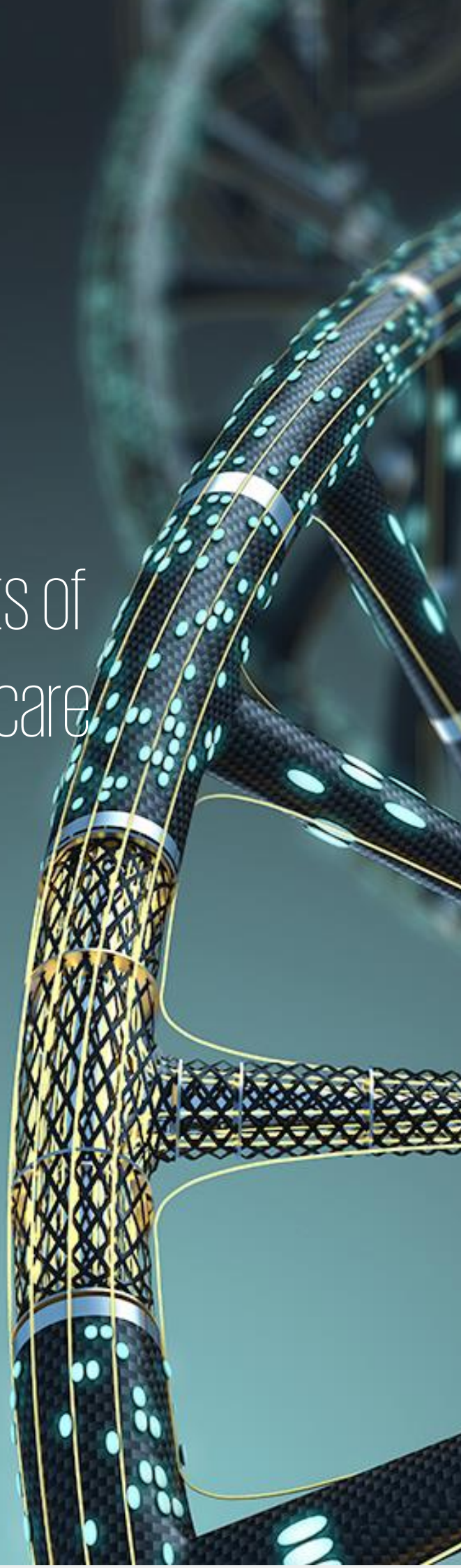
Future of Work

Understanding the Impacts of Technology on the Healthcare Workforce

FINAL

Ministry of Health NSW

May 2020



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Introduction

This paper has been developed to set the scene for NSW Health in realising the benefits of the Future of Work to meet its aim of "delivering twenty-first century care".[1] It is the first in a series of papers which consider what the Future of Work means for the NSW Health system, aiming to support the development of a shared understanding across NSW Health. It provides an overview of the Future of Work and the challenge for health, identifies emerging health technologies, highlights current strategies, and provides insight as to what is required for success in supporting the health workforce for NSW Health.

What is the Future of Work?

The Future of Work can be defined as the impact of technological advancements, such as artificial intelligence and automation, on the workforce.[2] While there have been concerns raised about the substitution of labour with technology, there is a growing body of work highlighting the benefits of technology for the workforce and society. Current research suggests that the jobs at least risk of automation are those that require social intelligence, such as healthcare.[3] For health, the introduction of technology can be seen as a key enabler to addressing the big healthcare challenges of the twenty-first century.[4] If the benefits of technology are realised, it can help transform healthcare, through improving safety and quality, empowering consumers, driving better decisions (for example in value-based healthcare), and changing and optimising patterns of need and services. These benefits in turn, contribute to the creation of a more sustainable health system.[5]

What is the Future of Work challenge for NSW Health?

Technology provides the opportunity to enhance healthcare and its workforce, it does not replace it. A better frame is that technology affects tasks, not jobs.[6] For the health workforce, the changes required as a result of the Future of Work and the change journey will be different for each workforce group. Given the diverse roles within NSW Health (for example, but not limited to those such as clinicians, corporate services, hotel services, maintenance, and clinical support staff), this may mean an equally diverse impact of technology. While there will be some similarities, the functions and tasks impacted will depend on the health profession and speciality, the health context (such as metropolitan, rural and regional), and the health setting (such as emergency care, acute care, home and community care) of each individual. It is anticipated that some tasks will be automated completely leaving healthcare workers to focus on more complex aspects of their role, while other healthcare workers will require new skills to utilise new technologies.[7] New roles and specialities will also likely need to be created, such as digital navigation, cyber-legal, and roles associated with the support for new technologies. A key challenge then, is understanding and defining what the new roles and functions will be for the NSW Health workforce.

The second challenge for NSW Health is navigating through this complex and dynamic change and supporting the workforce to do the same. This is made more complex by the fact that NSW Health is not the only stakeholder in the Future of Work, with new technologies being created and adopted beyond NSW and Australia and the public health system. Disruption is occurring across all sectors and industries and NSW Health will be expected to respond and adapt to this environment as other industries are doing. Further, this change is continuous, with new technologies emerging all the time, adding to the complexity of managing a response.

For the NSW Health system, now is the time to gain clarity on the goals for the future of the NSW Health workforce and embark on a proactive approach to emerging technology that values the critical role that people play in our health system, and recognises that they are the key to success and the delivery of high quality healthcare.

