



**HealthConnect Systems Architecture Project  
Phase 2 – Systems Architecture Development**

**HealthConnect Architectural Principles**

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## HealthConnect Architecture Documents

Phase 1 of the Systems Architecture involved the definition of the requirement for the System Architecture project. This was then used in shaping the Systems Architecture Phase 2. The following listed documents form part of the reporting for this second phase of the HealthConnect Systems Architecture project and are available at [www.healthconnect.gov.au](http://www.healthconnect.gov.au).

If you click on the Systems Architecture link on that web page you will be able to obtain the listed documents.

The key Systems Architecture (Phase 2) documents comprise of:

HealthConnect Architecture Overview	Presents a high-level overview and conceptual model of HealthConnect.
HealthConnect Systems Architecture	Defines the HealthConnect Systems Architecture from the three design viewpoints of Data, Application and Technology. Provides an in-depth description of the HealthConnect Systems Architecture.
HealthConnect Implementation Strategy	Describes an implementation strategy for establishing HealthConnect as a national system of compatible health records systems.

Other System Architecture (Phase 2) documents, available at the above web address, are as follows:

HealthConnect Architectural Principles	Defines and describes the principles underpinning the architecture.
HealthConnect Financial Business Model	Describes options for the HealthConnect financial business model and how the business model might operate. It also explores questions like who might own the assets and data, funding sources for implementation and ongoing operations.
HealthConnect Business Architecture Models	Documents the business models derived from the Business Architecture (see above). The UML (Universal Modelling Language) models were prepared using Popkin's <i>System Architect</i> modelling tool. The document provides instruction on how to navigate the <i>System Architect</i> encyclopaedia (see below).
HealthConnect System Architecture Encyclopaedia	Web browser viewable set of the architectural models built using the Popkin <i>System Architect</i> tool.
HealthConnect Current Systems and Technology	Describes application systems and supporting technology currently in use in the health sector.
HealthConnect Standards Assessment	Reviews relevant standards that impact/enable HealthConnect.

Next Steps for the HealthConnect Systems Architecture. (This document)	Identifies the activities that are required to complete the development of the HealthConnect architecture to a level of detail sufficient to guide future implementation activities.
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The following documents available at the indicated web addresses are referenced in the draft Systems Architecture (Phase 2):

A Health Information Network for Australia	The report of the National Electronic Health Records Taskforce published in July 2000. The recommendations of the taskforce led to the initiation of the HealthConnect project. This document is available on the internet at: <a href="http://www.health.gov.au/healthonline/publications/publications.html#Pub00">http://www.health.gov.au/healthonline/publications/publications.html#Pub00</a>
HealthConnect Interim Research Report	The report comprises three volumes: Volume I, which provides an overarching view of the Project achievements and findings to date, and recommends a way forward for this important national project; and Volumes II and III which contain a number of research reports, case studies and evaluation reports as background materials.  <a href="http://www.healthconnect.gov.au">www.healthconnect.gov.au</a>
HealthConnect Business Architecture	Describes the business requirements for HealthConnect. It was the starting point for the development of the Systems Architecture. Version 1.0 is being published in the HealthConnect Interim Research Report, which is being released at the same time as the Systems Architecture. <a href="http://www.healthconnect.gov.au">www.healthconnect.gov.au</a>

## **PLEASE NOTE**

As well as being available on the web site [www.healthconnect.gov.au](http://www.healthconnect.gov.au) all the HealthConnect Architecture documents and HealthConnect Interim Research Report are available on CD.

Printed versions of the HealthConnect Interim Research Report and HealthConnect (Phase 2) draft Systems Architecture document are also available.

If you would like a CD or printed document please send your request to [healthconnect@health.gov.au](mailto:healthconnect@health.gov.au) or phone 02 6289 7716.

**Glossary of Terms**

<b>Term</b>	<b>Definition</b>
CIS	Clinical Information System
COE	Common Operating Environment
DSS	Decision Support System
EHR	Electronic Health Record
FEAF	Federal Enterprise Architecture Framework
GP	General Practitioner
IT	Information Technology
PAS	Patient Administration System

# 1. Introduction

## 1.1 Purpose of this Document

HealthConnect has adopted the Federal Enterprise Architecture Framework (FEAF) as the framework for developing the HealthConnect Systems Architecture. FEAF requires that architectural principles be developed to guide the architectural work.

