across industry, education providers and government will be required to ensure that measures implemented to address skills gaps are effective and have a lasting impact across the MedTech industry.

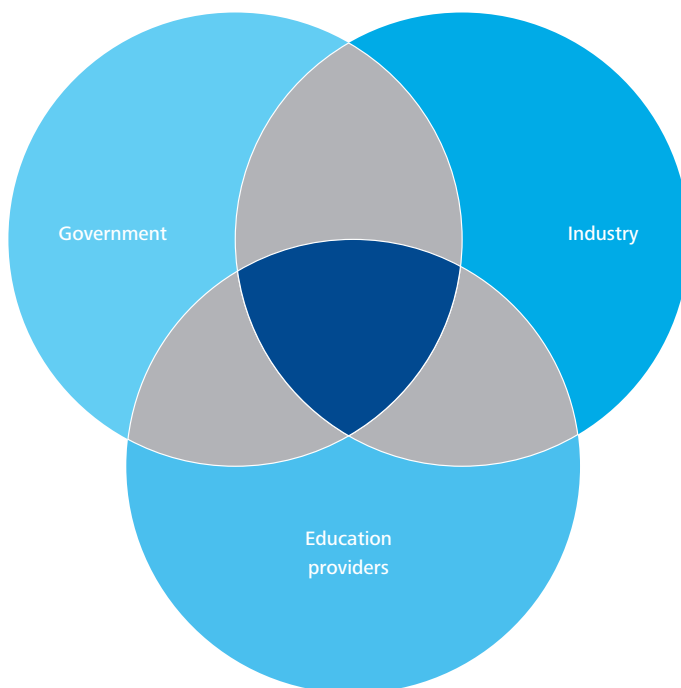
A number of ideas have emerged from this study as potential directions for future action to address skills gaps in the Australian MedTech industry. The key theme that underpins all of these recommendations is that collaboration across industry, education providers and government will be required to ensure that the measures implemented are effective and have a lasting impact across the industry. Coordinated action is necessary because many of the issues raised in this study are problems associated with the MedTech industry as a whole, rather than particular stakeholders within the sector. Developing a strong MedTech ecosystem will be critical to ensuring that the skills requirements and demands of the industry as a whole can be met in the future.

This is consistent with the direction in which the Australian policy landscape is evolving around the MedTech industry – there is increasing recognition that collaboration between different groups is required to drive growth and innovation in the future. At a national level, the MedTech industry has been identified by the Australian Government as one of five priority Industry Growth Centres, which aims to enable national action on key issues for the industry such as skills, collaboration, commercialisation and deregulation (Commonwealth Department of Industry, 2014). Action is also being taken at a state level – for example, the Medical Technology Knowledge Hub in NSW will bring together industry, government and universities to improve the business environment across the MedTech industry (NSW Department of Industry, 2015), as well as development work and industry investment in other jurisdictions including Victoria and South Australia.

These initiatives represent vehicles that can drive the recommendations emerging from this study. National leadership on taking these recommendations forward can be provided by the MedTech and Pharmaceuticals Industry Growth Centre, while industry-led initiatives such as the MedTech Knowledge Hub in NSW as well as the MTAA’s activities across Australia are also ideally positioned to address the skills and workforce challenges facing the MedTech community.

The recommendations have been grouped into five key areas:

- Information and awareness
- Career links
- Learning by doing
- School education
- Reducing red tape.



8.2 Information and awareness

Stakeholders from across the MedTech industry must work together to increase the industry's profile in Australia in addressing skills and workforce issues.

Recommendation 1: MTAA and MedTech and Pharmaceuticals Industry Growth Centre to use the proposed MedTech Blueprint, MedTech Virtual Museum and other industry initiatives to raise the profile of the MedTech industry amongst the general public and policymakers.

One major finding of this study was the need to increase awareness of the MedTech industry, its growth prospects and career pathways through the industry. This is because many of the difficulties associated with attracting skilled workers into the MedTech industry stem from a lack of awareness of the industry itself.

As such, the overarching brand of the MedTech industry needs to be marketed more actively throughout the community, so that the broader population is aware of the social and economic value of the industry. Initiatives such as the MedTech and Pharmaceuticals Industry Growth Centre, the proposed MedTech Blueprint and the NSW MedTech Knowledge Hub provide good opportunities to increase the community's understanding of the industry with respect to its high-tech products, strong growth prospects and benefits to the broader public. They should also be considered by policymakers as such initiatives can provide the foundation from which State and Federal Government policy could be developed in relation to the MedTech industry.

Increased marketing of the MedTech brand can also be driven forward by industry through increased engagement and positive messaging between companies and the community, for example by promoting the social benefits of medical technologies and devices in the context of healthcare and improving lives. This could involve joint action between government and industry, such as government support and funding for initiatives by companies and industry associations that promote the overarching MedTech brand.

An example of such an initiative is the MedTech Virtual Museum that is being established by the NSW MedTech

Knowledge Hub as an online resource that will depict the history of medical technology and its impact on healthcare, illness and wellbeing. The Virtual Museum will be a readily accessible learning tool that can help to promote the MedTech industry to a broad audience across the Australian population. In addition, it will be linked to the school science curriculum in order to assist in raising the profile of the MedTech industry amongst schools and education policymakers.

Recommendation 2: MTAA and MedTech and Pharmaceuticals Industry Growth Centre to hold regular forums bringing together the disparate groups from across the MedTech community in various states to discuss issues relevant to skills and the workforce.

Increased information sharing and awareness within the MedTech industry was also raised as an important factor in addressing the skills gaps that exist in the MedTech workforce. This is applicable to all stakeholders across the MedTech community – industry, government and education providers.

Holding regular state and national forums that bring together these various disparate groups from across the MedTech community could work to encourage more frequent discussion across these groups on issues relevant to skills and the workforce, such as innovation and technological developments or increasing gender balance. While there are currently conferences hosted by MedTech industry groups and research institutions, some stakeholders believe that these tend to be aimed towards particular segments in the industry such as large companies, small businesses or academics. Having a forum that actively seeks to bring groups together can help to facilitate regular discussion across these different groups on how to address the issues facing the MedTech industry in the future. To ensure nationwide participation, these forums should be coordinated by centralised industry body with national reach, such as the MTAA or through the MedTech and Pharmaceuticals Industry Growth Centre.

8.3 Career links

Career pathways and professional development opportunities in the MedTech industry must be made clearer to both existing employees in the industry and students looking to enter the industry.

Recommendation 3: MedTech companies and industry associations (e.g. MTAA) to increase their presence on campus and at careers fairs to ensure students understand MedTech careers options.

