NSW GOVERNMENT

NSW Government Cloud Strategy

Enabling government-wide adoption of public cloud services in an aligned and secure manner, to accelerate innovation, modernise service delivery and drive better outcomes for the citizens of NSW.

Contents

1. Executive Summary

The NSW Government is making the strategic shift to cloud consumption through the use of public and private cloud services. The purpose of the NSW Government Cloud Strategy is to provide all NSW Government agencies with a common vision, direction, and approach for consuming cloud services to enable agencies to transform and accelerate digital service delivery.

The NSW Government Cloud Strategy has been developed with inputs from all NSW Government clusters and in partnership with industry. The strategy has provided an understanding of the common challenges that are getting in the way of agencies achieving their cloud aspirations and has been developed to help guide agencies past these to make the most of the cloud opportunity.

The vision for cloud consumption across NSW Government is 'Enable government-wide adoption of public cloud services in an aligned and secure manner, to accelerate innovation, modernise service delivery and drive better outcomes for the citizens of NSW'.

The NSW Government cloud strategy includes success measures for cloud consumption. These success measures include: consumption of cloud arcross NSW Government agencies, reduction in capital expenditure on ICT services and limited exceptions to the NSW Government Cloud Policy.

This NSW Government Cloud Strategy also provides principles for consistently adopting cloud alongside the benefits of cloud consumption. This document is to be used in conjunction with the NSW Government Cloud Policy, and NSW Government Cloud Adoption Framework.

The NSW Government Cloud Strategy is presented in five sections:

1. **Executive Summary:** outlines background and context, introduces what the strategy is, the outcomes to be achieved by following this strategy, the scope of the strategy and NSW Government agency responsibilities in following and executing the strategy.
2. **The Cloud Opportunity:** provides a common definition for cloud services and presents the case for why NSW Government is making the strategic shift to consume services through public cloud.
3. **Where we are:** outlines the current position of NSW Government cloud consumption and challenges experienced across the sector.
4. **Public Cloud First Strategy:** sets the vision, direction, and principles for the consumption of public cloud services across NSW Government.
5. **Roadmap:** outlines the mechanisms that will be developed to make it easier for agencies to access and consume cloud services, as well as the immediate steps being actioned.

a. Background and Context

The NSW Government's ICT and Digital landscape has evolved significantly over the last decade through delivery of the NSW Government Data Centre Reform and growth in the consumption of cloud services.

The NSW Government has continued to increase ICT service offerings through the introduction of GovDC (herafter referred to as private cloud), implementation of dedicated cloud network connectivity, development of the private cloud marketplace, and introduction of mechanisms to support access to public cloud services. In parallel, NSW Government agencies have been increasing their consumption

of public cloud services to support responsive delivery of innovative and scalable services to the citizens of NSW.

The NSW Government Cloud Strategy was developed in collaboration with all NSW Government Clusters. It takes into account historic iterations of various digital and cloud strategies and policies, including the NSW Digital Strategy, 'Beyond Digital Strategy', Federal Secure Cloud Strategy, and the Federal Digital Transformation Strategy. The NSW Government Cloud Strategy further evolves and aligns the thinking within these strategies to provide cetralised guidance and direction to enable a consistent, scalable, and aligned approach to the consumption of cloud.

b. Outcomes of the Strategy

The strategy provides guidance and direction to enable NSW Government agencies to achieve the following outcomes:

Alignment – By defining and guiding the direction of the adoption and implementation of cloud services, this strategy ensures alignment of cloud implementation across the NSW Government in accordance with NSW Government strategic objectives and priorities set in the Beyond Digital strategy.

Security – adhering to this strategy guidance, regarding usage of cloud services will ensure NSW Government agency assets and data are secured.

Consistency – NSW Government agencies receive common direction in the consumption of cloud services, allowing them to make consistent usage of the public and private cloud services.

Modernisation – the NSW Government Cloud Strategy guides NSW Government agencies in consuming cloud services to modernise their ICT and Digital service delivery. The strategy enables modernisation through lineage to updated business processes for procurement, security, and consumption of cloud services.

Innovation – enables NSW Government agencies to consume new cloud capabilities such as AI, machine learning, data analytics etc. By leveraging cloud services, the NSW Government will be able to keep up with services released by industry, without having to build and maintain each capability.

Optimal Commercial Outcomes – NSW Government agencies will contribute to optimising NSW Government commercial outcomes by using strategic partnerships with public cloud services providers, whole of government agreements and purchasing arrangements that have been established and referred to in this strategy.

c. Scope & Responsibility

The NSW Government Cloud Strategy applies to all NSW Government clusters and agencies. It does not apply to State Owned Corporations, but it is recommended for their adoption.

All NSW public sector Secretaries and Chief Executives are responsible for ensuring that this strategy is applied within their clusters and/or agencies. The NSW Government ICT and Digital Leadership Group (IDLG) provides oversight for this strategy.

Agencies will be responsible for understanding and making use of the following documents to realise the benefits of cloud in line with their organisational goals. As such, agencies will be supported and guided by the following documentation:

- **NSW Government Cloud Strategy** (this document) – which sets the vision, principles, and outcomes for cloud use across NSW Government as well as the roadmap for overcoming existing challenges.
- **NSW Government Cloud Circular and Cloud Policy** – which guides and directs agency cloud use in line with existing procurement and security guidance, to ensure use of cloud services is efficient, secure, and financially sound.
- **NSW Government Cloud Adoption Framework** – which provides guidance and support in how agencies adopt cloud including common considerations around areas including risk, architecture, business case development, workload assessment and migration.

2. The Cloud Opportunity

This section of the strategy provides a common definition for cloud services, presents the case for why the NSW Government is making the shift to public cloud and outlines the benefits of public cloud.

This section will cover:

- What is Cloud?;
- 'Beyond Digital' Alignment; and
- Public Cloud Benefits.

a. What is Cloud?

Cloud has become the new standard for how information technology services are consumed. It is the on-demand consumption of computing services and resources, such as servers and storage, over the internet. Cloud has been enabling the NSW Government to consume information technology as a commodity, and increase the scalability, flexibility, and speed of delivering digital services.