This document defines the architectural principles relevant to HealthConnect. This principles document is intended to be succinct and capture significant guiding principles only. A few rigorous rules applied consistently are effective while a large number of principles are often rarely used or consulted. A large number of principles is also likely to result in inconsistencies across principles.

## 1.2 Document Structure

This document is structured into seven sections:

1. **Introduction**, which describes the purpose and structure of this document and its relationship to the other HealthConnect Systems Architecture documents.
2. **Background**, which defines the purpose and nature of architectural principles.
3. **Architectural principles**, which provide guidance on the objectives, establishment and maintenance of the architecture.
4. **Business principles**, which provide guidance on the scope, reach and intended use of the system.
5. **Data principles**, which provide guidance on how to manage data, ownership considerations, sharing of data, scalability, distribution and source of data.
6. **Application principles**, which provide guidance on application characteristics such as: re-use of functions, development approach and methods etc.
7. **Technology principles**, which provide guidance on technology aspects such as use of common infrastructure services, use of common components, standards, technology leverage, etc.

## 1.3 Relationship to Other Documents

The relationship of this document to the other HealthConnect Systems Architecture documents is shown in Figure 1-1.

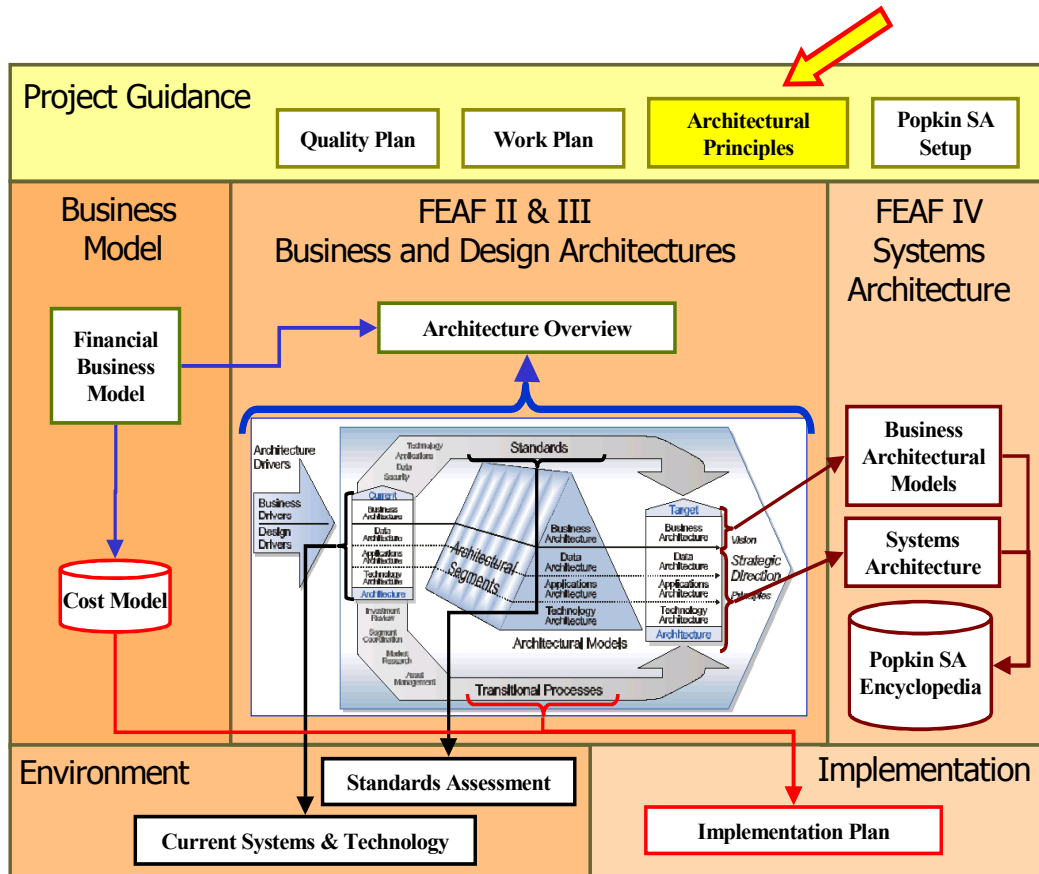


Figure 1-1 HealthConnect Systems Architecture Documentation

## 2. Background

### 2.1 Definition

The following definition of principles has been adapted from the FEAF definition:

Principles are statements that provide strategic direction to support the HealthConnect vision, guide design decisions, and provide a basis for dispersed, but integrated decision-making. Principles are fundamental and durable statements on the role, use or direction of IT in support of the business. Principles are developed for each area of the architecture to direct deployment of IT in support of the business. <sup>1</sup>

### 2.2 Good Architecture Principles

A good architecture principle<sup>2</sup>:

- has wide applicability across the enterprise,
- is durable,
- has relevance to the architecture under development,
- is not purely financial or subjective, and
- has objective reasons for its advancement.

