

Queensland Government Enterprise Architecture

Queensland Government Data centres

Strategy and principles

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Queensland Government Data centres - Strategy and principles

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Information security

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Contents

1	Introduction.....	4
1.1	Purpose.....	4
1.2	Audience.....	4
1.3	Scope.....	4
1.4	Background.....	4
2	Business environment and requirements.....	5
2.1	Business drivers/objectives.....	5
2.2	Technology trends.....	5
2.3	Vision.....	6
2.4	Principles.....	6
2.5	Assumptions.....	8
	The key assumptions that apply to the Queensland Government data centres - Strategy and principles are:.....	8
3	Future state.....	8
3.1	A new approach.....	8
3.2	Polaris.....	8
3.3	317 Edward St.....	9
3.4	Agency managed facilities.....	9
3.5	Exclusions.....	10
4	Current state.....	10
4.1	Analysis.....	10
4.2	Changing demands.....	10
4.3	Private cloud options.....	10
5	Dependencies.....	11
6	Governance of data centre use in Queensland Government.....	11
7	High level actions.....	11
7.1	Action 1.....	11
7.2	Action 2.....	11
7.3	Action 3.....	11
7.4	Action 4.....	12

1 Introduction

1.1 Purpose

The purpose of this document is to translate the State's evolving data centre needs into a high level strategy and principles that will outline the principles for data centre provision and consumption across Queensland Government.

This document will:

- describe the current data centre landscape
- explore the pressures on the existing model
- identify the principles that need to be followed in developing a new model
- describe the desired future state
- inform and guide decision making and policy setting
- detail the steps to transitioning to a new data centre landscape.

1.2 Audience

This document is primarily intended for decision makers on data centre management and procurement across Queensland Government agencies.

1.3 Scope

Data centres are buildings or rooms which provide the secure and controlled environments necessary to support the operation of the information technology and telecommunications equipment that stores, processes and transmits an organisation's information. This document is intended to apply to the facilities that provide this service at some scale and not small rooms that provide local connectivity or support for office systems.

1.4 Background

The previous *Queensland Government ICT Consolidation Strategy* relied on a data centre landscape comprised of two primary data centres (Polaris and 317 Edward St) which were supplemented by various agency operated facilities around the greater Brisbane area and across the state. The two primary data centres are operated by CITEC and house infrastructure delivering managed services to agencies as well as housing agency-owned and operated ICT infrastructure. The original Queensland Government Data Centre Strategy published in 2007 and reviewed in 2009 and 2011, described a data centre landscape relying on two primary sites and decommissioning of small facilities located in various office accommodations.

From mid-2009 a concerted effort to remove the reliance on inadequate data centres by Queensland Government agencies has seen a significant transition into the two primary data centres and the decommissioning of several unsuitable sites. The sites employed by individual agencies are of an acceptable standard and are either self-owned and operated or are provided by commercial data centre operators.

Over the past several years Queensland Government agencies have shown an increased interest in sourcing ICT solutions as a service from a variety of cloud and managed services providers. This is a world-wide trend and in many cases is driven by government 'as-a-service' policy. As such, we are experiencing significant changes in demands for physical data centre capacity.

A review of what other jurisdictions in Australia are doing in regards to their data centre solutions reveals a common philosophy of decreasing the number of sites utilised, consolidating into larger facilities and procurement of data centre housing as a service rather than owning and operating their own. The Australian Federal Government set up a panel of commercial data centre providers several years ago to service departments needing data centre capacity. The New South Wales Government has recently engaged Metronode to provide a two data centre solution delivered on a modular, pay as you grow model which also provides efficient access to cloud services.

2 Business environment and requirements

2.1 Business drivers/objectives

Queensland Government agencies are using data centre facilities to support in-house or public facing applications. In either scenario, the efficient and effective delivery of these services is dependent on a highly available and reliable data centre topology supporting 'always available' application needs. Whether these data centre services are sourced from a commercial provider or are delivered in-house, it is important for sound decision-making that the real cost of this underpinning service must be understood and factored into the true cost of the operation.

CITEC currently manages two major data centre facilities, providing an underpinning service for their ICT services product suite as well as delivering a data centre hosting service for other government agencies. Following a change in government policy, the future of this business model is to be determined in 2016-17.