Increasing awareness of the MedTech industry amongst students is critical in ensuring that there is a sufficient pipeline of potential workers entering the sector. More information therefore needs to be provided to students on career options in the MedTech industry.

At a university level, this could involve increased engagement between industry leaders and students, such as through representatives from MedTech companies speaking to students at careers events or as guest lecturers. This would provide future graduates with more exposure to and understanding of potential pathways through the MedTech industry. While time and resource constraints might prevent companies from reaching out to all universities across Australia in person, digital delivery of information – for example through online videos or profiles of industry leaders discussing their careers and the diverse opportunities in the MedTech industry, such as in the Faces of Industry initiative (MTAA, 2014) – could allow industry to have greater reach across the education sector. In addition to online resources, industry associations such as the MTAA could have a presence at careers fairs in order to create a more visible profile for the MedTech industry as a whole across a wider student audience.

As part of this information provision, students need to be educated about potential career paths through other organisations where graduates can gain the skills and experience required to enter the MedTech industry at a later stage in their careers. Young people aspiring to enter the MedTech industry could create a career path and gain the relevant skills outside of the industry itself, for example by developing regulatory experience working at the TGA, or clinical research and health policy experience by working in the Federal or State Departments of Health, or experience from the customer side working in hospitals. In translating the spirit of collaboration across the Australian MedTech ecosystem, students and graduates can build networks and industry nous by working in and learning from adjacent organisations to the MedTech industry itself. It is important that students are aware of these opportunities and how they can represent alternative pathways into the MedTech industry.

Recommendation 4: MTAA to create a map of current professional development opportunities in the MedTech industry, with input from industry and government.

A number of companies consulted in this study were interested in contributing more to developing the skills of graduates and workers in the MedTech industry. However, they were unsure in how to go about doing so.

In light of this, another potential initiative is that the MedTech industry needs a map of the professional development opportunities that are currently being administered across industry, education and government at both the Federal and State levels. This map would fit within the broader MedTech Industry Blueprint that is being developed, and would form one component in creating the right environment for developing and growing the industry. Such an initiative would help to identify where there are gaps and can be used as a tool

for developing new training programs that fill these gaps, while avoiding overlap with current professional development opportunities that already exist in the industry. It could also help companies to collaborate on both existing and new professional development opportunities in order to build the skills of the MedTech workforce.

An additional benefit associated with having a map of professional development programs is that it would increase awareness and take-up of existing opportunities. For example, there are a range of training programs and information seminars that are already offered by private providers and industry associations such as the MTAA. Given the range of training courses already offered by the MTAA, the organisation is ideally placed to coordinate the creation of this map of current professional development opportunities, in combination with input from industry and government.

8.4 Learning by doing

MedTech companies, education providers and government need to work together to ensure that students can develop the skills that are being demanded by industry.

Recommendation 5: MedTech companies to increase internships and work placements, with a role for the MedTech and Pharmaceuticals Industry Growth Centre or an industry association (e.g. MTAA) to create an Internship Advisor program with an online toolkit of resources.

There is a clear need for more engagement between companies in the MedTech industry and the education sector: many businesses believe that graduates are not equipped with the skills and experience that industry is looking for, and one way of improving this is for students to learn by doing.

Increased internship and work placement opportunities was generally acknowledged to be an important way of ensuring that future graduates entering the MedTech industry are more 'industry ready', with a better understanding of the broad base of skills required to work in different business areas. These opportunities provide benefits for both parties, by providing students with exposure to industry and by reducing the risks faced by companies when hiring new graduates. In doing so, companies can assist in upskilling students in the areas that are particularly demanded by industry, and provide students with valuable experience working in the MedTech industry. Internships and work placements can also give students the opportunity to develop mentoring relationships with representatives from industry, and gain insights on potential career pathways to enter the MedTech industry.

Companies can be assisted in this through the creation of an industry-wide Internship Advisor program. Such a program would involve the provision of an online 'toolkit' of resources that MedTech companies can draw on in designing an internship or work placement program, based on experiences from across the industry. The program could be run through the MedTech and Pharmaceuticals Industry Growth Centre or by an industry association such as the MTAA, and could potentially involve having a nominated person within the organisation to liaise with MedTech companies on their specific needs in creating internship and work placement programs to students.

Recommendation 6: Government and education providers to support smaller MedTech companies in mentoring students and providing internship programs, which could otherwise be prohibitive in terms of resources required.

This study found that industry representatives agree that MedTech companies need to contribute to upskilling university students by helping them to develop the skills necessary for applying the knowledge learnt through their courses. However, as discussed previously in Section 5.2, this could be difficult for small businesses who themselves lack the skills to mentor students that are new to the MedTech working environment.

As such, there is potentially a role here for government and/or education providers themselves to support smaller MedTech companies in mentoring students and interns. This could include educating MedTech SMEs on the university curriculum and working with them to build a program or identify relevant projects that could allow a student to contribute to the company. Industry associations such as the MTAA could also help to develop training modules to help meet the needs of SMEs in mentoring and supporting interns. In addition, as these smaller companies grow and gain experience in working with interns and work placement students, they could themselves educate other SMEs on their learnings and how to design a suitable program for an internship or work placement.

Recommendation 7: MedTech companies to identify more clearly to education providers what skills are required in graduates, with an updated stocktake of skills needs every three years.

Another way of improving the transition from tertiary or vocational education to industry for graduates is ensuring that subjects are teaching the right skills, and courses are appropriately structured so that students can receive exposure to the skills industry is looking for.

This means that industry generally needs to identify more clearly what skills they are looking for in graduates, and education providers can then seek to match this within the academic requirements of their courses. This also helps to facilitate learning

by doing when students undertake internships and work placements in industry during their study. For example, increasing awareness amongst universities and academics that business and commercial skills are required in addition to technical skills could lead them to encourage students to undertake more interdisciplinary education while studying engineering, science or health degrees. There could be a role for initiatives such as the MedTech and Pharmaceuticals Industry Growth Centre and the MedTech Knowledge Hub in facilitating such links between industry and the education sector, to ensure that these conversations are taking place.

In doing this, it is critical that the information on skills required by industry provided to education providers is updated on a regular basis. This is particularly important given the constantly changing nature of the MedTech industry and its workforce requirements. As such, the MedTech industry should be reviewing its skills needs on an ongoing basis and an updated stocktake of these skills needs should be communicated to education providers every three years going forward. This will ensure that universities and other education institutions are able to use up-to-date information to inform their courses and advice to students on subject choices.

8.5 School education

The MedTech industry's presence at the school level should be increased to ensure that young people understand the industry and its career options when making future decisions.

