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Australian Digital Health Agency

Connecting Australian Healthcare

NATIONAL HEALTHCARE
INTEROPERABILITY PLAN
2023–2028

Supplement

Australian Digital Health Agency

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SECTION 1

EXECUTIVE SUMMARY

Healthcare interoperability supports safe, secure, efficient and quality care. It involves an ecosystem of connected providers that conveniently and seamlessly shares high-quality data with easily understood meaning throughout the health system.

This National Healthcare Interoperability Plan maps a pathway to a more interoperable Australian health system and supports the implementation of digitally enabled models of care. Australia has key systems in place to enable interoperability, such as national healthcare identifiers, and continues to make progress as shown by the rapid national uptake of electronic prescribing. However, the inability to easily share meaningful information between clinical systems remains the norm and is seen by healthcare providers as the major barrier to using digital health to improve healthcare for all Australians.

A more connected and interoperable digital health system across all settings – both public and private – can enable access to healthcare when and where it is needed, and harness the power of health information to drive whole-of-person care. The pathway outlined in the Interoperability Plan will offer benefits for:

- **individuals**, by enabling them to easily access their secure information, control who can access that information, and improve their health outcomes and experience of care
- **healthcare providers**, by providing them with timely access to the permitted information they need, in a format that allows them to effectively improve clinical decision-making and care
- **healthcare provider organisations**, by enabling them to safely share information across the entire healthcare system, to support best-practice processes and new digital models of care, and helping to increase productivity and reduce costs
- **researchers and planners**, by providing permitted access to more comprehensive, timely and accurate data to identify better clinical practices and implement health service improvements
- **the health technology sector**, by having an agreed direction for interoperability that they can incorporate into their forward workplans, and improved access to standards and guidance material; this will provide the confidence to innovate through new technology approaches and new digital models of care, and the potential to leverage libraries of common components
- **funders and regulators**, by providing better and more timely information to inform policy, funding, investment and regulatory decisions that support value-based care and best-practice regulation.

The Interoperability Plan was informed by national consultations undertaken in 2019, engagement with health departments in 2020-21 and feedback on a draft plan from stakeholders in the health sector. This Supplement is consistent with the Interoperability Plan, and its purpose is to provide greater detail and retain content that was provided in the draft Interoperability Plan released in October 2021.

Interoperability principles

The Interoperability Plan sets out 10 principles to accelerate the shift towards a more interoperable national healthcare system. Implementing digital health initiatives that align with these principles will significantly increase the digital health maturity of the Australian healthcare sector and enable contemporary, innovative models of care.

The principles are:

- Health information is discoverable and accessible.
- Use of health information supports individual privacy, choice and safe access to information.
- National healthcare identifiers are used across the healthcare sector.
- National digital health standards and specifications are agreed and adopted.
- The value and quality of care is multiplied in a digitally connected health system.
- Measurement of digital health maturity informs interoperability system design.
- Core national healthcare digital infrastructure is used across the sector.
- Investment supports interoperability and an efficient health technology sector.
- Collaboration and stakeholder engagement underpins interoperability.
- High-quality data is critical for safe and meaningful interoperability.

PRIORITY ACTION AREAS

To maximise the benefits of interoperability, these principles will be applied across five priority areas identified through stakeholder consultations – identity, standards, information sharing, innovation and benefits (Figure 1.1).

Priority area 1 – Identity

A critical characteristic of interoperability in the healthcare system is the ability to easily search for information about individuals, healthcare providers and healthcare provider organisations, and to correctly identify them. This can be achieved by wider use of Australia's national healthcare identifiers and the National Health Services Directory, and alignment with national efforts to enable digital identity.

Priority area 2 – Standards

Interoperability is made possible by the implementation of standards. The Australian Digital Health Agency (the Agency) will continue to collaborate with the health sector and software providers to develop specifications and conformance arrangements for national digital infrastructure. These will use national terminology and the standards developed by recognised standards development organisations. Work is underway to develop a standards catalogue that can support easy search and retrieval of national specifications and associated standards.

Figure 1.1: Interoperability priority areas



Priority area 3 – Information sharing

Information sharing covers sending, receiving, discovering and accessing information. A mature interoperable healthcare system provides for safe, convenient and secure sharing of information across healthcare providers and individuals, based on individual consent and privacy requirements. Actions are required on several fronts to realise the benefits from information sharing, including adopting consistent national interoperability requirements in government ICT (information and communications technology) procurement processes, building national infrastructure to support discoverability and consent-based information exchange, and providing supporting legislative and incentive mechanisms.

Priority area 4 – Innovation

As more digitally enabled models of care incorporate nationally consistent components of interoperability – such as identifiers, standards and terminology – it will become easier to innovate, develop and adopt digital systems that are connected and can meaningfully communicate. Australia has implemented successful digital infrastructure that supports interoperability such as the My Health Record system, the National Authentication Service for Health (NASH), the National Clinical Terminology

Service (NCTS) and electronic prescribing. Work is underway to build interoperable systems for digital imaging and to roll out Provider Connect Australia. The next National Digital Health Strategy will identify priority improvements for digital systems that will build digital maturity and interoperability.

Priority area 5 – Benefits

Being able to measure digital health maturity is important for encouraging continuous improvement in a high-performing interoperable healthcare system. Building on experience with maturity models in Victoria and Queensland, the Agency will work with jurisdictions to assess the best digital health maturity model to adopt in the public hospital system. Hospital, pharmacy, specialist, aged care, allied health and general practitioner (GP) organisations were surveyed to provide a benchmark for the level of interoperability. The survey can be repeated every few years to measure progress. Evaluating and measuring the benefits of individual digital health initiatives is also required to demonstrate progress.

Implementation horizons

Improving interoperability requires a sustained effort over a long time and across all settings of care. The Interoperability Plan contains proposed actions to mature interoperability over the next five years (Table 1.1), which will require engaging with all sectors of the Australian health ecosystem, including consumers, peak clinical bodies, public and private providers, government agencies, the health technology sector and research bodies.

Table 1.1: Summary of interoperability actions

AREA	NATIONAL ACTION	LEAD	TIMEFRAME
PRIORITY AREA 1 Identity – healthcare identifiers	ACTION 1.1 – Using healthcare identifiers Jurisdiction health departments, the Agency and Services Australia will adopt and use national healthcare identifiers in future digital health initiatives involving health information sharing.	The Agency Services Australia All health departments	Ongoing
	ACTION 1.2 – Promoting healthcare identifiers Promote the use of IHLs, including creating IHLs for newborns as soon as possible after birth.	The Agency Services Australia	Ongoing
	ACTION 1.3 – Healthcare Identifiers Roadmap Develop a Healthcare Identifiers Roadmap that includes (among other items): <ul style="list-style-type: none"> coordinating a response to recommendations from the 2018 Healthcare Identifiers Act and Service Review and the 2020 review of the My Health Records Act that relate to or affect healthcare identifiers reviewing legislative impediments to the wider uptake of healthcare identifiers in the <i>Healthcare Identifiers Act 2010</i> reporting on healthcare identifier adoption. 	The Agency Department of Health and Aged Care	Immediate

Immediate = within one year; short = 1–3 years; medium = 3–5 years

Table 1.1: Summary of interoperability actions (cont.)

AREA	NATIONAL ACTION	LEAD	TIMEFRAME
PRIORITY AREA 1 Identity – healthcare identifiers (cont.)	ACTION 1.4 – Healthcare identifier matching Develop and implement a program of improvements in healthcare identifier matching (especially IHIs), focusing on data quality, user interfaces, service improvements, enhancements and proactive efforts on IHI retrieval.	The Agency Services Australia	Short
	ACTION 1.5 – Review HPI-I conformance Review conformance requirements for using HPI-Is when uploading documents to the My Health Record system, recognising that providers are at different stages of use of HPI-Is.	The Agency	Short
	ACTION 1.6 – Develop deeper network structures Develop deeper HPI-O network structures, including revising published guidance, to support enhancing online HPI-O network registration, and work with vendors to address software limitations.	The Agency Services Australia	Short
PRIORITY AREA 1 Identity – health service directories	ACTION 1.7 – Using the NHSD Use the NHSD as the service directory for digital health programs. Where this is not possible (such as for a specialised directory), jurisdictions will work with Healthdirect Australia and the Agency to support the required flow of information.	All health departments	Ongoing
	ACTION 1.8 – Implementing the 2019 NHSD review Healthdirect, in partnership with the Department of Health and Aged Care and state and territory health departments, will implement the work packages developed in response to the 2019 AHMAC NHSD review, which include positioning the NHSD as core national infrastructure.	Healthdirect	Ongoing
	ACTION 1.9 – Provider Connect Australia rollout Roll out and support the implementation of Provider Connect Australia.	The Agency	Immediate
	ACTION 1.10 – Integrating the NHSD and the Healthcare Provider Directory (HPD) Assess the feasibility of integrating the NHSD and the HPD to reduce duplication and rationalise the national directory infrastructure.	Services Australia	Short

Immediate = within one year; short = 1–3 years; medium = 3–5 years

Table 1.1: Summary of interoperability actions (cont.)

AREA	NATIONAL ACTION	LEAD	TIMEFRAME
PRIORITY AREA 2 Standards	ACTION 2.1 – Terminology in digital health systems Engage with the health technology sector and health departments to enhance digital health systems to integrate national terminologies and classifications natively.	The Agency	Ongoing
	ACTION 2.2 – Develop specifications and standards Engage with the health sector on the development, selection, use and maintenance of specifications and standards that support the Agency's approved priorities. When required, Agency-developed specifications will be progressed to become standards through the appropriate standards development organisation and their balloting/development processes.	The Agency	Ongoing
	ACTION 2.3 – HL7 FHIR® AU usage Develop and expand on HL7 FHIR® AU Base 4 for all Agency and Healthdirect digital health systems and services, including modifications and new systems.	The Agency Healthdirect	Ongoing
	ACTION 2.4 – International standards participation Support Australian participation in international standards development.	The Agency Australian Institute of Health and Welfare	Ongoing
	ACTION 2.5 – Standards catalogue Develop and implement a national digital health standards catalogue as a user-friendly access point for digital health standards.	The Agency	Immediate
	ACTION 2.6 – National Digital Health Standards Program (NDHSP) Implement the NDHSP to develop a dynamic, comprehensive and collaborative digital health standards environment. This program will inform the need for and scope of national governance arrangements for standards.	The Agency	Immediate
	ACTION 2.7 – Digital health standards guiding principles Develop and publish a set of national guiding principles for those developing or implementing digital health standards in Australia, in partnership with standards development organisations and the health technology sector.	The Agency	Immediate
	ACTION 2.8 – Standards gap analysis Complete a gap analysis to prioritise the digital health standards that are required most urgently to accelerate the interoperability agenda.	The Agency	Immediate
	ACTION 2.9 – Engage standards stakeholders Develop and maintain strong partnership ties with the health technology sector, standards development organisations and other key standards bodies.	The Agency	Immediate

Immediate = within one year; short = 1–3 years; medium = 3–5 years

Table 1.1: Summary of interoperability actions (cont.)

AREA	NATIONAL ACTION	LEAD	TIMEFRAME
PRIORITY AREA 2 Standards (cont.)	ACTION 2.10 – Including terminology in datasets Coordinate discussions on expanding minimum datasets to incorporate the use of SNOMED CT-AU, AMT and LOINC for data not currently collected in areas such as medications, adverse reactions, pathology and radiology.	The Agency	Short
	ACTION 2.11 – National library of terminology mapping Develop a national library of resources that provide translation mapping from national terminologies to other popular terminologies.	The Agency	Short
	ACTION 2.12 – API information exchange Engage with the health technology sector to enhance digital health systems to use HL7 FHIR®, OAuth and OpenID Connect for API information exchanges.	The Agency	Short
	ACTION 2.13 – Develop a conformance framework Engage with stakeholders to develop a conformance framework and associated conformance rules for national digital health systems and services.	The Agency	Short
	ACTION 2.14 – Standards development cooperative Establish a cooperative of developers working to expedite the development of new digital health standards, with a suitable operating model.	The Agency	Short
PRIORITY AREA 3 Information sharing	ACTION 3.1 – Interoperability in procurement The Agency, health departments and Services Australia will specify interoperability requirements in procurement requests where they meet business objectives. This will leverage existing national infrastructure, terminology and standards.	The Agency All health departments Services Australia	Ongoing
	ACTION 3.2 – API Gateway information exchange Promote the use of the API Gateway to support interoperable information exchange, including development of a service catalogue.	The Agency	Ongoing
	ACTION 3.3 – Procurement guidance Establish an intergovernmental working group to harmonise procurement and use of standards, based on best-practice approaches to interoperability requirements for information and communications technology system procurement.	The Agency	Immediate
	ACTION 3.4 – Online interoperability toolkit Develop and maintain an online interoperability toolkit that provides practical guidance, lessons learned, case studies, data dictionaries, terminologies, common specifications, frameworks, and a library of exemplars and reusable components, including implementation guides.	The Agency	Immediate

Immediate = within one year; short = 1–3 years; medium = 3–5 years

Table 1.1: Summary of interoperability actions (cont.)

AREA	NATIONAL ACTION	LEAD	TIMEFRAME
PRIORITY AREA 3 Information sharing (cont.)	ACTION 3.5 – GP and aged care facility interoperability Assess the current interoperability between GP and residential aged care facility systems, identifying issues, requirements and potential solutions to resolve issues.	The Agency	Immediate
	ACTION 3.6 – Consent management Engage with consumers to investigate options for enabling individuals to grant consent to access all their health information, across a range of healthcare systems. Options will include making it easier to choose which healthcare providers are authorised, and the types of information they can access.	The Agency	Short
	ACTION 3.7 – Research international practice Assess the United Kingdom national minimum standards for digital health technologies and similar international policies to inform consultation on Australian approaches.	The Agency	Short
	ACTION 3.8 – Care management network Investigate opportunities to build capability to identify and manage individuals within a consumer's formal and informal care management network.	The Agency	Short
	ACTION 3.9 – Information-sharing model agreement Collaborate with stakeholders on the development of a model agreement to be used by organisations holding personal health information. This will specify the terms and conditions for sharing, discovering and acquiring information from other organisations. It will cover privacy, security, access controls, patient data rights, technical specifications and intellectual property rights.	The Agency	Short
	ACTION 3.10 – Publish–subscribe service Develop a business case for a national publish–subscribe service to support actions such as alerts for changes to an individual's health information and notifications of acute episodes. This would be available to individuals, healthcare providers and healthcare provider organisations.	The Agency	Medium
	ACTION 3.11 – Consistent legislative health definitions Collaborate with jurisdictions and key stakeholders to develop consistent definitions to support health information sharing.	The Agency	Medium
	ACTION 3.12 – Harmonising legislation Undertake collaborative intergovernmental work on harmonising relevant jurisdiction legislation, drawing on outcomes from Action 3.11.	All health departments	Medium

Immediate = within one year; short = 1–3 years; medium = 3–5 years

Table 1.1: Summary of interoperability actions (cont.)

AREA	NATIONAL ACTION	LEAD	TIMEFRAME
PRIORITY AREA 4 Innovation	ACTION 4.1 – Interoperability innovation challenges Run interoperability innovation challenges and “connectathons” to encourage interoperability.	The Agency	Ongoing
	ACTION 4.2 – Interoperability workforce Implement the National Digital Health Workforce and Education Roadmap to support the workforce required to progress interoperability.	The Agency Australasian Institute of Digital Health	Ongoing
	ACTION 4.3 – Develop education content Develop education content in partnership with users to increase awareness of interoperability.	The Agency	Immediate
PRIORITY AREA 5 Benefits	ACTION 5.1 – Administer interoperability survey Undertake an interoperability survey of hospital, pharmacy, GP, allied health, specialist and aged care organisations periodically to measure overall progress on interoperability, starting with a baseline survey in 2022.	The Agency	Ongoing
	ACTION 5.2 – Publish annual report Publish an annual report on progress of the Interoperability Plan.	The Agency	Ongoing
	ACTION 5.3 – Assess digital health maturity models Collaborate with jurisdictions to assess digital health maturity models.	The Agency	Immediate
	ACTION 5.4 – GDHP interoperability maturity model Work with the GDHP to develop and apply the GIMM.	The Agency	Short
POLICY TOOLS	ACTION 6.1 – Review policy tools Engage collaboratively with health departments and key stakeholders to review the effectiveness of current policy tools and assess the additional mechanisms required to support and accelerate interoperability.	The Agency	Immediate

Immediate = within one year; short = 1–3 years; medium = 3–5 years

SECTION 2

INTRODUCTION

Over the past three decades, waves of new digital technologies such as the internet, mobile devices and big data have transformed how businesses operate and engage with their customers. Healthcare models are also changing from episodic, transactional, provider-centric care models to preventive, personalised and consumer-centric care models. Digital health technologies are increasingly being used to support “anywhere, anytime, anyhow” models of service provision.

However, it is widely acknowledged that the healthcare sector lags behind other industries in adopting digital technologies.¹ In some areas of the healthcare system, this is seen in the keeping of paper-based clinical records, continued use of the fax, and inconsistent adoption of standards and terminology that support information sharing for clinical care.

In a connected healthcare system, foundational infrastructure must build confidence and trust in the integrity and provenance of health information. Fundamental building blocks include accurate healthcare recipient and healthcare provider identities; standardised digital record keeping, and ways to safely discover and share information that can be easily accessed and understood; and clear consumer rights regarding personal information and privacy. Information needs to be discoverable so that, in the context of a clinical relationship, unique information held about an individual can be readily found. Importantly, information must be standardised technically and semantically, and referenced to accepted national and international standards.

