

GEA White Paper

Information Architecture

Issue & Review

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Purpose

The purpose of this white paper is to describe the meaning and scope of information architecture as understood from the perspective of the Government Enterprise Architecture and provides a unification of the various concepts surrounding the information dimension of the government.

Target Audience

This document is provided for agency Chief Information Officers (CIOs), information standard or policy officers, records managers, library managers, ICT managers and ICT architects (enterprise, information, application, technology and solution).

Applicability

This document applies to the following segment(s) of the Queensland Government:

- All Agencies Listed Agencies Whole of Government
1. _____
 2. _____
 3. _____

Domains

This GEA white paper relates to the following classification framework domains:

Framework & version	Applicable Domains
Business portfolio framework 2.0	N/A
Application portfolio framework 2.0	N/A
Technology portfolio framework 2.0	N/A
Information portfolio framework 0.0	All

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Models and frameworks used in the development of this framework and its associated parts may have been modified during the development effort to suit the needs of the Queensland Government. No guarantees can be made that those models and frameworks continue to serve their original intent or that they can be interpreted in the same way as the original. Any issues connected with the operation or interpretation of the models or frameworks should be referred to the Queensland Government in the first instance.

Introduction

The Government Enterprise Architecture (GEA) contains four classification models or layers upon which the Enterprise Architecture (EA) representations are created. During the initial development of the GEA, the information portfolio framework was set aside to be completed at a later date. Consequently, GEA related activity, such as ICT Planning (including the ICT Planning Baseline) and whole of government technology positions have relied primarily on the application and technology portfolio frameworks.

The ongoing maturing of the GEA and associated planning processes within agencies requires the finalisation of the information portfolio framework. However, to complete the information portfolio framework the context and purpose of the information of the GEA need to be well understood by all stakeholders.

The Office of Government ICT (OGICT) has developed this white paper to outline and describe the Queensland Government perspective on information architecture and the role of the GEA's information portfolio framework within this area of EA practice.

Information Architecture

Definition of Information

A clear understanding of Information Architecture requires a clear definition of 'information' as a core concept. The Office of Government ICT has adopted the following definition drawn from the existing definitions of information currently in active use across the sector¹.

Information is any collection of data that is processed, analysed, interpreted, organised, classified or communicated in order to serve a useful purpose, present facts or represent knowledge in any medium or form. This includes presentation in electronic (digital), print, audio, video, image, graphical, cartographic, physical sample, textual or numerical form.

Definition 1: Information

Information as defined at this level is considered to be the universe of all potential information, not necessarily information that is required or valued by the Queensland Government.

Definition of Information Architecture

The information layer within the GEA defines what information needs to be made available to accomplish an agency's mission; with what, to whom, how, when, where and why. It contains all of the information models, frameworks and classifications in use at a whole of government level including but not limited to the information portfolio framework.

¹ Specifically formal definitions from Queensland Transport Enterprise Architecture Principles, NRMW Custodianship Policy (IMP/2006/2443) and IM Standards Definitions (IMP/2004/1487), Information Standards Glossary, Queensland State Archives Glossary of Archival & Recordkeeping Terms, and Information Queensland. In addition a review of the Australian Government Information Management Office's (AGIMO) Australian Government Information Interoperability Framework (IIF) was also conducted to ensure alignment with federal activity. This definition is also consistent with the Australian Business Excellence Framework (GB002-2004)

Information architecture is therefore the mechanism by which information needs are determined and appropriate models, frameworks and classifications established. Or more formally:

Information architecture is the means of providing a structured description of an enterprise's information, the relationship of this information to business requirements and processes, applications and technology, and the processes and rules which govern it.²

Definition 2: Information architecture

Figure 1 illustrates the conceptual scope of information architecture as defined within the Queensland Government.

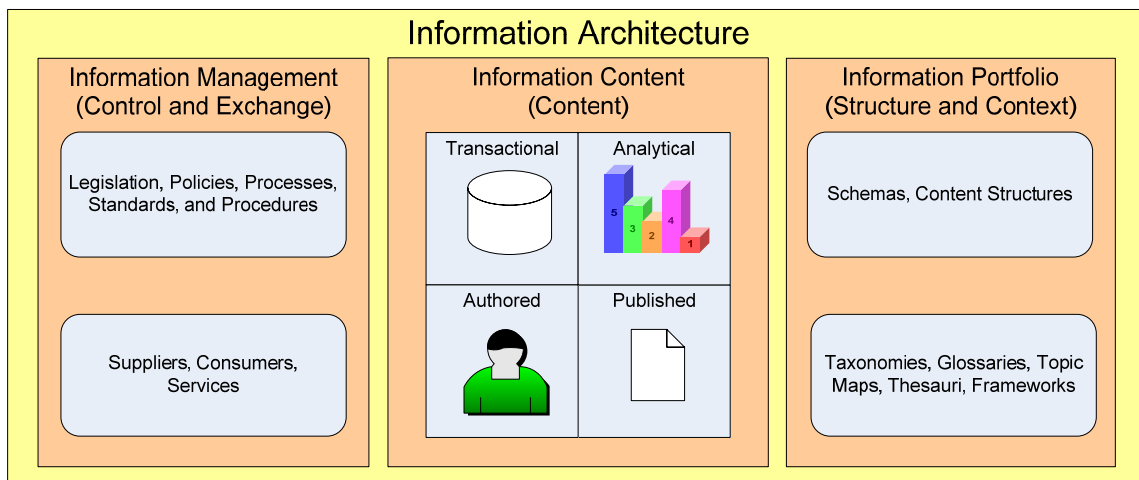


Figure 1: Conceptual scope of information architecture within the Queensland Government

Attempting to define information architecture is difficult, as the community of practitioners approach the problem from their particular perspective on information. This definition of information architecture is intentionally the broadest or enterprise level form of information architecture. It has been defined at this level in order to encompass all existing approaches across the spectrum from modern distributed content architecture practices for the web to the foundational ICT disciplines of data architecture as well as the early forms of traditional library sciences³.

Aspects of Information Architecture

² Definition modified from the original definition published by Queensland Government in the Government Information Architecture. Sources for this definition include; Forrester Research's definition of Information Architecture see September 9 2005 - Best Practices - "Simplifying Information Architecture" and November 11 2001 - Planning Assumption - "The Pillars of Enterprise Architecture Terminology"; Gartner's definition of Information Architecture see 5 September 2000 - "The Information Architecture Requirement Defined", 31 July 2002 - "Information Architecture for the Virtual Enterprise", 2 August 2005 - "Make a Compelling Case for Enterprise Information Architecture".

³ The phrase "information architecture" has its origins in the work of building architect Richard Wurman, when in 1976 he served as the chair of the national conference of the American Institute of Architects (AIA) and chose as "The Architecture of Information" as the conference theme. He later published his work through the 70s and 80s in the 1996 book entitled "Information Architects". Wurman provides us with the most definition of an information architect as: "1) the individual who organizes the patterns inherent in data, making the complex clear. 2) a person who creates the structure or map of information which allows others to find their personal paths to knowledge. 3) the emerging 21st century professional occupation addressing the needs of the age focused upon clarity, human understanding, and the science of the organization of information."

From the above definition the scope of information architecture within Queensland Government is considered to contain a number of aspects as follows:

- Information Management;
- Information Portfolio; and
- Information Content.

Each of these aspects is described in the sections below.

