Australian Government

Australian Digital Health Agency

Health Connect

Architecture

Australian Digital Health Agency

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Acknowledgement of Country

All partners acknowledge and respect Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of Country throughout Australia and their continuing connection to land, seas and community. We pay our respects to their cultures and to Elders past and present.

Thank you to partners and contributors

Thank you to the partners, organisations, healthcare providers and Australians from all walks of life who contributed to the Health Connect Australia Architecture and broader consultations. We appreciate all who gave their time, experience and expertise to contribute to Australia's digital health transformation journey.

Role of the Australian Digital Health Agency

The Australian Digital Health Agency (the Agency) is a corporate Commonwealth entity supported by all Australian governments to accelerate adoption and use of digital services and technologies across the Australian health ecosystem, as set out under the Public Governance, Performance and Accountability (Establishing the Australian Digital Health Agency) Rule 2016 (Agency Rule). The Agency Rule was created under the *Public Governance, Performance and Accountability Act 2013*. Under the Agency Rule, the Agency is charged with developing a digital health strategy at the national level for Australia.

The Agency has a key role in delivering the Intergovernmental Agreement on National Digital Health 2023–2027 (Intergovernmental Agreement), which has been signed by all Australian governments. The Agency delivers cross-jurisdictional priorities, as set out in the Intergovernmental Agreement.

Along with our partners, the Agency is responsible for leading and coordinating the implementation of the strategy and maintaining a national view of its progress. The Agency is also responsible for some key elements of the strategy, including the continued expansion of My Health Record and other platforms that support the secure and safe use of digital health systems across the nation.

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Executive summary

To maximise interoperability in the Australian health ecosystem and break the current pattern of investing in siloed systems, the Health Connect Australia program will deliver significant improvement to national digital health interoperability in Australia over the coming 5 years. The Health Connect Australia architecture is founded on a common set of core capabilities. The architecture remains, however, flexible and adaptable to deal with the broadest range of health system requirements and models of care.

At its core, Health Connect Australia is focused on delivering common approaches to healthcare interoperability that span the Australian health ecosystem. Health Connect Australia is not a single product. Instead, it is a collection of capabilities (legislative, policy and technical capabilities) seeking to address identified gaps in the digital health ecosystem and facilitate national health information sharing and availability.

To achieve these national objectives, the Australian Digital Health Agency and the Australian Government will oversee and implement key aspects of the technology delivery. True success will come from change and adoption activities to support all health system technology investments aligning to the nationally agreed common architectural approaches, adopting agreed national standards and using nationally delivered common services as part of the Health Connect Australia ecosystem. A structured approach will be taken for the delivery and adoption of the Health Connect Australia architecture to support prioritised use cases. Investment in foundational systems described within the Health Connect Australia architecture will be targeted to ensure they can be reused across various applications and use cases.

The Health Connect Australia architecture describes:

- a federated model to allow interconnected health information technology systems to function together – this model balances the use of centralised components delivered nationally and local system components
- common technology and technology approaches to support multiple legislative and policy models
- interoperability patterns to define common reusable technology approaches.

While the entire Health Connect Australia architecture is designed to be reusable across multiple use cases, key foundations need to be in place to ensure initial use cases can be built effectively. These include:

- identifying and authorising each participant to access information based on business rules and policy in a safe and secure way with privacy at the forefront
- using a consistent approach to exchange information about people and organisations within the healthcare system in real time that enables seamless data exchange across borders
- adopting open national and international interoperability standards to ensure that healthcare information can be created, exchanged and meaningfully used and can be seamlessly connected and interpreted by systems across the ecosystem
- enabling consumer choice (for example, allowing consumers to nominate who is in their care team at a point in time and what information their care team can access) and embedding consumer-centred care so that consumers have more agency in their care.

Introduction

Purpose

This document presents a high-level conceptual architecture to address the intent of Health Connect Australia, a program that will deliver significant improvement to national digital health interoperability in Australia over the coming 5 years. The architecture presented here is a high-level overview intended to support future detail and provide industry with an indication of the approaches government intends to take. Further detail on specific technologies and solution architecture will be provided during each program phase. To achieve this, the Australian Digital Health Agency and the Australian Government will oversee and implement key aspects of the technology delivery.

The architecture serves as a foundation for guiding solution designs within the digital health ecosystem by defining key components and functions they will fulfil. This will ensure that solutions can take a consistent approach to defining their own functions within the ecosystem and identifying where they will rely on other systems.

This document is intended to be read alongside Health Connect Australia Strategy document and the accompanying Health Connect Australia Roadmap.

Intended audience

This document is primarily intended for people or organisations who:

- develop, supply or maintain software solutions that are used within the digital health ecosystem
- design end-to-end digital solutions
- are responsible for technology solution definition and selection
- are responsible for solution design within the digital health ecosystem.

It may also be of interest to any other people or organisations with an interest in the digital health ecosystem.

Scope

This document primarily describes a high-level conceptual architecture. It outlines the components and functions needed to meet the intent of Health Connect Australia and provides an overview of some of the key interactions among these components.

This document does not cover:

- a detailed definition of the components or the functions they perform
- service or application programming interface (API) specifications for the components

- a gap analysis between the functions of the components described in this document and those provided by existing products and systems
- the sequence of technology implementation; this is defined in the Health Connect Australia Roadmap document.

Overview

This document has the following sections:

- Executive summary – a concise, high-level overview of this conceptual architecture document
- Introduction – the purpose and intended audience and scope of the document (this section)
- Intent – the intent of Health Connect Australia. Further detail on intent and objectives of Health Connect Australia is in the accompanying document Health Connect Australia Strategy
- Participation – the different types of people and organisations that will participate in the Health Connect Australia ecosystem and the roles they will play
- Health Connect Australia architecture – the high-level architecture to meet the intent of Health Connect Australia
- Implementation considerations – what people need to consider to support prioritisation of implementation activities and considerations for each of these activities
- Representative healthcare journey – contextualises the architectural approach against a representative healthcare journey
- International healthcare information exchange (HIE) experience – an overview of the internation HIE landscape.
- Australia's digital health current state – an overview of key technology capabilities that exist today and some of the challenges around achieving the intent of Health Connect Australia within this landscape.

Intent

The National Digital Health Strategy's objectives and the Interoperability Plan's recommendations have been brought together to form the intent of Health Connect Australia, which aims to deliver a significant improvement to national digital health interoperability in Australia.

Intent of Health Connect Australia

Health Connect Australia will establish, evolve, innovate and refine a set of nationally consistent capabilities, products and standards, to facilitate health information sharing across existing systems and meet the evolving needs of consumers and healthcare providers.

At its core, Health Connect Australia is focused on delivering common approaches to healthcare interoperability that span the Australian health ecosystem. Health Connect Australia is not a single product. Instead, it is a collection of capabilities (legislative, policy and technical capabilities) seeking to address identified gaps in the digital health ecosystem and facilitate national health information sharing and availability.

Health Connect Australia is not only about Australian Government–led investments to modernise national digital health infrastructure and capabilities. It also intends to provide all health system stakeholders with a set of reusable architectural patterns and principles that can be used to drive their own investments, which, collectively, can drive overall system interoperability. These patterns and principles will be released as architecture artefacts, implementation guides, technical specifications and conformance requirements. They will also be included in the Australian Digital Health Agency's Digital Health Procurement Guidelines and the National Digital Health Standards Catalogue where appropriate.

Using nationally consistent capabilities is a fundamental prerequisite to connecting healthcare providers, consumers and stakeholders across the country and transforming the Australian healthcare ecosystem. National interoperability and connectivity will enable the efficient exchange of health information, which will facilitate better health outcomes and help to empower consumers to actively manage their health.

The design and development of Health Connect Australia is informed by research conducted by the Agency that found that:

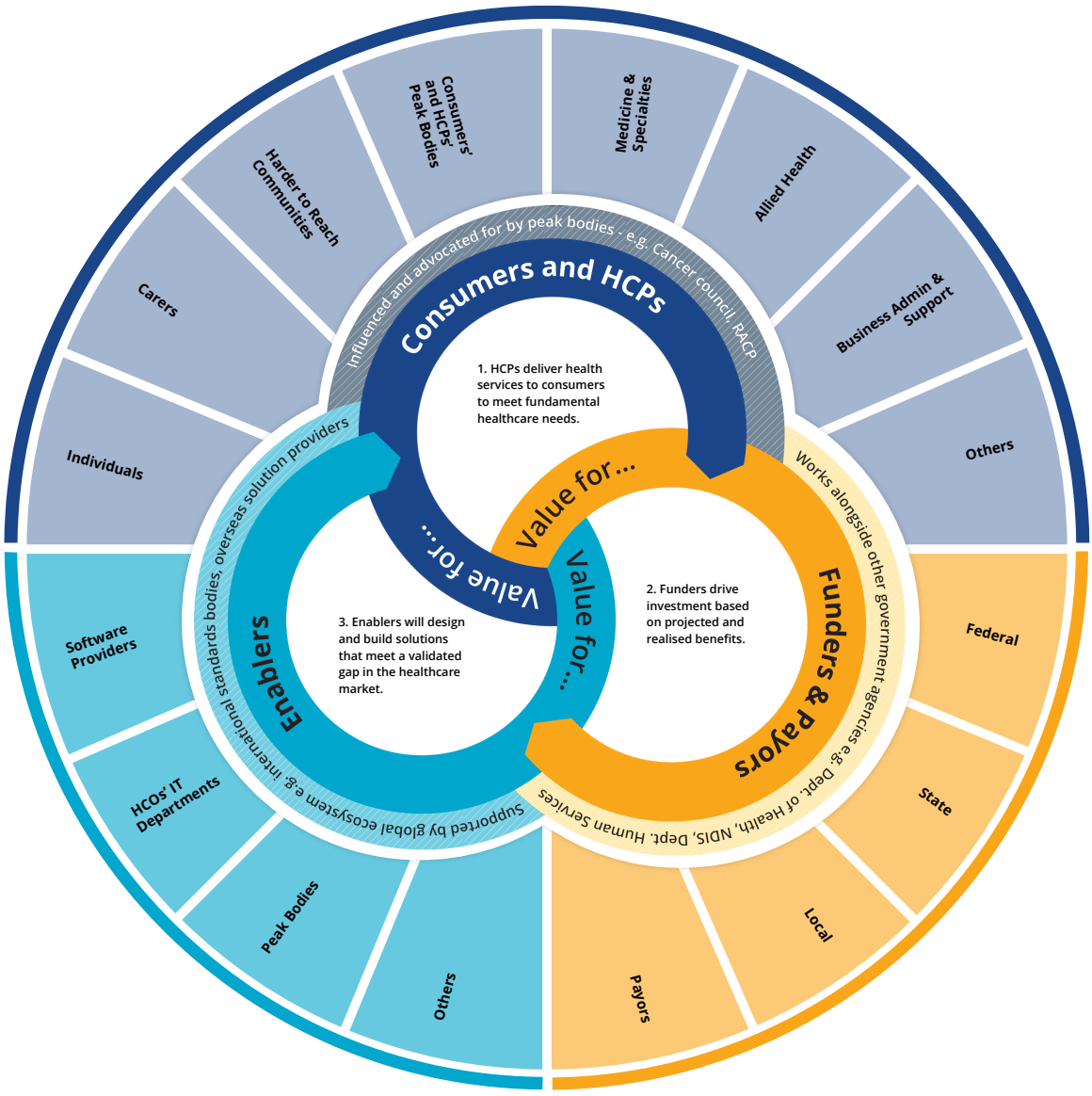
- Consumers want better access to their health information and choice in who can access it. Specifically, they want:
  - a single channel to access and upload their own health information; this includes consumers in rural, remote and regional areas and Aboriginal and Torres Strait Islander consumers and carers
  - to select the format and method of receiving documents (for example, an electronic request by SMS) and be notified when new documents are available or there are changes in their circumstances (for example, if there are limited care plan sessions remaining)

  - their historical health information shared between healthcare providers, such as when transferring to a new healthcare provider, when they have a care team or during transfers of care
  - the ability to provide consent for healthcare providers to access their health information and remove this access if required
  - choice of healthcare provider to fulfil a referral or request
- Healthcare providers seek interoperability and standardisation to enable access to patient health information. Specifically, they want:
  - their clinical systems to be interoperable – that is, to work with other systems and allow for timely access to, and sharing of, health information so there are no delays in providing care to patients
  - a single channel to access and contribute to a comprehensive patient record to facilitate better patient care
  - standardisation of collected health information to ensure quality and patient safety and avoidance of repeat investigations and testing
  - digitisation of workflows to avoid delays in care or loss of documentation
  - continuous HIE, which is core to a functional healthcare system design and for consumer-centric care.

Participation

The Australian Digital Health Agency uses the term 'customer' as an umbrella term for all people and organisations that may directly benefit or be impacted by our activities (Figure1).

Figure 1: The customer ecosystem and virtuous cycle



HCO = healthcare organisation; HCP = healthcare provider; IT = information technology; NDIS = National Disability Insurance Scheme

Source: Australian Digital Health Agency, Experience and service design CX toolkit, 2021 (not publicly available).

All parts of this customer ecosystem will participate in the Health Connect Australia ecosystem. This framework ensures that benefits are driven across the ecosystem and provide value to all customers.

Consumers and healthcare providers

Consumers and healthcare providers are the people in the healthcare ecosystem who will primarily use technology to support the delivery or management of care.

Healthcare providers

The Australian healthcare system has many different types and tiers of services available to consumers. Healthcare providers are grouped into general categories that reflect the type of care given or the nature of the relationship with consumers. Healthcare providers interact with the healthcare ecosystem via clinical information systems (CISs), portals, or mobile applications (apps).

Healthcare consumers, representatives and carers

A consumer is any individual who has received, is currently receiving or will receive healthcare in Australia. Where a consumer requires assistance with managing their healthcare, they may have another person act on their behalf or provide assistance (that is, an authorised or nominated representative or carer).

Representatives and carers directly support consumers. Carers can provide direct care in settings that are formal, such as in aged care, or informal, such as in the home. Representatives have different levels of authorisation to act on behalf of a consumer.

