Australian Government
Australian Digital Health Agency

Connecting Australian Healthcare

NATIONAL HEALTHCARE INTEROPERABILITY PLAN

2023–2028

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INTRODUCTION

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- **Purpose and scope of the Interoperability Plan**

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.

Australia's health system consistently ranks as one of the best in the world. It is a complex mix of public and private sector service providers, with multiple funding streams that include contributions from governments, insurance companies and individuals. However, this complexity has contributed to siloed health information systems, and incompatible data formats, standards and terminology between information systems. The healthcare sector lags behind other industries in adopting digital technologies that deliver seamless connectivity.[1]

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.

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
- clear consumer rights regarding personal information and privacy.

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

The views and needs of individuals and healthcare providers must be considered when developing a more interoperable healthcare system. Healthcare providers want access to information about the individual they are caring for to support them in providing safe and quality care. This information must be of high quality, meaningful and trustworthy. At the same time, individuals want to be confident that their health data is secure, and that they have control over how information is made available to healthcare providers to improve their health and wellbeing. These issues are important for individuals managing their own health or participating in the care of others.

What is interoperability?

The main goal of healthcare interoperability is 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.

This National Healthcare 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.[2]**

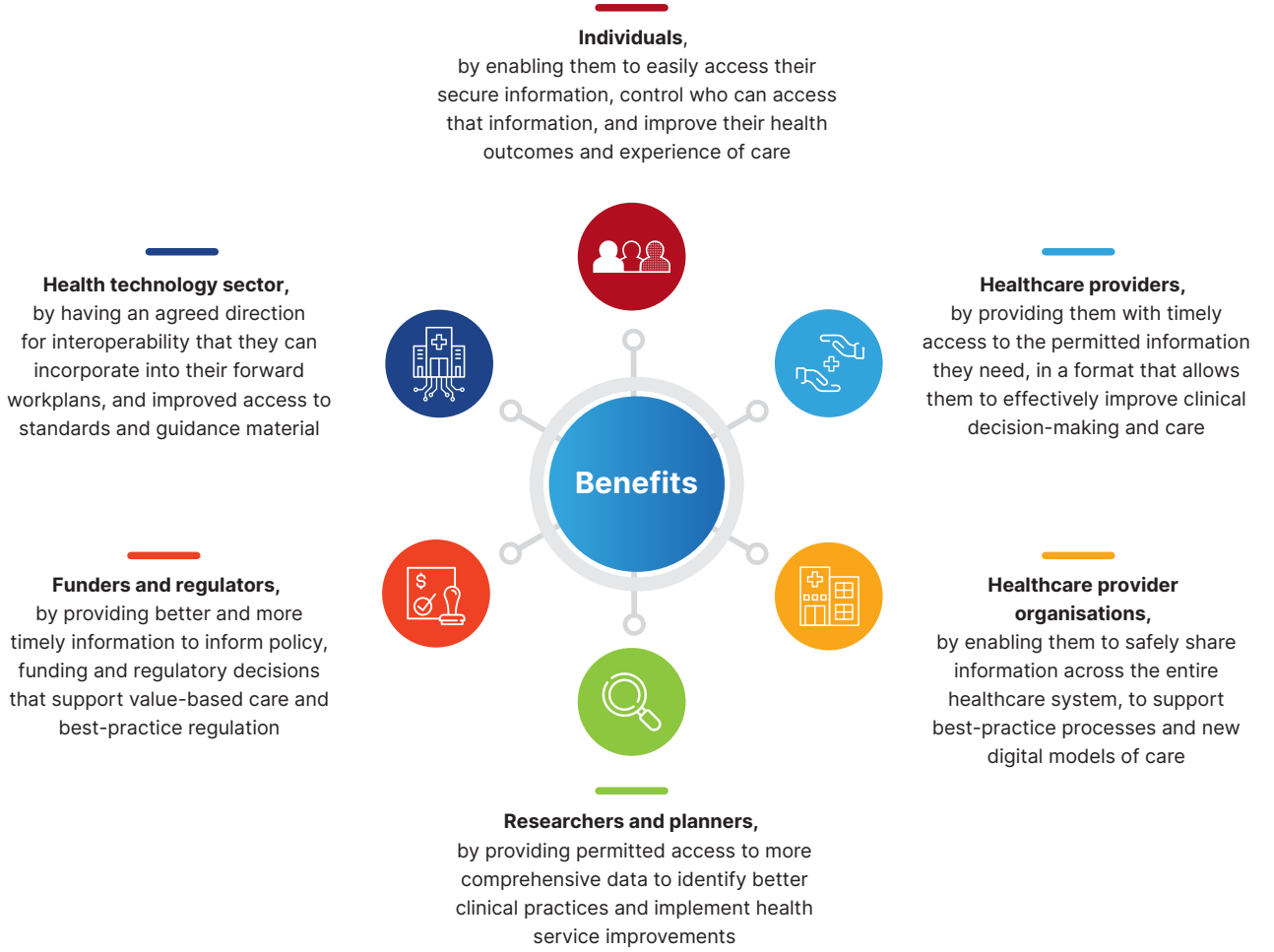
Interoperability is a strategic priority in Australia's National Digital Health Strategy, and involves the provision of high-quality data with a commonly understood meaning that can be used with confidence.[3] The interoperability of clinical information is essential to high-quality, sustainable healthcare in which clinical information is collected in a prescribed manner and can be shared in real time with patients and their providers.

[2] Global Digital Health Partnership, 'Interoperability', accessed 17 May 2022.
[3] Australian Digital Health Agency, *Australia's National Digital Health Strategy*, 2018.