Recommendation 8: Establish a MedTech Careers program (like the Digital Careers program) that brings together education providers, industry and government to promote MedTech careers to school students.

Given that students often formulate decisions about their future careers in high school, it is important that increasing awareness of the MedTech industry extends to earlier levels of education. This includes high school students, their parents and their career advisers.

Increased engagement at the school level when young people are thinking about their future careers would increase the pipeline of STEM workers that could potentially enter the MedTech industry in the longer run. An example of a related industry that has effectively marketed itself to high schools, universities and the general public in order to improve brand awareness and attract STEM skills is the Information and Communications Technology (ICT) industry (Deloitte, 2015). A key initiative associated with this is the Digital Careers program: a collaborative initiative between industry, educational institutions and government aimed at raising awareness and interest in ICT amongst primary and secondary students in Years 5 to 10 (Digital Careers, 2015). There has also been considerable activity around implementing more ICT education in high schools through the inclusion of a Digital Technologies subject in the Australian Curriculum (ACARA, 2015).

The MedTech industry could seek to emulate some of these initiatives in order to increase broader awareness of MedTech in Australia amongst school students. At a national level, this could be driven by the MedTech and Pharmaceuticals Industry Growth Centre,

while engaging with schools within each state could be driven by state-specific initiatives such as the Knowledge Hub in NSW. This should be done in collaboration with industry, for example by having representatives from MedTech companies speaking at relevant high school events such as careers evenings and work experience information sessions.

Recommendation 9: Bring MedTech into the science classroom by providing teachers with online resources and product examples that showcase medical devices in the context of the senior science curriculum.

In addition to the provision of information from a careers perspective, a more practical way of increasing student awareness of the MedTech industry could be to incorporate more on medical devices and technologies into the broader science curriculum.

School curricula across all Australian states and territories include science subjects, from general science in the earlier years of schooling to more advanced and specific subjects in the senior science curriculum. Featuring MedTech more significantly in these science curricula can help to provide students with foundational knowledge on the industry as well as provide practical 'hands-on' insights on the technologies and devices produced in the MedTech industry. This would require providing teachers with information and training, for example through online resources and group seminars, on how to showcase medical devices in the context of the science curriculum – such as featuring cochlear implants in studying biology and physics. It could also involve companies providing schools with samples of these medical devices so that students can work with them in their practical work.

8.6 Reducing red tape

Government regulation could be streamlined to enable MedTech companies to more efficiently utilise regulatory affairs workers.

Recommendation 10: Government to streamline MedTech industry regulations to enable more efficient utilisation of regulatory affairs workers; for example, by ensuring that tendering is transparent and consistent across Australia.

This study found that a number of companies believe that the reduction of unnecessary regulatory burdens in the MedTech industry could assist with addressing skills issues. Streamlining regulations and processes would help companies to more efficiently utilise their regulatory affairs workers, which is important as skills in this area are already in short supply.

The MedTech industry has a complex regulatory environment, and procedures such as the approval process for medical devices can lead to delays. Unnecessary regulatory burdens can also mean that companies have to dedicate additional resources to addressing these requirements. While the nature of the MedTech industry means that it necessarily must be a heavily regulated area, the various regulations and processes could be streamlined, so that these unnecessary procedures are reduced or eliminated. This means that companies can utilise their regulatory affairs workers to address industry regulation more efficiently, rather than having to employ additional regulatory skills and resources to deal with unnecessary regulations and processes. Streamlining industry regulation would also improve the general business environment, which could subsequently allow MedTech companies to invest in other growth and career opportunities as well as attracting more skilled workers into the industry.

Some examples of how MedTech regulation could be streamlined include the recommendations from the stage one report of the *Expert Review of Medicines and Medical Devices Regulation* (discussed in Section 2.4), as well as ensuring that tendering processes are transparent and consistent across Australia and facilitating more harmonisation between Australian and international regulations. This would assist Australian SMBs in the MedTech industry in particular, as they may not have the scale to address different regulatory requirements across jurisdictions. Another option for reducing regulatory burdens could be increased connectivity of data sources across government and other authorities, so that industry-wide efficiencies can be realised and the value of regulation to the industry can be more clearly communicated.

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Appendix A – survey questions

The Medical Technology Association of Australia (MTAA) has engaged Deloitte Access Economics (DAE) to analyse the future workforce and skills needs of the medical technology (MedTech) industry. The study is part of a broader long-term workforce planning strategy for the MedTech industry, assessing where the current jobs are, where the gaps lie and what the future gaps are likely to be.

The purpose of this survey is to gather information on the skills needs of different segments of the MedTech industry. Through this survey we aim to gain an understanding of which areas in the MedTech industry are experiencing skills shortages, and assess how these skills gaps in the workforce are affecting business activities and industry growth both in the present and for the future. All information provided by you will be treated as strictly confidential; only aggregated figures will be published.

Organisation information

Where is your head office in Australia?

- NSW
- Victoria
- Queensland
- Western Australia
- South Australia
- ACT
- Other jurisdiction.

How was your company established in Australia?

- Subsidiary of multinational
- Spin off from company
- Spin off from university
- Merger
- Start-up
- Other (please specify).

If your organisation's presence in Australia represents a local subsidiary or regional office of a multi-national corporation, what area(s) is your organisation responsible for?

- Responsible for Australia only
- Responsible for Australia and New Zealand
- Responsible for Australia and other countries besides New Zealand
- N/A – organisation is not a subsidiary of multinational.

What year was your company established in Australia?

What is your organisation's current annual turnover in Australia?

- Less than \$5 million per annum
- Between \$5 million and \$100 million per annum
- Greater than \$100 million per annum.

Which of the following best describes your organisation's primary operations in Australia?

- Pre-manufacturing, strong R&D focus
- Manufacturing with strong R&D focus, little or no imports
- Manufacturing with strong R&D focus, substantial importing
- Manufacturing with little or no R&D focus, little or no imports
- Manufacturing with little or no R&D focus, substantial importing
- Importing only, no Australian manufacture or R&D
- Other primary activity (please specify).

What is your area of therapeutic focus? Please select all that apply.

- Cardiovascular
- Anaesthesia
- Musculoskeletal
- Skin
- Respiratory
- Gastrointestinal
- Infection
- Ear, nose, oropharynx
- Reproductive health
- Malignant disease
- Nutrition and blood
- Eye
- Central Nervous System
- Immune system
- Endocrine
- Other (please specify).

Which of the following best describes your organisation's product offerings? Please select all that apply.

- Non-implantable devices
- Implantable devices
- Diagnostic imaging
- IVD
- Biologics
- Other (please specify).

Which of the following best describes your organisation's activities?