### 2.3 Justification and Implications

In the tables of Section 3, the justification and the implication statements ensure that the principles are not subjective and provide a basis for the consideration of the significance and relevance of the principle. The justifications and the implications are essential elements of the principle as they capture the scope and the spirit of the principle. The justifications explain the reasons for establishing the principle and the implications provide the significance of the architecture principle.

### 2.4 Use and Application of Principles

Principles are the underlying general rules which hold true across the architecture. Architectural principles define the spirit of the architecture in that they are an attempt to capture the thinking behind it. Principles are best described in terms of the benefits that may be gained through their application:

- When an architecture is built upon a coherent set of architecture principles it has a *wholeness*, which it might otherwise not have.
- The architecture principles can be used to explain and justify why things are the way they are.
- The architecture principles facilitate change as the implications of the change are better understood.

Acceptance of these principles, and the “spirit” that they reflect, implies an acceptance of the implications that they bring. This means a commitment to the investment, activities, and way

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<sup>1</sup> Refer FEAF v1.1 Sept 1999 Appendix C-7

<sup>2</sup> NSW Health – Enterprise Architecture Project, Enterprise Architecture Principles Release1, 19 March 2002

of doing business that is necessary to make the vision into reality. It should be understood that no architecture principle works alone, rather the principles work together to define a belief system that drives behaviour and significantly influences decision making. The architecture principles will exert a strong influence on the shape of the architecture and its contents.

### 3. Architectural Principles

#### 3.1 Architecture Principles

The following principles have been adapted from “Federal Enterprise Architecture Framework Version 1.1”.

No	Principle	Justification	Implication
1	Utilise interoperability standards.	<ul style="list-style-type: none"> <li>Connectivity required between multiple processing environments and applications operating on a variety of technology platforms.</li> <li>Achieve data, applications and technology interoperability.</li> </ul>	<ul style="list-style-type: none"> <li>HealthConnect should adopt open systems.</li> <li>HealthConnect to engage in development of health data standards.</li> </ul>
2	Coordinate technology investments.	<ul style="list-style-type: none"> <li>Optimisation of expenditure.</li> <li>Investments made are consistent with the business need.</li> </ul>	<ul style="list-style-type: none"> <li>Need to ensure that investments align with the business need.</li> <li>Technology blueprint changed when compatibility with current infrastructure, improvement in operational efficiency or a required capability is demonstrated.</li> </ul>
3	Minimise the data collection burden.	<ul style="list-style-type: none"> <li>Ability to collect, manipulate and transmit accurate and consistent data quickly.</li> </ul>	<ul style="list-style-type: none"> <li>Data standardisation including common vocabulary and data definition.</li> <li>Data quality manager.</li> </ul>
4	Secure data against unauthorised access.	<ul style="list-style-type: none"> <li>Deter, detect and respond to unauthorised access to data and breaches of privacy.</li> </ul>	<ul style="list-style-type: none"> <li>Protect system from unauthorised access.</li> <li>Security measures in place.</li> <li>Contingency plans in place.</li> </ul>
5	Take advantage of standardisation based upon common functions and customers.	<ul style="list-style-type: none"> <li>Avoid duplication of effort and cost.</li> </ul>	<ul style="list-style-type: none"> <li>Design reusable components.</li> <li>Implement change in a timely manner.</li> </ul>

