Government of **Western Australia**
Department of **Health**

WA Health Digital Strategy
2020–2030

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Minister for Health Foreword

It gives me great pleasure to present the *WA Health Digital Strategy 2020–2030*.

We live in a world that is continually responding to digital disruption. New and exciting innovations continue to become available for our communities to pursue. The Digital Strategy places consumers at the heart of digital design to improve delivery of healthcare.

Achieving the vision for a digitally-enabled public health system will increase the array of new and innovative offerings for consumers who are keen to adopt these opportunities within the WA health system.

An electronic medical record (EMR) system is the foundation for many of these new and innovative digital technologies and we will be seeking to implement a system with this functionality as a key priority. As a foundation the EMR will need to be practical, scaleable across our geographical area, and ultimately designed for the needs of patients, clinicians and other users.

The development of the Digital Strategy for the WA health system has been undertaken in consultation with a broad array of stakeholders, including consumers, clinicians, health managers and administrators, Health Service Providers and their boards and third party healthcare representatives.

Health consumers have expressed a strong desire to further engage with the health system and be empowered to have greater control of their wellbeing. They also want improved levels of access and transparency about what is happening to their loved ones who are receiving care in our system.

Health professionals continue to adopt new digital innovations at a rapid pace, introducing the community to online and virtual health services that allow for collaboration and treatment closer to home.

Implementation of the Digital Strategy's vision will significantly change the way health services are delivered in Western Australia. As living documents, the Digital Strategy and its Roadmap may change over time with the availability of new digital innovations.

I look forward to seeing the strong foundations implemented across the WA health system to enable flexibility in responding to digital disruption. With a strong foundation the WA health system can invest in the most current digital technology and innovation of the time to enable Western Australians to better access to health services for better health outcomes.

Hon Roger Cook MLA
Minister for Health

Director General Foreword

The WA health system has had the privilege of modernising and commissioning hospitals and health facilities across Western Australia over the past decade. In conjunction with improving building infrastructure, we need to benefit from new approaches to deliver safe and high quality care to health consumers. Adopting new technology and digital innovation will help us do this. Our Digital Strategy will now help us take a more comprehensive approach to how we shape our Digital future.

Consumers of healthcare services are also more active in the use of technology in their day-to-day lives, placing greater expectations on their healthcare providers to interact and communicate with them digitally. The Digital Strategy is focused on the person; how patients can be more up to date with their care program in real-time, how we can improve the health and wellbeing of the community while keeping them out of hospital, and how we can be more innovative in delivering health services.

Importantly, this Strategy is also about how we can use technology to support our health professionals to provide quality care. We will focus on how all our staff interact and use technology, from those dealing face to face with patients to administrators, building managers, patient support services and executives. Digital technology can improve the working lives of all staff and we will aim to improve the takeup, where possible and where appropriate.

The challenge expressed in the Digital Strategy is to make our health services more sustainable, accessible and personalised. We need to do this while remaining focused on our safety and quality obligations.

I am confident that the future of healthcare, enabled by digital innovation, is a challenge that we are ready to face and that the Digital Strategy sets the agenda for the coming decade.

Dr D J Russell-Weisz
Director General

Executive summary

Digital technologies are driving a revolution that can deliver more personalised and precise health care to the people of Western Australia.

Through the use of mobile devices, video, web-based services and remote monitoring sensors, the patient is connected with clinicians, carers and health information in more direct and efficient ways.

Increasingly, healthcare services are being integrated with the way people live their lives.

More than ever, the patient is empowered to manage their own health and wellbeing.

The move towards improvement through digital innovation has also been highlighted in the *Sustainable Health Review Final Report*, with a strategy (Strategy 6) to 'Invest in digital healthcare and use data wisely' and a specific recommendation (Recommendation 22) to 'invest in a phased 10-year digitisation of the WA health system to empower citizens with greater health information, to enable access to innovative, safe and efficient services; and to improve, promote and protect the health of Western Australians'.

> Transformation will come from the new ways of working that will shape and arise from technology; and not just the technology in itself.

The *WA Health Digital Strategy 2020–2030* sets a vision of how digital innovation and technology will transform health services and the way they will be delivered to the people of Western Australia in the next decade.

The Digital Strategy places stakeholders – consumers, carers, clinicians and the general health workforce – at the heart of how it has been designed.

The Digital Strategy has a vision for a digitally-enabled public health system – from health promotion, protection and disease prevention to the acute clinical environment as well as in corporate systems and processes.

As such, the Digital Strategy describes digitally-enabled future journeys of health care for patients and staff. These journeys illustrate a potential future state based on available technology.

The goal is to improve health service delivery by leveraging digital innovation and adopting new ways of working.

Initiatives, investment priorities and resources for the Digital Strategy will be focused on six strategic themes:

1. **Empowered consumers** – Improving equity of access and empowering consumers to become true partners in their own care.
2. **Informed clinicians** – Ensuring clinicians are informed to make effective decisions that advance quality and safety.
3. **Optimised performance** – Optimising health system performance with user-centricity, modernisation, innovation and interoperability.
4. **Supported workforce** – Supporting workforce engagement through connectivity and communication.
5. **Enhanced public health** – Protect, maintain, promote and improve the health of individuals and their community through a combination of safeguards, policies and programs.
6. **Embedded innovation and research** – Managing the adoption of rapidly-evolving technologies and creating value for the system.

Key to a number of these strategic themes is the establishment of a system with statewide Electronic Medical Record (EMR) functionality.

The introduction of new technologies, supported by an EMR, can significantly improve the consumer experience of receiving healthcare, reduce the need for repetitive tests and information requests, assist clinical decision-making and boost innovation and research.

The establishment of a system with EMR functionality is a priority of the Digital Strategy.

The Digital Strategy will be implemented over a 10 year time period. A Digital Strategy Roadmap will guide the implementation of the Strategy and sets out key initiatives over four time horizons. Initiatives may move between horizons as detailed planning progresses.

Implementing the Digital Strategy will require a balance of long term (strategic) planning and short term (tactical) action: annual implementation plans covering the short-term tactical actions will be developed and reviewed on an annual basis to ensure they remain aligned to the long-term vision.

Ongoing investment and funding throughout the life of the Digital Strategy will be critical to ensuring its success. To achieve this, the Department of Health will have to identify funding sources and work with its Treasury and Office of Digital Government counterparts to prioritise this much-needed investment in digital transformation.

Other factors critical to the success of the Digital Strategy include:

- a robust governance structure
- the adoption of agile procurement practices
- an uplift in digital asset management
- enhancing workforce capability and capacity
- establishment of strategic partnerships
- an extensive change management approach.

As part of the planning process for each initiative on the Roadmap and to ensure benefits are realised, a clear set of benefits will be outlines for future measurement and monitoring. In broad terms the benefits anticipated from implementing the Digital Strategy include improved safety and quality of care, streamlined service delivery, enhanced consumer journeys, accelerated research and development, optimised operations and improved public health outcomes.

The Department of Health will establish a team to provide oversight and program management support for the various initiatives.

With the right government investment and commitment by Health Service Providers (HSPs) and the Department of Health, the ability to bring about major reform enabled by technology is very much possible.

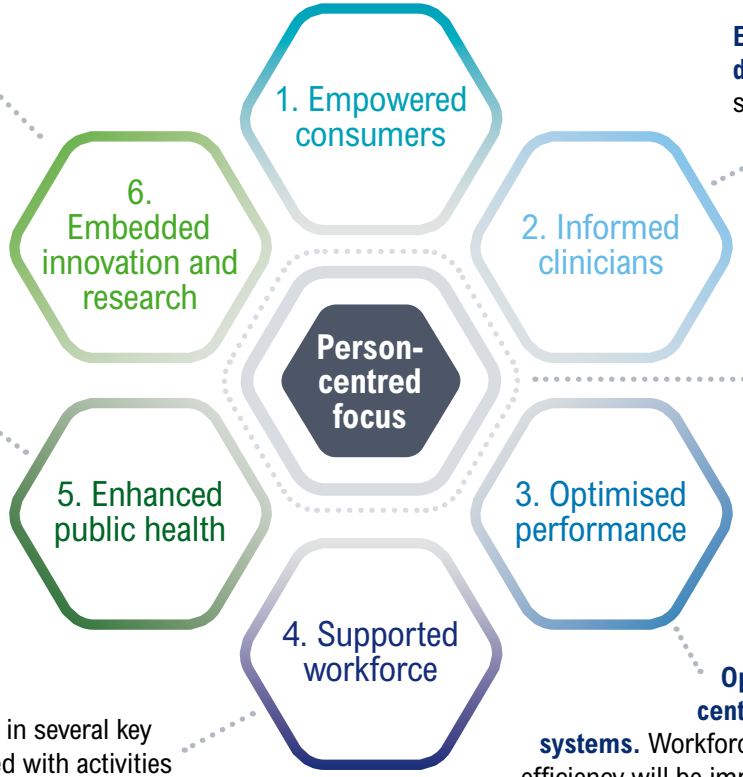
The Digital Strategy has been developed in collaboration with an extensive group of key stakeholders including patients, carers, clinical, corporate and WA health system leadership representatives.

It builds on existing strategies, including the strategic intent for the WA health system, the *WA Health ICT Strategy 2015–2018, Digital WA: the State Government ICT Strategy 2016–2020, the Australian Government Cyber Security Strategy* and *Australia's National Digital Health Strategy* and fulfills one of the Sustainable Health Review's Strategies (Strategy 6) to 'Invest in digital healthcare and use data wisely'.

Strategic themes

Embed innovation and research into core business. Staff in the WA health system will be empowered to innovate existing services, processes, systems, organisational structures and business models in order to create increased value for consumers and improve the efficiency and effectiveness of health services.

Improve equity of access and empower consumers to become true partners in their own care. The WA health system will respond to consumer expectations and demands by placing consumers at the heart of an increasingly virtual and personalised healthcare system. Digital solutions will be provided to progressively enable them to engage with clinicians and the WA health system at a time and location of their choice.



Ensure clinicians are informed to make effective decisions that support high value healthcare. Digital solutions for clinicians will enhance communication, collaboration and provide seamless access to real-time comprehensive patient information. Accessing patient information in this manner will support clinical decision-making and the delivery of quality, person-centred care.

Protect, maintain, promote and improve the health of individuals and their community through a combination of safeguards, policies and programs. Public health strategies aim to constantly improve and provide a healthier future for individuals, families and communities across the State. Targeted public health programs and person-centric information to support clinical decision-making will be improved by the availability of interoperable systems, big data, Artificial Intelligence (AI), business intelligence, linked data and analytics.

Person-centred focus: an approach to ensure the needs, preferences and values of consumers, carers, clinicians, staff and partners are front and centre of all initiatives.

Support and foster workforce engagement through connectivity and communication, empowering health workers to offer higher levels of service to the community and government. The right investment in several key corporate systems will address legacy issues associated with activities such as financial reporting, payroll and rostering.

Removing unnecessary manual steps and paper-based workflows will reduce the cost and time of these activities, while improving the employee experience. Using updated systems and redesigned processes will also improve service delivery to consumers and clients.

Optimise health system performance with user-centricity, modernisation and interoperability between systems. Workforce and health system communication, collaboration, efficiency will be improved through the implementation of a number of in-progress and new initiatives over the next 10 years. The ability to access information anywhere, at any time and using any device will allow staff to work in an effective, secure and productive manner of their choice. Improved communication throughout the health system will assist decision-making, better management of organisational resources and improved productivity.

Proposed initiatives

- Mobile Health
- Patient Portal
- Virtual Care
- Telehealth
- Remote Patient Monitoring
- My Health Record

- Statewide Electronic Medical Record Functionality
- Electronic Medications Management
- Specialty Clinical Systems
- Laboratory Information System Replacement
- Medical Imaging System Replacement
- Mobile Applications and Devices
- Clinical and Research Analytics
- Care Coordination Platform Across Multiple Settings (Shared Care Platform)
- 24-hour WA Health Operations/Command Centre
- Augmented Reality and Virtual Reality

- Digital Hospital
- Robotics, Automation and Artificial Intelligence (AI)
- Predictive Analytics
- Commercialisation, Development and Ownership of Intellectual Property

- Population Health data
- Spatial Data and Technology
- Research and Data Linkage
- Regulatory Responsibilities

- Employee Portal
- Third-Party Corporate Platform
- Learning Management System
- Financial Management Information System
- Human Resources, Rostering and Payroll Systems Replacement
- Online Credentialing System
- Business Intelligence

- Mobile and Efficient Workforce Computing
- Application Consolidation and Identification of Critical Systems
- Enterprise Architecture and Interoperability Standards
- Modernising ICT Infrastructure Foundations (HealthNext)
- Legislation and Policy Review

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What is digital?

