



Washington State - Office of the

Chief Information Officer

# Unisys Deliverable 3

## Washington State Consolidated Technology Services



## Statewide Cloud Computing Readiness Assessment

Submitted to James Weaver, Director and State CIO

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**Deliverable 3:**

*Final Report*

**April 30, 2020**

**(Revised due to contract extension: October 31, 2020)**

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## 1.0 Executive Summary

This report was initiated, as required by ESHB 1109. Sec. 152 FOR THE CONSOLIDATED TECHNOLOGY SERVICES AGENCY (CTS), which states: “conduct a statewide cloud computing readiness assessment to prepare for the migration of core services to cloud services, including ways it can leverage cloud computing to reduce costs.”

The Unisys CloudForte™ Cloud Computing Readiness Assessment Methodology was used to include the full portfolio of people, process, and technology for the seventy-nine (79) in-scope Agencies at the State of Washington. Our comprehensive solution utilized Agency evaluations, leveraged State government benchmarking data, and applied industry research insights. Our assessment provided scoring baseline criteria for cloud readiness using Unisys and third-party tools to analyze cloud readiness, service cost, and migration risk.

During this assessment, the Unisys CloudForte™ Methodology and Framework provided:

- An inventory of 5,251 applications, 11,275 IT assets, associated Department of Enterprise Services (DES) Contracting Reports representing 86% of the IT Tower Service contracts, and other relevant information found with discovery activities and validation tools;
- A cloud skillset survey identifying the impacts to State Agency staffing resulting from the migration to cloud computing, including a skills gap analysis between current practices and future cloud services with the recommendation for necessary retraining, ongoing training, and career development;
- A summary of identified resources needed by the CTS/WaTech Agency to enable sufficient future cloud migration support to state agencies; and
- A cost/benefit analysis to identify the impacts on overall State IT spend by migrating core services to cloud solutions.

In this report, Unisys analysis noted the following key findings for the seventy-nine (79) Agencies:

- Current Agency applications and infrastructure inventories have a “High Readiness” score: 89% of in-scope applications scored as “Strong Candidates” for cloud adoption, and 92% of all servers received “High to Medium” readiness ratings for cloud migration.
- Physical servers have an average age of 4.2 years, which is a high-risk factor where the industry typically refreshes server hardware every 3-5 years; therefore, for the State of Washington, an estimated \$105M physical server technology refresh is less than one year away. This \$105M server refresh is part of the estimated \$211.7M in technology refresh investment over the next three years.
- During cloud skillset survey, 32% of the Agency respondents reported that their IT staff have cloud certifications and experience. Managing the IT employee resignation and retirement risk (10% annual average) and expanding the cloud-skilled IT staff will impact the State Agencies’ ability to migrate to cloud computing.
- A summary of the staffing roles identified a need to realign FTE resources to future cloud support capabilities. Today, one FTE System Admin manages an average of 12-25 servers; with future cloud skills and practices, one FTE will be able to manage 250-300 servers
- Unisys estimates that the in-scope Agencies will spend \$3.73B on IT (if unchanged) over the next three years. By investing in Unisys project recommendations and migrating 9,000 servers to the cloud, the State of Washington has the potential to realize a post cloud transformation Return on Investment (ROI) of \$60M - \$116M over three (3) years while providing the State



with efficiency improvements that can support the future growth of cloud-based services.

## 1.1 Unisys Recommendations

Our workshop confirmed the need for the seventy-nine (79) Agencies to collaborate and focus efforts to move to the Cloud. Cloud computing will optimize operations and services with significant financial impact in cost reduction for IT assets, centralized procurement, and rebalanced staffing.

Under the Business Case Analysis section (Section 13), we have listed the ten most important projects at a high level. Also listed are the sub-projects defined with critical activities that impact the seventy-nine (79) Agencies. The estimated financial impact and cost to implement are based on a 3-year timeline.

Unisys recommends the projects summarized in the Exhibit 1.1.1. These projects drive cloud adoption, providing the key opportunities and benefits to the State. They will be discussed in further detail throughout this document.