The models of cloud differ based on the types of services consumed as well as the types of deployment used. The scope of this strategy encompasses the following areas of cloud computing:

Cloud Services Consumed:

- **Infrastructure as a Service (IaaS):** Consumption of IT infrastructure (server, storage, network, operating system) from a cloud provider.
- **Platform as a Service (PaaS):** Consumption of IT platform to allow for the development, operation, and management of applications without the complexity of building and maintaining infrastructure.
- **Software as a Service (SaaS):** On demand delivery of software applications, with cloud providers hosting and managing the application and its underlying infrastructure.

Cloud Deployment Types:

- **Public Cloud:** Public clouds are owned and operated by third party cloud service providers, who own, manage, and deliver computing resources (eg compute, storage) over the internet.
- **Private Cloud:** Private cloud offerings refer to cloud computing resources used exclusively by a single organisation, with services and infrastructure maintained on a private network. NSW Government agencies consume private cloud services through the NSW Government Data Centres (GovDC).
- **Community Cloud:** Community clouds are similar to private cloud, but resources are used by a single type of organisation (eg Government only).
- **Hybrid Cloud**: Hybrid deployments leverage public and private clouds, linked by technologies that allow data and applications to be shared between them.

The NSW Government Cloud Strategy will be to use public cloud services by default and use private cloud services by exception. The mandate, direction and exemption process for selection of cloud services can be found in the NSW Government Cloud Circular.

b. ‘Beyond Digital’ Alignment

The NSW Government developed the ‘Beyond Digital’ Strategy in 2019, to guide the use of digital technology across Government, in achieving better citizen outcomes. The focus of the strategy was not to simply better use technology, but to go beyond by considering people, process and governance elements such as adopting a whole-of-government view of service delivery, driving a culture of continuous improvement, or setting the strong security and privacy foundations.

Cloud has been identified as an enabler of the ‘Beyond Digital’ Strategy, supporting the outcomes of two of the five strategic directions, namely ‘Deliver Better Frontline Technology’ and ‘Invest for Customer Outcomes’. The diagram below summarises the five strategic directions and the outcomes which underpin these.

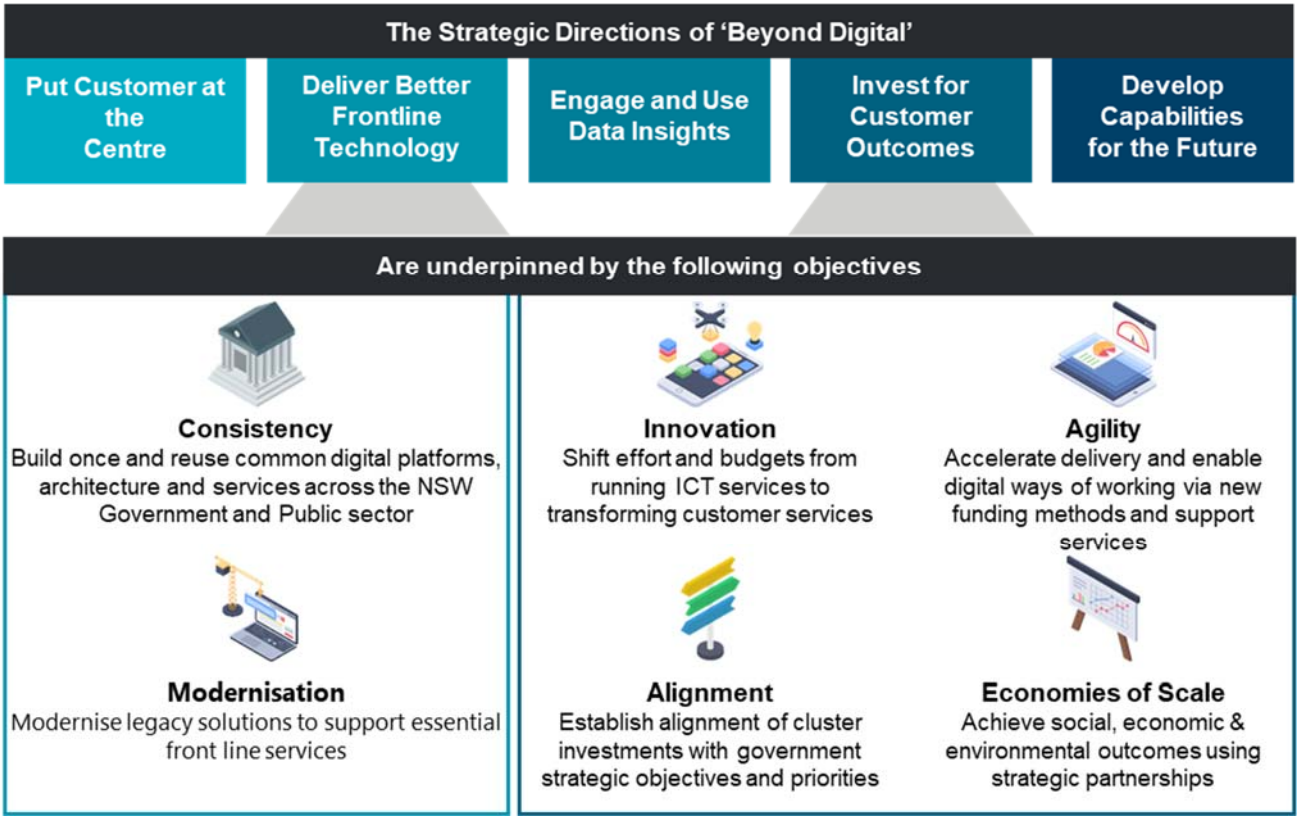

Figure 1 - Cloud Alignment to the 'Beyond Digital' Strategy

Cloud supports the ‘Beyond Digital’ Strategy, by enabling the responsive delivery of more innovative services to meet the growing and changing needs of the people of NSW. Cloud enables two significant shifts for Government to achieve this:

1. **Focus on Differentiating Services** - Cloud allows government to transition from the undifferentiated activities of managing infrastructure, to consumption of ICT as a service, allowing greater focus on differentiating services.