Benefits to key stakeholders

A better connected healthcare system will provide efficiencies and benefits to a number of stakeholders, as shown in Figure 1.

Figure 1:
A better connected healthcare system benefits stakeholders



Risk and cost considerations

To support interoperability, existing legacy systems will need to be replaced and modernised. The limited resources available in the health system may affect the pace at which these systems can become more interoperable. 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.

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.

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** 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 **My Health Record** system provides an online summary of an individual's key health information.
- **Electronic prescribing** enables prescribers, individuals and pharmacists to use electronic prescriptions.
- The **National Clinical Terminology Service** (NCTS) contains localised HL7 FHIR® resources (Fast Healthcare Interoperability Resources) and SNOMED CT-AU (including the AMT), which is maintained and released monthly.
- 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.
- **Provider Digital Access** (PRODA) allows individual healthcare providers and healthcare provider organisations to securely authenticate and access online provider services across all government sectors.
- The **Metadata Online Registry** (METEOR) is Australia's repository for national metadata standards for health, housing and community services statistics and information.

The need for a National Healthcare Interoperability Plan

The Interoperability Plan maps a pathway to a more interoperable Australian health system and supports the implementation of digitally enabled models of care. 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 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.

Interoperability supports national health strategies

The vision of the 2023-28 National Digital Health Strategy 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.

Progressing the Interoperability Plan will support other national strategies such as the National Health Reform Agreement, the Primary Health Care 10 Year Plan, and the response to the Royal Commission into Aged Care Quality and Safety. All these strategies seek to make better use of digital technologies to deliver more connected and accessible services, and to use data to support better care and more informed consumers.

Consultations on the next National Digital Health Strategy identified key areas that underpin an interoperable health system.

Purpose and scope of the Interoperability Plan

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.

The Interoperability Plan is intended to be used by all participants in the health sector (including public and private organisations), and individuals as consumers and providers of healthcare.

The Interoperability Plan uses a broad definition of health from the World Health Organization.[4] 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 healthcare, aged care and disability services, as well as healthcare provided in other settings, such as schools.

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.

Engagement and collaboration with key stakeholders

The Interoperability Plan was developed under the governance of a national steering committee. It was informed by national consultations undertaken in 2019, and engagement with health departments and other key stakeholders in 2020 and 2021.

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. 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.

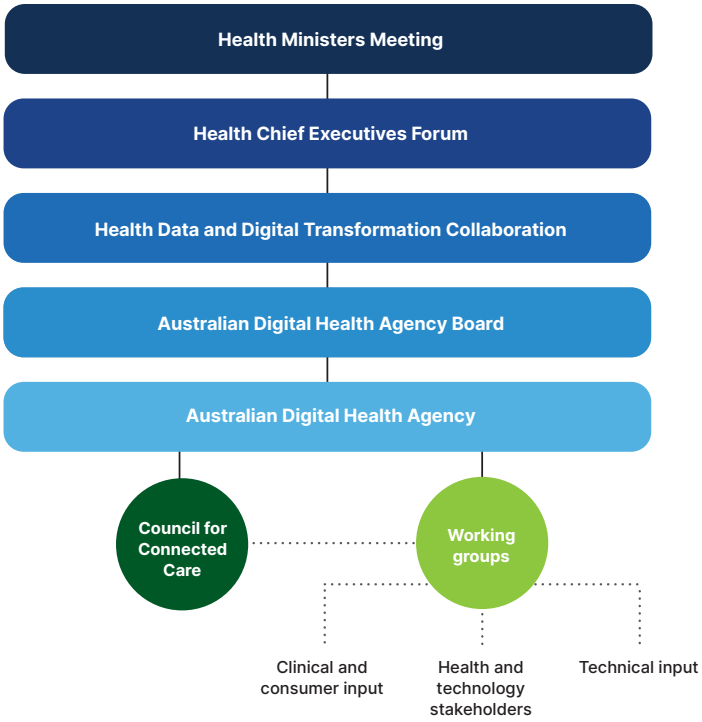
All stakeholders will have the opportunity to share their specific expertise and to collaborate through co-design on actions, initiatives, and the development of standards and specifications.

[4] The 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".

Governance

Governance arrangements will prioritise interoperability and provide an accountability structure to coordinate and monitor efforts that will facilitate interoperability. Figure 2 illustrates the agreed governance arrangement.

Figure 2: Proposed governance arrangements for the Interoperability Plan



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 Interoperability Plan and report on progress to the Health Chief Executives Forum. 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.

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.

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.

SECTION 2

PRINCIPLES AND PRIORITIES

THIS SECTION INCLUDES:

- **Interoperability principles**
- **Priority areas**
- **Challenges to achieving interoperability**

Interoperability principles

The Interoperability Plan sets out 10 principles (Table 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 sector and enable contemporary, innovative models of care.

Table 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.

Table 1: Interoperability principles (*cont.*)

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.
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.

Priority areas

The Interoperability Plan identifies five priority areas to advance digital health interoperability in Australia. These building blocks will contribute to the National Digital Health Strategy's interoperability objective (Figure 3).

Figure 3:
Interoperability priority areas

1. Identity Leverage the Healthcare Identifiers Service and the NHSD. Adopting healthcare identifiers will ensure that individuals, healthcare providers and healthcare provider organisations are uniquely and correctly identified when exchanging health information.

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.

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.

4. Innovation Drive interoperability through future innovations that apply the interoperability principles to new digital health initiatives and functional enhancements.

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.