- Develops and commercialises new medical technology
- Sells and distributes medical technology in Australia
- Undertakes R&D
- Exports medical technology
- Secures regulatory approval to supply
- Manufactures medical technology
- Provides services to assist MedTech companies (e.g. consultant).

Employment

How many (full time equivalent) people does your organisation employ in Australia?

What proportion of your workforce is female?

What is the state breakdown of your employment (number of full time equivalent persons)?

- New South Wales
- Victoria
- Queensland
- South Australia
- Western Australia
- Tasmania
- Australian Capital Territory
- Northern Territory.

Educational attainment. How many of your employees have:

- Secondary degrees only?
- Vocational education and training accreditation?
- Undergraduate degrees?
- Postgraduate education (MBA, Masters, PhDs etc.)?

Of your employees with post-secondary education, how many conducted study in:

- Natural and physical sciences (e.g. chemical sciences, biological sciences, mathematics, physics)
- Engineering and related technologies (e.g. biomedical, manufacturing, mechanical, electronic engineering)
- Health (e.g. medicine, nursing, pharmacy, public health)
- Management and commerce (e.g. business, finance, marketing, actuarial studies)
- Other fields of education.

How many of your (full time equivalent) employees are currently employed in:

- General and corporate management
- Supply chain and logistics
- Information technology
- Australian sales and marketing
- Customer service
- Export sales and logistics
- Overseas market development
- Product research
- Product development
- Clinical
- Manufacturing
- Quality assurance
- Reimbursement
- Regulatory affairs
- Government relations
- Other business areas (please specify).

If appropriately skilled employees were available, how many (full time equivalent) people would you desire to be employed today in:

- General and corporate management
- Supply chain and logistics
- Information technology
- Australian sales and marketing
- Customer service
- Export sales and logistics
- Overseas market development
- Product research
- Product development
- Clinical
- Manufacturing
- Quality assurance
- Reimbursement
- Regulatory affairs
- Government relations
- Other business areas (please specify).

If appropriately skilled employees were available, how many (full time equivalent) people would you desire to be employed in 5 years in:

- General and corporate management
- Supply chain and logistics
- Information technology
- Australian sales and marketing
- Customer service
- Export sales and logistics
- Overseas market development
- Product research
- Product development
- Clinical
- Manufacturing
- Quality assurance
- Reimbursement
- Regulatory affairs
- Government relations
- Other business areas (please specify).

Skills availability

Have skills shortages in the MedTech industry affected your organisation? If so, how would you characterise the impact of skills shortages on your organisation?

- No impact
- A slightly adverse impact
- A moderately adverse impact
- A substantially adverse impact.

How has the impact of skills shortages on your organisation changed over the past 5 years?

- Skills shortages now have a significantly larger negative impact
- Skills shortages now have a slightly larger negative impact
- There has been no change in the impact of skills shortages
- Skills shortages now have a slightly smaller negative impact
- Skills shortages now have a significantly smaller negative impact.

In which particular areas has your organisation experienced skills shortages, if any?

- N/A – no skills shortages
- General and corporate management
- Supply chain and logistics
- Information technology
- Australian sales and marketing
- Customer service
- Export sales and logistics
- Overseas market development
- Product research
- Product development
- Clinical

- Manufacturing
- Quality assurance
- Reimbursement
- Regulatory affairs
- Government relations
- Other business areas (please specify).

How difficult has it been filling open positions in your organisation?

- Very difficult
- Somewhat difficult
- Neutral
- Somewhat easy
- Very easy.

How has the difficulty in filling open positions changed over the past 5 years?

- It is now significantly more difficult to fill open positions
- It is now slightly more difficult to fill open positions
- There has been no change in the difficulty of filling open positions
- It is now slightly less difficult to fill open positions
- It is now significantly less difficult to fill open positions.

In which particular areas has your organisation experienced difficulties filling open positions, if any?

- N/A – no difficulties filling positions
- General and corporate management
- Supply chain and logistics
- Information technology
- Australian sales and marketing
- Customer service
- Export sales and logistics
- Overseas market development
- Product research
- Product development
- Clinical
- Manufacturing
- Quality assurance
- Reimbursement
- Regulatory affairs
- Government relations
- Other business areas (please specify).

How would you assess the education and experience of recent job applicants for open positions in your organisation, relative to the ideal requirements for education and experience for the position?

- Most applicants are overqualified relative to the requirements for the position
- Some applicants are overqualified relative to the requirements for the position
- Applicants generally meet the requirements for the position
- Some applicants are underqualified relative to the requirements for the position
- Most applicants are underqualified relative to the requirements for the position.

If your organisation is involved in product R&D, which area do you specialise in?

- Biomedical engineering
- Mechanical engineering
- Electrical engineering
- Materials engineering
- Process engineering
- Systems engineering
- Software engineering
- Clinical
- N/A – organisation does not partake in product research or development.

If your organisation is involved in product R&D, are you confident in your ability to source the required product R&D capabilities?

- Confident
- Not confident
- N/A – organisation does not partake in product research or development.

Please identify any of the following factors that you believe have contributed to skills shortages in the MedTech industry and/or difficulties with filling open positions in your organisation.

- People are not entering and/or are leaving the MedTech industry as it is perceived as risky
- People are not entering and/or are leaving the MedTech industry because of low wage growth opportunities
- People are not entering the MedTech industry as career paths are not clear to university students and graduates
- People studying law don't think about MedTech regulation as a career option
- People are not entering the MedTech industry as they aren't aware of MedTech as a career option
- Applicants for open positions have not had suitable education or qualifications
- Applicants for open positions have not had suitable experience

- It is too costly to recruit and train the right people
- Other factors (please specify)
- N/A – no skills shortages or difficulties filling positions.

Please identify if your organisation has employed any of the following to address skills shortages in the MedTech industry and/or difficulties with filling open positions.

- Paid a wage premium to attract suitably qualified and skilled staff
- Transferred staff internally within the organisation
- Provided in-house professional development or training programs to upskill staff
- Engaged in external professional development or training programs to upskill staff
- Adjusted the business strategy to adapt to changing skills needs and availability
- Other (please specify)
- N/A – no skills shortages or difficulties filling positions.

Organisational growth

How do you see the future of the MedTech industry in Australia?

- Very positive
- Positive
- Neutral
- Challenging
- Very challenging.

Please explain your response.

What annual percentage growth in turnover do you expect over the next 5 years?

What annual percentage growth in turnover would you expect over the next 5 years if there were no skills shortages or skills gaps?

To what extent has demographic change (e.g. ageing population, increased life expectancies); technological advancements (e.g. new technologies, product innovation); the emergence of new markets (e.g. growth of Asian economies); and policy changes (e.g. changes to government funding, regulation) affected your organisation's demand for skilled workers over the past 5 years?