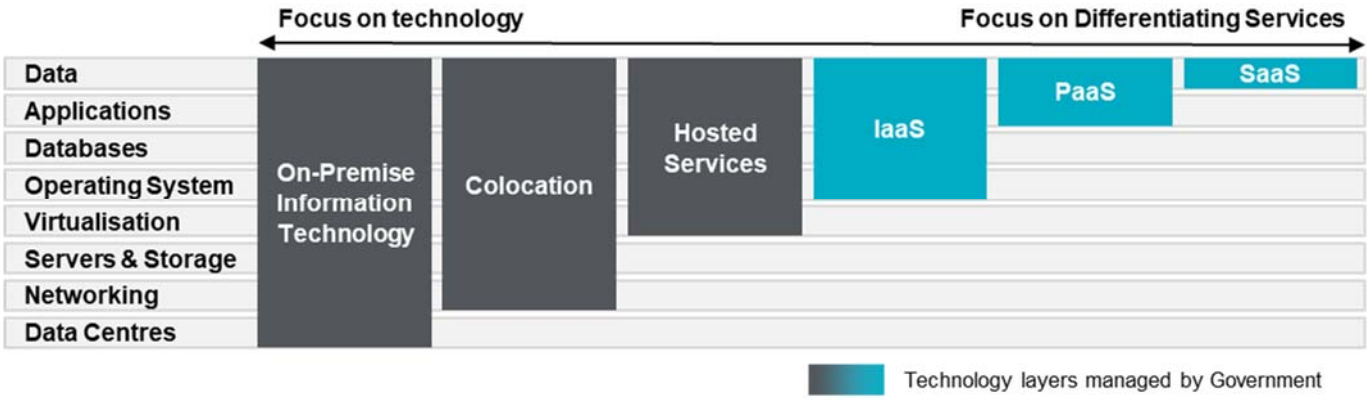

Figure 2 - Cloud enables a focus on differentiating services

2. **Deploy and Leverage Innovative and Native Services** - Cloud provides the foundational infrastructure upon which to rapidly deploy more advanced services. This empowers the government to keep up with the most innovative services in industry, without having to build and maintain each capability.

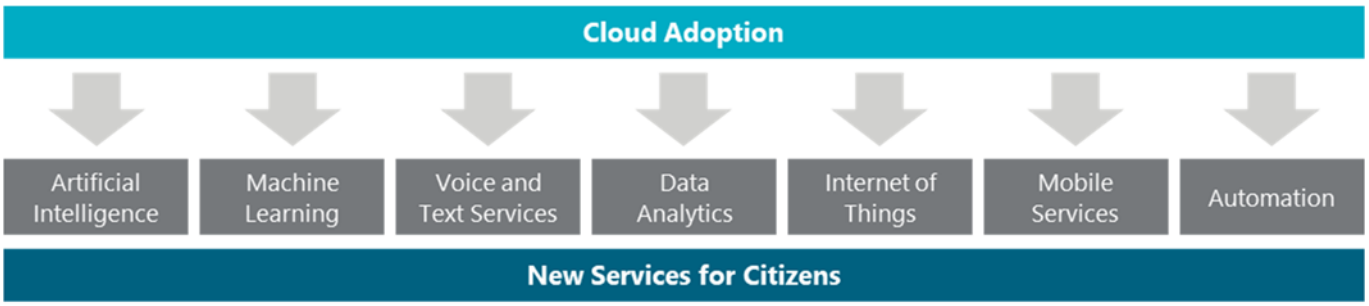

Figure 3 – Cloud allows NSW Government to deploy innovative and native services

These two major shifts are also further reinforced by a series of benefits which can be achieved through the consumption of public cloud services. These are explained in the section below.

c. Public Cloud Benefits

Public cloud services enable a series of direct and indirect benefits for the NSW Government. The direct benefits of using public cloud, such as elasticity, flexibility, and access to new services, are the more visible changes enabled by cloud. Through well considered architecture and governance, agencies can also realise indirect benefits of cloud such as greater agility, cost savings and innovation.

The table below details the benefits of using public cloud services and indicative measures to quantify each outcome.

Benefit	Indicative measure
Direct Benefits	
Rapid Elasticity - The on-demand model of cloud allows agencies to rapidly scale up and down their infrastructure in line with end user and developer needs, allowing the NSW Government to keep up with growing and changing citizen demands.	1-3 minutes to scale up an instance through autoscaling
Access to New Services - Cloud provides the NSW Government the foundations upon which to deploy more advanced services such as artificial intelligence and machine learning as well as access to continual updates and service improvements.	1000s new services released by cloud providers each year
High Availability - Services can be architected to be highly resilient and available in the cloud to ensure fewer outages and less down time by leveraging the architecture constructs of cloud (eg availability zones).	80% reduction in unplanned downtime instances per year
Flexibility - Through cloud, the NSW Government will have access to a range of programming models, operating systems, databases, and architectures as well as vendor services available through cloud marketplaces.	10,000s services available through cloud marketplaces
Indirect Benefits	
Automation - Platform and application automation can enable greater ease of management across ICT environments as well as self-service provisioning capabilities.	18% increase in process efficiency
Cost Avoidance & Efficiencies - Cloud enables the NSW Government to pay for resources used, on demand. Upfront this can enable cost avoidance on the refresh of infrastructure assets as well as long-term cost savings as workloads are optimised in cloud.	15% average reduction in IT operational costs
Focus on Service Differentiation - Cloud enables Government departments to transform away from the undifferentiated heavy lifting of managing infrastructure to consuming it as a service, allowing greater focus on differentiating services for citizens.	118% increase in number of business applications deployed per year
Business Agility - Cloud supports more agile development practices and deployment methodologies which can significantly reduce time to market if processes are updated to make use of rapid provisioning.	7% decrease in average time to deploy new applications
Centralisation & Visibility - Well governed cloud environments can help to centralise ICT environments and provide clearer visibility of services being used as well as ICT costs at a granular level.	22% increase in IT spend visibility
Greater Security & Resiliency - Cloud environments keep track of all changes made through logging and can make use of the latest firewalls and security features to reduce the likelihood and impact of cyber-attacks and internal misconfiguration.	