An obvious precondition of a connected healthcare system is that healthcare records are created and stored in a digital form. For Australia to realise the potential of interoperability, there needs to be a strong endorsement of and transition to digital clinical record keeping.

Two questions summarise the problems of creating a more interoperable healthcare system:

- **From the individual's perspective** – How can I be confident that my health data is secure and I can make it available to healthcare providers and other health professionals to improve my health and wellbeing?
- **From the healthcare provider's perspective** – What is known about the individual I am caring for that will allow me to provide more convenient, safe and high-quality care? How can I, as a healthcare provider, contribute high-quality data about this individual to better help future healthcare interactions?

The answers are complex and must address four factors:

- What is the best way to identify individuals and healthcare providers?
- What is the best and most consistent way to share important health information?

¹Forrester Consulting, *The Digital Transformation Race Has Begun*, 2017.

- What health information exists about an individual?
- What is the best way to establish trust in the provenance, quality and security of information shared?

These issues are important for managing our own health or participating in the care of others, whether as a healthcare provider, carer or volunteer. There must be a way to discover and share information between systems and healthcare providers so that the information can be easily understood and accessed through the digital systems that are normally used. This is vital for identifying relevant information that can support better health and healthcare delivery. An example of the current gap in information sharing is that 45 per cent of GPs are not informed about an individual's treatment in hospital before that individual sees the GP for follow-up care.²

Australia's health system is a complex mix of service providers in the public and private sectors, and is funded through equally complex (largely activity-based) models that include contributions from governments (Australian, state and territory), insurance companies and individuals. Even with this complexity, Australia's health system consistently ranks as one of the best in the world. However, this complexity has contributed to siloed health information systems, incompatible data formats and standards, and non-standardised terminology between information systems.

2.1 What is interoperability?

The Interoperability Plan uses the Global Digital Health Partnership (GDHP) definition of interoperability:

“The ability of a system or product to transfer meaning of information within and between systems or products without special effort on the part of the user. Interoperability is made possible by the implementation of standards.”³

The main goals of healthcare interoperability are to support safe, secure, efficient, quality care through a connected healthcare system that conveniently and seamlessly shares high-quality data with the right people at the right time.

2.2 Benefits to key stakeholders

A more connected and interoperable digital health system across all settings – both public and private – can enable access to healthcare when and where it is needed, and harness the power of health information to drive whole-of-person care. The pathway outlined in the Interoperability Plan will offer benefits for:

- **individuals**, by enabling them to easily access their secure information, control who can access that information, and improve their health outcomes and experience of care
- **healthcare providers**, by providing them with timely access to the permitted information they need, in a format that allows them to effectively improve clinical decision-making and care

²Productivity Commission, [Innovations in Care for Chronic Health Conditions](#), 2021.

³Global Digital Health Partnership, [‘Interoperability’](#), accessed 17 May 2022.

- **healthcare provider organisations**, by enabling them to safely share information across the entire healthcare system, to support best-practice processes and new digital models of care, and helping to increase productivity and reduce costs
- **researchers and planners**, by providing permitted access to more comprehensive, timely and accurate data to identify better clinical practices and implement health service improvements
- **the health technology sector**, by having an agreed direction for interoperability that they can incorporate into their forward workplans, and improved access to standards and guidance material; this will provide the confidence to innovate through new technology approaches and new digital models of care, and the potential to leverage libraries of common components
- **funders and regulators**, by providing better and more timely information to inform policy, funding, investment and regulatory decisions that support value-based care and best-practice regulation.

2.3 Risk and cost considerations

In achieving the benefits of interoperability, a range of risks and costs need to be considered and balanced.

Privacy and security must continue to have high priority as digital systems become more interoperable. Interoperability should not be accelerated at the expense of significant privacy risks or cyber security disruption, as this could lead to an erosion of trust and unacceptable harm to individuals or organisations. Privacy impact assessments and cyber security assessments have become an essential element of digital health technology programs to help identify, manage, minimise or eliminate these risks.

The pace at which the digital health system can become more interoperable has to recognise the number of existing legacy systems that will need to be replaced and modernised, and the limited resources available in the health system to meet cost pressures. Business cases to invest in more interoperable systems have to recognise the cost of developing and implementing the standards and terminologies that make interoperability possible, as well as associated change management, workforce training and education costs. Procurement processes have to work with the health technology sector to understand and support its capacity to provide more interoperable digital systems.

2.4 What Australia has accomplished so far

Excellent examples of interoperability already exist in Australian health services. Established national systems, solutions, services and capabilities that can be leveraged include the following:

- The **Healthcare Identifiers Service** (HI Service) supports the unique and consistent identification of healthcare recipients, healthcare providers and healthcare provider organisations.
- The **Australian Medicines Terminology** (AMT) and the Australian extension of SNOMED CT (**SNOMED CT-AU**) provide standard vocabulary to record and exchange clinical information.

- The **National Clinical Terminology Service** (NCTS) contains localised HL7 FHIR® (Fast Healthcare Interoperability Resources) and SNOMED CT-AU (including the AMT), which is maintained and released monthly to support shared semantics for communication, quality data transfer and improved reporting.
- **Real Time Prescription Monitoring** (RTPM) monitors the prescribing and dispensing of controlled medicines, with the aims of reducing their misuse and ensuring that patients who genuinely need these medicines can access them. The RTPM solution has been implemented in a number of states and territories and is supported by a National Data Exchange (NDE).
- The **National Health Services Directory** (NHSD) enables individuals and healthcare providers to access comprehensive, consolidated, accurate and up-to-date information.
- The **National Authentication Service for Health** (NASH) enables healthcare providers and supporting organisations to securely access, encrypt and share health information. NASH is used to digitally sign and encrypt information exchanged using the NASH Public Key Infrastructure credentials (public and private keys, and digital certificates).
- **Provider Digital Access** (PRODA) allows individual healthcare providers and healthcare provider organisations to securely authenticate and access online provider services across all government sectors. These include My Health Record, the Australian Immunisation Register, the Practice Incentives Program, Health Professional Online Services and the Aged Care Provider Portal.
- The **My Health Record** system provides an online summary of an individual's key health information. By allowing health information to be viewed and shared, healthcare providers can gain a more detailed picture to make decisions, diagnose and provide treatment. The system also allows individuals to be active participants in their care.
- The **Metadata Online Registry** (METEOR), maintained by the Australian Institute of Health and Welfare (AIHW), is Australia's repository for national metadata standards for health, housing and community services statistics and information. It includes national minimum datasets and a data dictionary.
- **Electronic prescribing** enables prescribers, individuals and pharmacists to use electronic prescriptions. Electronic prescriptions are part of the broader digital health and medicines safety framework. They enable the prescribing, dispensing and claiming of medicines without the need for paper prescriptions.
- The national **Pregnancy and Child Digital Health Record** (PCDHR) is being progressed by the Agency. This is based on the reuse and transition of the most mature and transferrable components of the proof of concept delivered by the National Children's Digital Health Collaborative. The PCDHR will include antenatal visits, birth and records of child health checks.
- **Electronic medical records** (EMRs) have been introduced by many hospitals. EMRs provide a base requirement to enable sharing of accurate health data relating to patient journeys.

2.5 Contribution of interoperability to national health strategies

Progressing interoperability will be supported by the implementation of Australia's 2023-28 National Digital Health Strategy. Its vision is for digital health to transform the way Australians look after their own health and wellbeing, and how they access healthcare, leading to better outcomes for all. The strategy identifies interoperability as a key change enabler.

Interoperability has been identified as a key component in several national health strategies and priorities. Progressing the Interoperability Plan will support these examples of national strategies:

- The Digital Economy Strategy outlines a roadmap to become a leading digital economy and society to drive Australia's future prosperity. Actions in the Interoperability Plan will help build foundations for the growth of our digital economy through more integrated data and technologies that support better service delivery and a more dynamic health technology sector.
- The *National Preventive Health Strategy 2021-2030* notes how the COVID-19 pandemic demonstrated the importance of scalable, interoperable technologies and real-time access to high-quality data in facilitating an effective public health response.
- The 2020-25 National Health Reform Agreement nominates increased use of data as one of its reform streams. The aim is to achieve comprehensive access, usage and sharing of health data while maintaining data security and preserving individuals' privacy. Another reform stream is to improve interfaces between health, disability and aged care systems.
- In its response to the final report of the Royal Commission into Aged Care Quality and Safety, the Australian Government accepted recommendations on universal adoption of digital technology and My Health Record, and data interoperability with the healthcare sector.
- The Primary Healthcare 10 Year Plan 2022-2032 identifies the need for interoperability of information systems within health and across sectors, particularly aged care and disability services.

2.6 Development of the Interoperability Plan

Interoperability is a strategic priority in Australia's National Digital Health Strategy, and involves the provision of high-quality data with a commonly understood meaning that can be used with confidence.⁴ The interoperability of clinical information is essential to high-quality, sustainable healthcare in which clinical information is collected in a prescribed manner and can be shared in real time with patients and their providers. The strategy proposed public consultations on interoperability, and the development of an agreed vision and roadmap for implementing interoperability between all public and private healthcare services in Australia.

⁴Australian Digital Health Agency, [Australia's National Digital Health Strategy](#), 2018.

The Agency held national consultations in 2019 to inform the co-design of interoperability principles and priorities that would enhance information sharing and improve health outcomes. These consultations included co-design workshops, community meetings and jurisdictional working groups held across Australia. In addition, more than 150 individuals, more than 100 healthcare providers, and several organisations participated in an online survey or made submissions.

In December 2019, the Australian Health Ministers' Advisory Council (AHMAC) endorsed the broad directions of the interoperability principles and gave approval for the Agency, in partnership with jurisdictions, to develop an implementation plan in 2021. Following discussion and agreement through the National Health Chief Information Officers Roundtable – a national committee that includes chief information officers from each jurisdiction – a steering committee was established in November 2020 to begin work. Its members included representatives of state and territory health departments, the Australian Government Department of Health, the Australasian Institute of Digital Health, the AIHW and the Agency.

2.7 Purpose and scope of the Interoperability Plan and this Supplement

The Interoperability Plan outlines the current state of interoperability in Australia's healthcare system and identifies priority actions to foster a more connected healthcare system. It sets the direction for a nationally coordinated future state that leverages current activities and creates opportunities for future innovation.

The Interoperability Plan defines a shared vision for long-term interoperability in the Australian healthcare environment. It explores current barriers and enablers to interoperability between organisations. It recommends priority actions across government, the health technology sector and private healthcare organisations to increase interoperability and improve workflows, accessibility and outcomes within the healthcare sector.

This Supplement supports the Interoperability Plan and provides more detail and material from the draft Interoperability Plan that can be used by individuals who become involved in implementing actions in the Interoperability Plan. This would include:

- participants in the health technology sector
- clinical representative groups
- organisations representing healthcare consumers
- Australian, state, territory and local governments
- public and private healthcare providers.

The Interoperability Plan uses a broad definition of health from the World Health Organization.⁵ This is because the benefits of interoperability can be maximised by connecting all care systems that aim to improve physical, mental and social wellbeing. This encompasses acute care, primary care (including Aboriginal and Torres Strait Islander community-controlled health organisations), allied health, community care,

⁵The World Health Organization definition of health is "a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity".

aged care and disability services, health and human services, and healthcare provided in other settings, such as schools.

The Interoperability Plan refers to opportunities to align with global efforts in digital health interoperability. This is more relevant than ever given the COVID-19 pandemic and the likely need to exchange vaccination information for health and safety in international travel, for example. Interoperability is a key capability for global pandemic preparedness and response.

States and territories may prioritise and implement actions differently to reflect local needs and resources. Some actions will be rolled out nationally. The timeframes to initiate actions are categorised as immediate (within one year), short (one to three years), medium (three to five years) or ongoing. Stakeholders from across the Australian health ecosystem will need to be engaged to ensure that the actions deliver successful outcomes. It is the responsibility of the lead organisation(s) for each action to engage with stakeholders to progress the actions.

2.7.1 Engagement and collaboration with key stakeholders

The Interoperability Plan was developed to support the broad health sector that covers public and private sectors, all settings of care, and interactions with aged care, allied health and disability services. The actions in the plan have been designed to expand on the interoperability foundations and to drive the uptake of interoperability across the health system.

Engagement and collaboration are required with all stakeholders to achieve a connected health system. In addition to primary, secondary and tertiary healthcare providers, stakeholders include the health technology sector, peak bodies, national associations, consumers, jurisdictions, research organisations and academics, standards organisations, regulatory bodies, primary health networks, and private hospitals. It will be critical that all stakeholders understand the plan to deliver a connected health system and are moving in the same direction. As the supplier of digital health technology, the health technology sector is key to ensuring that other healthcare stakeholders have access to the systems, services and information needed to safely deliver improved health outcomes.

All stakeholders will have the opportunity to share their specific expertise and to collaborate through co-design on actions, initiatives, and the development of standards and specifications.

SECTION 3

PRINCIPLES AND PRIORITIES FOR INTEROPERABILITY

3.1 Interoperability principles

The Interoperability Plan sets out 10 principles (Table 3.1) to accelerate the shift towards a more interoperable national healthcare system. Implementing digital health initiatives that align with these principles will significantly increase the digital health maturity of the Australian healthcare sector and enable contemporary, innovative models of care.

Table 3.1: Interoperability principles







	Health information is discoverable and accessible	Discoverable and accessible health information is key to supporting healthcare providers to deliver safe and quality healthcare to their patients. It is equally important for individuals to have access to their personal health information to help them manage their own health.
	Use of health information supports individual privacy, choice and safe access to information	The roles of security, privacy and consent must be considered and regulated in relation to safely using and sharing health information. Australians expect a transparent process and to be in control of their health information, including who can access it and when, and that it is handled in accordance with privacy legislation.
	National healthcare identifiers are used across the healthcare sector	National healthcare identifiers will support interoperable digital systems and solutions. Healthcare identifiers support information sharing by accurately identifying healthcare recipients, healthcare providers and healthcare organisations involved in an exchange. This inspires confidence that information is only accessible by approved healthcare providers, and information shared is for the right individual and improves the safety of the care provided.
	National digital health standards and specifications are agreed and adopted	To seamlessly exchange or access health information and ensure consistent understanding, it is essential to have agreed digital health standards, specifications and terminology that are technology agnostic. These need to be developed using a transparent, co-designed and consensus-based approach, leveraging international standards where appropriate. Digital health standards and specifications will need to align with other relevant standards. As part of adoption, software and processes should adhere to approved national conformance rules.
	The value and quality of care is multiplied in a digitally connected health system	Investing in interoperable systems produces a network effect in which value increases as more digital systems are connected and can meaningfully communicate. Implementing digitally enabled models of care that incorporate one or more core components of interoperability will foster a more advanced and innovative digital environment.
	Measurement of digital health maturity informs interoperability system design	Different healthcare organisations operate at different levels of digital health maturity. For example, aged care and health services in rural and remote areas are generally recognised as requiring a lift in digital maturity. It is important to identify and consider these levels when designing solutions that can best enhance interoperability without impacting service delivery and access.

Table 3.1: Interoperability principles (cont.)

Core national healthcare digital infrastructure is used across the sector

All healthcare organisations should use the existing core national digital infrastructure, where it is fit for purpose. These are trusted systems that can drive standardisation and interoperability. For example, the NHSD should be used for discovering healthcare providers and healthcare services. As the use of national infrastructure increases, the volume of information within the system increases, which will increase its utility.



Investment supports interoperability and an efficient health technology sector

It is essential that future investments consider methods for capturing, sharing and managing clinical information. Procurement documentation and strategies should include consistent interoperability requirements that support an efficient and innovative health technology sector, and provide the solutions required to deliver an interoperable digital health system.



Collaboration and stakeholder engagement underpins interoperability

Collaboration and stakeholder engagement will support the development and consistent implementation of standards (including for terminology, content and exchange). Successful delivery of interoperability will require a transparent, collaborative approach that involves all stakeholders.



High-quality data is critical for safe and meaningful interoperability

High-quality data and data integrity are essential for information to be used and trusted. Data should be validated against sources of truth (where available). It should ideally be entered once and used over multiple platforms, in accordance with authorisation, consent, security and privacy. The quality of data depends on strong data governance, use of standards for terminology, and investment in data collection, processing and storage.

3.2 Priority areas

The Interoperability Plan identifies five priority areas (Figure 1.1) to advance digital health interoperability. The plan provides an overview of each priority area, the case for reform, current activities, future state and implementation actions to support the transition towards the future state. The priority areas reinforce the importance of the principles and are the foundations for a convenient, safe and secure healthcare system.

The five priority areas provide the building blocks for the Interoperability Plan. Together, they contribute to the National Digital Health Strategy's commitment to deliver high-quality data with a commonly understood meaning that can be used with confidence and support the delivery of convenient, safe and secure care.

Priority area 1 – Identity

Leverage the HI Service and the NHSD. Adopting healthcare identifiers will improve access controls and records of access, and will ensure that individuals, healthcare providers and healthcare provider organisations are uniquely and correctly identified when exchanging health information.

Priority area 2 – Standards

Drive digital transformation through effective leadership and a sustainable approach to standards governance. This will ensure that digital health standards, specifications and terminology are developed consistently and collaboratively, and are fit for purpose, widely adopted and implemented using relevant conformity assessment schemes.

Priority area 3 – Information sharing

Increase information exchange between healthcare providers and individuals by making information discoverable and accessible. This includes consideration of an individual's safety, consent, privacy and data quality. Using consistent requirements in procurements will drive the interoperability of digital health solutions.