Scope and limitations

The scope of this paper is to provide an understanding of the impacts of technology on the health workforce that is contextualised to NSW Health. The scope was limited to a review of an agreed set of recent, significant publications which distil some of the emerging thinking focused on the future of work and a scan of other similar reports to August 2019 (a full reference list is provided at the paper's conclusion), and a review of the digital health agenda and plan for NSW Health.[8]

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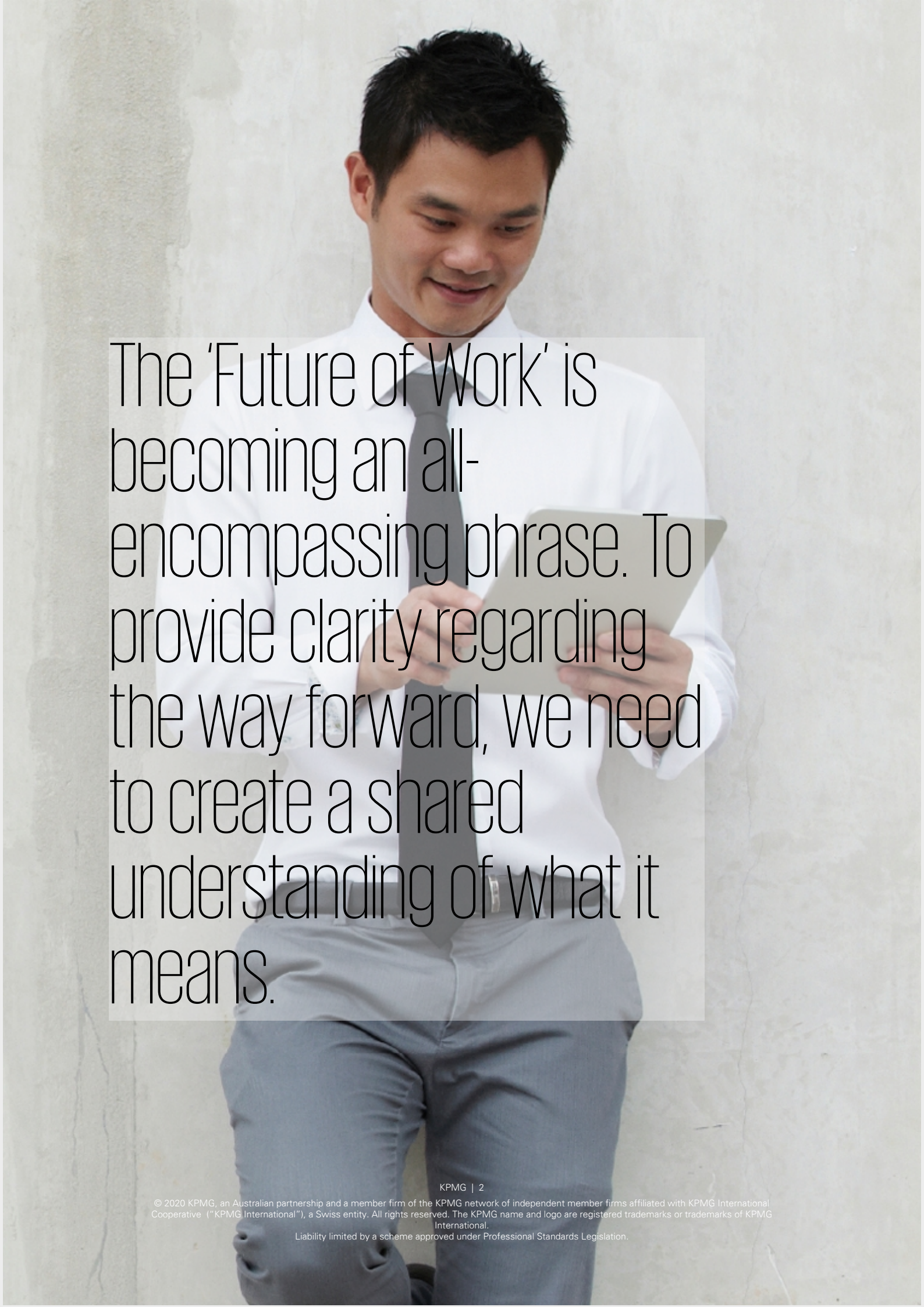

The 'Future of Work' is becoming an all-encompassing phrase. To provide clarity regarding the way forward, we need to create a shared understanding of what it means.

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Global thought leadership

This paper has been developed through the consideration of a number of significant thought leadership publications. The eight publications below provided key commentary, insights or recommendations that were valuable in achieving the outcomes of this paper for the NSW Ministry of Health. A short overview of each publication and its applicability to the NSW Health context is given in the table below.