Challenges to achieving interoperability

Several barriers and challenges will need to be addressed to achieve mature interoperability in Australia. 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)[5] 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.

[5] These 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 3

PRIORITY AREA 1
IDENTITY

THIS SECTION INCLUDES:

- Healthcare identifiers
- Health service directories

High-quality care relies on the ability to easily search for information about individuals, healthcare providers and healthcare provider organisations, and correctly identify them using their unique identifiers. 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.

Healthcare identifiers

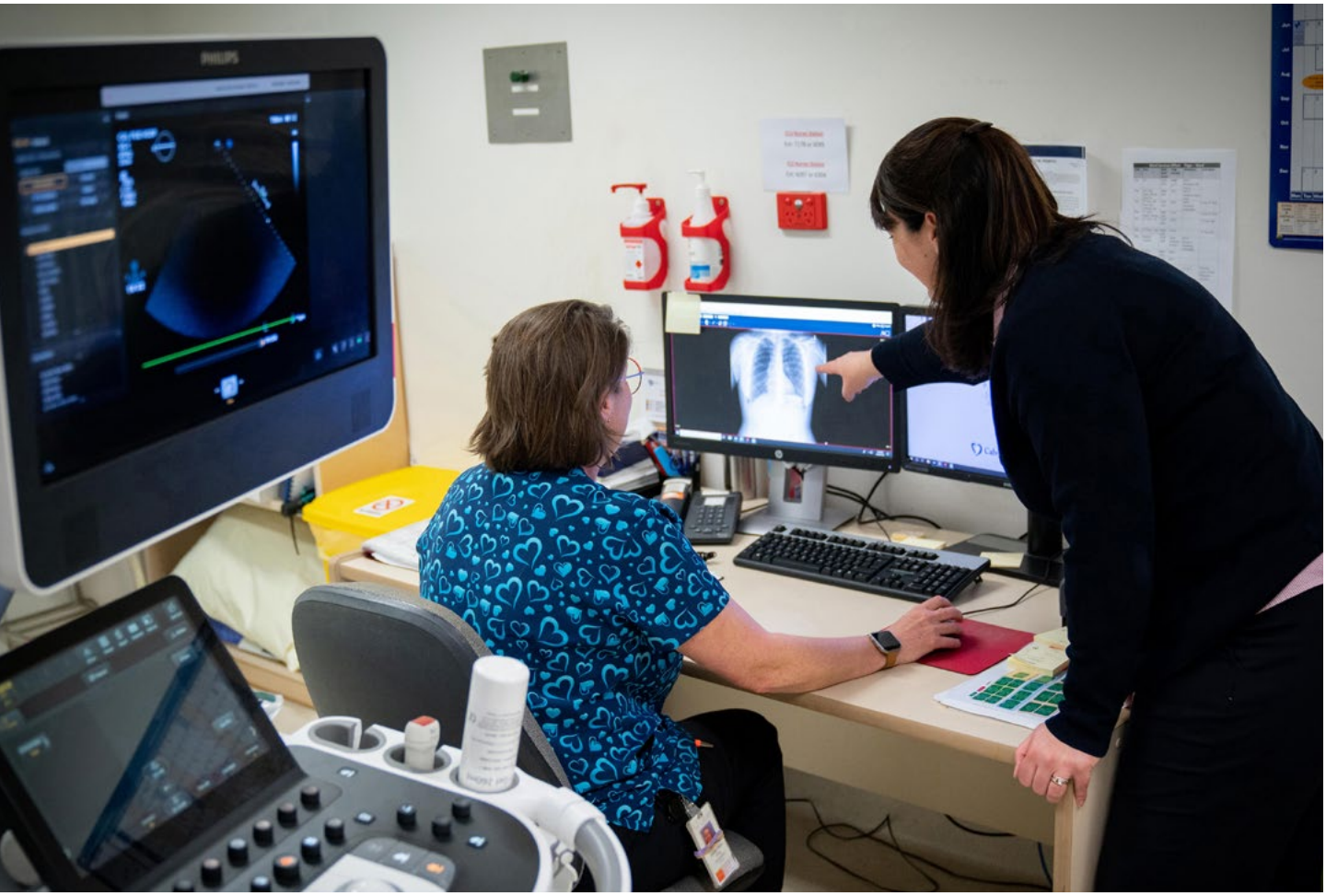
Australia has a well-established Healthcare Identifiers Service:

- Every Australian has a unique Individual Healthcare Identifier (IHI).
- Every healthcare provider has a unique Healthcare Provider Identifier – Individual (HPI-I).
- Every healthcare provider organisation has a unique Healthcare Provider Identifier – Organisation (HPI-O).

Uniquely identifying individuals, healthcare providers and healthcare provider organisations is the most important capability for supporting interoperability.

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.



THE CASE FOR REFORM

The core rationale for national healthcare identifiers is unchanged from when the Healthcare Identifiers Service was established in 2010. More than a decade later, the benefits are constrained by the significant variation in healthcare identifier use across the Australian healthcare sector, and a proliferation of local identifiers that are not linked to national healthcare identifiers.

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.[6]

The Australian Commission on Safety and Quality in Health Care 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".[7]

The 2020 review of the *My Health Records Act 2012* recommended actions to improve the use of HPI-Os and HPI-Is.[8] It noted 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. The review also noted the need to identify organisations that provide services that support healthcare, such as home care services.

CURRENT ACTIVITIES

Healthcare identifiers are currently used to:

- support the response to COVID-19, including the vaccine rollout
- facilitate access to and use of the My Health Record system
- deliver electronic prescriptions, including dispensing and claiming
- improve funding models.