Priority area 4 – Innovation

Drive interoperability through future innovations that apply the interoperability principles to new digital health initiatives and functional enhancements. This will enable future innovation for digitally enabled healthcare, such as electronic requesting of digital imaging and pathology, electronic referral, clinical decision support, notifications to GPs, and identifying care management networks.

Priority area 5 – Benefits

Measure healthcare services' digital health maturity to identify areas for investment that align with their strategic and transformational goals, and the national digital health direction. Identifying, monitoring and evaluating the benefits of interoperability will inform progress on priorities and help target resources.

3.3 Challenges to achieving interoperability

Over the course of consulting with stakeholders on interoperability and developing the Interoperability Plan, several barriers to and challenges for achieving mature interoperability in Australia were identified. These include:

- limited use of national healthcare identifiers
- difficulty in discovering what information health services have about an individual, beyond what is available on the My Health Record system and within an individual organisation's system
- lack of trust that systems for exchanging health information are secure
- lack of clarity among healthcare providers about their professional and legal obligations in relation to handling and sharing health information
- commercial incentives for vendors to use proprietary standards or different standards rather than nationally consistent standards and terminologies
- limited policy drivers (legislative, financial) to encourage sector-wide implementation of interoperable solutions and standards
- limits placed by current legislation on the use of healthcare identifiers by community care and administrative organisations to support healthcare delivery
- the absence of a national governance system for endorsing, adopting and developing information-sharing standards, and maintaining and evolving these standards
- the absence of nationally agreed information-sharing structures (for example, HL7 v2, HL7 CDA, HL7 FHIR® and IHE standards)⁶ and agreed profiles within those structures
- the cost of upgrading legacy systems to provide greater interoperability
- the additional challenges in regional, rural and remote settings due to historical gaps in digital connectivity and technology.

Overcoming these barriers and challenges will take time and will need to be considered with all actions and initiatives to further interoperability in the health system. The Interoperability Plan outlines staged actions to build a trusted interoperable digital health system that is informed by the interoperability principles.

⁶These terms are Health Level 7 version 2 (HL7 v2), Clinical Document Architecture (CDA), Fast Healthcare Interoperability Resources (FHIR®), and Integrating the Healthcare Enterprise (IHE) standards.

SECTION 4

PRIORITY AREA 1 – IDENTITY

High-quality care relies on the ability to quickly find complete, reliable and meaningful information about an individual and their care. Being able to search for and correctly identify individuals, healthcare providers and healthcare provider organisations is critical for interoperability and healthcare delivery.

Health information about an individual and the provenance of the information created is enabled by using national healthcare identifiers (such as an Individual Healthcare Identifier [IHI], Healthcare Provider Identifier – Individual [HPI-I] and Healthcare Provider Identifier – Organisation [HPI-O]). This gives both the individual and the healthcare provider confidence that information is associated with the correct individual and has been authored by a registered healthcare provider.

Accurate and current health service directories that leverage these identifiers are foundational enablers of an interoperable system. They facilitate connections between systems and services, such as for sending secure messages, booking appointments, establishing care teams and transmitting electronic referral letters. However, their utility relies on the volume and quality of the information in the systems.

National approaches to identity are a priority across all sectors of the economy and government. The Digital Transformation Agency (DTA) is developing a digital identity to help Australians to verify their identity in a safe and secure way when they access government and other services online.

4.1 Healthcare identifiers

Accurately and consistently identifying individuals, healthcare providers and healthcare provider organisations is essential for building trust in an interoperable healthcare system. Australia has a well-established HI Service:

- Every Australian has a unique IHI.
- Every healthcare provider has a unique HPI-I.
- Every healthcare provider organisation has a unique HPI-O.

Healthcare identifiers are fundamental to the discovery, access and sharing of information. Using healthcare identifiers:

- enables healthcare providers to accurately identify individuals, healthcare providers and healthcare provider organisations
- improves the accuracy of information shared with other healthcare providers and individuals
- gives individuals greater control over the level of access to their information that they provide to healthcare providers

- increases the quality and accuracy of health information used for research, public health and planning
- assists with the auditing and traceability of healthcare processes
- supports the ability to use healthcare identifiers for unknown future purposes, such as linking with the DTA's digital identity⁷ or allowing individuals to share their IHI with their healthcare providers.

Currently, IHIs are used to identify a person in the My Health Record system, and most health software can retrieve them from the HI Service.

Uniquely identifying individuals, healthcare providers and organisations is the most important capability for supporting interoperability across the Australian health landscape.

4.1.1 The case for reform

The 2018 Healthcare Identifiers Act and Service Review found that Australia has built a national healthcare identifier capability, but it is not being used to its fullest possible extent. This means that potential benefits are not being fully realised.⁸ Factors that have limited the realisation of benefits include limited adoption of HPI-Is and HPI-Os, challenges in maintaining data quality, and minimal active planning to use the HI Service beyond the My Health Record system. The limitations and complexity of the current *Healthcare Identifiers Act 2010* were identified as a barrier to wider use of this capability, particularly in health-related areas that are not directly involved in delivering healthcare, such as health administration, and community and home care services.

The Australian Commission on Safety and Quality in Healthcare (ACSQHC) commented that “IHIs are necessary to ensure the right information is attached to the right patient within the My Health Record system. Patient misidentification is a significant clinical safety concern for the healthcare system overall”.⁹

Wider and convenient use of IHIs will improve clinical safety while meeting privacy requirements. Challenges to overcome include embedding wider use of IHIs beyond the current focus on the My Health Record system and improving HI Service match rates to improve data quality.¹⁰

The inability to confirm a person's IHI may:

- act as a barrier to individuals and healthcare providers participating in new digitally enabled models of care
- limit healthcare providers' ability to discover and access additional health information that would support their clinical decision-making and enable the most appropriate care for their patients
- limit healthcare providers' and individuals' ability to share health information
- limit the ability to link health information to support research and analytics.

⁷ Australian Government, 'Digital identity', 2022, accessed 17 May 2022.

⁸ Australian Government Department of Health, *Healthcare Identifiers Act and Service Review – Final Report*, 2018.

⁹ PwC, *Sixth Clinical Safety Review of the My Health Record System*, Australian Commission on Safety and Quality in Healthcare, 2015, p. 3.

¹⁰ In June 2020, 6.4 per cent of matching failed. Ideally, the failure rate should be as close as possible to zero.

Accurately identifying healthcare provider organisations and individual providers is critical to:

- ensure that only authorised individuals access information
- enable healthcare providers to make informed assessments of the information they receive (based on its provenance)
- support organisations' clinical governance arrangements
- support health-related payments and claims
- support patients' and consumers' healthcare experiences.

The benefits of national healthcare identifiers are constrained by the significant variation in their use across the Australian healthcare sector, and a proliferation of local identifiers that are not linked to national healthcare identifiers. For example, digital health systems within hospitals often do not use or reference each doctor's HPI-I. In some cases, the hospital itself is not identified by its HPI-O, and only the larger entity to which the hospital belongs is identified.

The 2020 review of the *My Health Records Act 2012* recommended actions to improve the use of HPI-Os and HPI-Is.¹¹ It noted transparency issues relating to using local healthcare provider identifiers instead of HPI-Is. It also stated that using one HPI-O for a network of organisations (rather than a separate HPI-O for each organisation within a network) makes it hard to identify the specific organisation involved (for example, the specific hospital or clinic). The review also noted the need to identify organisations that provide services that support healthcare, such as home care services.

The limited use of national healthcare identifiers affects the capacity to link and use health data for research, planning and quality improvement. Without widespread use of national healthcare identifiers, data analytics must be based on less accurate and more costly statistical methods to identify individuals and healthcare providers.

The core rationale for national healthcare identifiers is unchanged from when the HI Service was established in 2010, and includes the following:

- Accurate patient identification is at the core of delivering a safe and efficient healthcare system and affects how people experience and engage with that system.
- As the use of digital health technologies grows, the importance of having accurate, unique identifiers for individuals, healthcare providers and healthcare provider organisations increases exponentially.
- National healthcare identifiers are essential to connect Australia's highly fragmented healthcare system. They would improve the patient experience as individuals move across state and territory borders, and between public and private health services and non-government organisations with complex funding arrangements.

Identifiers for devices, medications and other healthcare-related products are also critical for interoperability and can be used to support activities such as product recalls and supply chain management. Supply chain management has been a crucial capability supporting the COVID-19 vaccine rollout and management of personal protective equipment for healthcare workers.

¹¹ J McMillan, [Review of the My Health Records Legislation: Final report](#), Australian Government Department of Health, 2020.

Accurate patient identification is at the core of delivering a safe and efficient healthcare system.

4.1.2 Current activities

The use of healthcare identifiers to support interoperability is now universally accepted. Their adoption and use are key issues that need to be managed.

A significant number of initiatives that use healthcare identifiers or drive their adoption are underway in Australia. These include the following:

- **Using IHIs to support public health and the response to COVID-19.** IHIs enable tracking of the dispensing and use of vaccines, health outcomes of infections and treatments, and the progress of vaccine programs, which increases data accuracy.
- **Electronic prescriptions.** Healthcare identifiers are vital for delivering electronic prescriptions that enable the prescribing, dispensing and claiming of medicines without the need for paper prescriptions.
- **Health Delivery Modernisation.** Services Australia and the Australian Government Department of Health and Aged Care have undertaken this project that aims to strengthen primary healthcare through digital enablement, deliver new digital health services and modernise the critical Services Australia health payments system for all Australians.
- **Using IHIs to improve funding models.** The Independent Hospital Pricing Authority is undertaking a proof of concept to use IHIs to improve funding models by accurately identifying service delivery to individuals across different settings of care, financial years and hospitals.
- **WA Health's use of HPI-Is.** WA Health has launched a project to adopt and use HPI-Is to support the rollout of electronic prescriptions, which will increase the use of HPI-Is across the Western Australian public healthcare system.
- **Unique device identifiers (UDIs).** The Therapeutic Goods Administration (TGA) is proposing to use identifiers to uniquely identify and track medical devices such as blood pressure devices and biosensing wearables across the health system. The capture, storage and easy access to UDI information when linked with IHIs would be invaluable for product recalls.

The use of healthcare identifiers to support interoperability is now universally accepted.

4.1.3 Future state

Australian, state and territory governments – as joint owners, funders and users of the HI Service – are committed to using and benefiting from making national healthcare identifiers a foundational element of an interoperable healthcare system.

A mature interoperable system built on a strong healthcare identifier system has these key features:

- National healthcare identifiers are captured, stored and exchanged between all individuals and healthcare providers – public and private providers, and aged care and disability services – as standard practice in delivering healthcare and in accordance with privacy requirements.
- National identifiers are universally used to identify individuals, healthcare providers and healthcare provider organisations, with all individuals and healthcare providers that require a national identifier having one.
- Management of identifiers and associated artefacts (such as digital certificates) is simple, streamlined and effective, making it harder to not use them than to use them, and removing the need for exemptions on their use.
- Identifier matching errors are minimised, reducing or eliminating misidentification of individuals, and enabling individuals to control their information, manage their privacy, and receive better and safer care with improved access to their health information.
- National healthcare identifiers are readily available and can be used in innovative models of care and all exchanges of health information.
- A legislative framework for healthcare identifiers enables the identification of relevant participants involved directly or indirectly in delivering healthcare.

National healthcare identifiers are captured, stored and exchanged between all healthcare providers and individuals as standard practice in delivering healthcare, providing confidence that the right information is associated with the right individual.

4.1.4 Implementation actions

Table 4.1 outlines priority actions to improve adoption of national healthcare identifiers and to transition the healthcare system towards the proposed future state. It will be the responsibility of the lead organisation to engage with stakeholders in progressing these actions, as they will need to draw on stakeholder experience and expertise to be successful.

Table 4.1: Actions for priority area 1 – Identity – healthcare identifiers

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 1.1 – Using healthcare identifiers Jurisdiction health departments, the Agency and Services Australia will adopt and use national healthcare identifiers in future digital health initiatives involving health information sharing.	The Agency Services Australia All health departments	Ongoing
ACTION 1.2 – Promoting healthcare identifiers Promote the use of IHLs, including creating IHLs for newborns as soon as possible after birth.	The Agency Services Australia	Ongoing
ACTION 1.3 – Healthcare Identifiers Roadmap Develop a Healthcare Identifiers Roadmap that includes (among other items): <ul style="list-style-type: none"> coordinating a response to recommendations from the 2018 Healthcare Identifiers Act and Service Review and the 2020 review of the My Health Records Act that relate to or affect healthcare identifiers reviewing legislative impediments to the wider uptake of healthcare identifiers in the <i>Healthcare Identifiers Act 2010</i> reporting on healthcare identifier adoption. 	The Agency Department of Health and Aged Care	Immediate
ACTION 1.4 – Healthcare identifier matching Develop and implement a program of improvements in healthcare identifier matching (especially IHLs), focusing on data quality, user interfaces, service improvements, enhancements and proactive efforts on IHL retrieval.	The Agency Services Australia	Short
ACTION 1.5 – Review HPI-I conformance Review conformance requirements for using HPI-Is when uploading documents to the My Health Record system, recognising that providers are at different stages of use of HPI-Is.	The Agency	Short
ACTION 1.6 – Develop deeper network structures Develop deeper HPI-O network structures, including revising published guidance, to support enhancing online HPI-O network registration, and work with vendors to address software limitations.	The Agency Services Australia	Short

Immediate = within one year; short = 1–3 years

4.2 Health service directories

Health service directories enable individuals and healthcare providers to accurately locate and connect with the appropriate individual, healthcare provider and/or related service through a variety of channels.

Numerous health service directories have been established by public and private organisations. These directories store information on health services and healthcare providers. From a national interoperability perspective, it is essential to have a system that allows for a consolidated, consistent, accurate and easily accessible directory of healthcare services and healthcare providers.

The NHSD, which is managed by Healthdirect Australia, is a key national health services directory. In February 2020, AHMAC endorsed the NHSD review completed in 2019 that recommended positioning the NHSD as core national infrastructure

and an agreed funding model that provides for the long-term security of operational funding. A different directory with a separate but vital role in discovering HPI-Os is the HI Service's Healthcare Provider Directory. It contains information on healthcare providers and healthcare provider organisations.

The NHSD should be managed as core national infrastructure.

Discussion in this section of the Interoperability Plan is based on the NHSD having a national role, while recognising the need for other service directories for specific purposes.

4.2.1 The case for reform

Having a trusted directory that accurately identifies healthcare providers and healthcare provider organisations is an important aspect of information exchange. Individuals and healthcare providers need access to comprehensive, consolidated, accurate and up-to-date healthcare provider and health service information to navigate and participate in an interoperable health system.

Healthcare services and healthcare providers need to be findable and identifiable to:

- share health information with authorised healthcare providers
- enable healthcare providers to locate and contact other providers and healthcare services
- allow healthcare providers to make informed assessments of the provenance of the information they receive
- enable individuals to find healthcare providers and healthcare services.

Another important reason for having health service directories is to improve secure digital communication. Currently, a robust directory of information that is regularly updated is absent at an individual healthcare provider level. Most directories only contain information at a healthcare provider organisation level. An effective health services directory will be able to link a healthcare provider with one or more healthcare provider organisations – as core national infrastructure, the NHSD is best positioned to be this directory.

However, the NHSD has limitations, which were highlighted in the 2019 NHSD review. Despite best efforts, maintaining accurate and up-to-date content is a concern. This is partly because it is voluntary to input information (such as healthcare provider and service content), and partly because the NHSD is not the source of truth for the information it holds. Often, the information that is fed into the NHSD is not accurate or is outdated because healthcare providers and organisations have limited incentives to maintain the accuracy and currency of the information.

It will be necessary to have specialised directories for particular purposes – for example, directories for qualifications and accreditations. However, directories must be interoperable to ensure consistency and reliability, and support the flow of information. Rationalising health service directories should also be considered. The 2013 review of the HI Service and the Healthcare Identifiers Act recommended that governments “consider the feasibility of integration between the National Health Services Directory and the Healthcare Provider Directory to reduce duplication and rationalise the national directory infrastructure.”¹²

¹² Australian Government Department of Health, [Healthcare Identifiers Act and Service Review – Final Report](#), 2013.

An NHSD that is not up to date creates missed opportunities and significant costs. Without an agreed source of truth to accurately identify health services, individuals, public health staff and healthcare organisations must navigate multiple, unaligned health directories.

Individuals and healthcare providers need access to comprehensive, consolidated, accurate and up-to-date provider and service information to navigate and participate in an interoperable healthcare system.

4.2.2 Current activities

Initiatives are underway to support improvements to health service directories.

The 2019 AHMAC review of the NHSD made 29 recommendations that have been integrated in the development of the five NHSD Strategic Priorities and Work Packages:

1. Drive improved outcomes and experiences of the NHSD, including to review current utilisation and co-design use cases to improve the experience of the NHSD.
2. Partner across the digital health ecosystem. This includes continuing to advocate for the development of a national policy position by the Australian Government Department of Health and Aged Care that will provide clarity on the role, scope, intended functions and operations of the NHSD, and address the role of the NHSD in national programs.
3. Support health system integration, including partnering with shareholders, funders and other health-related agencies to identify and facilitate opportunities to improve integration and reduce duplication of local directories.
4. Be a trusted and recognised source of truth, including to ensure that the NHSD's data is reliable, usable, scalable and secure.
5. Build the capacity and capability to deliver and embed the NHSD as core national infrastructure.