Thought leadership	Overview	What this means for NSW Health
The Topol Review, NHS, 2019	The Topol Review provides a comprehensive analysis of significant emerging technologies and its impacts on the United Kingdom (UK) National Health Service (NHS) workforce when adopted. The Review also explores ethical considerations and potential healthcare economic benefits of each technology. It also details recommendations for methods of technological adoption and the organisational development needs that are necessary for effective implementation of these emerging technologies.	Health technologies such as telehealth, genomics, Artificial Intelligence (AI), and robotics will have significant impacts on improving health delivery and overall health outcomes. To attain the expected benefits, a safe and ethical strategy for implementation of these technologies in NSW Health must be co-developed with the workforce and patients. Further, capability development which enables the workforce to effectively harness these technologies and thrive within the changing technological landscape must be a priority for NSW Health and this can be best achieved by establishing attractive career pathways for the workforce.
Australia's future workforce, Committee for Economic Development Australia (CEDA), 2015	This report compiles insights from leading researchers and practitioners about the major factors that will influence Australia's labour market in the future. These factors include global trends, the current state of technological change in Australia's labour market, the ideal future workforce and capability building recommendations, and policy implications. With the consideration of these factors, this report presents elements for a reform agenda that will assist in maximising benefits and increase economic prosperity from major technological advances. It provides a holistic framework to approach the analysis; focusing not just on the direct impact of the emerging technology, but also on how to develop policy and build capacity to maximise benefits. The report also provides key cross-industry lessons from case studies that can be used within the health industry.	This report provides a number of key considerations that will assist NSW Health in its Future of Work journey. Fostering an innovation and leadership culture within an organisation is instrumental in driving technological change, and NSW Health must find and empower innovative leaders to establish this culture. Consumers in any industry are becoming increasingly active contributors who co-create knowledge and evolve markets through their choice. Hence, adoption of technology must ultimately benefit the consumers to be successful. For NSW Health, this means considering how technology will benefit its patients and their experience of the health system to ensure that the adoption of technology is successful. This report also provides a macroscopic view of technological advances in various industries, and explores factors such as demographic changes, geopolitics, various labour markets, and climate change. This assists in understanding that the Future of Work in NSW Health is not operating in an isolated system but is impacted by external factors.
Work for a brighter future, Global Commission on the Future of Work, International Labour Organisation, 2019	This report provides a series of recommendations by the International Labour Organisation (ILO) which is informed through extensive research, and deep industry and governmental experience of Commission members. The recommendations aim to increase the capabilities of the workforce, positively change the institutions of work to improve wellbeing, and increase investment in sustainable work.	This report provides the guiding principles that should be core of every strategic decision which advances the Future of Work in any sector. It shifts the focus from emerging technologies and explores demographic changes and evolution of employee preferences. For NSW Health, it is less about the technologies that will impact healthcare but what this means for its employees and their career pathways in NSW Health. The ILO recommends the promotion of lifelong learning that enables people to acquire skills, re-skill, and upskill, which NSW Health should consider in upskilling its workforce. Further, the ILO recommends the adoption of a human-in-command approach to artificial intelligence to ensure that final decisions affecting work are taken by human beings. This is a key message in maintaining the human element that is so important in healthcare. For NSW Health, this means determining what skills are required of the NSW Health workforce in order for staff to be able to work alongside technology and gain maximum benefits from its use.

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Thought leadership	Overview	What this means for NSW Health
A Health and Care Digital Capabilities Framework, NHS	This digital capability framework has been developed to support the improvement of the digital capabilities of the healthcare workforce. It provides a criteria and self-assessment tools that enable the empowerment of staff to improve their digital literacy to adapt to the rapidly changing technological landscape in healthcare.	There are six "domains" of digital literacy and four levels of proficiency within each domain. These domains are: information, data and content; teaching, learning and self-development; communication, collaboration and participation; digital identity, wellbeing, safety, and security; technical proficiency; and creation, innovation and research. NSW Health could look to adopt elements of this criteria to assess the current state of digital literacy in its workforce and set goals for future digital literacy milestones.
Healthcare Reimagined, KPMG (Australia), 2018	Healthcare Reimagined explores technological advancements and its implications for the healthcare industry. It analyses drivers for change, and emerging technologies to predict how healthcare will be reshaped in the future. It then provides recommendations on what healthcare organisations can do now to adapt and thrive in the change.	This paper proposes six key considerations within a framework for change that can be used by healthcare organisations, including NSW Health, to adapt to the rapid technological advancement within the industry. These are: vision and strategy; organisation and culture; patient experience; physical environment; process and operations; data and analytics; and technology. Each consideration and its implications are explored to provide multi-faceted recommendations which enable effective adoption of health technologies within the organisation, which NSW Health may consider for its own technology adoption.
Rise of the Humans (I, II & III), KPMG	Rise of Humans I provides an overall glance at the workforce of the future, the likely jobs that will be replaced with automation, and issues that will arise through automation. It also sets some high-level guidelines for organisations to assist them in shaping their workforce of the future. Rise of Humans II provides the lessons learned from early adopters of intelligent automation and also details the practical initial steps that can be taken to shape the new workforce of an organisation. Rise of Humans III builds upon the knowledge and insights of I and II to deliver a strategic roadmap for action for organisations seeking to shape their workforce of the future.	Workforce shaping is a critical initiative that every organisation must undertake, including NSW Health, if it is to be ready to adapt to the changing technological landscape. Workforce shaping should follow five key stages: translation of the business strategy into implications on how roles may change; shaping of the size and composition of the workforce in order to understand how it will evolve over time; designing the workforce of the future through a detailed blueprint of how human and digital labour can be optimally integrated; changing the workforce through strategic workforce planning, talent strategy, and change management; and monitoring the progress and staying alert to respond to any necessary changes with agility. These steps can be informed and further explored through the Roadmap for Action in Rise of the Humans III, which highlights key areas that NSW Health should explore to successfully manage its workforce of the future. These areas are: skills for the future, sources of talent, workplace structure and organisation, services to enable the workforce, organisational culture, and change and transformation leadership.

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What are the emerging technologies changing the face of healthcare?

There are a range of emerging technologies that are expected to accelerate the rate of technological change and adoption over the coming years, and with this, impact on the workforce. Often, the discussion about the impact of technology on the Future of Work talks about digital disruption in sweeping terms without a clear or nuanced view of what technologies are planned for adoption, or the industry-specific technologies which will have a significant workforce impact. The table below describes some of the types of technologies that are being adopted, or are emerging that are relevant to healthcare (noting this is not exhaustive).