The Therapeutic Goods Administration is investigating the use of unique device identifiers to track medical devices.

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

[7] PwC, *Sixth Clinical Safety Review of the My Health Record System*, Australian Commission on Safety and Quality in Health Care, 2015, p. 3.

[8] J McMillan, *Review of the My Health Records Legislation: Final report*, Australian Government Department of Health, 2020.

FUTURE STATE

Australian, state and territory governments – as joint owners, funders and users of the Healthcare Identifiers Service – are committed to using national healthcare identifiers.

- National healthcare identifiers are readily available and universally used by all individuals and healthcare providers in all health information exchanges.
- 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.
- Misidentification (matching errors) of individuals is reduced or eliminated.
- Individuals use identifiers to control their information, manage their privacy, and receive better and safer care.
- National healthcare identifiers are used in innovative models of care.
- A legislative framework for healthcare identifiers enables the identification of relevant participants involved directly or indirectly in delivering healthcare.

IMPLEMENTATION ACTIONS

TABLE 2: ACTIONS FOR PRIORITY AREA 1 – Identity – healthcare identifiers

NATIONAL ACTION	LEAD
ONGOING	
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
1.2 **Promoting healthcare identifiers** Promote the use of IHIs, including creating IHIs for newborns as soon as possible after birth.	The Agency Services Australia
IMMEDIATE	
1.3 **Healthcare Identifiers Roadmap** Develop a Healthcare Identifiers Roadmap that includes (among other items): • 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 *Healthcare Identifiers Act 2010* • reporting on healthcare identifier adoption.	The Agency Department of Health and Aged Care
SHORT	
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
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
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

Health service directories

The National Health Services Directory should be managed as core national infrastructure.

Numerous health service directories have been established by public and private organisations. These directories store information on health services and healthcare providers.

The NHSD is managed by Healthdirect Australia and is a key tool for the national health system. The Australian Health Ministers' Advisory Council (AHMAC) endorsed the 2019 NHSD review, which recommended that the NHSD be positioned as core national infrastructure.

THE CASE FOR REFORM

Having a trusted national directory that accurately identifies healthcare providers and services is an important aspect of interoperability. This has been demonstrated in the COVID-19 pandemic. 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
- improve secure digital communication.

The 2019 NHSD review highlighted some limitations with the current directory. 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.

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.

Without an agreed source of truth to accurately identify health services, individuals, public health staff and healthcare organisations have the burden of navigating through multiple unaligned health directories.

CURRENT ACTIVITIES

- Healthdirect has integrated the recommendations from the 2019 AHMAC review of the NHSD into its NHSD strategic priorities and workplan. This includes driving improved outcomes and experiences of the NHSD, facilitating opportunities to enhance integration and reduce duplication of local directories, and building the capacity and capability to deliver and embed the NHSD as core national infrastructure.
- The Agency will roll out Provider Connect Australia to synchronise information across multiple health service directories, including the NHSD. 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.

FUTURE STATE

- Directories are managed and maintained to support safe, secure healthcare provider communications.
- The NHSD is adopted for national digital health programs to ensure comprehensive, consolidated, accurate and up-to-date healthcare provider and service information. This information is available for all health and related human services provided by governments, the private sector and not-for-profit organisations.
- Healthcare provider organisations maintain information about their services and healthcare providers in the NHSD, using Provider Connect Australia.
- 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 specialist health service directories to obtain information on healthcare providers, healthcare provider organisations and healthcare services.

IMPLEMENTATION ACTIONS

TABLE 3: ACTIONS FOR PRIORITY AREA 1 – Identity – health service directories

NATIONAL ACTION	LEAD
ONGOING	
1.7 **Using the National Health Services Directory (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
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
IMMEDIATE	
1.9 **Provider Connect Australia rollout** Roll out and support the implementation of Provider Connect Australia.	The Agency
SHORT	
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

SECTION 4

PRIORITY AREA 2
STANDARDS

THIS SECTION INCLUDES:

- **Interoperability standards**
- **Conformance**
- **The case for reform**
- **Current activities**
- **Future state**
- **Implementation actions**

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, which ensures that standards are fit for purpose, widely adopted and implemented in line with national conformance rules.

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.

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 the clinical or operational meaning and the purpose of the data.
- Semantic interoperability is the ability of two or more systems to exchange, interpret and use data. This includes using standard terminology such as SNOMED CT-AU, AMT and LOINC.

Interoperability standards

Interoperability relies on unambiguous standards that are implemented consistently. Using interoperability standards allows shared meaning of health information for both healthcare providers and individuals. It also enables health information to be discovered and exchanged across the healthcare system. A key challenge is to maintain relevance and compatibility as new standards are created and existing ones evolve.

Interoperability standards refer to a range of standards artefacts, such as:

- health information models that describe the structure of the healthcare content being exchanged
- clinical terminology that defines healthcare concepts in both human-readable terms and machine-readable codes
- data exchange specifications that provide a standard set of rules for communication between two systems that meet a defined objective or use case
- communication protocols that define the rules, syntax, semantics and synchronisation of communication, and possible error recovery methods

Cyber security standards are also required to support interoperability throughout the digital health system. These are applied across the whole digital health ecosystem and are not specific to interoperability.[9]

There are numerous national and international interoperability standards, and there has been significant adoption of some health interoperability standards in Australia. For example, some Australian health sectors have near-universal use of HL7 v2 for reporting, but standardisation between healthcare providers is unclear. In Australia, the adoption of standards has generally been voluntary. AHMAC endorsed SNOMED CT-AU as the national clinical terminology in 2005, but adoption has been sporadic.

