# Draft National Healthcare Interoperability Plan

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# 1    Executive summary

The primary goal of healthcare interoperability is to support safe, secure, efficient, and quality care through an ecosystem of connected providers that conveniently and seamlessly share high-quality data with easily understood meaning.

This draft National Healthcare Interoperability Plan (the Plan) has been developed to map a pathway to a more interoperable Australian health system and to support the implementation of digitally enabled models of care. Australia has key systems in place to enable interoperability such as national healthcare identifiers, and it continues to make progress as shown by the rapid take up nationally of electronic prescribing. However, the inability to easily share meaningful information between clinical systems remains the norm in Australia and is seen by clinicians as the major barrier to using digital health to improve healthcare.

A more connected and interoperable digital health system is a foundational element of a health system that can provide access to health care when and where it is needed, and harness the power of health information to drive whole of person care. The pathway outlined in this Plan will offer benefits for:

- **individuals**, by enabling them to easily access their secure information, control who can access that information, and improve their health outcome and experience of care

- **healthcare providers**, by providing them with timely access to the information they need, in a format that allows them to effectively improve clinical decision-making and care

- **healthcare provider organisations**, by enabling them to safely share information across the entire healthcare system, to support best-practice processes and new digital models of care.

- **funders and regulators,** by providing better and more timely information to inform policy, funding and regulatory decisions that support value-based care and best practice regulation.

The draft Plan was informed by national consultations undertaken in 2019 and by engagement with health departments over 2020-21. Following consultation with stakeholders, a final Plan will be submitted to the Health Chief Executives Forum for approval in the first half of 2022.

Written comments on this draft Plan can be sent to Interoperability@digitalhealth.gov.au by 13 December 2021.

**Interoperability principles**

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

The guiding principles are:

1.  Health information is discoverable and accessible.

2.  Use of health information supports individual choice and access to information.

3.  National healthcare identifiers are used across the healthcare sector.

4.  National digital health standards are agreed and adopted.

5. The value of care delivered increases as more digital health systems are connected.

6. Interoperability system design is informed by national digital health system maturity.

7. Core national healthcare digital infrastructure is used across the healthcare sector.

8. Investment supports interoperability.

**Priority action areas**

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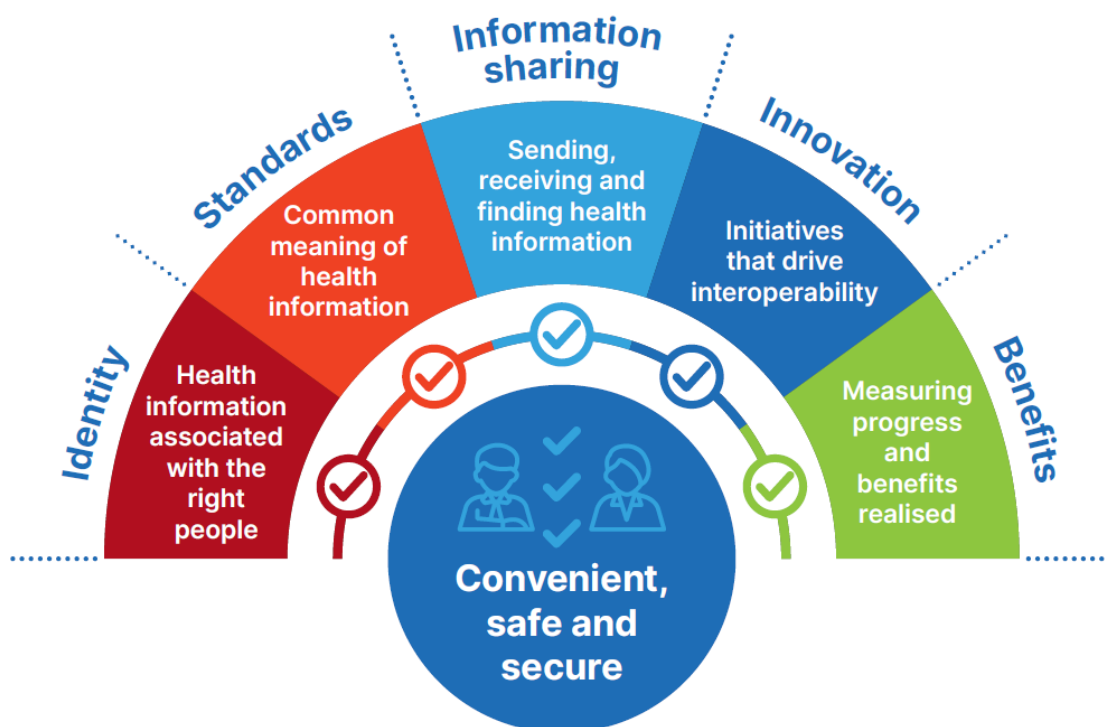


*Figure 1.1: Interoperability priority areas*

*Identity*

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

*Standards*

Interoperability is made possible by the implementation of standards. The Agency will continue to collaborate with the health sector and vendors to develop specifications and conformance arrangements for national digital infrastructure that use national terminology and the standards

developed by recognised Standards Development Organisations. Work is underway to develop a standards catalogue that can support easy search and retrieval of national specifications and associated standards.

*Information sharing*

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

*Innovation enabled through interoperability*

As more digitally enabled models of care incorporate nationally consistent components of interoperability – such as identifiers, standards and terminology – it will become easier to innovate, develop and adopt digital systems that are connected and can meaningfully communicate. Australia has implemented successful digital infrastructure that support interoperability such as the My Health Record and electronic prescribing and is working to build interoperable systems for digital imaging and to roll out Provider Connect Australia. Consultation undertaken since 2019 has identified potential digital system enhancements that will need to be prioritise and built into the work programs of the Agency and jurisdictions over time. The separate consultation underway on developing the next National Digital Health Strategy will provide a basis for identifying the priority digital health initiatives over the next five years.

*Benefits, evaluation and maturity measurement*

Being able to measure digital health maturity is important for encouraging continuous improvement in a high-performing interoperable healthcare system. Building on experience with maturity models in Victoria and Queensland, the Agency will work with jurisdictions to assess the best digital health maturity model for adoption in the public hospital system. A survey of hospital, pharmacy and GP organisations will be undertaken to provide a benchmark of the level of interoperability that can be repeated every few years to measure progress. Evaluation and benefits measurement of individual digital health technologies is also required to demonstrate progress.

**Implementation horizons**

Improving Interoperability requires a sustained effort over a long time and across all settings of care to build the maturity of different digital health systems that can access, exchange, and integrate data in a coordinated manner. The Plan contains proposed actions to mature interoperability over the next five years.

Table 1.1 summarises the key actions for each priority area.

*Table 1.1: Horizons for interoperability actions*

| | **Immediate (within 1 year)** | **Short term (1 to 3 years)** | **Medium term (3 to 5 years)** |
|---|---|---|---|
| **Identity** | • Adopt nationally agreed healthcare identifiers in future digital health initiatives involving exchange of health information<br>• Roll out Provider Connect Australia<br>• Support the role the National Health Service Directory as core national infrastructure | • Create a roadmap to support the wider take-up of healthcare identifiers<br>• Introduce a program to improve match rates when using identifiers in data searches<br>• Promote the use of healthcare organisation identifiers to identify network structures | • Consolidate the wider use of healthcare identifiers to support interoperability<br>• Continue to implement the roadmap to support the wider take-up of healthcare identifiers |
| **Standards** | • Develop a standards catalogue to support easy search and retrieval of Agency specifications and associated standards<br>• The Agency to continue to co-design specifications and use of standards with industry | • Develop resources to support mapping between national and other common terminologies<br>• The Agency to promote the use of FHIR as part of its modernisation program | • Digital health systems to use HL7 FHIR, OAuth and OpenID Connect for API information exchanges |
| **Information sharing** | • Jurisdictions to harmonise interoperability requirements in future procurements<br>• Investigate the capability to identify members of a care management network and discover health information | • Investigate options for supporting a national approach to individual consent<br>• Build an online toolkit and service catalogue to support interoperability projects | • Develop a common agreement for organisations to use for information sharing<br>• Develop a conformance framework for national digital health systems and services |
| **Innovation** | • Progress priority work on aged care, electronic requesting and referrals that improve interoperability | • Progress further initiatives such as building a discoverability service for health information | • Progress further initiatives such as enhancing systems to support shared care |
| **Benefits** | • Undertake a baseline survey of the interoperability of GPs, Pharmacies and Hospitals.<br>• Assess current experience with digital maturity models for wider use in Australia | • Produce an annual report on progress and key benefit metrics<br>• Repeat the survey of interoperability to assess progress<br>• Advance the rollout of an agreed national approach to digital health maturity measurement | • Repeat the survey of interoperability to assess progress<br>• Review the current Plan and commence work on the next Plan |

# 2 Introduction

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.

The Global Digital Health Partnership (GDHP) defines interoperability as:

> "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."[1]

Two questions – one each from a clinician's and individual's perspective – summarise the problems of creating a more interoperable healthcare system:

- Individual – How can I be confident that my health data is secure and that I can make it available to healthcare providers and other health professionals looking to improve my health and wellbeing?

- Clinician – What is known about the individual I am caring for that will allow me to provide more convenient, safe and high-quality care? How can I as a clinician contribute high-quality data for this individual to better help future healthcare interactions?

The answers are complex and must address four factors:

- What is the best way to identify individuals and healthcare providers?

- What is the best and most consistent way to share important health information?

- What health information exists about an individual?

- What is the best way to establish trust in the provenance, quality and security of information shared?

These issues are important for managing our own health or participating in the care of others, whether as a healthcare provider, carer or volunteer. There must be a way to discover and share information between systems and healthcare providers so the information can be easily understood and accessed through the digital systems normally used. This is vital for identifying relevant information that can support better health and healthcare delivery.

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

The National Healthcare Interoperability Plan (the Plan) defines actions that will build a more digitally connected health system to deliver safer, more convenient and secure care that benefits Australians and our healthcare system.

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[1] Global Digital Health Partnership (GDHP) https://www.healthit.gov/topic/global-digital-health-partnership

## 2.1    Background

Interoperability is a strategic priority in Australia's National Digital Health Strategy (the Strategy), which describes the provision of high-quality data with a commonly understood meaning that can be used with confidence.[2] The interoperability of clinical information is essential to high-quality, sustainable health care in which clinical information is collected in a prescribed manner and can be shared in real time with patients and their providers. The Strategy proposed public consultations on interoperability, and the development of an agreed vision and roadmap for implementing interoperability between all public and private healthcare services in Australia.

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

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

The draft National Healthcare Interoperability Plan (the 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.

## 2.2    Purpose and scope of the draft Interoperability Plan

The Plan explores the current barriers and enablers to interoperability between organisations and identifies key priority areas for the next five years.

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

It is intended to be used by:

- participants in the healthcare software industry

- clinical representative groups

- healthcare consumer representative organisations

- Australian, state, territory and local governments

- public and private healthcare providers.

The Plan refers to opportunities to participate in and consider global digital health interoperability needs and benefits. This is more relevant than ever given the COVID-19 pandemic and the likely

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[2] National Digital Health Strategy: Safe, seamless and secure

need to exchange vaccination information for international travel health and safety. Interoperability is a key capability for global pandemic preparedness and response.

Prioritisation and implementation of action items may differ across states and territories, reflecting local needs and resources, and some items will be rolled out nationally. The timeframes to initiate or complete actions are categorised as immediate (within one year), short (1–3 years), medium (3–5 years) or ongoing.

A better-connected healthcare system will provide the following benefits:

- **Individuals** will be able to access their information and control who else can access it, and become engaged in their health care. This will enhance their experience and improve the quality and safety of care provided.

- **Healthcare providers** will have timely access to information they need in a meaningful format to improve clinical decision-making and patient care. Better access to health information will benefit health research, with the flow-on benefit of improving clinical practice.

- **Healthcare provider organisations** will be able to increase information sharing across the entire healthcare system to support effective and efficient processes that are based on best practice and to enable the delivery of new digital models of care. This will help to increase productivity and reduce costs.

- **Funders and regulators** will have access to more comprehensive and more timely information to inform their policy, funding, investment and regulatory decisions that support value-based care and best practice regulation.

The Plan considers interoperability across all sectors: acute care, primary care, allied health, community care, aged and disability services, and health and human services. Achieving this would establish harmonised and holistic interoperability nationally.

## 2.3    How to provide comment on the draft Plan

Written comments on this draft Plan can be sent to Interoperability@digitalhealth.gov.au by 13 December 2021. The following questions are provided as a guide for submissions.

There is no requirement to respond to each question, if you have a particular area of focus then please provide us with your view on that area. Equally, any general views you wish to raise, not related to the specific questions, are also welcome.

*Interoperability Principles*

1.  Do you support the Interoperability Principles in section 3.1, or should some principles be amended, added or removed?

*Implementation Actions*

2.  Are there any key actions missing to promote the objectives of this Plan? (A consolidated list of actions can be found in section 10)

3.  Would you like to see any changes to the scope or timeframe of the proposed actions?

4.  Are there any actions that your organisation would like to be involved in progressing, and what would that involve?

*Interoperability Initiatives*

5.  Which, if any, of the implementation initiatives in section 7.4 would you like prioritised for delivery and why?

*General feedback*

6.  Is your organisation leading any activities that should be identified in the final Plan?

7.  Do you have any additional feedback on the Plan?


The Agency will use any personal information you provide in your response to inform the final National Health Interoperability Plan. We do not intend to publish responses received, and will only include references from submissions in the final Plan where advised or agreed with the submitter.

# 3    Principles and priorities for interoperability

## 3.1    Interoperability Principles

The Plan sets out guiding principles (Table 3:1) to accelerate the uptake and shift towards a more interoperable national healthcare system. Implementing digital health initiatives that align with these guiding principles will significantly increase the digital health maturity of the Australian healthcare sector and enable more contemporary innovative models of care.

*Table 3:1: Interoperability Principles*

| |
|---|
| **1.    Health information is discoverable and accessible.** |
| Discoverable and accessible health information is key to supporting healthcare providers to deliver quality health care to their patients. It is equally important for individuals to have access to their personal health information to help them to manage their own health. This principle must have regard to Principle 2 so that privacy and consent requirements are fully met. |
| **2.    Use of health information supports individual choice and access to information.** |
| The roles of security, privacy and consent must be considered and regulated in relation to using and sharing health information. Australians expect 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. |
| **3.    National Healthcare Identifiers are used across the healthcare sector.** |
| National Healthcare Identifiers are essential for interoperability. Wider use of 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 that an approved healthcare provider has shared information for the right individual. |
| **4.    National digital health standards and specifications are agreed and adopted.** |
| To seamlessly transfer health information between individuals and providers, and ensure that the sender and recipient consistently understand the information, it is essential to have agreed terminology and digital health standards and specifications. It will be necessary to develop these using a transparent and consensus-based approach. As part of adoption, software and processes should adhere to national conformance rules. |
| **5.    The value of care delivered increases as more digital health systems are connected.** |
| 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 of the core foundational components of interoperability – such as identifiers, standards and terminology – will foster a more advanced and innovative digital environment that is more convenient for users and enables better integration and healthcare delivery across different care settings. |

| **6.  The interoperability system design is informed by national digital health system maturity.** |
|---|
| Different healthcare organisations operate at different levels of maturity. It is important to identify and consider these levels when designing solutions that can best enhance interoperability without impacting service delivery and access. A minimum level of digital capability is required to participate in an interoperable health system. |

| **7.  Core national healthcare digital infrastructure is used across the healthcare sector.** |
|---|
| All healthcare organisations should use the existing core national digital infrastructure as a trusted national system, this will drive standardisation and interoperability across the health system. For example, the National Health Services Directory (NHSD) should be used for discovering healthcare providers and healthcare services. As the use of national infrastructure increases, so too will the volume of information within it, increasing its utility. Other core national infrastructure includes the My Health Record system, the Healthcare Identifiers Service (HI Service), National Clinical Terminology Service (NCTS) and the National Authentication Service for Health (NASH). |

| **8.  Investment supports interoperability.** |
|---|
| To move to an interoperable healthcare system, it is essential that decision-making about future investments considers methods for capturing, sharing and managing clinical information. Procurement documentation should include consistent requirements that enforce the need for interoperability. |

## 3.2    Interoperability priority areas

Over the past three decades, waves of new digital technologies such as the internet, mobile devices and big data have transformed how businesses operate and engage with their customers. However, it is widely acknowledged that the healthcare sector lags behind other industries in adopting digital technologies.[3] In some areas of the healthcare system, this is seen in the keeping of paper-based clinical records, continued use of the fax as a method of information exchange and inconsistent adoption of standards and terminology that support information sharing for clinical care.