The Agency will also support Provider Connect Australia to synchronise information across multiple health service directories, including the NHSD. This will help to ensure that directories are as accurate and current as possible. Provider Connect Australia gives healthcare provider organisations a mechanism to maintain a single source of truth about the services they provide and the practitioners that provide them. It also allows organisations to distribute that information to the NHSD and other health service directories that are relevant to their business.

4.2.3 Future state

A mature interoperable system would include health service directories that achieve the following outcomes:

- Directories are managed and maintained to support safe, secure healthcare provider communications, and are reliable sources of information for individuals.
- The NHSD is adopted for national digital health programs to ensure comprehensive, consolidated, accurate and up-to-date healthcare provider and service information for all health and related human services provided by governments, the private sector and not-for-profit organisations.

- Organisations such as Healthdirect Australia enable individuals (through tools such as the NHSD) to be active participants in their care by providing the information they need to make informed decisions about managing their health and the services they can access.
- Healthcare provider organisations maintain information about their services and healthcare providers in the NHSD, using Provider Connect Australia to synchronise information across multiple health service directories.
- Health service directories support better integration between health services and implementation of digital tools by providing easier access and more transparent information about the most appropriate services for referral and care pathways.
- Individuals regularly use the NHSD and other health service directories to obtain information on healthcare providers and healthcare provider organisations, and find value in these directories. Health service directories support the implementation of digital tools to improve access and experiences for individuals.

4.2.4 Implementation actions

Table 4.2 outlines actions that involve using core national digital infrastructure, such as the NHSD and Provider Connect Australia, to discover healthcare services and healthcare providers, which supports the interoperability of the Australian healthcare system. It will be the responsibility of the lead organisation to engage with stakeholders in progressing these actions, as they will need to draw on stakeholder experience and expertise to be successful.

Table 4.2: Actions for priority area 1 – Identity – health service directories

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 1.7 – Using the NHSD Use the NHSD as the service directory for digital health programs. Where this is not possible (such as for a specialised directory), jurisdictions will work with Healthdirect Australia and the Agency to support the required flow of information.	All health departments	Ongoing
ACTION 1.8 – Implementing the 2019 NHSD review Healthdirect, in partnership with the Department of Health and Aged Care and state and territory health departments, will implement the work packages developed in response to the 2019 AHMAC NHSD review, which include positioning the NHSD as core national infrastructure.	Healthdirect	Ongoing
ACTION 1.9 – Provider Connect Australia rollout Roll out and support the implementation of Provider Connect Australia.	The Agency	Immediate
ACTION 1.10 – Integrating the NHSD and the Healthcare Provider Directory (HPD) Assess the feasibility of integrating the NHSD and the HPD to reduce duplication and rationalise the national directory infrastructure.	Services Australia	Short

Immediate = within one year; short = 1–3 years

SECTION 5

PRIORITY AREA 2 – STANDARDS

Agreed digital health standards and specifications are required to exchange and access health information and ensure that information is consistently understood. A core component of digital transformation is a mature standards-based ecosystem grounded on strong leadership and supporting a conformance-centred approach to standards management. A mature ecosystem ensures that digital health standards are fit for purpose, consistently and widely adopted, and implemented in line with national conformance rules.

Standards generally support a wide range of use cases and therefore are often too broad to facilitate interoperability without profiling for a specific use case. This profiling work is a large and critical part of creating an interoperable Australian health system. Terminology in many diagnostic fields still relies on local codes. However, significant work has been undertaken in areas such as pathology (for example, by the HL7 Australia working group on the version 2.4 [v2.4] localisation for pathology messages).

Conformance of software with standards and process-specific conformance rules is critical to the integrity of digital health systems. Conformant software gives purchasers and users confidence that the software is fit for purpose and that the standards are implemented correctly. Non-conformance introduces unacceptable risk from an interoperability perspective because healthcare providers rely on the integrity of the information exchanged in their decision-making.

Standards underpin structural interoperability and semantic interoperability:

- Structural interoperability enables the exchange of health data between one health IT system and another in a way that preserves clinical or operational meaning and the purpose of the data. Structural interoperability defines the syntax of the data exchange (for example, HL7 v2, extensible markup language [XML], HL7 FHIR® and web service profiles [WS-*]).
- Semantic interoperability is the ability of two or more systems to exchange, interpret and use data. Semantic interoperability takes advantage of both the structure of the data exchange and the codification of the data, including standard, publicly available vocabulary (such as SNOMED CT-AU, AMT, LOINC, ICD-10-AM [Australian Modification of the International Classification of Diseases] and HL7 FHIR®), so that the receiving information management systems can interpret the data.

STANDARDS

Unambiguous standards that are implemented consistently are essential in achieving interoperability in any system or industry. A key challenge is to maintain relevance and compatibility as new standards are created and existing ones evolve. Interoperability standards refer to the collection of nationally recommended standard health information models, clinical terminologies, data exchange specifications and communication protocols. Standards define the structure, format and syntax of the

data to be exchanged, enabling humans and machines to interpret the data in a clear, reproducible and consistent manner.

Use of health information models, clinical terminologies, data exchange specifications and communication protocols allow shared meaning of health information when viewed by healthcare providers and individuals. It also enables health information to be discovered and exchanged across the healthcare system.

Health information models (such as the HL7 Reference Information Model, the National Health Information Model, HL7 FHIR® data resource content structures and the National Health Data Dictionary) describe the structure of the healthcare content being exchanged (that is, a structure by which various data elements are grouped in a logical manner alongside definitions, data types, cardinalities, rules and contextual information).

Clinical terminology (for example, SNOMED CT-AU, AMT and LOINC) defines healthcare concepts in both human-readable terms and machine-readable codes. Clinical terminology code sets allow an accurate representation of meaning during data capture and information sharing.¹³

Data exchange specifications (for example, HL7 v2, HL7 CDA, HL7 FHIR® and Digital Imaging and Communications in Medicine [DICOM]) provide a standard set of rules for communication between two systems that meet some defined objective or use case. They typically specify the format and syntax of elements based on a standard schema and the metadata (information about how data is defined, structured and represented).¹⁴

Communication protocols define the rules, syntax, semantics and synchronisation of communication, and possible methods for error recovery (for example, AS 5550 E-health web services profiles and ATS 5821 E-health secure message delivery). Interface operations are defined by standards such as IHE's Cross-Enterprise Document Sharing interoperability profile (used by the My Health Record system's Business-to-Business [B2B] Gateway) and HL7 FHIR® Representational State Transfer (REST) application programming interface (API), which is used by the My Health Record system's Mobile Gateway. They are supported by access and authorisation standards to allow the secure and private exchange of information (for example, AS 5551 E-health XML secured payload profile and OAuth and OpenID Connect).

Cyber security standards are required to support interoperability throughout the digital health system. These are applied across the whole digital health ecosystem and are not specific to interoperability.¹⁵

There are numerous national and international interoperability standards, and there has been significant adoption of some health interoperability standards in Australia (for example, HL7 v2, DICOM, LOINC, ICD-10-AM and AMT). Some Australian health sectors (for example, pathology and diagnostic imaging) have near-universal use of HL7 v2 for reporting, but standardisation between healthcare providers is unclear.

¹³ These clinical terminologies are different from clinical classification systems, such as ICD-10-AM, which is used to classify diseases and other health problems and to code episodes of admitted patient care across Australian hospital services for funding, monitoring and analysis.

¹⁴ Data exchange specifications can include a defined information model with clinical terminology bindings. Data exchange specifications include system-to-system data exchanges, as well as device-to-system data exchanges such as ISO/IEEE 11073 (health device communication standards for communication between medical, healthcare and wellness devices and external computer systems). The AIHW maintains METEOR, Australia's repository for national metadata standards for health information.

¹⁵ More information about [cyber security standards](#) is available on the Agency's website.

In Australia, there has been no national adoption of the standards, except for the AMT. AHMAC endorsed SNOMED CT-AU as the national clinical terminology in 2005, but adoption has been sporadic. Without a national authority, adoption will continue to be sporadic at best. Regarding standards such as HL7 FHIR®, uptake has mainly been driven by traction in the health technology sector.

CONFORMANCE

Conformance regimes or frameworks allow testing of whether systems have met a standard or specification. Conformance helps with developing a register of trusted software that can satisfy procurement requirements and provide evidence of where standards have been adopted. Australian examples of conformance and compliance frameworks include those for the My Health Record system, electronic prescriptions, the HI Service, secure messaging, uploading vaccination details to the Australian Immunisation Register and reporting morbidity data to the AIHW.

5.1 The case for reform

Many standards relating to terminology and exchange specifications are used in recording health information electronically. When there is no centralised approach to using standards, as in Australia, the number of standards proliferates. This inhibits information sharing and integration, which leads to a lack of interoperability. Exchange specifications need to be adapted to new requirements and support different use cases.

5.1.1 Standards

As noted in the Rowlands report, which examined why standards are needed, “interoperability is impossible without standards”.¹⁶ A well-known example of the problems caused by inconsistent standards is the loss of the US\$125 million Mars Climate Orbiter in 1999. This was caused by a measurement standard mismatch between two software systems: NASA (National Aeronautics and Space Administration) used metric units and Lockheed Martin, which built the spacecraft, used imperial units.

Half of the nurses interviewed for a survey on interoperability in the United States in 2015 said they had witnessed a medical error due to a lack of coordination (that is, lack of data sharing) among devices.¹⁷ In 2017, an analysis of patient safety incident reports associated with health IT systems in the United States found that 8 per cent of incident reports were due to interoperability issues between electronic health records and another health IT system.¹⁸

Interoperability is made possible by the implementation of standards.¹⁹

¹⁶ D Rowlands (JP Consulting), *A Health Interoperability Standards Development, Maintenance and Management Model for Australia*, Australian Digital Health Agency, 2020.

¹⁷ The Gary and Mary West Health Institute, *Missed Connections: A Nurses Survey on Interoperability and Improved Patient Care*, 2015.

¹⁸ KT Adams, JL Howe, A Fong, JS Puthumana, KM Kellogg, M Gaunt and RM Ratwani, ‘An analysis of patient safety incident reports associated with electronic health record interoperability’, *Applied Clinical Informatics* 2017, 8(2):593–602.

¹⁹ Global Digital Health Partnership, *Connected Health: Empowering health through interoperability*, GDHP White Paper on Interoperability, 2019, p. 10.

To attain unambiguous shared meaning of recorded health information, the data must be shared in one or more universal code sets that can be understood by all systems. These standards also need to be communicated, promoted, maintained and updated to work effectively as a system.

Implementing standards brings the following benefits:

- Time and money are saved through improved clinical activities (for example, reconciling medications when an individual is admitted to hospital, or conducting medication management reviews in residential aged care) and more efficient procurement (via clinical and supply chain integration).
- Using universal code sets when coding machine-readable data is a foundation for improving safety by reducing misinterpretation of data, driving evidence-based best practices in managing disease and the use of medicines, aiding clinical decision support, and improving the quality of data for research and big data analytics.
- Individuals benefit from
 - having a shared and consistent understanding of their health information with healthcare providers
 - automated clinical decision support, which improves care and reduces errors
 - faster identification of information relevant to their care.
- Product development is simplified by codifying the information required, which also reduces uncertainty.
- Australian products would be more likely to meet international standards and could be used in overseas health systems.

The ACSQHC undertook clinical safety reviews (CSRs) to ensure patient safety and the appropriateness of treatment. CSR 7.2 (My Health Record medicines information view) and CSR 9 (SNOMED CT-AU and AMT adoption and use) contained recommendations for adopting and using SNOMED CT-AU and the AMT as national clinical terminologies.^{20,21}

In Australia, multiple national policies, programs, frameworks and specifications recommend using standard clinical terminologies to record aspects of patient care and transfer information between systems. For example, AHMAC endorsed SNOMED CT-AU as the national clinical terminology in 2005 and the National Safety and Quality Health Service Standards issued AS18/11, an advisory on entering clinical information in the My Health Record system. Programs include the Australian Government Department of Health and Aged Care's electronic prescribing; Active Ingredient Prescribing; and the Practice Incentives Program eHealth Incentive (ePIP).

Adoption of standards has varied depending on the strength of incentives and mandates. In addition, owners of digital health systems have considerable discretion in determining what standards they will adopt. This means that the proprietary standards used by software providers have a major influence. The inconsistent uptake of standards is affecting the maturity of interoperability within the Australian healthcare system.

²⁰ Australian Commission on Safety and Quality in Healthcare, [Seventh Clinical Safety Review of the My Health Record System](#), a review of the presentation to healthcare providers of the My Health Record system 'medications views', 2016.

²¹ Australian Commission on Safety and Quality in Healthcare, [Ninth Clinical Safety Review of the My Health Record System](#), a review of the adoption and utilisation of SNOMED CT-AU and the AMT, 2018.

Maximising the value of health information and its analysis will critically depend on the ability of these systems to share data and interoperate, on both technical and semantic levels, through the use of common terminologies.

Ideally, clinical terminologies would be adopted natively, and all systems and services would use the same code sets. However, that is not always practical, so translation services are used to map between similar clinical terminologies (for example, AMT and PBS [Pharmaceutical Benefits Scheme], or AMT and Global Trade Item Number). While mapping is an accepted way to adopt clinical terminology, it may involve clinical risks during development and the perpetual maintenance required to keep them current (for example, some codes in separate code sets may not be equivalent, and data quality issues can develop with different update cycles).

Increasingly, data exchange specifications are defining standard APIs to simplify system interactions and integrations, and support secure, on-demand data requests based on commonly used web service protocols. The standard data exchange protocol used in the My Health Record system (HL7 v3 and HL7 CDA) has very rich data, but it requires significant expertise and skill to implement, which impacts its adoption. HL7 FHIR® was developed as an alternative to existing data exchange protocols. HL7 FHIR® uses a modern API approach with well-defined data content structures and RESTful web services. This ensures that HL7 FHIR® is closely aligned to integration approaches outside healthcare, which simplifies implementation. A key objective of HL7 FHIR® is to facilitate interoperability between healthcare systems and services across a variety of devices, supporting easier exchange and integration of health information. HL7 FHIR® is increasingly used nationally and internationally to support API integration between health systems and services.

HL7 v2 messaging is the most common information exchange specification in use across most health sectors in Australia. Profiling and standardising terminology for different clinical domains and settings for existing HL7 v2 messaging exchanges will help drive interoperability.

5.1.2 Conformance

Not all existing national infrastructure is supported by conformance rules and assessments. This leads to inconsistent implementations that can affect interoperability. Existing conformance and compliance frameworks require support from the wider health community to ensure that conformance rules are agreed and non-conformance is identified and resolved.

5.1.3 Governance

The Australian digital health landscape is a complex web of interacting ecosystems. Due to the number of healthcare stakeholders in digital health standards in Australia, and to ensure alignment with overarching national directions, all key parties in the standards ecosystem must collaborate.

A collaborative approach is required to develop and maintain standards to underpin an interoperable health system. The roles of an effective standards governance capability include orchestration, commissioning, development support, standards selection and maintenance, support for standardisation, and standards conformance assessment.

The Agency has established a National Digital Health Standards Program and the Agency Board has approved a two-year program of work to develop a dynamic, comprehensive and collaborative digital health standards environment that enables an interoperable healthcare system. This program has been incorporated into the Interoperability Plan actions.

The Agency will continue to govern and lead the development and maintenance of digital health specifications (using existing digital health standards and specifications where possible) for national digital health systems, services and national health priorities to achieve the Agency's workplan. Specifications will be co-designed with stakeholders, including standards development organisations and the health technology sector. Where required, Agency-developed specifications will be progressed to become standards through the appropriate standards development organisation and their balloting/development processes.

The 2020 report *A Health Interoperability Standards Development, Maintenance and Management Model for Australia* recommended that a new entity be formed to provide national governance of standards on a collaborative basis, with membership drawn from government, clinical and technical interests.²² HL7 Australia and the Medical Software Industry Association have also proposed formation of a National Interoperability Standards Governance Group to provide the oversight, governance and advocacy needed to achieve interoperability in Australia. Through the National Digital Health Standards Program, the Agency will engage with stakeholders on guiding principles, gap analysis and collaboration arrangements to inform the need for and scope of any national governance arrangements for standards.

Australia needs to be active and participate in international work on standards that are taken up by global software providers that operate in Australia. It is also good practice to build on international standards when developing standards that suit Australian conditions, such as the Australian Base (AU) HL7 FHIR® profiles that the Agency is promoting. The Agency will contribute to specifications and standards work instigated by other organisations, will engage internationally to inform international standards and, where possible, incorporate Australian requirements.

5.1.4 Collaboration with the health technology sector

The health technology sector has a critical role in supporting a more connected digital health system through its deep understanding of the practical implications of interoperability.

Successful implementation of digital technology depends on alignment between supply-side and demand-side value. This is where there is a strong chance of return on investment for the software supplier, and the technology is desirable for patients, effective, safe and cost-effective.²³

The health technology sector is directly impacted by standards and conformance requirements, and needs to be engaged along with other stakeholders in the co-design development process.

²² D Rowlands (JP Consulting), [A Health Interoperability Standards Development, Maintenance and Management Model for Australia](#), Australian Digital Health Agency, 2020.

²³ T Greenhalgh, J Wherton, C Papoutsis, J Lynch, G Hughes, C A'Court, S Hinder, N Fahy, R Procter and S Shaw, 'Beyond adoption: A new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies', *Journal of Medical Internet Research* 2017, 19(11):e367.

It is the responsibility of purchasers of health software (both public and private), government and the health technology sector to set the specifications and identify the standards that deliver the net benefit to users of the digital technology. This requires purchasers to recognise the cost impact and development lead time for suppliers to respond in a way that makes business sense.