‘Digital’ is a broad term which means different things in different contexts. In its simplest form, ‘digital’ is used to describe the interaction between technology and human experience.

Digital solutions allow for human and/or automated interpretation of data and information from complex environments to support improved decision-making and streamline workflows. This requires harmonisation of diverse capabilities and processes which are enabled by technology.

Digital has moved from being solely the domain of an organisation’s technology function (such as data storage, personal computers and software applications) to being embedded in all organisational functions and activities.

It is a product or a system, as well as an approach to change.

Introduction

Consumers and clinicians want to be empowered to use technology to transform healthcare. The Digital Strategy supports the development of an integrated health system that delivers high quality, person-centred care, enabled by digital innovation.

The *WA Health Digital Strategy 2020–2030* (the Digital Strategy) aims to take advantage of the innovations transforming healthcare to drive better health outcomes for all Western Australians.

The move towards improvement through digital innovation has also been highlighted in the *Sustainable Health Review Final Report*, with a strategy (Strategy 6) to 'Invest in digital healthcare and use data wisely' and a specific recommendation (Recommendation 22) to 'invest in a phased 10-year digitisation of the WA health system to empower citizens with greater health information, to enable access to innovative, safe and efficient services; and to improve, promote and protect the health of Western Australians'.

The WA health system faces many challenges such as an ageing population, increased prevalence of chronic disease and specific workforce shortages. Services are delivered across a vast land area with a sparse population in a cost constrained environment.

The Digital Strategy presents an exciting opportunity for the WA health system. Clinical and cultural reform, supported by mature digital capabilities, can positively transform the health experience for all users, providing an improved service delivery that is more convenient and accessible for all.

The Roadmap sets out a 10-year plan of initiatives for the WA health system. Successful implementation of the initiatives within the Roadmap will:

- empower consumers
- inform clinicians
- optimise performance
- support the workforce
- enhance public health outcomes
- embed innovation and research.

Critical to the success of the Digital Strategy is the required funding and ongoing investment to continuously improve health service delivery. This needs to be carefully managed within an appropriate governance structure. Together these elements will provide greater coordination and certainty of the delivery of a complex set of project initiatives for the WA health system and the community.

Through implementing the Digital Strategy, it is envisaged that the WA health system will take advantage of digital innovation and encourage continual improvement and greater digital literacy, leading to new methods of service delivery and better outcomes for all Western Australians.

Consumers of healthcare today

Consumers of healthcare today have told us they have an expectation of access to exceptional care that is safe, effective, timely, affordable and personalised.

A key objective of the Digital Strategy is to ensure the Western Australian health system is able to meet these needs and requirements.

The healthcare consumer of today[1]…

- …wants to be more proactive about their personal health and the health of their community
- …accepts and adapts quickly to technology changes
- …seeks a convenient and personalised interaction with the health system
- …often turns to online sources for health information
- …desires personalised and useful health information at their fingertips
- …is concerned about the security and privacy of their personal data
- …is already creating their own health data directly through wearables and other devices
- …is more connected than ever before, hence is more digitally enabled to receive care
- …wants choice of when and where health care is delivered
- …wants demonstrated value-for-money as a taxpayer while delivering high-quality health services
- …has an expectation that everything is available at an instant
- …has an expectation of equitable access to care, regardless of location, health status or personal situation

1 Expectations have been collated from workshops, recent strategic reviews and multiple references listed at the back of this document.

The digital future of the WA health system

The digital vision for the Western Australian health system cannot be easily captured in a single statement – it starts with a **person-centred approach** and expands to transform the experiences of patients, carers, clinicians, staff, partners and other stakeholders.

This transformed experience is the digital future that the Digital Strategy aims to achieve.

A **digitally enabled** WA health system is not only about technology in an acute clinical environment but also its use in prevention, promotion, regulation and corporate support.

The future of health care is moving rapidly in a disruptive manner towards the real-time serving of data to connected patients, carers, clinicians, staff, communities, and other service providers. The need for, and effective use of, high-quality data to inform decisions can occur at any location and at any time throughout the care continuum, planning or regulatory processes.

This includes the need for right **connectivity**: having effective digital links between systems, people and processes. Seamless communication is needed across the broader health system, from primary care, community health, and aged care through to acute care; with workflows providing real-time, contextual information to patients, carers, clinicians and other health staff. The lack of connectivity due to poor telecommunication services in regional and remote areas of the State remains a primary concern as it limits the ability of health practitioners to deliver **equitable health outcomes** to all Western Australians.

Making this future a reality will require the WA health system to concurrently pursue next-generation technologies, address gaps in existing foundational systems and legislation, and seek improvements to processes, capabilities and culture. The goal is to improve health service delivery via an innovative, digital approach to care while responding to unpredictable digital disruption events. This means that just as much effort should be invested in the **workforce** – to support a transformational organisational culture – as will be needed to transform technology itself.

Future-state outcomes for the WA health system

Examples are highlighted below of what will be achieved in the future once key digital initiatives are achieved. These demonstrate the potential improvements that can be made across the care continuum with the implementation of this Digital Strategy.

Consumer portals provide real-time and contextual information that is personalised and informs consumer choices

(Patient portal)

Consumers have control of outpatient bookings and directly receive diagnostic results within the prescribed parameters set by the health practitioner

(Patient portal)

Data from wearables is analysed through AI, notifying GPs and specialists if a person is recording results outside of normal parameters

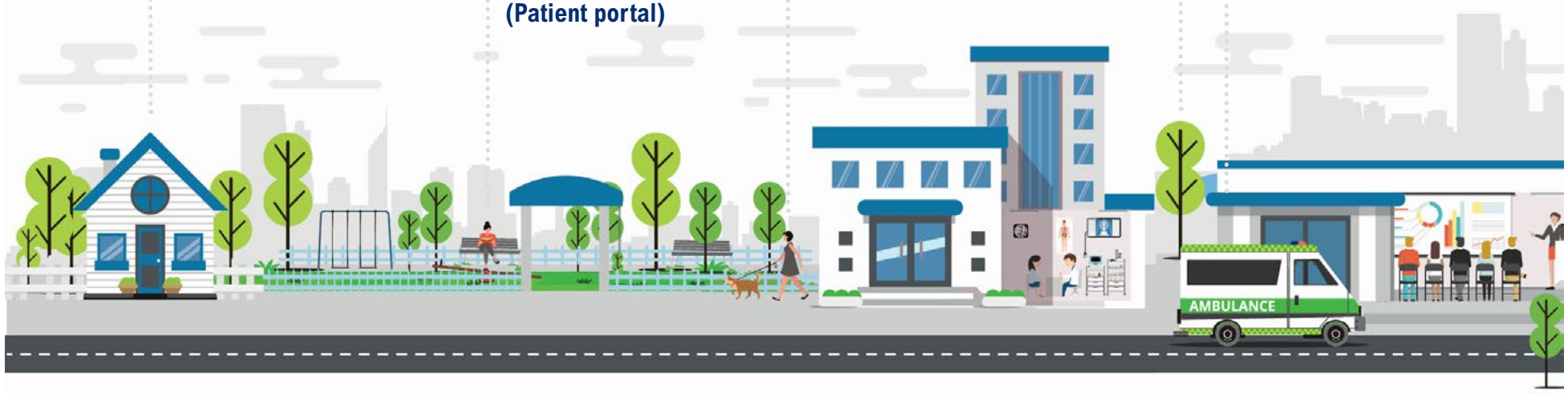
(Shared care platform)

Partner organisations transfer data to a single EMR in real-time

(Interoperability standards)

Automated corporate workflows allow for more analytical tasks to be prioritised

(Robotics, automation and AI)



Virtual consultations are informed by real-time patient information from the EMR and Internet of Things devices

(Virtual care)

AI informs public health responses from the monitoring of infectious disease outbreaks

(Public health information systems)

Researchers and data scientists have access to big data across the continuum of care and data from external agencies such as justice, education and police to correlate sociodemographic factors to health needs of communities

(Linked data repository)

Automated rostering is driven by predictive analytics

(Employee portal)

Consumption-based and as-a-service offerings are deployed to enhance data storage and network performance

(Modernising ICT foundations)

Cloud-based systems provide secure access from a multitude of devices

(Mobile workforce computing)

Strategic themes

The strategic themes of the Digital Strategy represent six areas of focus that, when pursued together, will establish a truly person-centred health system. All Digital Strategy initiatives, investments and resources will need to contribute to the achievement of these themes.

Person-centred focus is at the heart of the Digital Strategy. It is not a strategic theme, rather an approach to the design and delivery of all health services.

For Digital Strategy initiatives this approach ensures the needs, preferences and values of consumers, carers, and health professionals are front and centre of all initiatives.

The six strategic themes are described in detail in the following sections of the Digital Strategy.

1. Empowered consumers

Improve equity of access and empower consumers to become true partners in their own care.

2. Informed clinicians

Ensure clinicians are informed to make effective decisions that support high value health care.

3. Optimised performance

Optimise health system performance with user-centricity, modernisation and interoperability.

4. Supported workforce

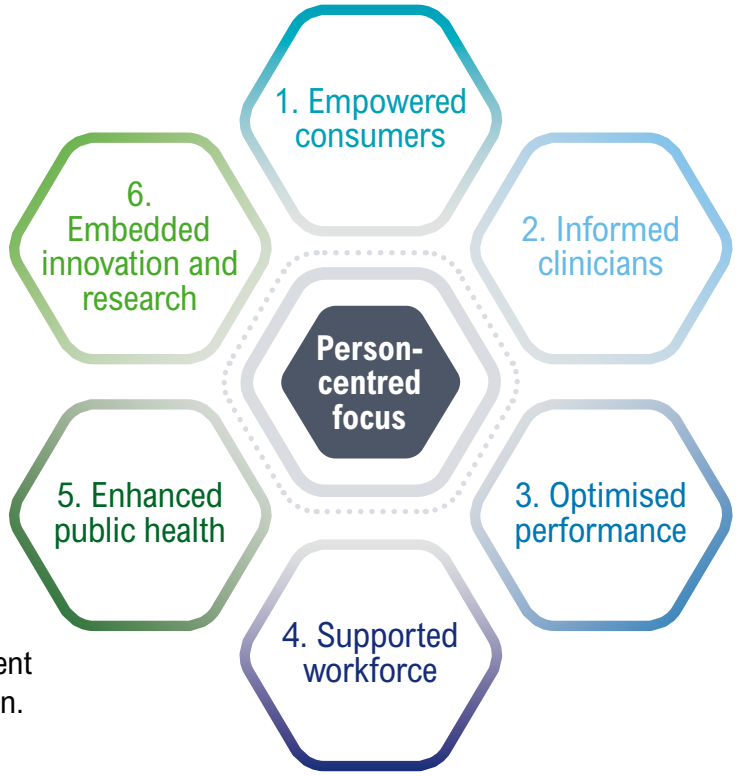
Support and foster workforce engagement through connectivity and communication.

5. Enhanced public health

Protect, maintain, promote and improve the health of individuals and their community through a combination of safeguards, policies and programs.

6. Embedded innovation and research

Embed innovation and research into core business and promote the adoption of rapidly-evolving technologies.



The digital future of healthcare in WA for Jenny…

Jenny is a 38-year-old woman with mental health issues living alone with little support from family…

Jenny often misses doses of her medication as the side effects make her feel unwell. As a result she is frequently presenting to the Emergency Department (ED).