Coinciding with technological change, the healthcare model is moving from episodic, transactional, provider-centric care models to preventive, personalised and participatory care models. Digital health technologies are increasingly being used to support 'anywhere, anytime, anyhow' models of service provision.

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; clear consumer rights regarding personal information; and the protection of an individual's privacy. Information needs to be discoverable so that in the context of a clinical relationship, unique information held about an individual can be readily found. Importantly, information must be standardised technically and semantically, and referenced to accepted national and international standards.

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

The Plan identifies five priority areas (see Figure 3.1) to advance digital health interoperability. Based on the Interoperability Principles, it is necessary to focus on these areas to benefit from

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[3] Healthcare IT, "Despite high consumer demand, digital care efforts are lagging", 30 May 2019.

interoperability. The Plan provides an overview of each priority area, the case for reform, current activities, future state and implementation actions to support the transition towards the future state. The priority areas reinforce the importance of the principles and are seen as the foundations for a convenient, safe and secure healthcare system.
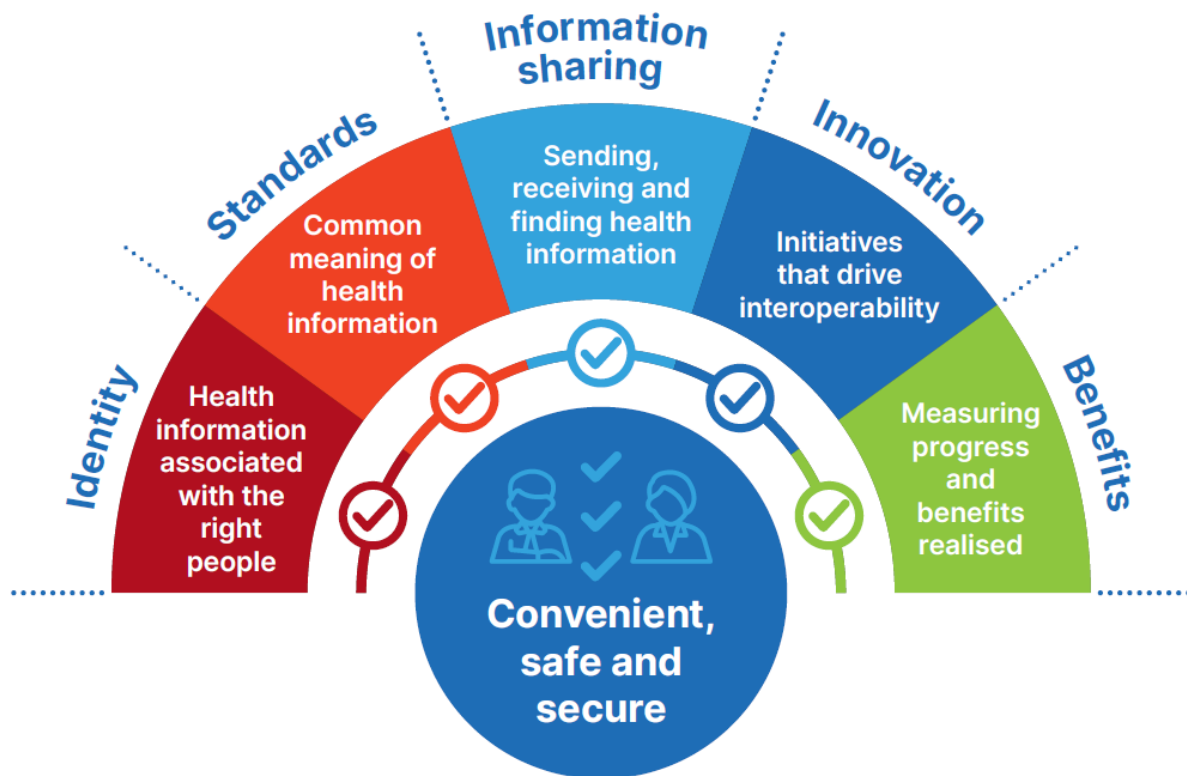


*Figure 3.1: Interoperability priority areas*

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

These priorities involve the following actions and benefits:

1. Identity

   Leverage the HI Service for national healthcare identifiers and health service directories such as the NHSD to obtain healthcare services and healthcare providers. Adopting healthcare identifiers will improve access controls and logging and will ensure that individuals, healthcare providers and healthcare provider organisations are uniquely identified when exchanging health information, ensuring that the source of information and the individual are identified correctly.

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 in a consistent and collaborative manner, and are fit for purpose, widely adopted and implemented as required by relevant conformity assessment schemes.

3. Information sharing

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

4. Innovation

Identify initiatives and functional enhancements that will drive interoperability across the healthcare system and create value for individuals and providers from interoperability. This will enable future innovation for digitally enabled healthcare, such as electronic requesting of digital imaging and pathology, electronic referral, clinical decision support, notifications to general practitioners (GPs) and the identification of care management networks.

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. By identifying, monitoring and evaluating the benefits of interoperability, they will be able to inform progress on priorities and provide information to better target resources.

## 3.3   What Australia has accomplished

Excellent examples of interoperability exist in Australian health services, showing the collective will driving a safer, more convenient and secure healthcare system. Established national systems, solutions, services and capabilities that can be leveraged include the following:

- The HI Service supports the unique and consistent identification of healthcare recipients, healthcare providers and healthcare provider organisations.

- The Australian Medicines Terminology (AMT) and the Australian extension of *SNOMED CT (SNOMED CT-AU)* provide standard vocabulary to record and exchange clinical information.

- The National Clinical Terminology Service (NCTS), which contains localised FHIR resources and SNOMED CT-AU (including the AMT), which is maintained and released monthly to support shared semantics for communication, quality data transfer and improved reporting. The NCTS provides:

  o Free licensing for the Commonwealth Scientific and Industrial Research Organisation (CSIRO)/Australian eHealth Research Centre (AEHRC) clinical terminology applications[4]

  o Nationally accessible servers exposing standards-based APIs for syndication and integration of terminology.

- The Developer Centre, hosted by the Agency, contains digital assets and support material (including toolkits, sample code, standards and conformance test tools) to assist developers to integrate their software into Australia's digital health systems.

- Real Time Prescription monitoring (RTPM), which monitors the prescribing and dispensing of controlled medicines with the aim of reducing their misuse in Australia. As well as ensuring that patients who genuinely need these medicines are able to access them, the RTPM solution

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[4] These include the Ontoserver terminology server and the Snapper mapping and FHIR resource authoring platform.

has been implemented in a number of states and territories. It is supported by a National Data Exchange (NDE).

- The NHSD is a comprehensive national directory of health services, which enables individuals and healthcare providers to access comprehensive, consolidated, accurate and up-to-date information.

- NASH enables healthcare providers and supporting organisations to securely access, encrypt and share health information. NASH is used to digitally sign and encrypt information exchanged using the NASH Public Key Infrastructure credentials (public and private keys; and digital certificates).

- Provider Digital Access (PRODA) allows individual healthcare providers and healthcare provider organisations to securely authenticate and access online provider services across all government sectors. These include My Health Record, the Australian Immunisation Register (AIR), the Practice Incentives Program (PIP), Health Professional Online Services (HPOS) and the Aged Care Provider Portal.

- The My Health Record system provides an online summary of an individual's key health information. By allowing health information to be viewed and shared, healthcare providers can gain a more detailed picture to make decisions, diagnose and provide treatment, and individuals can be active participants in their care.

- The Metadata Online Registry (METeOR), maintained by the AIHW, is Australia's repository for national metadata standards for health, housing and community services statistics and information. It includes national minimum data sets (NMDS) and a data dictionary.

- The Australian Modification of the International Classification of Diseases (ICD-10-AM) and the Australian Classification of Health Interventions (ACHI) classify diseases, procedures and interventions in episodes of admitted patient care.

- electronic prescribing enables prescribers, individuals and pharmacists to use electronic prescriptions. They are part of the broader digital health and medicines safety framework. They enable the prescribing, dispensing and claiming of medicines, without the need for paper prescriptions.

# 4      Identity

Being able to correctly search for and identify individuals, healthcare providers and healthcare provider organisations is a critical for interoperability and healthcare delivery. Health information about an individual and the provenance of the information created is enabled by using national healthcare identifiers (such as an Individual Healthcare Identifier (IHI), Healthcare Provider Identifier-Individual (HPI-I) and Healthcare Provider Identifier-Organisation (HPI-O)). This gives both the individual and the healthcare provider confidence that information is associated with the correct individual and has been authored by a registered healthcare provider.

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

National approaches to identity are a priority across all sectors of the economy and government. Australia's Data and Digital Ministers have a high priority to develop a consistent approach to digital identity that will make it easier for the Australian public to interact online across a wide range of digital services, regardless of the jurisdiction they live in or the service they are accessing.

## 4.1     Healthcare Identifiers

Australia has a well-established HI Service, through which every Australian has a unique IHI, every healthcare provider has a unique HPI-I and every healthcare provider organisation has a unique HPI-O. Accurately and consistently identifying individuals, healthcare providers and healthcare provider organisations is essential for building trust in an interoperable healthcare system. In particular, healthcare identifiers:

- enable healthcare providers to accurately identify individuals, healthcare providers and healthcare provider organisations by matching the correct records with the unique identifiers

- improve the accuracy of information shared with other healthcare providers and individuals

- provide greater control to individuals on the level of access to their information they provide to healthcare providers

- increase the quality and accuracy of health information used for research, public health and planning purposes

- support the ability to use healthcare identifiers for yet unknown future purposes, such as linking with the Digital Transformation Agency's national digital identity[5] or where individuals share their IHI with their healthcare providers

- support the auditing and traceability of healthcare processes.

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

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[5] https://www.dta.gov.au/our-projects/digital-identity

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

### 4.1.1    The case for reform

The 2018 Healthcare Identifiers Act and Service Review found that while Australia has built a national healthcare identifier capability, it is not being used to its fullest possible extent, so potential benefits are not being fully realised.[6] The review identified factors that have limited the realisation of benefits including limited adoption of HPI-Is and HPI-Os, challenges in maintaining data quality and minimal active planning to use the HI Service beyond the My Health Record. A key factor identified was limitations and complexity of the current *Healthcare Identifiers Act 2010* that are a barrier to wider use of this capability, particularly in health-related areas not directly involved in delivering care. These include health administration and community and home care services that support healthcare delivery.

The Australian Commission on Safety and Quality in Health Care (ACSQHC) has 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]

Wider and convenient use of IHIs will improve clinical safety. Some challenges to be addressed include embedding wider use of IHIs beyond the current focus on the My Health Record system and improving HI Service match rates to enhance data quality.[8]

The inability to confirm a person's IHI may:

- act as a barrier to individuals and healthcare providers participating in new digitally enabled models of care

- limit healthcare providers' ability to discover and access additional health information that would support their clinical decision-making and enable the most appropriate care for their patients

- limit healthcare providers and individual's ability to share health information

- limit the ability to link health information to support research and analytics.

It is necessary to accurately identify healthcare provider organisations and individual providers to:

- ensure that only authorised individuals access information

- enable healthcare providers to make informed assessments of the information they receive (based on its provenance)

- support organisations' clinical governance arrangements

- support health-related payments and claims

- support patients' and consumers' healthcare experiences.

The benefits of national healthcare identifiers are constrained by the significant variation in their use across the Australian healthcare sector, and a proliferation of local identifiers that are not

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[6] Department of Health, *Healthcare Identifiers Act and Service Review – Final Report*, November 2018.
[7] PwC, *Sixth Clinical Safety Review of the My Health Record System*, Australian Commission on Safety and Quality in Health Care (ACSQHC), November 2018, p. 3.
[8] In June 2020, 6.4 per cent of matching failed. Ideally, the failure rate should be as close as possible to zero.

linked to national healthcare identifiers. For example, digital health systems within hospitals often do not use or reference each doctor's HPI-I. In some cases, the hospital itself is not identified by its HPI-O, and only the larger entity to which the hospital belongs is identified.

The 2020 review of the *My Health Records Act 2012* recommended actions to improve the use of HPI-Os and HPI-Is.[9] It noted transparency issues relating to using local healthcare provider identifiers instead of HPI-Is. It also said that using one HPI-O for a network of organisations rather than separate HPI-O for each organisation within a network, makes it hard to identify the actual healthcare provider organisation involved (for example, the specific hospital or clinic). The review also noted the need to identify organisations that provide services that support health care but do not deliver healthcare services, such as home care services.

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

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

- Accurate patient identification is at the core of delivering a safe and efficient healthcare system, and affects how people experience and engage with that system.

- As the use of digital health technologies grows, the importance of having accurate, unique identifiers for individuals, healthcare providers and healthcare provider organisations increases exponentially.

- National healthcare identifiers are essential to connect Australia's highly fragmented healthcare system. They would improve the patient experience as individuals move across state and territory borders, and between public and private health services and non-government organisations, with complex funding arrangements.

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

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

### 4.1.2    Current activities

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

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

- *Using IHIs to support public health and the response to COVID-19:* IHIs enable tracking of the dispensing and use of vaccines, health outcomes of infections and treatments, and the progress of vaccine programs, increasing data accuracy.

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[9] Professor J McMillan AO, *Review of the My Health Records Legislation: Final Report*, 1 December 2020.

- *Electronic prescriptions:* Healthcare identifiers are vital for delivering electronic prescriptions that enable the prescribing, dispensing and claiming of medicines without the need for paper prescriptions.

- *COVID vaccine role out:* Healthcare identifiers have been incorporated into the digital systems that have supported the COVID vaccine role out and certification. This has included digitising the process for individuals without a Medicare or DVA card to get an Individual Healthcare Identifier (IHI) and gain access to online proof of COVID-19 vaccination.

- *NASH Certificate Simplified Renewal:* Deliver a more streamlined certificate renewal process from within healthcare provider software products, to provide a simple and efficient renewal experience for the healthcare provider organisations.

- *Health Delivery Modernisation:* Services Australia and the Department of Health have undertaken this project to stabilise and modernise the existing health and aged care payment systems. It includes a phase that focuses on simplifying and rationalising the multiple individual and healthcare provider identifiers, potentially using national healthcare identifiers.

- *Use IHIs to improve funding models:* The IHPA is undertaking a proof of concept to use IHIs to improve funding models by accurately identifying service delivery to individuals across different care settings, financial years and hospitals.

- *Remote Area Aboriginal Health Services Program Section 100 medicines:* This project will help improve the IHI matching rates for Aboriginal and Torres Strait Islander peoples and improve the visibility of medicines provided under this program.

- *WA Health's use of HPI-Is:* WA Health has launched a project to adopt and use HPI-Is to support the rollout of electronic prescriptions, which will increase the use of HPI-Is across the WA public healthcare system.