- Resulted in a significant increase in skills needs
- Resulted in a slight increase in skills needs
- No impact on skills needs
- Resulted in a slight decrease in skills needs
- Resulted in a significant decrease in skills needs.

To what extent do you expect demographic change (e.g. ageing population, increased life expectancies); technological advancements (e.g. new technologies, product innovation); the emergence of new markets (e.g. growth of Asian economies); and policy changes (e.g. changes to government funding, regulation) to affect your organisation's growth and skills needs over the next 5 years?

- Resulted in a significant increase in skills needs
- Resulted in a slight increase in skills needs
- No impact on skills needs
- Resulted in a slight decrease in skills needs
- Resulted in a significant decrease in skills needs.

Additional assistance

What additional assistance do you need in terms of ensuring the availability of a skilled MedTech workforce e.g. type of policy or assistance?

Appendix B – list of consultees

Representatives from a number of organisations across the MedTech industry were consulted in the one-on-one consultations conducted as part of this study. Deloitte Access Economics and the MTAA would like to acknowledge their contribution and thank representatives from the following organisations for their time and insights:

- 3M
- Anatomics
- Baxter
- Cochlear
- Cook Medical
- Egon Zehnder
- iNova Pharmaceuticals
- Johnson & Johnson
- LBT Innovations
- LMT Surgical
- Medtronic
- MiniFAB
- Philips
- ResMed
- Simavita
- Speedx
- Surgical Specialties
- Tunstall
- Varian
- Flinders University
- University of Technology Sydney.

Appendix C – workshop attendees and notes

Organisations represented at the Sydney, Melbourne or Brisbane workshops included:

- 3M Healthcare
- AES Environmental
- American Medical Systems (Australia)
- AusBiotech
- Bard Australia Pty Ltd
- Bio Melbourne Network
- Board of Studies, Teaching and Educational Standards, NSW (BOSTES)
- Bond University
- Boston Scientific
- Cook Medical
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Department of Industry, Innovation and Science (Australian Government)
- GE Healthcare
- Hear and Say
- Horten Medical
- Johnson and Johnson Medical
- Life Sciences Queensland
- Macquarie University
- Monash University
- National Measurement Institute, Department of Industry and Science
- Nevro
- NSW Department of Industry
- Office for Health and Medical Research
- Philips Healthcare Australasia
- Queensland University of Technology
- ResMed
- SJ Alder
- Sorin Group Australia
- STC Australia
- Stryker Australia
- Surgical Specialties

- Swinburne University
- Tunstall Australasia
- Universal Biosensors
- University of Technology Sydney
- Varian Medical Systems
- W. L. Gore and Associates (Australia)
- Zimmer.

Notes from workshop 1 – Sydney, 10 June 2015

Recent industry trends

The marketplace for medical devices has changed. There has been a move away from the traditional clinical buyers, and there is now greater interaction with the commercial side and more focus on the end user. This affects the skills needs in the MedTech industry – people need more procurement and tendering skills, and more business experience. Sales and marketing people now need more commercial nous. This reflects a global trend which is taking place across the United States and Europe.

There has been increasing consolidation in the MedTech industry – increased grouping of tenders (e.g. whole of government, whole of state tenders) is affecting smaller companies who might only produce only one or two products, rather than the whole range of products demanded in the tender. Small businesses also have difficulties winning tenders because of significant regulatory requirements (e.g. the TGA, state regulations). While there has been some red tape reduction which has helped, there is more to do – Australia is highly regulated relative to other countries such as New Zealand.

Technological changes are affecting the workforce, and a high level of digital literacy across the MedTech workforce is now important. In particular, the pace of technological and information change has increased in recent years. The ability of businesses to keep up with this change is crucial, but in some cases questionable. The industry and government need to adapt to how technology and information are changing consumers' expectations and demand – technology is enabling patients to gather more information about products and e-commerce is creating new avenues for demand and delivery.

Increasing globalisation and external government policy such as in relation to trade, industry and investment has meant that the Australian MedTech industry increasingly needs to be viewed in an international context. Companies are increasingly competing in a global market. Australia is a small market, and companies in larger countries often receive more establishment, more funding and more generous tax benefits in the areas of income, research, innovation and manufacturing incentives. This makes it more difficult for Australian MedTech companies to compete in a global environment. Notwithstanding this, Australia is geographically close and therefore ideally placed to service and meet the ever-growing needs of the Asia-Pacific region – but needs to be competitive to do so.

Current skills gaps

Commercialisation skills were highlighted as a gap in Australia. In particular, we are good at publishing research in peer-reviewed journals, but converting ideas into a marketable product is a weakness and Australia has one of the lowest commercialisation rates in the world. This is partly related to the funding landscape for MedTech in Australia – university funding is based on citations, publications and peer-reviewed measures, which affects the ability to convert research into a product and commercialise a solution for the end user (as opposed to converting research into a publication).

Within companies, more business development and commercial skills are required rather than just straight sales skills. As discussed, the marketplace for MedTech is changing, and the skills set required of sales representatives has shifted towards a requirement for business management skills and experience as hospitals become more sophisticated in their procurement of MedTech and medical devices. There is a constant tension between cost and innovation.

There is also a shortage of regulatory affairs staff, specifically in areas such as international regulation, quality control, compliance and reimbursement. Given the complicated and changing nature of the regulatory landscape and a push towards global harmonisation to cut red tape and provide earlier access to patients, finding workers who understand regulatory affairs is crucial. Consultants who understand the regulatory space are difficult to find and small businesses often cannot afford to hire the right people as the cost is prohibitive. Health economics has also become more important in the drive to ensure evidence-based policy, and health economists and effective government affairs specialists who understand the industry and allied stakeholders are other related areas where skills gaps were identified.

General skills such as problem solving, communication and collaboration skills, as well as the ability to adapt and cope with change, are also valued by MedTech companies. Relationship building is important in the industry, with 'soft' skills and emotional intelligence being particularly important. This is because customer expectations with regards to customer service can be quite high, and more general communication skills can assist in increasing the service quality in the industry.

Another important skill that can be difficult to find is IT professionals who understand the systems and data requirements for MedTech, patients and doctors, as well as being able to link medical devices with systems, monitoring and action to ensure compliance by patients.

Reasons for skills gaps

One reason is that there is a disconnect between the skills that industry seeks and the skills that are coming out of university. Given the changing nature of the MedTech industry, business skills are increasingly necessary in combination with the traditional technical science and engineering skills required in the industry. It is no longer sufficient for workers to be purely technical because buyers are demanding more commercial input.