The eMeds system in the ED records the interactions of her medications and notifies her local General Practitioner (GP). After a telehealth consultation with Jenny he prescribes an alternative. The local pharmacy receives this information and delivers Jenny her new medications that afternoon.

Jenny's healthcare app helps promote communication with her care team, and records her symptoms if and when they occur. The app also provides alerts to help with daily medication management and suggests a variety of complementary strategies to support her mental health.

Jenny is also referred to a community provider for ongoing support. She chooses the most convenient time to have her appointment from the choices in the online booking system. The provider communicates and collaborates with her multidisciplinary team via the Shared Care Platform. The Shared Care Platform enables Jenny to communicate with her community provider, allowing them to intervene early if she experiences side effects in the future, saving her from having to go into the ED.

Jenny is not experiencing the same side effects as before and continues to see her GP for monitoring. She can book an appointment with him via the app, which is integrated with her patient portal.

Jenny continues to have regular consultations with her specialist mental health team through virtual health technology which allows her to complete health assessments, monitoring and appointments from home.

1. Empowered consumers

The aim of this strategic theme is to improve equity of access and empower consumers to become true partners in their own care. This will be achieved by implementing the digital initiatives described below.

The WA health system will respond to consumer expectations and demands by placing consumers at the heart of an increasingly virtual and personalised healthcare system.

The digital initiatives in this section aim to empower consumers to participate in their own treatment and care by enabling them to engage with clinicians and the WA health system at a time and location of their choice.

Mobile Health (mHealth)

High-quality health information is becoming increasingly accessible to consumers. Consumers are able to use mobile applications (apps) to track all aspects of their lives, including their health, thus enabling them to have more control over their own health and wellbeing.

Mobile Health (mHealth) apps also provide the opportunity to deliver care beyond the hospital and facilitate the sharing of patient-generated health data. This helps to improve patient outcomes by delivering tailored care and engaging consumers in their treatment between clinical visits.

Patient portal

Patient portals allow consumers to engage directly with their health providers and allow for the provision of real-time, intuitive and accessible information regarding their health status, treatment and history.

The WA health system is trialling a patient portal which will give patients access to information regarding their outpatient appointments and referrals.

Future functionality could include:

- facilitating appointment scheduling
- improving clinical interactions between service providers and consumers
- tracking chronic disease
- assisting medications management
- allowing access to diagnostic test results
- providing targeted health promotion education and/or procedure-specific information
- related peer support links for patients.

Any information would be contextualised for the individual consumer based on their demographic profile (e.g. location, culturally and linguistically diverse (CALD) groups). Functionality could also potentially include clinical monitoring and care escalation of services in home settings.

User-centred design should be used to develop efficient, easy to use, personalised interfaces for the patient portal (also known as a customer relationship management platform). Any designs must be mindful of the requirements of consumer groups with poor connectivity and/or low digital literacy.

Introduction and evaluation of a patient self-management solution (as recommended in the *Sustainable Health Review Final Report*) will also help patients take greater responsibility through the use of new and emerging technologies to support behaviour change where required, and in the day-to-day management of chronic conditions.

Telehealth/Virtual care

WA faces a unique challenge in providing comprehensive health services to sparse populations scattered across vast distances. The result of these geographic challenges can be inequity of service access and availability.

The WA Country Health Service (WACHS) has pioneered the establishment of world-class telehealth services to improve access and reduce the burden of travel on country communities.

The expansion of telehealth services to include services such as stroke, mental health, obstetrics, intensive care and paediatrics across both regional and metropolitan areas will further improve access to health services and the consumer experience.

The combination of telehealth and robotic technology may also allow for clinicians to perform diagnostic testing and minor treatments on remote patients.

Introduction and evaluation of virtual clinics (as recommended in the *Sustainable Health Review Final Report*) could be used to increase access to specialist outpatient services and reduce unnecessary visits where in-person consultations are not required.

These solutions will offer superior convenience to consumers, assist the WA health system to improve equity of access, and support the transition of healthcare delivery away from traditional hospital settings and into the community.

Notably, this initiative will require changes to Commonwealth funding arrangements to allow patients to be supported in the community. This initiative may also require investment in infrastructure within health services and healthcare settings.

Remote patient monitoring

Remote patient monitoring enables clinicians to monitor and actively manage consumers in the community via wearables, sensors and Internet of Things (IoT) devices.

It can be used to improve clinical decision-making, drive effective chronic disease management programs, enhance falls management and support telehealth initiatives. When combined with virtual care, remote patient monitoring can reduce demand on hospitals, as will be the case for Medihotels that are being established at Fiona Stanley Hospital and Royal Perth Hospital.

The real-time data transmitted from wearables can also alert clinicians or artificial intelligence tools to assist patients in self-care or alert them to seek clinical care as soon as possible.

My Health Record

My Health Record is a patient controlled summary of an individual's health information that can be viewed securely online, from anywhere, at any time. At the time of writing, the WA health system is connected to the My Health Record and uploading discharge summaries, pathology and diagnostic imaging reports. Clinicians can also view My Health Records securely through key clinical applications. The WA health system will continue to work in partnership with the Australian Digital Health Agency to continue to upgrade applications for viewing and uploading and promote the use of the My Health Record in routine clinical care. As well as increasing the use of My Health Record in the WA health system, it is anticipated that this will support the shared approach to care resulting from an increased take-up of My Health Record for people and communities with complex health needs recommended in the *Sustainable Health Review Final Report*.

International Experience

UK National Health Service

The UK National Health Service has used mobile health apps to help patients manage their chronic conditions.

Patients have used apps to record and communicate their symptoms and observations to their clinical team over the past eight years. In addition to a significant reduction in admissions, all patients reported feeling more empowered to manage their own condition.

The Mayo Clinic

The Mayo Clinic's advanced mobile health platform is extremely popular with its patients. More than 750,000 users have downloaded the application across Android and iOS, which facilitated the sending of more than 1.1 million patient-initiated secure messages to Mayo providers in 2016 alone.

Over 10,000 appointments were requested via the app, which has also recently been updated with new features allowing patients to view their X-ray and other radiology images directly from their smartphone.

The digital future of healthcare in WA for Peter…

Peter

is 67-year-old man with type 2 diabetes, living in the Great Southern...

Peter's smart phone is equipped with a monitoring app that is connected wirelessly to a blood glucose meter. The app tracks and stores Peter's daily blood glucose levels.

The acquired blood glucose data is transmitted securely via Peter's smartphone to the EMR.

The EMR is supported with AI and predictive analytics that process this data together with diet and activity information to predict the likelihood of hypoglycemia. Adjustments to Peter's diet, insulin and exercise routines are suggested by the algorithm and sent to Peter's smartphone.

An alert is sent to Peter's diabetes nurse when his real-time results are outside of allowable parameters.

Peter's diabetes nurse uses videoconferencing via a smartphone to conduct a telehealth consultation with the care team in the Great Southern because local intervention is necessary.

Based on the consultation, Peter needs to be admitted into hospital. The 24-hour WA Health Operations/Command Centre monitors Peter's transfer into the hospital automatically, registering his attendance and allocating a bed. Hospital clinicians are advised of Peter's pending presentation and his specific care needs.

Facial recognition technology at Peter's local hospital recognises him on arrival, accelerating his admission and navigation to his allocated ward.

Peter's Perth-based diabetes specialist receives a reminder to review his progress remotely after the ward round the following day.

2. Informed clinicians

The aim of this strategic theme is to ensure clinicians are informed to make effective decisions that support high value health care. This will be achieved by implementing the digital initiatives described below.

The digital initiatives in this section aim to enhance communication and collaboration between clinicians and provide seamless access to real-time comprehensive patient information.

Accessing patient information in this manner will support clinical decision-making and the delivery of quality, person-centred care.

Statewide Electronic Medical Record functionality

Adoption of a system with EMR functionality has become the global best-practice standard for delivering health services, demonstrating considerable benefits to health service safety and quality. The *Sustainable Health Review Final Report* supports the phased and prioritised implementation of an EMR across the WA health system.

EMR functionality provides a digitised patient record including integrated progress notes, clinical assessments and summaries, medication history, images and diagnostic test results. It is the foundation for a single source of truth and easier access to up-to-date patient information.

EMR functionality offers clinical decision support tools and prompts that aid clinical decision-making, thus reducing variation in care. Clinical decision supports range from passive supports, such as hyperlinks and guidelines to proactive, one-click flow mechanisms that streamline entire clinical pathways.

Equipped with real-time access to comprehensive patient information and clinical decision-making support tools, EMR functionality will ensure clinicians are better informed to make effective clinical decisions and deliver quality, person-centred care. Full benefit of this system will be achieved when clinicians are able to access the EMR from any network-connected device, including devices such as smartphones and tablets, providing immediate access to patient records anywhere and anytime.

Clinical decision support systems (CDSSs) combined with computerised physician/provider order entry (CPOE) systems will remove the need for paper-based order entry systems for procedures, medication orders and diagnostic tests. This functionality will reduce errors and duplication and increase laboratory turn-around times and efficiency.

EMRs also provide the backbone for integrating other digital solutions and modules, including patient portals and shared care platforms. Establishing the capability for these systems to connect and work in conjunction with each other will provide future benefits that far exceed those achieved by those same systems acting in isolation.

At the time of writing, market scanning, research and the experience of other jurisdictions suggests a single enterprise, statewide solution providing a suite of clinical and community capabilities is recommended. This approach would best support the complete electronic exchange of patient information, closed loop medication management and analysis of clinical data as represented by Healthcare Information and Management Systems Society (HIMSS) EMR Adoption Model (EMRAM) level 6-7 certification. National and international experience suggests a best-of-breed approach limits the ability to attain this certification.

The approach to an EMR solution for the WA health system will take these factors into consideration with the aim to maximise learning from other jurisdictions.

Healthcare Information and Management Systems Society

Healthcare Information and Management Systems Society (HIMSS) has established an internationally-adopted scoring system that ranks hospitals as they progress through their EMR deployment. The EMR Adoption Model (EMRAM) is an eight-stage (0-7) model based on the adoption and use of various levels of EMR functionality from no electronic functionality through to complete diagnostic, imaging and medications management support.

The EMRAM model will be used as a guide by the WA health system to track progress and establish a benchmark against other healthcare organisations around Australia and the world.

Options for achieving EMR functionality within the WA health system are varied, and include:

- a single instance of a single system for all sites
- multiple instances of the same system at different sites
- a standardised set of 'core elements' of a single system with optional additional modules for each site
- a complete set of EMR modules for each site to choose as required
- different systems at different sites.

All of these approaches will provide EMR functionality and represent a significant improvement on the present combination of paper-based and electronic systems. The specific approach to obtaining EMR functionality will require detailed analysis and assessment, including an assessment of infrastructure, applications, systems and workforce readiness.

Regardless of which option is chosen, the size and complexity of the WA health system requires a phased implementation approach. In addition to this, clinical practice and workflows will need to be standardised in order to implement EMR functionality. The extent of standardisation required will be determined by the scope of the EMR functionality and the approach taken to achieve it.

Digital maturity and capability assessment

The digital maturity and capability assessment will assess capabilities and technology across the WA health system and define future areas for improvement in preparation for implementation of an EMR and other major digital initiatives. The assessment will be used to serve several purposes including:

- understanding variability across the WA health system
- prioritisation of funding decisions
- understanding systemwide ICT/ infrastructure maturity
- understanding delivery capability and talent.

Difference between electronic health records and electronic medical records

The main difference between an electronic health record (EHR) and an EMR is the scope of data held by the platform.

An EMR provides a digitised record of a patient's clinical notes including medical history, integrated progress notes, hospital laboratory and imaging results, medication charts, etc. The term EMR can be applied to a single service provider, or a single organisation such as the WA health system.

An EHR provides a holistic and longitudinal view of a patient's health information offering additional functionality than that of the EMR by collecting and compiling information from external healthcare providers such as specialists, allied health providers, general practitioners, etc., thus giving a more comprehensive picture of a patient's health. In some ways the My Health Record could be considered a preliminary EHR for Australian citizens.

The WA health system does not have remit over external providers or systems, hence the focus on establishing EMR functionality rather than that of an EHR. Having said that, by ensuring the system with EMR functionality is compliant with national and international interoperability standards the WA health system will support the development of a national EHR.