- *Unique Device Identifiers (UDI):* The Therapeutic Goods Administration (TGA) is proposing to use identifiers to uniquely identify and track medical devices such as blood pressure devices, bio-sensing wearables across the health system. The capture, storage and easy access to UDI information when linked with IHIs would be invaluable for product recalls.

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

### 4.1.3    Future state

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

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

- National healthcare identifiers are captured, stored and exchanged between all individuals and healthcare providers across public and private providers, and aged care and disability services as standard practice in delivering health care.

- National identifiers are universally used to identify individuals, healthcare providers and healthcare provider organisations, with all individuals and healthcare providers that require a national identifier having one.

- Management of identifiers and associated artefacts such as digital certificates is simple, streamlined and effective, making it harder to not use them than to use them, and removing the need for exemptions on their use.

- Identifier matching errors are minimised, reducing or eliminating misidentification of individuals, and enabling individuals to control their information, manage their privacy and receive better and safer care with improved access to their health information.

- The requirement to use and manage healthcare identifiers is included in all healthcare system procurements.

- National healthcare identifiers are a mandatory requirement of digital initiatives that identify an individual, a healthcare provider or healthcare provider organisation.

- National healthcare identifiers are used in Application Programming Interfaces (APIs) in the digital health ecosystem[10] to uniquely identify individuals, healthcare providers and healthcare provider organisations.

- National healthcare identifiers are readily available and can be used in innovative models of care and all health information exchanges.

- A legislative framework for Healthcare Identifiers enables the identification of relevant participants involved directly or indirectly in delivering health care.

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

### 4.1.4 Implementation actions

outlines actions identified as priorities to resolve the deficiencies in the current adoption of national healthcare identifiers and to transition the healthcare system towards the proposed future state.

*Table 4:1: Priority actions for adopting national healthcare identifiers and moving towards the future state*

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead; S = support | TIMEFRAME |
|---|---|---|
| **General recommendations** | | |
| **ACTION 4.1**<br>The Agency in partnership with the Department of Health will coordinate a Healthcare Identifiers Roadmap, which will include, among other items:<br>• 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 HIs | The Agency (L)<br>Department of Health (L)<br>State and territory health departments (S)<br>Services Australia (S) | Short* |

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[10] Add reference once document is put on Agency web site

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead; S = support | TIMEFRAME |
|---|---|---|
| • reviewing legislative impediments to the wider take-up of healthcare identifiers in the *Healthcare Identifiers Act 2010*<br><br>• evolve data exchange specifications to support a contemporary service such as considering use of FHIR, reviewing data elements and permissible values. | | |
| **ACTION 4.2**<br>The Agency will engage jurisdictions to develop a cost–benefit analysis to inform the wider adoption of national healthcare identifiers, initially focusing on HPI-Is. | The Agency (L)<br>Department of Health (S) | Immediate* |
| **ACTION 4.3**<br>Jurisdictions, the Department of Health, and Services Australia will adopt and use national healthcare identifiers in future digital health initiatives involving health information sharing. | The Agency (L)<br>Services Australia (L)<br>Department of Health (S)<br>State and territory health departments (S) | Ongoing |
| **ACTION 4.4**<br>The Agency and Services Australia will 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 (L)<br>Services Australia (L)<br>Department of Health (S) | Short |
| **IHI recommendation** | | |
| **ACTION 4.5**<br>The Agency and Services Australia will promote the use of IHIs, noting current focus areas include IHIs for newborns as soon after birth as possible and introducing an online capability to enable individuals who do not have a Medicare card or a Department of Veterans' Affairs card to register for an IHI. | The Agency (L)<br>Service Australia (L)<br>Department of Health (S) | Ongoing |
| **HPI-I recommendation** | | |
| **ACTION 4.6**<br>The Agency will review conformance requirements for using HPI-Is when uploading documents to the My Health Record system, recognising healthcare providers are at different stages of use of HPI-Is. | The Agency (L)<br>Department of Health (S) | Short |

| NATIONAL ACTION | RESPONSIBILITY L = lead; S = support | TIMEFRAME |
|---|---|---|
| **HPI-O recommendation** | | |
| **ACTION 4.7** The Agency will support the development of deeper HPI-O network structures, including revising published guidance, enhancing online HPI-O network registration, and working with vendors to address software limitations. | The Agency (L) Service Australia (L) Department of Health (S) | Short |

*\* Immediate: within one year; short: 1–3 years*

## 4.2    Health service directories

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

Within Australia there are numerous health service directories established by public and private organisations that store information on health services and healthcare providers. From a national interoperability perspective, it is essential to have a national system in place that allows for a consolidated, consistent, accurate and easily accessible directory of healthcare services and healthcare providers.

The NHSD, which is managed by Healthdirect Australia, is a key national health service directory. In February 2020, AHMAC endorsed the NHSD review completed by Doll Martin Associates in 2019 that recommended the NHSD be positioned as core national infrastructure and a funding model agreed that provides for the long-term security of operational funding.[11] A different directory with a separate but vital role in discovering HPI-Os is the HI Service's Healthcare Provider Directory (HPD). It contains information on healthcare providers and healthcare provider organisations.

### *"The NHSD should be managed as core national infrastructure."*

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

### 4.2.1    The case for reform

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

It is necessary to be able to discover healthcare services and healthcare providers to:

- share health information with authorised healthcare providers

- enable healthcare providers to locate and contact other healthcare providers and healthcare services

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[11] Department of Health, Healthcare Identifiers Service Strategic Intent, August 2019.

- allow healthcare providers to make informed assessments of the provenance of the information they receive

- enable individuals to find healthcare providers and healthcare services.

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

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

While it is acknowledged that it will be necessary to have specialised directories for particular purposes (for example, directories for qualifications and accreditations), directories must be interoperable to ensure consistency and reliability, and support the flow of information. Consideration should also be given to rationalising health service directories. The 2013 review of the HI Service and the Healthcare Identifiers Act recommended that governments "consider the feasibility of integration between the National Health Services Directory and the Healthcare Provider Directory to reduce duplication and rationalise the national directory infrastructure".[12]

There are missed opportunities and significant costs associated with not having an up-to-date NHSD. 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.

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

### 4.2.2   Current activities

Initiatives are underway to support improvements to health service directories, including:

- *2019 NHSD review recommendations:* The NHSD Fund Provider Committee (FPC) is developing an implementation plan for all 29 recommendations of the 2019 Review, including to:[13]

  o   define the benefits being sought through improved integration and use of the NHSD across the sector

  o   identify areas for improvement in the NHSD

  o   define the objectives, timeframes and responsibilities for planned collaborations

  o   develop a high-level roadmap and governance process

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[12] Department of Health, *Healthcare Identifiers Act and Service Review – Final Report*, June 2013.
[13] Department of Health, Healthcare Identifiers Service Strategic Intent, August 2019.

      ○   identify the relationships between the various health service directories in use across the Australian health landscape.

- *Provider Connect Australia (PCA):* The Agency will implement the PCA to support the synchronisation of information across multiple health service directories, including the NHSD. This will help to ensure directories are as accurate and current as possible. The PCA achieves this by giving healthcare provider organisations a mechanism to maintain a single source of truth about the services they provide and the practitioners that provide them – and to distribute that information to the NHSD and other health service directories that are relevant to their business.

*"Identify the relationships between the various health service directories in use across the Australian health landscape"*

### 4.2.3  Future state

A mature interoperable system would include health service directories that offer the following features:

- Directories are managed and maintained to support safe, secure healthcare provider communications, and be reliable sources of information for individuals.

- The NHSD is adopted for national digital health programs to ensure comprehensive, consolidated, accurate and up-to-date healthcare provider and service information.

- Organisations such as Healthdirect Australia enables individuals through tools such as the NHSD to be active participants in their care, by providing the information they need to make informed decisions about managing their health and the services they can access.

- Health service directories support better integration between health services by providing easier access and more transparent information about the most appropriate services for referral and care pathways.

- Health service directories support the implementation of digital tools to improve access and experiences for individuals.

- The NHSD encompasses comprehensive, consolidated, accurate and up-to-date healthcare provider and service information for all health and related human services provided by governments, the private sector and not-for-profit organisations.

- Healthcare provider organisations maintain information on their services and healthcare providers in the NHSD, using the PCA to synchronise information across multiple health service directories.

- Individuals regularly use the NHSD and other health service directories to obtain information on healthcare providers and healthcare provider organisations, and find value in these directories.

### 4.2.4  Implementation actions

Table 4:2 outlines actions that involve using core national digital infrastructure, such as the NHSD and PCA, to discover healthcare services and healthcare providers, supporting the interoperability of the Australian healthcare system.

*Table 4:2: Priority actions for establishing core national digital infrastructure*

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 4.8**<br>Jurisdictions will work with Healthdirect Australia to use the NHSD as the service directory for digital health programs and where it is not possible (such as for a specialised directory), work with Healthdirect Australia and the Agency to support the required flow of information. | Department of Health (L)<br>State and territory health departments (S)<br>The Agency (S)<br>Healthdirect (S) | Ongoing |
| **ACTION 4.9**<br>The Department of Health, in partnership with state and territory health departments, will finalise a response to the recommendations of the 2019 NHSD review that supports the role of the NHSD as core national infrastructure. | Department of Health (L)<br>State and territory health departments through the NHSD FPC (L)<br>Healthdirect Australia (S) | Immediate* |
| **ACTION 4.10**<br>The Agency will roll out and support the implementation of Provider Connect Australia, which will be used by jurisdiction health departments. | The Agency (L)<br>Department of Health (S)<br>State and territory health departments (S) | Immediate |
| **ACTION 4.11**<br>Services Australia will assess the feasibility of integrating the NHSD and the HPD to reduce duplication and rationalise the national directory infrastructure. | Services Australia (L)<br>The Agency (S) | Short* |

*\* Immediate: within one year; short: 1–3 years*

# 5    Standards and conformance

To seamlessly transfer health information between individuals and providers, and ensure that information is consistently understood by both the sender and the receiver, agreed digital health standards and specifications are required. A core anchor point of digital transformation is a mature standards-based ecosystem, grounded on strong leadership supporting a conformance-centred approach to standards governance. A mature ecosystem ensures that digital health standards are fit for purpose, consistently and widely adopted, and implemented in line with national conformance rules.

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

Standards and conformance are key to enabling interoperability in the Australian healthcare ecosystem. Ensuring the conformance of software against 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 standards are implemented correctly. Non-conformance introduces unacceptable risk from an interoperability perspective as healthcare providers rely on the integrity of the information exchanged in their decision-making.

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

**Standards**

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

*Health information models* (such as the HL7 Reference Information Model, the National Health Information Model, FHIR data resource content structures and the National Health Data Dictionary) describe the structure of the healthcare content being exchanged (that is, a structure

by which various data elements are grouped in a logical manner alongside definitions, data types, cardinalities, rules and contextual information).

*Clinical terminology* (for example, SNOMED CT-AU, AMT and LOINC) defines healthcare concepts in both human readable terms and machine-readable codes. Clinical terminology code sets allow an accurate representation of meaning during data capture and information sharing. These clinical terminologies are different to clinical classification systems, such as ICD-10-AM, which is used to classify diseases and other health problems and to code episodes of admitted patient care across Australian hospital services for funding, monitoring and analysis.

*Data exchange specifications* (for example, HL7 v2, CDA, FHIR and Digital Imaging and Communications in Medicine (DICOM)) provide a standard set of rules for communication between two systems that meet some defined objective or use case. They typically specify the format and syntax of elements based on a standard schema, and the metadata (information about how data is defined, structured and represented).[14] Data exchange specifications can include a defined information model with clinical terminology bindings. Data exchange specifications include system-to-system data exchanges as well as device-to-system data exchanges such as ISO/IEEE 11073 (health device communication standards for communication between medical, healthcare and wellness devices and external computer systems).

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

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

While cybersecurity standards are required to support interoperability throughout the digital health system, they are applied across the whole digital health ecosystem and are not specific to interoperability.[15]

There are numerous national and international interoperability standards, and there has been significant adoption of various health interoperability standards (for example, HL7 v2, DICOM, LOINC, ICD-10-AM and AMT). Some sectors (for example, pathology and diagnostic imaging) have near unanimous use of HL7 v2 for reporting, but standardisation between healthcare providers is unclear. In Australia, there has been no centralised adoption of the standards, except for AMT. It should be noted that AHMAC endorsed SNOMED CT-AU as the national clinical terminology in 2005, but adoption has been sporadic. Without a centralised authority, adoption will continue to be sporadic at best. With respect to standards such as HL7 FHIR, uptake by the sector has mainly been driven by traction among healthcare software vendors.

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[14] The AIHW maintains METeOR.

[15] Further information about cybersecurity standards is available on the Agency's website at: https://www.digitalhealth.gov.au/healthcare-providers/cyber-security.

**Conformance**

Conformance regimes or frameworks allow testing of whether or not systems have met a standard or specification. Conformance helps with developing a register of trusted software that can satisfy procurement requirements and provide evidence for where standards are to be adopted. Australian examples of conformance and compliance frameworks include those for the My Health Record, electronic prescriptions, the HI Service, secure messaging, uploading vaccination details to the AIR and reporting morbidity data to the AIHW.

**Governance**

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

Currently, the AIHW leads a governance structure for health information (including metadata), which is outlined in the National Health Information Agreement between government health authorities. Discussions are underway to align and better integrate efforts on digital health and health information standards so they are mutually reinforcing.

## 5.1    The case for reform

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

**Standards**

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

Half of the nurses interviewed for a survey on interoperability said they had witnessed a medical error due to a lack of coordination (that is, data sharing) among devices.[17]

*"Interoperability is made possible by the implementation of standards."*[18]

To attain unambiguous shared meaning of recorded health information, the data must be shared in one or more universal code sets that can be easily understood by all systems across all healthcare settings. The existence of standards, however, is not enough – standards need to be communicated, promoted, maintained and updated (when required) so they work together effectively as a system.

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[16] D Rowlands, *A Health Interoperability Standards Development, Maintenance and Management Model for Australia*, JP Consulting for the Agency, January 2020.
[17] *Missed Connections: A Nurses Survey on Interoperability and Improved Patient Care*, The Gary and Mary West Health Institute, 2015.
[18] GDHP, "Interoperability".

Implementing standards brings the following benefits:

- Time and money are saved through improved clinical activities (for example, reconciling medications when an individual is admitted to hospital or conducting medication management reviews in residential aged care) and more efficient procurement (via clinical and supply chain integration).

- Using universal code sets when coding machine-readable data is a foundation for improving safety by reducing misinterpretation of data, driving evidence-based best practices in managing disease and the use of medicines, aiding clinical decision support, and improving the quality of data for research and big data analytics.

- Individuals benefit from:

  o having a shared and consistent understanding of their health information with healthcare providers

  o automated clinical decision support, which improves care and reduces errors

  o faster identification of information relevant to their care.

- Product development could be simplified by codifying what information is 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 regularly undertakes clinical safety reviews (CSRs) of different areas of the health system to ensure patient safety and the appropriateness of treatment. CSR 7.2 (My Health Record medicines information view) and CSR 9 (of SNOMED CT-AU and AMT adoption and use) contained recommendations in relation to adopting and using SNOMED CT-AU and AMT as the national clinical terminologies.[19,20]

In Australia, multiple national policies, programs, frameworks and specifications recommend using standard clinical terminologies to record aspects of patient care and to transfer information between systems. For example, AHMAC endorsed SNOMED CT-AU as the national clinical terminology in 2005 and the National Safety and Quality Health Service Standards issued AS18/11, an advisory on entering clinical information in My Health Record. Programs include the Department of Health's electronic prescribing; Active Ingredient Prescribing; and the Practice Incentives Program eHealth Incentive (ePIP)). Adoption 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 the priority standards used by vendors have a major influence. The inconsistent take-up of standards is impacting the maturity of interoperability within the Australian healthcare system.

