Enterprise Architecture Policy

Systems Integration Protocol

1. Purpose
This Protocol describes the mandatory steps for the use of integration technologies and standards to support decision making, ensuring trusted and accessible integration where and when needed, and using cost-effective and sustainable integration capabilities.

2. Scope
This Protocol applies to all employees, contractors and consultants within the Department of Health agencies, divisions and commercialised business units. The following items are within the scope of this document:

- functional integration, data integration and presentation integration
- integration of clinical and non-clinical applications
- integration of internal and external applications
- integration of Department of Health managed applications
- integration of Department of Health managed applications with any other applications including Hospital and Health Services (HHS) managed applications
- integration of applications with Department of Health managed enterprise services.

3. Supporting documents
Authorising Policy and Standard/s:

- Enterprise Architecture Policy
- Enterprise Architecture Framework Implementation Standard
- Enterprise Architecture Foundations Implementation Standard
- Enterprise Business Architecture Implementation Standard
- Enterprise Information Architecture Implementation Standard
- Enterprise Applications Architecture Implementation Standard
- Enterprise Technology Architecture Implementation Standard
- Information Security Protocol

Procedures, Guidelines and Protocols:

- ICT Cabling Protocol (under development)
- Identity Management and Demographics Protocol (under development)
4. Related documents
   • Queensland Government Enterprise Architecture Framework 2.0
   • Department of Health Information Security Policy

5. Approach
   The public healthcare sector requires an integration environment that allows information to be shared quickly and accurately system-wide and across organisational boundaries, in a secure fashion that satisfies privacy and patient information consent requirements.
   In particular, the integration environment must:
   • enable systems to access information that is integrated, accurate, timely, complete and relevant
   • enable information to be consolidated and shared from multiple source systems
   • enable the sharing of information and collaboration amongst a network of providers across organisational boundaries
   • support participation in national health initiatives
   • support a decentralised organisational delivery model
   • reduce cost of integrating applications
   • support reuse of integration services
   • support Enterprise Application Integration (EAI) for message based interfaces (such as HL7), and integrating legacy applications
   • support system enterprise services and standards based web service integration; and
   • support Service Oriented Architecture (SOA) design, build and delivery concepts.

Health Services Information Agency (HSIA) currently operates several integration technologies that support or partially support these capabilities. Some of these technologies are nearing end of life, and need to be replaced and rationalised.

6. Integration platform

6.1 Use the enterprise integration platform
   The Department of Health enterprise integration platform shall be used for integrating all Department of Health managed applications and services.
Implications

- The enterprise integration platform supports both clinical and non-clinical application integration.
- Point to point although discouraged may be unavoidable for legacy systems and short term data warehouse and business intelligence applications (see 7.1 Point to Point)
- The enterprise integration platform will be used to integrate all Department of Health managed applications, and to integrate Department of Health managed applications with any other applications including HHS managed applications. The enterprise integration platform may also be used for integrating local/HHS supported applications to other local/HHS supported applications.
- JCAPS is the current enterprise integration platform. As time and resources permit, existing e*Gate interfaces should be migrated to JCAPS. For example, if a significant change is being made to an existing e*Gate interface, the opportunity should be taken to migrate the interface to JCAPS.
- e*Gate will not be used for any new integration interfaces, except for Client Directory interfaces which will remain on e*Gate (since the current e*Index technology on which Client Directory is based is tightly coupled to e*Gate).

6.2 Manage the enterprise integration platform centrally

The enterprise integration platform shall be centrally managed as an enterprise-wide, shared capability.

Implication

- Integration technologies, the services or interfaces created and any supporting processes should be centrally managed.

6.3 Maintain quality of service to meet the most demanding integration needs

Application integration shall be driven by the quality of service and security requirements needed for effective exchange of information between systems.

Implication

- The integration platform should be able to meet the quality of service and security requirements of the most demanding systems using the platform.
- Projects need to ensure that non-functional requirements for integration are adequately defined.

6.4 Use the External Gateway for all external application integration

The existing external gateway system shall be used for handling all information exchanges and underpinning security policy and associated controls with external systems. Information exchanges in scope include all exchanges with partners and providers via messages, services and documents.

Implication

- The Department of Health Secure Information Transfer Service will be used.
7. Integration Approach

7.1 Avoid using point-to-point interfaces

The enterprise integration platform is the preferred means of enabling system integration. The use of point-to-point interfaces should be discouraged.