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.

[9] More information about cyber security standards is available on the Agency's website.

THE CASE FOR REFORM

Interoperability is made possible by the implementation of standards.[10]

Australia has no centralised approach to using standards. This leads to a proliferating number of standards, which inhibits information sharing and integration, and leads to a lack of interoperability.

STANDARDS

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 and more efficient procurement.
- Using universal code sets when coding machine-readable data improves safety by reducing misinterpretation of data, driving evidence-based best practices, aiding clinical decision support, and improving data quality.
- Individuals benefit from having a shared and consistent understanding of their health information with healthcare providers, as well as automated clinical decision support and 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 the AMT adoption and use) contained recommendations for adopting and using SNOMED CT-AU and AMT as national clinical terminologies.[11,12]

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.

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.

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

[11] Australian Commission on Safety and Quality in Health Care, *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.

[12] Australian Commission on Safety and Quality in Health Care, *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.

THE CASE FOR REFORM (CONT.)

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. 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.

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. 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.

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.

GOVERNANCE

An effective standards governance capability includes 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 started a two-year program of work to develop a dynamic, comprehensive and collaborative digital health standards environment.

The Agency will continue to govern and lead the development and maintenance of digital health specifications for national digital health systems, services and national health priorities. Specifications will be co-designed with stakeholders, including standards development organisations and the health technology sector.

THE CASE FOR REFORM (CONT.)

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.[13] 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 participate in international work on standards that are taken up by global software providers that operate in Australia. International standards should be leveraged when developing standards to suit Australian conditions.

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.[14]

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.

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.

The health technology sector will 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.

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

[14] T Greenhalgh, J Wherton, C Papoutsi, 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.

CURRENT ACTIVITIES

TERMINOLOGY

- The Queensland Clinical Terminology Service aims to ensure best practice in addressing the clinical terminology needs of Queensland Health stakeholders. The service provides new processes, technical specifications, an enterprise-managed information and communications technology solution, and a governance model.
- The National Clinical Terminology Service publishes SNOMED CT-AU every month. This incorporates the medicine subset, the AMT, and HL7 FHIR® terminology resources.
- 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.[15]

INFORMATION MODELS

- The multi-phase National Primary Healthcare Data Asset project is developing an enduring data asset that contains detailed, high-quality data from primary care. The aim is to better understand and improve the patient journey.
- The Agency publishes and maintains a set of working drafts that show how the Agency is adopting and extending the HL7 FHIR® Australian Base Implementation Guide (AU Base 4).[16]

DATA EXCHANGE SPECIFICATIONS

- 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.
- 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.

CONFORMANCE

- My Health Record material, overviews and guides continue to be improved for business-to-business clinical exchanges.
- 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.

[15] Royal Australian and New Zealand College of Radiologists and Australian Diagnostic Imaging Association, *Radiology Referral Set Position Statement*, 2021.

[16] FHIR®, 'Australian Base Implementation Guide (AU Base 4)', 2022, accessed 17 May 2022.

CURRENT ACTIVITIES (CONT.)

AGENCY DEVELOPER CENTRE

- The Agency hosts a Developer Centre that provides resources for developers of clinical software and health technology.

FUTURE STATE

All Australian healthcare organisations are committed to the correct, sustained and widespread use of interoperability standards.

- Healthcare settings achieve interoperability through:
  - native adoption of a unified and agreed set of national terminology standards and classifications, where clinical, statistical, supply chain and administrative content is fully coded
  - the adoption and use of an agreed set of national standard APIs (including HL7 FHIR®)
  - trusted, widespread and autonomous sharing of secure, authorised, coded data between systems and individuals.
- Interoperability standards and specifications are co-designed, open source and non-proprietary.
- The health technology sector is dynamic and efficient, with a clear standards framework to inform technology development. Organisations engage with the health sector on the development, selection and use of standards that support their approved work priorities.
- 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. All systems that integrate with national health systems and services adhere to conformance rules and are reassessed when software is enhanced.
- International standards are adopted where possible so that:
  - the Australian health technology sector can supply global markets
  - Australians 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.

FUTURE STATE (CONT.)

- Stakeholders easily and regularly access a well-maintained standards catalogue that contains a list of endorsed and recommended standards and specifications for digital health.
- Implementation guidance material (handbooks, profiles, patterns, technical guidance) exists and is regularly accessed to support standards implementation.
- Cloud platforms are used in line with contemporary architectures and the Digital Transformation Agency's Secure Cloud Strategy.[17]

[17] Digital Transformation Agency, 'Secure cloud strategy', 2021, accessed 17 May 2022.

IMPLEMENTATION ACTIONS

TABLE 4: ACTIONS FOR PRIORITY AREA 2 – Standards

NATIONAL ACTION	LEAD
ONGOING	
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
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
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
2.4 **International standards participation** Support Australian participation in international standards development.	The Agency Australian Institute of Health and Welfare
IMMEDIATE	
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
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
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
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
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

TABLE 4: ACTIONS FOR PRIORITY AREA 2 – Standards (*cont.*)

NATIONAL ACTION	LEAD
SHORT	
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
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
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
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
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

SECTION 5

PRIORITY AREA 3 INFORMATION SHARING

THIS SECTION INCLUDES:

- **The case for reform**
- **Current activities**
- **Future state**
- **Implementation actions**

Increased sharing of information between healthcare providers improves decision-making and outcomes by helping to reduce clinical risks and inefficiencies.[18]

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.

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.