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

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[19] ACSQHC, 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

[20] ACSQHC, Ninth clinical safety review of the My Health Record System, A review of the adoption and utilisation of SNOMED CT-AU and AMT, 2017

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

HL7 FHIR was developed as an alternative to existing data exchange protocols. It exposes individual data elements via services based on a modern API approach, including an HTTP-based RESTful protocol and well-defined data resource content structures. While the standard used in the My Health Record system (HL7 v3 and CDA) has very rich data element content, it requires significant expertise and skill to implement, which impacts its adoption. Using APIs and web services ensures that FHIR is closely aligned to integration approaches that occur outside health care, simplifying implementation. A key objective of FHIR was to facilitate interoperability between healthcare systems and services across a variety of devices, supporting easier exchange and integration of health information. FHIR is increasingly used nationally and internationally to support API integration between health systems and services.

Profiling and standardising terminology for different clinical domains and settings for existing HL7 v2 messaging exchanges will help to drive interoperability. This is due to it being by far the most prevalent information exchange specification in use across most health sectors.

**Conformance**

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

**Governance**

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

The Agency will continue to govern and lead the development and maintenance of digital health specifications (leveraging existing digital health standards and specifications where possible) for national digital health systems and services and national health priorities to achieve the Agency's work plan. In undertaking this work the Agency will co-design the specifications through collaboration with stakeholders including SDOs. Where required, Agency developed specifications will be progressed to become standards through the appropriate SDO and their balloting/development processes.

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

## 5.2    Current activities

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

**Terminology**

- *Queensland Clinical Terminology Service (QCTS)* - Queensland Health is establishing a statewide terminology service, which will provide new processes, technical specifications, an enterprise-managed ICT solution and a governance model, which will ensure best practice to address the clinical terminology needs of stakeholders. Technical aspects of the QCTS are based on international standards like FHIR, SNOMED CT, LOINC, Atom and OAuth2 through adoption of corresponding NCTS technical specifications for content and APIs. The QCTS will integrate with the NCTS for retrieval of national terminology content items and adopt clinical terminology applications from the CSIRO. The QCTS will support API-based integration by clinical and administrative applications seeking to access terminology content releases or to meaningfully use terminology content held in the QCTS.

- *World Health Organization Smart Vaccination Certificate:* A draft specification was published in March 2021, which includes the use of ICD-11 (the 11th revision of the ICD) to record vaccines and map ICD-11 to SNOMED CT (Global Patient Set) for COVID-19 vaccines.

- *NCTS:* Each month, the NCTS publishes SNOMED CT-AU, which incorporates its medicine subset, the AMT. The NCTS also publishes FHIR terminology resources to enable FHIR implementations, and the National Terminology Server hosts LOINC for observations and measurements, including laboratory test orders and results.

- *PBS and TGA:* A multi-year project to align the TGA, PBS, AMT and National Product Catalogue (NPC) has been initiated to uplift the TGA and PBS data models, and simplify data distribution, product registration and reimbursement processes. The Health Products Portal and an ongoing AMT-NPC link project are components of this project. There is work occurring to align the MBS and UDIs.

**Information models**

- *Primary care data quality foundations project:* The CSIRO is leading this project and collaborating with stakeholders, such as prescribing software vendors. The AIHW has developed a data dictionary and FHIR implementation guide to better support the practice-to-practice exchange of patient records.

- *National Primary Health Care Data Asset project:* This multi-phase project is developing an enduring data asset that contains detailed, high-quality data from primary care, to better understand and improve the patient journey. It will also become a source for data analysis by providers, policy makers and researchers to improve population health. The AIHW has concluded the consultation phase of this project.

- *Agency published data models:* The Agency publishes and maintains a freely available, latest 'peek behind the curtain' set of working drafts that show how the Agency is adopting and extending the FHIR Australian Base Implementation Guide (AU Base 2)[21].

**Data exchange specifications**

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 (for example, RESTful web services).

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[21] http://build.fhir.org/ig/hl7au/au-fhir-base/profiles.html

FHIR APIs are being built into Australian health software systems. In addition to providing a definition of the standards for implementation, these standardised APIs can support privacy and security requirements. They also have a policy component that requires participants to agree to certain obligations if they wish to access the API.

- *AU Base 2 on FHIR:* HL7 Australia maintains the Australian Base Implementation Guide (AU Base 2), which is based on the FHIR specification. This material is collaboratively developed, open source set off materials that provide guidance on how to represent Australian local concepts using FHIR, including FHIR profiles and extensions.

- *Agency API Gateway:* The Agency is delivering an FHIR-based API gateway, providing a single point of access to the My Health Record and other national infrastructure.

- *Secure messaging:* South Australia is implementing secure messaging based on the latest secure messaging exchange standards (HL7 v2 payloads and Secure Message Delivery), conformance requirements and FHIR-based directory access.

**Conformance**

- *My Health Record conformance:* Material, overviews and guides continue to be improved for B2B clinical exchanges (for example, support for Transport Layer Security 1.2 to enhance encryption methods for secure interactions using the ATS 5820-2010 E-health web services profiles).

- *Digital Health Conformance Framework:* The Agency is developing a conformance framework for its processes and tooling for administering conformance processes in a scalable and consistent manner for several national infrastructure systems and services. The conformance framework is a component of the Agency's Assurance framework for connecting systems, which also includes a compliance framework, as well as a lens on legislation and other product supporting frameworks.

**Agency Developer Centre**

The Agency hosts a Developer Centre that provides new and existing clinical software and other health technology developers with the latest resources to assist their development activities. Resources include technical specifications and implementation guides that incorporate standards required to access the national health infrastructure operated by the Agency. The following table provides some examples of specifications and associated standards that already apply on a national basis.

*Table 5:1 Example of specifications and associated standards from Agency Developer Centre*

| Product | Specifications incorporating associated standards |
|---|---|
| Electronic Prescribing | Electronic Prescribing - Technical Framework Documents v3.0<br><br>eHealth Prescription Record v1.2.1<br><br>eHealth Prescription and Dispense View v1.2.2 |
| My Health Record | My Health Record FHIR Gateway v2.1<br><br>PCEHR Architecture v1.35<br><br>My Health Record B2B Gateway Services v2.0<br><br>Clinical Documents Integration Toolkit v1.8<br><br>My Health Record Overviews, Guides and Conformance Material v1.5 |

| Secure Messaging | Secure Messaging v1.1 |
| --- | --- |
| | eSignature v1.1 |
| Diagnostic Services | Supporting Document Library v1.0 |
| | eHealth Diagnostic Imaging Report View v1.1 |
| | eHealth Pathology Report View v1.1 |

## 5.3    Future state

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

- All Australian healthcare organisations are committed to the correct, sustained and widespread use of interoperability standards as a foundational element of a safe, secure, fully interoperable and digitised Australian healthcare system.

- Digital health initiatives are coordinated across stakeholders to ensure there is agreement on which standards to use for which purposes.

- Healthcare settings achieve interoperability through:

  o   native adoption of a unified and agreed set of national terminology standards and classifications (including SNOMED CT-AU, AMT, ICD-10-AM and LOINC), where clinical, statistical, supply chain and administrative content is fully coded, meeting all required healthcare use cases

  o   the adoption and use of an agreed set of national standard APIs (including FHIR) that support sharing and accessing health information in a secure and authorised manner

  o   trusted, widespread and autonomous sharing of secure, authorised, coded data between systems within the same setting, systems outside the setting, national repositories, and international initiatives, and with individuals.

- There is no incompatibility between the terminologies used to describe healthcare and the classifications used to fund healthcare.

- Interoperability standards and specifications are co-designed, open source and non-proprietary, and are supported by governance that is open to all healthcare stakeholders.

- Use of interoperability standards and specifications are underpinned by continuous, high-quality implementation support, incentives, exemplars, demonstrations, materials, specifications, conformance, and review and data quality programmes to ensure optimal implementation of standards.

- Organisations engage with the health sector on the development, selection and use of standards that support their approved work priorities, recognising the role of accredited standards development organisations in developing standards.

- International standards are adopted where possible so that:

  o   the Australian health technology industry can access global markets

  o   Australian can access globally developed products

  o   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.

- Stakeholders easily and regularly access a well-maintained Standards Catalogue that contains a list of endorsed and recommended standards and specifications for digital health. These are profiled in terms of the use cases they have been defined for.

- Implementation guidance material (handbooks, profiles, patterns, technical guidance) exists and is regularly accessed that supports standards implementation.

- All systems that integrate with national health systems and services adhere to conformance rules and are reassessed when software is enhanced.

- Updated standards and specifications are incorporated by implementers in a timely fashion.

- Structured data elements, including terminology bindings, are used to capture and store health information, and structured data is the recommended format for exchanging health information, based on nationally agreed data exchange specifications.

## 5.4    Implementation actions

Interoperability standards are a critical enabler for semantic, structural and technical interoperability between all systems across the Australian health landscape. Table 5:2 outlines actions that have been identified as priorities for the adoption of interoperability standards and to transition towards the proposed future state.

*Table 5:2: Priority actions for adopting national interoperability standards*

| NATIONAL ACTION | RESPONSIBILITY L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 5.1**<br>The Agency will coordinate discussions on expansion of national minimum data sets 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 content. This will allow fuller analysis of patient care episodes. | The Agency (L)<br>State and territory health departments (S)<br>AIHW (S)<br>IHPA (S)<br>Clinical Peak bodies (S) | Medium* |
| **ACTION 5.2**<br>Agency to engage with Software vendors to enhance digital health systems to integrate national terminologies and classifications natively, preferably using FHIR-enabled methods to access terminology content from the NCTS. | The Agency (L)<br>Software vendors (L)<br>Department of Health (S)<br>Services Australia (S) | Ongoing |
| **ACTION 5.3**<br>The Agency and Services Australia will develop a national 'library' of resources that provide translation mapping from national terminology to other popular terminologies; for example, AMT to AIR or Anatomical Therapeutic Chemical. This can be used until Action 5.2 is complete. | The Agency (L)<br>Services Australia (L) | Short* |

| NATIONAL ACTION | RESPONSIBILITY L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 5.4** <br> The Agency will engage with software vendors to enhance digital health systems to use HL7 FHIR, OAuth and OpenID Connect for API information exchanges. | The Agency (L) <br><br> Health system software vendors (L) | Short |
| **ACTION 5.5** <br> The Agency will develop a conformance framework and associated conformance rules for all national digital health systems and services. | The Agency (L) | Short |
| **ACTION 5.6** <br> The Agency will engage with the health sector on the development, selection, use and maintenance of specifications and standards that support the Agency's approved work priorities. When required, Agency developed specifications will be progressed to become standards through the appropriate SDO and their balloting/development processes. | The Agency (L) | Ongoing |
| **ACTION 5.7** <br> The Agency and Healthdirect will develop and expand upon FHIR HL7 AU Base 2 for all future new and modifications to their digital health systems and services. | The Agency (L) <br> Healthdirect (L) | Ongoing |
| **ACTION 5.8** <br> The Agency and AIHW will support Australian participation and active contribution to the international standards development process. | The Agency (L) <br> AIHW (L) | Ongoing |
| **ACTION 5.9** <br> Agency to develop a standards catalogue to support easy search and retrieval of Agency specifications and associated standards, and to capture Agency efforts to continuously improve and update these requirements. | The Agency (L) | Immediate* |

*immediate: within one year, short: 1–3 years, medium: 3–5 years*

# 6 Information sharing

The definition of 'information sharing' in the Plan covers sending, receiving, discovering and accessing information. Sharing information is a complex process that requires a number of 'known facts': knowing that a piece of information exists, knowing who it is about, knowing where it is located, knowing how to access the information and knowing if there is authorisation to share.

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

Research published in the Nordic countries noted general consensus among international governments that increased sharing of information between healthcare providers improves decision-making and outcomes by helping to reduce clinical risks and inefficiencies.[22]

Currently, in the Australian healthcare context information is often not shared and requests and procedures are reperformed or decisions made without access to all information. When information is shared, there are three principal means by which information is exchanged:

1. 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, it is very difficult for them to know that it took place or to see the information that was exchanged. Examples include a referral to a specialist or a discharge summary to a GP.

2. 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.

3. Individual as a courier – where the individual carries the information from healthcare provider to healthcare provider (for example, in a folder with papers and images or in digital format on a phone or laptop). But this requires that the individual has all the information needed, and can determine when it is important to raise it.

Relying on these models for information exchange limits the ability of healthcare providers to comprehensively discover information about an individual and for an individual to access their own information, which can have an impact on the care they receive and their participation in managing their health.

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

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[22] Nordic Co-operation, *eHealth standardisation in the Nordic countries*, 5 August 2019.

To provide an environment that encourages convenient and effective information sharing, it is necessary to:

- have a method for discovering known facts; and for knowing that a piece of information exists, who it is about, where it is located, how to access it, and if 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

- recognise the healthcare provider's right to withhold information if it is in the best interests of the individual.

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

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

## 6.1 The case for reform

As noted above, the Australian healthcare system is highly decentralised, with information captured by many government and non-government healthcare provider organisations.

### 6.1.1 Information discoverability

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

The ACQHSC 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."[23]

Healthcare providers are generally limited to what health information exists within their clinical information system and what is available in the My Health Record system. The My Health Record system provides discrete events summary information received from many sources. It is not

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[23] ACSQHC, *Safety Issues at Transitions of Care: Consultation report on pain points relating to clinical information systems*, December 2017.

intended to replace the digital health information systems and databases that store the full range of health information generated in providing health care to individuals.

Emergency departments and other specialists provided anecdotal evidence that accessing images was a source of substantial frustration, and where images were not available it was not uncommon for imaging to be repeated (resulting in potential harm to the individual due to exposing them to radiation, as well as the associated cost and time burden). During consultations, clinicians repeatedly noted that simply being able to identify which practice performed a diagnostic process, enabling them to make a phone call to request a result, would be a significant step forward.

### 6.1.2    Privacy and authorisation to access and share information

While there are strong general privacy provisions in federal, state and territory privacy laws, these are not well understood or translated for the health sector. Information sharing and access controls need to be managed in a way that the community would expect and be able to apply in practice when exchanging such sensitive information. Common access policies will enable health system–wide access to health information that is distributed over multiple systems, including emerging mobile health (mHealth) systems. From an individual's perspective, trust is a key characteristic of a connected interoperable system, given the personal and intimate nature of the information that may be shared. Without a digital consent service that supports all health information, there is a risk that information is shared between health service providers that an individual may not want shared, such as that relating to sensitive medical conditions. Australians expect to be in control of who is looking at their personal health information, and this will need to be recognised in digital health models of care.

A GDHP white paper on interoperability notes that a foundational element to ensure good interoperability outcomes is "the understanding that the sharing of data, and the delivery of treatment reflects the wishes and consent of the patient – ensuring that no data is shared, or treatment undertaken, without the express consent of the patient and their carers".[24]

### 6.1.3    Information sharing, including across borders

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

A Productivity Commission report on innovations in care for chronic conditions noted that information flows across the health system are fractured.[25] 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 Commission noted that improving information flows enhances nearly every aspect of health care. The case studies included using data to identify people at risk of hospitalisation, so they receive care before their health deteriorates; and using reports to alert healthcare providers to potential medication safety issues or individuals who require periodic reviews.