As commercial entities, suppliers must look to their financial viability as well as meeting their customers' objectives. Clear value statements and government strategic directions will provide the confidence for the health technology sector to improve their products and work with end users.

The health technology sector can be supported to be a future strategic partner through early engagement in the design of new systems and models of care, along with strategic roadmaps to provide understanding of the future direction of both government and healthcare provider organisations.

5.2 Current activities

Multiple initiatives are underway across the Australian healthcare system to promote the use of national clinical terminologies, information models and healthcare exchange specifications.

5.2.1 Terminology

- **Queensland Clinical Terminology Service (QCTS):** Queensland Health has established a state-wide terminology service, which will provide new processes, technical specifications, an enterprise-managed ICT solution and a governance model. This will ensure best practice to address the clinical terminology needs of stakeholders. Technical aspects of the QCTS are based on international standards such as HL7 FHIR®, SNOMED CT, LOINC, Atom and OAuth2 through adoption of corresponding NCTS technical specifications for content and APIs. The QCTS will integrate with the NCTS for retrieval of national terminology content items and adopt clinical terminology applications from the CSIRO (Commonwealth Scientific and Industrial Research Organisation). The QCTS will support API-based integration by clinical and administrative applications seeking to access terminology content releases or to meaningfully use terminology content held in the QCTS.
- **NCTS:** Each month, the NCTS publishes SNOMED CT-AU, which incorporates its medicine subset, the AMT. The NCTS also publishes HL7 FHIR® terminology resources to enable HL7 FHIR® implementations, and the National Terminology Server hosts LOINC for observations and measurements, including laboratory test orders and results.
- **PBS and TGA:** A multi-year project to align the TGA, the PBS, the AMT and the National Product Catalogue (NPC) has been initiated to uplift the TGA and PBS data models, and simplify data distribution, product registration and reimbursement processes. The Health Products Portal and an ongoing AMT-NPC link project are components of this project. Work is underway to align the Medical Benefits Schedule and UDIs.

- **Radiology Referral Reference Set:** The Royal Australian and New Zealand College of Radiologists and the Australian Diagnostic Imaging Association published a position statement endorsing SNOMED CT-AU as the preferred radiology referral set terminology.²⁴

5.2.2 Information models

- **Primary care data quality foundations project:** The CSIRO is leading this project and collaborating with stakeholders such as prescribing software providers. The AIHW has developed a data dictionary and HL7 FHIR® implementation guide to better support the practice-to-practice exchange of patient records.
- **National Primary Healthcare Data Asset project:** This multi-phase project is developing an enduring data asset that contains detailed, high-quality data from primary care to better understand and improve the patient journey. The data asset will also become a source for data analysis by providers, policymakers and researchers to improve population health. The AIHW has concluded the consultation phase of this project.
- **Agency published data models:** The Agency publishes and maintains a freely available, latest “peek behind the curtain” set of working drafts that show how the Agency is adopting and extending the HL7 FHIR® Australian Base Implementation Guide (AU Base 4).²⁵

5.2.3 Data exchange specifications

Increasingly, data exchange specifications are defining standard APIs to simplify system interactions and integrations and to support secure, on-demand data requests based on commonly used web service protocols (for example, RESTful web services). The following are examples currently underway:

- **HL7 FHIR® APIs are being built into Australian health software systems.** These standardised APIs provide a definition of the standards for implementation, and also support privacy and security requirements. They have a policy component that requires participants to agree to certain obligations if they wish to access the API.
- **AU Base 4 on FHIR®.** HL7 Australia is managing the balloting and finalisation of the next version of HL7 FHIR® AU Base 4, which is based on the HL7 FHIR® specification. This material is a collaboratively developed, open-source set of materials that provide guidance on how to represent Australian local concepts using HL7 FHIR®, including HL7 FHIR® profiles and extensions.
- **Agency API Gateway.** The Agency is delivering an HL7 FHIR®-based API Gateway. This provides a single point of access to the My Health Record system and other national infrastructure.
- **Secure messaging.** South Australia is implementing secure messaging based on the latest secure messaging exchange standards (HL7 v2 payloads and Secure Message Delivery), conformance requirements and HL7 FHIR®-based directory access.

²⁴Royal Australian and New Zealand College of Radiologists and Australian Diagnostic Imaging Association, [Radiology Referral Set Position Statement](#), 2021.

²⁵FHIR®, ‘[Australian Base Implementation Guide \(AU Base 4\)](#)’, 2022, accessed 17 May 2022.

5.2.4 Conformance

- **My Health Record conformance:** Material, overviews and guides continue to be improved for B2B (Business-to-Business) clinical exchanges (for example, support for Transport Layer Security 1.2 to enhance encryption methods for secure interactions using the ATS 5820-2010 E-health web services profiles).
- **Digital Health Conformance Framework:** The Agency is developing a Digital Health Conformance Framework for its processes. This also includes tools that allow conformance processes to be administered in a scalable and consistent way, which will be applied in several national infrastructure systems and services. The conformance framework is a component of the Agency's assurance framework for connecting systems, which also includes a compliance framework, as well as a lens on legislation and other product-supporting frameworks.

5.2.5 Agency Developer Centre

The Agency hosts a Developer Centre that provides resources for developers of clinical software and health technology. Resources include technical specifications and implementation guides that incorporate standards required to access the national health infrastructure operated by the Agency.

5.3 Future state

A mature, standards-based interoperable healthcare system has the following key features:

- All Australian healthcare organisations are committed to the correct, sustained and widespread use of interoperability standards as a foundational element of a safe, secure, fully interoperable and digitised Australian healthcare system.
- Healthcare settings achieve interoperability through
 - native adoption of a unified and agreed set of national terminology standards and classifications (including SNOMED CT-AU, AMT, ICD-10-AM and LOINC), where clinical, statistical, supply chain and administrative content is fully coded and meets all required healthcare use cases
 - the adoption and use of an agreed set of national standard APIs (including HL7 FHIR®) that support sharing and accessing health information in a secure and authorised manner
 - trusted, widespread and autonomous sharing of secure, authorised, coded data between systems within the same setting, systems outside the setting, national repositories, international initiatives, and individuals.
- There is no incompatibility between the terminologies used to describe healthcare and the classifications used to fund healthcare.
- Interoperability standards and specifications are co-designed, open source and non-proprietary, and are supported by governance that is open to all healthcare stakeholders.
- The health technology sector is dynamic and efficient, with a clear standards framework to inform technology development, and has been engaged in the development of specifications, standards and conformance requirements.

- Common specifications use foundational components within the ecosystem and include concepts such as healthcare identifiers, authentication, authorisation, security, data provenance, non-repudiation of information, common terminologies and common payload structures.
- New or enhanced capabilities or data content are based on contemporary industry-adopted standards.
- Customers demand changes to their software to support interoperability and align with the latest national directions.
- Use of interoperability standards and specifications are underpinned by continuous, high-quality implementation support, incentives, exemplars, demonstrations, materials, specifications, conformance and review, and data quality programs to ensure optimal implementation.
- Organisations engage with the health sector on the development, selection and use of standards that support their approved work priorities, and recognise the role of accredited standards development organisations in creating standards.
- International standards are adopted where possible so that
 - the Australian health technology sector can supply global markets
 - Australia can access globally developed products
 - Australian healthcare organisations can reduce costs associated with localising and customising global products.
- Agreed APIs are accepted as the key technical structure for interoperability in Australia and are used for health information exchanges across the care continuum. The national API Gateway is resilient, scalable and flexible, with simplified consumer interaction that supports frictionless data sharing between parties.
- Stakeholders easily and regularly access a well-maintained standards catalogue that contains a list of endorsed and recommended standards and specifications for digital health. These are profiled in terms of the use cases they have been defined for.
- Implementation guidance material (handbooks, profiles, patterns, technical guidance) exists and is regularly accessed to support standards implementation.
- All systems that integrate with national health systems and services adhere to conformance rules and are reassessed when software is enhanced.
- Cloud platforms are used in line with contemporary architectures and the DTA's Secure Cloud Strategy.²⁶

5.4 Implementation actions

Interoperability standards are a critical enabler for semantic, structural and technical interoperability between all systems across the Australian health landscape. Table 5.1 outlines actions that have been identified as priorities for the adoption of interoperability standards and to transition towards the proposed future state. Given the number of stakeholders affected by these actions, implementation will involve consultation and co-design, particularly with the health technology sector and clinical groups. It will be the responsibility of the lead organisation to engage with stakeholders in progressing these actions, as they will need to draw on stakeholder experience and expertise to be successful.

²⁶Digital Transformation Agency, [‘Secure cloud strategy’](#), 2021, accessed 17 May 2022.

Table 5.1: Actions for priority area 2 – Standards

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 2.1 – Terminology in digital health systems Engage with the health technology sector and health departments to enhance digital health systems to integrate national terminologies and classifications natively.	The Agency	Ongoing
ACTION 2.2 – Develop specifications and standards Engage with the health sector on the development, selection, use and maintenance of specifications and standards that support the Agency's approved priorities. When required, Agency-developed specifications will be progressed to become standards through the appropriate standards development organisation and their balloting/development processes.	The Agency	Ongoing
ACTION 2.3 – HL7 FHIR® AU usage Develop and expand on HL7 FHIR® AU Base 4 for all Agency and Healthdirect digital health systems and services, including modifications and new systems.	The Agency Healthdirect	Ongoing
ACTION 2.4 – International standards participation Support Australian participation in international standards development.	The Agency Australian Institute of Health and Welfare	Ongoing
ACTION 2.5 – Standards catalogue Develop and implement a national digital health standards catalogue as a user-friendly access point for digital health standards.	The Agency	Immediate
ACTION 2.6 – National Digital Health Standards Program (NDHSP) Implement the NDHSP to develop a dynamic, comprehensive and collaborative digital health standards environment. This program will inform the need for and scope of national governance arrangements for standards.	The Agency	Immediate
ACTION 2.7 – Digital health standards guiding principles Develop and publish a set of national guiding principles for those developing or implementing digital health standards in Australia, in partnership with standards development organisations and the health technology sector.	The Agency	Immediate
ACTION 2.8 – Standards gap analysis Complete a gap analysis to prioritise the digital health standards that are required most urgently to accelerate the interoperability agenda.	The Agency	Immediate
ACTION 2.9 – Engage standards stakeholders Develop and maintain strong partnership ties with the health technology sector, standards development organisations and other key standards bodies.	The Agency	Immediate
ACTION 2.10 – Including terminology in datasets Coordinate discussions on expanding minimum datasets to incorporate the use of SNOMED CT-AU, AMT and LOINC for data not currently collected in areas such as medications, adverse reactions, pathology and radiology.	The Agency	Short
ACTION 2.11 – National library of terminology mapping Develop a national library of resources that provide translation mapping from national terminologies to other popular terminologies.	The Agency	Short

Immediate = within one year; short = 1–3 years

Table 5.1: Actions for priority area 2 – Standards (cont.)

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 2.12 – API information exchange Engage with the health technology sector to enhance digital health systems to use HL7 FHIR®, OAuth and OpenID Connect for API information exchanges.	The Agency	Short
ACTION 2.13 – Develop a conformance framework Engage with stakeholders to develop a conformance framework and associated conformance rules for national digital health systems and services.	The Agency	Short
ACTION 2.14 – Standards development cooperative Establish a cooperative of developers working to expedite the development of new digital health standards, with a suitable operating model.	The Agency	Short

Immediate = within one year; short = 1–3 years

SECTION 6

PRIORITY AREA 3 – INFORMATION SHARING

Increased sharing of information between healthcare providers improves decision-making and outcomes by helping to reduce clinical risks and inefficiencies.²⁷

Information sharing in the Interoperability Plan refers to sending, receiving, discovering and accessing information. Sharing information is a complex process that requires knowing:

- that a piece of information exists
- who it is about
- where it is located
- how to access it
- whether there is authorisation to share it.

Currently, the Australian health system is not a connected interoperable system that consistently identifies healthcare providers and individuals, associates information with healthcare providers and individuals, notes the location of the information, or captures how information can be accessed and who is authorised to access it.

In the Australian healthcare sector, information is often not shared. This leads to repeated requests and procedures, and decisions made without access to all information. When information is shared, there are three common models by which information is exchanged:

1. **Individual as a courier** – where the individual carries the information from one healthcare provider to another. This could be in a folder with papers and images, or in digital format on a phone or laptop. However, this requires that the individual has all the information needed and can determine when it is important to raise it.
2. **Point to point** – an exchange between healthcare providers, and between healthcare providers and individuals. If a healthcare provider is not part of a particular exchange between providers (for example, referral to a specialist or a discharge summary sent to a GP), it is very difficult for them to know that it took place or to see the information that was exchanged.
3. **Point to share** – an exchange in which a healthcare provider or individual sends information to a shared exchange platform, where it can be accessed by other healthcare providers and the individual. Examples include sharing information across an individual's care network and uploading information to the My Health Record system.

Relying on the first two of these models limits the ability of healthcare providers to comprehensively discover information about an individual, and the ability of an individual to access their own information. This can affect the care they receive and their participation in managing their health.

²⁷ Nordic Co-operation, [eHealth Standardisation in the Nordic Countries](#), Nordic Council of Ministers, 2019.

In theory, the simplest approach would be to store a copy of all information in a central national repository. However, this is not practical because there are limits to what can be stored nationally, and there are heightened security risks to manage from such an approach. This is due to the massive volume of health information that exists and is generated; the variability of privacy laws between jurisdictions; the need for minimum datasets, data structure and standards; the significant system changes required across the entire healthcare system; and jurisdictional and national healthcare legislative requirements.

An environment that encourages convenient and effective information sharing must:

- have a method for discovering that a piece of information exists, who it is about, where it is located, how to access it, and whether there is authorisation to access and share it
- recognise the individual's right to decide who has access to their information
- adhere to legislation and community expectations in relation to privacy and authorisation to access and share information
- ensure the information exchange is secure
- ensure the data integrity of the information is protected from corruption or modification
- provide assurance of the provenance of all information exchanges
- acknowledge that there are numerous sources of health information, including traditional sources such as healthcare providers, but also personally owned information (in apps and on digital devices) and platforms such as Google Health and Apple Health
- recognise the healthcare provider's right to withhold information if it is in the best interests of the individual and in accordance with professional standards.

The My Health Record system embodies these features. The *My Health Records Act 2012* (the primary legislation underpinning the system) was developed through a rigorous process involving extensive consultation and public debate. It prescribes requirements around information handling, security and privacy. It represents a model that could enable future exchanges of information directly between organisations and through discoverability.

Information sharing is predicated on different levels of interoperability known as structural and semantic interoperability, which is further defined in Priority Area 2 – Standards.

6.1 The case for reform

The Australian healthcare system is highly decentralised, with information captured by many government and non-government healthcare provider organisations.

6.1.1 Information discoverability

When a healthcare provider sees an individual, the provider should have a full view of clinically relevant information that is easy to access to deliver efficient and effective care. In the current healthcare setting, this data is often not visible, discoverable or interoperable, and the healthcare provider is forced to make decisions without all the required information.

The Australian Commission on Safety and Quality in Healthcare highlighted the clinical risks and inefficiencies arising from the lack of information sharing between health services:

“Important information about patients’ medical histories on admission to acute hospitals cannot be accessed. Hospitals often compensate for this lack of information by repeating patient assessments and investigations on admission. This practice leads to increased cost, delays and frustration on the part of patients and clinicians. Safety risks are increased when clinicians have incomplete medical histories, and when patients undergo unnecessary repeat investigations.”²⁸

Healthcare providers are generally limited by the health information within their clinical information system and what is available in the My Health Record system. The My Health Record system provides discrete summary information received from many sources. It is not intended to replace the digital health information systems and databases that store the full range of health information generated in providing healthcare to individuals.

Emergency departments and other specialists report that accessing images was a source of substantial frustration. Where images were not available, it was not uncommon for imaging to be repeated. This results in potential harm to the individual due to unnecessary radiation exposure, as well as the associated cost and time burden. During consultations, providers noted that simply being able to identify which practice performed a diagnostic process would be a significant step forward, enabling them to request a result.

6.1.2 Privacy and authorisation to access and share information

While there are strong general privacy provisions in federal, state and territory privacy laws, these are not well understood or translated for the health sector. Information sharing and access controls need to be managed in a way that the community would expect and be able to be applied in practice when exchanging sensitive health information.

Common access policies will enable health system-wide access to health information that is distributed over multiple systems, including emerging mobile health (mHealth) systems. From an individual's perspective, trust is a key characteristic of a connected interoperable system, given the personal and intimate nature of the information that may be shared. Without a digital consent service that supports all health information, there is a risk that information that an individual may not want shared, such as that relating to sensitive medical conditions, will be shared between health service providers. Australians expect to be in control of who is looking at their personal health information, and this will need to be recognised in digital health models of care.

A GDHP white paper on interoperability notes that a foundational element to ensure good interoperability outcomes is “the understanding that the sharing of data, and the delivery of treatment reflects the wishes and consent of the patient – ensuring that no data is shared, or treatment undertaken, without the express consent of the patient and their carers”.²⁹

²⁸ Australian Commission on Safety and Quality in Healthcare, [Safety Issues at Transitions of Care](#), a consultation report on pain points relating to clinical information systems, 2017, p. 8.

²⁹ Global Digital Health Partnership, [Connected Health: Empowering health through interoperability](#), GDHP White Paper on Interoperability, 2019.

6.1.3 Information sharing, including across borders

Information sharing is not just about sharing documents. Medical devices (for personal use and self-monitoring) and wearables capture a vast amount of observational data that is stored in siloed repositories that are not readily available or accessible. Across the world, the amount of data within the health system is growing exponentially. This health data, which is generated by individuals, should be translated into meaningful information that can be shared for permitted purposes and proactively used to support consumers' health and wellness. Individuals and healthcare providers should also be able to access this and other healthcare information.