Consumers may access the ecosystem via many channels; however, the expectation is that this will typically be via a web portal, app or application.

Funders and payers

Funders and payers play distinct yet interconnected roles in the health ecosystem. Funders provide financial resources to deliver and scale digital health technologies and services, while payers reimburse or cover the costs of digital health services and solutions.

Both funders and payers look to use data to help inform management and funding of the health system. This includes the Australian Government and jurisdictions. This group leverages funding to optimise the delivery of the National Digital Health Strategy priorities and to enable the ecosystem enablers to maintain strategic alignment and benefit realisation. Funders and payers play a crucial role in incentivising adoption, driving innovation and shaping digital health standards.

Enablers

Enablers do not directly deliver healthcare or manage the healthcare system; however, they are instrumental in enabling the ecosystem to function by providing the necessary services, conditions or support needed for digital health solutions and a digitally enabled workforce to thrive. Enablers include policy and regulatory settings, peak bodies, information and communication technology (ICT) system development and support, reference data management and research functions.

ICT system vendors

ICT system vendors deliver the different types of ICT systems needed in the ecosystem.

Clinical systems

Healthcare providers use a variety of commercial off-the-shelf or customised software products to manage medical records and the administration of healthcare delivery (clinical systems). The capabilities offered by the products are extensive and are often tailored to a specific segment of the healthcare industry.

Clinical systems broadly encompass:

- electronic medical records (EMRs)
- clinical information systems (CISs)
- practice management systems
- pharmacy systems
- diagnostic imaging systems
- laboratory systems
- other systems used to support the delivery of healthcare.

Apps and applications

Apps and applications provide a front end for users to interact with the ecosystem via web portals, applications or mobile applications outside of clinical systems or embedded within clinical systems. However, apps and applications exclude functionality provided natively by clinical systems.

The portals or mobile applications can be operated by the Agency, other government organisations or a third party and, potentially, accessed by both providers and consumers.

Repositories

Repositories hold information to be exposed across the ecosystem. Repositories do not work alone; rather, they are paired with access controls, discoverability and other functions aligned to the legislation and policy they are subject to.

Repositories do not need to be standalone stores of information, as they may also be embedded within clinical or other information systems.

Registry services

Registry services are a type of repository that are registers of clinical or health-related information. There are several types of register, and the number of registers connected to the ecosystem is expected to increase over time. Registers can be owned and operated by government or commercial operators as a place to hold specific consumer data, such as the Australian Immunisation Register. Consumer-managed registries hold information primarily generated by consumers, such as advance care plans and allergy information. Registries may also be run to support research activities.

Exchange services

Exchange services are a type of repository that facilitate the exchange of clinical and other health-related information between organisations and individuals in the context of enabling delivery of healthcare products and services to healthcare consumers. Exchange services support the healthcare consumer's ability to choose service providers. Exchange services can be owned and operated by government or a commercial entity as a place to support the exchange of specific data.

References services

References services make available to the ecosystem information that is not created from the management or delivery of healthcare. They are typically used to improve the quality and accuracy of other information (such as terminology services) or as a value-add service for use downstream.

Research

Research, including population health research, uses data from across the ecosystem to develop insights into behaviours and patterns related to the health of the population. These data may then be used by funders, healthcare providers or consumers to inform their activities.

Information providers

Information providers make information available to the ecosystem and take responsibility for the creation, curation and governance of this information. This may include:

- fact-based information services to improve the quality and accuracy of other information or as a value-add service for use downstream
- generated information such as predictive health data based on other information within the ecosystem.

Health Connect Australia architecture

The Health Connect Australia architecture is designed to facilitate the seamless and secure exchange of healthcare data across providers, organisations and systems. It ensures interoperability, data accessibility and improved coordination of care. The Health Connect Australia architecture has several key features.

Architectural intents

Health Connect Australia will be built using a modern best-practice architecture. The ICT components of Health Connect Australia will be designed to be flexible to support change, which is expected over time, to ensure that costs for the health sector are minimised.

Systems will not be thought of as standalone applications that have functions and responsibilities spread thin across the end-to-end stack. Rather, systems will be considered as pieces of a holistic, interoperable healthcare environment.

The Agency has developed a set of architectural intents (Table 1) to enable the Health Connect Australia architecture to address the strategic goals described in Health Connect Australia Strategy while considering architectural best practice.

Table 1: Architectural intents for Health Connect Australia

Intent	Description
Provide a common architecture that is broadly applicable and used by all	The Health Connect Australia architecture should support all health system technology investments, ensuring that they are able to align to nationally agreed common architectural approaches and support adoption of agreed national standards across the health sector.
Maximise the shareability of information	The Health Connect Australia architecture should ensure, as much as possible, that when information is shared, its use is not constrained to a single use case or a limited set of providers. Instead, Health Connect Australia should support broad access to shared data, noting policy and legislative considerations.
Ecosystem-wide perspective	The healthcare system has various standards, technologies and practices that create unnecessary divisions. Health Connect Australia aims to support the ecosystem as it evolves. It may need to offer features or services for external partners, such as APIs to help third-party ICT systems integrate smoothly. Unlike a closed-off 'black box' approach, Health Connect Australia will provide transparent, accessible services that third-party systems can use.

Intent	Description
Adopt a consumer-centric approach	A consumer-centric approach will ensure that any change to how a consumer's health information is accessed, used and shared is well informed and contributes to expected improvements in healthcare delivery.
Support broad use cases and be flexible for the future	The Health Connect Australia architecture needs to be flexible to cater for existing and future interoperability use cases and not only be focused on solving specific problems.
Support local investment and innovation	The Health Connect Australia architecture should consider that different entities in the ecosystem have different needs. Therefore, Health Connect Australia needs to support these entities to invest in systems that target specific clinical or consumer needs and workflows and allow innovation within their own settings. The Health Connect Australia architecture must balance the level of constraints placed on local systems by the common national approaches, having core common functions while allowing flexibility in local system investment and supporting local innovation.
Support multiple legislative and policy models	Efforts to simplify and better align the legislative and policy landscape will be crucial to fully achieving the intent of Health Connect Australia in the longer term. Health Connect Australia must consider architectural flexibility to allow it to rapidly cater to future national, state and territory policy priorities. To support early benefits, consideration should be given to supporting a range of legislative and policy frameworks from the outset.
Consider appropriate reuse of current technology investment	The Health Connect Australia architecture must recognise the existing digital health ecosystem and consider appropriate reuse of existing investment. Conversely, the architecture must also consider where: • existing investment has not facilitated broad interoperability or does not support a broad strategic approach to interoperability • existing investment presents challenges with scalability or supportability • investment in new technology could benefit existing systems. Therefore, the Health Connect Australia architecture must consider the appropriate balance between reuse of current investment and new investment.

Intent	Description
Develop architecturally resilient platforms	Technical systems need to be flexible, enabling change and growth. The Health Connect Australia ecosystem may change and evolve over the long term, and the technical systems that support health information exchange (HIE) need to be flexible to accommodate change. The Health Connect Australia architecture should consider decoupled approaches leveraging platforms as service models, in which problems can be solved by bringing together relevant platform capabilities.
Support high-quality clinical health information	It is not enough for Health Connect Australia to simply support information sharing between providers and/or consumers. Health Connect Australia must support quality HIE, in which shared clinical information is of sufficient quality to maximise consumer outcomes. The Health Connect Australia architecture must include services and controls that support quality health information by considering both semantic interoperability of data and management of data that are conflicting or out of date.
Contextualise clinical information	Health Connect Australia will need to contextualise information for both providers and consumers. For example, from a provider perspective, longitudinal records may need to be captured and synthesised to present more usable data. Consumer demographics, care teams, preferences and other information may need to be captured to better contextualise the consumer.
Support legacy and modern standards	The provider landscape involves different standards, practices and technologies. Although Health Connect Australia will support consistent adoption of modern standards, consistent adoption cannot be expected initially. As such, the Health Connect Australia architecture will need to support multiple standards, both legacy and modern. For example, there may be a need to support standards based on HL7 Clinical Document Architecture (CDA) and HL7 Fast Health Interoperability Resources® (FHIR®), allowing providers to have some level of interoperability as the ecosystem progressively adopts modern standards.
Support a spectrum of provider and consumer technical sophistication	Across Australia, providers and consumers vary in their technical sophistication. For example, provider management systems range from out-of-date on-premises systems to modern cloud-based systems. Rural consumers and providers may not have the same access to telecommunications infrastructure (e.g. high-speed internet) as their urban counterparts. The Health Connect Australia architecture will need to support the spectrum of technical sophistication of providers and consumers. For example, the architecture may need to support both real-time access to source data where systems support it, as well as interim repositories where they cannot.

A loosely coupled federated model

The Health Connect Australia architecture envisions a federated model of interconnected health IT systems that function together to support users. These systems include those owned and operated by the Agency, the Australian Government, jurisdictions and private organisations.

A federated model balances the use of centralised core components run and operated as national infrastructure (such as identity management, access management, information discovery and indexing) with support for distributed components run and operated by third-party participants such as jurisdictions or private organisations. This approach supports local investment and innovation by different entities to meet specific clinical or consumer needs and workflows, while limiting the need for local systems to duplicate common national functions such as policy evaluation against national information sharing legislation and policies.

Table 2 outlines the key differences between a federated model, a fully centralised model and a fully distributed model in a national digital health environment demonstrating the benefit of using a federated model.

Table 2: Key differences between federated, fully centralised and fully distributed models in a national digital health environment

Function	Federated model (Health Connect Australia approach)	Fully centralised model	Fully distributed model
Evaluation of national legislative and policy frameworks	Allows for investment in and maintenance of a single system that provides common central evaluation of national legislative and policy frameworks	Allows for investment in and maintenance of a single system that provides common central evaluation of national legislative and policy frameworks	Requires individual systems to implement and maintain the capability to evaluate national legislative and policy frameworks
Discovery of the location of relevant data	Supports a simplified pattern to discover the location of relevant data	Supports a simplified pattern to discover the location of relevant data	Discovery of the location of relevant data is complex
Innovation and information sharing	Allows for local systems (such as those in healthcare organisations or providing consumer functionality) to innovate while fully participating in sharing health information	Allows slow innovation from a central system that supports access to shared health information Local system innovation is limited in the amount of health information it can share and access	Requires duplicated investment in foundations to share health information, detracting from the funding available to innovate Sharing health information is harder
Data storage	Accesses data from as close to a source of truth as possible, limiting the need to store excess copies of data and simplifying synchronisation of data across repositories	Copies data into central systems, increasing overall system storage costs	Although data are held as close to a source of truth as possible, lacks common services, making access to these data more complex

With the adoption of a federated model, healthcare providers do not have to choose between adopting national information-sharing approaches or investing in local systems that drive innovation and target local system needs. Instead, the federated model of Health Connect Australia will empower jurisdictions, the private healthcare sector and the software vendor industry to make decisions relevant to their environment while still aligned with national approaches. This means that existing investments in a public or private HIE or software solution can be extended to become part of the federated environment, allowing bidirectional information sharing with other participants in the ecosystem. New investments can leverage key national components rather than duplicate delivery of functions that are best delivered centrally, meaning that investment is made where it adds most value in local settings.

Ecosystem participants are free to maximise their existing investment and leverage national investments. In addition, local investments are to some extent insulated under a federated model from changes at a national level.

Loose coupling will be achieved by ensuring that the functions performed by each of the components in the health system architecture are exposed as services using API's that are conformant to agreed standards and specifications (A standards-driven approach)

The Health Connect Australia architecture has 3 layers that each contain distinct but interrelated capabilities (Figure 2). Combined, the capabilities provide a set of functions needed to deliver the overall Health Connect Australia intent, without introducing unnecessary complexity or coupling. Interoperability within and between the layers will be based on common standards to ensure information shared between systems across the health ecosystem is meaningful and usable.

Common services layer

The common services layer delivers the required common reusable foundation elements. This layer holds the common, centralised functions of the federated Health Connect Australia model, and it is expected that these functions will be progressively delivered nationally across multiple phases of the program.

This layer includes components delivering the following capabilities:

- Digital health authorisation evaluates and implements authorisation controls on the supply and access of health information using national legislation and policy frameworks.
- Digital health authentication enables a consistent pattern to allow identity claims from consumers and providers, organisations, applications and application instances to be validated within the digital healthcare ecosystem. This will leverage existing and proposed national capabilities (such as myID) when possible.
- Digital health identification and identity management ensures that there is a recognised identity available for consumers, providers, organisations and applications. This will leverage existing and proposed national capabilities (such as the Healthcare Identifiers Service and myID) as sources of truth when possible. However, it may need to be the source of truth for some identity types.

- Digital health notifications ensure delivery of notifications to participants in the digital health ecosystem. This includes delivery of notifications, as well as management and knowledge of the different notification paths used by different participants in the ecosystem. Notifications may be triggered by the event service (such as notification of subscribed event) or be sent directly from a participant in the ecosystem (such as a health provider identifying a need to notify another of an event).
- Digital health event management provides a platform to generate events that are noteworthy (such as subscribed events under a publish subscribe model) based on predefined rules, logic and, potentially, consent and preferences. This involves integrating various components to automate event generation while ensuring relevance and compliance.
- Digital health information discovery provides a single channel for discovering digitally discoverable and/or shared health information.
- Digital health preferences, controls and consent capture and record the preferences, controls and digital health consent settings of participants in the digital health ecosystem to support the requirements of different health information sharing legislation and policy frameworks. Consent for healthcare treatment is not part of this function and will be captured as part of general health information.
- Digital health information history and audit enables the application of audit capabilities for security purposes and to meet requirements of different health information sharing activities. It allows the history of digital health information (such as when it was created, viewed or updated) to be viewed.
- Digital health participation validates the participation of consumers, providers, organisations, applications and application instances in different health information sharing legislative and policy frameworks. Some of these frameworks will require registration. This capability will be responsible for maintaining this registration.
- Digital health representatives and relationships facilitates digital representation of relationships between different participants in the digital health ecosystem (such as between healthcare consumers and providers, healthcare consumers and their representatives, organisations, applications and application instances) to support policy and legislative requirements to enable HIE. This includes functions for capturing, recording and managing these relationships.