The ease with which information can be shared and understood across state and territory borders has been a key challenge in Australian care settings. An individual may travel across state or

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[24] GDHP, *Connected Health: Empowering Health Through Interoperability*.
[25] Productivity Commission, *Innovations in Care for Chronic Health Conditions*, March 2021.

territory borders for treatment, but digital cross-border information sharing does not always occur. This issue has been highlighted as Australia has responded to the COVID-19 pandemic. It is imperative that information can flow freely across borders (and potentially international borders) to support the response to COVID-19 and future epidemics and pandemics or other emergency health situations.

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

When considering the ability for cross-border information sharing in Australia, in particular jurisdictional information sharing, the current legislative environment presents potential barriers including:

- inconsistent (or non-existent) definitions within legislation for key concepts needed to support interoperability (for example, consent, personal information and health information)

- divergence in the level of disclosure required when collecting health information at national, state and territory levels

- divergence about how and when information can be used and disclosed

- lack of a regulatory framework to support and advance interoperability and digital health systems, including agreement on standards, legislation and overall approach.[26]

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

### 6.1.4    Procurement

There is a lack of guidance material and reference information to support healthcare providers acquiring or building new digital health systems. This includes a national repository of standards, forums to share ideas and lessons learned, and national minimum standards for digital health technologies. The UK recently introduced national minimum standards for digital health technologies. Software solutions are assessed against these standards to support healthcare provider organisations in procuring solutions.[27]

Tender documents also lack interoperability-specific requirements, often limiting the interoperability of chosen solutions. Procurement processes can be an effective mechanism for promoting interoperability, as they can directly influence market and vendor behaviours, particularly when implemented at scale. There is an opportunity for jurisdictions to improve the information available and adopt best practice approaches to procurement. Examples include:

- sharing common terms and conditions for interoperability requirements to include in tender/contract documents

- developing standards catalogue that is searchable by subject areas to support product procurement

- share existing guidance documents such as interoperability standards and protocols used to inform procurement

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[26] The Agency, *Legislative Impediments to Interoperability*, July 2020. (unpublished)
[27] NHS, "Digital Technology Assessment Criteria".

## 6.2 Current activities

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

- *Modernisation of the My Health Record Infrastructure:* The Agency is mapping out enhanced functionality for the My Health Record that could also be leveraged to support national digital health capability. Under consideration is a modernised repository services and information exchange, together with data analytics and notification services. This work includes the feasibility of a national service to support the federated discoverability of clinical information to reduce the time spent searching for and retrieving information.

- *National Children's Digital Health Collaborative proof of concept:* Subject to business case approval, it will enable every child in Australia to have a comprehensive digital health record from the time they are conceived to their critical first years and adolescence. It will also enable the creation of a digital pregnancy health record (antenatal record) containing vital health information that can be shared between an expectant mother and her healthcare provider.

- *PCA:* The PCA enables each organisation to publish information about itself and its health services. This information can be updated once with the PCA automatically making it available to all approved organisations rather than the organisation having to share it with each organisation it does business with.

- *Secure Messaging Conformance Profile:* This enables the effective management and governance of the National Secure Messaging Network by prescribing the essential requirements to mitigate operational risks associated with delivering reliable, safe and secure messaging via a network comprising multiple systems with multiple suppliers. It includes conformance to prescribed Australian health informatics secure message delivery and payload standards.

- *Digital technology enhancements to aged care:* The Royal Commission into Aged Care Quality and Safety recommended that every approved aged care provider use a digital care management system (including an electronic medication management system). The Agency is working with the aged care sector to enable integration with the My Health Record system and support increased information sharing with external healthcare providers and carers.

- *National data sharing initiatives:* Australian governments have recognised the importance of data sharing as reflected in plans to develop an intergovernmental agreement to support national data sharing between governments. The Australian Government is continuing to promote data sharing reforms and in May 2021 released a Digital Economy Strategy with the vision of Australia being a leading digital economy and society by 2030. This includes developing Australia's first Data Strategy setting out how the Government will enhance effective, safe and secure data use over the period 2021 to 2025.

- *My Health Record system:*

  o Clinical document categorisation will introduce subtypes within existing My Health Record document types and a new Diagnostic Report that will enable uploading of additional health information and support healthcare providers to easily discover clinically relevant content.

  o The Aged Care Transfer Summary (ACTS) will summarise a residential aged care facility (RACF) resident's health information (for example, medicines information and advance care planning) to support clinical handover of care to a hospital or another RACF.

- o 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 Health API Gateway service will be integrated via 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 will support access so that developers understand the APIs on offer including information on how to implement them.

The USA introduced the 21st Century Cures Act and resultant rules against information blocking. This shows the global trend towards not just promoting interoperability, but towards penalising systems and organisations that do not enable the appropriate sharing of clinical information. Given that the majority of our hospital-based clinical systems are US companies and are therefore subject to US laws, Australia should benefit from changes software providers need to make in order to be compliant with US laws.

## 6.3    Future state

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

- The National Infrastructure Modernisation program has delivered a more secure and sustainable digital infrastructure with improved ability to innovate and expand future capabilities and services nationally. Information is readily available through a services catalogue so developers and users can leverage national infrastructure to support interoperability.

- Information flows freely and securely across Australian state and territory borders, and aligns with privacy, legislative and consent requirements. In addition:

  - o individuals understand how their information is used, are confident in its uses and understand how to manage access to their information.

- When authorised by an individual, relevant health information may flow internationally (for example, to support proof of vaccination or test results when travelling).

- 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; use national healthcare identifiers and agreed national terminology; adhere to authorisation, consent and privacy requirements; and conform to national digital health standards.

- A healthcare provider can make a request to an integrated service to discover the available health information about an individual.

- A national discoverability service developed by the Agency is used to discover information on individuals, including in instances where information is not automatically retrievable. The requestor has the ability (for example, by using metadata) to request the information directly from wherever it is held, in the form permitted by the holder of the information (for example, through a URL, API, health service's contact details or repository).

- The My Health Record system continues to be a key component supporting the sharing of health information by healthcare providers and individuals. It will evolve with the use of an API Gateway for enabling new information sources and standards-based formats (incl. FHIR) to be used for integration.

- Procurement of digital health systems includes consistent interoperability requirements and adheres to national minimum standards for digital health technologies.

- All requests for tests, procedures, referrals and consultations are electronic and leverage an electronic requesting service.

- The Agency-hosted interoperability toolkit is regularly maintained and frequently used by organisations to contribute to and learn from the knowledge base. This facilitates delivery of interoperable digital health solutions that underpin clinical and business workflows.

- Mobile apps exchange information with clinical information systems and/or repositories, allowing healthcare providers and individuals to readily access information and enabling individuals to manage access to their health information.

- Individuals can identify the people and organisations involved in their care (both formal and informal) and permit them to access their information based on their personal privacy preferences.

- Digital consent management gives individuals user-friendly digital methods to provide or revoke their consent and to identify all accesses to their health information that breach 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.[28]

- Each organisation holding personal health information uses a single common agreement that stipulates the terms and conditions for sharing and acquiring information from other organisations. This would include vendors, contracted service providers and healthcare provider organisations.

- Consistent legislation exists across the jurisdictions to support information sharing within Australia.

## 6.4 Implementation actions

A connected interoperable healthcare system relies on safe, convenient and secure sharing of information across healthcare providers and individuals, and it is easy to use and effective for all participants. Table 6:1 outlines actions that have been identified as priorities for reforming and transitioning the healthcare system to the proposed future state.

*Table 6:1: Priority actions for safe, convenient and secure information sharing*

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 6.1**<br>Healthcare providers will specify interoperability requirements in procurement requests, leveraging existing national infrastructure, terminology and standards including:<br>My Health Record system, HI Service, NHSD, NASH, SNOMED CT-AU, AMT, FHIR and PCA. | The Agency (L)<br>Department of Health (S)<br>State and territory health departments (S)<br>Services Australia (S) | Ongoing |
| **ACTION 6.2**<br>The Agency will establish an intergovernmental working group to harmonise procurement and use of standards, based on assessments of best practice | The Agency (L)<br>Department of Health (S)<br>State and territory health | Immediate* |

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[28] The Agency, "What is secure messaging?"

| NATIONAL ACTION | RESPONSIBILITY L = lead, S = support | TIMEFRAME |
|---|---|---|
| approaches to interoperability requirements for information and communications technology (ICT) system procurement. | departments (S) | |
| **ACTION 6.3** The Agency will 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 that demonstrate best practice, including implementation guides for interoperability. | The Agency (L) | Immediate |
| **ACTION 6.4** The Agency will investigate options for enabling individuals to grant consent to access all their health information, including in My Health Record. Options will include making it easier to choose which healthcare providers are authorised to access an individual's records, and which types of information they can access. | The Agency (L) | Short* |
| **ACTION 6.5** The Agency will assess the UK national minimum standards for digital health technologies and similar international policies to determine the merits of such approaches in Australia. | The Agency (L) | Short |
| **ACTION 6.6** The Agency will investigate opportunities to build a capability to identify individuals within a consumer's formal and informal care management network. | The Agency (L) | Short |
| **ACTION 6.7** The Agency will promote the use of the API Gateway to support interoperable information exchange, including development of a service catalogue. | The Agency (L) | Short |
| **ACTION 6.8** The Agency to develop a business case for a national publish–subscribe service available to individuals, healthcare providers and healthcare provider organisations to support actions such as alerts, changes to an individual's health information and notifications of acute episodes. | The Agency (L) | Medium* |
| **ACTION 6.9** The Agency will collaborate with stakeholders on the development of an agreement for each organisation | The Agency (L) AIHW (S) | Medium |

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| holding personal health information, which stipulates the terms and conditions for sharing, discovering and acquiring information from other organisations. This would cover key dimensions such as privacy, security, access controls, patient data rights, technical specifications and intellectual property rights. | Australasian Digital Health Institute (S) | |
| **ACTION 6.10**<br><br>The Agency will collaborate on the development of consistent definitions to support health information sharing that supports interoperability and communication of health information (for example, statutory definitions of health information, consent and access management). | The Agency (L)<br><br>Department of Health (S)<br><br>State and territory health departments (S) | Medium |
| **ACTION 6.11:**<br><br>Drawing on outcomes from Action 6.10, there will be collaborative intergovernmental work on harmonising relevant Australian, state and territory legislation with respect to consistent health definitions that support interoperability. | Department of Health (L)<br><br>State and territory health departments (L) | Medium |

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

# 7 Innovation enabled through interoperability

## 7.1 The case for reform

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

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

*"Interoperability foundations create the opportunity for widespread digital health innovation."*

An important contributor to innovation will be knowledge and understanding of the foundations of interoperability. These will be gained through easy access to guidance and education material on implementing interoperability, and by providing an environment in which vendors and healthcare providers can innovate.

Innovation challenges and connectathons support innovation by encouraging new ideas and driving the development of new digital technologies. Focusing on the foundations of interoperability as requirements in innovation challenges will advance the interoperability maturity of the healthcare system.

## 7.2 Current activities

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

- Healthcare stakeholder initiatives:
  - *Digital technology enhancements to aged care:* The Royal Commission into Aged Care Quality and Safety has released its final recommendations, including universal adoption by the aged care sector of digital technology and the My Health Record system. It proposes that every approved provider of aged care services uses a digital care management system (including an electronic medication management system).
  - *ACSQHC's AS18/11 advisory on the My Health Record:* The ACSQHC introduced actions 1.17 and 1.18 to drive healthcare provider organisations towards implementing systems that can enter clinical information in the My Health Record system that:[29]

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[29] ACSQHC, "Advisory: Implementing systems that can provide clinical information into the My Health Record system"; "Action 1.18: Healthcare records".

- is designed to optimise the safety and quality of health care for individuals
- uses national individual and healthcare provider identifiers
- uses standard national terminologies.

o *Diagnostic imaging referral system:* The Australian Governments' 2021-22 Budget announced $7.2 million to modernise diagnostic imaging through the development of an integrated electronic diagnostic imaging referral system. This will draw on work by the Agency on electronic requesting and user experience mapping.

- Agency-led initiatives:

o *electronic requesting:* This will allow the secure transmission of electronically generated requests and referrals through an exchange service to providers of the requested procedure or service. Electronic requesting will enable a secure, safe and convenient process for healthcare providers and individuals that will dramatically shorten transmission times and reduce the potential for errors that is present in paper-based requests. Integration with a discoverability service will reduce time spent searching for and retrieving related diagnostic images/reports and reduce duplicate imaging requests.

The scope of the electronic requesting initiative has three core deliverables:

- agreed request and result terminology
- an electronic requesting solution
- a discoverability service.

The foundational interoperability components that will be incorporated within electronic requesting include:

- standard exchange specifications – a combination of HL7 v2.4 and FHIR-based resources
- nationally agreed terminology standards with new radiology and diagnostic imaging reference sets
- integration with a discoverability service for retrieving previous diagnostic images
- conformance profiling and validation for interoperable HL7 v2.4 ORM, ORR and ORU message types
- national Healthcare Identifiers.

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

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

- national Healthcare Identifiers
- use of national terminology standards (such as AMT)

- NASH authentication

- HL7 FHIR profiles and resources

- key frameworks (regulatory and technical) that were developed to enable the safe and secure use of electronic prescriptions.

o *Information discoverability:* This will identify what information is available to be discovered, who wants to discover it, where it is located (for example, a data repository) and its format (for example, FHIR, CDA, PDF or HTML). The ability to find records of previously performed or requested diagnostic tests and results (including diagnostic images) for areas such as pathology and radiology would be a significant step forward in driving interoperability across the healthcare landscape and improving the delivery of care.

This initiative will leverage core interoperability components such as:

- agreeing and implementing national digital health standards (including terminology, access, security, privacy and authorisation)

- national Healthcare Identifiers

- My Health Record system

- information exchange standards including FHIR.

o *Care management support network:* This will enable the identifying and recording of formal and informal members of an individual's care management network, and help improve health information sharing. Individuals will be able to provide consent or approval to whom they include in their care management network. The vision for success focuses on genuine patient-centred care, where information is integrated and shared seamlessly across the care continuum. This initiative will leverage core interoperability components to deliver these capabilities, such as:

- use of national terminology standards (SNOMED CT-AU)

- national Healthcare Identifiers

- FHIR API for federated look-up of healthcare providers

- HL7 FHIR profiles and resources.

o *The Agency's 2020 Innovation Challenge:* This event encouraged industry and academia to share ideas and put forward digital tools that would help to improve the quality of healthcare services. Winners are currently working on their innovative ideas for future-proofing the Australian healthcare system.

## 7.3 Future state

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

- interoperability is a well-accepted and widely adopted function of all digital health systems

- healthcare providers and vendors can leverage foundational interoperability components to innovate new digitally enabled models of care (for example, mHealth) and incrementally improve digital health maturity

- operational, demographic and financial information including interaction metadata is used to identify best practice and innovative models of care to drive improved health outcomes

- innovative solutions consider the targeted cohort and relevant constraints and limitations (for example, digital literacy, access to technology and capacity). Interoperability and innovation will reduce the digital divide and ensure vulnerable populations are not marginalised by new digitally enabled models of care

- people and change capabilities are delivered to drive the uptake and wider adoption of innovative digital models of care and ultimately to improve patient safety and quality outcomes

- innovation is a key focus of individuals, healthcare providers and software vendors, and is supported by government and industry.

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

- Individuals document their care management network and assign levels of information access that reflect each person's role in the care network. Importantly, the individual can be involved in managing the process and assign or revoke access by the care network.

- Healthcare providers can subscribe to certain kinds of information about their patients (with an individual's consent, where required), including observational data in which thresholds are met or exceeded.

- Image ordering screens automatically show a list of previous relevant studies.