Figure 4: Direct & Indirect Benefits of Cloud Adoption

3. Where we are now

This section of the strategy outlines the current position of NSW Government cloud consumption (both private and public) and identifies the challenges hindering agencies in achieving their cloud aspirations. These challenges are reinforced through a comparison to challenges being experienced across industry.

This section will cover:

- Private Cloud Consumption;
- Public Cloud Consumption;
- Challenges to address; and
- Industry Challenges.

a. Private Cloud Consumption

The NSW Government consume private cloud services through the Government Data Centres (GovDC). In 2009, the NSW Government launched the 'Data Centre Reform' to support the Government's ICT strategy by consolidating 130 disparate data centres into two purpose built facilities (GovDC). GovDC opened for business in 2013 with offerings centred on secure data storage, network services and internet gateway services.

GovDC hosts ICT infrastructure for over 27 agencies, 14 cloud service providers, 3 education institutions and 2 councils. As of 2019, GovDC has also enabled the NSW Government to achieve the following benefits:

- $52 million in savings for the government;
- 646,000 tonnes reduced carbon emissions;
- Reduced electricity consumption by 50%; and
- Achieved 100% availability.

Agency demand has historically focussed on private cloud services within GovDC. However, this demand growth is starting to taper, as more agencies explore public cloud services. The graph below summarises the growing consumption of GovDC from 2014 through to 2020. This demand is expected to flatten, as agencies consume more public cloud services.

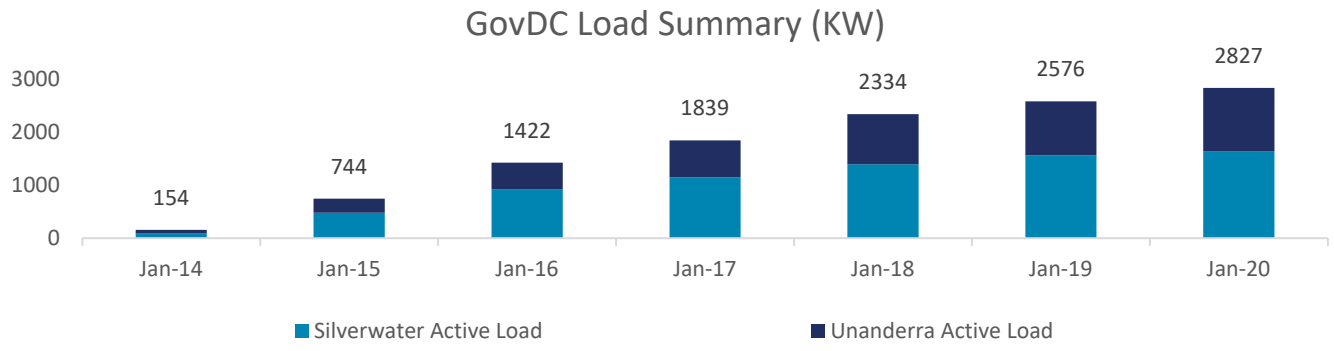

Figure 5: GovDC Load Summary (KW) from 2014-2020

b. Public Cloud Consumption

Increasingly NSW Government agencies have also been leveraging public cloud services to accelerate the delivery of responsive services for citizens. Discovery research identified that NSW Government agencies are largely using public cloud services for foundational services such as compute, network, storage, databases, enterprise applications and application services.

NSW Government departments are approaching cloud at differing paces. Discovery research asked 13 agencies to self-assess against four stages of cloud adoption, summarised in the table below. This research highlights that agencies have varying levels of maturity in their use of cloud, with some agencies just commencing their cloud journey, whilst others have matured multi-cloud environments.

Stage of Cloud Adoption	Initiation	Development	Transition	Cloud Native
Number of Departments	5	3	5	0

Figure 6: NSW Government Agency Stage of Cloud Adoption

The variable maturity of cloud use across agencies means that there is no 'one size fits all' approach to cloud across the NSW Government, but provides the opportunity to leverage and extend existing work and learnings to support all agencies.

The increase in NSW Government public cloud use is summarised in the graph below. Between 2016 and 2019, public cloud spend has doubled, with some volatility. Spend has been largely focused on software as a service consumption rather than infrastructure or platform as a service usage.

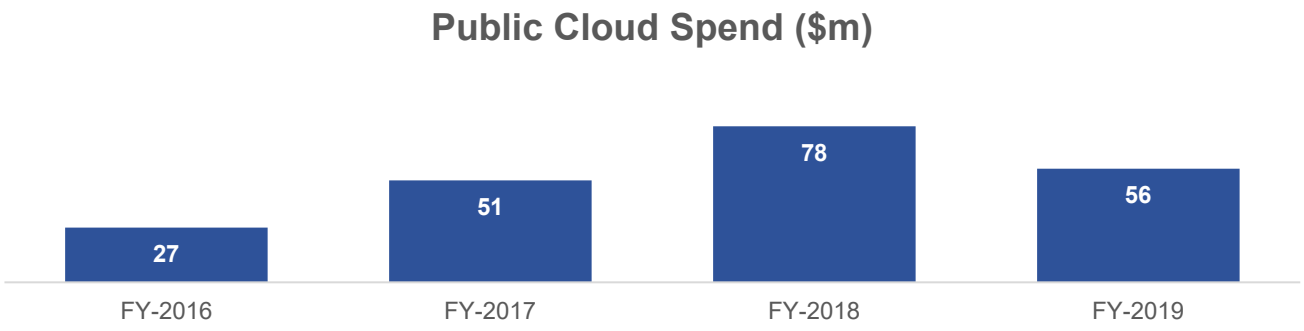

Figure 7: Public Cloud Spend FY 2016-2019

Future NSW Government cloud use cases centre on Software as a Service (SaaS) consumption as well as more contemporary services such as mobile services, content delivery, artificial intelligence, machine learning, language processing and the internet of things.