Another critical component of the preparation for an EMR will be an early scoping exercise to determine the required EMR functionality for the system. This will be combined with the digital maturity and capability assessment to support the development of a detailed business case that establishes the most appropriate model for the EMR functionality and the way it should be procured, developed and configured. Together, these components will ensure existing investments and the value they now provide to the WA health system are considered as part of the initiative.

Record digitisation

Phased introduction of EMR functionality will require the conversion of existing paper-based clinical documentation to a digital format to ensure continuity of information during the transition. The WA health system will consider the most appropriate approach to record digitisation following endorsement of the preferred phased implementation approach for achieving EMR functionality.

Electronic medications management

A closed-loop electronic medication management (eMeds) system enables clinicians to electronically order medications for automated dispensing and tracking, thus improving the quality, safety and effectiveness of medication management for patients.

An eMeds system offers decision support, such as evidence-based order sets and checking for allergy and medicine interactions, reducing the number of preventable adverse medication events and medication prescribing and dispensing errors.

As recognised by the Australian Council of Healthcare Standards, eMeds systems have been found to result in:

- reductions of 67 per cent in missed doses, 25 per cent in prescribing errors and 72 per cent in wrong drug errors
- elimination of medication errors due to legibility
- 99.9 per cent accuracy in allergy status
- no incidences of lost drug charts.

eMeds systems can be provided as part of a comprehensive EMR system, as an optional module to an EMR system or as a separate system integrated into the network of clinical systems and apps. The most appropriate approach for the WA health system will be considered in tandem with and be informed by the EMR functionality and digital maturity assessments.

Critical Clinical Systems Uplift

Recognising the effort and cost involved in implementation of EMRs (noting the *Sustainable Health Review Final Report*'s goal of all health services having a functional EMR or equivalent by July 2029), work will commence concurrently on identifying existing applications with functionality that could be either 'switched on' or enhanced relatively quickly, easily and cost effectively in a way that would provide immediate benefit to clinicians and patients.

Critical clinical systems will be identified, and where appropriate, uplifted in functionality. This uplift will be bounded by cost and application lifecycle, particularly for those that may be close to replacement by a system providing EMR functionality.

Clinical Workbench

Depending upon the EMR functionality and approach chosen, a clinical workbench could be implemented to provide a customisable user interface for clinicians to access their clinical systems and applications.

Specialty Clinical Systems

Some clinical specialties have workflows which cannot be accommodated by generic EMR functionality and therefore require specialty modules to create a fully electronic patient record and management system. Specialty clinical systems can also automate hundreds of tasks and protocols; create repeatable workflows and consumer care pathways, thus contributing to improvements in efficiency. Criteria for identifying specialist systems (i.e. where workflows cannot be accommodated by the system with EMR functionality) will be determined as part of the EMR initiative. Common enterprise specialist systems or modules will be implemented where possible.

Laboratory Information System Replacement

PathWest is implementing a new enterprise Laboratory Information System (LIS).

The LIS may enable faster and more effective management, testing and interpretation of pathology samples to provide clinicians with the information they need for clinical decision-making. The automated testing of pathology results, with diagnoses informed by analytics, could deliver results more quickly to the consumer. These results are already being automatically uploaded in WA to a patient's My Health Record.

Mobile Applications and Devices

Mobile devices can be used to facilitate communication and enable data-driven clinical decision-making. Mobile apps can facilitate easy access to guidelines, drug information and diagnostic aids, helping clinicians make informed, evidence-based decisions. Clinician access to approved apps will be enabled by a BYOD (Bring Your Own Device) policy, providing authorised users with access to clinical systems on their personal devices while protecting the confidentiality, privacy, integrity, security and availability of consumer health information.

Clinical and Research Analytics

A centralised data repository is a platform that consolidates data from a variety of clinical and non-clinical systems in one place. It serves as a platform for data consolidation and an integrated view of consumer health information allowing clinicians to undertake analytics. Interoperable architecture facilitates the exchange of health information with other services and clinicians.

The *Sustainable Health Review Final Report* recommends that the approach to high-value care uses contemporary data analytics to support systemwide benchmarking, transparent public reporting, and drive implementation of standardised care pathways to maximise value to patients and communities and reduce clinical variation and waste.

Three of the eight *Sustainable Health Review Final Report* strategies highlight the need for investment in contemporary systemwide data analytics and benchmarking to support continuous improvement and sustainability.

Medical Imaging System Replacement

The WA health system is procuring a replacement picture archiving and communication system (PACS) for the storage of digital medical imaging, and a replacement radiological information system (RIS) for the electronic management of medical imaging services.

These clinical information systems are an integral part of EMR functionality and necessary for efficient clinical workflows. As is now the case, automatic upload of diagnostic imaging reports for patients with a My Health Record will give patients greater visibility over their information, prevent repeat testing and contribute to the establishment of a national EHR.

Shared Care Platform

Integrating primary, secondary and tertiary health services through a collaborative Shared Care Platform will enable real-time communication and holistic care planning between community-based physicians, allied health professionals, hospital specialists and patients.

This Platform will enable clinicians to securely communicate (including sending referrals), create and assign tasks, and monitor their patient's progress. Consumers should also benefit from this collaboration by having an improved experience and better health outcomes as information about their care moves seamlessly across the continuum.

The *Sustainable Health Review Final Report* recommends the introduction and evaluation of a shared care platform for integrated, chronic disease management between WA health and community-based clinicians.

24-hour WA Health Operations/ Command Centre

The WA health system is multifaceted and provides services across vast distances. Improved visibility and management of patient movement and clinical data across the system will help better manage patient volumes, wait times and hospital transfers, enabling greater access to the health system and an improved patient experience.

A 24-hour Operations/Command Centre can display real-time data, such as:

- location
- alerts
- bed capacity
- bed cleaning turnaround time
- patient transport times
- delays for procedures and diagnostic tests
- ambulatory use on dashboards visible across the system.

It can allow for spatial analysis and visualisation (e.g. mapping) of patients, and, with the addition of predictive analytics and AI, has the potential to interact with big data to mitigate risks and optimise operations and workforce use.

The *Sustainable Health Review Final Report* recommends the introduction and evaluation of a command centre commencing with country patients to improve safety and quality, access to emergency and specialist services and patient transport and retrieval.

Augmented reality and virtual reality

Augmented reality (AR) and virtual reality (VR) have been adopted in the medical community to help clinicians practice clinical procedures, simulate surgery and prepare for new and complex procedures.

The WA health system will progressively adopt and introduce this technology to provide benefits to consumers and enhance the clinician's experience of health services wherever feasible.

Johns Hopkins Hospital

The Johns Hopkins Hospital has a state-of-the-art, advanced hospital control centre that uses real-time and predictive information and innovative problem-solving to trigger action. Staff monitor the movement of patients in and out of the hospital, volume of patients and their patient's safety and experience.

Cited benefits of this centre include a 60 per cent improvement in the ability to transfer patients from other hospitals, dispatch of critical care teams 63 minutes sooner to pick up patients from outside hospitals, and a 30 per cent improvement in bed assignment after decision to admit patients in the ED.

3. Optimised performance

The aim of this strategic theme is to optimise health system performance with user-centricity, modernisation and interoperability between systems. This will be achieved by implementing the digital initiatives described below.

The Digital Strategy will improve workforce and health system communication, collaboration, efficiency and performance through several in-progress and new initiatives over the next 10 years.

The ability to access information anywhere, at any time and using any appropriate device will allow staff to work in an effective, secure and productive manner of their choice.

Improved communication throughout the health system will assist decision-making, better management of organisational resources and improved productivity.

Mobile and efficient workforce computing (End-User Computing)

A statewide End-User Computing (EUC) strategy will assist in providing the workforce with streamlined access to work-related applications.

This initiative will use cloud-based systems to provide secure, authenticated access to WA health systems from devices such as desktops, laptops, tablets and smartphones. Staff will be able to work in a modernised, efficient and mobile fashion via common and intuitive interfaces with 'single sign-on' enabled across all systems.

Application consolidation

The proliferation of unmanaged applications across the WA health system has resulted in considerable duplication and inefficiencies.

Existing systems and applications will be reviewed, and where possible retired or replaced by a common agreed platform. Particular attention will be given to those nearing the end of their life or licence support period.

Consolidating applications and focussing attention on a smaller number of critical systems can deliver a more consistent staff experience, minimise training, support and maintenance requirements, and allow common security issues to be identified and addressed.

Enterprise Architecture and Interoperability standards

Successful delivery of the Digital Strategy requires the establishment of an Enterprise Architecture (EA) practice that organises the structure of software applications, IT infrastructure and supporting data into a design framework. It will need to be standards-driven and responsive to the changing needs of clients. EA ensures that new and updated systems meet design standards and deliver interoperability. EA can integrate processes, promote collaboration across multiple settings and facilitate the delivery of meaningful information to users.

Data sharing across multiple settings is essential to supporting coordinated care and realising the full benefits of digital health solutions.

Interoperability standards will be set and mandated across the WA health system to facilitate data sharing, including for external stakeholders wanting to interact with the health system's digital infrastructure and services. This will allow for integration across borders and between systems. The WA health system will, at a minimum, adopt the interoperability standards specified by the Australian Digital Health Agency, including conformance to document types, structures, terminology and interfaces.

Patient privacy and data security will remain of paramount importance to the WA health system.

The exchange of personal health information in Western Australia will be informed by a review of policy and legislation, to ensure that patient information can be shared in a way that is safe, secure and protects the privacy of consumers.

Modernising ICT Infrastructure Foundations (HealthNext)

The WA health system has prioritised the replacement of legacy infrastructure and ICT with modern consumption-based infrastructure-as-a-service offerings that enhance data storage, improve network performance and simplify the use of other cloud services. Priority work in this initiative will achieve consistency and parity across the health system in IT infrastructure foundations across all hospitals.

Moving from owning and operating ICT assets to consuming infrastructure services is a sustainable and "future-proof" approach that can reduce the risk of system outages, provide more robust security protection, and allow the WA health system to scale capacity and use up and down in an agile manner while paying only for what is used.

An immediate priority is to implement fast and reliable Wi-Fi across the WA health system at hospital locations and eliminate black spots in order to support a workforce that is mobile and efficient in their service delivery.

Digital Information Security

The WA health system has commenced a digital information security program to improve the quality and effectiveness of its digital security environment. The program of work includes delivery of the following:

- An increase in organisational capability via core information security leadership and resources.
- Improved digital security governance and reporting.
- A defined event monitoring strategy and vulnerability management function.
- Improvements to identity access management.
- Increased digital security awareness across the WA health system via education and training.
- The establishment of thorough Business Continuity and Disaster Recovery plans for digital information security events.

Legislation and policy review

In order to successfully implement the Digital Strategy, a review of relevant legislation and specific policies is critical to achieve the following outcomes:

- Facilitate the sharing of health data between clinicians and other healthcare providers to improve the coordination of healthcare service delivery.
- Overcome the fragmentation of health information and achieve a single source of truth for each patient record.
- Improve the quality and availability of data for clinicians, public health officers and researchers.
- Extend healthcare models to enable providers to deliver health services in new ways (e.g. via virtual care, or community-based models).
- Ensure privacy and data security remain paramount, while allowing a patient record to be accessed by the appropriate clinicians.
- Allow analysts to use the information to assist in the planning of future care, health regulations and quality controls.

The review will articulate the legislative parameters in terms of privacy and data sharing within which digital initiatives will need to operate.

Concerns around the privacy of information and sharing of data have been highlighted in the *Sustainable Health Review Final Report*. The Report recommends a priority for the introduction of data sharing and privacy legislation for WA as well as the development of key policy frameworks in health for informed consent for use, sharing and release of data.

4. Supported workforce

The aim of this strategic theme is to support and foster workforce engagement through connectivity and communication, empowering health workers to offer higher levels of service to the community and government. This will be achieved by implementing the digital initiatives described below.

The digital initiatives described in this section aim to address legacy issues in key corporate systems that support financial reporting, payroll and rostering. Many of these systems are at the end of their lifespan and the risk of a systemwide failure is increasing as these systems become less reliable.