No	Principle	Justification	Implication
6	Provide efficient access to data.	<ul style="list-style-type: none"> <li>• Public should have access efficiently, effectively and economically.</li> <li>• Right information attainable at any place, any time and in the right format.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage a diversity of public and private access methods.</li> <li>• Access and display adaptable to wide range of users and access methods.</li> <li>• Separation of transactional from analytic data and data warehousing architecture.</li> </ul>
7	Select and implement proven market technologies.	<ul style="list-style-type: none"> <li>• Past experience with “bleeding edge technology” resulted in wasted time and effort.</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of proven market technology</li> <li>• Systems should be developed on global data classes and process boundaries.</li> <li>• Systems should be de-coupled to allow maximum flexibility.</li> </ul>
8	Conform to relevant legislation.	<ul style="list-style-type: none"> <li>• The need to act in a lawful manner by complying with relevant legislation.</li> </ul>	<ul style="list-style-type: none"> <li>• Consent processes must conform to privacy legislation.</li> <li>• Audit processes must conform to the Audit Acts.</li> <li>• Archive practices must conform to Archive Acts</li> </ul>

### 3.2 Architectural Practice Principles

The following principles have been extracted from “Practical Guide to FEAF, Appendix E: Sample Architecture Principles”.

No	Principle	Justification	Implication
9	Architectures must be appropriately scoped, planned and defined based upon intended use of the architecture.	<ul style="list-style-type: none"> <li>The architecture development effort needs direction and guidance to meet expectations for specific uses of the architecture end products.</li> <li>Detailed models may not be needed for high-level decision making; similarly, simple, descriptive architectures may not provide enough information to support engineering choices.</li> </ul>	<ul style="list-style-type: none"> <li>The architecture must be generated with a specific purpose and for a specific audience to ensure it meets the expectations of its intended stakeholders.</li> </ul>
10	Architectures Facilitate change.	<ul style="list-style-type: none"> <li>In the rapidly changing IT environment, organisations need tools to manage and control their business and technical growth and change. As the technical development life cycle shortens, with new technologies replacing older systems every 18 months, organisations require an overarching architecture to capture their systems design and operating environment.</li> </ul>	Systems developers and architects should ensure the coordination between technology investments and business practices.
11	Enterprise Architecture must reflect the enterprise’s strategic plan.	<ul style="list-style-type: none"> <li>The target architecture has maximum value when it is most closely aligned with the organisation’s strategic plan and other corporate-level direction, concepts, and planning.</li> </ul>	<ul style="list-style-type: none"> <li>The target architecture must be developed in concert with strategic planners as well as the operational staff. As the strategic plan changes, so do the future environment and the target architecture.</li> </ul>

No	Principle	Justification	Implication
12	Architectures continuously change and require transition.	<ul style="list-style-type: none"> <li>• The organisation is constantly evolving towards its future. As today's architecture transitions to the target architecture, the target becomes the organisation's baseline architecture at some point in the future.</li> <li>• The baseline architecture continuously moves and transitions toward the target architecture.</li> </ul>	<ul style="list-style-type: none"> <li>• The target architecture is a rolling set of products, continually portraying the out-year environment.</li> <li>• As a component of strategic planning and change management, the target architecture captures the future environment including data requirements and systems transitions.</li> <li>• The sequencing plan is the organisation's roadmap to systems migration.</li> </ul>
13	Target Architectures should project no more than 3 to 5 years into the future.	<ul style="list-style-type: none"> <li>• Technology life cycles currently are in the neighbourhood of 18 months, and new IT products appear on the market every 18 months. Federal acquisition practices are aligning to these rapid changes, which means that an organisation's future information needs and technical infrastructure requirements are changing just as rapidly.</li> <li>• No one can accurately predict what business practices will prevail 5 years into the future and what type of IT capabilities and resources will be available.</li> </ul>	<ul style="list-style-type: none"> <li>• Target architectures will need to be revised and updated regularly.</li> <li>• The sequencing plan, illustrating intermediate points in time, may become more valuable than the target architectures.</li> </ul>
14	Architectures provide standardised business processes and common operating environments.	<ul style="list-style-type: none"> <li>• Commonality improves interoperability, cost avoidance, and convergence.</li> </ul>	<ul style="list-style-type: none"> <li>• The systems architect and the chief architect must ensure the coordination between technology investments and business practices.</li> </ul>