A lack of job security in the MedTech workforce is another issue, in particular deterring women from entering the workforce. The full-time employee model is declining and recruitment based around temporary contracts is common, often because of the short-term nature of funding in the MedTech industry (e.g. grants). This means that there can be a lack of permanency associated with working in the MedTech industry.

Information about working in the industry could be better communicated to the wider population in order to encourage people to work in MedTech. At a high level, poor perceptions and a lack of definition of the industry can deter potential workers from entering the industry. More specifically in relation to university graduates, factors that discourage graduates from pursuing careers in MedTech include uncertainty about entry points into different areas of the industry, how to translate their degrees into jobs in MedTech, and career paths through the industry.

Education

University degrees are generally required in the MedTech industry. Sometimes this can mean postgraduate degrees – for example, senior positions, research roles, more specialised education or just to demonstrate willingness.

Observations

A major recommendation is that more internship opportunities should be provided by MedTech companies to university students, in order to help them gain the experience and skills which are required by the industry. However, there appears to be a disconnect between businesses claiming that they wish to set up more internships, and the reality that finding companies to take on interns is difficult. Smaller MedTech companies in particular find it difficult to hire interns because they represent another FTE to pay, and there may not be continuous work within the company. It was suggested that industry and universities should work together to provide more internships or other career mentoring type experiences to Australian students.

Universities can also assist in equipping graduates with the necessary commercial skills by ensuring that students are skilled in business in addition to science and engineering. This could be done through increasing interdisciplinary or cross-faculty studies between science and business departments, or by facilitating programs aimed at teaching business development and commercial skills to university students.

Another recommendation is to streamline the approvals process. Currently, the clinical trials and research approval process across jurisdictions is very challenging, and clinical investigation can take anywhere up to two years. This is a particular problem for the MedTech industry because technology is rapidly changing and may have moved on over this time. Furthermore, skilled workers may be under-utilised while companies are awaiting approval. Streamlining the approvals process would make the system easier to navigate and also encourage greater innovation in the industry.

The MedTech industry also needs a map of the professional development and training opportunities that are currently available in Australia, so as to better understand where there are gaps in the system. This will assist in evaluating how to fill these gaps, and ensure that there is no overlap when implementing future training programs in the industry.

Notes from workshop 2 – Melbourne, 23 June 2015

Recent industry trends

Harmonisation of TGA with Europe and US, for example with respect to regulatory approval processes, is helping to drive greater commercialisation activity in Australia, allowing Australia to act as a testing ground. This is a trend that has emerged in the last five years, assisted by a lucrative reimbursement policy (most lucrative outside of the US). In addition, the commercialisation process in Australia and New Zealand allows for more input from end-users of software.

With the FDA moving to pre-market approval for high risk devices, Australia's strong clinical trial capabilities could help the Australian industry going forwards.

Current skills gaps

Candidates with a combination of subject matter/clinical expertise and business/commercial acumen are difficult to find, which may be because students lack awareness of the available career pathways in MedTech. Some companies' internal training encourages crossovers in training, so that those with clinical backgrounds undertake leadership training, designed to draw out what their goals and aspirations are.

Companies have difficulty in finding software engineers with an understanding of MedTech and the industry-specific skills required, although there have been examples of software engineers with experience in the automotive industry moving into MedTech. There is also a gap in the supply of medical imaging professionals, particularly sonographers, which could be related to the profile of the workforce (predominantly female).

Regulatory affairs is still an area where there are skills shortages. For SMEs, it is often too expensive to have a dedicated regulatory affairs officer, but those who can afford to hire struggle to find appropriate candidates, particularly ones with international regulatory knowledge. These individuals tend to be hired by larger companies, who have in-house training, and it is difficult to hire individuals from the public sector/TGA, as wages are relatively high in Australia. SMEs are usually the businesses that need regulatory affairs guidance the most. Some customers ask MedTech companies for assistance and guidance with regulatory affairs. Due to the barriers, some companies focus on the private sector, limiting the size of the market that they can reach.

There is still a big opportunity in product research and development.

Reasons for skills gaps

Increased commercialisation activity presents an opportunity for growth, but also increases demand for appropriate skills. In the past, some companies have hired people from the US to Australia. In Australia, there is cultural resistance/poor perception of sales and marketing careers, particularly relative to other countries – an analogy was drawn to the hospitality industry in Australia versus Europe. There is a disconnect between how the industry is perceived by others and how it perceives itself. PhDs may be aiming to go into industry, but not sales and marketing.

Students also lack awareness of the transferability of their skills – and this could relate to a broader point around the focus of our university system. Australia's higher education courses tend to narrowly focus on their subject area, without the breadth of US undergraduate degrees. Students are often focused on jobs that a degree will lead to, rather than broader skills that are transferable.

The US higher education system is also perceived to have closer links with industry, through industry funding of buildings, sponsorship of student projects, site visits and general interaction. The reason why this is not seen in Australia may be due to stringent OH&S rules that restrict undergraduate students from working in labs unsupervised – which may be in conflict with training and learning objectives. Universities may not recognise the value of industry interaction and thus are unwilling to fund supervision of students. Likewise, companies may recognise the value of work experience programs for Year 10 students and internships, but there may be constraints on the company's time and resources. There also may be a general inability to find work experience options that suit student interests due to limited opportunities.

The recently released Vision for Australia's STEM future discussion paper by the Federal Government suggests that there is recognition of the issues, and it is likely that education in general may see many changes in delivery mode in the future, with a shift towards lifelong learning.

Educational

General agreement that at least 80% of the workforce would have a tertiary degree, with close to 100% for areas doing science-related work. However, at some companies a person with the right personality/ characteristics but fewer formal qualifications may be hired over someone with more qualifications.

Not necessarily one specific stream or field of education is missing from the education system, more a matter of developing students with skills across disciplines – for example a medical student who has some engineering skills so that they can work in MedTech. There can also be a mismatch of language and jargon across different disciplines, and graduates can take up to 12 months of training before they are ready to do R&D work in labs. Some universities are currently in the process of designing a modular curriculum that aims to meet some of these needs.

Observations

There is a role for industry to be more proactive in giving students exposure to the potential pathways and careers and improve their understanding of MedTech careers. There is a potential scale problem – time constraints may preclude leaders of companies from speaking to many groups of students (school and university level), however digital delivery of videos of leaders, talking about their careers and their pathways which may be varied and diverse, could allow for a greater reach. A tiered approach, with online information for all students, and more specialised programs for high performing/ interested students (mentoring, work experience, etc.) could be more achievable.