In addition to the broad aspects above the detailed language (nomenclature, semantics or terminology) surrounding information architecture within Queensland Government has been refined and harmonised across the various information based initiatives from the past, the present and the known future. This has resulted in the creation of the *Queensland Government Information Architecture Abstract Model* described in detail within the section titled "Information Architecture Abstract Model" below.

In the absence of a clear standard or appropriate domestic (at either state or federal government levels) the *Queensland Government Information Architecture Abstract Model* is based on the Data Reference Model (DRM) produced by the United States Federal Government Office of Management and Budget as part of their Federal Enterprise Architecture (FEA).

Information Management (Control and Exchange)

The Queensland Government Information Standards define information management as:

Information management is the means by which an organisation plans, collects, organises, governs, secures, uses, controls, disseminates, exchanges, maintains and disposes of its information; as well as any means through which the organisation ensures that the value of that information is identified and exploited to its fullest extent.

Definition 3: Information Management

Information management manifests as controls over government information sets in the form of statutes, policies, standards and procedures⁴. These controls are established at Commonwealth, Queensland Government and agency level and then implemented within individual agencies.

At the Queensland Government level primary controls applicable to all agencies include, but are not limited to:

- Copyright Act 1968 (Cth)
- Electronic Transactions (Qld) Act 2001
- Evidence Act (Qld) 1977
- Financial Administration and Audit Act (Qld) 1977
- Financial Management Standard (Qld) 1997
- Freedom of Information Act (Qld) 1992
- Queensland Government Information Standards
 - Information Security (IS18)
 - Retention and Disposal of Public Records (IS31)

⁴ It should be noted that within the GEA the term information management is defined as also including records management (administered by Queensland State Archives) as defined by the current information standards.

- Metadata (IS34)
- Recordkeeping (IS40)
- Managing Technology Dependant Records (IS41)
- Information Privacy (IS 42) *and* Information Privacy for the Queensland Department of Health No. 42A (IS42A)
- Libraries Act (Qld)1988
- Public Records Act (Qld) 2002
- Public Services Act (Qld) 1996
- Privacy Act (Cth) 1988

It should be noted that standards within the information management aspect of the information architecture apply not only to management processes, but also to the contextual and structural representations within the information portfolio.

Typically the drivers for information management include the ability to access information quickly and use it efficiently. In a government context a key dimension of information efficiency is the re-use and sharing of information sources. Therefore, information management controls play a pivotal role not only within an agency, but also in facilitating the provision of information services between suppliers and consumers of information.

Information Content (Content)

Understanding the information content available to government enables agencies to distinguish between information which needs to be managed and maintained within an information portfolio and the total “universe” of information to which all employees are exposed but which does not necessarily require managing. That is, not all information requires ongoing management and maintenance by government.

For instance, it is not considered government’s responsibility to put in place management or governance over a publicly available information accessed using a search engine (e.g. Google), even though such information may be used by government employees during their day to day activities. Nor is it always deemed necessary to manage a work of reference.

Information content therefore is defined as:

Information content is the subset of available information that has been identified as necessary to support, or of value in supporting, the requirements of government and requires ongoing management.

Definition 4: Information Content

Information content manifests as various types of information presented in many different forms, and managed using a variety of means. Ensuring a consistent approach to identification and management of information requires an agreed understanding of the types of content that is encountered within government. Despite the seeming variety, the information architecture provides for a high level classification using one of the following four content types⁵ define in Table 1 below:

Information content type	Resulting content and typical implementation
--------------------------	--

⁵ Based on the concepts of the Data Supplier-to-Consumer Matrix from the US Government FEAP DRM 2.0.

Transactional	Structured content that supports business processes and workflows and is implemented using structured databases, these are highly normalised and optimised for transactional performance.
Analytical	Structured content that supports queries and analysis and is implemented using structured databases, these are purposefully de-normalised and optimised for query ease and performance. Analytical content will contain aggregated or derived information.
Authored	Creation of unstructured content ⁶ in a wide variety of formats, such as multimedia, application system programs or text documents with embedded graphics. The term “authoring” is broad in scope. At one extreme, taking a photo with a digital camera may be “authoring”. At the other, authoring may involve a complex workflow for the production of a formal report. E-mail or other messages exchanged are considered to be authored content. These are implemented by specialised authoring systems whose underlying repositories may be of any of a variety of constructs to store data objects such as file systems, and relational databases.
Published	Unstructured content assembled from its component pieces, into a desired format and disseminated to a target audience and implemented using technologies that optimise discovery, search and retrieval. Traditionally, published content manifests as physical printed media catalogued by libraries using physical or electronic catalogues. However, more and more published content is being held electronically in repositories that include the file systems underlying websites, relational databases underlying content management systems, and XML registries.

Table 1: Description of information content types

The above information content types also form part of the *Queensland Government Information Architecture Abstract Model* (for more details see the section titled “Information Architecture Abstract Model” below) and are formally defined within the model.

Information Portfolio (Structure and Context)

The information portfolio is defined as:

The information portfolio is the collection of various contextual and structural representations used by an organisation to aid in effective and efficient creation, capture, storage, retrieval and disposal of information.

Definition 5: Information Portfolio

The information portfolio manifests as the data architecture including models of information, classification schemes, frameworks and inventories of information assets. As with information management some of these are used at the whole-of-government level, such as

⁶ Unstructured content is defined within the Queensland Government Information Architecture Abstract Model (see the section titled Information Architecture Abstract Model for further details). However, it should be noted that unstructured content can include semi-structured concepts. Unstructured content accompanied by meta-data or classifications is still considered to be unstructured, as the primary knowledge is derived by from unstructured content – not its accompanying structured content.

the GEA's own Information Portfolio Framework or the QKey⁷. While others are agency specific, such as the Queensland Transport Contextual Model or the Natural Resources, Mines and Water's use of the ISO 19115 topic categories mapped to data themes.

Ultimately all of these schemes provide different, but fit for purpose⁸, perspectives on the same information assets within government as illustrated in Figure 2 below:

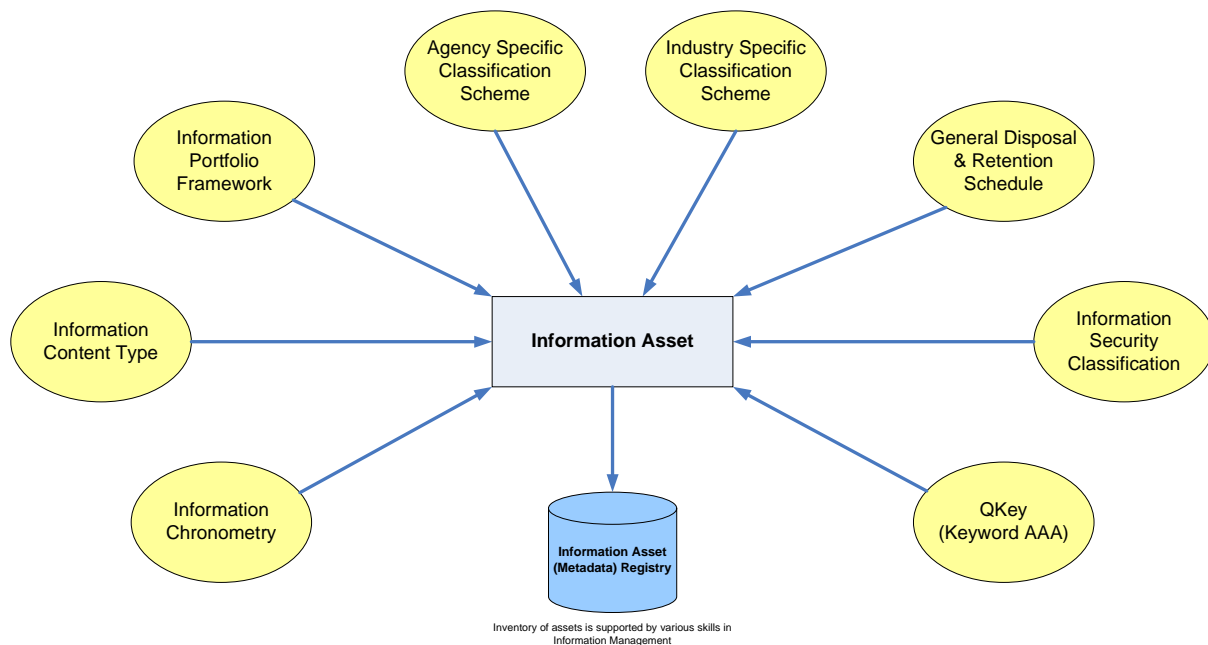


Figure 2: Multiple perspectives on a single information asset

Information Architecture Abstract Model

The need for a reference model

The establishment of the *Queensland Government Information Architecture Abstract Model* is an attempt to harmonise the varying language (nomenclature, semantics or terminology) surrounding information architecture across the sector. This varying language has grown up over time as a result of the various, but otherwise complementary, perspectives on information architecture at both an agency and whole of government level.

To that end the purpose of the model is to:

- establish a common language for information related initiatives and activities across government and within agencies;
- enable cross-agency agreements around information management, data architecture and information sharing; and

⁷ Specifically the Queensland Government's modified version of the Keyword AAA: A thesaurus of common administrative terms as recommended by Queensland State Archives.

⁸ A critical element that must be understood is that the information assets of an agency will not be exposed to merely one single information portfolio perspective. Classification schemes must be developed with the intended purpose in mind. As a result there will always be a need to classify a single information asset using multiple schemes.

- provide a context for the creation of whole of government classification schemes, such as the Information Portfolio Framework to allow for improved ICT Planning.

In addition, the model provides value for agency data architecture initiatives by:

- describing information architecture and the resultant associated artefacts in a consistent way, thus creating increased opportunities for cross-agency sharing of information architecture deliverables;
- acting as a meta-model or “Rosetta stone”⁹ to facilitate communications between enterprise architects and other architects about information architecture resulting in an increase in the effectiveness of efforts to support the business/mission needs of the agency;
- facilitating compliance with requirements for good information architectures across government providing a foundation for agency information architecture initiatives that result in increased compatibility between agency architectures; and
- providing the basis for a physical model for the creation of an information asset inventory, such as that encouraged by the Queensland Government Information Security Classification Framework¹⁰ (QGISCF).

The following sections provide the definition of the abstract model, plus discussions of additional considerations surrounding the context and use of the model.

Understanding the abstract model

The abstract model depicts the major concepts for each aspect of the information architecture (as previously illustrated in Figure 1 above) and indicates the relationships between them. In doing so it provides a whole-of-government pattern for information architecture and presents the minimal level of detail necessary to convey the meaning behind each of the major concepts.

It is not the Office of Government ICT’s intention that the abstract model provides a detailed representation of specialised information management practices existing in agencies for example management of spatial information or recordkeeping. Rather it is left to the discretion of agencies and or initiatives responsible for these specialisations, to extend the architectural pattern as necessary to describe specific disciplines.

The abstract model contains the core concepts of these and all other associated information disciplines within the Queensland Government and any abstract model created by such agencies or initiatives must be able to map back to the concepts within the model.

The abstract model is in two parts:

1. The diagrammatic model as illustrated in Figure 3; and
2. A list of definitions for the concepts shown in the diagram in Table 2.

⁹ The Rosetta stone was discovered in 1799 near the town of el-Rashid (Rosetta). It is inscribed with a single decree, but in three languages and as a result allowed scholars to finally decipher the phonetics associated with Egyptian hieroglyphs. The term is often used to describe something which acts as a mechanism or basis of translation.

¹⁰ At the time of writing the QGISCF was currently undergoing consultation and was not formally endorsed, but is expected to be in place by Q3 2006.

The following conventions are used in the abstract model diagram:

- aspects which form the scope of information architecture as depicted in Figure 1 give rise to the five (5) subject areas within the abstract model and are shown as the shaded areas of the model;
- Significant concepts (entities) are expressed as boxes, while relationships between the concepts are expressed as arrows;
- Concepts shown within the boundary of a particular subject area are considered to be fundamental to that aspect of the information architecture. However they may also support concepts in other subject areas;
- Some peripheral concepts and or sub-types are not shown on the model, but may be specified within the definitions to aid understanding;
- only “outbound” relationships are shown (i.e. those that originate from the concept) on the model. However, the full relationship definition (bi-directional) is specified within the definitions;
- optionality, where relevant is shown in the relationship name using the “may” suffix; and
- cardinality (e.g. 1-to-many, many-to-many) is not depicted in the abstract model; however these are sometimes expressed within the definitions.