It is important to realise that the roadmap for technological adoption of different "digital disruptors" will be different across every organisation, and depends on the technologies, timeframes, and sequencing they choose. This means that an organisation's technological roadmap for reform will drive a unique workforce transition process, including the evolution of roles, tasks, processes and workforce design that is associated with that process. In turn, the Future of Work journey will be different for NSW Health compared with other jurisdictions and, as a decentralised health service, for each of the Local Health Districts within it, albeit with some similarities. Given this, Future of Work initiatives should focus on the areas of greatest workforce impact to provide the greatest benefit of investment.

Emerging technologies[9]	
Electronic records: Moving systems from paper-based to electronic systems, however there are different types including Electronic Patient Portals (EPP), Computerised Provider Order Entry (CPOE), Clinical Decision Support Systems (CDSS), and Treatment Decision Support Systems (TDSS).	**Big Data:** Large amounts of data stored in 'data lakes' through cloud technologies, where it can be analysed retrospectively.
Mobile Apps/Devices: Handheld devices and apps to assist health professionals and consumers with management of their healthcare.	**Digital Hospitals:** The convergence of digital technologies designed to create an entirely paperless and integrated system that links consumers, clinicians, assets and information systems used throughout the hospital.
Telehealth and telemedicine (Virtual Care): Virtual communication between service providers and patients which is increasingly being used to help drive goals such as home-based healthcare.	**Artificial Intelligence:** Intelligent behaviour by machines for a specific purpose or "narrow AI". Machine learning is included in this as a type of AI that enables software applications to become more accurate in forecasting (without being programmed to do so).
Wearables/Implantables: Sensors on/in a consumer which enables clinicians to continuously track health and wellness in real-time.	**Advanced Robotics:** Robots with enhanced senses, dexterity and intelligence used to automate tasks or processes.
Precision Medicine: Individually tailored medicine which accounts for the patient's genes, environment, and lifestyle in disease treatment and prevention by building a more tailored and comprehensive picture of circumstance.	**Augmented Reality:** Enables supplementing of usual senses with computer generated graphics, video, sounds or geo-location information.
Internet of Things: Networks of sensors for data collection, monitoring, decision making and process optimisation. It allows improved and remote monitoring of products and supply chains in healthcare.	**3D Printing:** This refers to where material is joined under computer control. In the health context, it is being used in a variety of ways including personalised prosthetics, bioprinting and skin for burn victims.
Cloud technologies: Delivery of computer hardware or software delivered over a network or the internet.	**Next generation genomics:** Fast and low cost gene sequencing and synthetic biology.

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An organisation's technological roadmap for reform will drive a unique workforce transition process, including the evolution of roles, tasks processes and workforce design.

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Current NSW Health initiatives and strategies

NSW Health has set out a number of major digital priorities for adoption over the last five years, and has made clear its technological roadmap for the next five years and beyond (as is outlined below). This is based on the key health investments flagged as digital transformations by the NSW Government, but it should be noted that there will be other initiatives adopted locally at the Local Health District and hospital level that will also need to be considered. There are several initiatives in various stages of implementation that aim to incorporate emerging technologies to improve patient experience and system efficiency. Almost all of these initiatives focus on the adoption of electronic records and advancement of digital hospitals. The timeline shows that the adoption of these technologies is in progress, with most planned for completion in the next few years, providing the opportunity to adopt other emerging technologies.

			Rollout Plan														
Initiative[10]	**Description**	**Investment**	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Australia's National Digital Health Strategy[11]	National strategy to strengthen digital health infrastructure	257M (in 2018)										◆ All principles of digital healthcare delivered					
My Health Record[12]	Electronic medical record of all opted-in Australians	$374.2M										◆ All healthcare providers can use and contribute to the patient record					
NSW Health eHealth Strategy[13]	State-wide strategy to strengthen digital health infrastructure	$536M												◆ All three horizons successfully completed			
Electronic Medical Record 2 (eMR2)[14]	Transfer and integration of patient medical record to digital platform	$85.4M					◆ Rollout on specific specialties complete										
Electronic Medication Management (EMeds)[15]	Provides a complete picture of a patient's medicine record	$198M[16]								◆ To be rolled out in 148 facilities by end of 2020							
Rostering (HealthRoster)[17]	Upgrade of staff rostering system	$126M						◆ Fully Implemented									
HealtheNet[18]	Digital upgrade of clinical information platform to share pathology results	$9.7M						◆ Rollout complete, continuously updated									
Patient/Guest Free Wi-Fi[19]	Roll out of Wi-Fi in hospitals to stay connected to friends and family	$3.2M							◆ Rollout in most facilities complete								

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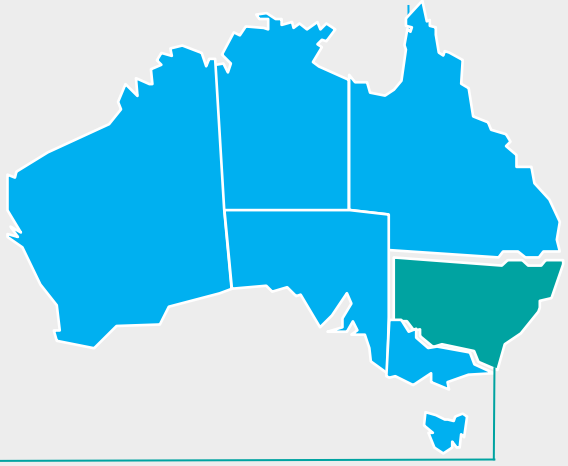
Underpinning the roll out of these technologies are a range of plans and strategies. An overview the key strategies is provided below.