Potential for more structured graduate recruitment/ internship programs, which benefits students (giving them exposure to industry) and businesses (de-risking the hiring process). Many students studying science degrees lack industry experience and opportunities while studying, are generally unaware of the careers in MedTech, and often work in other industries after graduating.

Many universities have placement programs that allow students to go on industry placements for one or two semesters. However, there needs to be flexibility in placement lengths for industry to be involved – a 12 month commitment for an SME may be too large and companies may be more interested in 3 to 6 month placements. Conversely a short placement can restrict the ability of students to do meaningful work. In order to enable SMEs to participate, asking universities to provide mentoring support, or forming cross-disciplinary mentoring teams to share the resources required may help.

A Singapore report has identified skills shortages areas, one of which was regulatory affairs. In response, capacity was built across the whole sector, with some individuals sent to TGA to learn about regulatory affairs, which filtered through as individuals moved to different organisations. There are opportunities for MedTech in Australia to work with the TGA to build up capability throughout the industry around regulatory affairs.

Notes from workshop 3 – Brisbane, 2 July 2015

Skills issues

The planets are aligned right now for the MedTech industry to grow. Australia is a stepping stone into Asia which represents a strong source of new demand (often for simple medical technology that we already have), and we are also strong in the digital space. In Queensland, biosciences are a focus and it will be important to see which sectors can grow further.

The issue in the MedTech industry is not so much about quantity. The number of STEM graduates coming into the sector is not a problem. Nor is there a lack of interest from students – some companies have high school students contacting them being interested in MedTech (the key here is ensuring that industry promotes this interest and has open doors to educate students on opportunities in the industry). The issue is more about graduates coming in with the right skills.

The skills required to work in MedTech are not just engineers inventing and creating new technology. In order to turn these innovations into products, workers need to understand the commercialisation process. This involves many other tasks including different types of paperwork and requires commercial and business skills, which may go against the expectations of new graduates (and as such, meeting these expectations can be challenging). Students at the undergraduate level need to develop transferrable 'soft skills' such as communication skills, in addition to technical expertise. They also need to be more open-minded and flexible, and recognise that they have the ability to move into other areas.

It can help to think about the workforce not in terms of roles but in terms of the skill requirements. For example, instead of thinking about the business areas where more workers are required (e.g. regulatory affairs), we need to think about the skills that we require, where they exist, and how to adapt them

into what is needed for these areas (e.g. project management to regulatory affairs). And as it is about the skills that companies are after, the industry shouldn't be sending the message that engineering degree A leads to job A. We need to communicate the message that people must be flexible and specific science and engineering degrees can lead to elsewhere, into broader roles. Professors who specialise in more than one area can help with increasing student awareness about different areas, as currently university degrees are often too siloed.

The funding environment can affect the nature of skills demanded by the MedTech industry. At present, many students move into large research organisations to do research on 'glamorous' topics. This is great for getting grants and funding, but sometimes the research conducted may not actually be addressing any practical problems. We need to better balance science and engineering skills with discovery of what the clinical needs are. For example, more engagement programs with clinical backgrounds in order to understand what the problems are. Graduates need to be better analysts and identifiers of problems, and have the skills set to recognise emerging opportunities and pick what tools can best be used to solve problems and seize the opportunities.

There is the potential for reskilling displaced workers from other industries to work in the MedTech industry. For example, Brisbane used to have a significant clothing manufacturing industry. As companies in this industry began closing down over the years, many displaced workers have come to work in the MedTech industry – they have been reskilled and their dexterity and sewing skills have been reapplied to MedTech. This reskilling and translations across industries is happening around the country.

There is also the potential for an increased focus on the role of vocational education. When it comes to tertiary studies, VET training and accreditation can be equally as important as university degrees for some roles, such as the delivery of community services e.g. community nursing – or even the sewing skills discussed above. This has the added benefit of creating a more affordable skills base that can be used to support industry growth, particularly amongst smaller companies that have more limited resources, where workers won't be affordable in the future if we only focus on the 'higher level' skills. We therefore need to develop education pathways more broadly in order to grow the MedTech industry in Australia, which will involve marketing MedTech career paths to VET students.

Observations

There needs to be more collaboration between industry and tertiary institutions in order to ensure that the future MedTech workforce develops a broader base of skills and is industry ready. We need to build the culture in industry and in universities that it is beneficial to all parties for students to be getting work experience in industry. In particular, industry needs to contribute to upskilling workers – we cannot expect graduates coming out of university to have all the required skills, we need to help graduates develop the ability to apply the knowledge they have learnt.

One example of this is reinforcing the need for industry to recruit interns. There are concerns that other MedTech companies aren't following through in engaging with and hiring university students. However, valuable lessons can be learnt from internships, such as learning the language used in the industry. But it should be noted that smaller MedTech companies may be limited in the extent to which they can offer internships – both with respect to resources and knowledge on how they can mentor university students. That is, students should receive some value out of interning, but small companies may not be able to provide this learning.

There could be a role for government to support small MedTech companies and teach them how to mentor interns. For example, providing templates for businesses to fill out their company characteristics for the intern to learn beforehand, or providing content that businesses can then teach their interns. This would be efficient in ensuring that the multitude of small businesses in the MedTech industry aren't constantly having to come up with their own methods and 'reinventing the wheel' each time they recruit an intern.

For graduates or even experienced workers in industry, online modules could be a way of imparting skills- or knowledge-specific 'pieces' of education that are required to work in particular roles. For example, there could be modules on different areas of regulatory affairs that someone entering a specific job and choose from and customise their learning based on what is required in their role. This means that rather than teaching everyone to specialise in everything at university – from health to engineering to business – they could instead be taught what is necessary, soft skills, and how to connect things together. Then these postgraduate modules could be a type of demand-driven learning which are used as building blocks as they move into different roles in industry. The modules could be developed in collaboration with universities and industry, with all parties (including the worker) sharing in the costs.

Notes from workshop 4 – Sydney, 23 July 2015

Recent industry trends

The buyer and the consumer in MedTech are often not the same thing, as the consumer is the patient. However, patients are becoming more influential in choosing products because they can use the internet to access information. They have more influence on product purchase decisions than has historically been the case. Consumer savviness is on the rise.

Purchasers are getting more cost conscious in terms of getting value for money. Therefore, the industry needs more business skills and health economics skills.

There has also been a huge change in the regulatory environment for medical devices – over the past 30 years, the industry has gone from no regulation to a very sophisticated level of regulation. Back then, organisations would just use, for example, a quality person to do the regulatory work. Now, companies still hire those same people to do the regulatory work and are finding they don't have the skills to deal with the more sophisticated regulatory environment, so there is a huge gap. We need scientists who have regulatory skills and know how to apply them – we can teach them the necessary technical skills. Often these regulatory people come from the pharmaceutical sector, but sometimes these aren't the right fit either. And this is the same for health economics as well – the professionals come from the pharmaceutical sector.