Health information sharing layer

The systems in the health information sharing layer will facilitate the sharing of health information through the adoption and application of standards.

Systems in this layer will conform and interact with the common services layer to ensure use of common functions such as consent, identity, authorisation, auditing, event management and participation in common discovery services to support location of information held in this layer.

This layer includes systems that hold clinical data; as well as systems that hold data entered or managed by consumers; or administrative data such as provider information, billing, scheduling and appointment information. It also includes systems that present alternate views of data such as consolidated data from multiple sources and systems that will cache data to support more efficient data flows across the ecosystem.

Multiple systems will perform the functions of this layer, including those delivered by the Australian and jurisdictional governments and private organisations.

Systems in this layer provide the following functions:

- Health information repositories provide technical capabilities for collecting, storing and exposing information that is shared as part of the Health Connect Australia ecosystem. These repositories may be run by the Australian Government, jurisdictions or other third parties. They may present health information they hold as the primary source of truth (such as an EMR performing the functions of a repository in the context of Health Connect Australia) or they may hold health information on behalf of other sources of truth (such as the My Health Record National Repository Service or a third-party intermediary).
- Health information views present aggregated health information (from across multiple repositories) or transformed health information. This capability extends the ability to view information stored in repositories by providing an ability to define and apply different views of health information.
- Health information caches provide the technical capabilities to cache, or temporarily store and expose, health information that would otherwise be accessed directly from other systems in the health information sharing layer. This function is used to support more efficient data flows in the ecosystem and reduce the burden on these other systems such as where there may be a high volume of access to data they hold that they would otherwise need to scale to support.

Health service delivery and user interface layer

The health service delivery and user interface layer includes the systems that:

- support processes and workflows for the delivery of health services, such as those used in health practices or hospital EMRs
- support administration, funding and activity management, reporting and research
- provide user interfaces for providers, consumers and others as required.

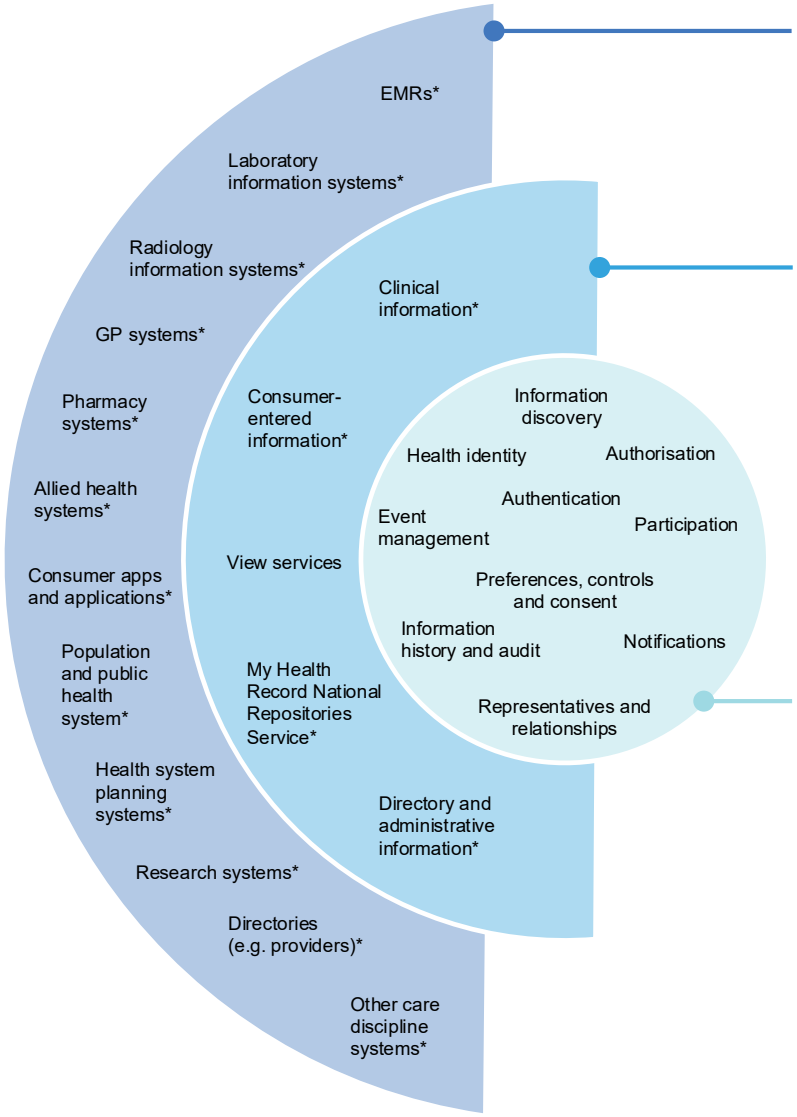
The functions of the systems in this layer will be complemented by their ability to access and exchange information via the health information sharing layer.

The systems in this layer are expected to predominantly be owned and operated by the jurisdictions and private organisations that have adopted healthcare software products to target specific clinical or consumer needs and workflows. These may be exiting systems that are adapted to work as part of the Health Connect Australia ecosystem, or new systems that are designed to more natively form part of this ecosystem.

A single system may perform functions in both the health information sharing layer and the health service delivery and user interface layer when it both directly exposes for sharing as part of the Health Connect Australia ecosystem and provides access to these data and workflow management directly via a user interface.

The components that deliver the services described in the Health Connect Australia architecture will be loosely coupled using common standards. Because each component will have a discrete area of responsibility, the components will be easier to maintain and change.

Figure 2: Health Connect Australia layered architecture



Health service delivery and user interface layer

This layer includes the clinical information systems and administration systems that are integrated with the common services layer and will access the health information sharing layer to exchange clinical and personal health information between organisations.

It is expected that the systems in this layer will predominantly be owned and operated by states and territories and private organisations that have adopted healthcare software products and will target specific clinical or consumer needs and workflows.

Health information sharing layer

The systems in this layer will facilitate the sharing of health information through the adoption and application of standards.

Systems in this layer will conform and interact with the common service layer to ensure use of common functions such as consent, identity, authorisation, auditing, event management and participating in common discovery services to support location of information in this layer.

This layer not only includes systems that hold clinical data but also systems that hold consumer-entered or consumer-managed data or administrative data such as provider information. It also includes systems that present alternate views of data such as consolidation from multiple data sources.

Multiple systems will perform the functions of this layer, including those delivered by state and territories, private organisations and the Australian Government.

Systems in this layer may be combined with systems in the health service delivery and user interface layer when a single system both holds the data and provides access to the data via a user interface.

Common services layer

This layer delivers the required common reusable foundation elements, including:

- functions such as authentication, participation, preferences, consent, representative, relationship and care team management functions that deliver a repeatable approach, establishing trust with participants in a national digital health ecosystem – this includes identity validation and authorisation to use and exchange health information
- services to support standardised patterns to trigger and deliver notifications to participants (e.g. publish subscribe services)
- audit capabilities (as required), allowing the history of digital health information (such as creation, view, update and exchange) to be viewed
- services to simplify discovery of health information stored across different digital health systems.

As this layer holds the common, centralised functions within the federated Health Connect Australia model, its functions are expected to be progressively delivered nationally across multiple phases of the program.

EMR: electronic medical record; GP: general practitioner; MHR: My Health Record.

* Single systems can span the functions of the information sharing layer and the health service delivery and user interface layer.

Common technology approach

Information collected in a healthcare setting is often needed to support more than one activity, for example:

- A diagnostic imaging report may be used immediately to support investigation of a specific complaint that the imaging was ordered for. However, it may also be relevant to future consultations with other providers and be used to support research activities.
- Information in prescriptions is used to allow dispensing of prescribed medications. However, the information is also relevant for medication reconciliation activities and for management of potential drug interactions during an emergency department presentation.

The rules that regulate the sharing of health information to support these different activities sometimes fall under more than one legislative or policy framework. In some scenarios, rules and considerations from various frameworks apply. These might include how users identify themselves, what information is covered by the framework, and any restrictions or conditions on the collection, use and disclosure of the information.

Efforts to simplify and better align the legislative and policy landscape is crucial to overall success of Health Connect Australia outcomes. However, the architecture approach must support a range of legislative and policy frameworks from the outset. This is because legislative change can take time and is subject to decisions of governments. This level of flexibility also allows Health Connect Australia to rapidly cater to future national and jurisdictional priorities.

Reduced duplication of investment

Designing Health Connect Australia so that common technology and architecture patterns are reused to support different legislative and policy frameworks means that:

- systems in the ecosystem will have fewer styles of technology interfaces to develop, maintain and monitor, resulting in lower cost to implement and maintain these systems in supporting and participating in the multiple different information sharing uses within the ecosystem
- the need to fund maintenance of systems that are performing the same functions will be limited, maximising the value in overall digital investment
- there can be faster and less costly development of solutions to meet new and emerging needs, as foundational capabilities will already be in place and investment can focus on needs for specific use cases and change and adoption concerns.

As an example, health software solutions can currently support access to vaccination information from the Australian Immunisation Register and My Health Record. These different legislative pathways are both required to be supported as the different rules governing access to this information under each framework support different uses of the information. The technical approach to accessing this same information is different under these different frameworks. Moving towards a common technology model would limit the different technology approaches that health software solutions would need to support.

Increased information sharing

When healthcare providers share information, they often have to follow multiple processes to distribute it. As a result, information sharing tends to focus on immediate healthcare needs while other potential uses are overlooked. For example, a specialist's letter/report might be shared with the referring general practitioner (GP), but it is less common for that letter/report to be made accessible to other healthcare providers in the future.

By adopting a unified technology approach, information only needs to be shared once, making it accessible to multiple authorised parties under various legal and policy frameworks. One application of this model is to enhance the availability of relevant health information within My Health Record. This ensures that important data are automatically included in a consumer's My Health Record, eliminating the need for providers to manually upload it every time.

Interoperability patterns

Interoperability patterns are central to the architectural approach to Health Connect Australia. The functions under the Health Connect Australia layered model will be exposed as services. These patterns will be enabled by using core services that are common to multiple patterns (such as authentication, identity management) and services that are designed for specific use cases (as described in Loosely coupled federated model). The patterns will provide a consistent approach for composition of these services to meet the intent of each pattern, allowing a consistent and reusable technology approach to be implemented within the federated environment. Implementable specifications describing the service composition for each of the Health Connect Australia supported patterns will be developed (A standards-driven approach). Investment in technology will be tailored to align with the technology design that underpins the services that enable these patterns.

Health Connect Australia initially envisages 5 interoperability patterns:

- information publish
- discovered information exchange
- directed information exchange
- consumer-mediated exchange
- information lifecycle management.

As use cases are further developed, extra patterns may be added to subsequent versions of this document.

The patterns are designed to complement each other. For example:

- The directed information exchange pattern and consumer-mediated exchange pattern could allow an electronic request for diagnostic services to be sent directly to a diagnostic provider agreed to by a consumer and their GP (via the directed information exchange) and allow a consumer to choose a different diagnostic provider (via the consumer-mediated exchange pattern) should they change their mind.
- The discovered information exchange pattern could allow this information to be found in support of a future consultation as part of a consumer's longitudinal record.

The interoperability patterns have been mapped across a representative future-state user journey and are reflected in scenarios included in Representative healthcare journey. The scenarios show situations where a single pattern or parallel patterns may be used to exchange information.

Information publish

The information publish pattern enables information to be made available in the digital health ecosystem so that it can be accessed and discovered. This pattern supports scenarios when information:

- needs to be shared immediately
- does not need to be shared in the short term but there is value in it being discoverable in the future – for example, a patient summary would typically be published immediately but only discovered by others in the mid to long term.

The information publish pattern will not always require information to be uploaded into a central database. It will need to consider different approaches to fit the needs of all participants in the ecosystem, balancing where information may be exposed directly from source systems against data being stored in centralised repositories.

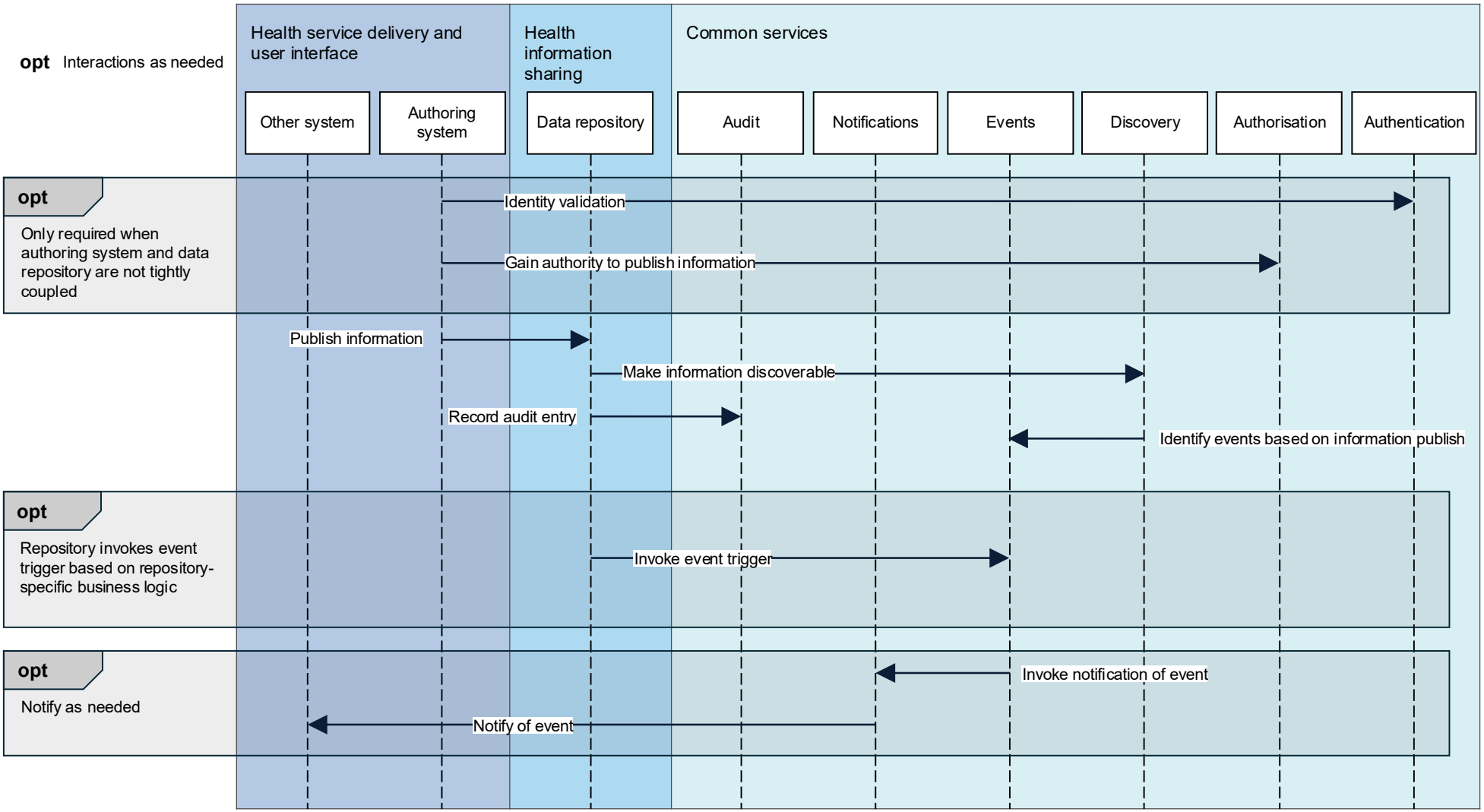
Conceptual approach

The key activities in this pattern ensure that:

- information is exposed from the health information sharing layer using common standards. This may be supported by either:
- uploading data to a national or third-party repository
- exposing data to enable access directly from the source system using standardised APIs
- information can be discovered via the discovery service
- events that are relevant to the publishing of the information are triggered.