**Note:** Refer to *Department of Health Integration Patterns Procedure.*

**Implications**

- Projects will need to engage the integration support team (currently the HSIA Systems Integration Team) to assist in the design of appropriate interfaces.
- Queensland Health will reduce its reliance on point-to-point integration over time as investment priorities allow the replacement of legacy systems. Existing point-to-point interfaces will be replaced with appropriate enterprise integration in an opportunistic fashion. When interfaces are being modified, they should be converted to use preferred integration patterns. There will be cases where systematic replacement of point-to-point interfaces is required in order to prepare for replacement or upgrade of strategic applications.
- Point-to-point integration is likely to continue to be used in the short term for data warehouse and Business Intelligence extracts until an enterprise approach is defined for these areas. Point-to-point may be used for ‘one-off’ throw-away integration such as data conversion for system migration.
- Point-to-point integration may be used where it is consistent with industry best practice, or where vendor constraints make any other form of integration impractical. For example, there are a number of interfaces within Radiology where use of point-to-point integration may be valid, such as between RIS and PACS.
- Any use of point-to-point integration not covered above will require an architectural dispensation approval.

7.2 Use data integration for large scale data movement and data synchronisation

Use data integration for large scale data movement or synchronisation where appropriate, or where COTS package or legacy constraints prohibit functional integration.

**Implications**

- Data integration should not be used as an alternative to functional integration where applications could be integrated at the business logic layer using messaging or services. Solution architects and designers should determine whether there is an appropriate functional integration pattern before opting for data integration.
- Data integration is appropriate where large volumes of data have to be moved between systems (e.g. to populate analytical data stores). Data integration may be used in the data warehouse area for population of data warehouses and data marts.
- When designing common data services, consideration should be given to how applications which are unable to consume the common service will obtain access to the data. For example, iEMR is not designed with the ability to directly consume a provider
directory common service, but still requires access to provider information.

- The integration platform should be used to mediate where one system is capable of functional integration but the other can only integrate using data integration.

### 7.3 Separate integration logic from business logic

Separate the integration logic that performs connectivity, transformation and routing, from business logic.

#### Implications

- The integration platform should not contain business logic, and should not apply application specific rules such as error message transformation.
- Integration design should be carried out collaboratively by the owners of the business facing system and the integration designers.
- Integration logic should not include business rule processing – the business rules should be contained within the business logic components of the associated source and target systems, or within a separate business rules engine.
- The enterprise integration platform will be used to support messaging in multiple formats, and routing to and from multiple destinations. Instead of requiring applications to support complex logic to generate messages in multiple standards and versions, they should generate one version of the message and have the enterprise integration platform produce any messages required in alternative formats. Similarly, messages should be generated once by the host application, with the enterprise integration platform taking responsibility for routing copies of the message to all of those destinations requiring that data.

**Business logic** is the logic within an application that deals with the implementation of business policies, rules, practices and procedures for relevant business functions or processes.

### 7.4 Limit the sending of unsolicited information

The sending of unsolicited feeds of unfiltered or partially filtered messages from one system to another shall be limited.

#### Implications

- Sending unnecessary information is an overhead that consumes bandwidth and requires additional processing for the receiving application to filter out the unwanted information. This also carries the risk of breaching legislation applicable to the use and disclosure of patient information, including privacy of that patient information. This unfiltered message pattern should be discouraged.

**Note:** Refer to Department of Health Integration Patterns Procedure.

- The publish/subscribe pattern should be used to enable receiving applications to subscribe to information of interest. Filtering rules are implemented in the enterprise integration platform to limit what information is forwarded to a particular application.
- Where appropriate, use the request/response message pattern to retrieve the required information in real time i.e. ‘just in time’ integration. It is recognised that this pattern will have few deployments in the short term as most vendor applications do not support this
7.5 **Align integration interfaces with supported integration patterns**

Integration interfaces shall align with supported integration patterns.

**Implications**

- The HSIA Strategy and Architecture Office maintains and publishes a library of preferred integration patterns that describes the options available to designers.

  *Note: Refer to Department of Health Integration Patterns Procedure.*

- The designer should select an integration pattern that is in the best interest of Department of Health based on their assessment of clinical safety, reliability and responsiveness, and value for money.
- Should an integration pattern other than one of the supported patterns be preferred, the designer should seek a dispensation approval prior to making a decision.

7.6 **Limit validation performed in the integration layer**

Validation in the integration layer shall be performed only to the extent necessary to ensure the successful execution of integration operations.