Australia's National Digital Health Strategy[20]

Underpinned by a belief that the effective incorporation and flow of digital information forms the bedrock of quality and sustainable healthcare, the Australian Digital Health Agency was established by the federal and state governments of Australia to implement the National Digital Health Strategy. The Strategy outlines principles which will improve the delivery of healthcare through the realisation of benefits such as prevention of adverse drug events by coordinating care pathways, creation of a more efficient health system by increasing availability of data, improvement of healthcare availability and access, and protection of the national digital health infrastructure.
The Strategy and its principles will be delivered by 2022 through a guiding Framework for Action that details the Strategy's deliverables and the role that governments, services providers, peak bodies, industry, and consumers need to play to achieve the expected benefits

NSW eHealth Strategy[25]

Sharing much of the same expected benefits as the National Digital Health Strategy, the eHealth Strategy for NSW Health 2016-2026 aims to improve delivery and access to healthcare, integrate care pathways, and improve smart infrastructure of New South Wales. The Strategy establishes seven key focus areas which will be implemented over three "Horizons". The Strategy is currently in Horizon 1, where core and critical infrastructure is being upgraded for reliability and consistency. The next two Horizons will focus on integrating systems for a seamless continuum of care, and personalising and tailoring of patient management within the connected environment.

Rural Health Plan[24]

The NSW Rural Health Plan is a range of capacity building initiatives that aim to provide connected and seamless care to regional, rural, and remote NSW communities. The Plan aims to enhance the rural health workforce, strengthen the rural health infrastructure (including research), and improve rural eHealth to increase rural population health, increase accessibility to high quality care, and integrate health services by 2021.

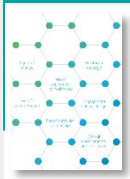
Health Education and Training Institute (HETI): Digital Health and Data Use[23]

In line with its strategic initiative of building data literacy with the acknowledgment of inter-generational differences, HETI will offer the "Digital Health & Data Use" module that introduces NSW Health staff to digital health and expected changes to healthcare which equips them to anticipate changes and ease the transition into digital healthcare.

Framework for New Health Technologies[22]

NSW Health has provided a framework which assists Chief Executives of NSW Districts and Pillar Organisations through the process of nomination and implementation of new health technologies in local and state wide networks. Providing guidance on the mandatory processes that are to be followed in implementation of new health technologies, this document plays a crucial role in strategic plans that are key to the technological transformation of health in New South Wales.

Centre for Healthcare Redesign[21]



The Centre for Healthcare Redesign (CHR) focuses on capability development of frontline staff to not only better equip them to adapt to the rapidly changing technological landscape of healthcare in New South Wales, but to also develop their knowledge and skills in change management, enabling them to thrive in these new environments and improve patient experiences and access to care. CHR provides intensive graduate certificate programs in Project Management, Redesign and Change Management, free of charge eLearning covering core knowledge, and bespoke coaching programs to develop leadership capacity.

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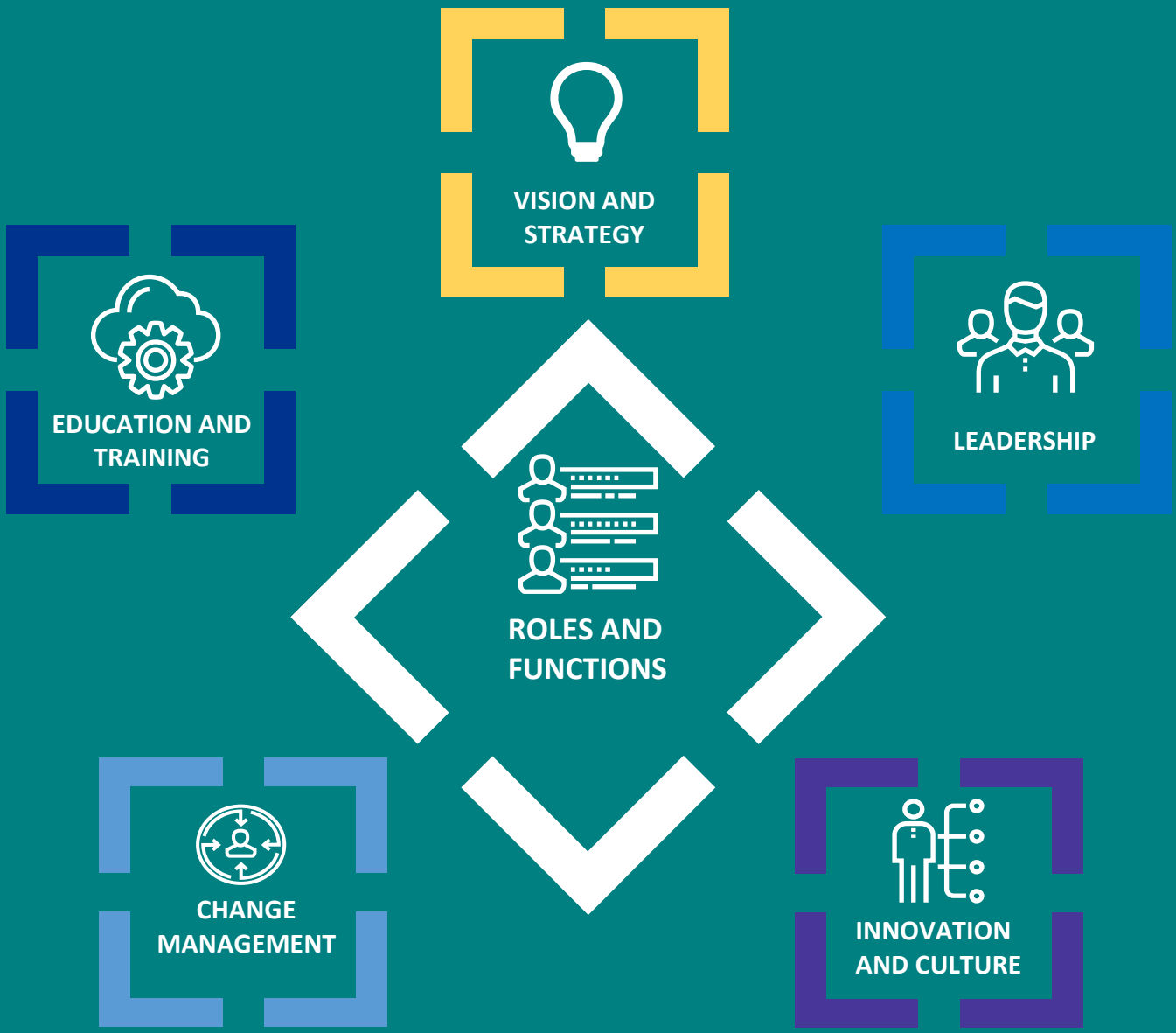
Considerations for NSW Health to enable success in the Future of Work