Figure 3 expands on these activities. It is not intended to show an accurate technical approach (which will be developed during a detailed design phase, aligned with the Health Connect Australia Roadmap priorities). Instead, it shows the conceptual relationship between the services.

Figure 3: Key activities in the information publish pattern



Discovered information exchange

The discovered information exchange pattern facilitates discovery of and access to shared health information based on search parameters defined by the person or organisation looking for information. This includes:

- providers finding information about their patients
- consumers (and their carers and representatives) finding information about themselves
- participants discovering information about healthcare providers, provider organisations and services
- researchers discovering broad health information sets required to support analytics and insights.

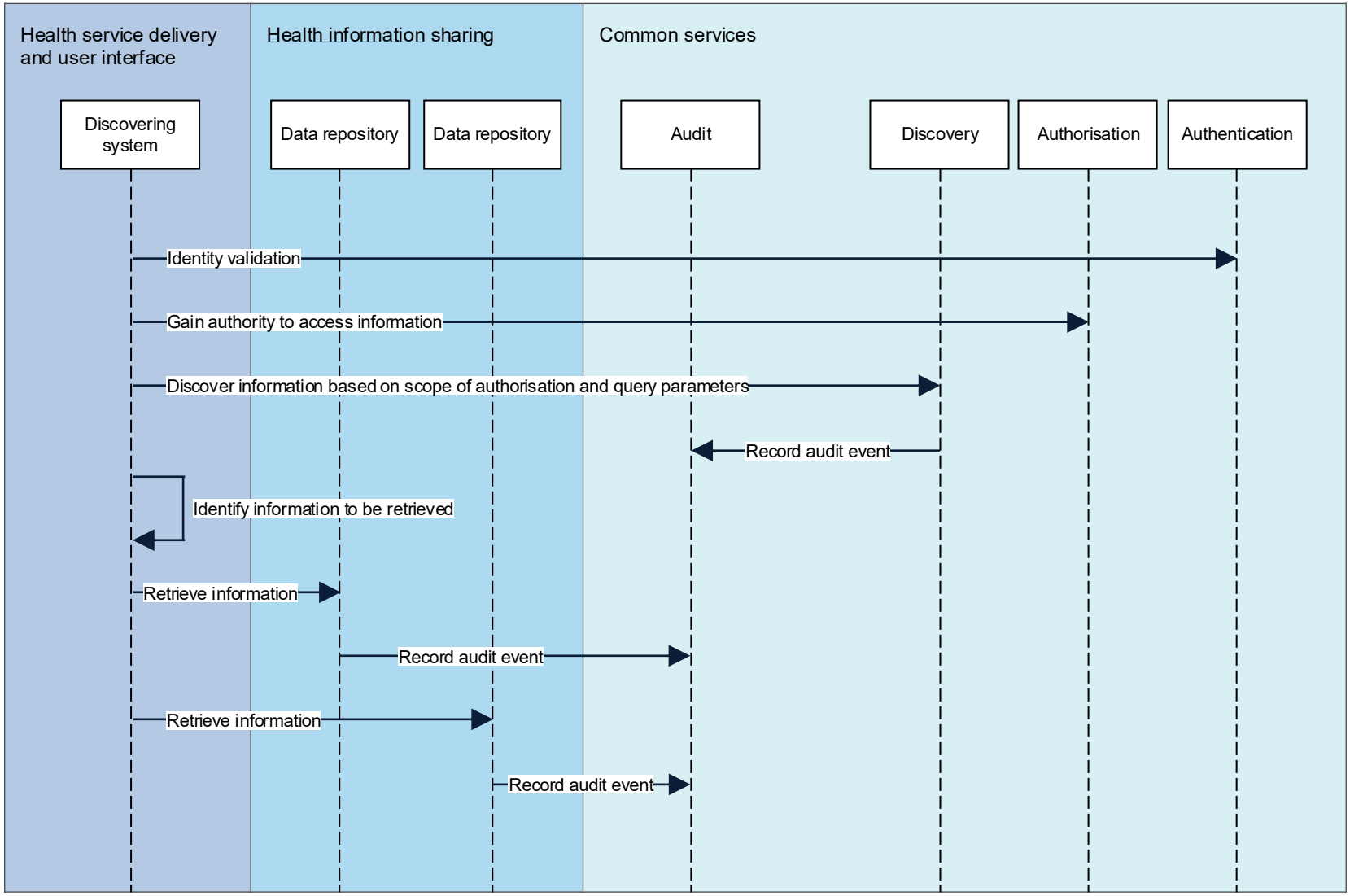
Conceptual approach

The key activities in this pattern ensure that:

- systems can identify the information available to be accessed (based on relevant policy rules)
- systems identify relevant information to retrieve (either based on automated workflow needs or via user choice)
- relevant information is retrieved.

Figure 4 expands on these activities. Like Figure 3, it is not intended to show an accurate technical approach (which will be developed during a detailed design phase, aligned with the Health Connect Australia Roadmap priorities). Instead, it shows the conceptual relationship between the services.

Figure 4: Key activities in the discovered information exchange pattern



Directed information exchange

The directed information exchange pattern facilitates sharing of health information with a predetermined recipient who is expected to perform an action based on the information received. For example:

- A hospital shares a discharge summary or diagnostic outcomes with a GP who is expected to use this to inform the consumer's care.
- A requesting clinician sends an electronic request or referral to a fulfilling organisation (when an agreed fulfiller has been defined) that is expected to accept or decline the request.
- A consumer sends a request for an appointment to a healthcare provider who is expected to accept or decline the request.

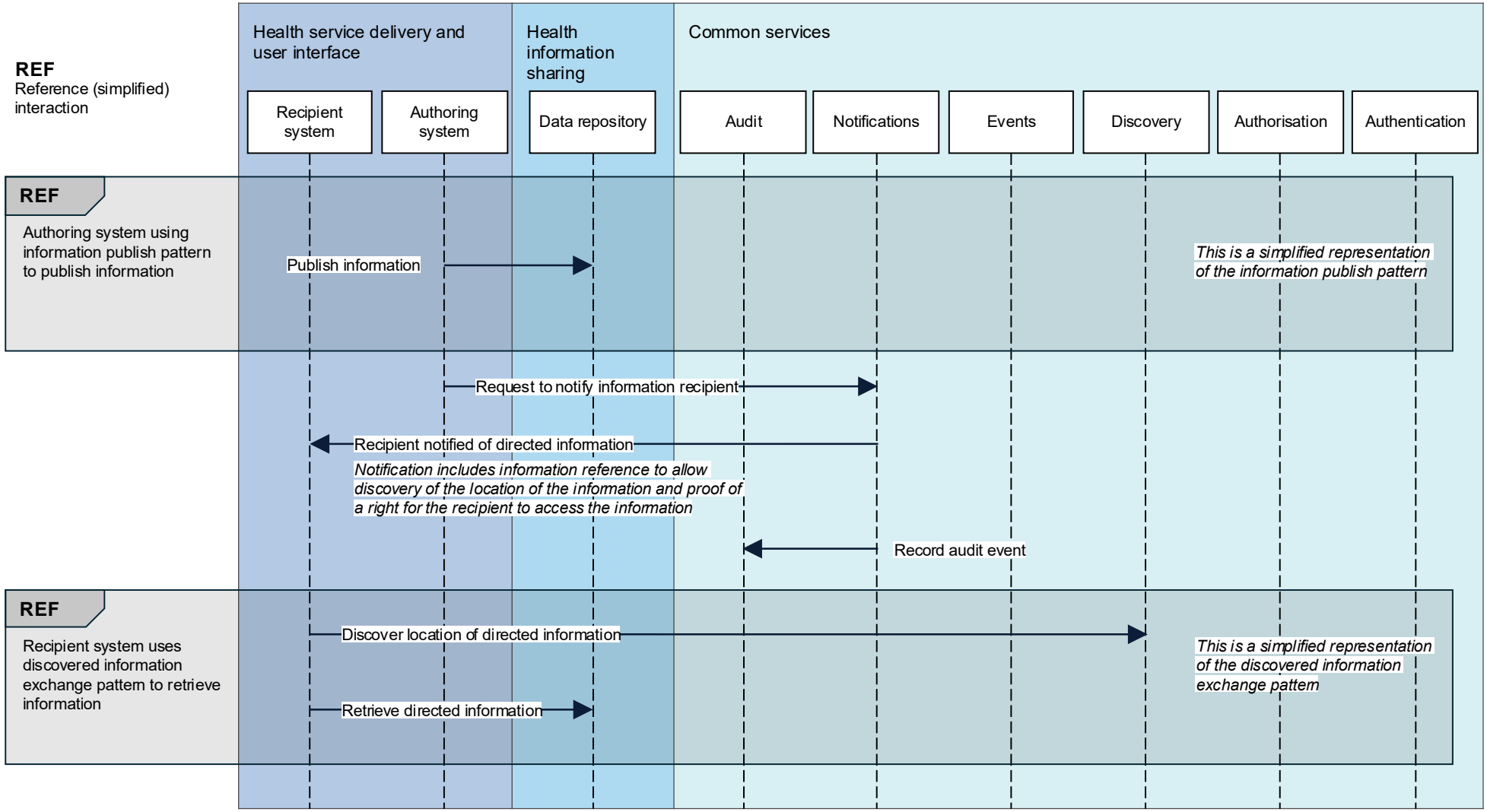
Conceptual approach

This pattern extends the information publish and discovered information exchange patterns by adding an intermediary step that notifies the intended recipient of the information. The notification includes a reference to the information that allows its location to be retrieved via the discovery service as part of the discovery pattern, and evidence that establishes the right of the recipient to access the information as part of the discovery pattern.

The discovery service is used to locate the information rather than the information, or location of the information, being included in the notification. This facilitates scenarios where information is moved between repositories or superseded using the information lifecycle management pattern.

Figure 5 expands on these activities. Like previous figures, it is not intended to show an accurate technical approach (which will be developed during a detailed design phase, aligned with the Health Connect Australia Roadmap priorities). Instead, it shows the conceptual relationship between the services.

Figure 5: Key activities in the directed information exchange pattern



Consumer-mediated exchange

Consumers are actively involved in the access and use of their health information. The consumer-mediated exchange pattern facilitates the sharing of information when the consumer can choose the recipient (and the coupled expectation that the recipient will perform an action based on the information received) or can confirm a pre-chosen recipient. This pattern will predominantly be used to allow consumers to:

- have flexibility in their choice of provider for actions such as requests or referrals
- direct specific information to their healthcare provider(s) of choice (such as letting a specialist know of previous diagnostic results).