**Implications**

- In general, responsibility for enforcement of data validation rules and checking conformance with the canonical information model should be implemented by the system producing the information.
- Where the integration platform is performing transformation, validation may be required in the integration layer to ensure the success of the transformation.
- The integration platform should perform validation such as checking that messages are well formed, conform to a particular schema, fields which drive content-based routing are valid, mandatory fields are present where these are necessary for transformation.
- Validation which requires an understanding of the application’s business rules shall not be performed in the integration layer, e.g. validation such as ‘field A can only be x if value of field B is in range y’ should not be performed.
- In the absence of appropriate validation at the business facing application, centralised data validation and message structure validation may be implemented in the integration layer (e.g. to correct systematic errors in input messages).

7.7 **Centralise translation logic**

Translation shall be centralised to increase the reusability of translation logic content in meeting different integration requirements.

**Implications**

- The integration environment should use an internal translation capability. This translation capability should be designed to facilitate replacement with a terminology service in future without significant rework and re-design being required.
- Integration translation should be coded within the enterprise integration platform. The translation logic should be isolated to make it platform agnostic.
8. Commercial off-the-shelf packages

8.1 Limit use of application's own integration engine to within its own suite

Application suites with their own ESB or integration engine may use that capability within their application components, but not as an alternative to the enterprise integration platform.

Implications

- It is becoming more common for third-party packages to include an ESB or integration engine. The package may use its own integration capability for interoperability amongst its own components. All interaction with Department of Health applications, Department of Health enterprise services and external services are via the Department of Health enterprise integration platform.
- A package may use its own integration capability to mediate between its own internal formats and Department of Health integration platform formats.
- The internal integration capability within the packages will not be used as an alternative to the Department of Health integration platform (i.e. don't use the package's integration tool to bypass the enterprise integration platform). For example the Cerner Interface Engine may communicate with the enterprise integration platform, but will not interface directly with Department of Health applications such as HBCIS, AUSLAB, EDIS etc.

9. ICT Systems Lifecycle

9.1 Document all interfaces in a central integration register

All interfaces to Department of Health managed applications shall be reported to Strategy and Architecture Office and documented in the central integration register.

Implication

- Projects need to ensure that all new interfaces created are documented in the central integration register as soon as they are implemented or amended.

10. Review

This Protocol is due for review on: 16 June 2016

Date of Last Review:  N/A

Supersedes: New

11. Business Area Contact

Director, Strategy and Architecture Office, Planning, Engagement and Performance Directorate, Health Services Information Agency (HSIA)