Understanding the agencies future demands for data centre capacity and the way they desire to procure this capacity is essential in determining if the two Queensland Government primary data centres should be retained, and if so, under which business model these services should be provided.

2.2 Technology trends

As Queensland Government moves to a hybrid model for the provision of ICT services supporting their business solutions, hybrid data centres are now being designed to satisfy this new demand. When discussing hybrid clouds, where on-premises clouds (private) are intended to work with public clouds, the need for hybrid data centre solutions becomes an important consideration.

Data centre facilities today are expected to support consolidation and integration and use sophisticated solutions to deliver optimisation and automated management. The use of advanced Data centre infrastructure management (DCIM) solutions is an integral part of efficiently operating data centres today and ensuring the data required for capacity and change management is readily available.

Data centre facilities, whether co-location or self-owned and managed, need to provide a resilient, efficient and economical service. As part of achieving this, modern day facilities need to be employing technologically advanced cooling, power, cabling and racking solutions. With the escalating costs of energy, and an increasing focus on minimising environmental impacts, free air cooling in appropriate locations is being incorporated in new facility designs, and the use of renewable energy sources is also becoming almost essential in delivering a cost effective data centre service.

The cost of power consumed by a data centre is becoming an increasingly important consideration in calculating the total cost of ownership of a data centre solution. Modern day facilities need to source competitive power provision models as well as having consideration for environmentally friendly options.

With technology advances we are seeing more and more compute power and storage capacity delivered on smaller footprints and sometimes consuming less power. Today's data centres must be able to support high density racks potentially occupying less and less floor space.

2.3 Vision

Queensland Government is striving to establish a data centre landscape that will support the business and IT demands of its agencies. It is recognised that as these demands vary from agency to agency, and in order to satisfy specific operational requirements of individual departments, the model adopted must incorporate a level of flexibility.

It is accepted that for some years to come, the ongoing existence of Queensland Government-owned and operated ICT infrastructure will drive the need to procure data centre housing services. The principles and future states outlined in this document will guide this procurement in a way that existing resources are efficiently utilised and future resources are procured to the benefit of the whole-of-government ICT landscape.

2.4 Principles

There is a proposed set of principles concerning cost, location, resiliency, connectivity and security considerations that will guide the development of the future state for data centres in Queensland Government and the transition activity to this new environment. These principles have been developed with appropriate consideration of the current Queensland Government Enterprise Architecture [ICT-as-a-service policy](#).

2.4.1 Cost principles

Ref	Principle
C1	All data centre procurement activities should investigate whether spare capacity of existing Queensland Government data centre assets is a suitable solution.
C2	Procurement of data centre capacity should be under a 'pay for use' arrangement. Ideally, contract conditions will allow for growth and reduction of capacity as required
C3	It is highly desirable that Queensland Government agencies do not increase the data centre capacity beyond what is currently owned and operated; future data centre capacity, where required, should be sourced 'as-a-service'.
C4	Network connectivity costs should be factored into data centre assessments. Where it is practical and cost effective to do so existing Queensland Government network infrastructure should be used.

Table 1: Cost principles

2.4.2 Location

Ref	Principle
L1	The location of the selected data centre should be taken into account to minimise business risk.
L2	Geographically disperse locations should be considered to satisfy business continuity demands.

Table 2: Location principles

2.4.3 Resilience

Ref	Principle
R1	Resiliency, availability and security should form part of the assessment criteria used by an agency to determine a suitable data centre provider
R2	Disaster recovery and business continuity should be considered to determine if more than one data centre solution is required.
R3	The selection of data centre services should consider the ability of the facility to satisfy the changing and future demands of ICT infrastructure.

Table 3: Resilience principles

2.4.4 Connectivity

Ref	Principle
CN1	Data centres should provide multi carrier access
CN2	In most cases diverse paths for major carriers should be available
CN3	Data centres should provide resilient access to internet delivered services.

Table 4: Connectivity principles

2.4.5 Security

Ref	Principle
S1	Information systems should be assessed to determine the required level of physical security to be provided by the data centre and any formal security certifications required to support them.
S2	Data centres used by Queensland Government agencies should provide at least a 'IN CONFIDENCE' level of security.
S3	Higher levels of security that may be required by specific business needs should be achieved through specialised treatments of prescribed locations as required e.g. partitions, C-class racks, extra monitoring etc.