No	Principle	Justification	Implication
15	Architecture products are only as good as the data collected from subject matter experts and domain owners.	<ul style="list-style-type: none"> <li>• The architect is not vested with the organisational information. It is incumbent upon the architect to collect the needed architectural information from the members of the organisation who possess the knowledge of the business processes and associated information.</li> <li>• These subject matter experts tend to be operational staff, field representatives, systems developers, software designers, etc. The domain owners are the responsible managers of specific business areas.</li> </ul>	<ul style="list-style-type: none"> <li>• The development of the architecture can be a slow process, dependent on the architect's access to subject matter experts and domain owners.</li> <li>• The validity of the architecture can be limited by the accuracy of the collected data.</li> <li>• Development of the architecture is an iterative process of data gathering and interviewing to obtain verification and validity checks of the architectural products.</li> </ul>
16	Architectures minimise the burden of data collection, streamline data storage and enhance data access.	<ul style="list-style-type: none"> <li>• Data, as a corporate asset, is key to an organisation's vision, mission, goals, and daily work routine.</li> <li>• The more efficiently an Agency gathers data, stores and retrieves that data, and uses the data, the more productive the Agency. Information is power.</li> </ul>	<ul style="list-style-type: none"> <li>• Business processes are best improved by streamlining the flow and use of data and information.</li> <li>• The development of semantic data models and class models will aid in the design of improved data management systems.</li> </ul>
17	Target architectures should be used to control growth of technical diversity.	<ul style="list-style-type: none"> <li>• The rapid adoption of new and innovative IT products can easily lead to introducing a diverse set of IT products that may not always be fully compatible within the existing enterprise infrastructure. This necessitates the selection and implementation of proven market technologies.</li> </ul>	<ul style="list-style-type: none"> <li>• The target architecture must be used in conjunction with the organisation's investment review process and technology insertion plans.</li> <li>• Relying on the architecture as an integral component of IT decision making helps control the introduction of incompatible products.</li> </ul>

## 4. Business Principles

The following principles have been derived from the “**HealthConnect Business Architecture V1.0**”.

No	Principle	Justification	Implication
1	HealthConnect shall be accessible to all health providers and consumers of health services within Australia.	<ul style="list-style-type: none"> <li>Equity of access for all Australians.</li> <li>Fundamental to being a national system.</li> </ul>	<ul style="list-style-type: none"> <li>Reliance on public communications infrastructure.</li> <li>Maintain a “whole of health” perspective.</li> <li>User interface shall support technology that is widely used, eg Internet and web browser technology.</li> <li>The array of participating provider types will evolve over time.</li> </ul>
2	HealthConnect shall build upon and interface with rather than replace end-user health information systems.	<ul style="list-style-type: none"> <li>Clinician systems shall continue to provide the clinical support functions including patient administration, care planning, decision support and analysis.</li> <li>Clinician systems shall continue to be the primary repository of detailed clinic data.</li> </ul>	<ul style="list-style-type: none"> <li>HealthConnect should be realised as a federation of systems that conform to a common set of policies, architecture and interface standards and specifications.</li> <li>Providers will likely access HealthConnect service through their IT systems user interface.</li> </ul>
3	HealthConnect shall have a minimal impact on the time require to complete clinical business processes.	<ul style="list-style-type: none"> <li>HealthConnect should not cause a significant increase in the time providers spend entering data.</li> <li>HealthConnect should enhance and not disrupt established clinical work practices and workflows.</li> </ul>	<ul style="list-style-type: none"> <li>HealthConnect performance must be consistent with user work practice requirements.</li> <li>HealthConnect availability and reliability must be consistent with user work practice requirements.</li> <li>Providers should not have to enter the data in twice.</li> </ul>
4	HealthConnect will only perform simple clinical decision-support and analysis functions.	<ul style="list-style-type: none"> <li>HealthConnect should not be liable for any diagnoses or treatment. This is the domain of the clinician.</li> <li>The clinician should remain responsible for interpretation of the clinical data.</li> </ul>	<ul style="list-style-type: none"> <li>HealthConnect shall primarily act as a repository and source of EHR.</li> <li>HealthConnect shall not normally interpret the meaning of the clinical data.</li> </ul>

## 5. Data Principles

The following principles have been derived from the “**HealthConnect Business Architecture V1.0**”.