[18] Nordic Co-operation, *eHealth Standardisation in the Nordic Countries*, Nordic Council of Ministers, 2019.

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.

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)
- recognise the healthcare provider's right to withhold information if it is in the best interests of the individual and in accord 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 represents a model that could enable future exchanges of information directly between organisations and through discoverability.

THE CASE FOR REFORM

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

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. The Australian Commission on Safety and Quality in Health Care 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."[19]

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.

PRIVACY AND AUTHORISATION TO ACCESS AND SHARE INFORMATION

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.

[19] Australian Commission on Safety and Quality in Health Care, *Safety Issues at Transitions of Care*, a consultation report on pain points relating to clinical information systems, 2017, p. 8.

THE CASE FOR REFORM (CONT.)

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

Without a digital consent service that supports all health information, there is a risk that information that an individual may not want shared 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.

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. This health data, which is generated by individuals, should be translated into meaningful information and proactively used to support consumers' health and wellness.

A Productivity Commission report on innovations in care for chronic conditions noted that information flows across the health system are fractured.[20] 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 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.

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. 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 and determining 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.[21]

[20] Productivity Commission, *Innovations in Care for Chronic Health Conditions*, a productivity reform case study, 2021.

[21] Australian Digital Health Agency, *Legislative Impediments to Interoperability*, 2020 (unpublished).

THE CASE FOR REFORM (CONT.)

PROCUREMENT

In Australia, there is a lack of guidance material and reference information to support healthcare providers acquiring or building new digital health systems. 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.[22]

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, 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. 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 in 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."[23]

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

[23] Clinical stakeholder submission to 2022-27 National Digital Health Strategy.

CURRENT ACTIVITIES

- The Agency is mapping out enhanced functionality for the My Health Record system that could be leveraged to support national digital health capability.
- The Aged Care Royal Commission recommended that every approved aged care provider use a digital care management system and integrate this with the My Health Record system.
- The South Western Sydney Primary Health Network integrated real-time active data (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.
- The National Approach to Genomic Information Management (NAGIM) Blueprint describes principles to guide decision-making on the responsible collection, storage, use and management of genomic data.
- 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.

FUTURE STATE

- The National Digital Health Infrastructure Modernisation is delivering a more secure and sustainable system. Information is readily available through a service 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, 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.

FUTURE STATE (CONT.)

- A healthcare provider can make a request to an integrated service to discover the available health information about an individual.
- 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.
- 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.
- 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 that breaches their privacy preferences.
- Information exchanges between healthcare providers and individuals are safe, seamless and secure, sent directly or through one or more secure messaging providers.[24]
- 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.
- Consistent legislation across jurisdictions supports information sharing.

[24] Australian Digital Health Agency, 'What is secure messaging?', accessed 17 May 2022.

IMPLEMENTATION ACTIONS

TABLE 5: ACTIONS FOR PRIORITY AREA 3 – Information sharing

NATIONAL ACTION	LEAD
ONGOING	
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
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
IMMEDIATE	
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
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
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
SHORT	
3.6 Consent management Engage with consumers to investigate options for enabling individuals to grant consent to access 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
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
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

TABLE 5: ACTIONS FOR PRIORITY AREA 3 – Information sharing (*cont.*)

NATIONAL ACTION	LEAD
SHORT	
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
MEDIUM	
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
3.11 Consistent legislative health definitions Collaborate with jurisdictions and key stakeholders to develop consistent definitions to support health information sharing.	The Agency
3.12 Harmonising legislation Undertake collaborative intergovernmental work on harmonising relevant jurisdiction legislation, drawing on outcomes from Action 3.11.	All health departments

SECTION 6

PRIORITY AREA 4 INNOVATION

THIS SECTION INCLUDES:

- **The case for reform**
- **Current activities**
- **Future state**
- **Implementation actions**

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.

The key elements of interoperability are identifiers, consent, privacy, information discoverability, access, digital health standards and terminology. Including these 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.

THE CASE FOR REFORM

If technology is to effectively transform models of care interoperability is essential.[25]

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.

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) needs to grow and have access to ongoing education and training. There is also a need for trained health managers and clinicians who can bridge the gaps between clinical care and digital technology.

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

THE CASE FOR REFORM (CONT.)

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 assessment framework for organisations to assess their workforce capability and readiness for change.

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

CURRENT ACTIVITIES

The Australian Commission on Safety and Quality in Health Care AS18/11 advisory on the My Health Record system introduced actions to drive healthcare provider organisations towards implementing systems that can enter clinical information in the My Health Record system.[26]

- 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.
- An electronic prescription initiative was undertaken with the Department of Health. This enables secure transmission of electronically generated prescriptions to a prescription delivery service, for dispensing and supply using dispensing software.

FUTURE STATE

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 develop new digitally enabled models of care.
- 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.
- Innovation is a key focus of individuals, healthcare providers and software providers, and is supported by government and industry.

[26] Australian Commission on Safety and Quality in Health Care, *Advisory: Implementing systems that can provide clinical information into the My Health Record system*, 2019; Australian Commission on Safety and Quality in Health Care, 'National Safety and Quality Health Service Standards: Action 1.18: Healthcare records', 2019, accessed 17 May 2022.

FUTURE STATE (CONT.)

- 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 that could be 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.
- Healthcare providers can subscribe to information about their patients (with an individual's consent, where required), including observational data in which thresholds are met or exceeded.
- 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.
- 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 book appointments, communicate with healthcare providers, receive referrals and order prescriptions.
- Patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) are used to understand patient perspectives on digitally enabled models of care.
- International healthcare is leveraged – for example, by requesting a second opinion from an international clinical service to support 24-hour service delivery.
- Australians are supported in their ageing journey with the latest technology for remote monitoring and virtual care.
- New digital technologies become available, such as disease-detecting "precision health" monitoring devices.