The Queensland Government Information Architecture Abstract Model

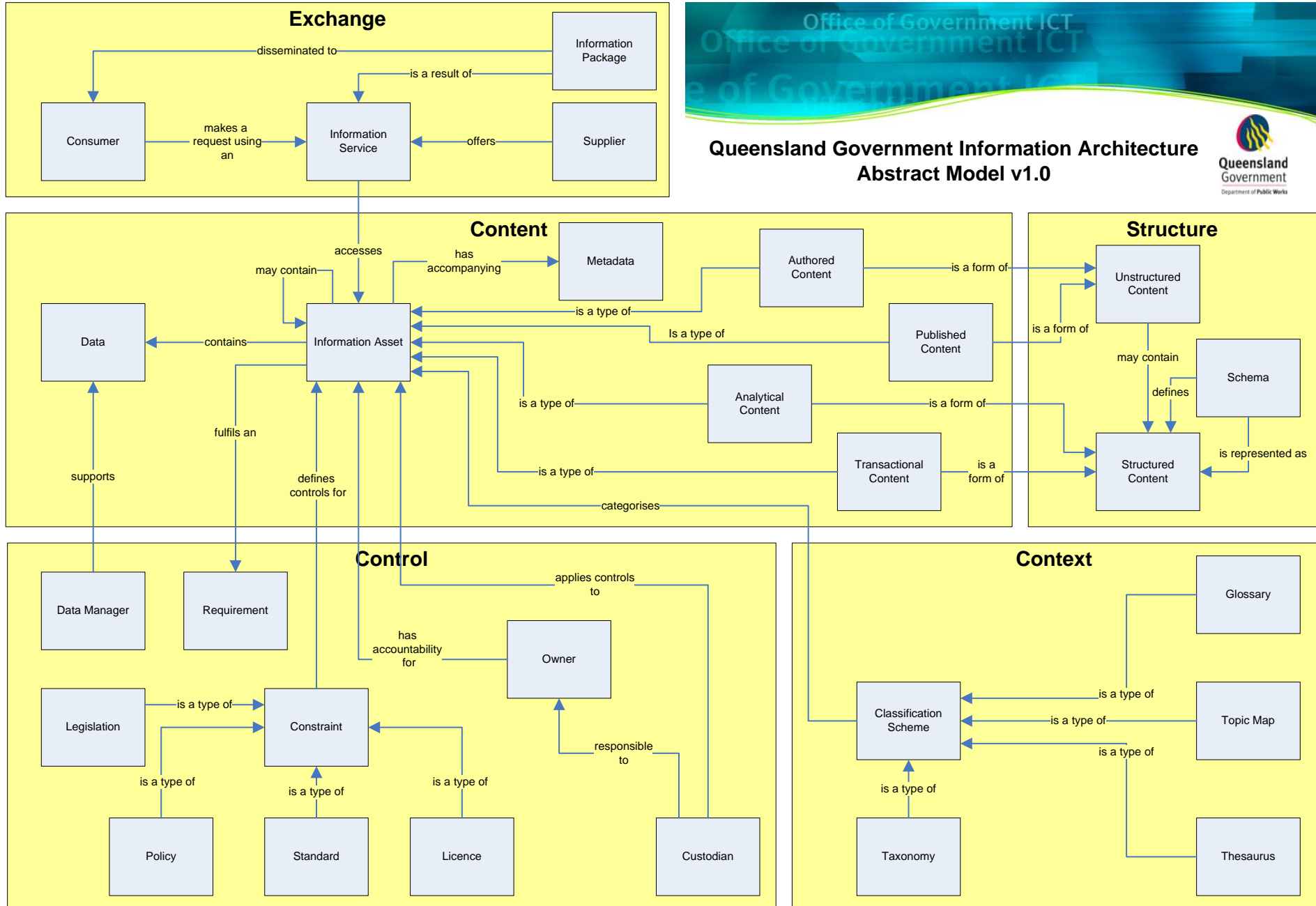


Figure 3: Queensland Government Information Architecture Abstract Model

Outlined below are the definitions associated with the abstract model. These definitions represent the efforts of the Office of Government ICT's to standardise similar terminology from a number of varied sources. Each definition adheres to the following conventions:

- the definitions are shown in alphabetical order;
- a definition is comprised of the:
 - concept name which is the recommended Queensland Government preferred term for the concept;
 - standardised meaning of the concept, plus the sources reviewed or used in compilation of the standardised definition;
 - examples or sample instances of the concept used to test the validity of the model;
 - alternative terms (synonyms) in use across Queensland Government. Items marked with an ** are no longer considered preferred and agencies are encouraged to remove them from use; and
 - relationships to and from the concept.
- meanings for subject areas are prefixed with the "Subject Area:"; and
- subject areas do not have examples, alternative meanings or relationships.

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
<p>Analytical Content</p>	<p>Structured content optimised to support query, investigative or decision making activities. Analytical content will contain not only base information, but incorporate information derived or transformed from the original sources.</p> <p>Analytics may take the form of:</p> <ul style="list-style-type: none"> - Operational information (sourced over a short timeframe, but provision is time critical) - Tactical information (sourced over the medium term, with longer lead times on provision) - Strategic information (sourced over the long term, but often requested ad hoc and at short notice). <p>Analytical content will typically be purposefully de-normalised when compared with Transactional content. Analytical content is primarily query or read only.</p> <p><i>Source: US Government FEAP DRM 2.0</i></p>	<p>Content</p>	<ul style="list-style-type: none"> • Banking reconciliation report • Customer service centre activity report • Budget trend analysis • Cash flow analysis • Data warehouse • Pivot tables. 	<ul style="list-style-type: none"> • Analytical data • Analysis 	<p>Analytical Content:</p> <ul style="list-style-type: none"> - is a type of information asset - is a form of unstructured content

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
Authored Content	<p>Unstructured content in a wide variety of formats. Authored content are creations that are attributed to an individual or identifiable entity.</p> <p>Unlike its Published Content counterpart, Authored Content is typically restricted in its distribution or kept internal.</p> <p><i>Source: US Government FEAP DRM 2.0</i></p>	Content	<ul style="list-style-type: none"> • E-mail • Instant messages • Internal memorandums • Briefing notes • Application system code • Presentations • Movies • Electronic messages 		<p>Authored Content:</p> <ul style="list-style-type: none"> - is a type of information asset - is a form of unstructured content
Classification Scheme	<p>Formal definition of a common set of terms or concepts that are used to describe and represent a domain of knowledge</p> <p>Classification schemes describe information with different degrees of structure using logical conventions, methods and procedural rules and as such range from simple taxonomies, thesauri, glossary, metadata schemes, to logical theories.</p> <p>Classification schemes provide the contextual metadata of an information asset.</p> <p>If the classifications were produced by the agency then the classifications will also be information assets of the agency.</p> <p><i>Source: W3C OWL Web Ontology Language Use Cases and Requirements Recommendation; Wikipedia.org</i></p>	Context	<ul style="list-style-type: none"> • Taxonomy • Thesauri • Glossary • Topic Map • Metadata Scheme • ISO 19115 Data Themes 	<ul style="list-style-type: none"> • Classification • Ontology • Domain 	<p>A classification scheme:</p> <ul style="list-style-type: none"> - categorises one or more information assets - may be a taxonomy - may be a glossary - may be a topic map - may be a thesaurus
Constraint	<p>A rule, restriction, limit or check that provides the controls or governance for the management of information requirements and their supporting information assets.</p> <p>Constraints apply to information assets as a result of legislation, policies or standards.</p> <p>If the constraints were produced by the agency then the constraints will also be information assets of the agency.</p> <p><i>Source: The American Heritage Dictionary of the English Language; ISO 19115</i></p>	Control	<ul style="list-style-type: none"> • Information Standard 42 • Financial Management Standard 1997 • Public Records Act 2002 • NRMW Custodianship Policy IMP/2006/2443 - Version 1 	<ul style="list-style-type: none"> • Rule 	<p>A constraint:</p> <ul style="list-style-type: none"> - defines controls for one or more information resources - may be a standard - may be a policy - may be legislation - may be a licence

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
Consumer	<p>The recipient of a payload resulting from a request made to an information service. Consumers operate under agreed levels of service with information service providers.</p> <p>Consumers may also be bound by one or more constraints (such as a licence) applied by the owner over the source information asset.</p> <p><i>Source: Service orientation: Winning Strategies and Best Practices; US Government FEAP DRM 2.0</i></p>	Exchange	<ul style="list-style-type: none"> • Brisbane City Council requests confirmation of the survey details for a land parcel from NRMW • ABS requests a count of new vehicle sales from Queensland Transport. Treasury requests an annual budget report from an agency 	<ul style="list-style-type: none"> • Customer • Recipient • User • Client 	<p>A consumer:</p> <ul style="list-style-type: none"> - makes a request using an information service - receives a information package
Content	<p>Subject Area: The concepts related to the manifestation of information.</p> <p>It is ultimately the content itself that is used to affect an outcome for government. It is also the dimension of the information architecture that generates the majority of costs to government.</p>				
Context	<p>Subject Area: The concepts related to the schemes used for identification of content to support its creation, use and management such as information classification.</p>				
Control	<p>Subject Area: The concepts relating to the rules and processes that content is subject to.</p> <p>Control provides the ongoing management and governance that ultimately impacts the efficiency and effectiveness (i.e. the value) of content in supporting the needs of government.</p>				