A Productivity Commission report on innovations in care for chronic conditions noted that information flows across the health system are fractured.³⁰ For example, 45 per cent of GPs are not informed about an individual's treatment in hospital before that individual sees the GP for follow-up care. From the case studies examined, the Productivity Commission noted that improving information flows enhances nearly every aspect of healthcare. The case studies included using data to identify people at risk of hospitalisation, so they receive care before their health deteriorates; and using reports to alert healthcare providers to potential medication safety issues or individuals who require periodic reviews.

The ease with which information can be shared and understood across state and territory borders has been a key challenge across the Australian health sector. An individual may travel across state or territory borders for treatment, but digital cross-border information sharing does not always occur. This issue has been highlighted as Australia has responded to the COVID-19 pandemic. It is imperative that information can flow freely across borders (and potentially international borders) to support the response to COVID-19 and future emergency health situations.

Australia's federated structure and distribution of powers must be considered for the interoperability of information and the delivery of digital health systems. Each state and territory has its own parliament empowered to pass laws governing the handling of personal information (including health information), which is in addition to Australian Government legislation (for example, the *Privacy Act 1988*).

The current legislative environment presents potential barriers to jurisdictional information sharing, including:

- inconsistent (or non-existent) definitions within legislation for key concepts needed to support interoperability (for example, consent, personal information and health information)
- divergence in the level of disclosure required when collecting health information at national, state and territory levels
- divergence about how and when information can be used and disclosed
- lack of a regulatory framework to support and advance interoperability and digital health systems, including agreement on standards, legislation and overall approach.³¹

³⁰ Productivity Commission, [Innovations in Care for Chronic Health Conditions](#), a productivity reform case study, 2021.

³¹ Australian Digital Health Agency, *Legislative Impediments to Interoperability*, 2020 (unpublished).

There are increasing intergovernmental efforts to reform cross-jurisdictional data and digital platforms, services and protocols, as reflected in the formation of the Data and Digital Ministers' Meeting and the Intergovernmental Agreement on Data Sharing between Commonwealth and State and Territory Governments. The purpose of the agreement is to share public sector data where it can be done securely, safely, lawfully and ethically, in recognition that data is a shared national asset that can support better policies and services for Australians.

Australians expect to be in control of who is looking at their personal health information.

6.1.4 Procurement

In Australia, there is a lack of guidance material and reference information to support healthcare providers acquiring or building new digital health systems. This includes a national repository of standards, forums to share ideas and lessons learned, and national minimum standards for digital health technologies. The United Kingdom recently introduced national minimum standards for digital health technologies. Software solutions are assessed against these standards to support healthcare provider organisations in procuring solutions.³²

Tender documents often lack interoperability-specific requirements, which limits the interoperability of chosen solutions. Procurement processes can be an effective policy lever for promoting interoperability because they can directly influence behaviours in the market and the health technology sector, particularly when implemented at scale. In seeking value for money, the procurement process should consider the impact on suppliers, support a competitive and efficient health technology sector, and recognise the cost of new technology and meeting contemporary standards. Undertaking initial market research is a way to assess the capability, maturity or competitiveness of the Australian and international software market to meet interoperability standards in the technology solutions sought. Major projects under the Australian Industry Participation National Framework are required to provide opportunity for capable and competitive Australian industry to participate.

There is an opportunity for jurisdictions to improve procurement that involves a common approach to the architecture and requirements for system interoperability. Examples include:

- sharing common interoperability terms and conditions for tender/contract documents
- developing a standards catalogue that is searchable by subject areas to support product procurement
- sharing existing guidance documents, such as interoperability standards and protocols used to inform procurement.

The longer the delayed shift to a standards-based interoperable healthcare eco-system the greater the difficulty of ever achieving this goal because, in the meantime, each new investment decision adds to the cost of making the change.³³

³² National Health Service (United Kingdom), '[Digital technology assessment criteria](#)', accessed 17 May 2022.

³³ Clinical stakeholder submission to 2022-27 National Digital Health Strategy.

6.2 Current activities

Australian initiatives that are facilitating information sharing and enabling information to be securely exchanged between healthcare providers and individuals include the following:

- **Modernisation of the My Health Record infrastructure.** The Agency is mapping out enhanced functionality for the My Health Record system that could be leveraged to support national digital health capability. This work includes the feasibility of a national service to support the federated discoverability of clinical information to reduce the time spent searching for and retrieving information.
- **Digital technology enhancements to aged care.** The Royal Commission into Aged Care Quality and Safety recommended that the aged care sector universally adopt digital technology and the My Health Record system. The Agency has established a dedicated Aged Care Program to implement the government's response to this recommendation.
- **Secure exchange of data.** WA Primary Health Alliance (WAPHA) is working with GPs and WA Health to facilitate the exchange of secure data between WAPHA, GPs and the department. Initial delivery will focus on digital imaging.
- **Integrated real-time active data (iRAD).** The South Western Sydney Primary Health Network iRAD project enables clinicians to access and share critical patient data between hospitals, general practice and other connected healthcare professionals, resulting in informed decision-making and high-quality patient outcomes.
- **National Approach to Genomic Information Management (NAGIM) Blueprint.** The NAGIM Blueprint describes principles to guide decision-making on the responsible collection, storage, use and management of genomic data. The NAGIM Blueprint is available to the public to support implementers working in jurisdictional health agencies and research groups across Australia.
- **Primary healthcare data and the use of electronic clinical decision support (eCDS).** The Australian Government Department of Health and Aged Care is undertaking a consultation process to inform thinking around primary healthcare data and the use of eCDS systems in primary healthcare.
- **My Health Record system**
 - Clinical document categorisation has introduced subtypes within existing My Health Record document types and a new Diagnostic Report that will enable uploading of additional health information and support healthcare providers to easily discover clinically relevant content.
 - The Aged Care Transfer Summary (ACTS) will summarise a residential aged care facility resident's health information (for example, medicines information and advance care planning) to support clinical handover of care to a hospital or another residential aged care facility.
 - The Health API Gateway Service will provide a single point of access to digital health systems and services across the Australian digital health ecosystem (where appropriate). The service will be integrated in a range of digital channels

– including clinical systems, web portals and mobile apps – to enable the seamless exchange of information across the healthcare system. A service catalogue and developer portal will support access so that developers understand the APIs on offer and how to implement them.

The United States introduced the 21st Century Cures Act and resultant rules against information blocking. This shows the global trend towards not only promoting interoperability, but also towards penalising systems and organisations that do not enable the appropriate sharing of clinical information. Given that many of our hospital-based clinical systems are developed by United States companies and are therefore subject to United States laws, Australia should benefit from changes that software providers need to make to comply with these laws.

6.3 Future state

A mature interoperable healthcare system with safe and secure sharing of health information has the following features:

- The National Digital Health Infrastructure Modernisation program is delivering a more secure and sustainable system. Information is readily available through a services catalogue so that developers and users can innovate, expand capabilities and services, and support national interoperability.
- Information flows freely and securely across state and territory borders, and aligns with privacy, legislative and consent requirements. Individuals understand how their information is used and how to manage access to it, and are confident in its uses. When authorised, relevant health information may flow internationally (for example, to support proof of vaccination or test results when travelling), in accordance with current privacy regulations.
- When new information about an individual is created, the publisher of that information makes the information discoverable.
- All internal and external health information exchanges are digital. They use national healthcare identifiers and agreed national terminology, and conform to national digital health standards. They adhere to authorisation, consent and privacy requirements.
- A healthcare provider can make a request to an integrated service to discover the available health information about an individual.
- A national discoverability service developed by the Agency is used to discover information on individuals, including in instances where information is not automatically retrievable. The requestor has the ability (for example, by using metadata) to request the information directly from wherever it is held, in the form permitted by the holder of the information (for example, through a URL, an API, a health service's contact details or a repository).
- The My Health Record system continues to be a key component supporting information sharing by healthcare providers and individuals. It will evolve with the use of an API Gateway for enabling new information sources and standards-based formats (including HL7 FHIR®) to be used for integration.
- Procurement of digital health systems includes consistent interoperability requirements and adheres to national minimum standards for digital health technologies.

- All requests for tests, procedures, referrals and consultations are electronic and use an electronic requesting service.
- The Agency-hosted interoperability toolkit is regularly maintained and frequently used by organisations to contribute to and learn from the knowledge base. This facilitates delivery of interoperable digital health solutions that underpin clinical and business workflows. Mobile apps exchange information with clinical information systems and/or repositories, allowing healthcare providers and individuals to readily access information, and enabling individuals to manage access to their health information.
- Individuals can identify the people and organisations involved in their care (both formal and informal) and permit them to access their information based on their personal privacy preferences.
- Digital consent management gives individuals user-friendly digital methods to provide or revoke their consent and to identify all instances of access to their health information.
- Information exchanges between healthcare providers and individuals are safe, seamless and secure, sent directly or through one or more secure messaging providers.³⁴
- Each organisation holding personal health information uses a single common agreement that stipulates the terms and conditions for sharing and acquiring information from other organisations. This would include software providers, contracted service providers and healthcare provider organisations.
- Consistent legislation across jurisdictions supports information sharing within Australia.

6.4 Implementation actions

A connected interoperable healthcare system relies on safe, convenient and secure sharing of information across healthcare providers and individuals, and is easy to use and effective for all participants. Table 6.1 outlines actions that have been identified as priorities for reforming and transitioning the healthcare system to the proposed future state. It will be the responsibility of the lead organisation to engage with stakeholders in progressing these actions, as they will need to draw on stakeholder experience and expertise to be successful.

Table 6.1: Actions for priority area 3 – Information sharing

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 3.1 – Interoperability in procurement The Agency, health departments and Services Australia will specify interoperability requirements in procurement requests where they meet business objectives. This will leverage existing national infrastructure, terminology and standards.	The Agency All health departments Services Australia	Ongoing
ACTION 3.2 – API Gateway information exchange Promote the use of the API Gateway to support interoperable information exchange, including development of a service catalogue.	The Agency	Ongoing

Immediate = within one year; short = 1–3 years

³⁴ Australian Digital Health Agency, [‘What is secure messaging?’](#), accessed 17 May 2022.

Table 6.1: Actions for priority area 3 – Information sharing (cont.)

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 3.3 – Procurement guidance Establish an intergovernmental working group to harmonise procurement and use of standards, based on best-practice approaches to interoperability requirements for information and communications technology system procurement.	The Agency	Immediate
ACTION 3.4 – Online interoperability toolkit Develop and maintain an online interoperability toolkit that provides practical guidance, lessons learned, case studies, data dictionaries, terminologies, common specifications, frameworks, and a library of exemplars and reusable components, including implementation guides.	The Agency	Immediate
ACTION 3.5 – GP and aged care facility interoperability Assess the current interoperability between GP and residential aged care facility systems, identifying issues, requirements and potential solutions to resolve issues.	The Agency	Immediate
ACTION 3.6 – Consent management Engage with consumers to investigate options for enabling individuals to grant consent to access all their health information, across a range of healthcare systems. Options will include making it easier to choose which healthcare providers are authorised, and the types of information they can access.	The Agency	Short
ACTION 3.7 – Research international practice Assess the United Kingdom national minimum standards for digital health technologies and similar international policies to inform consultation on Australian approaches.	The Agency	Short
ACTION 3.8 – Care management network Investigate opportunities to build capability to identify and manage individuals within a consumer's formal and informal care management network.	The Agency	Short
ACTION 3.9 – Information-sharing model agreement Collaborate with stakeholders on the development of a model agreement to be used by organisations holding personal health information. This will specify the terms and conditions for sharing, discovering and acquiring information from other organisations. It will cover privacy, security, access controls, patient data rights, technical specifications and intellectual property rights.	The Agency	Short
ACTION 3.10 – Publish–subscribe service Develop a business case for a national publish–subscribe service to support actions such as alerts for changes to an individual's health information and notifications of acute episodes. This would be available to individuals, healthcare providers and healthcare provider organisations.	The Agency	Medium
ACTION 3.11 – Consistent legislative health definitions Collaborate with jurisdictions and key stakeholders to develop consistent definitions to support health information sharing.	The Agency	Medium
ACTION 3.12 – Harmonising legislation Undertake collaborative intergovernmental work on harmonising relevant jurisdiction legislation, drawing on outcomes from Action 3.11.	All health departments	Medium

Immediate = within one year; short = 1–3 years

SECTION 7

PRIORITY AREA 4 – INNOVATION

Interoperability is a key foundation of the healthcare environment that encourages and enables the healthcare industry to develop innovative products and services that enhance digital functionality. Ultimately, this will support the delivery of new digitally enabled models of care that place individuals at the centre of their healthcare experience.

7.1 The case for reform

The foundations of interoperability (identifiers, consent, privacy, information discoverability, access, digital health standards and terminology) individually and collectively create the opportunity for widespread healthcare innovation. Including these interoperability foundations in future digital health initiatives will have a cumulative “network effect” that makes it easier to connect to and derive value from the wider digital health ecosystem. This will result in a stronger, more effective healthcare system and better health outcomes.

Some individuals and communities continue to face challenges regarding access and use of digital technology in healthcare. Digital literacy and inclusion policies are required to realise the benefits of digital technology in an equitable way. Work on the 2022-27 National Digital Health Strategy has identified digital inclusion and digital literacy as crucial elements to enable consumers and carers to navigate the health system.

If technology is to effectively transform models of care, interoperability is essential.³⁵

Important contributors to innovation will be knowledge and understanding of the foundations of interoperability, and a skilled workforce that can implement interoperability in clinical information systems to improve clinical practice.

Building a workforce that can confidently use digital health technologies to deliver healthcare is a strategic priority of the National Digital Health Strategy. The National Digital Health Workforce and Education Roadmap outlines the digital capability requirements of all those involved in the healthcare system.

The workforce required for standards development, system architecture and software development (APIs, HL7 FHIR®, and so on) is highly specialised. This workforce needs to grow and have access to ongoing education and training to keep up with the pace of technological change. There is also a need for trained health managers and clinicians who can bridge the gaps between clinical care and digital technology.

³⁵ A Brown, *Reimagining Healthcare in Australia: The journey from telehealth to 21st century design*, Digital Health CRC, 2021, p. 56.

The Australasian Institute of Digital Health, in partnership with the Agency, is developing a Capability Action Plan to progress the National Digital Health Workforce and Education Roadmap. This includes developing a digital health capability framework and an assessment framework for organisations to assess their workforce capability and readiness for change. A range of supporting materials will be developed and made available through an online Digital Health Hub. This work could consider how to support general education for health professionals on concepts that support interoperability, as well as skills and resources required for the more specialist workforce that designs and builds interoperable digital health systems.

General awareness and understanding should be promoted through easy-to-read guidance and educational material on implementing interoperability, and by creating an environment in which software providers and healthcare providers can innovate.

Events such as innovation challenges and “connectathons” that focus on interoperability can support innovation by encouraging new ideas and development of new digital technologies.

7.2 Current activities

Across the Australian health landscape, numerous initiatives are helping to increase the interoperability of the healthcare system.

Healthcare stakeholder initiatives include the following:

- **ACSQHC’s AS18/11 advisory on the My Health Record system.** The ACSQHC introduced Actions 1.17 and 1.18 to drive healthcare provider organisations towards implementing systems that can enter clinical information in the My Health Record system that³⁶
 - is designed to optimise the safety and quality of healthcare for individuals
 - uses national individual and healthcare provider identifiers
 - uses standard national terminologies.
- The Australian Government’s 2021-22 Budget announced \$7.2 million for the Modernisation of Diagnostic Imaging (MODI) project to develop an integrated electronic diagnostic imaging referral system. The project will draw on work by the Agency on electronic requesting and user experience mapping, and on the Royal Australian and New Zealand College of Radiologists white paper *Towards Interoperability: Clinical Radiology Forging the Path Ahead*.

Agency-led initiatives include the following:

- **Electronic prescribing.** This initiative was undertaken with the Australian Government Department of Health and enables secure transmission of electronically generated prescriptions to a prescription delivery service, for dispensing and supply using dispensing software. The implementation of electronic prescriptions gives individuals and healthcare providers greater accessibility and convenience. This is particularly beneficial in the current environment because COVID-19 restrictions made it more difficult for people to access medicines, and COVID-19 has increased the risk of spreading infection through GP waiting rooms and in community pharmacies.

³⁶ Australian Commission on Safety and Quality in Healthcare, [Advisory: Implementing systems that can provide clinical information into the My Health Record system](#), 2019; Australian Commission on Safety and Quality in Healthcare, [‘National Safety and Quality Health Service Standards: Action 1.18: Healthcare records’](#), 2019, accessed 17 May 2022.

The foundational interoperability considerations that are incorporated within electronic prescribing include:

- national healthcare identifiers
- use of national terminology standards (such as the AMT)
- NASH authentication
- HL7 FHIR® profiles and resources
- key frameworks (regulatory and technical) that were developed to enable the safe and secure use of electronic prescriptions.
- **Information discoverability.** This will identify what information is available to be discovered, who wants to discover it, where it is located (for example, a data repository), and its format (for example, HL7 FHIR®, HL7 CDA, PDF or HTML). The ability to find records of previously performed or requested diagnostic tests and results (including diagnostic images) for areas such as pathology and radiology would be a significant step forward in driving interoperability across the healthcare landscape and improving the delivery of care.