Future healthcare journey

The healthcare journey in Figure 4 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 4:
Future healthcare journey

Andrew is an elderly individual living independently at home.

He has chronic conditions, including high blood pressure and chronic obstructive pulmonary disease.

His health information is stored in his My Health Record and is approved for use in research and analytics.

Andrew visits his GP regularly for check-ups.

He books his appointments online and receives his prescriptions and referrals for tests via electronic prescribing and eRequesting.

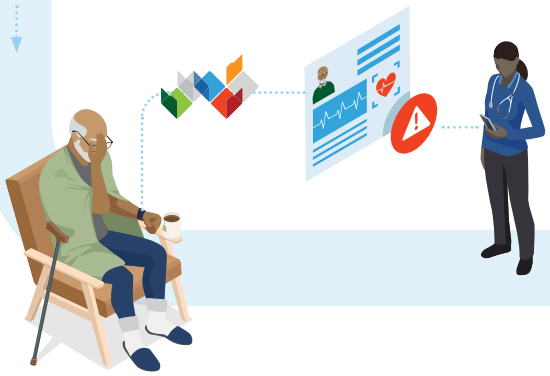
Andrew is admitted to hospital and stabilised.

Healthcare providers have access to his past medical history, medicines and recent laboratory results. Convenient access to his health history has supported an efficient and safe care experience.

Andrew monitors his blood pressure at home with a blood pressure device.

Due to deteriorating health, Andrew's GP prescribes a biosensing wearable to monitor his blood pressure, heart rate and oxygen saturation levels.

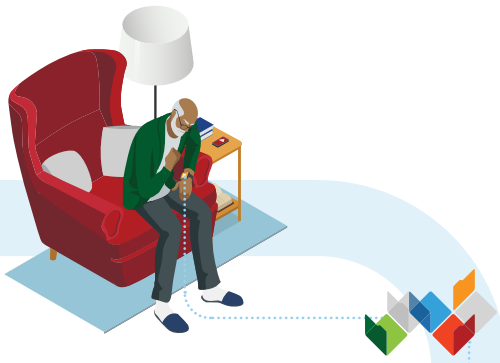
Figure 4:
Future healthcare journey (cont.)



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.

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.

IMPLEMENTATION ACTIONS

TABLE 6: ACTIONS FOR PRIORITY AREA 4 – Innovation

NATIONAL ACTION		LEAD
ONGOING		
4.1	**Interoperability innovation challenges** Run interoperability innovation challenges and "connectathons" to encourage interoperability.	The Agency
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
IMMEDIATE		
4.3	**Develop education content** Develop education content in partnership with users to increase awareness of interoperability.	The Agency

SECTION 7

PRIORITY AREA 5 BENEFITS

THIS SECTION INCLUDES:

- **The case for reform**
- **Current activities**
- **Future state**
- **Implementation actions**

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. 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 is not available.
- **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.
- **Improved data for health research and practice** – interoperability supports more accurate collection and analysis of health data for both research and innovative healthcare delivery.

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.

Improving digital health maturity 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. However, national data are not collected consistently to measure the nature, extent and progress of digital maturity.

THE CASE FOR REFORM

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.

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

- **leadership and governance** – leadership to increase digital maturity and optimise system performance, and governance to enable accountability and ease decision-making
- **workforce capability** – policies and processes to drive workforce capacity, competency and development
- **interoperability** – adoption of the core components of an interconnected healthcare system
- **technology (infrastructure, architecture and security)** – tools, networks, hardware and software that are available and maintained to support interoperability
- **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, regonal 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
- inform future actions and investment decisions
- 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.

THE CASE FOR REFORM (CONT.)

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.
- Key performance indicators (KPIs) – use a limited number of KPIs to track selected domains of interoperability as a form of program monitoring.

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.

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. 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.

CURRENT ACTIVITIES

The Victorian Department of Health has developed a digital health maturity model for the Victorian healthcare system.[27]

- Queensland has piloted the Healthcare Information and Management Systems Society (HIMSS) Digital Health Indicator. This has also been trialled by some health districts in New South Wales and Victoria.
- 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.
- The Agency is participating in the development of a Global Interoperability Measurement Model (GIMM). This is a tool for a country or territory to assess its interoperability progress by measuring foundational, structural, semantic and organisational interoperability.
- 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.
- 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.

[27] Victorian Department of Health, 'Victoria's digital health maturity model', 2022, accessed 17 May 2022.

FUTURE STATE

National digital health maturity tools are used to measure healthcare providers' levels of digital maturity.

- Metrics are collected that provide evidence of improving levels of interoperability.
- Evaluation and benefits realisation are applied to projects.
- The evidence base of lessons learned, evaluations and metrics is growing. Evidence is accessible and used to inform efforts to increase maturity.
- Interoperability survey indicators continuously evolve to accommodate shifting national policies and include additional health sectors (where relevant).
- The Interoperability Plan is evaluated and includes measurements that consider how interoperability has changed the care experience for consumers.
- Digital maturity is measured using suitable international maturity models and benchmarked against other countries.