No	Principle	Justification	Implication
1	The consumer shall determine who has access to their EHR data and the duration of that access.	<ul style="list-style-type: none"> <li>Compliance with Privacy Act.</li> <li>Improve consumer confidence and take-up.</li> <li>Enable the consumer to control access to their EHR.</li> </ul>	<ul style="list-style-type: none"> <li>Consumers will require the capacity to set, view and update their consent restrictions.</li> <li>HealthConnect shall maintain an audit trail of access to data.</li> <li>Consumers will require the capacity to view the audit trail to see who has accessed their data.</li> </ul>
2	The provider, with the consumer, shall determine what clinical data is recorded for each specific health event.	<ul style="list-style-type: none"> <li>Provider retains the clinical responsibility.</li> <li>Enables provider discretion to deal with specific consumer circumstances.</li> </ul>	<ul style="list-style-type: none"> <li>All data entry shall be optional.</li> <li>HealthConnect will not necessarily have the complete health history for a consumer.</li> </ul>
3	The content and formats of EHR data shall be able to evolve over time.	<ul style="list-style-type: none"> <li>System should be able to evolve in response to changes in clinical practices.</li> <li>Allows for the future extension of the EHR to include additional health services.</li> </ul>	<ul style="list-style-type: none"> <li>Data structures must be extensible</li> <li>System processes must accommodate data extensibility.</li> <li>Data structure evolution must be subject to a governance arrangement.</li> </ul>
4	The EHR data shall be preserved for the life of the consumer.	<ul style="list-style-type: none"> <li>System should always be able to retrieve a consumers’ health history.</li> <li>System should be able to recreate views in the format that was presented to a user at the time of access.</li> </ul>	<ul style="list-style-type: none"> <li>HealthConnect must ensure that a consumers EHR data is accessible during their lifetime.</li> <li>HealthConnect must maintain a record of each data access.</li> <li>HealthConnect cannot allow correction, modification or rejection of an EHR record once it has been accepted by the system.</li> </ul>

## 6. Application Principles

The following principles have been derived from the “**HealthConnect Business Architecture V1.0**”.

No	Principle	Justification	Implication
1	HealthConnect shall provide interfaces that allow third party systems to integrate with it.	<ul style="list-style-type: none"> <li>End-user systems can enhance the value of EHR to consumers and providers.</li> <li>Avoids the need for end users to access multiple systems.</li> </ul>	<ul style="list-style-type: none"> <li>Vendors will embed the common HealthConnect services into their products and provide additional valued added capabilities.</li> <li>HealthConnect application should include standards based interfaces for provider applications.</li> <li>The HealthConnect application interface specifications should be publicly available.</li> </ul>
2	Users shall initiate and control their interactions with HealthConnect.	<ul style="list-style-type: none"> <li>HealthConnect should be a user driven system.</li> </ul>	<ul style="list-style-type: none"> <li>Users must explicitly input information into HealthConnect and explicitly request information from HealthConnect.</li> <li>HealthConnect shall not implement automatic extraction of data from participating systems.</li> </ul>
3	Consumers should not be required to use multiple authentication mechanisms.	<ul style="list-style-type: none"> <li>Minimise the opportunity for loss of a “token”.</li> <li>Different organisations may standardise on different mechanisms burdening individuals with a range of mechanisms.</li> </ul>	<ul style="list-style-type: none"> <li>System to system authentication should be hidden from the end user.</li> <li>HealthConnect may need to support a range of authentication mechanisms.</li> </ul>

## 7. Technology Principles

The following principles have been derived from the “**HealthConnect Business Architecture V1.0**”.

No	Principle	Justification	Implication
1	HealthConnect shall adopt open standards in preference to proprietary standards.	<ul style="list-style-type: none"> <li>• Facilitate wide integration and interoperability.</li> <li>• Maximise choice of vendors and systems.</li> <li>• Facilitate the evolution of HealthConnect avoiding the restrictions of a proprietary solution.</li> <li>• Facilitate reuse.</li> <li>• Reduce lock-in and potential predatory pricing.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring and application of standards.</li> <li>• Encouragement of vendors to open systems.</li> <li>• HealthConnect must maintain and publish its architecture and interfaces.</li> <li>• Allows independence of component system infrastructures.</li> </ul>
2	HealthConnect shall not be prescriptive of the participating systems’ technology infrastructure.	<ul style="list-style-type: none"> <li>• HealthConnect defines a federation of systems. The internal infrastructure of each system should be capable of being changed independently.</li> <li>• Owners of systems should not be restricted in their choice of technologies.</li> </ul>	<ul style="list-style-type: none"> <li>• HealthConnect implementations should be designed to be platform independent to enable reuse.</li> </ul>