Removing unnecessary manual steps and paper-based workflows will reduce the cost and time of these associated activities, while improving the employee experience. Using updated systems and redesigned processes will also improve service delivery to consumers and clients.

Employee portal and single sign-on

A mobile-enabled employee portal will allow streamlined access by employees to their personal records such as rosters, payroll and leave, as well as to the specific business and clinical systems that they use. Easier access to internal communications and alerts will reduce the need to navigate multiple systems as well as improve usability.

The employee portal should be underpinned by single sign-on functionality which enables access to multiple related – yet independent – systems. It would have role-based access control and protection for personal information and digital identities. When combined with identity access management, single sign-on can streamline new digital ways of working.

Third-party corporate platform

A third-party corporate platform will give the WA health system a secure online workspace to communicate with suppliers, provide the ability to check the status of work orders and make payments. The online platform will save resources spent on post, faxes, processing bank cheques and third-party enquiries.

The platform will also support interactions with industry and local government in Public Health regulatory reporting (such as licensing of tobacco sellers and radiation safety).

Learning Management System

A common Learning Management System (LMS) as a platform for generic learning will provide a more consistent staff experience, the ability to structure future learning and automatically track and credit prior learning across the organisation. It would also simplify the process of verifying core competencies when staff move between sites or between Health Service Providers.

A common LMS platform will allow Health Service Providers to develop customised content relevant for their location, workforce and partners. Over time it is likely that variations in content will decrease as workflows and processes become more standardised.

Financial Management Information System

A Financial Management Information System (FMIS) supports the automation and integration of financial management and supply chain processes such as budget formulation, accounting, reporting, procurement and warehouse management.

The ageing FMIS used in the WA health system does not support the devolved governance structures or efficient processes, does not provide adequate management decision support, and is on the lowest level of technical support.

A new FMIS will provide improved:

- system configuration
- decision-making and accountability
- workflow productivity
- financial management
- system administration.

The new FMIS should be seamlessly integrated with other systems such as the human resources, rostering and payroll systems and contracting systems; supported by a central data warehouse. This will offer a modern, consolidated platform that can significantly improve operational efficiency, transparency and equity.

Human resources, rostering and payroll systems

Replacing human resource, recruitment, rostering and payroll systems with enterprise solutions will support automation, improve data quality, efficiency and enhance reporting. This includes processes such as budgeting, procurement, performance management and talent management, as well as recruitment, rostering and payroll.

The replacement of these systems is supported by the *Sustainable Health Review Final Report* which recommends investment in a systemwide integrated workforce information system to support workforce planning and support through linked information including payroll, Human Resources, learning management, rostering, training, credentialing and performance development.

Fortnightly, hard-copy payslips are issued to the majority of the health workforce. Modernising these information systems and processes will improve the efficiency and flexibility of workforce management and administration.

Urgent consideration is needed to ensure continued reliable processing of rostering and payroll information, as the current Human Resources applications are outdated.

Online credentialing system (eCredentialing)

An electronic credentialing system should be implemented that allows health practitioners to maintain their credentialing profile once the initial review and verification of qualifications and credentials has been completed. This credentialing profile could then be shared across multiple sites, and, if combined with the statewide LMS, would support strategies to ensure that the right people with the required skills are available at the right place in a timely manner.

Business intelligence and analytics

Investment in systemwide Business Intelligence systems to streamline and leverage data collections, and to support systemwide data sharing and benchmarking is seen as a priority within the *Sustainable Health Review Final Report*. A business intelligence and analytics strategy will provide direction for the aggregation and practical use of the vast amounts of data collected across the WA health system.

The strategy should address issues of privacy, de-identification of data, and maintenance of health record confidentiality. Statistical data and analysis derived from data lakes will inform and guide health administrators, clinicians and planners to make and drive improvements in service delivery and healthcare planning.

The digital future of providing healthcare in WA for Amy…

Amy

is a doctor in a specialist training program moving hospitals every few months as she gains experience in her chosen field…

Amy uses her smartphone to view her roster, appointments and the status of any critical test results for patients under her care. Notifications are distributed in real-time for those patients she needs to know about.

Amy confirms her new professional development profile, following last week's online training. She registers for a new training module, to be delivered using virtual reality headsets. The location and time of the training is synchronised with Amy's calendar.

A selection of medical literature is forwarded to Amy via her email and onto her employee portal. These journal articles have been selected based on Amy's role, her work history and recent training. Recent analytics, relevant to her interests at work, are also being displayed.

Amy applies for leave for training via the employee platform, which automatically verifies her available leave balance, routes an approval request to her supervisor and provisionally updates her roster to reflect her availability. The rostering platform automatically assigns a doctor with appropriate experience to cover for her absence and the switchboard is configured to divert her calls on this date.

To assist with the preparation of her annual tax return, Amy accesses her payslips and annual payment summary via the employee platform.

5. Enhanced public health

The aim of this strategic theme is to foster healthier communities through a combination of safeguards, policies and programs designed to protect, maintain, promote and improve the health individuals and their community.

The digital initiatives described in this section aim to support delivery of the Sustainable Health Review strategy to 'commit and collaborate to address public health issues.'

Public health strategies aim to constantly improve and provide a healthier future for individuals, families and communities across the State. Targeted public health programs and person-centric information to support clinical decision-making will be improved by the availability of interoperable systems, big data, AI, business intelligence and analytics.

Population health data

A population health data module together with EMR functionality can be used effectively to inform health promotion and prevention initiatives. Delivery of this initiative will allow the WA health system to collaborate more effectively with other government agencies, including police, education, justice, environment and child protection.

Anonymised big data generated by the health system can be leveraged to gain insights into some of the harder-to-tackle health and social issues, and used to identify and develop interventions that promote healthier communities.

Spatial technology

An individual's health status is often tied to environmental factors, economic opportunity, or having easy access to healthy food and healthcare services, all of which vary geographically.

Geographic analysis can determine relationships between contributing health factors and identify the people who are most at risk of ill health. Spatial Technology can help us understand why public health issues occur, who is impacted and where to provide healthcare services and prevention programs.

By applying a location-based approach to the health of the community, the health system can more efficiently: find and predict concentrations of high service use and readmissions; optimise patient transport methods and routes; plan and locate appropriate prevention programs and clinical services; track and respond to communicable disease outbreaks and disasters; determine exposure to environmental health hazards; and determine hotspots of ill health or disease risk.

For example, spatial technology can be used to explore the complex relationships between environmental health hazards, such as air pollution, and disease. Spatial tools can be used to create smoke exposure models using spatial data from satellite images. If we combine this information with data on health outcomes in spatial models, we can better understand the adverse effects of prescribed burns and bushfires on population health, and determine appropriate locations to implement mitigation and prevention strategies.

Spatial technology already adopted within parts of the WA health system will continue to be integrated to increase efficiencies. New applications of these technologies can be explored to help address key public health issues.

Spatial data from external sources (e.g. the Shared Location Information Platform (SLIP)) will continue to be used to identify environmental and other determinants of health impacts.

Precision medicine and public health

The emerging field of precision medicine and public health includes new data/digital, informatics, genomics, phenomics and geospatial technologies to assist with diagnosis and intervention. As stated in the *Sustainable Health Review Final Report* the WA health system is a leader in the application of genomics to health care, with the Undiagnosed Diseases Program using techniques such as comparing deep phenotype 3D facial analysis, exome sequencing, matchmaking and molecular confirmation to assist with diagnosis. This emerging field is likely to grow over the life of the Digital Strategy, along with other precision technologies.

Research and data linkage

Data linkage is used by the Department of Health to enable research and analysis of evolving trends, such as obesity, chronic diseases and communicable diseases, with the findings informing policy, programs and service delivery.

Implementing the Digital Strategy will see an increase in the quantity and quality of data captured and allow data linkage to make better use of non-health data in sectors such as disability services, training, education, justice and environment.

The implementation of modern governance for more timely and comprehensive whole-of-government and research access to data linkage services for more effective research, service planning and investment to meet community needs is a priority within the *Sustainable Health Review Final Report*.

Regulatory responsibilities

Successful public health outcomes rely on health consumers and stakeholders receiving timely and contextual information.

Surveillance systems and connectivity with health consumers can allow the system to monitor and prompt notifications for a varied range of regulatory obligations, including infectious disease outbreaks, disaster management and other environmental health hazards.

The digital future of public health service delivery in WA for John…

John works in the Public and Aboriginal Health Division at the Department of Health. He is involved in the management of communicable diseases in WA...

Decision support technology guides clinical diagnosis and treatment of infectious disease across the WA health system.

Real-time patient record data measures the prevalence and incidence of infectious diseases in populations across WA. John, along with clinicians and public health units are alerted about active disease outbreaks and disease trends.

Geographic Information Systems are used to better understand disease and vaccination rates across the State and refine predictive models to more effectively anticipate and prevent diseases. John also uses this data to identify areas for more targeted health promotion efforts.

AI applies algorithms to identify conditions of public health interest and to build predictive models that will more effectively anticipate, diagnose and assist in treating diseases. Results are transmitted to John as population-level aggregate summaries of infectious disease outbreaks and emerging trends.

The Patient Portal, Shared Care Platform and mHealth initiatives can be used to deliver infectious disease prevention and promotion information such as vaccination rates to communities. John oversees the dissemination of this information through a variety of channels and can monitor the analytics to assess the most effective methods of communication.

6. Embedded innovation and research

The aim of this strategic theme is to embed innovation and research into core business. This will be achieved by implementing the digital initiatives described below.

The digital initiatives described in this section will empower WA health system staff to innovate existing services, processes, systems, organisational structures and business models in order to create increased value for consumers and improve the efficiency and effectiveness of health services.

Digital hospital

A digital hospital is a hospital that leverages comprehensive and pervasive systems and technology to support clinical and administrative workflows as well as safety and quality improvements.

Where appropriate, the WA health system will continue to work towards the achievement of a digital hospital as indicated by an assessment of HIMSS EMRAM level 6-7. At the time of writing, achieving HIMSS EMRAM level 6-7 represents complete EMR functionality.

Robotics, automation and AI

AI and Robotic Process Automation (RPA) technologies can be used to improve the consumer experience by allowing clinicians to spend more time providing care and less time performing administrative and repetitive tasks such as writing reports and ordering tests. Robots in health care are becoming more widely used to perform precision surgery, pharmacy dispensing and collecting pathology samples.

Predictive analytics

Predictive analytics can be used for risk stratification, prompting pre-emptive intervention before a clinical crisis occurs. For example, vital sign monitors in hospital settings that are monitoring a patient remotely can inform diagnostic applications that provide treatment recommendations and intervention alerts. Predictive analytics used by those diagnostic apps will enable intervention to occur before a clinical crisis.

Predictive analytics can also be used to identify patients with high risk of developing chronic conditions early in the disease's progression. This enables early intervention which avoids long-term health problems that are costly and difficult to treat.

AI powering early warnings for adverse events

The Cleveland Clinic uses predictive analytics and AI to identify potential at-risk patients under ICU care and prevent patient emergencies before they occur. Local clinicians are able to provide improved and timely care and are supported through real time information and education. This program has resulted in improved health outcomes and a decrease in length of stay.

Commercialisation, development and ownership of intellectual property

Digital innovation may lead to the development of solutions and assets that can be commercialised to deliver economic and social benefits to the State.

The WA health system should seek to adopt an approach to manage ownership of intellectual property (IP) that encourages rather than inhibits innovative behaviour. In addition, the approach should pursue strategies to recognise employees for their involvement in the development of IP. The *Sustainable Health Review Final Report* recommends the establishment of a WA health system central unit to provide advice and guidance on innovation such as intellectual property, legal, marketing and protocols for commercialisation.

Design principles

The WA health system will be guided by a set of design principles that will be applied to all digital initiatives from scoping to implementation to ensure they are consistent with the direction of the Digital Strategy and represent the values of the WA health system.

1. Safety and quality

The Review of Safety and Quality in the WA health system undertaken by UK expert Professor Hugo Mascie-Taylor in 2017 notes that as people and processes transition into new ways of working, there needs to be assurance that safe and high-quality care continues to be provided.