- A prescribing screen shows previous medication events, and when a particular medication is prescribed, it automatically shows any relevant diagnoses, conditions, recent pathology or contraindicated medications.

- The ability to 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 (effectiveness of medicines based on an individual's genomic makeup).

- Bio-sensing wearables and medical devices relay real-time data and information to healthcare providers, who understand and proactively monitor the data, and initiate changes to health care based on this information.

- Individuals use mHealth technology to manage their care more effectively by booking appointments, communicating with healthcare providers, receiving referrals, ordering prescriptions, accessing and contributing to their medical record, and choosing who they share their record with.

- Patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) are used to understand patient perspectives on digitally enabled models of care and the interoperability components of that care.

- Leverage the internationalisation of health care – for example, by requesting a second opinion from an international clinical service or outsourcing services to other countries to support 24-hour follow-the-sun service delivery.

- Australians are supported in their ageing journey with the latest evidence-based best practice. This can include innovative healthcare advances such as injectables, implantables (breast implants and prosthetics are examples of simple implantables, and pumps and pacemakers are smart implantables), digestibles, and augmented and virtual reality.

- As new digital technologies such as blockchain, digital identity and disease-detecting 'precision health' monitoring devices are developed and mature, the Plan is updated to reflect advances that can assist and drive healthcare system interoperability.

**Future healthcare journey**

The following healthcare journey 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.
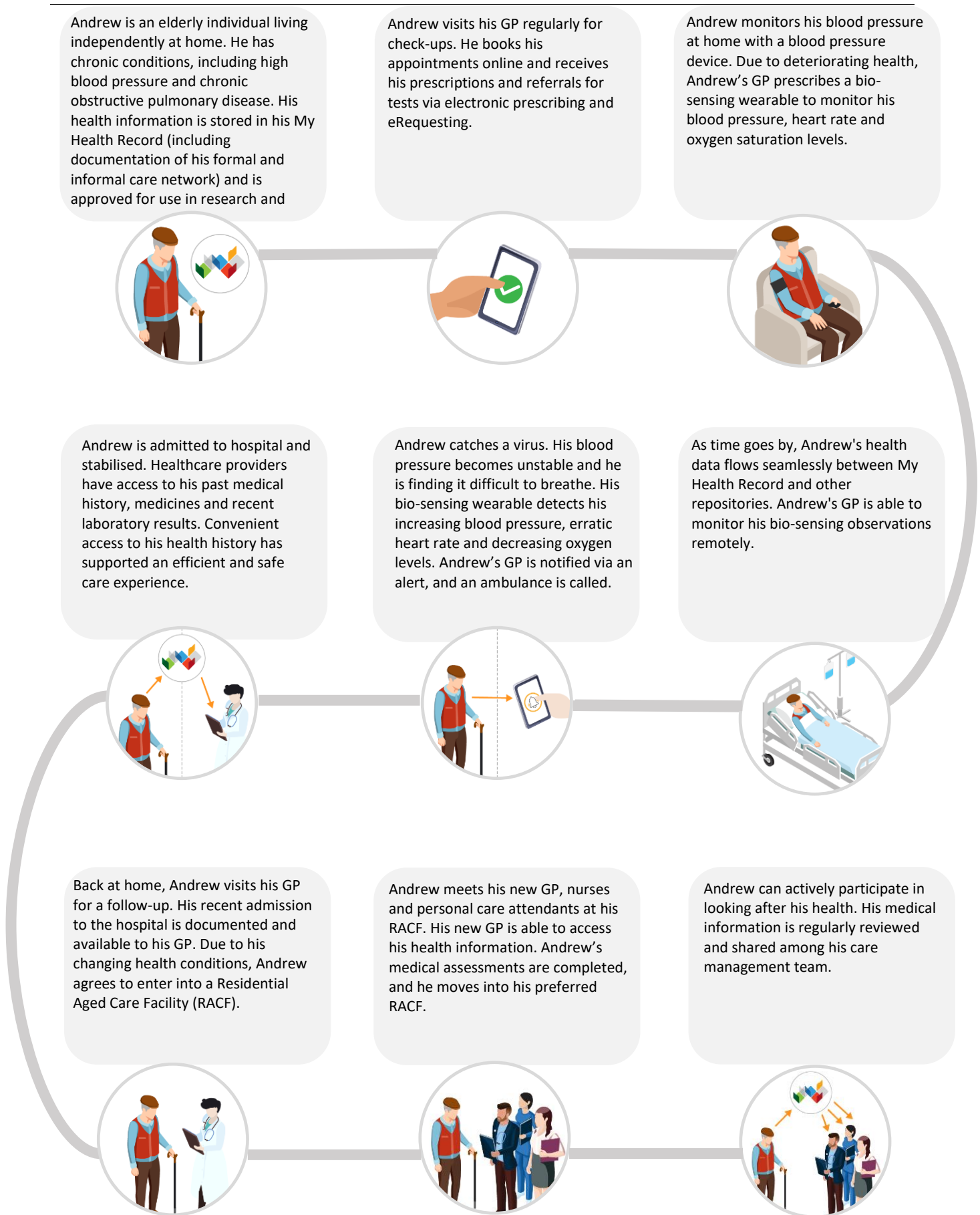
Andrew is an elderly individual living independently at home. He has chronic conditions, including high blood pressure and chronic obstructive pulmonary disease. His health information is stored in his My Health Record (including documentation of his formal and informal care network) and is approved for use in research and

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 monitors his blood pressure at home with a blood pressure device. Due to deteriorating health, Andrew's GP prescribes a bio-sensing wearable to monitor his blood pressure, heart rate and oxygen saturation levels.

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 catches a virus. His blood pressure becomes unstable and he is finding it difficult to breathe. His bio-sensing 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 bio-sensing observations remotely.

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 enter into a Residential Aged Care Facility (RACF).

Andrew meets his new GP, nurses and personal care attendants at his RACF. His new GP is able to access his health information. Andrew's medical assessments are completed, and he moves into his preferred RACF.

Andrew can actively participate in looking after his health. His medical information is regularly reviewed and shared among his care management team.

Figure 7.1 Future healthcare journey

## 7.4 Interoperability initiatives

During prior consultation with stakeholders, new initiatives were identified that will drive and enable interoperability. These initiatives will leverage the foundations of interoperability. The initiatives leverage the interoperability foundations and have been classified into the following key categories:

- information discoverability
- information sharing
- digital models of care
- standards
- electronic requesting and referrals.

The key beneficiaries of initiatives are represented by these symbols:

 Patient

 Healthcare provider

 Healthcare provider organisation

The implementation of initiatives will be based on clinical and patient engagement and education and will include measurement of benefits realised. Initiatives will be informed by user and workflow analysis and the opportunity should be taken to adopt standardised and evidence-based workflows.

# Information discoverability

## Near real-time access to inpatient information

*Develop APIs that can connect to acute care systems, enabling access to structured patient information for viewing and/or clinical decision support.*

This would give an individual's care team outside the hospital the ability to maintain real-time access to progress and test results, so they are informed about their patient's care and equipped to contribute to their care if requested by the inpatient team and once the individual is discharged from hospital.
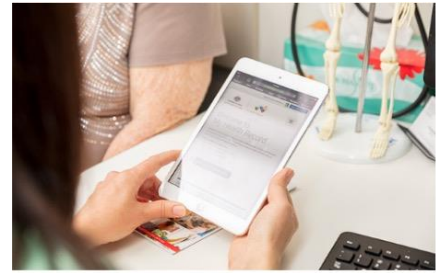


## Reducing dependence on discharge summaries

*Enable acute care services to make specific information available at or before discharge via the My Health Record or APIs (this relates to near real-time access to inpatient information).*

Making key information such as a diagnosis, key investigation results and medication lists available prior to finalising a discharge summary would allow a primary care provider to safely take over care of an individual while waiting for a final discharge summary.

## Clinical workflow APIs

*Develop standards and specifications for nationally agreed APIs to allow access to information such as pathology and diagnostic imaging results from within clinical information systems.*

Real-time integration via APIs of atomic and/or computable data enables clinical decision support that provides valuable and streamlined information directly to the point of care. This improves the efficiency of decision-making, reducing the number of duplicate orders and requests, and improves the quality of care and outcomes for individuals. Sharing PDF documents does not support automated clinical decision support.

## Automating access to diagnostic images via My Health Record radiology reports

*Deliver a technical capability that would enable healthcare providers to link directly from a radiology report in the My Health Record system to the diagnostic image without entering user credentials.*

Supporting automated access to diagnostic images via My Health Record radiology reports would streamline the process and ensure all healthcare providers who require access could view images.

## Reporting to and retrieval from medical device registries at point of care

*Develop standards for capturing information in quality registers that govern medical devices (such as breast implants, surgical meshes, pacemakers and joint prostheses) and making that information available at the point of care including EHR and computerised physician order entry (CPE) systems. Includes recording national healthcare identifiers.*

Quality data from registers is either not routinely included in an individual's medical records or the discoverability of this information is poor. If a product is recalled or an individual is undergoing testing, imaging or other medical procedures, the inaccessibility of this data has implications for patient safety and quality of care.
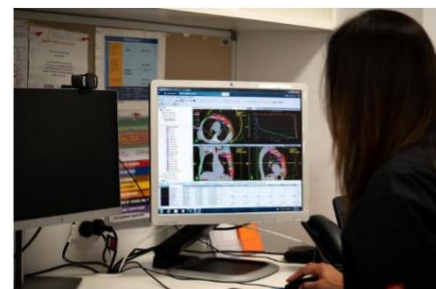
# Information sharing

## Notifying community providers of acute care events

*Enable healthcare providers to follow individuals (with their consent) and be notified of acute care events.*

There is no standardised, reliable mechanism for acute care facilities to notify primary care providers (for example, GPs) of an individual's admission (in an emergency or as an inpatient). This results in gaps in understanding among an individual's caregivers, which can create additional administrative work, costs, testing and errors. Addressing this would keep all caregivers informed in real time and mitigate these time, financial and safety concerns.



## Exchanging care plan goals and outcomes

*Develop standards and infrastructure that support the exchange of care plan goals and outcomes between systems involved in an individual's care.*

Patient care plans and/or the goals of care are generally housed in a single facility's system. Developing a standardised approach to structuring these documents and establishing the infrastructure to share them between systems would give all providers access to this critical information. The My Health Record system was flagged as a possible destination.



## Practice-to-practice record transfer

*Pilot the use of FHIR-based APIs to transport summary medical records from practice to practice.*

This would enable individuals to move from one provider to another and be confident their information will travel with them. This would ensure that vital patient information was available to their new provider to guarantee the quality of care they receive is based on their current medical history.



## Visibility of an individual's top 5 things to know

*Develop standards and infrastructure so that individuals can provide details of the top 5 things to know about them from their perspective, reducing the need to repeat this at each clinical encounter.*

Leveraging the My Health Record system to support functionality would allow individuals to record their key relevant clinical and personal information, significantly reducing the time they spend discussing this information at each clinical encounter.



## Accessing genomic data across IT systems

*Develop a national proof of concept for accessing genomic data across IT systems in different healthcare and research settings (such as pathology laboratories, hospitals, registries and research institutions), including standards-based interfaces (APIs) (this depends on the development of genomics data standards).*

Access to genomic data across IT systems today is ad hoc and based on local standards (where they exist). To obtain maximum clinical and research benefits from accessing genomic data, agreed standards and APIs are required.

# Digital models of care

## Evidence-based downloadable and computable care plans

*Develop standards that support care plans being published by evidence bodies in computable formats that are suitable for downloading and rendering in clinical information systems.*

Establishing a standardised way of creating care plans would result in evidence-based care plans authored for individuals regardless of the provider's available time or experience.
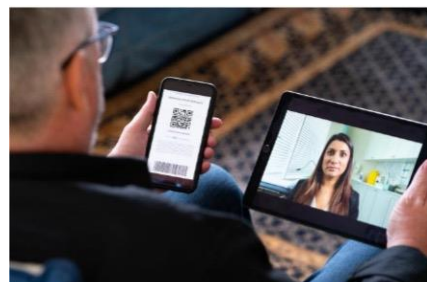


## Self-management and monitoring at home

*Develop standards for exchanging observations and information from medical and personal devices (for example, home monitoring devices and wearables).*

Without this information, providers are limited to 'reactive' care once an event has occurred. Establishing standards for exchanging data, and the infrastructure to support it, will also refine a provider's ability to conduct remote assessments, avoid unnecessary in-person visits, and contribute to a preventative approach that foresees events and provides treatment before they occur or become problematic.



## Flagging abnormal test results

*Develop standards and infrastructure to flag unexpected abnormal results and record a result as having been actioned.*

Introducing functionality to flag abnormal results and prompt action would reduce the possibility of results being missed or action being delayed. This would improve patient safety and the quality of care.
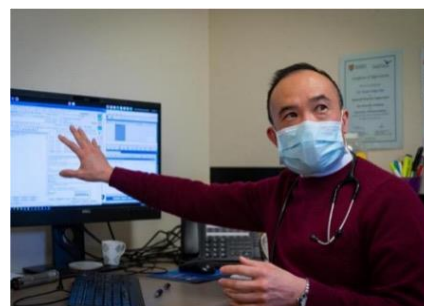


## Managing patient information sharing and access consent

*Retrieve and manage an individual's information sharing and access consent rules via a mobile app.*

If an individual wishes to manage their consent rules (for example, to provide access to a new provider or care team member), they would be able to do this via a mobile app that would also streamline clinical processes and decision-making.



## Remote monitoring and examination in aged care

*Facilitate the uptake and use of remote monitoring and examination technology to improve safety for elderly individuals in their homes and reduce the need to take them to a GP or emergency department, which can also present risks.*

Elderly residents in their own homes are at risk if their condition changes and they cannot communicate adequately. Systems would exist that continuously monitor activity in the home and communicate changes to family and/or providers.
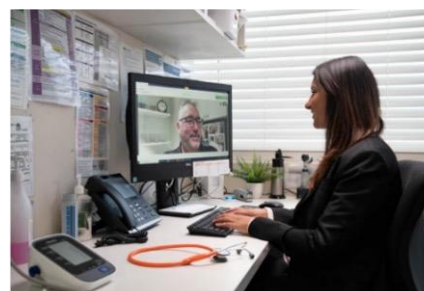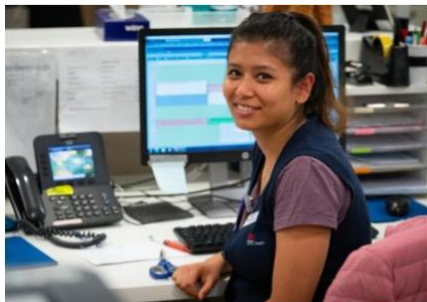
# Standards

## Effective capture and communication of diagnoses

*Develop standards and infrastructure to capture diagnoses in a format that can be communicated via the My Health Record system or APIs.*

There is no mandated terminology for diagnosis. Agreeing terminology standards (for example, SNOMED CT-AU) would make clinical information clearer, aid clinical decision-making, provide richer clinical data and support detailed research.

## Pathology orders and terminology for results

*Agree national standards for pathology orders and terminology for results to improve access to those orders and results.*

Pathology orders and results are often stored and displayed according to the date of collection. Lack of agreed terminology can impact patient safety and quality of care if the wrong test is performed. Agreed terminology would enable more sophisticated retrieval and viewing capabilities that would reduce time spent retrieving results and increase the likelihood of successful retrieval of a desired result.

## Developing genomics data standards

*Develop nationally agreed standards for data collection, safe storage and data sharing of genomics data.*

Not all jurisdictional or research organisations start with the same genomics capabilities or priorities. National agreements on a standards-based approach to managing genomic data is required to ensure interoperability between systems, whether they are research or health delivery services. The use of international standards must be considered.