As highlighted above, NSW Health is already on the journey to the adoption of technology and the Future of Work. Technology has the potential to reshape the healthcare landscape and provide increased benefits for all. In order to progress further, there are a number considerations for NSW Health, as shown in the diagram below.

At the centre of the Future of Work is the impact on roles and functions; as the emergence of innovative health technologies is expected to significantly change the functions, processes, and skills required of the health workforce. There are a number of enablers to support the adoption of these new roles and functions including leadership, vision and strategy, change management, education and training, and the fostering of an innovation culture. These are described below.



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Roles and Functions

The changes to the roles and functions of the workforce is at the heart of the Future of Work. It is the area that will need to be supported by the enablers of education and training, leadership, vision and strategy, change management, and innovation and culture.

What is the expected change?

Health technologies will inevitably change health workforce roles and functions, the way the workforce operates as individual professionals and as teams, and aspects of workforce productivity, accountability and capacity. Effective deployment of digital technologies in health will demand new capabilities, new roles, new models of care and new approaches to learning and education. However the change will not be immediate, and will occur over time. This provides the opportunity for a planned and proactive approach to the expected reform.

The degree and pace of change that different technologies will have on health workforce roles will be dependent on the types of technologies, timeframes, and sequencing adopted within NSW Health.

While there will be some similarities, the impact of health technologies will be different for each health occupation. If thoughtfully planned, strategic decisions will be made based on which tasks, functions or processes could be enhanced by technology, and which remain best done by people. Several factors will drive these strategic decisions including the relative cost of labour, the skills and capabilities of the workforce, consumer expectations around personal interactions and technology adoption, quality and safety, digital health innovations, fiscal constraints and critical workforce shortages.

New and emerging roles and functions

While it is difficult to accurately predict exactly what new roles will exist in the future there have been predictions about growth occupations which will impact not only the health industry but the broader Australian workforce.

Predictions of new and emerging roles relevant to health include:[26]

- Information technology-related occupations that are driven by the new technologies and systems (for example, occupations focused on artificial intelligence, computerised algorithms, data science, cyber-legal occupations, and occupations which focus on networking and interoperability of digital clusters and environments)
- Greater emphasis and focus on workforce-related roles and functions including roles focused on organisational development, workforce and talent development, and change transformation as a result of the impact of the technologies
- Occupations focused on networking and navigation of the health system, and digital health system. While roles such as health coaches and care coordinators are emerging in health to assist with consumer navigation of the health system, similar roles may emerge with a focus on digital health as the blurring of traditional boundaries of health contexts between primary, secondary, tertiary and quaternary care occurs
- Occupations focused on new business models and processes and systems integration. The historical health focus on service and process improvement will need to be refreshed to reflect new technologies and draw on the best balance between human and technology-driven health care.

The impact on health workforce tasks and processes provide the opportunity for the workforce to co-design new functions and improved processes with leaders, which is likely to promote the best outcomes for staff engagement and in achieving high performing organisations.

Most people have a strongly tied identity to their occupation and as this shifts due to digital disruption, there will need to be a genuine commitment to staff, positive culture, high performing teams and innovation through engagement of hearts and minds.

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Enablers of Success

Defining the roles and functions of the future workforce is not a simple task. The NSW Health system will need to navigate through this landscape to ensure that the benefits of new technology are realised. A range of enablers will be key to success: leadership, vision and strategy, change management, fostering an innovation culture, and education and training. These are outlined below, considering why these are important for the Future of Work and how these can be applied in the NSW Health context.

Leadership

Why is this important for the Future of Work?