It is critical to ensure safety and quality underpins the design and development of digital health solutions and services. Investment in digital initiatives should ultimately lead to improved safety and quality of health service delivery.

2. Person-centred approach

The digital initiatives identified in this Digital Strategy aim to provide proactive, personalised care responsive to the needs, location and preferences of Western Australians. A person-centred approach will be adopted throughout all aspects of delivery of the Digital Strategy and priority will be given to initiatives that align or otherwise support the priorities identified by the Sustainable Health Review.

3. Interoperability

Interoperability aims to remove siloed data, allowing information to flow between systems and across boundaries.

Effective communication and deployment of an interoperability standards will minimise point-to-point interfaces, deliver greater agility and reusability, facilitate faster and more efficient auditing and improve the ability to maintain systems integration.

Where possible, a common approach for ICT systems will be taken to minimise the variety, diversity and cost of solutions. Best-of-breed solutions will only be considered where a compelling case can be made that considers the integration requirements, patient safety risks and technical requirements.

4.

Equity of access for all Western Australians

The Service Priority Review commissioned by the WA Government in May 2017 noted that WA's size and geographically dispersed population presents particular challenges for service delivery. A key recommendation is to improve the coordination of service delivery in the regions. The Sustainable Health Review also recommended prioritising initiatives that improve access by rural and remote communities to healthcare services, for example via telehealth and/or virtual care.

Digital health solutions that provide opportunities to address geographical barriers and equity of access to health care will be prioritised.

5.

Data-driven decision-making

Analytics will form a core capability across the WA health system, providing insight at the point of action and supporting decision-making at the right place and the right time. Data to support greater analytical capabilities needs to be high quality, timely and spatially relevant. By embedding analytics into decision-making across all business functions, the workforce and eventually intelligent automation engines, can make and act on evidence-based decisions.

Initiatives that support the provision of high quality, timely and spatially relevant data will be prioritised, as will systems and apps that create value from this data. Where possible, within privacy and confidentiality constraints, an approach to open data that is consistent with the WA Government Open Data Policy will be adopted.

6.

Security and privacy

The WA health system aims to be a trusted digital environment where information security and privacy is paramount with protections in place to ensure personal health information is safe and protected.

Personal health information will only be disclosed for the ongoing care and treatment of patients and within legislative provisions.

7.

Sustainability

Investment will be sustainable in terms of consumer and workforce experience, cost, risk and waste reduction. Investments will be made for long-term gain and to minimise the risk of redundancy or rework.

By focusing on sustainability, the WA health system will orient to value – understanding what is being spent and being achieved, and measuring the benefits to patients, consumers and the wider community.

Investment in digital initiatives will be based on the total cost of ownership, while aiming to deliver the best available health outcomes to consumers and the wider community.

8.

Agility and adaptability

Digital solutions will use open architecture where possible, and be able to change and adapt to future requirements.

A culture of innovation and continuous improvement needs to be fostered and driven by the leadership of the WA health system so that emerging technologies are able to be examined, tested and iterated as and when they become available.

9.

Consistency of digital maturity

Due to a significant investment in building new hospitals over the past decade, older hospitals in WA have been left behind in terms of technological investment, resulting in an inequitable distribution of digital assets across the State. For example, several hospitals do not have Wi-Fi or medical workstations on wheels to allow health professionals to be more mobile in the delivery of health services to patients.

A digital maturity assessment across the State will establish a baseline of digital capability that includes physical technological assets and human capability. This baseline will be used to structure an appropriate funding strategy that will prioritise investments in less digitally mature sites in order to achieve the outcomes of the Digital Strategy.

It is further proposed that a minimum floor and/or a target aspirational HIMMS standard is set by the WA health system to ensure that future investments are targeted towards achieving the agreed base or target aspirational HIMMS standard.

10.

User-centred design

A user-centred approach to design (UCD) involves using input from end-users throughout the development process so that the technology that supports tasks and solves problems is easy to use and of value to the users.

End users, including consumers, clinicians and corporate groups, will be involved throughout the design and implementation of all digital solutions.

Future interactions
with the WA health system
will fundamentally change
through implementing and embedding
sustainable digital solutions

Roadmap

Digital strategies by their very nature need to be living documents; the pace of change and advent of digital disruption make developing a Roadmap an iterative process.

A prescriptive 10-year Roadmap is considered to be of little value in this ever-changing landscape. Rather, this section outlines a Roadmap that acts as a starting point and guide for immediate action. To ensure it remains contemporary, particularly in this changing environment, the Roadmap will be monitored, evaluated and updated on a regular or as-needs basis.

The regular updates will serve to ensure that all of the strategic themes will have been adhered to by the end of this Digital Strategy using the most current digital technology and innovation at that time.

To address the challenge of predicting an uncertain future, the Digital Strategy has been structured in two significant ways:

- Identifying a group of initiatives that represent the functionality most likely to achieve the desired digital future.
- Establishing an agreed set of design principles that will be used to guide decision-making at key points or when more advanced solutions become available.

This broad structure will be supplemented with detailed two-year implementation plans that outline the immediate next steps. The intent is to have these detailed two-year implementation plans as 'live' documents and for them to be updated annually. It is hoped that this approach will allow the WA health system to move forward in an agile manner with its digital initiatives.

The first two years of the Digital Strategy, i.e. Horizon One, will be a mixture of new and in-progress initiatives. The majority of work in Horizon One will be foundational, i.e. planning, analysis, assessment, workflow design, infrastructure uplifts and business case development.

The next Horizon, i.e. Horizon Two, will see the WA health system build on this foundation: many in-progress and foundational initiatives will be completed and their benefits starting to be realised.

Horizons Three and Four are where the most impact is anticipated: by this time significant progress will be made towards the digital delivery of health care and other services in the WA health system.

WA health system Digital Strategy Roadmap

Critical success factors

Successful implementation of the Digital Strategy is dependent upon several enabling elements.

Governance

The Department of Health as System Manager will ensure consistency in approach and delivery of the Digital Strategy across the WA health system by adhering to the following governance principles:

- The System Manager is the owner and custodian of the Digital Strategy and Roadmap.
- The System Manager is the owner of all critical clinical and non-clinical systems.
- The System Manager is the owner of all systemwide digital and ICT standards and policies.
- The System Manager is the Executive Sponsor of systemwide initiatives.
- Health Support Services (HSS) is the delivery lead (i.e. senior supplier) of all systemwide initiatives, and the custodian of all critical clinical and non-clinical systems.
- Each HSP will be represented on the advisory committees for systemwide initiatives.
- Consumers will be represented on reference groups for systemwide initiatives that interface with consumers.
- Industry will be consulted when relevant and possible without impacting on current and future procurement processes.
- First adopters for each of the major initiatives are to be agreed and endorsed during the planning phase of the initiative.

Under the *Health Services Act 2016*, Health Service Providers are empowered and allowed the flexibility to deliver services that matter to the community, improve health outcomes and create efficiencies. As such, Health Service Providers will lead and manage the digital transformation of their services at a pace and with local initiatives that best suits their service requirements. This includes the choice of local clinical and non-clinical systems, supporting infrastructure and change management processes. The deployment of local initiatives will be aligned to the Digital Strategy and compliant with mandatory policies and standards.

These standards include the design and interoperability standards that will ensure compatibility of systems within the WA health system and efficient transfer of information to consumers, private specialists and general practitioners (eg via the My Health Record or other compatible system).

Information Management and Data Sharing

The WA health system requires investment in improved information management to ensure confidentiality and security of personal health information. An overarching framework of regulations and policies will be established to support the creation, storage, use, retention and sharing of personal health information.

As noted under strategic theme 3 (Optimised performance), concerns around the privacy of information and sharing of data have been highlighted in the *Sustainable Health Review Final Report*. The Report recommends a priority for the introduction of data sharing and privacy legislation for WA as well as the development of key policy frameworks in health for informed consent for use, sharing and release of data.

Procurement

The WA health system will investigate opportunities to strengthen its ICT sourcing and procurement capability through streamlining processes and ensuring consistency.

Establishing a Digital Health Panel could allow vendors or products to be shortlisted through an early assessment of both contractual compatibility and capability.

Digital asset management

The development of a digital strategic asset lifecycle management plan, incorporating technology and other digital assets into the overall Strategic Asset Management planning process, will assist the WA health system to monitor the asset base, plan for future maintenance and upgrades and reduce the risk of unforeseen costs.

Asset management practices, such as strategic capital planning, asset optimisation and asset analytics, will be required to support the overarching digital asset management plan.

Consumption pricing and as-a-service

Consumption-based pricing and as-a-service delivery (commonly used for cloud-hosted services) is the preferred model for initiatives on the Roadmap, allowing for faster deployments and easier upgrades, the ability to quickly scale capacity, improved transparency of ICT operational costs and minimisation of risk of vendor lock-in.

Total-Cost-of-Ownership

Total-Cost-of-Ownership (TCO) needs to be evaluated and included in any business case and funding proposal for initiatives on the Roadmap.

TCO identifies the lifecycle costs of ICT solutions, including hardware and software acquisition, ongoing management and support, telecommunications and staff costs (clinical, corporate and ICT).

The opportunity cost of downtime, training and other productivity losses should also be incorporated to capture the full financial impact of implementation.

The deployment of consumption-based pricing will require a robust analysis of estimated usage to assist in the calculation of TCO. Detailed costing and funding requests for initiatives on the Roadmap will need to include analysis of recurrent spend – including TCO – and demonstrate the transition from capital expenditure to operational expenditure over future funding cycles.

Workforce capability and capacity

The WA health system needs to prepare for new and smarter ways of working, adapting to increased worker mobility, agile project delivery and rapidly-emerging digital capabilities.

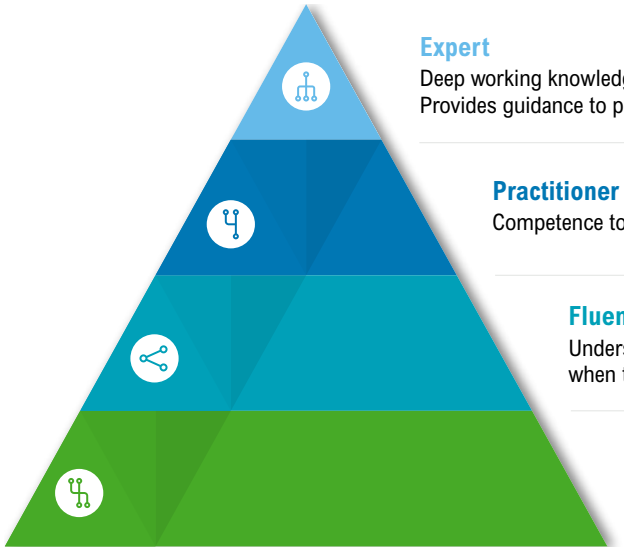
It will need to be responsive to changing consumer requirements and continuously reshape the capabilities of its workforce to deliver services in an effective and efficient manner.

Ongoing detailed digital workforce planning and capability assessments will help define exactly what and where capabilities are required, how to upskill the existing workforce and how to ensure digital leadership remains contemporary.

The required level of digital awareness and digital fluency will vary across the WA health system ranging from experts leading and enrolling staff in digital initiatives, to those who only require a broad understanding of digital services. The latter will still need ongoing guidance to maintain their level of digital awareness in a rapidly changing sector.

Capability development to support the delivery of initiatives on the Roadmap will be a continuous process. It will be critical that the first adopters of initiatives on the Roadmap dedicate time to identify the capabilities required to deliver both the project outcomes and maintain digital skillsets once initiatives are delivered. Digital experts will need to be trained and dedicated to implementation activities.

A range of 'hard' digital capabilities will be required in areas such as enterprise architecture, cloud computing, advanced analytics, automation and AI. Alongside these, a suite of 'soft' digital capabilities will be essential to ensure that digital initiatives place the person at the centre of solutions and that change to common workflows can be navigated easily by consumers, clinicians and the broader workforce.



Expert
Deep working knowledge and experience of the solution.
Provides guidance to practitioners.