Target services for NSW Government agencies include:

- Consuming serverless services to reduce management overheads and reduce the need for infrastructure;
- Adopting a cloud native approach to re-architecting legacy systems;
- Enabling an omni-channel experience through AI and virtual assistant services;
- Embedding automation for continuous assurance of security; and
- Leveraging cloud processing power for big data and analytics.

c. Challenges to address

NSW Government agencies aspire to make greater use of cloud services, however there are several challenges across the sector hindering adoption and consumption of public cloud.

Discovery workshops and interviews with NSW Government agency representatives highlighted that existing process and mechanism challenges are hindering cloud uptake, highlighting the need for mechanisms to enable frictionless supply.

The four key challenge themes that were identified are:

1. **Procurement:** existing procurement processes are limiting the Government's adoption of cloud and outcome realisation;
2. **Security:** expanding security boundaries and increasing service complexity could leave the Government vulnerable in their move to cloud;
3. **Funding:** Growth in ICT funding has not been accompanied by changes to the financial operating model needed to enable cloud; and
4. **Talent:** Cloud further exacerbates ICT talent challenges as cloud skills are less defined, in higher demand and in short supply.

These themes are further explored below in greater detail.

1. Procurement

The NSW Government have been increasing spend on cloud, however existing procurement process and policies have been challenged in keeping up with the on-demand nature of cloud purchasing and consumption. The following procurement challenges were prioritised by NSW Government agencies:

- **Lengthy Process:** Agencies find current processes for procuring cloud services to be lengthy, leading to agencies procuring outside of established processes.
- **Lack of Guidance:** Schedules and panels are not able to keep up with government service demands, leading to gaps in the guidance for procuring cloud.
- **Purchasing Mindset:** Agencies are procuring "As-a-service" individually which duplicates efforts and limits economies of scale.
- **Unclear Value in Process:** Agencies do not feel they are receiving value from procurement mandates.
- **Vendor Assessment:** Vendor capabilities, experience and quality are self - assessed which opens the NSW Government up to delivery risks.

2. Security

The increasing adoption of cloud services presents a security risk to the NSW Government due to the expansion of security boundaries, coupled with a shortage in security staff. A shortage of security, architecture and testing personnel is highlighted in the graph below.

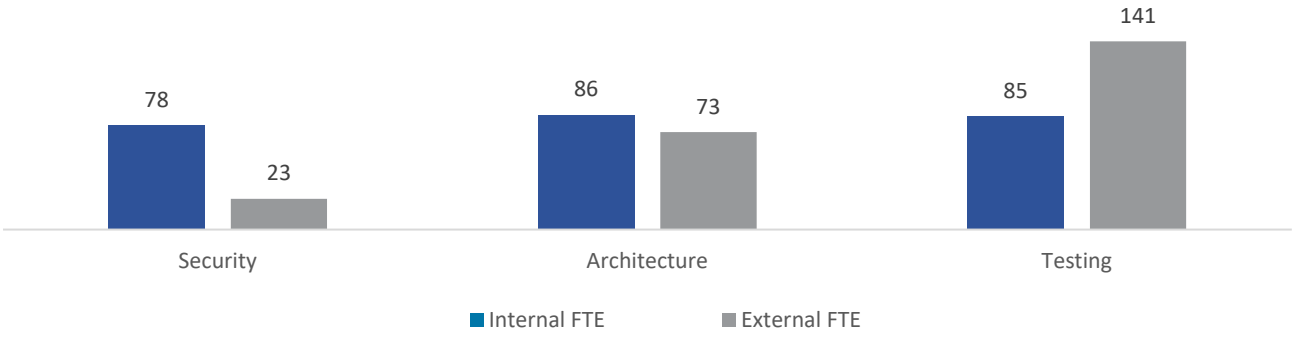

Figure 8: NSW Government Security Capability & Resources

As cloud security is a shared responsibility between the provider and NSW Government, alongside the heightened importance on security data and services in the Cloud, the current maturity and scarcity of security resources requires careful focus to ensure adequate readiness in the Government's move to cloud. The following security challenges were prioritised by NSW Government agencies:

- **Security Requirements:** Agencies require greater knowledge of the cloud security processes and compliance standards that are needed for their services.
- **Guidance:** Guidelines and documentation are required to help agencies implement cloud security controls and risk mitigations.
- **Application:** Security, compliance and risk assessments and control implementations need to be consistently applied across cloud implementations.
- **Sovereignty:** Agencies require an understanding of their data sovereignty requirements.

3. Funding

Funding models and processes require uplift to cater to the on-demand OPEX nature of cloud. The graph below highlights the continued increase in ICT spend from FY13 through to FY20. However, whilst ICT spend has increased, the models and processes for spend have historically focused on CAPEX procurement of assets.

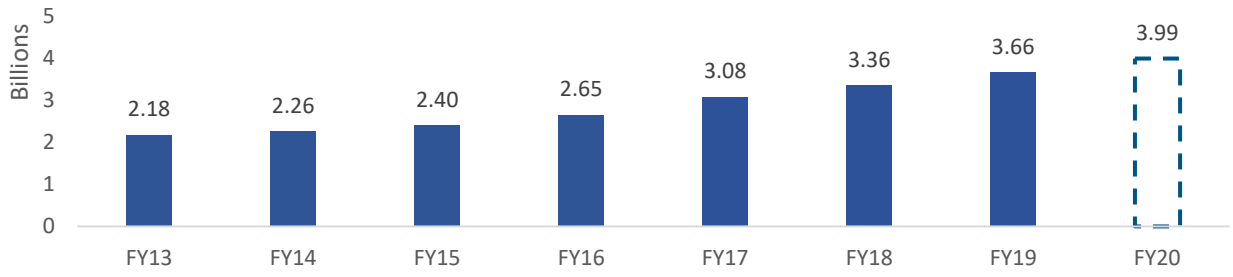

Figure 9: NSW Government ICT Spend ($bn)

The following funding challenges were prioritised by NSW Government agencies:

- **Funding Model:** The existing funding model and processes are built around CAPEX funding for procuring assets rather than OPEX funding for consuming services.
- **Cost Variability:** Cloud costs are variable with a risk of cost blowout if services are not governed and managed appropriately.
- **Unknown Cost Elements:** Agencies are not fully aware of the total cost of ownership for cloud.