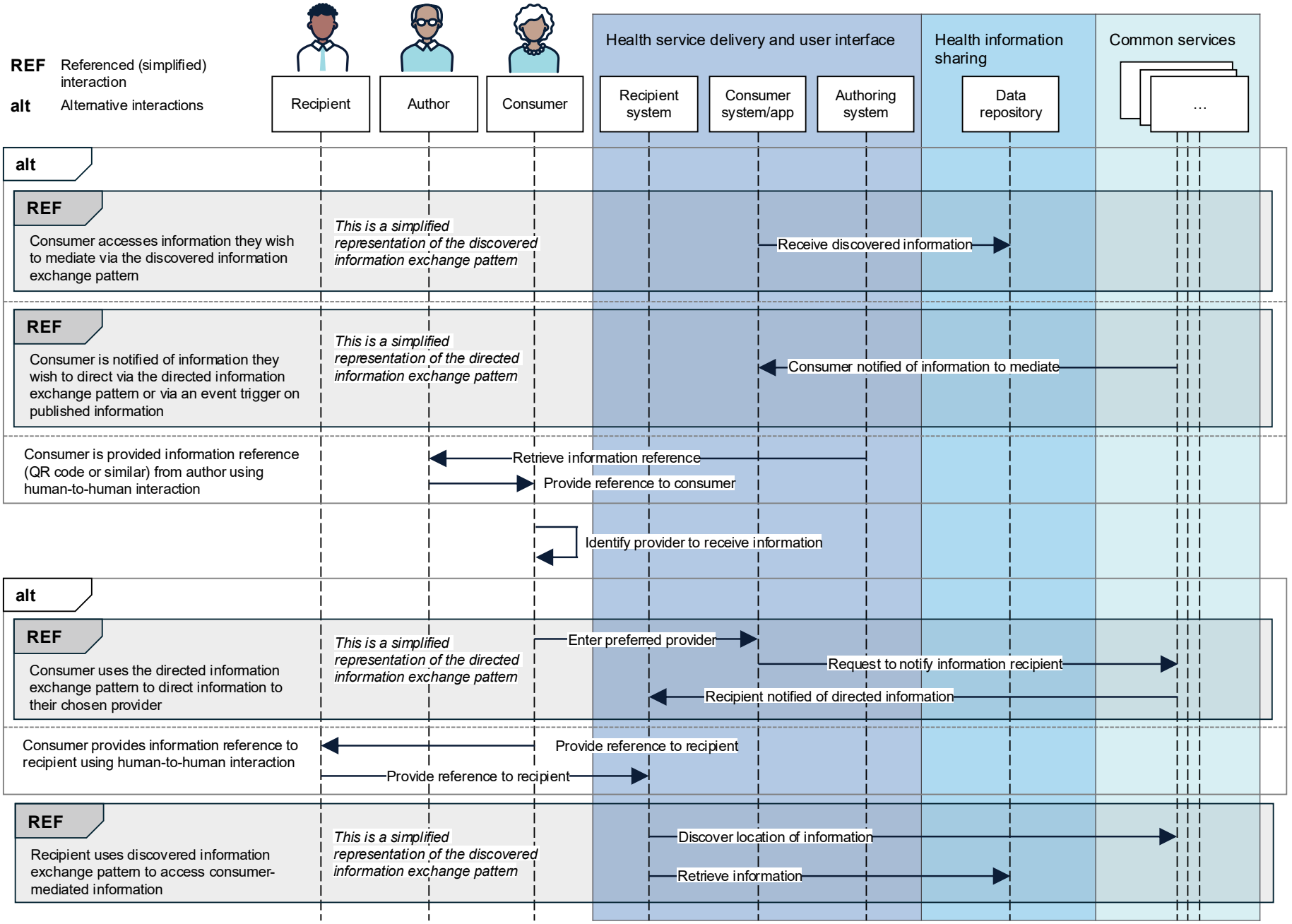
Conceptual approach

This pattern presents an alternative to the directed information exchange pattern, allowing a consumer (or their representative) to direct the information rather than the author of the information. The consumer:

- is provided with a reference to the data via the discovered information exchange pattern, the directed information exchange pattern or manually on paper
- invokes a second use of the directed information exchange pattern to facilitate electronic access to the data by the chosen recipient or uses human-to-human interaction (such as presenting a quick-response [QR] code or reading a reference number) to facilitate notification and access to the information.

Figure 6 expands on these activities. Like previous figures, it is not intended to show an accurate technical approach (which will be developed during a detailed design phase, aligned with the Health Connect Australia Roadmap priorities). Instead, it shows the conceptual relationship between the services.

Figure 6: Key activities in the consumer-mediated exchange pattern



Information lifecycle management

The information lifecycle management pattern allows lifecycle management of information published in the ecosystem, including the status of information. Lifecycle status may impact who can access information and what they can do with it. For example, this may include allowing a:

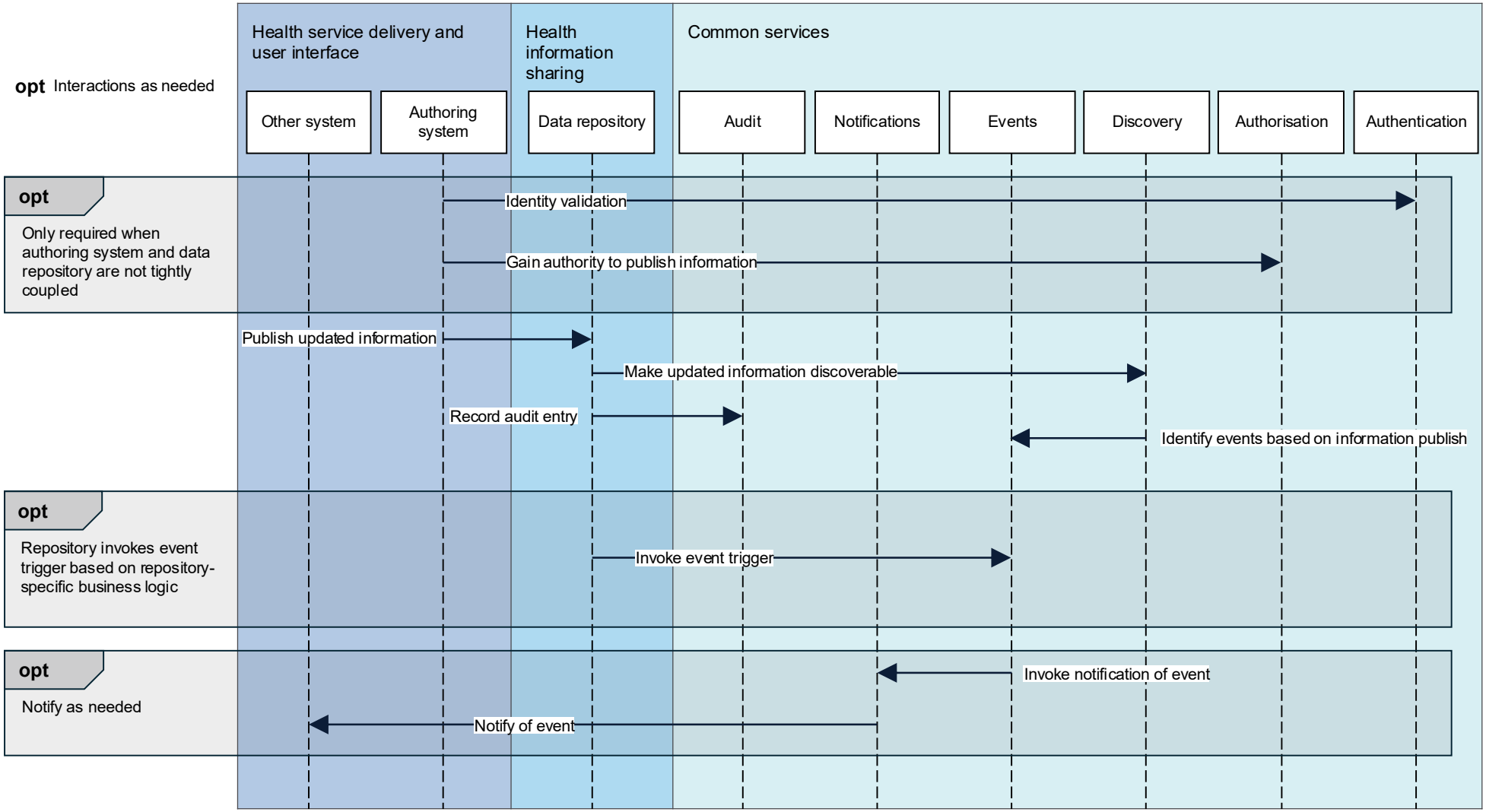
- junior medical officer to author health information that is then updated by a senior medical officer
- GP to update information that is incorrect
- diagnostic provider to update the status of electronic requests so that it is clear whether a request has been actioned.

Conceptual approach

This pattern is similar to the information publish pattern. However, rather than new information being published, existing information is updated. Information lifecycle considerations are key to this pattern, such as ensuring that updated or changed information is not lost.

Figure 7 expands on these activities. Like previous figures, it is not intended to show an accurate technical approach (which will be developed during detailed design phase, aligned with the Health Connect Australia Roadmap priorities). Instead, it shows the conceptual relationship between the services.

Figure 7: Key activities in the information lifecycle management pattern



My Health Record

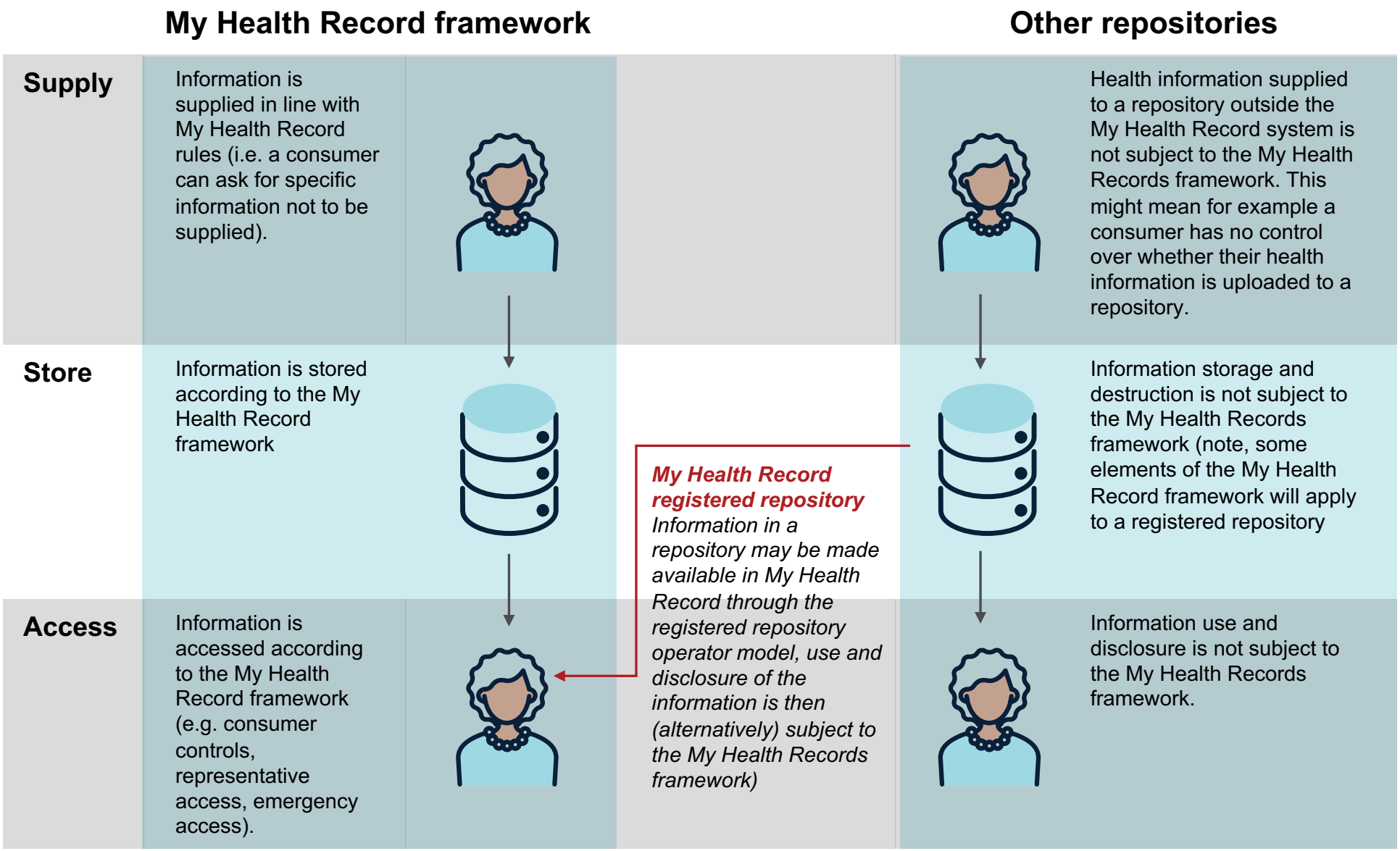
The *My Health Records Act 2012* is one of the key policy and legislative frameworks used to support HIE across Australia. This act provides a legislative basis for the right to share information across boundaries with some constraints and controls. Currently, the technical enablement of information sharing under the My Health Records Act is supported by dedicated technology investment (the My Health Record system), which:

- only functions to support information sharing under the My Health Records Act (that is, the investment cannot be reused for other purposes)
- uses a technology approach that is now more than 15 years old, which does not effectively enable some aspects of the legislation such as limiting the ability to use federated repositories (which is supported by the My Health Records Act).

Over time, it is expected that the common technology approach and services of Health Connect Australia will converge to support the sharing of information under the My Health Record legislative and policy framework. This means the My Health Record framework will be one of the different policy frameworks enabled using the common Health Connect Australia technology approach.

As described in Common technology approach, this will also simplify making more data available within My Health Record by leveraging the registered repository model supported under the My Health Records Act to expose data from federated repositories (such as EMRs or third-party repositories) as part of a consumer's My Health Record, rather than require that data to be uploaded to a central repository (Figure 8).

Figure 8: Use of the My Health Record registered repository operator model to expose information from federated repositories as part of a consumer's My Health Record



A standards-driven approach

Standard ways to capture, exchange and represent information will play a much greater role as single paths to exchange information are expanded to support more use cases. Stakeholders must be supported to work together to use common standards despite different practices and ways of working. It will be important to be able to understand where support is needed for different syntactic and semantic standards.

As far as possible, Health Connect Australia's technical interfaces and information payloads will be based on open and proven data and interoperability standards such as FHIR® and SNOMED CT®. National Digital Health Infrastructure, including My Health Record, will be modernised using FHIR standards. Future deployments of Health Connect Australia will also adopt FHIR as the preferred standard, unless an alternative is more appropriate based on the setting, use case, or specific requirements.

To support this, the Agency will develop, via community processes an AU Core Framework for Interoperability (AU CFI) that will include API specifications for the services that form part of the Health Connect Australia ecosystem that defines how requests and responses are structured and transmitted between systems. National Infrastructure, Vendors and Industry will need to use these elements of AU CFI to participate in the Health Connect Australia environment, including sharing content (such as AU Patient Summary) to MHR and more broadly to peers connected via Health Connect Australia.

The Sparked initiative, which is an HL7® Australia FHIR Accelerator already underway, accelerates the development of a core set of solution-agnostic FHIR standards for use in Australian settings – this includes implementation guides (IGs) that are expected to support a variety of information exchange scenarios and interoperability patterns.