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
<p>Custodian</p>	<p>The recognised officer responsible for implementing and maintaining information assets according to the rules set by the owner to ensure proper quality, security, integrity, correctness, consistency, privacy, confidentiality and accessibility.</p> <p>A custodian will be responsible for specific classifications or categorisations of data. In the majority of cases a custodian utilises data managers to handle the day to day activity associated with the custody of information assets and the data they contain.</p> <p><i>Source: Information Standards Glossary; State Archives Glossary of Archival and Recordkeeping Terms; Queensland Transport Principles; NRMW Custodianship Policy (IMP/2006/2443) and IM Standards Definitions (IMP/2004/1487); ANZLIC Guidelines for Custodianship 1998; US Government FEAP DRM 2.0; Queensland Government Information Security Classification Framework v1.0</i></p>	<p>Control</p>	<ul style="list-style-type: none"> • The Director General (DG) of NRMW delegates to an Executive Director responsibility for certain Topographic data themes as defined by the ISO 19115 standard • The DG of Queensland Transport assigns an Executive Director as being responsible for Customer data classified according to their Enterprise Architecture Contextual Information Model 	<ul style="list-style-type: none"> • Information Custodian • Data Trustee** • Data Steward 	<p>A custodian:</p> <ul style="list-style-type: none"> - applies controls to an information asset - is responsible to one or more owners
<p>Data</p>	<p>The representation of facts, concepts or instructions in a formalised (consistent and agreed) manner suitable for communication, interpretation or processing by human or automatic means. Typically comprised of numbers, words or images. The format and presentation of data may vary with the context in which it is used.</p> <p>Data is not information until it is utilised in a particular context for a particular purpose.</p> <p><i>Source: NRMW; QT; ISO 2382-4; ISO 11179-1</i></p>	<p>Content</p>	<ul style="list-style-type: none"> • Coordinates of a particular survey point • Driver licence number • Population of Queensland • Official picture of a minister in jpeg format 		<p>Data:</p> <ul style="list-style-type: none"> - is supported by a data manager - is found in one or more information assets

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
Data Manager	<p>Typically an officer or other service provider who is assigned to perform one or more activities associated with the day to day interpretation, management, operation and support of data.</p> <p>Data managers may have physical custody of the data, but are typically not assigned any formal custodial responsibilities.</p> <p>Data managers may provide support for data used in multiple information assets and therefore serve multiple custodians.</p> <p><i>Source: None.</i></p>	Control	<ul style="list-style-type: none"> • Librarians • Database Administrators • ICT Service Providers • Records managers • Archivists • Commercial data sources 	<ul style="list-style-type: none"> • Data Custodian** • Business System Owner • System Owner, Data Steward • Data Administrators 	<p>A data manager: - supports one or more items of data</p>
Exchange	Subject Area: The concepts related to the exchange of content between parties.				

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
Glossary	<p>An alphabetical list of technical terms in some specialized field of knowledge; usually published as an appendix to a text or as a stand alone tool. Glossaries are intended to aid communication, identification or classification of information assets.</p> <p>Source: None</p>	Context	E.g. Queensland State Archives Glossary of Archival and Recording Keeping Terms, Information Standards Glossary.		A glossary: - is a type of classification

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
<p>Information Asset¹¹</p>	<p>An identifiable collection of data stored in any manner and recognised as having value for the purpose of enabling an agency to perform its business functions thereby satisfying a recognised agency requirement.</p> <p>Data or information that is referenced by an agency, but which is not intended to become a source of reference for multiple business functions is not considered to be an information asset of the agency. This is merely information.</p> <p>Information assets are considered to be associated with one of four standard types: Transactional, Analytical, Authored, and Publication.</p> <p>It should be noted that information content may appear in more than one asset. For example, customer details may exist as a transactional asset, but also be represented in a second analytical asset. In this case there are two assets.</p> <p>It is important to note that an Information Asset may also be considered to be a Public Record if it meets certain criteria¹². However, not all of an agency's Information Assets will necessarily be Public Records.</p> <p>Information Assets within the Information Architecture that are technology dependent are implemented in accordance with the Application and Technology Architectures of an agency or the government.</p> <p><i>Source: Information Standards Glossary; Information Security Glossary by RUsecure Information Security UK; The Gartner Glossary of Information Technology Terms and Acronyms 2004; NRMW Custodianship Policy (IMP/2006/2443) and IM Standards Definitions (IMP/2004/1487)</i></p>	<p>Content</p>	<ul style="list-style-type: none"> • Record • Document • Electronic message • Row in a database • Table or figure within a document • Whole database table • Collection of data objects about a single logical entity or concept such as 'customer' • Content identified through a URL or URI • Metadata about other information assets. 	<ul style="list-style-type: none"> • Data Set • Set • Data Source • Information Set • Artefact • Record • Information resource** 	<p>An information asset:</p> <ul style="list-style-type: none"> - has an owner - is subject to one or more constraints - fulfils one or more requirements - is controlled by a custodian - contains one or more items of data - may contain one or more other information assets - has accompanying metadata - may be a type of transactional content - may be a type of analytical content - may be a type of authored content - may be a type of published content - is classified by one or more classification schemes - is accessed via an information service

¹¹ This definition of information asset replaces the previous definition used in the Information Standards and Information Standards Glossary. In addition, this definition will replace the use of the term "information resource".

¹² Information Assets will qualify as Public Records if they meet the definition of a public record as defined by Queensland State Archives. See <http://www.archives.qld.gov.au/publications/publicrecordsalert/pr304.pdf>

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
<p>Information Package</p>	<p>Information assets received by a consumer in response to a request (query) of an information service provided by a supplier. The content and structure (schema) of a payload is subject to the definitions that govern the information service and agreed between the supplier and consumer. Often this content and structure will be a direct result of the information assets contained within the payload.</p> <p>A payload, once received by a consumer, may become an information asset of the consumer.</p> <p><i>Source: US Government FEAP DRM 2.0</i></p>	<p>Exchange</p>	<ul style="list-style-type: none"> • A book received from the library in response to a request for loan • Full details of a parcel of land • EDI message • XML document 	<ul style="list-style-type: none"> • Data package • Data interchange • Information exchange • Data parcel • Payload 	<p>A information package:</p> <ul style="list-style-type: none"> - is the defined result of an information service - is disseminated to one or more consumers
<p>Information Service</p>	<p>Represents an endpoint that provides a defined interface for access to information assets in a particular business context.</p> <p>Implementation details of an information service should be transparent to the consumer. That is, it should not be necessary to understand the process of retrieval in order to locate, request and use the information asset(s) returned by the service.</p> <p>In addition the implementation of the service does not have to be automated - it could consist of purely human to human activity via a variety of channels.</p> <p>The interface of an information service represents the terms of a contract between the supplier of the service and its consumers. As such it describes the structure of the payload and any other conditions relating to the request for the information asset and / or the response.</p> <p>Such contacts may be in the form of a memorandum of understanding or legal agreement or for electronic information services in the form of Web Service Description Language (WSDL).</p> <p><i>Source: Service orientation: Winning Strategies and Best Practices; US Government FEAP DRM 2.0; NRMW Custodianship Policy (IMP/2006/2443)</i></p>	<p>Exchange</p>	<ul style="list-style-type: none"> • A web service to retrieve an address • Library assistance available via e-mail • Health information available from the SSQ call centre • A form available from a static web site • URL for the download of a particular cadastral data set 	<ul style="list-style-type: none"> • Service 	<p>An information service:</p> <ul style="list-style-type: none"> - accesses one or more information assets - is offered by a supplier - is queried by a consumer - returns a result as a information package