IMPLEMENTATION ACTIONS

TABLE 7: ACTIONS FOR PRIORITY AREA 5 – Benefits

NATIONAL ACTION		LEAD
ONGOING		
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
5.2	**Publish annual report** Publish an annual report on progress of the Interoperability Plan.	The Agency
IMMEDIATE		
5.3	**Assess digital health maturity models** Collaborate with jurisdictions to assess digital health maturity models.	The Agency
SHORT		
5.4	**GDHP interoperability maturity model** Work with the GDHP to develop and apply the GIMM.	The Agency

SECTION 8

POLICY TOOLS TO SUPPORT INTEROPERABILITY

THIS SECTION INCLUDES:

- **National and international experience**
- **Implementation actions**

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

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.

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.
- Mobile applications and clinical information systems that connect to the My Health Record system must meet conformance requirements and relevant standards.
- Software providers and healthcare organisations who want to participate in the national electronic prescribing program must meet conformance requirements set by the Agency.

Based on international practice, a wide range of policy tools could be used to promote the adoption of standards and conformant digital technologies. These include:

- providing certification services so that software purchasers know that products meet specified standards
- establishing a voluntary agreement or code of practice 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 accreditation[28]
- 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 that have lower levels of digital maturity and adoption, and for standards and terminologies that 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.

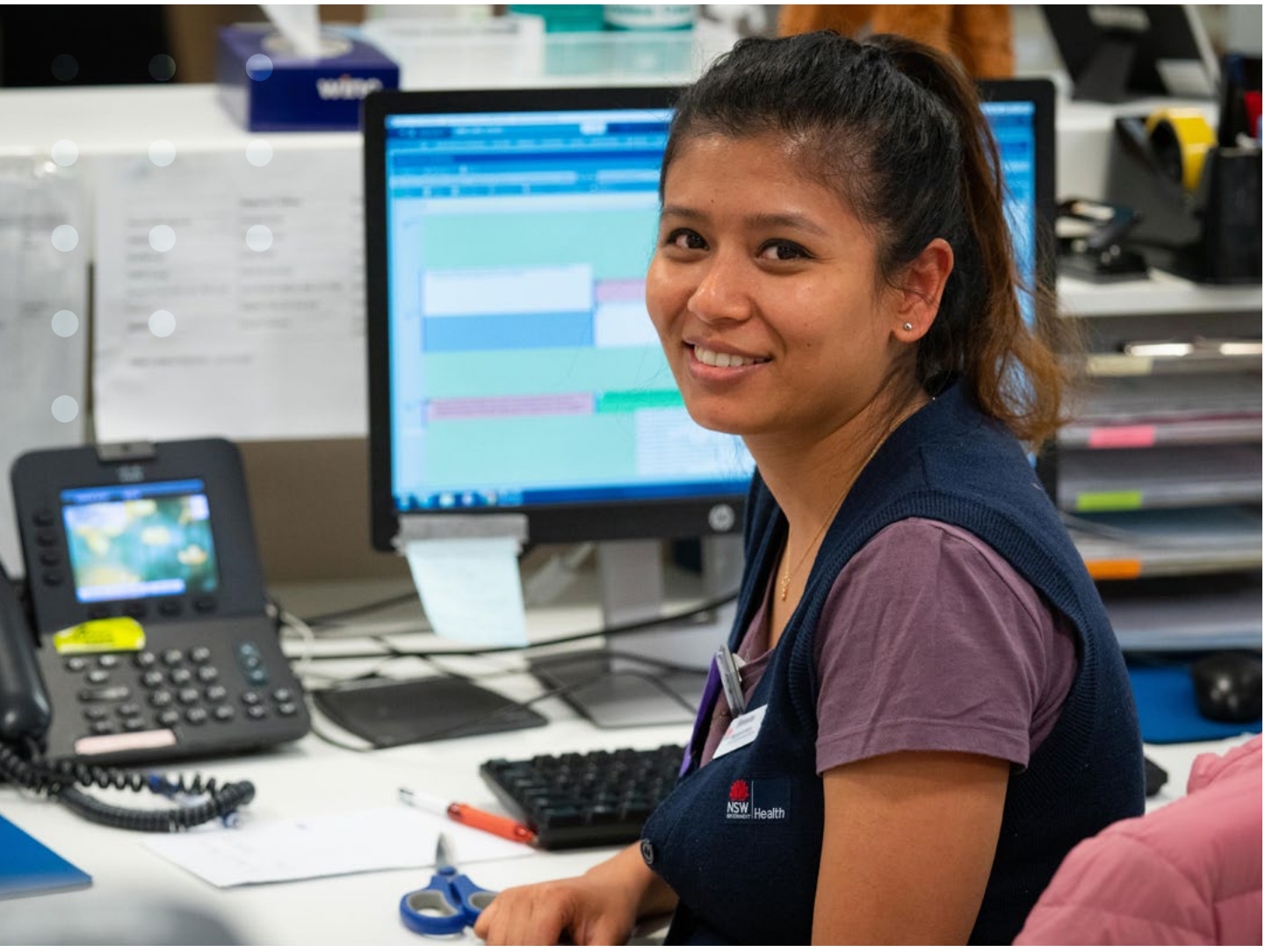
Any proposed change in current mechanisms will need to be developed with input from stakeholders and justified in terms of the net benefits that would arise. Policy tools must be tailored to support a viable and vibrant health technology sector in which companies bring digital solutions to market to meet the demand for interoperable digital health solutions.

[28] Australian Commission on Safety and Quality in Health Care, *National Safety and Quality Health Service Standards: Second edition*, 2019.

IMPLEMENTATION ACTIONS

TABLE 8: ACTIONS FOR POLICY TOOLS TO SUPPORT INTEROPERABILITY

NATIONAL ACTION		LEAD
IMMEDIATE		
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



SECTION 9

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