## Making the system safer for people with known allergies

*Establish, agree and adopt terminology standards for recording and sharing information about allergies and adverse reactions within clinical information systems.*

Severe reactions require prompt recognition and treatment, which can be significantly aided by the availability of accurate current and historical information in a standardised format. Given the potential seriousness of these conditions, non-standardised terminology can impact patient safety and quality of care. Visibility and sharing of standardised allergy information through clinical information systems and the My Health Record would improve the quality of care for individuals with allergies.

## FHIR security service

*Develop nationally agreed security standards for secure FHIR-based connections between healthcare provider organisations.*

Several initiatives are using FHIR for connectivity between healthcare provider organisations. These initiatives require a common approach to the security of FHIR connections to support interoperability and reuse. The FHIR security service is required to support the national scale-up of provider directories, PCA, the Child Digital Health Record and all future FHIR-based initiatives.

### Terminology-mapping resources

*Develop a national library of resources that translates the key existing terminologies into SNOMED CT-AU and LOINC, and vice versa.*

The CSIRO is developing this initiative for the IHPA, translating emergency diagnostic and procedure codes into SNOMED CT-AU and LOINC, and enabling easy look-up capability to speed up the coding process. Similarly, various organisations have created medicines translations between AMT and PBS. These could form part of the national infrastructure and be available for a limited number of terminologies that cannot migrate easily to SNOMED CT-AU and LOINC.



# Electronic requesting/referrals

### Pathology electronic ordering

*Develop standards and infrastructure to implement pathology electronic ordering at the point of care.*

Pathology orders submitted via fax or on paper are subject to delays and at risk of errors during data entry of information such as patient identification and test type. Electronic pathology ordering will dramatically reduce transmission time. Use of standard interface specifications and agreed terminology will reduce the potential for errors in order details.





### Electronic referrals

*Assess the electronic referral work programs and implementations from across the country, documenting lessons learned, standards used and products involved.*

Most referrals are made on paper or via fax. This slows transmission time, is not secure, can impair the triage process, and requires more inputs, which can delay the overall process. Establishing fully electronic referrals would expedite transmission time, improve data security, reduce the workload for administrative and clinical staff, and improve patient outcomes.

## 7.5    Implementation actions

Table 7:1 outlines the actions that have been identified as priorities for a connected interoperable healthcare system that supports and encourages innovation in digital health products and functionality, and digitally enabled models of care.

*Table 7:1: Priority actions for a connected interoperable healthcare system*

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 7.1**<br>The Agency will develop education and communication content to increase awareness of interoperability. | The Agency (L) | Immediate* |
| **ACTION 7.2**<br>The Agency in partnership with Department of Health and states and territory health departments will prioritise the interoperability initiatives in Section 7.4 and help to deliver them where funding is available. | The Agency (L)<br>Department of Health (S)<br>State and territory health departments (S) | Ongoing |
| **ACTION 7.3**<br>The Agency will run interoperability innovation challenges and connectathons to encourage interoperability. | The Agency (L) | Ongoing |

*\* Immediate: within one year*

# 8    Benefits, evaluation and measuring maturity

## 8.1    The case for reform

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

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

Australian healthcare systems are at different stages of digital maturity, while the use of digital systems to support healthcare delivery is becoming more common. Digital maturity needs to be improved to accelerate digital transformation that supports better health outcomes and patient-centred care. It is important to understand the digital health maturity of the participants and providers involved in an individual's healthcare journey when exploring future interconnected solutions. Measuring Australian digital health maturity – in particular the interoperability of the healthcare system – will provide insights that healthcare provider organisations could apply to inform improvements and decision-making.

Digital health maturity models can be used to:

- identify key strengths and gaps in healthcare providers' ability to operate digitally at the point of care

- inform future actions and investment decisions to achieve transformational goals

- provide evidence on digital health maturity progress

- allow healthcare providers to evaluate their progress and conduct benchmarking with peers

- identify where digital health system leaders exist

- assess compliance with maturity measures and specific digital health targets

- measure improvements in health outcomes as a result of increases in digital health maturity.

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

The Agency is considering three approaches for determining an appropriate digital health maturity model for adoption across the Australian health sector:

1.  As is – Find a suitable model and adopt it as is.

2.  Customise – Find a maturity model and customise it to support the Australian healthcare system.

3.  Develop – Develop a new model.

As noted earlier, interoperability of healthcare data is seen as essential to high-quality, sustainable health care. Consequently, measuring interoperability is a key domain in a digital health maturity model. There are two main approaches for measuring interoperability:

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

- *Key performance indicators (KPIs):* Use a limited number of KPIs to track selected domains of interoperability as a form of program monitoring. Surveys are a common means of monitoring digital health reforms and relevant international examples are available.

Examples of interoperability maturity measurements are also available internationally. In the US, the Office of the National Coordinator for Health Information Technology (ONC) has captured a time series of metrics at a national level across acute hospitals and office-based physicians to assess improvement in key interoperability measures (finding, sending, receiving and using patient summary information from external sources). These metrics enable ONC to report annually on progress in adopting interoperability. Between 2014 and 2018, the proportion of US hospitals that could find patient health information from sources outside their healthcare system increased from 48 per cent to 65 per cent.

There is potential to use a similar survey method to measure the progress and overall impact of the Plan and other actions underway to mature digital health interoperability. This would be in addition to evaluating and measuring the benefits of individual projects intended to improve interoperability.

As the digital health sector matures and evolves, new and emerging benefits are expected. The Agency is developing a new and emerging benefits framework and model design. An interoperability maturity index could contribute to a national digital health benefits model.

While achieving a fully interoperable healthcare system is challenging and complex, improving interoperability could deliver significant and wide-ranging benefits for Australians and for the healthcare system.[30] These benefits fall into four broad categories:

- *Enhanced patient experience:* Individuals could receive faster and more accurate treatment, reducing the clinical burden (for example, by avoiding unnecessary duplicative tests and administrative tasks). They would also gain better access to their own data, empowering them in their own care.

- *Improved safety:* Meaningful data would be shared across digital systems. This could prevent errors and avoid hospitalisations that might arise when vital information (such as about allergies, medications or pre-existing conditions) is not available. Greater interoperability of data supports easier analysis to identify the causes of medical errors to remediate issues and prevent future errors.

- *Increased productivity and reduced costs:* In addition to cost savings from reduced medical errors and safer care, interoperability saves time during provider–patient and provider–provider encounters by ensuring the right individual and provider data is available at the right time, every time.

- *Improved health data for health research and practice:* Interoperability supports more accurate collection and analysis of health data for both research and innovative healthcare delivery. Digital technologies like artificial intelligence, machine learning and big data analytics

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[30] M Lehne, J Sass, A Essenwanger, et al., "Why digital medicine depends on interoperability", *npj Digital Medicine*, 2: 79, 2019.

(such as data harvesting and data mining) can improve health care via access to searchable, structured and standardised data.

The West Health Institute examined the benefits that interoperability would bring to the US health system.[31] Its 2015 analysis identified an estimated US$36 billion in annual waste due to lack of interoperability and commonly implemented standards. It identified four primary activities that would be improved by greater interoperability and shared standards: improved quality of care through fewer adverse events; reduced cost of care due to avoiding redundant testing; increased clinician productivity due to spending less time manually entering information; and greater capacity to treat more patients due to shorter lengths of stay.

The software industry plays a key role in increasing the digital health maturity of the healthcare system. Given that this industry provides most digital health products, it is in a significant position to incorporate interoperability into the products it develops, which will further encourage healthcare providers to leverage new, interoperable technologies for digitally enabled models of are.

The benefits achieved by individual initiatives to enhance interoperability need to be identified and evaluated. This is essential to learn what works and ensure that solutions work as intended, and do not have adverse consequences. Evaluation will be more effective if planned during the early phases of a project, and if it focuses on measuring the outcomes intended by the interoperability project.

## 8.2    Current activities

The Agency identified a number of national and international digital health maturity models as potential models for use within the Australian healthcare system. These digital health maturity models addressed different aspects of digital health, interoperability, healthcare sectors and settings. They are all multi-stage models and emphasise the importance of defined, repeatable, measured, analysed and continually improved processes.

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

- *leadership and governance* – governance to enable accountability and ease decision-making; and strong digital health leadership to increase digital maturity and optimise healthcare system performance, quality, safety and efficiency

- *workforce capability (for example, digital literacy)* – organisational policies and processes to drive workforce capacity and competency, change capabilities, and ensure continuous improvement, workforce development and business continuity

- *interoperability* – adoption of the core components of an interconnected healthcare system including standards, identifiers, terminology, conformance, consent, exchange specifications and privacy

- *technical (infrastructure, architecture and security)* – tools, networks, hardware and software available and maintained to support interoperability across platforms and integration of data repositories and systems

- *patient engagement* – enabled through innovative patient-centric approaches to deliver population health capabilities and patient-centric models of care

- *health sector coverage* – maturity assessment that considers all health providers, including healthcare recipients, service provider groups, jurisdictions, geographies and social services

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[31] West Health Institute, *The Value of Medical Device Interoperability*, 2015.

- *benchmarking* – the ability to benchmark digital health maturity against peers.

Following are programs that measure digital health maturity in Australia:

- The Victorian Department of Health developed a digital health maturity model for the Victorian healthcare system. Most states and territories have reviewed this model.

- Queensland is piloting the HIMSS Digital Health Indicator (DHI). The DHI has also been trialled by a couple of local health districts across New South Wales and Victoria.

- South Australia has undertaken a statewide digital health maturity assessment.

- Other states and territories are investigating or planning to undertake digital health maturity assessments.

- Maturity models, such as the HIMSS Electronic Medical Record Adoption Model (EMRAM) and the Continuity of Care Maturity Model (CCMM), are not specific to interoperability but have been used to measure aspects of digital health maturity capabilities.

## 8.3    Future state

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

- using the national digital health maturity tools extensively to measure healthcare providers' levels of maturity. By using these tools, they will also be able to develop goals and improvement plans to increase their maturity and improve health outcomes

- collecting metrics periodically that provide evidence of improving levels of interoperability in care settings nationally

- applying evaluation and benefit realisation to projects that advance interoperability

- a growing evidence base of lessons learned, evaluations and metrics that is accessible and used to guide and inform efforts to increase interoperability maturity

- continuously evolving interoperability survey indicators to accommodate the shifting focus in national policies and include additional health sectors where relevant

- measuring digital maturity of Australia's health sector using international maturity models suitable for this purpose. Benchmarking against other countries will provide insights for prioritising improvements in the Australian digital health system.

## 8.4    Implementation actions

Table 8:1 outlines the actions that have been identified as priorities to support a health system that continuously measures its digital health maturity and uses the output of the measurement to drive further improvements in health care and digital health maturity.

*Table 8:1: Priority actions for continuously measuring digital health maturity and driving improvement*

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 8.1**<br>The Agency will develop and undertake a survey of hospital, pharmacy and GP organisations to provide a benchmark for the level of interoperability. | The Agency (L) | Immediate* |
| **ACTION 8.2**<br>The Agency will undertake an interoperability survey periodically to measure overall progress on interoperability in Australia. | The Agency (L) | Ongoing |
| **ACTION 8.3**<br>The Agency will develop a benefits and evaluation plan for the interoperability initiatives it delivers. | The Agency (L) | Ongoing |
| **ACTION 8.4**<br>The Agency will produce and publish an annual report on progress, with actions and key benefit metrics. | The Agency (L) | Ongoing |
| **ACTION 8.5**<br>The Agency will work with GDHP to develop the Global Interoperability Maturity Model. | The Agency (L) | Short* |
| **ACTION 8.6**<br>The Agency will investigate and in collaboration with jurisdictions assess the best digital health maturity model options for the Australian Healthcare system. | The Agency (L)<br>Department of Health(S)<br>State and territory health departments (S) | Immediate |

*\* Immediate: within one year; short: 1–3 years*

# 9 Governance and incentives to promote interoperability

Achieving system-wide interoperability will require a sustained effort over the long term. A governance arrangement that remains focused on prioritising interoperability and provides an accountability structure to coordinate and monitor efforts will support and accelerate interoperability. Aligning existing incentives and applying further incentives where appropriate will also help to advance interoperability.

## 9.1 Governance

Responsibility for executing the Plan primarily rests with the Agency and Australian, state and territory health departments. The governance body that oversees the rollout, review and reporting of progress against the Plan should be an established senior jurisdictional forum.

Governance arrangements to replace the former Council of Australian Governments (COAG) arrangements have been put in place, and include the Health Ministers Meeting and the Health Chief Executives Forum (HCEF). These ministerial and head of health department committees will consider priority strategic, intergovernmental issues that require national collaboration and decision-making.

The National Health Chief Information Officer Roundtable (NHCIOR), comprising CIOs from all health departments, could provide a governance committee for the Plan.

The Agency would brief NHCIOR so that it could help to coordinate a review of jurisdictions' progress and endorse any reports submitted to the HCEF for higher-level decision-making. The NHCIOR could also provide guidance on reviewing and refreshing a future implementation plan that spans 2025 to 2030.



*Figure 9.1: The bodies involved in the rollout, review and reporting of progress*

Responsibility for delivering interoperability cannot be assigned to one committee or organisation, because it depends on individual investment and clinical practice changes made across the digital health ecosystem. The governance outlined above will help to oversee progress and align government efforts. Private and non-government organisations can use this Plan and future reports on progress to inform and guide their own efforts to promote interoperability.

The implementation of individual Actions in this Plan will need to consider and develop effective governance structures, including a clear role for stakeholders and input from subject matter experts and providers/patients as users.

## 9.2    Interoperability incentives

In Australia, the adoption of digital health standards is largely voluntary, and healthcare organisations can set their own conformance requirements when purchasing digital technology. Different types of incentives could be used to encourage the adoption of interoperability. A wide range of incentive tools and mechanisms have been successfully used internationally.

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

- ePIP aims to encourage general practices to keep up to date with the latest developments in digital health. To meet ePIP requirements,[32] practices are expected to adopt compliant software for secure messaging and the My Health Record system, and use electronic prescribing and nationally recognised disease classification or terminology systems. SNOMED CT-AU is the preferred clinical terminology system.

- The Agency provided financial incentives to software providers to accelerate the adoption of new secure messaging standards and integrate the new standards into their products in 2019. In addition, all governments issued a communiqué that they will begin including the secure messaging interoperability standards in future procurements for applicable systems.

- Mobile applications and clinical information systems that connect to the My Health Record system must meet conformance requirements and relevant standards, although linking with the My Health Record system is voluntary.

- Software vendors and healthcare organisations wanting to participate in the national electronic prescribing program must meet conformance requirements set by the Agency, including using national terminology and healthcare identifiers.

Based on international practice, a wide range of policy tools could be used to promote the adoption of standards and conformant digital technologies, with the benefits of wider adoption outweighing the costs involved. Incentives can range from voluntary agreements to enforceable regulations and include:

- providing certification services so that software vendors can reassure purchasers that their products meet specified standards

- establishing a voluntary agreement or code of practice that is endorsed by governments, industry and private healthcare providers to support the adoption of consistent national specifications and standards and information-sharing arrangements

- linking incentive payments to the adoption of specified standards and conformance requirements, including through procurements

- requiring providers to use digital technologies that meet specified standards to be eligible for government funding or incentive payments

- making interoperability requirements part of health service accreditation[33]

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[32] https://www.myhealthrecord.gov.au/for-healthcare-professionals/practice-incentives-program
[33] ACSQHC, *National Safety and Quality Health Service Standards: Second edition*, 2019.

- linking standards to licensing and assurance regulations for technologies where those standards are essential to deliver safe care.