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
<p>Licence</p>	<p>The grant of certain rights over an information asset, describing the purposes to which the information asset may be used and the conditions upon that use.</p> <p>This takes the form of a contract for licence in the case where the information asset is sourced from a non-government entity and as a memorandum of understanding when the information asset is sourced from another government department.</p> <p>When an information asset is exchanged via an information service, the agency may choose to place a licence over the information asset provided to the consumer.</p> <p><i>Source: Queensland Treasury (Drew Cox)</i></p>	<p>Control</p>	<ul style="list-style-type: none"> An agency may be granted the right to distribute verbatim copies of an information asset they sourced from another government department as long it is unchanged and the original creator is attributed 	<ul style="list-style-type: none"> Contract Restrictions 	<p>A licence: - is a type of constraint</p>

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
<p>Legislation</p>	<p>Acts as passed and subordinate legislation (such regulations) of the Queensland Parliament or other jurisdictions (such as the Australian Commonwealth) that are legally enforceable in the state of Queensland. Legislation contains a set of rules expressed as an obligation, an authorization, permission or a prohibition.</p> <p>In the context of the Queensland Government Information Architecture legislation is merely one type of constraint.</p> <p><i>Source: Office of Queensland Parliamentary Council</i></p>	<p>Control</p>	<ul style="list-style-type: none"> • Water Act 2000 • Financial Management Standard 1997 • Commonwealth Privacy Act 1988 	<ul style="list-style-type: none"> • Law 	<p>Legislation: - is a type of constraint</p>
<p>Metadata¹³</p>	<p>Data about a particular information asset. Specifically the contextual information about an information asset upon which the asset was established and will be managed on an ongoing basis.</p> <p>Metadata may include information about ownership, the applicable constraints, performance measures that will be or are being applied to the information asset.</p> <p>As contextual information metadata assists in ensuring the authenticity, reliability, usability, integrity and accessibility of digital records over time.</p> <p><i>Source: National Archives of Australia Digital Record Keeping Guidelines; Australian Government Locator Service Metadata Element Set User Guide</i></p>	<p>Content</p>	<ul style="list-style-type: none"> • The AGLS record associated with a particular document, including the particular QKey (Keyword AAA) terms assigned to the document 	<ul style="list-style-type: none"> • Information context • Context record • Metadata record 	<p>Metadata: - provides the contextual content associated with a particular information asset</p>

¹³ The use of the term metadata within the information architecture is purposefully very specific and encompasses only contextual metadata given the level of abstraction for this model. More broad definitions of metadata include three key concepts. Namely the contextual metadata, plus the metadata schemes (such as classifying values used) and the metadata schema – all of which are present within the abstract model in their component parts.

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
Owner	<p>The recognised officer who is identified as having the authority and accountability under legislation, regulation or policy for the collection of information assets on behalf of the State of Queensland¹⁴.</p> <p>It is the owners who define the information asset requirements of an agency, including ongoing management requirements.</p> <p>An owner will often delegate the operational responsibility for information assets to a custodian.</p> <p><i>Source: Queensland Transport EA Principles; State Archives Glossary of Archival and Recordkeeping Terms; AS ISO 15489; Queensland Government Information Security Classification Framework v1.0</i></p>	Control	<ul style="list-style-type: none"> The Transport Operations (Maritime Safety) Act 1994 requires the Chief Executive of Maritime Safety to develop maritime safety strategies The Survey and Mapping Infrastructure Act 2003 requires the nominated chief executive to maintain a state wide digital cadastral data set 	<ul style="list-style-type: none"> Information Owner Information Resource Owner** Delegated Authority Delegate 	<p>A owner:</p> <ul style="list-style-type: none"> - has accountability for management of one or more information assets - delegates responsibility for control an information asset to a custodian
Policy	<p>Sets out a government plan or course of action intended to influence and determine decisions, actions, and other matters relative to a particular purpose. A policy, like legislation, contains a set of rules expressed as an obligation, an authorization, permission or a prohibition.</p> <p>In the context of the Queensland Government Information Architecture a policy is merely one type of constraint.</p> <p><i>Source: ISO 15414</i></p>	Control	<ul style="list-style-type: none"> NRMW Custodianship Policy IMP/2006/2443 - Version 1 Information Standards GEA Policies 		<p>A policy:</p> <ul style="list-style-type: none"> - is a type of constraint
Published Content	<p>Unstructured content assembled from its component pieces, into a desired format and disseminated to a wide target audience. Published content is only changed through either a “replacement” publication process or removal of access to the content.</p> <p>Unlike Authored Content, Published Content is typically less restricted in its distribution and often exposed to public or external access.</p> <p><i>Source: US Government FEAP DRM 2.0</i></p>	Content	<ul style="list-style-type: none"> Smart Directions PDF available from www.governmentict.qld.gov.au, Intranet sites Internet sites / content Government Gazette Re-prints of legislation Brochures on changes to road rules 	<ul style="list-style-type: none"> Publications 	<p>Published Content:</p> <ul style="list-style-type: none"> - is a type of unstructured content

¹⁴ It is well understood that within government all legal ownership and associated rights and entitlements is vested in the State of Queensland. However, practically the State can only act through the officers of the legislature, judiciary or the public service. Indeed, at an intellectual property level beneficial use delegations do not apply when the public entity represents the State of Queensland and has the power to deal with assets under its enabling legislation. That is, the public sector own is deemed to be acting as the state in relation to assets. For this reason the term owner for the purpose of describing the information architecture is deemed to be the officer through whom the State – as the ultimately legal owner - is acting.

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
Requirement	<p>A need arising from an agency's business activity, or from support of business activity, where such activity is intended to fulfil the purpose of the agency as defined by legislation, central agency requirements or ministerial direction.</p> <p>Importantly requirements within the Information Architecture are derived from the Business Architecture of an agency or government.</p> <p><i>Source: None.</i></p>	Control	<ul style="list-style-type: none"> • Maritime safety strategies required under the Transport Operations (Maritime Safety) Act 1994 to assist in managing maritime transport operations • The state wide digital cadastral dataset required under the Survey and Mapping Infrastructure Act 2003 to support the effective identification and valuation of land • The list of registered Nurses required by the Nursing Act 1992 to ensure integrity of the health profession 	<ul style="list-style-type: none"> • Need • Business requirement 	<p>A requirement:</p> <ul style="list-style-type: none"> - generates a need for information in the form of an information asset
Schema	<p>A representation, outline or model imposed on a complex information structure to assist in explaining it, mediate perception, or guide a response.</p> <p>Specifically the combination entities and their relationships, attributes and associated data types. Within the information architecture this includes specific XML documents, DTDs, XSDs, ER Models, UML Models or any other meta-description of the structure of content.</p> <p>Schemas also provide the structural metadata of an information asset.</p> <p>NB: A schema is not to be confused with a scheme which is a form of classification. See <i>Classification</i> above.</p> <p><i>Sources: Merriam-Webster's Online Dictionary, GEA Framework V1.0</i></p>	Structure	<ul style="list-style-type: none"> • Structure of the AGLS Element Set • Data model for an application • XML schema for a data exchange • Database structure • Model of page structure of a web site 	<ul style="list-style-type: none"> • Model • Structure • Meta Model • Data Model 	<p>A schema:</p> <ul style="list-style-type: none"> - defines one or more items of structured content - is represented as structured content