Reasons for skills gaps

Many years ago health care companies paid above what other companies did. But the industry has not kept up over the last 20-30 years and there is now a big salary gap, so it is hard to attract talented skills. Also, there is too much focus on looking for experience rather than looking for skills – and experience is hard to find. We need to be more flexible and start looking for skills that can be adaptable instead.

The majority of the employee base for sales-oriented companies comes from business degrees, or sales or operations. These companies have clinical and regulatory people but these teams are relatively small. The biggest issue is awareness. In the US, the candidate pools are at least four times what they are here. In Australia, MedTech doesn't have brand awareness as an industry. Companies are required to go to universities to hire business students for our sales, finance, marketing and general commercialisation roles. That is, instead of having job candidates available and coming to us, we need to go market ourselves to the universities.

There was broad agreement with the idea that sales and marketing in Australia is not a prestigious career, as compared with places such as the US. In the US, sales roles in MedTech are very high status positions. In Australia, these roles don't have the same visibility – many people don't even know the roles exist. We need to give visibility to the dynamic nature of the job – the high amounts of control and impact associated with sales positions in MedTech, and the remuneration that can be achieved by succeeding. Though remuneration is also partly an issue, because in general sales representatives are not as well compensated in Australia as in US, and there is not as much upside (though there is also more risk in the US). But the largest barrier is awareness.

Another issue is the 'brain drain' argument. While this is an issue outside of MedTech as well, the global pull to leave Australia is especially significant because many of the largest MedTech companies are located overseas. Given that they don't have a big presence here, as a young and talented university graduate it is more attractive to move overseas to pursue opportunities. Many opportunities don't exist in Australia because these head offices are overseas. In Australia, most MedTech companies are sales/marketing companies with a bit of clinical/regulatory on the side. So there aren't the same opportunities for science students to come and work in MedTech in Australia. We need a shift to make it attractive for scientists to come into the industry. Offering Australian workers a potential move to Head Office could be attractive.

There is also a large bias against older people in the MedTech workforce – ageism is a big problem. Recruiters often require someone with the experience of an older person but 30 years younger. Companies have removed senior people and promoted junior people, and following the financial crisis many training programs have been cut. So now there are many young people in senior roles who are too scared to say they don't understand (and who also often move between organisations quickly) – and yet there is a reluctance to hire older people. There is a perception that they won't cope with technology and innovation; for example, regulatory affairs are mostly done online now and companies believe older people can't handle this.

Education

At the high school level, students often don't know what MedTech is – to many students MedTech is just 'brochures of people in lab coats standing near big machines'. MedTech is a hidden industry, compared to say knowing what doctors and lawyers do. The industry needs to go out to schools at Year 8, 9 (rather than just at Year 11, 12) and speak to students. We need to ensure that students and parents and careers advisers understand the career pathways in MedTech. Also, many Technology subjects in the curriculum are outdated – but we can't update them because teachers aren't skilled enough to teach new technologies. This is causing students to lose interest in the subjects.

Training and retaining the workforce is key – companies can't just expect the universities to produce a fully well-rounded employee straight away. While tertiary education is generally required, on top of university degrees companies often need to provide product-specific training for new entrants to their company. The cost of this type of training is significant, on the software and hardware side. Due to the regulatory environment, workers need to touch a machine first before they can work. Sometimes the training has to be done in the US which can be expensive. Product- and company-specific training costs can also be an issue for experienced recruitments, as people moving around and starting over can be costly to train. But because the training is so specific, it is hard for organisations like the MTAA to hold training courses. The MTAA can support companies in their training but the generic courses and online modules they have are more relevant to broad categories of people.

The requirement for such specific knowledge can also impact on companies taking students in as interns. For placements, there is a reluctance to take interns on for short periods of time as they are only useful for companies after a few weeks of training. Universities are conscious of this as they would like students to add value to the industry, so placements need to be long (minimum 12 weeks). However, this does depend on the type of internship – for example, interns in the finance area have less need for this specific knowledge and training compared to in the marketing area.

Vocational education can be useful. TAFE students coming from a mechanical background are employed in some organisations. Jobs related to mechanics, gadgets and putting things together are perfect for TAFE graduates. The issue is more about where they can go next and whether they have career paths in the organisation.

Observations

It can be hard to create linkages with university students and interns for SMEs. SMEs don't have the capacity to mentor students, both with respect to costs and skills. They could use a third party to sit down with them to say 'this is what's in the curriculum, this is what your company does, we will work with you to build a program or identify projects that benefit both the student and your company.' These SMEs are generally Australian companies – so maybe the government could provide either grants or education facilities to support this as a third party. Some universities have programs that try to facilitate links between academics, students and industry. But it can be hard to scope out a good project and negotiate what works for both students and for industry. Such a program as this would be welcomed as it can be hard to understand what students would like to do and how companies can support this.

On having more collaboration between universities and companies, a simple action item would be to circulate what's available out there. What's come out of the workshop is that other companies have many programs that we didn't know were out there. Sending a list of what others are doing around industry would be good to increase collaboration so that everyone can know what everyone else is doing.

Also, on the awareness issue, the MedTech industry needs to think big. We need to think about our overarching brand as a group – not just marketing to students and universities but also to the broader community. So that parents, kids at a young age in Year 7, etc. are aware of MedTech and are receiving positive messaging from the start. Could we form a committee to expand on the value of MedTech to the community? This would push more people to all companies in the industry. We need to lift the MedTech industry out of senior science and into the mainstream by sending the message that MedTech is not just about sitting there tinkering with things and diverse career paths are available.

Some companies have programs that reach out to Year 7 and 8 students, sending engineers out as mentors to increase younger kids' interest in science and engineering. Many run internships and graduate programs but what they find is that when it comes to the software engineers they need for product development, their major competitors for talent are companies like Google and Atlassian. At Google, they have people focused on marketing to primary school, secondary school students. We need to try and make MedTech companies attractive like Google has. We have never had issues getting biomedical engineers but we also need other skills now, such as computer scientists and software engineers.

An attraction for students coming into MedTech is the intrinsic satisfaction that they receive from working in the medical/health area, and making a difference. This is something that could be tapped into more, like Google. Google markets themselves to graduates (e.g. in HR recruitment videos) as a company that changes lives. Why can't we do this in MedTech?

Workers from overseas can be used to fill skills shortages. A number of companies have had success in bringing foreign workers in – and generally these are people who would like to work and live in Australia and therefore staff retention is good for these workers. However, mass recruitment drives overseas can be expensive.

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