The role of leadership is critical to the NSW Health workforce embracing the shift to digital technologies. Healthcare systems are complex, consisting of a range of interactions between a wide array of stakeholders and the workforce. The changes associated with emerging technologies are also not finite. Changes to roles and functions will continue to emerge as technologies grow and develop. This will require an empowered leadership team in order to influence change, embrace collaboration, and focus on continuous improvement.[27] It may also require the capability to lead differently, and do so in an environment that is constantly adapting and changing.

Leaders are currently presented with a range of concerns that require serious thought, beyond just what technology to adopt. These include:

- How to most effectively integrate technology and their workforce to deliver safe, quality care alongside improvements in employee experience and productivity
- Determining what a career pathway looks like given the likely changes to current roles and the creation of new roles
- How to maintain employee engagement and successfully prepare them for the future.[28]

People are the key to a successful organisation, and in health this is particularly true. If leaders are proactive in planning the way the Future of Work plays out, they will have a greater chance of creating systems characterised by a positive culture, embedding of technological transformations, and a committed, contemporary workforce.

What does this mean for NSW Health?

NSW Health must identify the capabilities required of leaders to lead through ongoing, complex and adaptive change, and ensure that its leaders have access to the right learning and development opportunities to acquire and embed these. This may require careful assessment of current leadership development opportunities to ensure that these continue to be fit for purpose in developing the leaders of the future, as they navigate their way through the Future of Work. Leadership capability uplift must occur broadly across the NSW Health system, including those in executive, middle management, back office and clinical leadership roles.

Vision and Strategy

Why is this important for the Future of Work?

Setting a clear vision and strategy is crucial for NSW healthcare leaders in responding to change while continuing to deliver high quality healthcare.. A vision and actionable strategy will consider what the focus areas should be, and the change initiatives and capabilities required.[29] This ensures that the system has a shared understanding of where it is heading in response to the Future of Work.

The strategy should reflect a future vision that includes skills/capabilities, technology, leadership and structures, workforce, people, practices and principles.[30]

There are a number of common elements that create a cohesive strategy:

- A point of view regarding the way technology will change healthcare operating models in the future
- A view of how and where services will be provided in the future, including new markets and services
- Identifying key success factors and capabilities required to be successful
- Investing in innovation and promoting an innovation culture.[31]

What does this mean for NSW Health?

NSW Health needs to consider what its vision is for technology and the Future of Work. This should consider how healthcare will operate in a changing environment and what is needed to make this work from a system and workforce perspective. The strategy should then be translated into implications for the workforce. This may include a set of initiatives that support the strategy and ensure that any workforce change is balanced between short and medium term

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requirements and the long-term vision of the future workforce.

Innovation culture

Why is this important for the Future of Work?

Creating a culture of innovation will be important for NSW Health in order to capitalise on advancements in technology to improve healthcare outcomes. While healthcare organisations have often shied away from traditional innovation practices due to rightful concerns about patient safety, there is a need to understand the benefits that innovation can bring to healthcare, for example, mortality rates, length of stay, and available beds.[32]

KPMG's Healthcare Reimagined suggests that healthcare organisations require a deliberate and unique innovation framework to support innovation while managing risk and overcoming traditional roadblocks.[33] An innovation framework for health needs to allow for the exploration and growth of new ideas and experimentation with new technology.

Case Study: Rio Tinto

Mining giant, Rio Tinto, has set the benchmark of what can be achieved with a strong innovation and leadership culture, even in times of change. The company spearheaded the technological revolution in the mining industry through the establishment of its "Mine of the Future" which saw the implementation of a central operation system that remotely enables all 15 of its mines, ports, and rail systems. [34] They are the largest owner and operator of autonomous haulage system trucks and 60 percent of its trains and systems are automated through AutoHaul; the world's first fully-autonomous heavy haul, long distance rail network. [35] They are also the first to prove feasibility of an Autonomous Drilling System and have 11 currently in operation. [36]

Although Rio Tinto were the strongest competitors in the market in 2008, former CEO, Sam Walsh, saw the necessity to continually innovate after observing the decline of the United States automotive industry due to its complacency.[37] Through his leadership, the management team sought lessons and emerging technologies from leading universities and companies outside their industry. They fostered an innovative culture within an industry that generally lacked this to establish the "Mine of the Future". [38] Walsh states that:

"In the 21st century international businesses — by necessity — need to continue to reinvent themselves in order to thrive in an intensely competitive world. Innovation, technology and culture change are key ingredients which allow organisations to adapt past changing environment, where trade barriers are generally falling, financial constraints are increasing and where stakeholders are demanding increasingly efficient and effective organisations."[39]

This innovation enables Rio Tinto to continually thrive in the market and the company is set to be the world's biggest iron ore exporter in 2019.[40]

What does this mean for NSW Health?

NSW Health needs to identify the people who will lead the development of an innovation culture. Current leaders may require a capability uplift in order to support innovation and achieve innovation outcomes.

NSW Health should adopt the 'test and improve' approach to innovation (rather than traditional 'safe to fail'), which has been proposed as an approach for innovation in healthcare. This approach allows for prototyping and iterative learning using real-time feedback in the trialling of new ideas. [41]

In order for the value of innovation to be realised across NSW Health, effective knowledge management systems are essential in enabling the spread and adoption of new ideas. Supporting this should be the creation of virtual networks and communities of practice to connect interested people. Staff should be encouraged to participate in these activities and develop new collaborations for innovation.[42] NSW Health has the some of the building blocks for this in place already, for example, the Workforce Technology Muster.

Change management

Why is this important for the Future of Work?

Underpinning the development of a fit for purpose workforce of the future is change management. Leading change in a complex system like healthcare can be challenging for even simple changes; in considering the Future of Work, this is likely to be even more challenging.