There is a role for additional incentives and mechanisms 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. The regulatory impact principles agreed by Australian governments will be applied[34]. This asks policy makers to clearly demonstrate a public policy problem requires government intervention, and to examine a range of options, including non-regulatory options.

## 9.3    Implementation actions

*Table 9:1: Implementation actions*

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 9.1**<br>The NHCIOR will provide governance for the Plan, and will be responsible for coordinating and overseeing the implementation of actions. | NHCIOR (L)<br>The Agency (S) | Ongoing |
| **ACTION 9.2**<br>The Agency will review and refresh the Plan to cover the period from 2025 to 2030. | The Agency (L) | Medium* |
| **ACTION 9.3**<br>The Agency will review the effectiveness of current incentives and assess what additional mechanisms are required to support and accelerate interoperability. | The Agency (L)<br>Department of Health (S)<br>State and territory health departments (S) | Short* |

*\* Immediate: within one year; short: 1–3 years, medium: 3-5 years*

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

# 10      Implementation actions

*Table 10:1: Consolidated list of implementation priority actions*

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **Identity** | | |
| **ACTION 4.1**<br>The Agency in partnership with the Department of Health will coordinate a Healthcare Identifiers Roadmap, which will include:<br>• coordinating 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 HIs<br>• reviewing legislative impediments to wider take-up of healthcare identifiers in the *Healthcare Identifiers Act 2010*<br>• evolve data exchange specifications to support a contemporary service; for example, consider use of FHIR, reviewing data elements and permissible values. | The Agency (L)<br>Department of Health (L)<br>State and territory health departments (S)<br>Services Australia (S) | Short* |
| **ACTION 4.2**<br>The Agency will engage jurisdictions to develop a cost–benefit analysis to inform the wider adoption of national healthcare identifiers, initially focusing on HPI-Is. | The Agency (L)<br>Department of Health (S) | Immediate* |
| **ACTION 4.3**<br>Jurisdictions, the Department of Health, and Services Australia will adopt and use national healthcare identifiers in future digital health initiatives involving health information sharing. | The Agency (L)<br>Services Australia (L)<br>Department of Health (S)<br>State and territory health departments (S) | Ongoing |
| **ACTION 4.4**<br>The Agency and Services Australia will develop and implement a program of improvements in healthcare identifier match rates (especially IHIs), focusing on data quality, user interfaces, service improvements, enhancements and proactive efforts on IHI retrieval. | The Agency (L)<br>Services Australia (L)<br>Department of Health (S) | Short |

| NATIONAL ACTION | RESPONSIBILITY L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 4.5** The Agency and Service Australia will promote the use of IHIs. Suggested focus areas include IHIs for newborns as soon after birth as possible and introducing an online capability to enable individuals who do not have a Medicare card or a Department of Veterans' Affairs card to register for an IHI. | The Agency (L) Service Australia (L) Department of Health (S) | Ongoing |
| **ACTION 4.6** The Agency will review conformance requirements for using HPI-Is when uploading documents to the My Health Record system, recognising healthcare providers are at different stages of use of HPI-Is. | The Agency (L) Department of Health (S) | Short |
| **ACTION 4.7** The Agency will support the development of deeper HPI-O network structures, including revising published guidance material, enhancing online HPI-O network registration, and working with vendors to address software limitations. | The Agency (L) Service Australia (L) Department of Health (S) | Short |
| **Health service directories** | | |
| **ACTION 4.8** Jurisdictions will work with Healthdirect Australia to use the NHSD as the service directory for digital health programs and where it is not possible (such as for a specialised directory), work with Healthdirect Australia and the Agency to support the required flow of information. | Department of Health (L) State and territory health departments (S) The Agency (S) Healthdirect (S) | Ongoing |
| **ACTION 4.9** The Department of Health, in partnership with state and territory health departments, will finalise a response to the recommendations of the 2019 NHSD review that supports the role of the NHSD as core national infrastructure. | Department of Health (L) State and territory health departments through the NHSD FPC (L) Healthdirect Australia (S) | Immediate |
| **ACTION 4.10** The Agency will roll out and support the implementation of Provider Connect Australia, which will be used by jurisdiction health departments. | The Agency (L) Department of Health (S) State and territory health departments (S) | Immediate |
| **ACTION 4.11** Services Australia will assess the feasibility of integrating the NHSD and the HPD to reduce duplication and rationalise the national directory infrastructure. | Services Australia (L) The Agency (S) | Short |
| **Standards and conformance** | | |

| NATIONAL ACTION | RESPONSIBILITY<br><br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 5.1**<br>The Agency will coordinate discussions on the expansion of national minimum data sets 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 content. This will allow fuller analysis of patient care episodes. | The Agency (L)<br>State and territory health departments (S)<br>AIHW (S)<br>IHPA (S)<br>Clinical Peak bodies (S) | Medium* |
| **ACTION 5.2**<br>The Agency to engage with Software vendors to enhance digital health systems to integrate national terminologies and classifications natively, preferably using FHIR-enabled methods to access terminology content from the NCTS. | The Agency (L)<br>Software vendors (L)<br>Department of Health (S)<br>Services Australia (S) | Ongoing |
| **ACTION 5.3**<br>The Agency and Services Australia will develop a national 'library' of resources that provide translation mapping from national terminology to other popular terminologies; for example, AMT to AIR or Anatomical Therapeutic Chemical. This can be used until Action 5.2 is complete. | The Agency (L)<br>Services Australia (L) | Short |
| **ACTION 5.4**<br>The Agency will engage with enhance digital health systems to use HL7 FHIR, OAuth and OpenID Connect for API information exchanges. | The Agency (L)<br>Health system software vendors (L) | Short |
| **ACTION 5.5**<br>The Agency will develop a conformance framework and associated conformance rules for all national digital health systems and services. | The Agency (L) | Short |
| **ACTION 5.6**<br>The Agency will engage with the health sector on the development, selection, use and maintenance of specifications and standards that support the Agency's approved work priorities. When required, Agency developed specifications will be progressed to become standards through the appropriate SDO and their balloting/development processes. | The Agency (L) | Ongoing |
| **ACTION 5.7**<br>The Agency and Healthdirect will develop and expand upon FHIR HL7 AU Base 2 for all future new and modifications to their digital health systems and services. | The Agency (L)<br>Healthdirect (L) | Ongoing |
| **ACTION 5.8**<br>The Agency and AIHW will support Australian participation in international conferences and working groups to help inform international standards. | The Agency (L)<br>AIHW (L) | Ongoing |

| NATIONAL ACTION | RESPONSIBILITY<br><br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 5.9**<br><br>Agency to develop a standards catalogue to support easy search and retrieval of Agency specifications and associated standards, and to capture Agency efforts to continuously improve and update these requirements. | The Agency (L) | Immediate* |
| **Information sharing** | | |
| **ACTION 6.1**<br><br>Healthcare providers will specify interoperability requirements in procurement requests, leveraging existing national infrastructure, terminology and standards including My Health Record, HI Service, NHSD, NASH, SNOMED CT-AU, AMT, FHIR and PCA. | The Agency (L)<br><br>Department of Health (S)<br><br>State and territory health departments (S)<br><br>Services Australia (S) | Ongoing |
| **ACTION 6.2**<br>The Agency will establish an intergovernmental working group to harmonise procurement and use of standards, based on assessments of best practice approaches to interoperability requirements for ICT system procurement. | The Agency (L)<br><br>Department of Health (S)<br><br>State and territory health departments (S) | Immediate |
| **ACTION 6.3**<br>The Agency will 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 that demonstrate best practice, including implementation guides for interoperability. | The Agency (L) | Short |
| **ACTION 6.4**<br>The Agency will investigate options for enabling individuals to grant consent to access all their health information, including in My Health Record (for example, making it easier to choose which healthcare providers are authorised to access an individual's' record, and which types of information that they are permitted to access. | The Agency (L) | Short |
| **ACTION 6.5:**<br>The Agency to assess the UK national minimum standards for digital health technologies and similar international policies to determine whether a similar approach would have merit in Australia. | The Agency (L) | Short |
| **ACTION 6.6:**<br>The Agency to investigate opportunities to build the capability to identify the individuals within a consumer's formal and informal care management network. | The Agency (L) | Short |

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 6.7:**<br>The Agency will promote the use of the API Gateway to support interoperable information exchange, including development of a service catalogue. | The Agency (L) | Short |
| **ACTION 6.8:**<br>The Agency to develop a business case for a national publish-subscribe service available to individuals, healthcare providers and healthcare provider organisations to support actions such as notifications of alerts, changes to an individual's health information, notification of an acute episode. | The Agency (L)<br><br>Service Australia (S) | Medium |
| **ACTION 6.9:**<br>The Agency to collaborate with stakeholders on the development of an agreement for use by each organisation holding personal health information that stipulates the terms and conditions for sharing, discovering and acquiring information from other organisations. This would cover key dimensions such as privacy, security, access controls, patient data rights, technical specifications, intellectual property rights, etc. | The Agency (L)<br><br>AIHW (S)<br>Australasian Digital Health Institute (S) | Medium |
| **ACTION 6.10:**<br>The Agency to collaborate on the development of consistent definitions to support health information sharing that supports interoperability and communication of health information (for example statutory definitions of health information, consent and access management). | The Agency (L)<br>Department of Health (S)<br>State and territory health departments (S) | Medium |
| **ACTION 6.11:**<br>Drawing on outcomes from Action 6.10, there will be collaborative intergovernmental work on harmonising relevant Australian, state and territory legislation with respect to consistent health definitions that support interoperability. | Department of Health (L)<br>State and territory health departments (L) | Medium |
| **Innovation through interoperability** | | |
| **ACTION 7.1**<br>The Agency will develop education and communication content to increase awareness of interoperability. | The Agency (L) | Immediate |
| **ACTION 7.2**<br>The Agency in partnership with Department of Health and states and territory health departments will prioritise the interoperability initiatives in Section 7.4 and help to deliver them where funding is available. | The Agency (L)<br><br>Department of Health (S)<br>State and territory health departments (S) | Ongoing |

| NATIONAL ACTION | RESPONSIBILITY<br>L = lead, S = support | TIMEFRAME |
|---|---|---|
| **ACTION 7.3**<br>The Agency will run interoperability innovation challenges and connectathons to encourage interoperability. | The Agency (L) | Ongoing |
| **Benefits, evaluation and maturity measurement** | | |
| **ACTION 8.1**<br>The Agency will develop and undertake a survey of hospital, pharmacy and GP organisations to provide a benchmark for the level of interoperability. | The Agency (L) | Immediate |
| **ACTION 8.2**<br>The Agency will undertake an interoperability survey periodically to measure overall progress on Interoperability in Australia. | The Agency (L) | Ongoing |
| **ACTION 8.3**<br>The Agency will develop a benefits and evaluation plan for priority initiatives it delivers. | The Agency (L) | Ongoing |
| **ACTION 8.4**<br>The Agency will produce and publish an annual report on progress, with actions and key benefit metrics. | The Agency (L) | Ongoing |
| **ACTION 8.5**<br>The Agency will work with GDHP to develop the Global Interoperability Maturity Model. | The Agency (L) | Short |
| **ACTION 8.6**<br>The Agency will investigate and in collaboration with jurisdictions assess the best digital health maturity model options for the Australian Healthcare system. | The Agency (L)<br>Department of Health (S)<br>State and territory health departments (S) | Immediate |
| **Governance and incentives to promote interoperability** | | |
| **ACTION 9.1**<br>The NHCIOR will provide governance for the Plan, and will be responsible for coordinating and overseeing the implementation of actions. | NHCIOR (L)<br>The Agency (S) | Immediate |
| **ACTION 9.2**<br>The Agency will review and refresh the Plan to cover the period from 2025 to 2030. | The Agency (L) | Medium |
| **ACTION 9.3**<br>The Agency will review the effectiveness of current incentives and assess what additional mechanisms are required to support and accelerate interoperability. | The Agency (L)<br>Department of Health (S)<br>State and territory health departments (S) | Short |

*\* Immediate: within one year; short: 1–3 years; medium: 3–5 years*

# 11  Acronyms

| Acronym | Description |
| --- | --- |
| ACSQHC | Australian Commission on Safety and Quality in Healthcare |
| ACTS | Aged Care Transfer Summary |
| AEHRC | Australian eHealth Research Centre |
| AHMAC | Australian Health Ministers' Advisory Council |
| AIHW | Australian Institute of Health and Welfare |
| AIR | Australian Immunisation Register |
| AMT | Australian Medicines Terminology |
| API | Application Programming Interface |
| B2B | Business to business |
| CCMM | Continuity of Care Maturity Model |
| CDA | Clinical Document Architecture |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| CSR | Clinical safety review |
| DHI | Digital Health Indicator |
| DICOM | Digital Imaging and Communications in Medicine |
| ePIP | Practice Incentives Program eHealth Incentive |
| FHIR | Fast Healthcare Interoperability Resources |
| GDHP | Global Digital Health Partnership |
| GP | General practitioner |
| HCEF | Health Chief Executive Forum |
| HI Service | Healthcare Identifiers Service |
| HIMSS | Healthcare Information and Management Systems Society |
| HL7 | Health Level 7 |
| HPD | Healthcare Provider Directory |
| HPI-I | Healthcare Provider Identifier-Individual |

| | |
|---|---|
| HPI-O | Healthcare Provider Identifier-Organisation |
| HPOS | Health Professional Online Services |
| ICD-10-AM | Australian Modification of the International Classification of Diseases |
| ICT | Information and communications technology |
| IHE | Integrating the Healthcare Enterprise |
| IHI | Individual Healthcare Identifier |
| IHPA | Independent Hospital Pricing Authority |
| KPI | Key performance indicator |
| LOINC | Logical Observation Identifiers Names and Codes |
| MBS | Medicare Benefits Schedule |
| METeOR | Metadata Online Registry |
| NASH | National Authentication Service for Health |
| NCTS | National Clinical Terminology Service |
| NDE | National Data Exchange |
| NHCIOR | National Health Chief Information Officers Roundtable |
| NHSD | National Health Services Directory |
| NMDS | National minimum data set |
| NPC | National Product Catalogue |
| ONC | Office of the National Coordinator for Health Information Technology |
| PBS | Pharmaceutical Benefits Scheme |
| PCA | Provider Connect Australia |
| PIP | Practice Incentives Program |
| PKI | Public Key Infrastructure |
| PPE | Personal Protective Equipment |
| PRODA | Provider Digital Access |
| QCTS | Queensland Clinical Terminology Service |
| RACF | residential aged care facility |
| REST | Representational State Transfer |
| TGA | Therapeutic Goods Administration |
| WS | Web service |

# 12    Glossary

| Term | Meaning |
| --- | --- |
| Data Exchange standards | Define the format and structure for data should be shared between information systems |
| Data standards | Define what data is required to support a particular use case |
| Healthcare Provider Identifier-Individual (HPI-I) | Identifies an individual healthcare provider who provides health care, such as GPs, allied health professionals, specialists, nurses, dentists and pharmacists. |
| Healthcare Provider Identifier-Organisation (HPI-O) | Identifies healthcare provider organisations, such as hospitals, medical practices, pathology or radiology laboratories, and pharmacies. |
| 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. |
| 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. |
| Integrated care | Where all health services, social services and care providers from multi-disciplinary teams across all clinical settings – including in the community and in hospitals (primary, secondary and tertiary care) – seamlessly and collaboratively share information to optimise care as individuals move across multiple settings. |
| 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. This includes GPs, 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 an SDO and are therefore not Standards. |
| Terminology | Defines the codes and descriptions used to define a concept; for example, AMT for medications |
| WS-* | The collection of web service profiles – for example, WS-addressing and WS-security. |