Health Connect Australia (and MHR on FHIR) will leverage AU CFI (in definition of the services and how they interoperate) along with Sparked products to provide specific implementation guides to support a consistent approach to national interoperability.

Where the Agency develops new specifications for Health Connect Australia based on these standards, it will do so in consultation with the Australian implementer community.

Modular ICT systems and platforms

Health Connect Australia will be incrementally implemented with continual evolution of each component advanced as part of the Agency's enterprise architecture framework. As such, the ICT systems and platforms involved must be able to change and adapt over that time. Modular ICT systems and platforms are expected to follow the platform as a service model, with new application(s) deployed on top of the platform (if appropriate).

Information management and practices

Information management will be a shared responsibility of internal and external stakeholders, including healthcare providers themselves. Health Connect Australia must consider how it aligns with and supports different data policies, custodianship, data quality and data governance that underpin the data it supports.

Healthcare information and informatics

It is not enough for health information to be shared and accessible – it must also be high quality to achieve desired Health Connect Australia outcomes. The identification of information models, terminology and related standards – as well as how these are governed and maintained – will be critical to achieving overall success of the Health Connect Australia strategic goals and must be considered.

Advanced security and access controls

As the ecosystem continues to grow and evolve, security controls and capabilities will need to maintain alignment with evolving national and local policy and procedural requirements.

The current model of security necessitates adaptive and context-aware measures that respond to the dynamic nature of interactions among diverse stakeholder groups, including providers, consumers and caregivers. The increasing demand for information transparency among stakeholders requires security frameworks that enable both detailed access permissions and sophisticated control systems.

The ecosystem's security capabilities and control mechanisms must demonstrate measurable and clear compliance with the Australian Signals Directorate (ASD) Information Security Manual (ISM) and Essential Eight requirements. An evolving ecosystem and a rapidly changing threat environment will require a security posture that will both fulfill compliance requirements and defend against recognised cyber threats. Security controls require scalability and modularity along with forward compatibility to adapt to changes in threat vectors, technology stacks and regulatory requirements.

The security architecture requires development into a flexible framework that aligns with compliance standards and delivers context-specific intelligence to support diverse stakeholder needs while maintaining defensive capabilities aligned with ASD best practices and adapting to changing cybersecurity threats. This flexibility will also enable right-sizing of security controls applied in a federated environment.

Artificial intelligence

The Australian Digital Health Agency is committed to a healthier future through connected healthcare, leveraging AI and emerging technologies.

It is likely that artificial intelligence (AI) has the potential to enhance security and optimise real-time access to structured health data within Health Connect Australia. The Agency will continue collaborating with state and territory health departments to implement Health Connect Australia, guided by the strategic vision outlined in the Health Connect Australia Architecture and Roadmap, which sets a multi-year framework for nationwide digital health integration.

Implementation considerations

The Health Connect Australia architecture is not expected to be implemented as a single activity. Instead, it will be delivered incrementally (see Health Connect Australia Roadmap).

Delivery will need to balance the prioritisation of activities and consider:

- health system and government priorities
- feedback from consultation with key stakeholders
- alignment with Health Connect Australia interoperability patterns
- the level of foundational importance of the capability concerned
- the ability to deliver early value to stakeholders
- feasibility, including through technical and financial risk assessments.

The functionality of each of the capabilities in the Health Connect Australia layered architecture will be incrementally progressed to support the prioritised business themes and use cases as identified in the roadmap. For each prioritised use case, this will consider:

- identifying the required Health Connect Australia capabilities to support the use case, and if:
  - these capabilities are already delivered, and can be reused as is
  - additional functionality is required from these capabilities or if there is still a gap in them
  - the capabilities are still to be implemented
- identifying the systems that will perform the functions of each capability in the Health Connect Australia layered architecture for the use case, including considering use of a distributed or centralised model for storing data that underpins the use case
- identifying the appropriate standards for the information exchange needed to support the use case
- understanding the governance framework for the use case; for example, can existing frameworks be reused or extended, or are new policies required for data access, authentication and ethical usage to maintain trust and security?
- undertaking adoption activities to either integrate with existing systems or deploy new systems such as EMRs, laboratory systems, GP CISs and other healthcare applications
- deploying and testing, including conducting pilot programs, usability testing and validation to assess performance before full-scale implementation
- educating and training healthcare staff and administrators to maximise the platform's effectiveness
- monitoring and optimising by continuously tracking metrics, gathering feedback and refining the system to improve usability and efficiency.

Representative healthcare journey

The representative healthcare journey highlights how Health Connect Australia, as a HIE, enables seamless and secure data sharing to enhance patient care and system interoperability. By integrating real-time health information across providers, Health Connect Australia facilitates efficient clinical workflows, timely decision-making and improved patient outcomes. The journey exemplifies how digital transformation in healthcare supports coordinated care, minimises redundancies and empowers both patients and providers with accessible, accurate data. Below are the key components that underpin this connected ecosystem.

Figure 9 provides a representative future, Health Connect Australia–supported healthcare journey, illustrating the real-world impact of achieving Health Connect Australia's strategic goals.

Figure 10, Figure 11, Figure 12, Figure 13 and Figure 14 provide a high-level overview of the system interactions that support each of the activities in the representative future journey.

These figures are representative only and are not intended to constrain journeys or prescribe a specific journey for all scenarios.

Figure 9: Representative future-state healthcare journey

Trigger and transfer

Future state story

The consumer experiences a change in health, with a sudden onset of symptoms. They decide to call an ambulance immediately, and a paramedic is assigned to their call.

While travelling to the incident, the paramedic can access information on the patient's current conditions – medications, allergies, recent interactions with healthcare providers and any relevant contextual information using the patient's unique identifier – and arrives prepared with the information they need. The paramedic provides initial treatment to stabilise the patient and is able to share their full incident notes with the waiting ED clinicians.

Future state activities supported by Health Connect Australia

- A consumer experiences a health event, and an ambulance is called.
- HC The paramedic arrives with a full view of the patient's medical history.
- The paramedic administers initial treatment.
- HC The paramedic informs the hospital about the incoming patient and sends incident notes.

Acute care

Future state story

The patient is transferred to a health facility where they begin to receive treatment.

The paramedic provides the ED clinician with a verbal handover, which supplements the information the ED clinician already has. The ED clinician has all the information they need in order to provide the best treatment possible, which includes diagnostic imaging.

The GP receives the patient's diagnostic imaging results, admission and discharge summaries in near real time and therefore is ready to commence aftercare.

Future state activities supported by Health Connect Australia

- The patient is transferred to hospital.
- HC The ED clinician can access the patient's full medical history and the paramedic's incident notes in advance.
- The patient is triaged, has diagnostic imaging taken and receives treatment.
- HC The patient is discharged from the ED with a digital discharge summary and digital diagnostic imaging results, and their GP is notified about their hospital visit.

GP care

Future state story

The GP makes an appointment with the patient in order to continue their care. The GP already has access to the full diagnostic imaging results from their hospital admission, and orders some follow-up testing to help monitor their recovery.

The patient receives an eRequest which is sent to their phone, and they can also choose to receive a hard copy. The eRequest contains a recommendation for a provider, but informs the patient that they are able to attend a diagnostic imaging provider of their choice to fulfil the request. The patient agrees to use the GP-recommended provider.

Future state activities supported by Health Connect Australia

- HC The GP contacts the patient to arrange an appointment to discuss their recent ED visit and diagnostic imaging results.
- HC The GP makes an eRequest for follow-up diagnostic imaging testing as part of their care plan.
- HC The patient receives an eRequest with a provider recommendation, clearly stating that they can attend a provider of their choice.
- The patient agrees with the GP to use their recommended diagnostic imaging provider.

Diagnostic imaging

Future state story

The patient makes an appointment with the GP-recommended diagnostic imaging provider and shares the eRequest at the time of booking.

At the appointment, the diagnostic imaging provider retrieves the eRequest and runs the tests, uploads the results to the patient's My Health Record, notifies the patient that the results are ready, and shares the results with the GP directly.

The GP schedules a follow-up appointment with the patient to discuss the results.

Future state activities supported by Health Connect Australia

- HC The patient makes an appointment with the recommended diagnostic imaging provider and shares the eRequest. The eRequest is retrieved by the provider.
- The diagnostic imaging provider runs the tests and analyses.
- HC The patient and GP are notified about the test results being ready and accessible.
- HC The GP contacts the patient to discuss the results and recommends a specialist. The patient agrees with the recommended provider and the eReferral is sent directly to the specialist.

Specialist care

Future state story

The GP recommends the patient see a specialist as part of their care plan to help manage their condition and makes a referral to see a specialist that contains a specialist recommendation. The patient is informed that they can choose their own specialist; however, they agree to use the recommended provider. The patient receives an eReferral which is sent to their phone; they can also opt to receive a hard copy. The eReferral is sent directly to the specialist.

The specialist provides the patient with the care they need and shares all new information back to the care team and the patient.

Future state activities supported by Health Connect Australia

- HC The patient makes a specialist appointment with the recommended provider and adds the specialist to their care team, which gives them access to their information.
- HC The specialist looks up the patient's health information to provide care based on the full information available.
- HC The specialist updates the patient's care plan, which gets updated in the patient's health record.
- HC The GP can access any of the specialist's contributions to the patient's care plan.

Legend ED Emergency department GP General practitioner HC Activity enabled through Health Connect Australia

Figure 10: High-level overview of the system interactions that underpin the trigger and transfer representative future-state healthcare journey

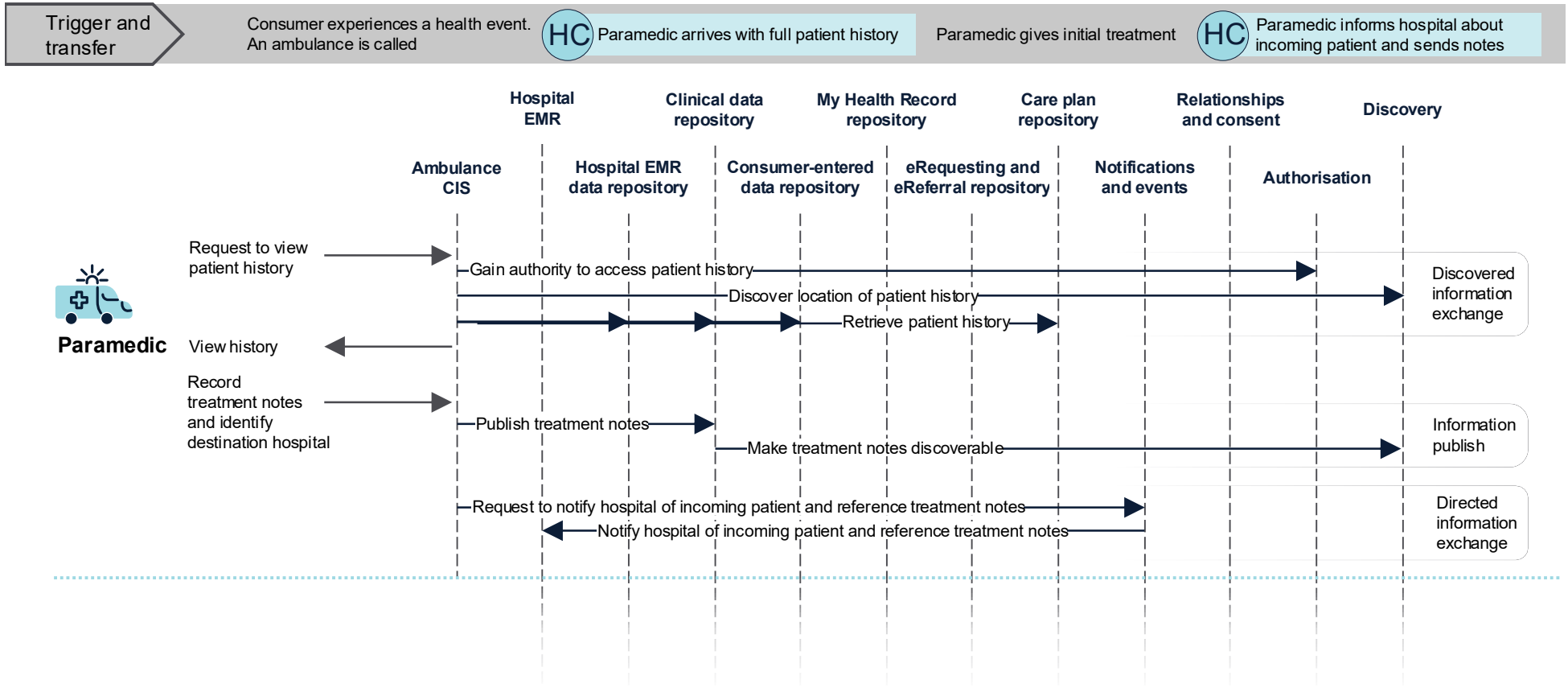


Figure 11: High-level overview of the system interactions that underpin the acute care representative future-state healthcare journey