This initiative will leverage core interoperability components such as

- agreeing and implementing national digital health standards (including terminology, access, security, privacy and authorisation)
- national healthcare identifiers
- My Health Record system
- information exchange standards, including HL7 FHIR®.

7.3 Future state

A mature interoperable system will drive innovation and make it easier to connect to and derive value from the wider digital health ecosystem. This will result in stronger, more effective healthcare in which:

- interoperability is a well-accepted and widely adopted function of all digital health systems
- healthcare providers and software providers can leverage foundational interoperability components to innovate new digitally enabled models of care (for example, mHealth) and incrementally improve digital health maturity
- operational, demographic and financial information (including interaction metadata) is used to identify best practice and innovative models of care to drive improved health outcomes
- innovative solutions consider the targeted cohort and relevant constraints and limitations (for example, digital literacy, access to technology and capacity) to ensure that vulnerable populations are not marginalised by new digitally enabled models of care
- people and change capabilities are delivered to drive the uptake and wider adoption of innovative digital models of care, and ultimately to improve patient safety and quality outcomes
- innovation is a key focus of individuals, healthcare providers and software providers, and is supported by government and industry

- the health workforce is trained to understand the importance of interoperability and its practical application to improve healthcare delivery and integration.

The following are examples of future models of care enabled by interoperability:

- Individuals document their care management network and assign levels of information access that reflect each person's role in the care network. Importantly, the individual can be involved in managing the process and assign or revoke access by the care network.
- Healthcare providers can subscribe to certain kinds of information about their patients (with an individual's consent, where required), including observational data in which thresholds are met or exceeded.
- Image ordering screens automatically show a list of previous relevant studies.
- A prescribing screen shows previous medication events. When a medication is prescribed, it shows relevant diagnoses, conditions, pathology or contraindicated medications.
- The system can capture and discover an individual's medical implant history to support product recalls and clinical care decisions.
- Individuals can access and share their genomics data for pharmacogenomic purposes, to assess the effectiveness of medicines based on an individual's genomic makeup.
- Biosensing wearables and medical devices relay real-time information to healthcare providers, who proactively monitor the data and initiate changes to care based on this information.
- Individuals use mHealth technology to manage their care more effectively by booking appointments, communicating with healthcare providers, receiving referrals, ordering prescriptions, accessing and contributing to their medical record, and choosing who they share their record with.
- Patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) are used to understand patient perspectives on digitally enabled models of care and the interoperability components of that care.
- International healthcare is leveraged – for example, by requesting a second opinion from an international clinical service or by outsourcing services to other countries to support 24-hour service delivery.
- Australians are supported in their ageing journey with the latest evidence-based best practice. This includes innovative healthcare advances such as injectables, implantables (including simple implantables such as breast implants and prosthetics, and smart implantables such as pumps and pacemakers), digestibles, and augmented and virtual reality.
- As new digital technologies such as blockchain, digital identity and disease-detecting "precision health" monitoring devices are developed and mature, the Interoperability Plan is updated to reflect advances that can assist and drive healthcare system interoperability.

Future healthcare journey

The healthcare journey in Figure 7.1 is based on current and future state capabilities. It models a fictitious individual's experience, highlighting potential information sharing, new models of care, device monitoring, and integrated systems and services across the primary, acute and aged care sectors that could be enabled in a more interoperable health system.

Figure 7.1: Future healthcare journey

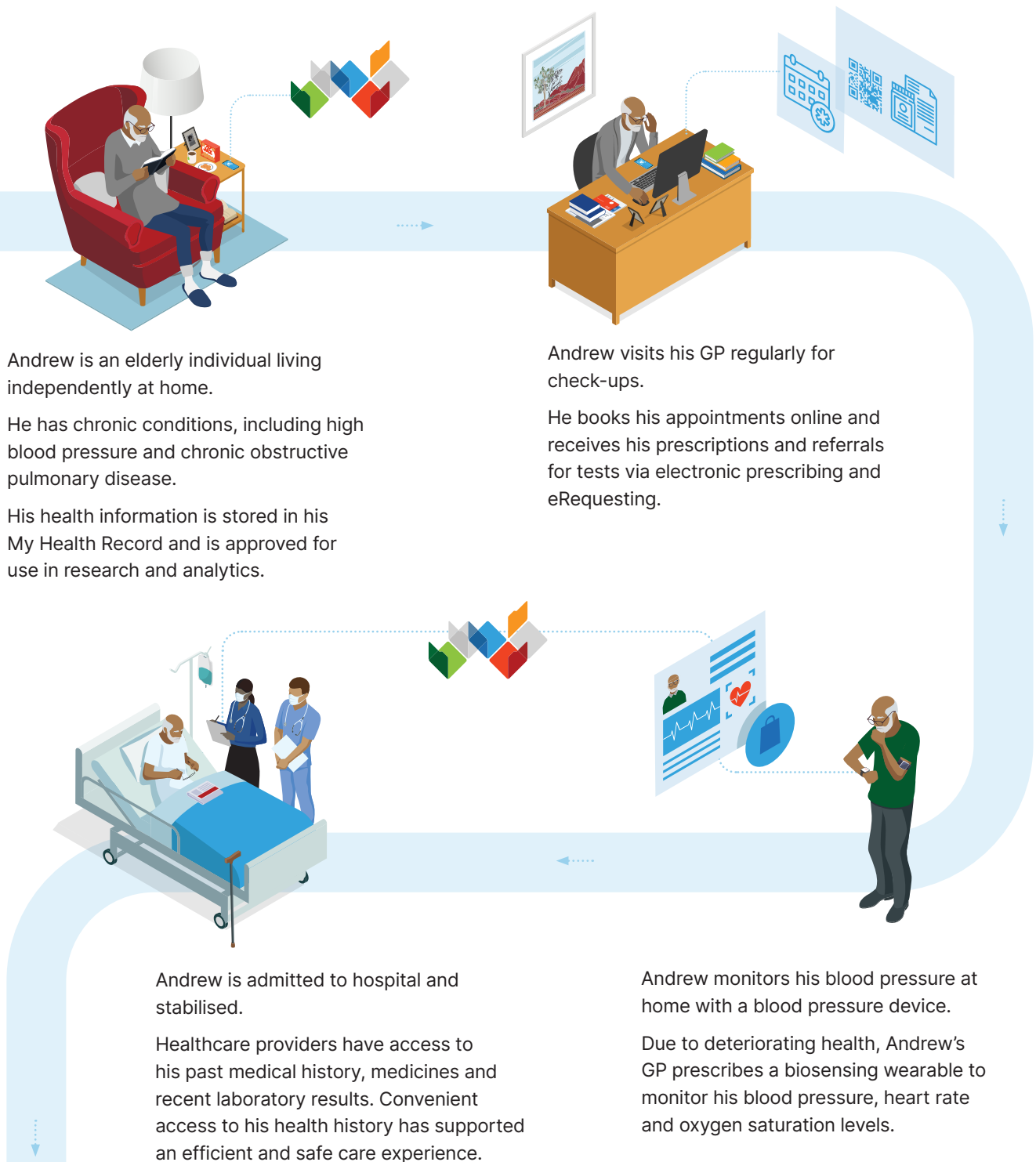
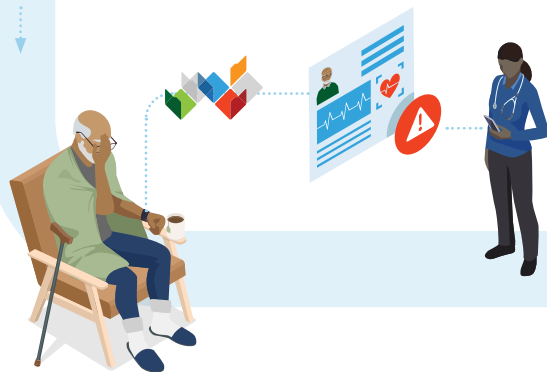


Figure 7.1: Future healthcare journey (cont.)



Andrew catches a virus.

His blood pressure becomes unstable and he is finding it difficult to breathe. His biosensing wearable detects his increasing blood pressure, erratic heart rate and decreasing oxygen levels.

Andrew's GP is notified via an alert, and an ambulance is called.



As time goes by, Andrew's health data flows seamlessly between My Health Record and other repositories. Andrew's GP is able to monitor his biosensing observations remotely.



Andrew meets his new GP, nurses and personal care attendants at his RACF.

His new GP is able to access his health information.



Back at home, Andrew visits his GP for a follow-up.

His recent admission to the hospital is documented and available to his GP. Due to his changing health conditions, Andrew agrees to move to a Residential Aged Care Facility (RACF).



Andrew can actively participate in looking after his health.

His medical information is regularly reviewed and shared among his care management team.

7.4 Future interoperability initiatives

During consultation with stakeholders on interoperability and on the 2023-28 National Digital Health Strategy, many potential use cases and digital technologies have been identified showing how digital health can transform the way healthcare is delivered, and how individuals can manage their health.

The 2023-28 National Digital Health Strategy and accompanying Strategy Delivery Roadmap will map digital health priority focus areas and initiatives that will transform the way Australians look after their health and wellbeing and access healthcare, leading to better outcomes for all. Work on the strategy has identified that a foundation change enabler for the health system is the development of connected, fit-for-purpose digital technologies and systems that safely and seamlessly share high-quality data with easily understood meaning.

Many of the digital health priorities and initiatives in the strategy and delivery roadmap will rely on the principles and actions in the Interoperability Plan, and at the same time build the capacity for a more interoperable health system. Some of the key initiatives that will be a priority in the Agency workplan include the following:

- **Primary care/acute care near-real-time data sharing.** This initiative will look at key pain points experienced in transitions of care between primary care and acute settings. It will consider such areas as data silos and differing levels of maturity with respect to information exchange capabilities. Future digital health solutions will improve interoperability and patient outcomes through co-design to enhance exchange of, and access to, information during transitions of care and clinical insights achieved from the near-real-time sharing of data.
- **National Digital Health Infrastructure Modernisation.** The Agency has commenced a multi-year program of re-platforming the My Health Record system that will also deliver national infrastructure that can be used across the digital health ecosystem. This started with the building of an API Gateway and service catalogue that will make it easier to develop and access APIs and improve information access and use. Proposed infrastructure enhancements across the health ecosystem include a new MHR data platform which will transition MHR from being a clinical document system to a data-rich platform that supports Fast Healthcare Interoperability Resources (FHIR) data formats and repository services. Further initiatives, which are subject to government consideration, include support for a national health information exchange platform and data analytics capability.
- **Pregnancy and Child Digital Health Record.** The Agency is developing a workplan to build out the Pregnancy and Child Digital Health Record program beyond the initial proof-of-concept work undertaken by the National Children's Digital Health Collaborative. This includes evaluating the feasibility of including child health data in the My Health Record system, in alignment with the Agency's plans to deliver a modernised, HL7 FHIR®-enabled API gateway and national infrastructure components. This infrastructure would leverage the significant investment to date in the collaborative, utilising the nationally agreed, harmonised dataset for pregnancy and child health information, and reusing and enhancing the HL7 FHIR® resources initially developed as part of the proof of concept.

- **Aged care reforms.** The Agency has commenced a program of work to build digital capability in aged care residential facilities, increase the use of the My Health Record system, and identify ways to improve the interoperability between GP and aged care clinical information systems. This program is in response to the Aged Care Royal Commission recommendations that called for the development of an integrated system for the long-term support and care of older people, improved data on the interaction between health and aged care, and greater participation in the My Health Record system.

7.5 Implementation actions

Table 7.1 outlines the actions that have been identified as priorities for a connected interoperable healthcare system that supports and encourages innovation in digital health products and functionality, and digitally enabled models of care. It will be the responsibility of the lead organisation to engage with stakeholders in progressing these actions, as they will need to draw on stakeholder experience and expertise to be successful.

Table 7.1: Actions for priority area 4 – Innovation

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 4.1 – Interoperability innovation challenges Run interoperability innovation challenges and “connectathons” to encourage interoperability.	The Agency	Ongoing
ACTION 4.2 – Interoperability workforce Implement the National Digital Health Workforce and Education Roadmap to support the workforce required to progress interoperability.	The Agency Australasian Institute of Digital Health	Ongoing
ACTION 4.3 – Develop education content Develop education content in partnership with users to increase awareness of interoperability.	The Agency	Immediate

Immediate = within one year

SECTION 8

PRIORITY AREA 5 – BENEFITS

The benefits of a fully interoperable health system fall into four broad categories:

- **Enhanced patient experience** – individuals could receive faster and more accurate treatment, which reduces clinical burden (for example, by avoiding unnecessary duplicative tests and administrative tasks). They would also gain better access to their own data, empowering them in their own care.
- **Improved safety** – meaningful data would be shared across digital systems. This could prevent errors and avoid hospitalisations that might arise when vital information (for example, about allergies, medications or pre-existing conditions) is not available. Greater interoperability of data supports easier analysis to identify the causes of medical errors to remediate issues and prevent future errors.
- **Increased productivity and reduced costs** – in addition to cost savings from reduced medical errors and safer care, interoperability saves time during provider–patient and provider–provider encounters by ensuring that the right individual and provider data are available at the right time, every time.
- **Improved data for health research and practice** – interoperability supports more accurate collection and analysis of health data for both research and innovative healthcare delivery. Digital technologies like artificial intelligence, machine learning and big data analytics (such as data harvesting and data mining) can improve healthcare through access to searchable, structured and standardised data. Sharing information and creating national datasets could pick up important signals in near real time, such as clusters of unusual disease appearing in hospitals, emergency departments or primary healthcare.

To realise these benefits, it is important to understand and improve the digital health maturity of the participants and providers involved in an individual's healthcare journey.

8.1 The case for reform

Improving digital health maturity – and health outcomes as a result – has been a long-term objective within the Australian health system. Being able to measure digital health maturity is a cornerstone for continuous improvement in a high-performing system.

It is generally acknowledged that there is a concerning lack of interoperability in Australia's digital health system. However, national data is not collected on a consistent basis to measure the nature and extent of the problem or whether progress has been made to improve digital maturity.

Australian healthcare systems are at different stages of digital maturity but the use of digital systems to support healthcare delivery is becoming more common. Improving digital maturity will accelerate digital transformation that supports better health outcomes and patient-centred care. It is important to understand the digital health maturity of the participants and providers involved in an individual's healthcare journey

when exploring future interconnected solutions. Measuring Australia's digital health maturity – particularly the interoperability of the healthcare system – will provide insights that healthcare provider organisations could apply to inform improvements and decision-making.

The key domains important for a digital health maturity model include:

- **leadership and governance** – strong leadership in digital health to increase digital maturity and optimise healthcare system performance, quality, safety and efficiency; and governance to enable accountability and ease decision-making
- **workforce capability** – organisational policies and processes to drive workforce capacity and competency, change capabilities, and ensure continuous improvement, workforce development and business continuity
- **interoperability** – adoption of the core components of an interconnected healthcare system, including standards, identifiers, terminology, conformance, consent, exchange specifications and privacy
- **technology (infrastructure, architecture and security)** – tools, networks, hardware and software that are available and maintained to support interoperability across platforms and integration of data repositories and systems
- **patient engagement** – enabled through innovative patient-centric approaches to deliver population health capabilities and patient-centric models of care
- **health sector coverage** – maturity assessment that considers all health providers, including service provider groups, jurisdictions, regional health services and social services
- **benchmarking** – the ability to benchmark digital health maturity against peers.

Digital health maturity models can be used to:

- identify key strengths and gaps in healthcare providers' ability to operate digitally at the point of care
- inform future actions and investment decisions to achieve transformational goals
- provide evidence on digital health maturity progress
- allow healthcare providers to evaluate their progress and conduct benchmarking with peers
- identify digital health system leaders
- assess compliance with maturity measures and specific digital health targets
- measure improvements in health outcomes as a result of increases in digital health maturity.

It is unlikely that a single maturity model will be appropriate to cover the requirements of all healthcare provider organisations, especially when they operate in different settings of care and at different scales.

Measuring interoperability is a key domain in a digital health maturity model. There are two main approaches for measuring interoperability:

- **Maturity measurement** – apply a comprehensive maturity measurement model in which a range of domains are assessed against maturity levels and an overall measure is assigned. Examples include the Healthcare Information and Management Systems Society (HIMSS) maturity models and the Victorian Department of Health's Digital Health Maturity Model.

- **Key performance indicators (KPIs)** – use a limited number of KPIs to track selected domains of interoperability as a form of program monitoring. Surveys are a common means of monitoring digital health reforms.

Examples of interoperability maturity measurements are also available internationally. In the United States, the Office of the National Coordinator for Health Information Technology (ONC) has captured a time series of metrics at a national level from acute hospitals and office-based physicians to assess improvement in key interoperability measures (finding, sending, receiving and using patient summary information from external sources). These metrics enable the ONC to report annually on progress in adopting interoperability. Between 2014 and 2019, the proportion of United States hospitals that could electronically find patient health information from sources outside their healthcare system increased from 48 per cent to 75 per cent.³⁷

Maturity models and an interoperability survey will provide the tools to measure the progress and overall impact of the Interoperability Plan, in addition to evaluating and measuring the benefits of individual projects intended to improve interoperability. The results of the survey will inform and help prioritise more detailed analysis and investigation of strategies to improve digital maturity. Several KPIs from the survey will be used to benchmark and track progress over time on interoperability.

The Agency is developing a new benefits framework that will be applied to the actions implemented by the Agency. This framework looks at benefits in terms of patient experience, efficiency, safety and quality.