Practitioner
Competence to deliver solution.

Fluent
Understanding of the solution,
when to apply it and how.

Aware
Broad knowledge of the technology/solutions
and the business value.

As well as upskilling its workforce, the *Sustainable Health Review Final Report* recommends the encouragement and advancement of health and social care educational curriculum to include training in the skills needed for a digitally literate workforce.

Program Implementation Support Unit

A centralised unit based at the Department of Health will be required to oversee the delivery of initiatives on the Roadmap, tracking progress, overseeing risk and identifying successes that can be communicated and repeated by other parts of the WA health system.

The program implementation support unit will support the System Manager's role as Executive Sponsor of systemwide initiatives.

Partnerships

The WA health system will continue to establish partnerships and collaborate with third-party organisations to realise the benefits of digital transformation. There is considerable value to be generated from these arrangements through sharing resources, capability uplift, knowledge transfer and data sharing.

Partnerships between the WA health system and other organisations can also facilitate pathways for the funding and commercialisation of accelerated research and innovation outcomes.

Engaging with consumers and consumer organisations in the design and implementation of initiatives sits at the heart of the Digital Strategy. This will be imperative to achieving a person-centred approach to care, hence the two design principles built around consumers (#2 Person-centred approach and #10 User-centred design) and the need to have consumers on reference groups as a governance principle.

Change management and culture

A transformational approach to change management and culture will require a strong commitment from stakeholders across the WA health system, especially those in leadership positions.

This contemporary change management approach will be essential to keep pace with the rate of change being fuelled by technology-driven innovation and digital disruption.

It will allow for engaging and personalised guidance throughout the implementation of the Digital Strategy.

The change management approach will also need to be fully resourced, with those resources ideally sourced from the relevant content areas of the organisations, for example, clinicians leading clinical digital initiatives.

In keeping with the Digital Strategy's design principles, the change management processes should be offered through multiple digital channels to empower stakeholders to tailor their own experience.

The culture adopted through implementing the Digital Strategy will be the central catalyst for driving the necessary behaviours – and ultimately outcomes – that determine success in a digitally disrupted future.

Digital leaders for the WA health system will need to think, act and react differently:

Think differently

Conceptualise possibilities in an increasingly complex environment, explore divergent possibilities and make decisions in a timely manner.

Act differently

Collaborate across different teams, identify the value of new solutions and accept iteration (try – fail – adjust) as a standard practice.

React differently

Tolerate risk and ambiguity, demonstrating resilience in the face of constant change, and have confidence to challenge practices and lead change.

Cultural change

Existing leadership and decision-making behaviours must give way to new ways of working and thinking for success to be sustained, irrespective of the digital solution being pursued. They must be embedded as part of a new set of behavioural norms to drive the right cultural change.

How success will be measured

A range of benefits will be pursued through the implementation of the Digital Strategy. Each initiative will identify specific benefits that will be measured and monitored.

The following section describes the broad benefits that can come from digital initiatives.

Improved safety and quality of care

Digitisation supports improved safety and quality of care, such as the reduction in risk of medication errors; greater compliance with standardised patient screening and risk assessments; and predictive analytics functionality that alerts health providers of 'at risk' patients.

Streamlined service delivery

Digital initiatives can reduce delays in ordering services, streamline discharge planning and minimise adverse clinical events. Functionalities such as e-booking and scheduling and patient-flow tracking interfaced with ancillary services will enable efficient information exchange and decrease turnaround times for information requests. These efficiencies will enable more time for care by clinicians and enhance patient experience.

Enhanced consumer journey

A digital health environment will improve connectivity and engagement with consumers and their carers, providing greater access to digital health services and supporting consumers to be more active in self-managing their care. Investment in digitally-enabled care models will provide consumers and carers with increased convenience as to when and how they interact with their healthcare providers and result in greater consumer satisfaction with their experience in dealing with the WA health system.

Accelerated research and innovation outcomes

Technology can enable multi-disciplinary and multi-institutional teams to share knowledge, collaborate and communicate across most traditional physical, geographic, organisational and technological barriers. This includes the ability to share research data assets and other forms of information in a secure manner, while complying with privacy and data security obligations. Improved data sharing and collaboration will likely accelerate research and innovation outcomes.

Optimised operations

Efficiencies in many corporate and clinical functions can realistically be achieved using technology-assisted processes, including robotics, chat bots and other cognitive tools.

For example, robots can deliver medications, transport blood samples, collect diagnostic results and schedule linen and food deliveries – either as a pre-scheduled task or a real-time request. Automated processes can be used to streamline various accounting and finance functions, such as scheduling and claims processing, as well as analyse and handle common types of requests for information or support from staff or consumers.

Improved public health outcomes

Adoption of digital health brings benefits for everyone. Consumers will have a deeper understanding of their own health and wellbeing through access to tailored information and specific apps. This deeper understanding will allow them to better manage their health and wellbeing, regardless of any interactions with the health system.

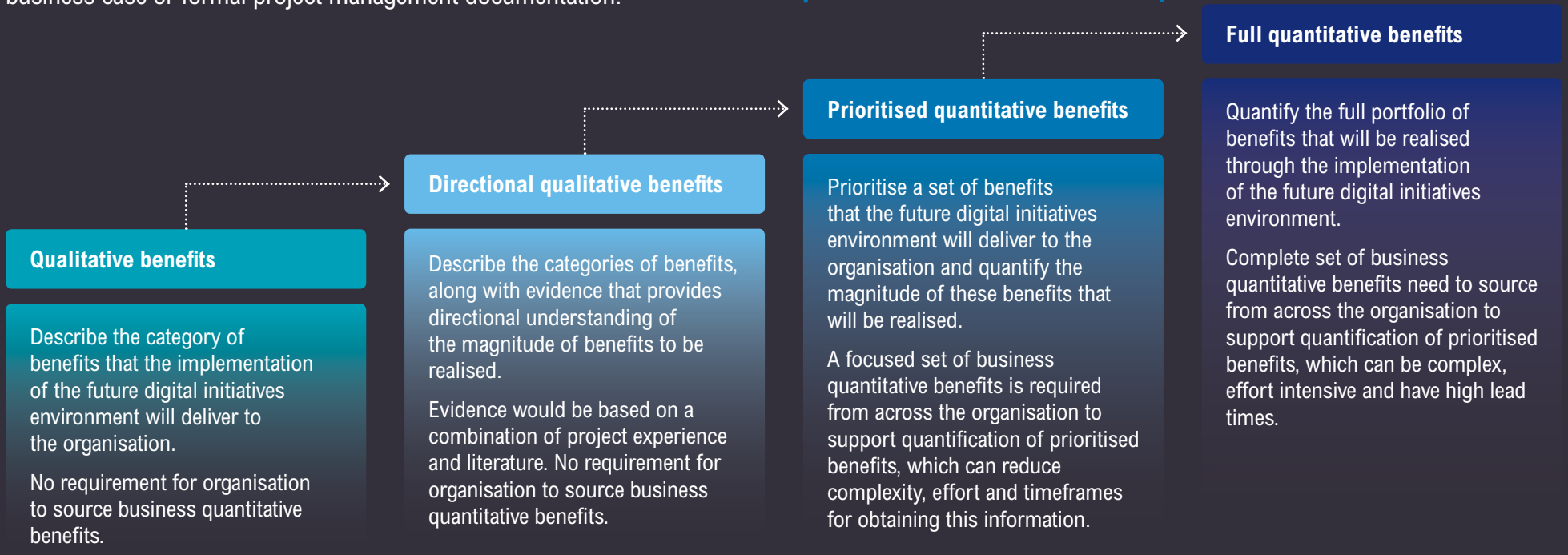
Prevention and health promotion campaigns can be targeted effectively to the appropriate community or population cohort and rapid notification and alerts of public health issues will ensure they are managed effectively and efficiently. Collectively, and coupled with improvements in acute care, this will see cumulative benefits accrue to the population over time.

Benefit realisation maturity

It is important to note that the realisation of benefits does not accrue from investment in digital technology alone – full benefits realisation also requires changes to service delivery, including business processes and staff capability. Consequently, the benefits to be realised by the Digital Strategy cannot be estimated ahead of a more detailed analysis of each initiative. The anticipated benefits of each initiative in the Digital Strategy Roadmap will be articulated at the clinical and business level as part of a business case or formal project management documentation.

A benefit realisation framework will provide the WA health system with a set of 'hard' benefits that the future digital environment should deliver. Smaller, low risk projects may only require general description of qualitative benefits whereas state-wide, high risk projects will require formal articulation and measurements of the benefits. Each project will therefore be able to use the benefits framework as part of developing a business case or formal project management documentation.

Recommended approach to benefits for development of digital initiatives



Implementation

Successful implementation of this Digital Strategy requires the ability to remain focused on strategic objectives, cultivate resilience in a rapidly changing industry and adopt agile approaches to realise both short- and long-term benefits.

Transformation approaches

Large scale ICT implementation programs typically take a long time to deliver results, carry high implementation risk and when not implemented well, realise only a fraction of the target benefits. Negative experiences with programs like this can lead senior stakeholders to be wary of approving and supporting new business cases for transformational change.

For smaller initiatives, a more agile approach can be considered, allowing for iteration of 'minimum viable transformations', centred on a clear strategic purpose, to deliver accelerated results. This approach involves proving concepts on a small scale and then scaling up in an iterative manner.

This transformation approach is ideal for pilot initiatives, quickly confirming or challenging value for money and the viability of proposed solutions and methods.

Where a targeted outcome depends on changes in culture and ways of working as well as technology implementation, the agile approach demonstrates value early and provides an ability to quickly adapt to lessons learned in the real world.

Initiatives which carry a high risk and are complex – such as implementing an EMR – are likely to still require a linear implementation. This style of approach may incorporate agile elements in various stages of the project but overall will still be focused on execution, detailed planning, a clear understanding of the objectives and well defined benefits.

Defining strategy in uncertain times

The advent of digital disruption will, by its very nature, bring unpredictable changes to service delivery models and offerings. To navigate this environment the WA health system will need to ensure short-term actions are aligned to a long-term vision. Traditional approaches to implementing a strategy often do not account for the increasing pace of change and degree of risk seen now, resulting in either reduced benefits or failure to realise benefits at all.

Despite the challenges of strategic planning in an increasingly volatile and complex world, most organisations remain loyal to the 'five-year plan' as a basic framework. However, uncertainty is also driving shorter planning cycles in order to be able to sense and respond as quickly as possible to events as they happen. Unfortunately this often leads to leadership being spread across an increasing number of reactive and isolated initiatives. A better approach requires a combined focus on questions at two very different levels:

Long-term (Strategic)

- What the healthcare industry might look like 10 years from now?
- What kind of health system will be needed in 10 years to be successful?

Short-term (Tactical)

- Which initiatives can be pursued in the next six to 12 months that will accelerate movement toward the longer-term goals?
- What resources are needed for those initiatives to ensure a high impact?
- What metrics can be used in six to 12 months to determine whether the intended impact was achieved?

This approach combines and amplifies two competing goals: preparing for the future and achieving short-term impact.

It generates and maintains business momentum toward realising the most promising future opportunities while delivering short-term outcomes that matter to stakeholders now.

The sustainability of the Roadmap can be strengthened by conducting formal annual reviews of the Digital Strategy, to ensure short term plans remains aligned with changing industry trends and the long-term strategic outcomes of the WA health system.

Next steps

In order to make immediate progress on the required digital transformation, the Department of Health as the System Manager of the WA health system will immediately undertake these preparatory initiatives in conjunction with Health Service Providers:

Establish a program implementation support unit to provide independent reporting on implementation progress, and to ensure clinical, technology and corporate requirements are balanced in planning and execution.

Define the future governance requirements to deliver the initiatives on the Roadmap for the WA health system.

Undertake a digital capability and maturity assessment and identify the variance in digital infrastructure, capability and planning that exists across the WA health system.

Reform the procurement model for large ICT projects to be more agile, adopting consumption-based technology and as-a-service models where possible.

Develop a digital asset lifecycle management framework and plan that addresses total cost of ownership and establishes a digital asset register.