Table 5: Security principles

2.5 Assumptions

The key assumptions that apply to the Queensland Government data centres - Strategy and principles are:

Ref	Assumption
A1	In line with 'cloud first' strategy, Queensland Government agencies are moving to less owned and operated ICT infrastructure and subsequently decreasing their data centre footprint.
A2	The future CITEC operating model will prescribe the appropriate treatments for the existing whole-of-government data centres (317 Edward St and Polaris)

Table 6: Assumptions

3 Future state

3.1 A new approach

It is recognised that there will be a continued need for Queensland Government agencies to own and operate some ICT infrastructure well into the future. The 'hybrid' model of on-premises and remote ICT systems is an expected outcome during the adoption of cloud-based solutions as outlined in the [Cloud Computing Strategy 2013-17](#). As such, it is prudent for Queensland Government to maintain access to data centre capacity into the future to house the owned and managed hardware supporting solutions identified to remain 'in-house', either in a private/on-premise cloud model or application specific environments. This data centre capacity should be provisioned following the principles detailed in this document.

The operation and management of the required data centre capacity could be accomplished under two models (or a combination of both):

- central management of all data centre facilities by one Queensland Government agency
- management of individual data centres by responsible agencies.

To facilitate the procurement of data centre capacity in the future by any Queensland Government agency, the DSITI procurement services can create a panel of preferred suppliers that have been identified to provision these services to Government.

3.2 Polaris

The Polaris data centre currently performs as one of Queensland Government's primary data centres. Commissioned in 2009, this state of the art facility using modern infrastructure management tools, delivers the resilience, redundancy and security attributes demanded by Queensland Government business needs, including many mission critical solutions. The significant amount of infrastructure emphasises the key role this facility performs in supporting all Queensland Government agencies. Any transition out of this facility would represent a high level of risk to service continuity as well as potentially high transition and relocation costs.

Provided issues with the current leasing contract can be resolved, Polaris should be retained as the Queensland Government primary data centre. The data centre could continue to be managed by an entity established to deliver selected ICT services to

agencies (the new CITEC), or under another arrangement as determined by the future operating model for CITEC.

The renegotiation of the lease at Polaris, expiring in Jan 2019, must make consideration for the expected demand for data centre capacity and also include mechanisms to increase and decrease capacity in a flexible manner at appropriate time intervals.

The development of the future operating model for CITEC will specify the appropriate treatment of the Polaris lease. This activity should be completed as soon as possible so a clear status for the site can be communicated to agencies. Options will include:

- terminate lease at expiry date (Jan 2019) and commence transition out immediately (unlikely)
- renegotiate lease immediately to a 'pay for use' model
- novate lease to another entity and purchase capacity as required from that entity.
- invite offers from the market for innovative solutions to the Government's requirements for datacentre capacity.

3.3 317 Edward St

As recommended in the analysis conducted by CS Technology in late 2011, 317 Edward Street should not be relied on in the long term to support Queensland Government ICT infrastructure and service delivery. Even though there are no critical issues currently with the site, the lack of redundancy in some key services, the high cost of refreshing key infrastructure elements and the high risk associated with operating a facility now in its fourth decade, collectively require a strategy to exit the site by 2020 to be developed.

As well as the technical issues supporting an exit from the 317 Edward St site, the financial considerations associated with the whole campus further reinforce the need to develop a strategy to vacate that site. The redevelopment potential of the 317 Edward St site would likely present a financial benefit to government even after funding a major transition of ICT infrastructure out of the data centre facility located there.

This exit strategy can be developed with the following considerations:

- Polaris is still available
- need to align with strategies for legacy services still supported by that site
- a transition out project will initiate migration to 'as a service' solutions for many business applications
- business case must consider financial benefits of redevelopment of the site
- industry should be engaged to explore transition out strategies
- the market could be invited to provide innovative solutions to the government's requirements for datacentre capacity, simultaneously with Polaris datacentre market test.