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
<p>Standard</p>	<p>Sets out the technical or other specifications necessary to ensure that a method or material will consistently do the job it is intended to do.</p> <p>In the context of information architecture standards may be applied to information assets. In many cases standards themselves may manifest as information assets.</p> <p>In the context of the Queensland Government Information Architecture a standard is merely one type of constraint.</p> <p>Some classifications also manifest as standards.</p> <p><i>Source: Information Standards</i></p>	<p>Control</p>	<ul style="list-style-type: none"> • ISO 19115 Geographic Information - Metadata Standard • Queensland Government Information Security Classification Framework 	<ul style="list-style-type: none"> • Specification 	<p>A standard:</p> <ul style="list-style-type: none"> - is a type of constraint
<p>Structure</p>	<p>Subject Area: The concepts related to the formal description of the internal structures of content as well as the relationships between content.</p>				
<p>Structured Content</p>	<p>Information assets typically described via entity-relationship or class models, such as logical data models and XML documents. Structured data is organized in well-defined semantic “chunks” called entities, nodes or objects.</p> <p><i>Source: US Government FEAP DRM 2.0</i></p>	<p>Structure</p>	<ul style="list-style-type: none"> • Relational database • Spreadsheet • Cadastral data set 	<ul style="list-style-type: none"> • Structured information • Structured data 	<p>Structured content:</p> <ul style="list-style-type: none"> - is defined by a schema - may represent a schema - is sometimes part of unstructured content - manifests as transactional content - manifests as analytical content
<p>Supplier</p>	<p>The provider of an information service through which consumers are able to access information assets. Suppliers implement the information service, but may not necessarily be the data manager, custodian or owner. However, a supplier would operate within the rules applicable to the information assets they utilise for an information service.</p> <p><i>Source: Service orientation: Winning Strategies and Best Practices; US Government FEAP DRM 2.0</i></p>	<p>Structure</p>	<ul style="list-style-type: none"> • OESR provides access to various information assets (some of which are held by other agencies) about Queensland to Queensland Government agencies • NRMW offers access to digital cadastral information assets to local councils 	<p>Provider</p>	<p>A supplier:</p> <ul style="list-style-type: none"> - offers one or more information services

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
Taxonomy	<p>A collection of controlled vocabulary terms organized into a hierarchical structure. Taxonomies provide a means for categorizing or classifying information within a reasonably well-defined associative structure, in which each term in a taxonomy is in one or more parent/child relationships to other terms in the Taxonomy. Specifically, the children in a taxonomy are specialisations of the parent concept.</p> <p><i>Source: US Government FEAP DRM 2.0</i></p>	Context	<ul style="list-style-type: none"> • Dublin Core • AGLS • Queensland Government Enterprise Architecture Portfolio Frameworks (Business, Application, Information and Technology) 		<p>A taxonomy: - is a type of classification</p>
Thesaurus	<p>A controlled list of terms linked together by semantic, hierarchical, associative or equivalence relationships. Not merely the hierarchical specialisation structure of a taxonomy, but also the semantics of related terms in forms of synonyms and antonyms as well as language usages (such as verb, noun etc).</p> <p><i>Source: State Archives Glossary of Archival and Recordkeeping Terms; Taxonomies: Frameworks for Corporate Knowledge</i></p>	Context	<ul style="list-style-type: none"> • Keyword AAA: A thesaurus of common administrative terms • QKey • Thesaurus of Geographic Names [TGN] • Australian Governments' Interactive Functions Thesaurus 		<p>A thesaurus: - is a type of classification</p>
Topic Map	<p>A mechanism for describing knowledge structures and associating them with information resources. Topic Maps exploit both the hierarchical classification of taxonomies (broader/narrower) with the semantic features of a thesaurus (related terms / uses) without necessarily the strict control of a thesaurus.</p> <p><i>Source: W3C; ISO 13250; Wikipedia.org</i></p>	Context	<ul style="list-style-type: none"> • OpenCyc • ISO/IEC 13250 Topic Maps 	<ul style="list-style-type: none"> • Knowledge Map • Subject Matters 	<p>A topic map: - is a type of classification</p>
Transactional Content	<p>Structured content that supports or results from the execution of business processes and workflows.</p> <p>Transactional content will typically be relational in nature and purposefully normalised when compared with Analytical content. Transactional content is typically subject to modification on an ongoing basis.</p> <p><i>Source: US Government FEAP DRM 2.0</i></p>	Content	<ul style="list-style-type: none"> • Driver licence record • Address details • Appointment 	<ul style="list-style-type: none"> • Transactions • Transactional data • Transactional information 	<p>Transactional content: - is a type of structured content</p>

Name	Meaning	Subject Area	Examples	Alternative Terms (Synonyms)	Relationships
<p>Unstructured Content</p>	<p>An information asset that is free-form format, such as multimedia files, images, sound files, or unstructured text. Unstructured data does not necessarily follow any format or hierarchal sequence, nor does it follow any relational rules.</p> <p>However, unstructured content may contain some structured content. For the sake of simplicity, this concept of semi-structured is considered to be within the scope of unstructured data for the purpose of the Information Architecture.</p> <p><i>Source: US Government FEAP DRM 2.0</i></p>	<p>Content</p>	<ul style="list-style-type: none"> • Web pages • Documents • MPEG files • E-mail 	<ul style="list-style-type: none"> • Unstructured Data • Unstructured Information 	<p>Unstructured content:</p> <ul style="list-style-type: none"> - is a type of information asset - may contain structured content - manifest as authored content - manifests as published content

Table 2: Queensland Government Information Architecture Abstract Model Standard Definitions

Applying the abstract model to the GEA Framework

A crucial test of the abstract model (in addition to its support for agency information architecture) is its ability to logically support the information aspects of the GEA itself and associated activities, such as ICT Planning. The following section provides an explanation of the treatment of key GEA components within the abstract model from the perspective of an agency¹⁵ beginning with the GEA Classification Models.

The GEA Classification Models are comprised of the Business, Information, Application and Technology Portfolio Frameworks. The classification models can be used as a means to navigate through the enterprise architecture depending on the perspective required by the organisation. It also defines the way in which these architecture artefacts can be classified and utilised to represent the enterprise – be that a division or unit of an agency, the agency itself, cluster of agencies or the entire Queensland Government.

Clearly from the above description the GEA Classification Models are taxonomies, and as such are catered for within the abstract model as types of classifications. For the other major elements of the GEA, namely the GEA Representations the components are catered for within their respective areas of the model as shown in Table 3 below.

GEA component	Supporting abstract model concept
Portfolio Framework	Taxonomy
Domain Profile	Information Asset
Whitepaper	Information Asset
Discussion Paper	Information Asset
Position Papers	Standard
Policy (Information Standard)	Policy
Strategy	Information Asset
Standards	Standard
Domain Specifications	Information Asset
Domain Targets	Information Asset

Table 3: Concepts in the abstract model supporting the GEA

In practical terms the above table provides clarification about the role and purpose of key aspects of the GEA and agency architecture artefacts giving rise to the following conclusions:

- domain profiles, specifications and targets all represent either inventories or models of an agency or government as-is or to-be position with respect to business direction, information needs, applications or technologies;
- domain profiles, specifications and targets are captured and used by agencies to ensure the smooth operation of their organisation through processes such as ICT Planning, as such as they are true information assets of the enterprise;

¹⁵ The GEA meta-model is excluded when dealing with the GEA from an agency perspective. This is due to the fact that the GEA meta-model is the definition of the GEA components and therefore an information asset of the Office of Government ICT only – not that of an agency.