Commence a review of legislation and policy to support the implementation of the Digital Strategy.

List of abbreviations

ADHA	Australian Digital Health Agency
AI	Artificial Intelligence
AR	Augmented Reality
BI	Business Intelligence
BYOD	Bring Your Own Devices
CALD	Culturally and Linguistically Diverse
CRM	Customer Relationship Management
EHR	Electronic Health Record
eMeds	Electronic Medication Management
EMR	Electronic Medical Record
EA	Enterprise Architecture
FHIR	Fast Healthcare Interoperability Resources
FMIS	Financial Management Information Systems
HL7	Health Level 7
HCD	Human Centred Design
HIMSS	Healthcare Information and Management Systems Society
HRMIS	Human Resources Management Information System
HSS	Health Support Service
IAMS	Identity and Access Management Systems
IoT	Internet of Things
LIS	Laboratory Information System
LMS	Learning Management System
MIRP	Medical Imaging Replacement Program
mHealth	Mobile Health
PACS	Picture Archiving and Communication System
PAS	Patient Administration System
RIS	Radiology Information System
TCO	Total Cost of Ownership
UX	User Experience
VR	Virtual Reality
WACHS	WA Country Health Service

Glossary of terms

Artificial Intelligence

Artificial Intelligence (AI) is not defined by a single technology. Rather, it includes many areas of study and technologies (such as natural language process, neural nets and voice recognition) that lie behind capabilities like diagnostic imaging interpretation, virtual health assistants and algorithmic medicine.

These capabilities benefit from advances in big data, open source and advanced computational power. AI for healthcare providers tracks the general emergence and adoption of AI for healthcare delivery and care.

Analytics

Analytics has emerged as a catch-all term for a variety of different Business Intelligence (BI) and application-related initiatives. For some, the term 'analytics' refers to the process of analysing information from a particular domain, such as a website. For others, 'analytics' refers to the application of BI capabilities to a specific content area (for example, sales, service or supply chain). In particular, BI vendors use the term 'analytics' to differentiate their products from the competition.

Increasingly, 'analytics' is used to describe statistical and mathematical data analysis that clusters, segments, scores and predicts what scenarios are most likely to happen. Whatever the use cases, the term 'analytics' has garnered a burgeoning interest from business and IT professionals looking to exploit huge amounts of internally generated and externally available data.

Augmented Reality

Augmented Reality (AR) is the real-time integration of information in the form of text, graphics, audio and other virtual enhancements with real-world objects.

It is the integration with 'real-world objects' element that differentiates AR from virtual reality; AR integrates and adds value to the user's interaction with the real world rather than presenting a completely simulated experience.

Big data

Big data refers to high-volume, high-velocity and/or high-variety information assets. Innovative, cost-effective information processes can be used to enhance insight, decision-making and process automation.

Business Intelligence

Business Intelligence (BI) is an umbrella term that includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimise decisions and performance.

Bring Your Own Device

Bring Your Own Device (BYOD) is a strategy allowing employees, business partners and other users to use a personally owned device to execute enterprise applications and access data. Typical BYOD devices are smartphones and tablets, but it could refer to any device including desktop computers.

Clinical Decision Support

Clinical Decision Support (CDS) enhances care by providing clinicians, staff, patients or carers with person-specific information, intelligently filtered and presented at appropriate times.

CDS encompasses a variety of tools to enhance decision-making such as: advanced analytic driven alerts and reminders to care providers; evidence-based clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support; and contextually relevant reference information.

Clinical Information Systems

Clinical Information Systems (CIS) is an umbrella term for the different clinical systems that store consumer information from sources such as multidisciplinary team members including pharmacy, laboratory, pathology and remote monitoring solutions.

Data lake

A data lake is a collection of storage instances of data assets that exist in addition to the originating data sources. These assets are stored in a near-exact, or even exact, copy of the source format.

The purpose of a data lake is to present an unrefined view of data to highly skilled analysts so they can explore data refinement and analysis techniques independent of any of the system-of-record compromises that may exist in a traditional analytic data store (such as a data warehouse).

Data linkage

Data linkage is a complex technique for connecting data records within and between datasets using demographic data (e.g. name, date of birth, address, sex, medical record number), also known as 'Record Linkage' or 'Linkage'.

Data Linkage Review

Data Linkage Review refers to the report of the Data Linkage Expert Advisory Group (Advisory Group), led by Professor Peter Klinken AC, Chief Scientist of Western Australia, released by the Minister for Science Dave Kelly and Minister for Health Roger Cook on 13 October 2017.

Digital health

Digital health involves the use of information and communication technologies (ICT) for health care including treating patients, conducting research, educating the health workforce, tracking diseases and monitoring public health.

Digital disruption

Digital disruption refers to changes to operational and business models that are enabled by emerging technologies. They reinvent traditional service offerings and models in unexpected and innovative ways.

Digital transformation

Digital transformation is the integration of digital technology into all areas of an organisation, fundamentally changing operations, processes and culture.

Electronic Health Record

An Electronic Health Record (EHR) contains information that can be managed, added to and accessed across multiple healthcare organisations. An EHR (such as My Health Record) contains information from all the clinicians involved in a patient's care and all authorised clinicians involved in a patient's care can access the information to provide care to that patient. It can include information such as a patient's health summary, medication prescribing and dispensing history, pathology reports, diagnostic imaging reports and discharge summaries.

Electronic medication management

Electronic medication management systems (eMeds) refers to comprehensive closed loop systems for prescribing, medications administration, and pharmacist reviews that are integrated with pharmacy management systems.

Electronic Medical Record

An Electronic Medical Record (EMR) contains information that is created and held within a single healthcare organisation, such as a clinic, medical centre or hospital. These are digital versions of the paper charts used by clinicians in clinics and hospitals. EMRs enable providers to track data over time, identify patients for preventative visits and screenings, monitor patients and improve the quality of care provided.

End-User Computing

End-User Computing (EUC) is a term that refers to the technologies used by IT professionals to deploy, manage and secure the devices, applications and data that workers require to perform their jobs. The major components of EUC are physical desktop computing, virtual desktop computing and mobile computing, each of which involves several different technologies.

Enterprise Architecture

Enterprise Architecture (EA) is a discipline that aims to assist an organisation to develop responses to disruptive forces by systematically identifying and analysing the impact of various change initiatives on desired business vision and outcomes. EA acts as a conduit between the business and technology and delivers value by presenting both business and IT leaders with recommendations for adjusting policies and projects to achieve desired outcomes.

Healthcare Information and Management Systems Society

Healthcare Information and Management Systems Society (HIMSS) is a global, cause-based, not-for-profit organisation focused on achieving better health through information and technology. HIMSS leads efforts to optimise health engagements and care outcomes using information technology.

Identity and Access Management

Identity and Access Management (IAM) is a security discipline that enables the right individuals to access the right resources at the right times for the right reasons. IAM addresses the essential need to ensure appropriate access to information resources across increasingly heterogeneous technology environments while meeting increasingly rigorous compliance requirements.

In-progress Initiatives

In-progress initiatives are those that are considered to be in progress at the time of writing. An initiative is considered to be 'in progress' if a project has been identified and work has commenced on drafting the scope, milestones, deliverables and/or budget for the initiative.

Integration

Integration services are detailed design and implementation services that link application functionality (custom software or package software) and/or data with each other or with the established or planned IT infrastructure.

Interoperability

In health care, interoperability refers to the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged. Integral elements of interoperability such as data exchange schema and standards will permit data to be shared between clinicians, laboratories, hospitals, pharmacies and patients regardless of the application or application vendor.

Internet of Things

The Internet of Things (IoT) refers to the extension of the internet into everyday items and devices, including applications, equipment, appliances and buildings. These items that make up the IoT possess the intelligence and technology to connect, communicate and interoperate with other items via the internet. In the hospital setting these functions may be moderated by standards set by the healthcare provider (for example to increase security and privacy).

Medical imaging

Medical imaging encompasses different imaging modalities and processes that are used to create images of the human body for diagnostic and treatment purposes.

Medical Imaging Replacement Program

The Medical Imaging Replacement Program (MIRP) is replacing the medical imaging system (Agfa PACS/RIS) that is operating beyond its intended capacity and life span.

Mobile Health

Mobile Health (mHealth) is a term used for the practice of medicine and public health supported by mobile devices.

Operations/Command Centre

Operations/Command Centres are centralised decision-making centres using tools created from analytics operation dashboards based on real-time operations and clinical data. They create a holistic view of enterprise operations across department settings, roles and sites. Existing operational dashboards are combined to provide a unified live view of operations, informing and enabling dynamic responses to changing conditions.

Picture Archiving and Communication System

The Picture Archiving and Communication System (PACS) is a medical imaging technology used primarily in healthcare organisations to securely store and digitally transmit electronic images and clinically-relevant reports.

The use of PACS eliminates the need to manually file and store, retrieve and send sensitive information, films and reports.

Patient portals

Patient portals enable a secure digital patient-provider relationship and access to clinical, financial and administrative functionality, educational information and personal health maintenance tools.

Patient portals are provided by a healthcare organisation (which could be a primary physician) and can be stand-alone or tethered to (integrated with) systems such as electronic medical record (EMR).

Predictive analytics

Predictive analytics describes any approach to data mining with an emphasis on prediction (rather than description, classification or clustering), rapid analysis measured in hours or days (rather than the typical months of traditional data mining), business relevance of the resulting insights and ease of use, making the tools accessible to business users.

Radiology Information System

A Radiology Information System (RIS) is a networked software system for managing medical imagery and associated data.

A RIS is especially useful for tracking radiology imaging orders and billing information, and is often used in conjunction with PACS to manage image archives, record-keeping and billing.

Remote patient monitoring

Remote patient monitoring (or telemonitoring) refers to the exchange of medical data between a patient who is at home and a healthcare professional based (usually) in a medical centre.

Robotic Process Automation

Robotic Process Automation (RPA) is an application of technology aimed at automating business processes and governed by business logic and structured inputs.

Using RPA tools, an organisation can configure software or a 'robot' to capture and interpret applications for processing a transaction, manipulating data, triggering responses or communicating with other digital systems.

Shared Care Platform

Shared Care Platforms are online platforms that support cross-sector collaboration when dealing with patients between the general practitioner, community or allied health service and hospital. The platform collects data from the health care providers' individual IT systems and the data is used to form a common coherent treatment plan for the patient.

Single sign-on

Single sign-on provides the capability for users to be authenticated once and subsequently automatically authenticated when accessing various target applications and systems.

It eliminates the need to separately authenticate and sign-on to individual applications and systems, serving as a user surrogate between client workstations and target systems.

Telehealth

The International Organisation for Standardisation defines Telehealth as the 'use of telecommunication techniques for the purpose of providing telemedicine, medical education, and health education over a distance'.

Telehealth is distinct from telemedicine, which is defined as the 'use of advanced telecommunication technologies to exchange health information and provide healthcare services across geographic, time, social and cultural barriers'.

Total cost of ownership

Total cost of ownership (TCO) is a comprehensive assessment of information technology and other costs across enterprise boundaries over time. For digital technology, TCO includes hardware and software acquisition, management and support, communications, end-user expenses and the opportunity cost of downtime, training and other productivity losses.

User-Centred Design

User-Centred Design (UCD) is an approach to interactive systems development that aims to make systems usable and useful by focusing on the needs and requirements of users, and by applying human factors/ergonomics, usability knowledge and techniques to the development of solutions.

This approach enhances effectiveness and efficiency, human wellbeing, user satisfaction, accessibility and sustainability and counteracts the risk of possible adverse effects of use on human health, safety and performance. A human-centred approach design should address the whole user experience.

User Experience

The term ‘User Experience’ (UX) encompasses all aspects of the end-user’s interaction with the company, its services, and its products.

Virtual Reality

Virtual Reality (VR) provides a computer-generated three-dimensional (3D) environment that surrounds a user and responds to that individual’s actions in a natural way, usually through immersive head-mounted displays and head tracking. Gloves providing hand tracking and haptic (touch sensitive) feedback may be used as well. Room-based systems provide a 3D experience for multiple participants; however, they are more limited in their interaction capabilities.

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