While achieving a fully interoperable healthcare system is challenging and complex, improving interoperability could deliver significant and wide-ranging benefits for Australians and for the healthcare system.³⁸

The West Health Institute examined the benefits that interoperability would bring to the United States health system.³⁹ Its 2015 analysis identified an estimated US\$36 billion in annual waste due to lack of interoperability and commonly implemented standards. It identified four primary activities that would be improved by greater interoperability and shared standards: improved quality of care through fewer adverse events; reduced cost of care through avoiding redundant testing; increased clinician productivity due to spending less time manually entering information; and greater capacity to treat more patients due to shorter lengths of stay.

The health technology sector plays a key role in increasing the digital health maturity of the healthcare system. This industry provides most digital health products, so it is in a significant position to incorporate interoperability into these products, which will further encourage healthcare providers to try new interoperable technologies for digitally enabled models of care. The health technology sector would benefit from clearer guidance and information on standards to support interoperability. Actions under the Interoperability Plan to provide tools and guidance will help the health technology sector to innovate, increase productivity and leverage libraries of common components that have been developed for use across the health sector.

³⁷ C Johnson and Y Pylypchuk, [Use of Certified Health IT and Methods to Enable Interoperability by U.S. Non-Federal Acute Care Hospitals](#), 2019, Office of the National Coordinator for Health Information Technology, ONC Data Brief no. 54, 2021.

³⁸ M Lehne, J Sass, A Essenwanger, J Schepers and S Thun, [‘Why digital medicine depends on interoperability’](#), *npj Digital Medicine*, 2019, 2:79.

³⁹ West Health Institute, [The Value of Medical Device Interoperability](#), 2015.

The benefits achieved by individual initiatives to increase interoperability need to be identified and evaluated. The Agency has a benefits and evaluation framework that it will apply to the initiatives and actions it undertakes. This is essential to learn what works and ensure that solutions work as intended and do not have adverse consequences. Evaluation will be more effective if planned during the early phases of a project and if it measures the outcomes intended by the interoperability project.

8.2 Current activities

The Agency identified a number of national and international digital health maturity models as potential models for use within the Australian healthcare system.

These digital health maturity models address different aspects of digital health, interoperability, healthcare sectors and settings of care. They are all multi-stage models and emphasise the importance of defined, repeatable, measured, analysed and continually improved processes.

The following are programs that measure digital health maturity in Australia:

- The Victorian Department of Health has developed a digital health maturity model for the Victorian healthcare system.⁴⁰
- Queensland has piloted the HIMSS Digital Health Indicator. This has also been trialled by some health districts in New South Wales and Victoria.
- South Australia has undertaken a state-wide digital health maturity assessment.
- Other states and territories are investigating or planning to undertake digital health maturity assessments.
- Maturity models, such as the HIMSS Electronic Medical Record Adoption Model (EMRAM) and the Continuity of Care Maturity Model (CCMM), are not specific to interoperability but have been used to measure aspects of digital health maturity capabilities.

As a member of the GDHP, the Agency is participating in the development of a Global Interoperability Maturity Model (GIMM). This is a tool for a country or territory to assess its interoperability progress by answering a structured set of questions that measure foundational, structural, semantic and organisational interoperability. The GIMM will help identify areas of strengths and opportunities compared with global interoperability best practices.

The University of Queensland has developed an assessment methodology for maturity models. The Agency will use this to assess the best digital health maturity model options for wider use in the Australian healthcare system.

The Agency is undertaking a survey of hospital, pharmacy, general practice, allied health, specialist practice and aged care organisations to provide an interoperability benchmark that can be used to track future progress.

⁴⁰ Victorian Department of Health, '[Victoria's digital health maturity model](#)', 2022, accessed 17 May 2022.

8.3 Future state

The future state for digital health maturity, benefits and evaluation will include:

- using the national digital health maturity tools to measure healthcare providers' levels of maturity, and developing goals and improvement plans to increase digital maturity and improve health outcomes
- collecting metrics periodically that provide evidence of improving levels of interoperability in care settings nationally
- applying evaluation and benefit realisation to projects that advance interoperability
- maintaining a growing evidence base of lessons learned, evaluations and metrics that is accessible and used to inform efforts to increase interoperability
- continuously evolving interoperability survey indicators to accommodate the shifting focus in national policies, including additional health sectors where relevant
- evaluating the success of the Interoperability Plan through measurements that consider how interoperability has changed the care experience for consumers
- measuring the digital maturity of Australia's health system using international maturity models. Benchmarking against other countries will provide insights for prioritising improvements in the Australian digital health system.

8.4 Implementation actions

Table 8.1 outlines the actions that have been identified as priorities to support a health system that continuously measures its digital health maturity and uses the output of the measurement to drive further improvements in healthcare and digital health maturity. It will be the responsibility of the lead organisation to engage with stakeholders in progressing these actions, as they will need to draw on stakeholder experience and expertise to be successful. An annual report will provide evidence on progress with interoperability generally and with the actions in this plan. This evidence will also provide an opportunity to consider whether any emerging issues or priorities require changes to the scope and timing of actions in the plan.

Table 8.1: Actions for priority area 5 – Benefits

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 5.1 – Administer interoperability survey Undertake an interoperability survey of hospital, pharmacy, GP, allied health, specialist and aged care organisations periodically to measure overall progress on interoperability, starting with a baseline survey in 2022.	The Agency	Ongoing
ACTION 5.2 – Publish annual report Publish an annual report on progress of the Interoperability Plan.	The Agency	Ongoing
ACTION 5.3 – Assess digital health maturity models Collaborate with jurisdictions to assess digital health maturity models.	The Agency	Immediate
ACTION 5.4 – GDHP interoperability maturity model Work with the Global Digital Health Partnership (GDHP) to develop and apply the Global Interoperability Maturity Model (GIMM).	The Agency	Short

Immediate = within one year; short = 1–3 years

SECTION 9

POLICY TOOLS TO SUPPORT INTEROPERABILITY

In Australia, the adoption of digital health standards is largely voluntary. Healthcare organisations can set their own conformance requirements when purchasing digital technology.

When an individual healthcare provider organisation purchases a new digital system, it may not fully factor in the benefit that patients and clinicians in other health organisations gain from the interoperable exchange of information, and the value generated by future digital innovations that can connect more readily. The potential benefits to patients include ensuring minimum levels of safety and quality that the patient is not able to influence. Interoperability can address safety and quality issues that arise from incorrect or misleading information, and from misidentification. Increased use of standard terminology and meaningful sharing of information will reduce reliance on handwritten notes and paper records that may be ambiguous or lack important context, and will support safer clinical decision-making.

There are also barriers to entry when proprietary standards and terminologies lock in organisations to legacy systems and providers.

Governments have many policy tools that could be used to incentivise interoperability to reflect the system-wide and public health benefits that are not captured in individual software investment decisions. Aligning existing policy tools and applying further mechanisms where appropriate will help to advance interoperability.

9.1 National and international experience

The following are examples of national arrangements that encourage the adoption of standards and conformant technology to support interoperability:

- The Agency provided financial incentives to software providers to accelerate the adoption of new secure messaging standards and integrate the new standards into their products in 2019. In addition, all governments issued a communiqué that they will begin including the secure messaging interoperability standards in future procurements for applicable systems.
- Mobile applications and clinical information systems that connect to the My Health Record system must meet conformance requirements and relevant standards, although linking with the My Health Record system is voluntary.
- Software providers and healthcare organisations who want to participate in the national electronic prescribing program must meet conformance requirements set by the Agency, including using national terminology and healthcare identifiers.

Based on international practice, a wide range of policy tools could be used to promote the adoption of standards and conformant digital technologies, with the benefits of

wider adoption outweighing the costs involved. Mechanisms can range from voluntary agreements to enforceable regulations and include:

- working with sectors and healthcare professional groups to promote interoperability as part of efforts to increase digital health uptake and digital health literacy
- providing certification services so that software purchasers know that products meet specified standards
- establishing a voluntary agreement or code of practice that is endorsed by governments, industry and private healthcare providers to support the adoption of consistent national specifications and standards, and information-sharing arrangements
- linking incentive payments to the adoption of specified standards and conformance requirements, including through procurements
- requiring providers to use digital technologies that are certified as compliant with specified standards to be eligible for government funding or incentive payments
- making interoperability requirements part of health service accreditation⁴¹
- linking standards to licensing and assurance regulations for technologies, where those standards are essential to deliver safe care.

There is a role for additional and enhanced policy tools to support and accelerate interoperability, particularly for settings of care and clinical groups that have lower levels of digital maturity and adoption, and for standards and terminologies that have been developed for national use but have low uptake. International experience suggests a blend of regulatory, non-regulatory and financial mechanisms is required. This will require a review of the effectiveness of current policy tools and an assessment of what additional mechanisms are required to support and accelerate interoperability.

Any proposed change in current mechanisms will need to be developed with input from stakeholders and justified in terms of the net benefits that would arise. Policy tools must be tailored to support a viable and vibrant health technology sector in which companies develop and bring digital solutions to market to meet the demand for and adoption of interoperable digital health solutions. The impact on smaller providers and users of digital technology systems will need to be considered. The regulatory impact principles agreed by Australian governments will be applied.⁴² These principles ask policymakers to clearly demonstrate that a public policy problem requires government intervention, and to examine a range of options, including non-regulatory options.

9.2 Implementation actions

Table 9.1 outlines actions relating to policy tools to support interoperability. It will be the responsibility of the lead organisation to engage with stakeholders in progressing these actions, as they will need to draw on stakeholder experience and expertise to be successful.

⁴¹ Australian Commission on Safety and Quality in Healthcare, [National Safety and Quality Health Service Standards: Second edition](#), 2019.

⁴² Commonwealth of Australia, Department of the Prime Minister and Cabinet, [Regulatory Impact Analysis Guide for Ministers' Meetings and National Standard Setting Bodies](#), 2021.

Table 9.1: Actions for policy tools to support interoperability

NATIONAL ACTION	LEAD	TIMEFRAME
ACTION 6.1 – Review policy tools Engage collaboratively with health departments and key stakeholders to review the effectiveness of current policy tools and assess the additional mechanisms required to support and accelerate interoperability.	The Agency	Immediate

Immediate = within one year

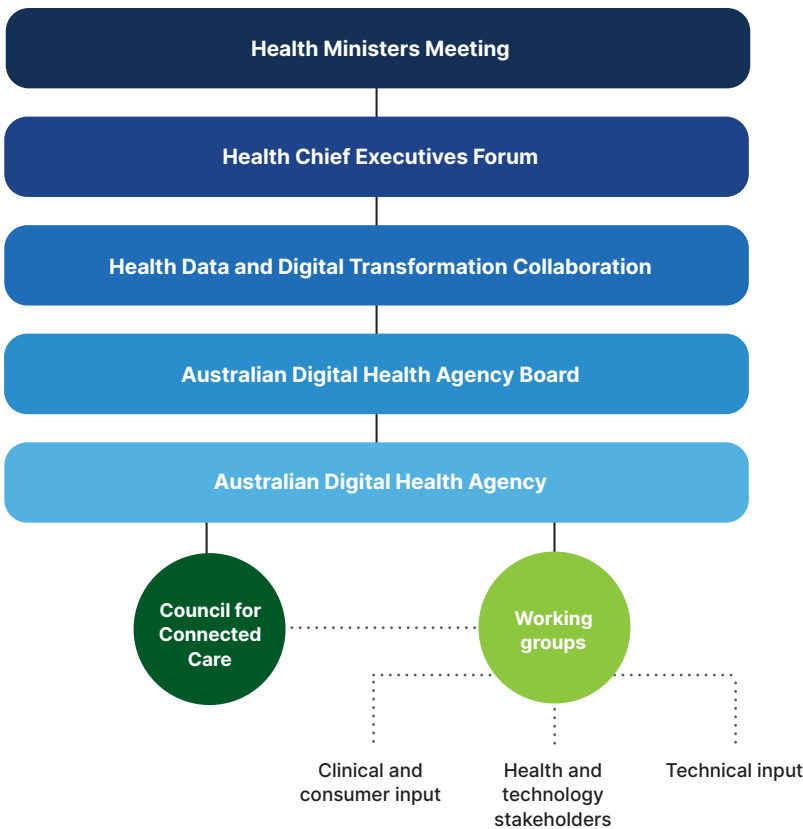
SECTION 10

GOVERNANCE TO SUPPORT INTEROPERABILITY

Governance arrangements will prioritise interoperability and provide an accountability structure to coordinate and monitor efforts that will facilitate interoperability. Figure 10.1 illustrates the agreed governance arrangement.

The Australian Digital Health Agency and Australian, state and territory health departments are primarily responsible for executing the Interoperability Plan. This forms part of their roles and responsibilities under the Intergovernmental Agreement on National Digital Health. The Health Data and Digital Transformation Collaboration (HDDTC) is identified as the appropriate intergovernmental committee to oversee implementation of the plan and report on progress to the Health Chief Executives. Annual progress reports will identify any emerging issues that require changes to the scope and timing of actions in the plan. The plan will be reviewed and refreshed through a consultation process with key stakeholders.

Figure 10.1: Proposed governance arrangements for the Interoperability Plan



The Agency will establish a stakeholder advisory group that reflects the diversity of stakeholders in the health system. Its roles and responsibilities will include providing advice on how the Interoperability Plan can best deliver benefits for interoperability in the health sector, and any stakeholder activities that may be interdependencies for the success of the plan. There will be opportunities for working groups of experts to be formed to address specific issues as they arise during the implementation of the plan.

Responsibility for delivering interoperability cannot be assigned to one committee or organisation because delivery depends on individual investment and changes in clinical practice made across the digital health ecosystem. The governance outlined above will help to oversee progress and align government efforts.

Private and non-government organisations can use the Interoperability Plan and future progress reports to inform and guide their own efforts to promote interoperability.

The actions in the Interoperability Plan will require effective governance structures, including a clear role for stakeholders, and input from subject matter experts and providers/patients as users. Each action has one or more leads and will require support from relevant stakeholders (such as government agencies, jurisdictions, peak bodies, consumers, public and private providers, the health technology sector, research organisations and industry) to ensure successful outcomes. The stakeholders involved will be specific to each action.

SECTION 11

ACRONYMS AND ABBREVIATIONS

ACRONYM	DESCRIPTION
ACSQHC	Australian Commission on Safety and Quality in Healthcare
AHMAC	Australian Health Ministers' Advisory Council
AIHW	Australian Institute of Health and Welfare
AMT	Australian Medicines Terminology
API	Application programming interface
CDA	Clinical Document Architecture
COVID	Coronavirus disease
DTA	Digital Transformation Agency
FHIR®	HL7 Fast Healthcare Interoperability Resources
GDHP	Global Digital Health Partnership
GIMM	Global Interoperability Maturity Model
GP	General practitioner
HI Service	Healthcare Identifiers Service
HIMSS	Healthcare Information and Management Systems Society
HL7	Health Level 7
HPI-I	Healthcare Provider Identifier-Individual
HPI-O	Healthcare Provider Identifier-Organisation
ICD-10-AM	Australian Modification of the International Classification of Diseases
IHE	Integrating the Healthcare Enterprise
IHI	Individual Healthcare Identifier
LOINC	Logical Observation Identifiers Names and Codes
mHealth	Mobile health
NASH	National Authentication Service for Health
NCTS	National Clinical Terminology Service
NHSD	National Health Services Directory
PBS	Pharmaceutical Benefits Scheme
REST	Representational State Transfer
SNOMED CT-AU	Australian extension to the Systematized Nomenclature of Medicine – Clinical Terms
TGA	Therapeutic Goods Administration

SECTION 12

GLOSSARY

TERM	MEANING
Data standards	Define what data is required to support a particular use case.
Health information system	A system designed to manage healthcare data. This includes systems that collect, store, manage and transmit an individual's electronic medical record; a hospital's operational management system; or a system supporting healthcare policy decisions.
Healthcare Provider Identifier-Individual (HPI-I)	Identifies an individual who provides healthcare, such as GPs, allied health professionals, specialists, nurses, dentists and pharmacists.
Healthcare Provider Identifier-Organisation (HPI-O)	Identifies organisations that provide healthcare, such as hospitals, medical practices, pathology or radiology laboratories, and pharmacies.
HI Service	A national system that assigns a unique identifier to Australian healthcare recipients, healthcare providers and healthcare organisations. Healthcare identifiers help ensure the right health information is associated with the right person at the point of care.
Individual Healthcare Identifier (IHI)	Identifies an individual receiving healthcare services. The HI Service assigns an IHI to each person enrolled in Medicare or registered with the Department of Veterans' Affairs.
Information sharing	Sending, receiving, discovering and accessing information.
Interoperability	The ability of a system or product to transfer the meaning of information within and between systems or products without special effort on the part of the user. Interoperability is made possible by the implementation of standards.
Primary care	Generally, the first contact a person has with Australia's healthcare system – it relates to the treatment of individuals who are not admitted to hospital. Primary care includes GP's, nurses (such as general practice nurses, community nurses and nurse practitioners), allied health professionals, midwives, pharmacists, dentists and Aboriginal health workers.
Provider Connect Australia (PCA)	A service to connect healthcare provider organisations with their business partners to streamline updates of the services they provide and the practitioners that provide them. The PCA also creates unique identifiers for healthcare services, service delivery locations and practitioners' service delivery roles, allowing these to be reliably identified and linked across the healthcare system.
Specifications	Refers to the data and data exchange specifications created to support integration with a system or service. Specifications are created by an individual organisation, not a standards development organisation, and are therefore not standards.
Terminology	Defines the codes and descriptions used to define a concept – for example, Australian Medicines Terminology for medications.
WS-*	The collection of web service profiles – for example, WS-addressing and WS-security.

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Australian Government
Australian Digital Health Agency