- **Business Case Approval:** Agencies are having trouble in developing compelling business cases that are understood and funded by Treasury.
- **Cloud Comparisons:** Differences in cloud provider constructs and services make comparisons against traditional infrastructure and between different providers difficult.

4. Talent

Cloud further exacerbates ICT talent challenges as cloud skills are less defined, in higher demand and in shorter supply.

In 2017, insourced ICT FTEs decreased to 66% with 34% outsourced. This rate trailed behind the Gartner average of 84% insourced FTEs and is attributed to high levels of competition with other industries and an ICT skills shortage.

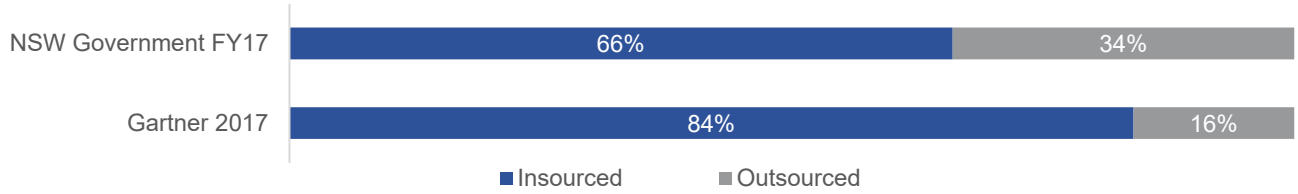

Figure 10: ICT Fixed Term Employees: Insourced vs. Outsourced

Furthermore, an industry report across Federal Government found skills issues to be among the top three issues hindering cloud adoption (alongside policy and structural issues).

Figure 11: Government Barriers to Adopting Cloud

The following talent challenges were prioritised by NSW Government agencies:

- **Skills Shortage:** There is a shortage of cloud expertise in Government and industry, making it difficult to access cloud SMEs.
- **Undefined Operating Model:** Capabilities, roles and skills needed to support cloud are not fully understood across NSW Government.
- **Outdated Skills Framework:** The current skills framework used by NSW Government (SFIA) is not up to date with cloud skills and capability levels.
- **Talent Retention:** Once trained, resources are difficult to retain due to industry competition over a limited supply of people.

d. Industry Challenges

The challenges faced across NSW Government were also validated through discovery activities with industry. A diverse range of perspectives were sourced across global and local cloud and infrastructure providers. Interestingly, several of the sentiments and challenges experienced mirrored challenges raised by NSW Government agencies.

Highlighted below are the key themes of these sentiments and challenges:

- Government skillsets are inhibiting cloud consumption;
- Procurement processes are complex and not consistently followed;
- Security is not always an upfront consideration and there is inconsistent application of security controls;
- Cost and risk components need to be considered holistically;
- There is a need for greater transparency in the assessment of cloud providers; and
- Interoperability and portability need to be considered.

The demand (NSW Government) and supply (cloud provider) challenges explored above, have been central in driving the NSW Government Cloud Strategy, which focuses on making it easier for agencies to access and consume cloud services. The strategy is explored in the following section.

4. Cloud Strategy

The NSW Government Cloud Strategy sets the vision, direction, and principles for the consumption of public cloud services across NSW Government.

This section will include:

- Cloud Vision; and
- Strategic Principles.

a. Cloud Vision

The vision for NSW Government is to 'Enable **government-wide adoption** of **public cloud services** in an **aligned** and **secure** manner, to accelerate innovation, modernise service delivery and **drive better outcomes for the citizens of NSW**'. The key tenants of this vision are explained below:

- **Government-wide adoption** – achieved by developing the supporting mechanisms to enable all agencies to consume cloud.
- **Public cloud services** – agencies will build and operate their ICT using industry leading public cloud services, to remove the undifferentiated heavy lifting of managing ICT and take advantage of innovative services from industry.
- **Aligned** – NSW Government will use a consistent set of cloud design and architecture principles, the NSW Government Cloud Policy, and the NSW Government Cloud Adoption Framework to make the best use of cloud services.
- **Secure** – Agencies will secure and protect citizen data by applying appropriate security controls.
- **Drive better outcomes for the citizens of NSW** – by using public cloud services to accelerate digital service delivery to meet the growing and changing needs of the people of NSW.

The success measures of the NSW Government Cloud Strategy are to ensure the following by 2023:

1. **All NSW Government agencies using public cloud**, for a minimum of 25% of their ICT services, by 2023. The Delivery and Performance Architecture checklist (DAPA) has been developed in line with this strategic goal.
2. **Less than 5%** of requests for ICT services funding, require **exception from the NSW Government Cloud Policy**
3. **25% reduction on ICT infrastructure** procured by NSW Government agencies with **capital expenditure**.

b. Strategic Principles

Cloud provides the opportunity for agencies to leverage new technology and services to achieve their business outcomes. As such agencies should not seek to replicate existing ICT services from their data centres to the cloud. A series of strategic principles have been defined to guide agencies in making the right decisions and consuming appropriate services.

Principle 1: Use public cloud services as the default

All NSW Government agencies must make use of public cloud services as the default.