For technology-based change to be successful, there needs to be acknowledgement that healthcare staff hold personal, social and institutional beliefs and practices about what healthcare is. Change management activities need to understand and leverage these beliefs.[43] In addition, a recognition and understanding of the enablers of change can assist in more effective change management strategies: a culture of innovation, prioritising people, empowered

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workforce, leadership, governance and investment.[44]

In all change management projects, building a compelling story to engage the workforce is a key enabler of change.[45] For the future of the health workforce, this may include highlighting the benefits of the Future of Work for both staff and patients (e.g., more time to devote to complex cases, better patient outcomes and improved diagnostics). The story and rationale for change should inspire and spark the desire for change in the workforce.

Case Study: Future Farm Program

The Grains Research and Development Corporation (GRDC) and Cotton Research and Development Corporation (CRDC) look to drive the technological change within the Australian agricultural industry through the implementation of The Future Farm Program.[46]

Emerging and established technologies such as autonomous tractors, drive-by-wire technologies, data analytics, soil and crop sensors, and GPS auto-steer are already available and tailored to the agriculture industry.[47] Although elements of farm automation have been adopted in Australia, there is generally a lack of uptake in these technologies within the industry due to a lower marketplace maturity.[48]

The Future Farm Program aims to tackle this issue by not only demonstrating the large impact these technologies will have on farms but it also aims to engage other change enablers to accelerate adoption.[49] Machinery manufacturers and technology companies are involved to identify developments that can be incorporated into farming processes.[50] The Program also enters discussions with banks, insurance companies, regulators, and legislators to ensure that farmers are adequately supported through the change.[51]

To date, the Program has built operational farms for demonstrations and collaborates with the transport, mining, and aerospace sectors to acquire knowledge about potential technology candidates.[52] In addition to gauging how prepared or interested the industry is in adopting new technologies, the Program also provides a platform which enables discussion in development of legislation, occupation health and safety considerations, and insurance and financing policies.[53]

In 2019, GRDC launched Future Farm 2 to bring together growers, a multi-disciplinary technology industry, and the Bureau of Meteorology to accelerate implementation of soil and crop sensors, and use of data analytics to better manage yield and future proof profits through extreme climate events.[54]

What does this mean for NSW Health?

NSW Health needs to identify its change leaders, and recognise that current leaders may require additional support and training to lead the workforce through change. The development of a well-thought-out change management plan that is widely communicated will build confidence and commitment from the workforce to navigate through the complex change that is required for the Future of Work.

It is generally accepted that time is needed for people to accept the benefits of change and to adopt innovation. In addition, it will take time for the benefits of technology to be realised, such as efficiency gains.[55] Therefore, sufficient time is needed for the workforce to accept and adapt to technological changes, meaning that NSW Health should be proactive in commencing the change journey as soon as is practical.

Education and training

Why is this important for the Future of Work?

Education and training will be key for NSW Health to achieve the capability uplift required to transform current occupations. The workforce will require ongoing training as new technologies emerge and roles and functions continue to change. A well-informed and adept workforce maximises the potential of new technologies and only this workforce is capable of delivering improvements to patient experience, enhance staff productivity, reduce costs, and foster a sustainable, forward-thinking health system.[56]

The degree and pace of workforce change/ capability uplift required may impact on the most suitable education and training approach to support the workforce (for example, whether micro-learning is suitable), the most suitable method of delivery (for example, online or face-to-face), the level of technical expertise or specialist knowledge required by the trainer, and whether the education and training should be delivered in-house or through an education and training provider.

The rate and pace of change of new technologies is expected to challenge the traditional approaches to the education and training of the workforce. There will be a need for education and training to be more responsive to the needs of industry and the workforce, including a digital mindset change across the workforce to one of lifelong learning and education around new and

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emerging digital technologies. Importantly, digital literacy and capability will need to be integrated into practice. [57]

What does this mean for NSW Health?

To work effectively, an education and training blueprint should be developed for occupational groups that are multi-pronged and combine together integrated university and/or VET curricula; continuing professional development training and education (including endorsement by professional associations and Boards); and on the job just-in-time training as the technologies are introduced (at a Local Health District level).

The significant transformation that is expected is also leading to greater recognition of the need for education and training in change leadership, including leading people through change, promoting creativity and flexibility, shaping systems and partnerships, seizing the future, and empowering others. These "soft skills" will be key for workforce support in the coming years.[58]

More than ever before, there will be a need to demonstrate that education and training is resulting in capability uplift for the workforce. This is due to an environment of fiscal constraints, a need for accountability and transparency regarding the way in which tax payer dollars are spent, coupled with a transformational shift expected of the health workforce.[59]

This will mean that education and training courses, curricula and on-the-job training will need to lead to changes in behaviours, attitudes, capabilities ,knowledge and skills – ultimately shifting practice for many roles. While adult learning principles and evidence-based practice already underpin health curricula, into the future there will be a greater emphasis on demonstrating that education and training investment is successful in supporting the workforce with these changes in practice.[60]

Across all of these enablers, there is a need to consider the way in which each element interacts, including the prioritisation and sequencing that will drive the most benefit in the engagement of, and support for, the workforce. Implementation science that includes process redesign should form part of this approach.

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Most people have an identity that is strongly tied to their occupation and as this shifts due to digital disruption, there will need to be a genuine commitment to staff, positive culture, high performing teams and innovation through engagement of hearts and minds.

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