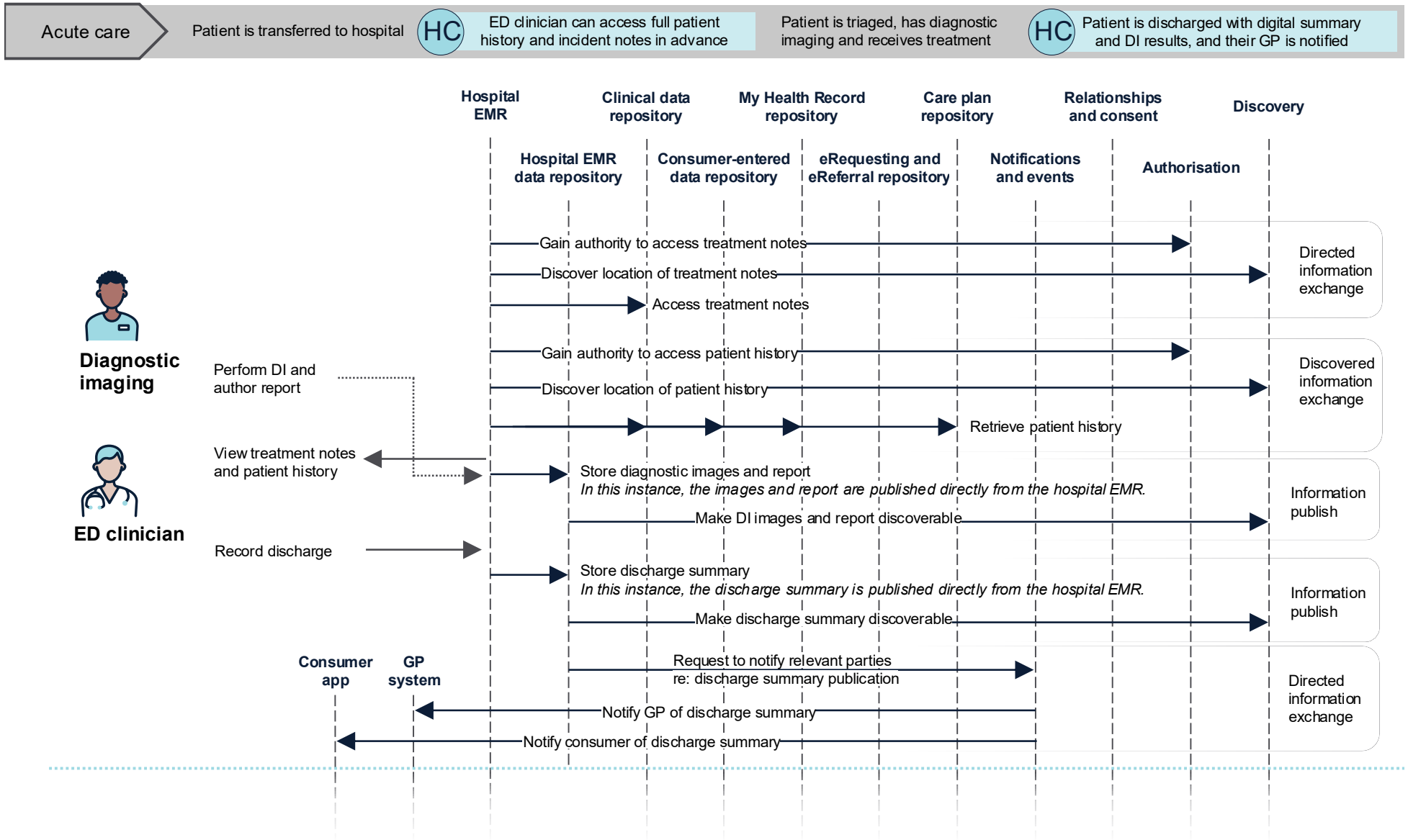


Figure 12: High-level overview of the system interactions that underpin the GP care representative future-state healthcare journey

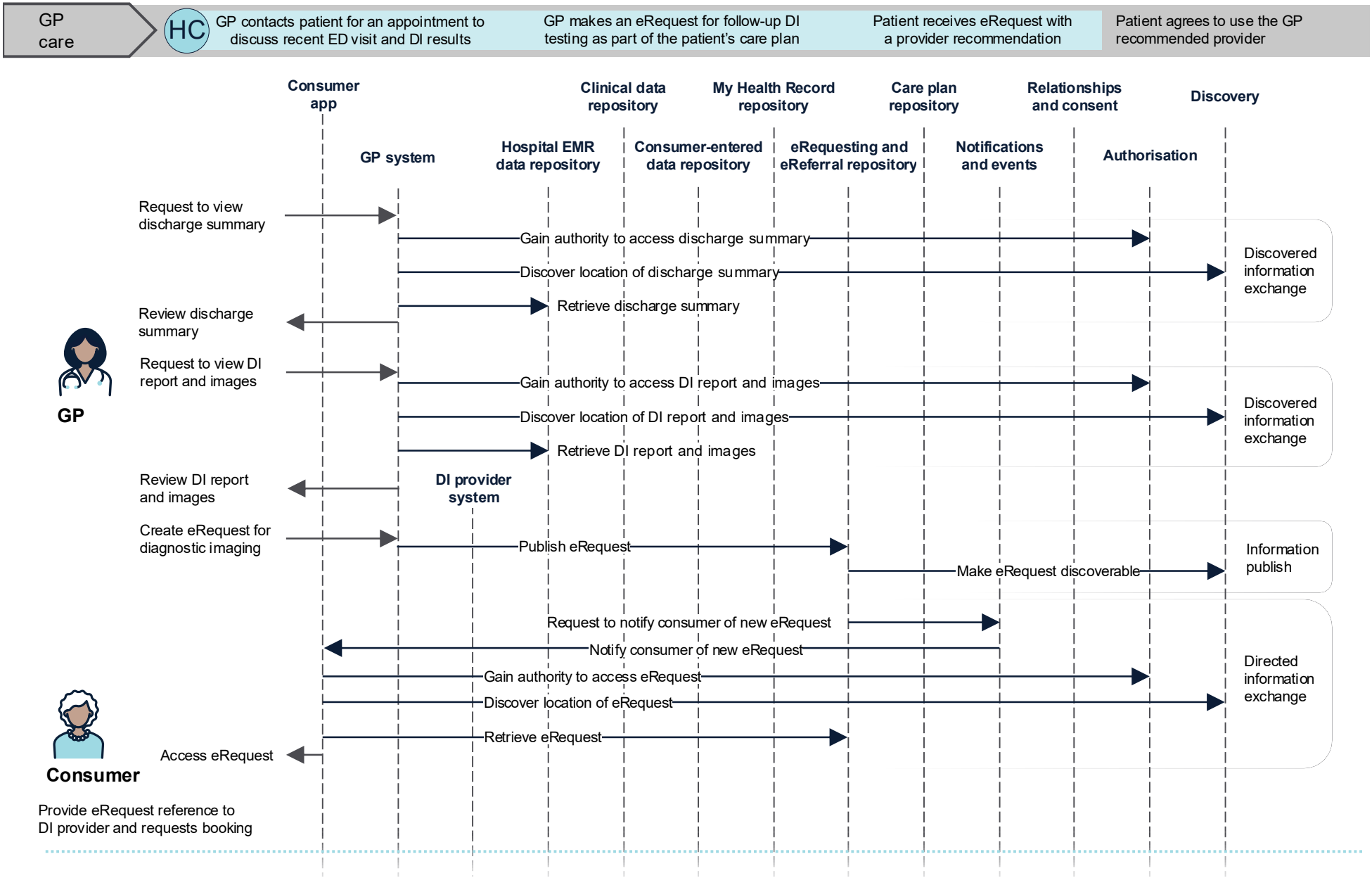


Figure 13: High-level overview of the system interactions that underpin the diagnostic imaging representative future-state healthcare journey

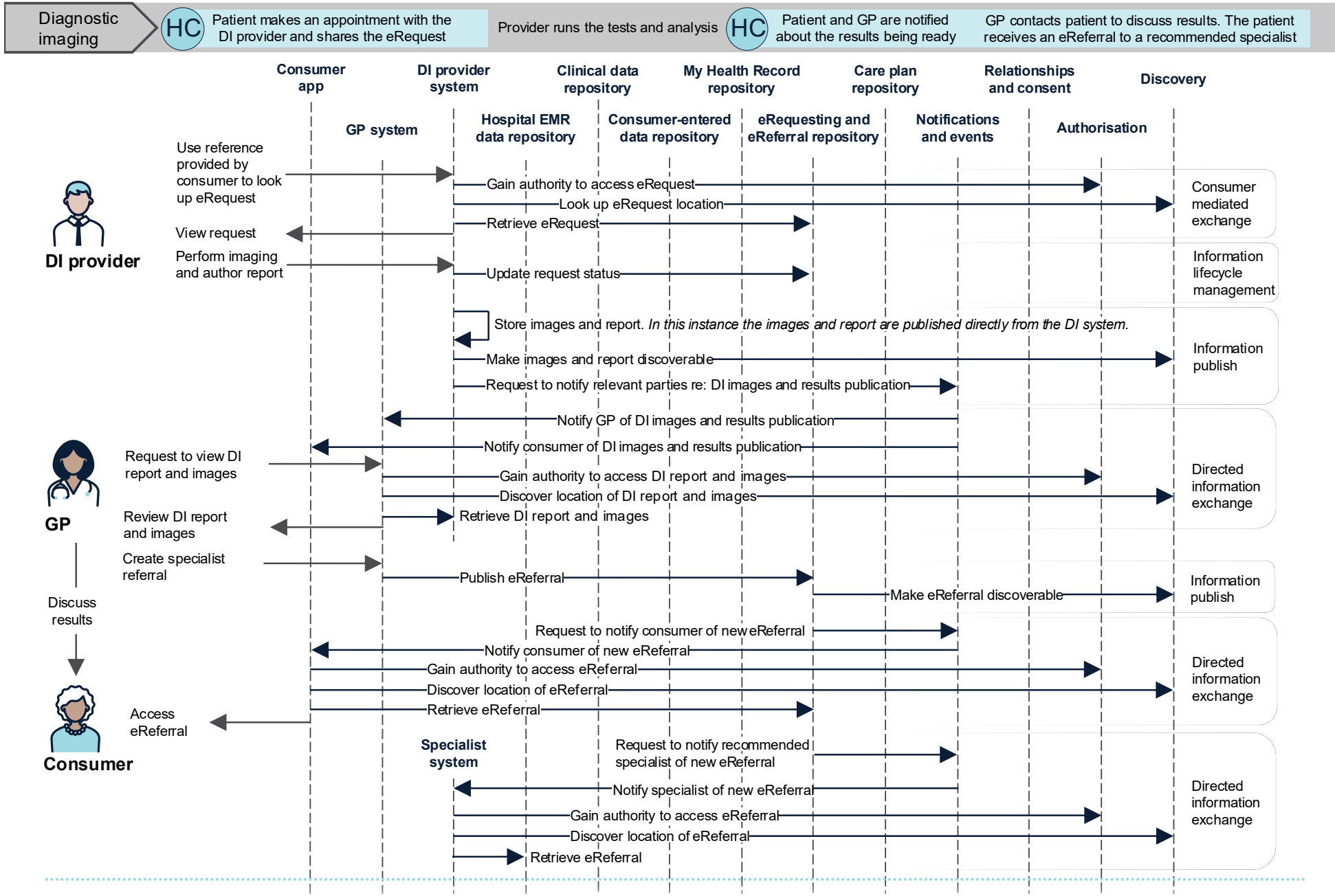
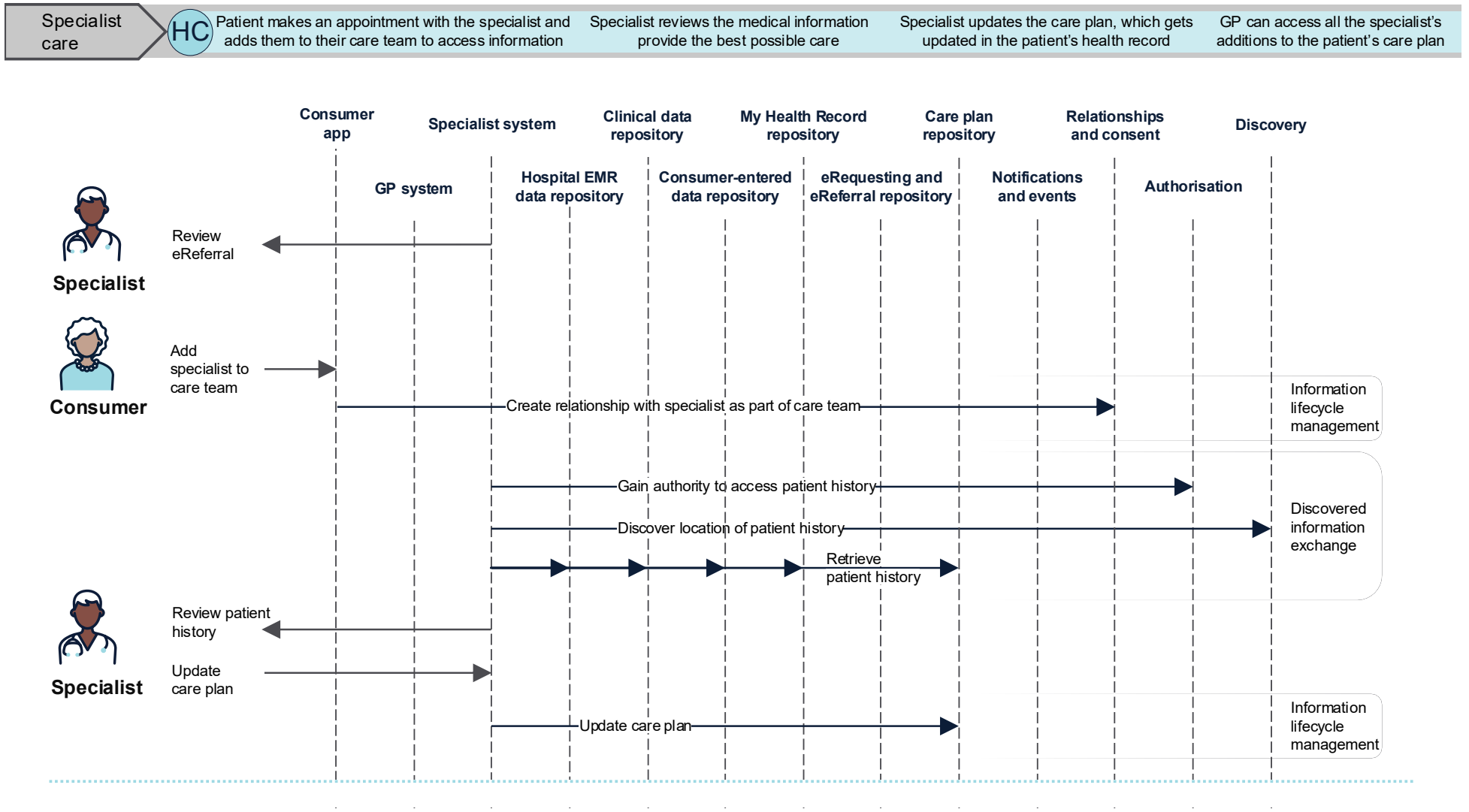


Figure 14: High-level overview of the system interactions that underpin the specialist care representative future-state healthcare journey



International HIE experience

The global experience with digital health systems and associated information is comparable to Australia's – information is often fragmented and siloed. Several countries, including China, Denmark, Estonia, India, Israel, the United Kingdom and the United States, see the potential benefits of national information exchange capabilities, leading to national and international efforts, which vary in scope, horizon and scale. No country has achieved a fully functioning national HIE. All approaches share common challenges in interoperability, connecting records, insufficient infrastructure, approaches to regulation and governance and management of interorganisational relationships.