- Where public cloud services are not suitable for agency requirements, private cloud services, provided through the Government Data Centres (GovDC) can be used by exception.
- The use of public cloud services will apply to new agency ICT services and the material replacement or renewal of any existing services, platforms, and infrastructure.
- Exemptions to the use of public cloud services will be reviewed in cases where public cloud services are not suitable, as assessed through one or more of the following pre-requisites: cost-benefit analysis, market scan of public cloud services, or security assessment.
- In cases where ICT services cannot be consumed through public cloud, agencies will be required to develop a briefing paper to request exemption, supported by these pre-requisite assessments.
- Exemption requests that are associated with a funding submission to the Digital Restart Fund will be reviewed and approved by NSW Government Delivery and Performance Committee (DaPCo), and are to be submitted in conjunction with the Delivery and Performance Architecture (DAPA) checklist.
- Exemption requests that are not associated with a funding submission to the Digital Restart Fund will also be reviewed and approved by DaPCo and are to be submitted in conjunction with the bi-monthly ICT assurance, cyber and procurement DaPCo submission.

Benefits of using public cloud services as the default include:

- Eliminate dependency on end of life infrastructure;
- Shift away from owning and managing infrastructure, to focus on transforming customer services;
- Leveraging innovative and native cloud services to support digital service delivery;
- Provisioning services to scale in line with growing and changing citizen needs; and
- Ensuring the availability and reliability of ICT services to maintain citizen trust in Government.

Principle 2: Automate infrastructure where possible

Script the process of deploying and configuring infrastructure, from launching a network, deploying an operating system, or configuring how services communicate with each other. Infrastructure Automation is achieved through:

- Infrastructure as Code: Develop infrastructure in code templates (definition files) to ensure repeatability and avoid manual configuration.

- Build Repeatable Patterns & Solutions: Cloud applications, infrastructure and security should be built as generally repeatable solutions to common use cases *(patterns). Examples of patterns include (eg vertical, horizontal or autoscaling and 2-tier, 3-tier or n-tier patterns).*
- Deployment Automation: Deployment of workloads and environments should be automated through the use of continuous integration and continuous deployment pipelines.

Benefits of infrastructure automation include:

- New services delivered are repeatable;
- Infrastructure in the cloud can be scaled up and down without additional effort; and
- Delivery of services is faster through automation of tasks.

Principle 3: Modernise applications to make use of cloud-native services

Modernise Applications – move away from monolithic applications and performance issues by using new cloud services (where it makes sense). Application modernisation is achieved through:

- Use cloud services to modernise applications shifting towards stateless and ephemeral applications.

Benefits of application modernisation include:

- Services can scale up and down without losing customer data or information;
- Increased portability and interoperability of applications and solution components by decoupling them from infrastructure and placing them in self-contained environments (containers and functions); and
- Existing application issues are revisited and removed to enable optimal performance.

Principle 4: Optimise operations to reduce manual toil and operational burdens

Operations optimisation can be achieved through:

- Event Triggers: Environments and solutions can respond automatically based on events and predetermined metrics (eg auto-scaling based on compute utilisation).
- Service Management Playbook: Cloud will have significant ramifications on existing IT processes and provides the opportunity to redefine and enhance processes for greater agility.
- Policy and compliance as code: Build security, policy and compliance requirements into code and repositories to enable rapid development.

Benefits of operations optimisation include:

- Reduction in manual effort and wait times required to complete tasks;
- Shift from run to grow and transform functions within ICT that better deliver visible value to NSW citizens; and
- Greater responsiveness and agility in the delivery and management of ICT services.

Principle 5: Measure services and use data to optimise

Monitor services and frequently measure performance of the cloud architecture against service behaviour and business outcomes to improve consumption choices based on the results.

- Cloud platforms provide tools to collect data on how services are performing which should be enabled, aggregated, and monitored.
- Continuous measurement of service use should be used to deactivate unused instances and optimise costs based on usage patterns.

Benefits of services and data optimisation include:

- Significant cost optimisation;
- Improved performance of architecture against varying workloads; and
- Ability to fine-tune architecture to required performance levels.

Principle 6: Configure services as the preference to customisation

Use services as they come, without bespoke customisations or processes which can impede the agility of the service through additional complexity introduced.

- Agencies should configure services and not customise them.
- Agencies should change business functions/processes in preference to changing service functions.

Benefits of configuration over customisation include:

- Improved security of applications and platforms;
- Risk of managing patching is transferred to cloud services provider; and
- Improved agility through use of standard services.

5. Our Strategic Roadmap

To achieve the NSW Government Cloud Strategy and realise the vision and cloud benefits, a roadmap has been developed to outline our next steps. We will deliver supporting mechanisms to enable agency consumption of cloud services over two horizons, from 2020 onwards.

This roadmap has been developed in collaboration with NSW Government representatives, with workshops being held to prioritise challenges and opportunities relating to the four overarching themes.

This section will cover the following:

- **Future Initiatives** - required to be implemented and delivered to address the four key challenge themes; and
- **Roadmap** – outlining the two stages whereby the future initiatives will be implemented and delivered to continuously uplift the maturity of NSW Government's cloud capabilities and adoption.

a. Future Initiatives

To address the key challenges outlined across the four themes of procurement, security, funding and talent, specific mechanisms have been determined which are required to be delivered across the next three years across separate phases.

The following section outlines the future mechanisms required to deliver the strategy for each of the thematic areas, given the challenges which have been identified.

Procurement

A. Continue to develop NSW Government cloud contracts: Use pre-negotiated contracts to simplify procurement. A service catalogue with buying guides should be established to inform departments of what is currently available.

C. Develop NSW Government cloud panel – further streamline the procurement of cloud services by establishing a NSW Government panel for cloud services, cloud advisory and cloud implementation services. This will enable agencies to partner with industry suppliers who are registered to work with the NSW Government.

D. Extend Buy.NSW into a cloud marketplace: Extend existing mechanisms into a marketplace for cloud and as a service services to enable informed purchasing and cost comparison.

Security

E. Develop NSW Government cloud security framework and architecture – extending upon the NSW Government Cloud Policy, we will develop a cloud security framework to guide agencies in how they protect citizen data, supported by reference security architectures for repeatable implementation.

F. Develop common cloud risks and mitigations guidance: Develop a view of risks and mitigations for cloud. In tandem, upskill teams in security, risk and governance for cloud to implement mitigations.