12. Definitions of terms used in this protocol

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>Source</th>
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<tbody>
<tr>
<td>Application Integration</td>
<td>Integration refers to the set of technologies and services that enable the exchange of information between systems and applications across the enterprise (or ‘system of systems’).</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Business Activity Monitoring (BAM)</td>
<td>Business Activity Monitoring refers to the real time monitoring, analysis, and presentation of SOA enabled business activities</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Term</td>
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<tr>
<td>Business Logic</td>
<td>The logic within an application that deals with the implementation of business policies, rules, practices and procedures for relevant business functions or processes.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Canonical Form</td>
<td>The data standards, structures, definitions and terminologies that are used within the integration environment.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Choreography</td>
<td>Choreography is concerned with asynchronous work flows usually involving interaction with external enterprises. Choreography defines the steps and conditions under which cooperating independent participants exchange messages in order to perform a task. Unlike orchestration, there is no central controlling service or ‘conductor’. The integration platform coordinates interaction with its immediate peers, but plays no part in coordinating interaction between other systems involved in the process.</td>
<td>Department of Health Strategy and Architecture Office</td>
</tr>
<tr>
<td>Data Integration</td>
<td>Used when applications need to share data from files or databases, as opposed to integration via the business logic layer. Data integration includes a number of mechanisms including Shared Database, File Transfer, Maintain Data Copies and Federation. This style of integration is widely applied in the Business Intelligence domain for population of analytical repositories such as data warehouses and data marts. There are also still many applications where File Transfer is used to move large volumes around. Data Integration is widely supported by vendors, non-invasive to the application, and can handle large volumes of data.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Digital Imaging and Communications in Medicine (DICOM)</td>
<td>Digital Imaging and Communications in Medicine is a standard for handling, storing, printing, and transmitting information in medical imaging. It includes a file format definition and a network communications protocol.</td>
<td><a href="http://www.dicom.nema.org">www.dicom.nema.org</a></td>
</tr>
<tr>
<td>Enterprise Application Integration (EAI)</td>
<td>Enterprise Application Integration is the sharing of information amongst applications or data sources connected to a central integration framework that facilitates exchange of data and messages. EAI technologies generally support a range of legacy integration capabilities.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Enterprise Integration Platform</td>
<td>The central integration capability (currently JCAPS and e*Gate) managed by the HSIA Systems Integration Team. In future this will be the new ESB/EAI platform.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Enterprise Service Bus (ESB)</td>
<td>Enterprise Service Bus is an application infrastructure component that enables integration using common business services that are made available across the system to consuming applications or business processes.</td>
<td>Department of Health Strategy and Architecture Office</td>
</tr>
<tr>
<td>Enterprise Services</td>
<td>Enterprise Services provide core business functionality that is common to multiple applications (e.g. Clinical Data Service, Provider Directory Service etc)</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>External Gateway</td>
<td>A software component that is used to control exchange of information (messages, documents, services) across the enterprise boundary. It is used to apply appropriate security controls and transform between external and internal formats. It can be thought of as an extension to the ESB for external integration.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Functional Integration</td>
<td>Used to integrate applications via the business logic layer by allowing the business functionality in one application to be accessed by other applications. Functional Integration can be done through a number of integration technologies such as Enterprise Service Bus (ESB) and Enterprise Application Integration (EAI).</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Information Model</td>
<td>The Department of Health information model refers to the collection of models, data set specifications (DSS) and standards that have been iteratively developed across the organisation. Key sources of data standards include the Queensland Health Data Dictionary and the Corporate Reference Data System. Within the department, the information model equates to an enterprise information model.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Integration logic</td>
<td>Integration logic is the logic that deals with connectivity, transformation, translation and routing of data from one application to another. This logic is ideally contained within the system integration platform.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Interface Contract</td>
<td>An interface contract specifies how the functionality of an application component can be accessed by other application components. The interface contract typically includes parameters, protocols, pre and post conditions and data formats.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>JCAPS</td>
<td>Java Composite Application Platform Suite</td>
<td>Department of Health Strategy and Architecture Office</td>
</tr>
<tr>
<td>Point-to-point</td>
<td>Point-to-point Integration is where one application shares information with another directly, through having knowledge of the location of the other system and the system specific aspects of its interfaces. This integration can be one way, two way and can occur in real time or in batch mode.</td>
<td>Department of Health Strategy and Architecture Office</td>
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<tr>
<td>Presentation Integration</td>
<td>Includes older technologies such as screen scraping, web page links and newer technologies such as Portal integration and Presentation Integration Servers.</td>
<td>Department of Health Strategy and Architecture Office</td>
</tr>
<tr>
<td>Service Orchestration</td>
<td>Service Orchestration is a technique of combining services into a new process service under the control of a controlling service or ‘conductor’. Service Orchestration is used within a Service Oriented Architecture context to orchestrate standards-based services, although it can also be used to orchestrate other reusable components into services.</td>
<td>Department of Health Strategy and Architecture Office</td>
</tr>
<tr>
<td>Service Oriented Architecture (SOA)</td>
<td>Service Oriented Architecture is a design approach that enables application functionality to be delivered as single software services and reused within those applications that would otherwise redundantly provision that functionality. The functionality is typically deployed as a collection of interoperable services that can be used within multiple separate systems from one or more business domains. Services are abstracted away from the implementation of any consuming application using standards-based interfaces. SOA is independent of specific technologies.</td>
<td>Department of Health Strategy and Architecture Office</td>
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</table>
### Translation logic

Translation logic is a subset of integration logic (refer to definition above) and deals specifically with the rules for mapping information presented using one set of terms to information using an alternative set of terms e.g. mapping ICD-10 (International Classification of Diseases) diagnosis terms to SNOMED-CT clinical terms.

**Source:** Department of Health Strategy and Architecture Office

### Web Service

A Web service is a standardised way of integrating Web-based applications using open standards (such as Extensible Markup Language [XML], Simple Object Access Protocol [SOAP], Web Service Definition Language [WSDL]) over an Internet protocol backbone. Web services are commonly used to implement SOA services (although SOA services can be implemented without web services).

**Source:** Department of Health Strategy and Architecture Office

## 13. Approval and Implementation

**Policy Custodian:**
Senior Director Strategy Governance and Architecture, Planning, Engagement and Performance Directorate, HSIA

**Responsible Executive Team Member:**
Chief Information Officer, HSIA

**Approving Officer:**
Ray Brown, Chief Information Officer, HSIA

**Approval date:** 16 June 2014

**Effective from:** 16 June 2014

## Version Control

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<th>Version</th>
<th>Date</th>
<th>Prepared by</th>
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<tbody>
<tr>
<td>1.0</td>
<td>30/05/2014</td>
<td>ICT Policy</td>
<td>Finalised for CIO approval</td>
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