- as information assets these are then subject to constraints, some of which are constraints provided by the GEA itself in the form of standards and policies. These impact the way in which domain profiles, specifications and targets are captured and managed; and
- lastly, the GEA provides the various Portfolio Frameworks as classification schemes to assist in the identification, reporting and retrieval of the domain profiles, specifications and targets held by agencies or produced by whole-of-government.

The GEA Information Portfolio Framework

As discussed in the section “Applying the abstract model to the GEA” the Information Portfolio Framework is primarily a form of taxonomy used at a whole of government level to facilitate the identification of common information assets and therefore common information needs. This in turn will allow for the subsequent identification of preferred or “authoritative” sources of this information across the sector¹⁶. The Information Portfolio Framework will be developed by the Office of Government ICT for release in 2006.

In addition to the role defined above, the Information Portfolio Framework is also intended to serve as the basis for the classification for agreed whole of government schemas. These schemas will become the interchange standard for information exchange of key information assets, such as client data as part of service delivery or land data as part of development planning.

The Information Portfolio Framework will be supported by a thesaurus and a taxonomy. The thesaurus will provide a similar role to the QKey. However, unlike QKey the Information Portfolio Framework thesaurus will provide synonyms of common data (not activity¹⁷) terms.

Thereby providing a mechanism by which agencies can retain their existing semantics, whilst still being capable of classifying their information. In the long term the thesaurus will provide the basis for standardisation of data terms across government.

Information Architecture and Cross-agency Integration

A key success factor for cross-agency integration is agreement to the way in which information assets are stored and exchanged. Specifically, reaching an agreed understanding across government of the relationship between the different information content types and their underlying repository provides a basis for architects to determine what capability (information services) should be provisioned to support an agency’s information sharing requirements.

As a basis for establishing such a shared understanding the Queensland Government Information Content Exchange Matrix will be developed by the Office of Government ICT for release in 2006.

The Queensland Government Information Content Exchange Matrix is based on the information content types already defined within the Information Architecture and will enable

¹⁶ This activity will be an important step in providing a supporting framework for whole-of-government initiatives such as Information Queensland and the Whole-of-government Information Licensing Review.

¹⁷ Current classification approaches using the Keyword AAA scheme rightly focus on classification of information assets, in particular those assets considered to be records, in terms of the activity or transaction from which they resulted. This is primarily because the interest or purpose of such classification is to be able to provide “evidence of business activity”. The purpose of the Information Portfolio Framework’s thesaurus is to provide assistance with identifying commonly held data.

agencies to assess their various information assets in order to identify the required information service types. This can then be used:

- as input into functional requirements; or
- to identify any applicable whole of government standardised terms, conditions and rules for information exchange transactions, as well as guidelines to support information exchange, access and use.

Appendix 1 Information Architecture Resources

During the development of this paper a number of sources regarding information architecture and associated practices were identified, but not necessarily directly referenced. These have been included here as a future reference for agencies wishing to expand their information architecture activities and or practices.

Publications

Finkelstein, Clive. *Enterprise Architecture For Integration: Rapid delivery methods and technologies*. Artech House, London, UK (2006)

Silverston, Len. *The Data Model Resource Book (Volume 1): A library of universal data models for all enterprises*. John Wiley & Sons, Inc, New York, USA (2001)

Wurman, Richard Saul; Bradford, Peter, *Information Architects*. Graphis Press, Zurich, Switzerland (1996)

Wyllie, Jan; Skyrme, David. *Taxonomies: Frameworks for Corporate Knowledge, 2nd Edition*. Ark Group, London, UK (2005)

Legislation and official government documents

Legislation reviewed:

- Copyright Act 1968 (Cth)
- Business Names Act 1962
- Electronic Transactions (Qld) Act 2001
- Evidence Act (Qld) 1977
- Financial Administration and Audit Act (Qld) 1977
- Financial Management Standard (Qld) 1997
- Freedom of Information Act (Qld) 1992
- Judicial Review Act (Qld) 1991
- Land Act (Qld) 1994
- Libraries Act 1988 (Qld)
- Public Records Act (Qld) 2002
- Public Services Act (Qld) 1996
- Privacy Act (Cth) 1988
- Survey and Mapping Infrastructure Act (Qld) 2003

Other official government documents publicly available:

- Information Standards, including the Information Standards Glossary (available at http://www.governmentict.qld.gov.au/02_infostand/index.htm)
- US Federal Government's Federal Enterprise Architecture Program (FEAP) Data Reference Model (DRM) Version 2.0 (available at <http://www.whitehouse.gov/omb/egov/a-2-EAModelsNEW2.html>)

Internet Resources

[ACTIONiT - Supporting co-ordinated government](#)

[AGIMO - Australian Government Technical Interoperability Framework](#)

[ANZLIC](#)[Collaborative Wiki of the US Federal Government Enterprise Architects](#)[Cycorp, Inc.](#)[VCU's Enterprise Data Modelling Effort](#)[Federal Enterprise Architecture](#)[Global Information Locator Service \(GILS\)](#)[Government Chief Information Office NSW](#)[GovTalk – GovTalk](#)[Health Data Model](#)[HL7 Reference Information Model](#)[The Global Enterprise Architecture Organisation](#)[NEDSS Logical Data Model \(NLDM\) Overview](#)[XBRL.org](#)[Interoperable Delivery of European eGovernment Services to public Administrations,](#)[Businesses and Citizens \(IDABC\)](#)[University of Texas - Information Architecture](#)[Institute For Enterprise Architecture Developments](#)[New Zealand E-government Programme](#)[UK Integrated Public Sector Vocabulary \(IPSV\)](#)[National Archives of Australia - Commonwealth Recordkeeping](#)[National Information Exchange Model \(NIEM\)](#)[National Institute of Standards and Technology \(NIST\)](#)[National Intelligence and the Integration Gap Implementing a Universal Data Model Across the Nation](#)[NZGLS metadata and thesauri](#)[OASIS Universal Business Language \(UBL\)](#)[Physically Implementing Universal Data Models to Integrate Data](#)[Ontology \(Computer Science Definition\)](#)[RosettaNet](#)[Semantic Interoperability \(XML Web Services\) Community of Practice \(SICoP\)](#)[Topic-maps.org](#)[Tasmanian Government Online Services - Enterprise Architecture](#)[Techquila - Topic Map Design Patterns For Information Architecture](#)[The Data Administration Newsletter \(TDAN.com\) Issue 36.0](#)[The Information Architecture Institute](#)[The Open Group Architecture Framework \(TOGAF\) Version 8.1](#)[The Suggested Upper Merged Ontology \(SUMO\)](#)[The TAO of Topic Maps](#)[The Universal Data Element Framework \(UDEF\)](#)[Topic Map.com](#)[Topic Maps — Data Model](#)[TopicMaps.Org](#)[Universal Data Models for Financial Services](#)[Universal Data Models for Health Care](#)[Universal GIS Operations for Environmental Modelling](#)[XML.com Formal Taxonomies for the U.S. Government](#)

Industry Analyst / Research Firms

ICT industry analyst firms provide research and specialist consulting on various topics including information architecture. Some of the more prominent global firms include:

AMR Research:

www.amrresearch.com

Butler Group:

<http://www.butlergroup.com>

Cutter Consortium:

www.cutter.com

Gartner:

www.gartner.com

Forrester Research:

www.forrester.com

Ovum:

www.ovum.com

ZapThink:

www.zapthink.com

Further details and perspectives on research firms can be found at:

<http://www.analystequity.com>

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0.0.5	June '06	SH	Issued for consultation.
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