3.4 Agency managed facilities

To consistently apply the agreed data centre principles, agencies currently operating their own data centres (either leased or owned) must develop a roadmap defining the use of these facilities for the next five years, taking into consideration:

- transition to 'as a service' solutions
- age of facility
- duration of lease
- capacity management (spare or extra required)

- true operational costs
- potential to support other agencies
- spare capacity at whole-of-government data centres.

3.5 Exclusions

The Department of Health has operational needs to maintain server room and data centre facilities in local hospital campuses. These facilities are required to support onsite clinical services and operational needs. This exclusion would not apply to Department of Health's data centre capacity supporting the corporate functions of the department, which would be sourced in alignment to this document.

4 Current state

4.1 Analysis

A high level survey conducted in December 2015 shows that the Queensland Government's data centre footprint is approximately 1400 racks, consuming 2500 kWatts. This capacity is consumed over 28 sites, including Polaris and 317 Edward St. Of these, three are facilities owned and operated by commercial providers (excluding Polaris).

Agencies have indicated their data centre footprint at these sites will remain static or decrease in the next few years. The exception to this is several agencies indicating an increase to their footprint at Polaris. Agencies have indicated that they are not seeking alternate data centre sites except in the cases where they have flagged their intention to leave 317 Edward St.

4.2 Changing demands

Discussions with agency representatives, and backed up by responses in the recent survey, have indicated the demand for physical data centre capacity is declining. The transition to managed services and cloud solutions to satisfy service delivery needs is resulting in a declining need for technical floor space.

The survey responses also indicate a preference to source data centre housing as a service where needed, rather than own and operate a facility. Apart from Polaris and 317 Edward St, there are 26 sites operated by government agencies, compared to 39 sites identified at the end of the data centre consolidation exercise in early 2012.

4.3 Private cloud options

Recent announcements by major infrastructure-as-a-service cloud providers have identified the potential for on-premises private cloud facilities to address the hybrid architecture requirement. Microsoft Azure Cloud is an example. These private cloud implementations are owned and operated by the public cloud provider, but housed locally and dedicated to the customer's sole use. This is a potential opportunity for accelerated migration to cloud computing solutions, while addressing the issues of security and control associated with pure public cloud offerings.

The overall contract management and data centre accommodation of such an externally managed 'private cloud' for Queensland Government could be a responsibility of the future CITEC entity.

5 Dependencies

- Outcome of CITEC future operating model deliberations.
- Queensland Government (State Development) intentions for 317 Edward St site.

6 Governance of data centre use in Queensland Government

It is proposed that the Directors-General Council for ICT, endorse and subsequently provide governance for the implementation of the agreed Data Centre Principles.

A supporting QGEA policy should be developed to reflect the requirement for agencies to observe the agreed principles. The Directors-General Council should provide endorsement of the QGEA Data centre policy.

It will be important that the Department of Housing and Public Works (Government Accommodation Office) supports adherence to the data centre principles with respect to any applications for construction of or extension to data centre facilities owned by Queensland Government. Such applications should not be progressed unless exceptional circumstances exist and an exemption from the QGEA Data centre policy (once finalised and approved) has been granted.

7 High level actions

7.1 Action 1

Obtain endorsement of the *Data centre - Strategy and principles* (this document) and supporting the creation of QGEA policy from the Directors-General Council for ICT.

7.2 Action 2

Obtain Ministerial approval for the Data centre principles.

7.3 Action 3

The Department of Science, Information Technology and Innovation (CITEC) will initiate program of work to address the 317 Edwards St and Polaris data centre situation with an outcome that delivers a sustainable data centre landscape for Queensland Government. The program of work will comprise an approach to market seeking innovative offers to provide the government's requirement for data centre facilities. Offers should be encouraged which:

- a. addresses the transition risks and costs to exit 317ES to an alternate facility
- b. takes over the Polaris lease in a form which allows the government to move to a utility-based arrangement for future use of this datacentre.

This program of work must align with the directives which will determine the Future CITEC Operating Model.

7.4 Action 4

Agencies will develop a data centre roadmap consistent with the implementation of the data centre principles and will report annually on its progress and their physical data centre footprint through the QGCIO ICT profiling collection. The progress and status report will be presented to the Directors-General ICT Council for consideration.