Architectural strategies, oversight agencies and incentives to foster exchange have led to different approaches to ensuring the availability of health information across national and international borders. The potential of an HIE to address many cost and quality issues will ensure that HIE remains on the agendas of many countries.

Australia's digital health current state

Australia's digital health landscape is evolving with a strong focus on connectivity, accessibility and data-driven healthcare. Substantial investments in digital solutions have improved the digital health environment, digital capabilities and interoperability within the scope of a targeted problem, use case or geographic or organisational boundary; however, without a holistic ecosystem-wide approach, challenges remain at a national level such as:

- duplicated approaches to sharing the same information for different uses
- clinical systems having numerous connections to other systems that have a variety of interface styles (some more complex than others) and authentication credentials to facilitate information sharing
- technical complexity, which creates an administrative and financial burden on healthcare organisations (for example, managing authentication credentials and contracts for a variety of third-party service providers) and is a barrier to the supply and sharing of data
- My Health Record – a key part of the digital health ecosystem – only facilitating access to a limited subset of health information, meaning that:
  - the national provider and consumer portals, which connect to the My Health Record system, can only view data stored in My Health Record
  - clinical information systems rely on multiple additional connections outside of My Health Record or are limited in the information they can access on behalf of providers
- multiple silos of information that are only accessible outside My Health Record or are not easily accessible at all.

An overview of some of the key systems that form part of the current state landscape is provided below.

My Health Record

My Health Record (formerly the Personally Controlled Electronic Health Record) was implemented in 2012 and aimed to address gaps in information availability and sharing across the healthcare ecosystem, using the standards and technologies available at the time. Since then, the Agency has undertaken several projects[1] that aimed to identify ways to progressively address gaps resulting from limitations in the My Health Record technology.

1 Such projects include National Digital Health Infrastructure Modernisation, Transitions of Care and Health Information Exchange, Modernisation of Diagnostic Imaging and Primary to Acute Care.

The Agency plays a significant role in providing platforms and services that support My Health Record and the Healthcare Identifiers Service. My Health Record has had significant success in meeting its stated objectives. As of December 2023:[2]

- more than 23.8 million Australians had registered for My Health Record and nearly 98% of these records contained clinical information
- 99% of eligible general practices and pharmacies and 97% of public hospitals had registered to participate in My Health Record.

Clinical information is now being shared more often because of the increased number of My Health Record connections. My Health Record now contains 30.4 million pathology reports and more than 1 million discharge summaries.[3]

As a result, health professionals now use My Health Record more often. Cross-healthcare organisational views (that is, one healthcare organisation looking at information about a consumer uploaded by a different organisation) increased by 102% from December 2022 to December 2023. However, for a variety of reasons, only some of the information generated during episodes of care in the health system is uploaded to My Health Record.

There are several technical barriers to higher uptake of My Health Record:

- Constraints within the My Health Record policy framework limit the ability of My Health Record to support all use cases. When coupled with My Health Record's use of a different technology approach to other information sharing legislative and policy pathways, this prevents extension of My Health Record, as it currently works, to be an enabler for broader information exchange.
- Technology advancements in healthcare, interoperability and security, such as FHIR®, continue to evolve rapidly. New standards and protocols are emerging to better address needs and challenges in delivery. However, adoption of standards can be fragmented, making it challenging for systems that are delivered to target specific use cases, like My Health Record, to stay aligned with the latest standards adopted by other parts of the industry.
- Information exchange via My Health Record does not effectively support granular atomic datasets that are delivered during all healthcare treatment activities.
- Limited visualisation in the consumer portal and apps are deterrents to clinicians, consumers and carers adopting My Health Record in the clinical workflow.

My Health Record aims to facilitate interoperability by allowing healthcare providers to access consumer records from different healthcare settings and systems. However, interoperability challenges may arise due to differences in the health information formats, standards and systems used by healthcare organisations. My Health Record needs to evolve from a centralised document repository to a repository that facilitates (near) real-time HIE as part of the broader Health Connect Australia ecosystem.

2 Australian Digital Health Agency, Statistics, Australian Digital Health Agency website, 2025, accessed 15 May 2025.
3 Australian Digital Health Agency, Statistics.

HI Service

The *Healthcare Identifiers Act 2010* (Cth) establishes a national framework for assigning unique identifiers to consumers, healthcare providers and healthcare provider organisations. These identifiers are managed through the Healthcare Identifiers Service (HI Service), currently overseen by Services Australia. The HI Service has issued 3 main types of healthcare identifiers:

- Individual Healthcare Identifiers (IHI) – these identifiers are automatically assigned to individuals who are eligible for Medicare and receiving healthcare services in Australia. They are available on request to all other healthcare consumers. IHIs help to ensure accurate consumer identification across different healthcare settings, enabling better coordination and continuity of care. They are used to identify an individual consumer for healthcare purposes.
- Healthcare Provider Identifier – Individual (HPI-I) – these are used to identify individual healthcare providers, including general practitioners and other specialists, allied health professionals, nurse practitioners, nurses, midwives, dentists and pharmacists. These identifiers are automatically assigned to an individual provider when they register with the Australian Health Practitioner Regulation Agency (Ahpra) and are available on application to members of a professional association with certain characteristics.
- Healthcare Provider Identifier – Organisation (HPI-O) – these are assigned to organisations involved in delivering healthcare services, such as hospitals, general practices and clinics. These identifiers help to identify healthcare provider organisations and support activities like electronic health records management, billing and administrative functions.
- By assigning and maintaining these unique identifiers, the HI Service aims to improve the accuracy, efficiency and security of HIE across the Australian healthcare system. A standardised approach to identification contributes to improved consumer safety, quality of care and healthcare outcomes.

Provider Connect Australia™

Provider Connect Australia™, operated by the Agency, serves as a vital link between healthcare provider organisations and the rest of the healthcare ecosystem by managing business and service information in one place and distributing that information to where it is needed. The service aims to alleviate the burden on healthcare provider organisations by significantly reducing the time spent on manual updates of administrative information and minimising errors. Provider Connect Australia plays a crucial role in improving efficiency within the healthcare system by facilitating seamless communication and information exchange between healthcare providers, communication providers, professional bodies, and service directories. By automating and standardising the update process, Provider Connect Australia helps ensure that provider information remains accurate and up to date, improving the quality of care delivered to consumers.

Overall, Provider Connect Australia™ serves as a valuable tool for healthcare providers, enabling them to focus more on patient care while ensuring that administrative tasks are managed efficiently and accurately.

Industry investment

The healthcare industry is advancing rapidly in developing solutions that enable HIE, improving data sharing across providers, systems and organisations. However, in the absence of a standardised common framework, these solutions often operate in isolation, creating fragmented data ecosystems. Without interoperability standards, patient information remains locked within individual platforms, limiting seamless data exchange and coordinated care. A unified framework – such as national interoperability guidelines, standardised APIs or governance policies – can bridge these gaps, ensuring that HIE solutions work cohesively to enhance patient outcomes, streamline workflows and support data-driven decision-making. Establishing this foundation is crucial for achieving a truly connected healthcare system.

Acronyms

Acronym	Description
Agency, the	Australian Digital Health Agency
API	Application Programming Interface
CIS	Clinical Information System
EMR	Electronic Medical Record
FHIR®	Fast Health Interoperability Resources®
GP	General Practitioner
HIE	Health Information Exchange
ICT	Information And Communication Technology

Glossary

Term	Meaning
application programming interface (API)	A particular set of rules and specifications that software programs can follow to communicate with each other. It serves as an interface between different software programs and facilitates their interaction, similar to the way the user interface facilitates interaction between humans and computers.
Australian Immunisation Register	A national register that records vaccinations given to people of all ages in Australia.
Australian Core Framework for Interoperability (AU-CFI)	The Agency has launched the Australian Core Framework for Interoperability (AU CFI), which is an agency led initiative in response to the need to maximize the use of common interoperability patterns, standards profiles, platforms, infrastructure, and processes, when delivering digital health solutions. It will develop, via community processes, a set of API specifications, frameworks and architectural artefacts that can guide and constrain products and solutions and defines how requests and responses are structured and transmitted between systems that deliver interoperability at a national level.
clinical information system (CIS)	A system that deals with the collection, storage, retrieval, communication and optimal use of health-related information and knowledge. A clinical information system may provide access to information contained in an electronic health record. It may also provide other functions such as workflow, order entry and results reporting.
consumer	Represents several roles including a healthcare recipient, carer, representative, significant other, care agency employee, parent and guardian.
diagnostic imaging	A medical specialty that employs X-rays and other modalities such as magnetic resonance imaging, ultrasound and nuclear medicine to contribute to identifying, diagnosing and investigating a medical condition.
diagnostic imaging report	A written communication between the radiologist interpreting the imaging study (e.g. X-ray or magnetic resonance imaging) and the clinician who requested the imaging. Diagnostic imaging reports can be uploaded to My Health Record via the Business to Business gateway.

Term	Meaning
discharge summary	A clinical report prepared by a health professional at the end of a hospital stay or series of treatments. A discharge summary is often the primary mode of communication between the hospital care team and aftercare providers. Discharge summaries can be uploaded to My Health Record via the Business to Business gateway.
electronic health record	A repository of personal health information in a computer-processable form. Its primary purpose is the support of continuing, efficient and quality healthcare.
electronic medical record	Sometimes used to distinguish detailed state-based and territory-based patient records from electronic health records in general, which in contrast are said to be summary-style records that cross the boundaries of state and territory and federal health systems.
enabler	Can be used to define any activity that improves the value stream in support of foreseeable business needs. Enablers are captured in backlogs as a type of epic, capability, feature or story. They are used primarily for exploration, architecture implementation, refactoring, building infrastructure and addressing compliance. They are written and prioritised according to the same rules as their corresponding epics, features, capabilities and stories.
eReferral	Supports the seamless exchange of significant consumer information from one treating healthcare provider to another via a national system of creating, storing and sharing referral reports.
Fast Health Interoperability Resources® (FHIR®)	An interoperability standard intended to facilitate the exchange of health information between healthcare providers, patients, caregivers, payers, researchers and anyone else involved in the healthcare ecosystem. It consists of 2 main parts – a content model in the form of resources and a specification for the exchange of these resources in the form of real-time RESTful interfaces, messaging and documents.
Healthcare Identifiers Service	A national system for uniquely identifying eligible healthcare providers and consumers (patients).

Term	Meaning
healthcare provider	A person who is involved in or associated with healthcare delivery. For the purposes of the My Health Record system, a healthcare provider is a person who has a Healthcare Provider Identifier – Individual and is authorised by a registered healthcare provider organisation to access the My Health Record system on their behalf.
health information	Includes health information for a consumer and the context in which that information was collected. Health information represents a broad range of health information, records and data, including: • notes about symptoms or diagnoses • information about a health service a consumer has had or will receive • specialist reports and test results • prescriptions and other pharmaceutical purchases • dental records • genetic information • consumer wishes about future health services • consumer wishes about potential organ donation • appointment and billing details • any other personal information about a consumer collected by a healthcare provider.
health interaction	Used to describe a point in time when health, care or system administrative information is exchanged. The health interactions concepts allow exchanges of small amounts of clinical, wellbeing or administrative information in near real time rather than waiting on the completion of an entire document.
Health Level Seven (HL7)	A non-profit organisation involved in developing international standards for healthcare informatics interoperability.
jurisdiction	An Australian state or territory government health department.
My Health Record	Australia's secure national digital health record system. It is an online summary of a consumer's health information and can include details such as medical conditions and treatments, medicine details, allergies and test or scan results. It contains health information added by the patient, their healthcare providers and Medicare.

Term	Meaning
provider (individual and organisation)	A skilled person or organisation that provides health services using health information covered by the *Privacy Act 1988* (Cth). Health services may be a primary or auxiliary responsibility of the provider. Individual providers include: • GPs and other medical practitioners • blood or tissue banks • private hospitals or day procedure centres • private aged care or palliative care facilities • pathology or radiology services • assisted fertility clinics • dentists • pharmacists • allied health professionals • complementary medicine therapists • health services provided by the non-government sector (such as phone counselling services and drug and alcohol services) • disability service providers (if they handle health information) • online health services (such as those related to counselling, advice and medicines), telehealth businesses or health mail order businesses • gyms and weight loss clinics • private schools and childcare centres. Provider organisations of health services include: • diagnosing or treating illness or disability • assessing, maintaining or improving an individual's physical or psychological health • managing an individual's health • recording an individual's health to assess, maintain, improve or manage it • dispensing prescription drugs or medication. See also 'health information'.
requirement	A condition or capability needed by a stakeholder to solve a problem or achieve an objective or that must be met by a solution or solution component to satisfy a contract, standard, specification or other formally imposed obligation.

Term	Meaning
shared health information	Information that, under different governance schemes, is sharable between participants across the healthcare ecosystem when appropriate, for example, between consumer and provider, provider and provider, and consumer and consumer. Shared health information includes personal information, health service information, symptoms and diagnoses, specialist reports, test results, pharmaceutical purchases, dental records, genetic information, care plans, organ donation decisions, appointments and billing details.
use case	A high-level use case is a specific situation in which a product or service could potentially be used. A detailed use case is a description of how a user interacts with a system or product, including success scenarios, failure scenarios and any important variants or exceptions.
user journey	The experiences a person has when interacting with a system. User journeys are focused on the user and what they see and what they do. They describe, in a high level of detail, exactly what steps users take to complete a task in a system.

Resources

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