U. Develop cloud business continuity processes: Refresh disaster recovery management processes for maintaining secure platforms and uninterrupted operations across services.

Funding

G. Develop business case templates including benefits: Develop business case templates that provide a standard, holistic view of cloud cost considerations. Establish a standard list of cloud benefits and measures in line with Treasury expectations to ensure a common understanding of consistent outcomes.

I. Establish digital funding sources: The Digital Restart Fund has been expanded to provide more funding to support the establishment of digital infrastructure and common platforms for reuse across NSW Government. However, all projects require a business case and cost benefit analysis to be developed by the agency and assessed by Treasury and to be considered as part of a whole of government prioritization process.

V. Embed cloud economic management: Ongoing reviews of billing, cost optimisation and forecasting to ensure visibility and optimal commercial outcomes.

Talent

J. NSW Government cloud skills framework – partner with industry to update the Skills for the Information Age (SFIA) framework to include the skills and capabilities needed to support cloud environments.

K. Develop NSW Government cloud operating model: Develop an operating model to outline the people, process and governance considerations needed to operate cloud across NSW Government, as well as the delineation of responsibilities between agencies, clusters and suppliers.

L. Implement Government cloud academy: Leverage relationships with cloud providers to reskill Government staff through roles-based cloud training plans and an on-demand training catalogue.

Ancillary

M. Establish NSW Government cloud community of practice and repository – establish a community to bring together experts on a regular basis to share learnings and experiences in using cloud. This will be supported by a repository of key cloud collateral, for all NSW Government agencies to leverage in advancing their cloud initiatives.

N. Workload assessment and placement – guidance on how to assess ICT services to select appropriate cloud services will be included in the NSW Government Cloud Adoption Framework.

b. Roadmap

The pathway to deliver the NSW Government Cloud Strategy have been designed over two stages with opportunities for optimisation identified in the future. Recommendations across the four prioritised themes need to be implemented to support the NSW Government vision for cloud and wider adoption. These will be underpinned by ancillary recommendations to be implemented in tandem.

The implementation of mechanisms to support cloud adoption across NSW Government are summarised in the roadmap below.

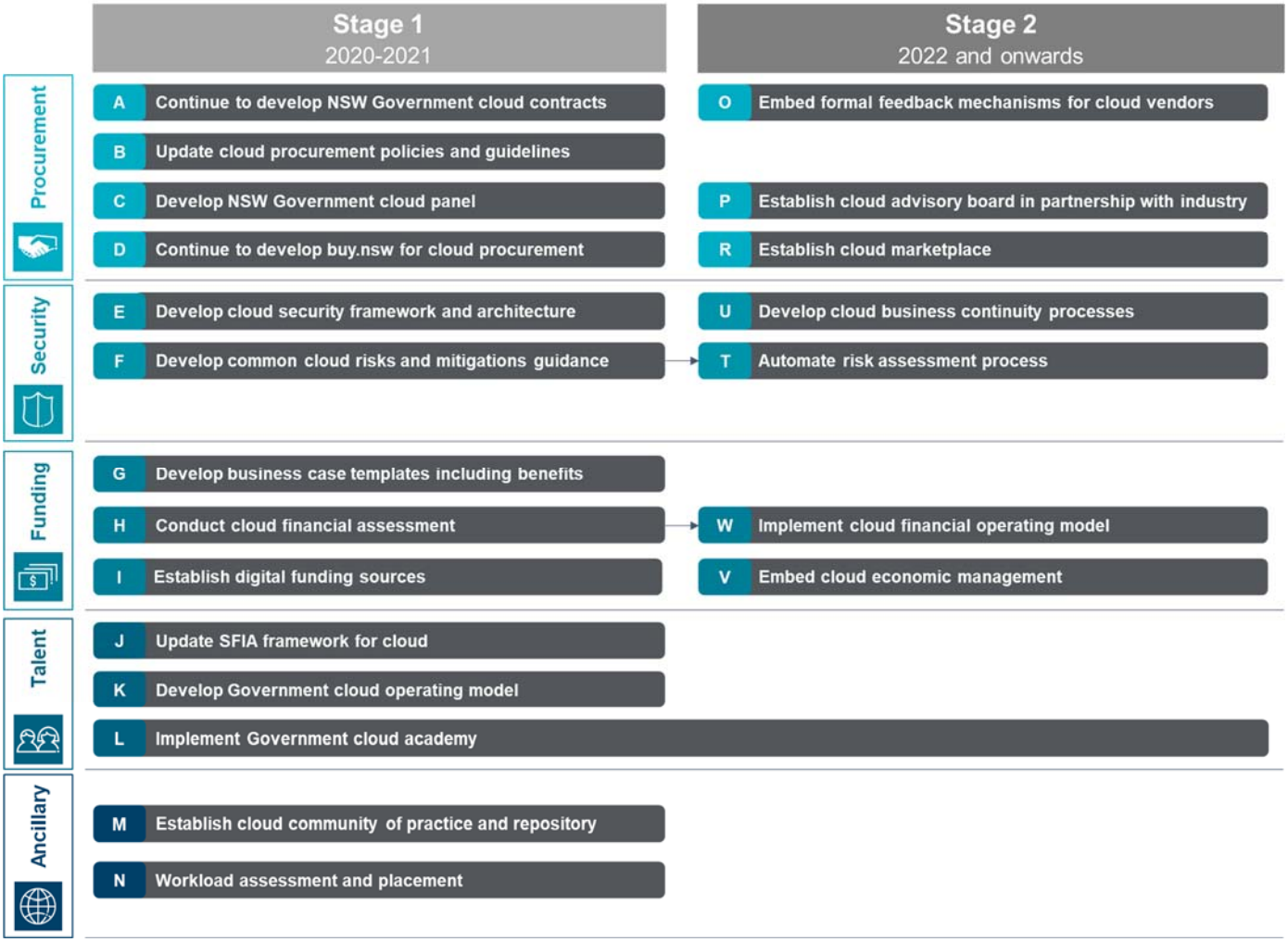

Figure 12: Cloud Strategy Implementation Roadmap