Project (sequence)	Key Opportunities	Benefits
Governance (GOV) Project 2: Establish Cloud Community of Excellence (CCOE) and Enterprise Cloud Service Broker	<ul style="list-style-type: none"> <li>Define criteria for vendor selection</li> <li>Establish a Community of Practices</li> </ul>	<ul style="list-style-type: none"> <li>Improve procurement, contracting, and project management by establishing consistent service levels, cost structures, and metrics for cloud adoption</li> </ul>
EA Project 4: Cloud Migration Projects	<ul style="list-style-type: none"> <li>Evaluate and plan application migrations</li> <li>Migrate selected applications to the Cloud</li> </ul>	<ul style="list-style-type: none"> <li>Shift costs to OPEX and on-demand solutions with cost management and governance.</li> <li>Reduce or eliminate Agency data centers for cloud services</li> <li>Support budget and business changes by right-sizing application infrastructure</li> </ul>
Enterprise Architecture (EA) Project 1: Cloud Management Tools	<ul style="list-style-type: none"> <li>Establish an application infrastructure inventory management program</li> <li>Provide shared cloud automation tools</li> <li>Add continuous cloud financial management across the enterprise</li> </ul>	<ul style="list-style-type: none"> <li>Track applications and infrastructure to maintain assets more consistently</li> <li>Identify opportunities to reduce operational costs as applications retire or move to the Cloud</li> </ul>
GOV Project 5: Cybersecurity and Risk Management Governance	<ul style="list-style-type: none"> <li>Security frameworks and data protection</li> </ul>	<ul style="list-style-type: none"> <li>Manage and provide enterprise standard security services in the Cloud using standardized security tools, platforms, and approaches</li> </ul>
EA Project-3 Network Optimization for Cloud Services	<ul style="list-style-type: none"> <li>Evaluate network bandwidth and data flow changes required to support cloud adoption</li> </ul>	<ul style="list-style-type: none"> <li>Improve network capacity and resilience for Agency locations as applications shift from on-premise to cloud environments</li> <li>Take advantage of available network services to support cloud use</li> </ul>



Project (sequence)	Key Opportunities	Benefits
EA Project 11: Federated Identity Management	<ul style="list-style-type: none"><li>Establish cloud-focused federated identity services and Platform</li><li>Provide a flexible platform to support privileged access management, multi-factor authentication, and Active Directory (AD) integration</li></ul>	<ul style="list-style-type: none"><li>Provides a single sign-on and integration for cloud services and administrative access.</li><li>Promotes improved security and user experience by using the state employee's AD ID to access cloud services and applications</li></ul>
WF Project 6: Workforce Planning Initiative	<ul style="list-style-type: none"><li>Skills Management Process</li></ul>	<ul style="list-style-type: none"><li>Investment in training staff and career development</li><li>Rebalance IT Staff and Retirements</li><li>Reduce External Labor</li></ul>
WF Project 10: Establish Cloud Ready Operations	<ul style="list-style-type: none"><li>Establish Agency cloud adoptions and operations team(s)</li><li>Implement cloud accounts and landing zone environments based on Agency requirements</li></ul>	<ul style="list-style-type: none"><li>Use standards, tools, operations based on the Agency scale and current needs</li><li>Drive cloud adoption through bi-modal operations for Cloud and current IT services</li></ul>
WF Project 7: Organizational Change Management Evolution	<ul style="list-style-type: none"><li>Develop an organizational change management strategy</li></ul>	<ul style="list-style-type: none"><li>Provide the process guidance, communications, and collaboration to support the Agencies to maximize the results of cloud adoption</li></ul>
EA Project 9: Portfolio Rationalization & Cloud Optimization	<ul style="list-style-type: none"><li>Identify application modernization candidates to use available cloud services</li></ul>	<ul style="list-style-type: none"><li>Align applications' technology use and costs to appropriate cloud services to benefit from the scalability and newer services</li></ul>

**Exhibit 1.1.1: Key Projects and Opportunities**



### Projects and Timeline (Roadmap)

Unisys estimates the recommended projects could be completed in a 36-month timeline.

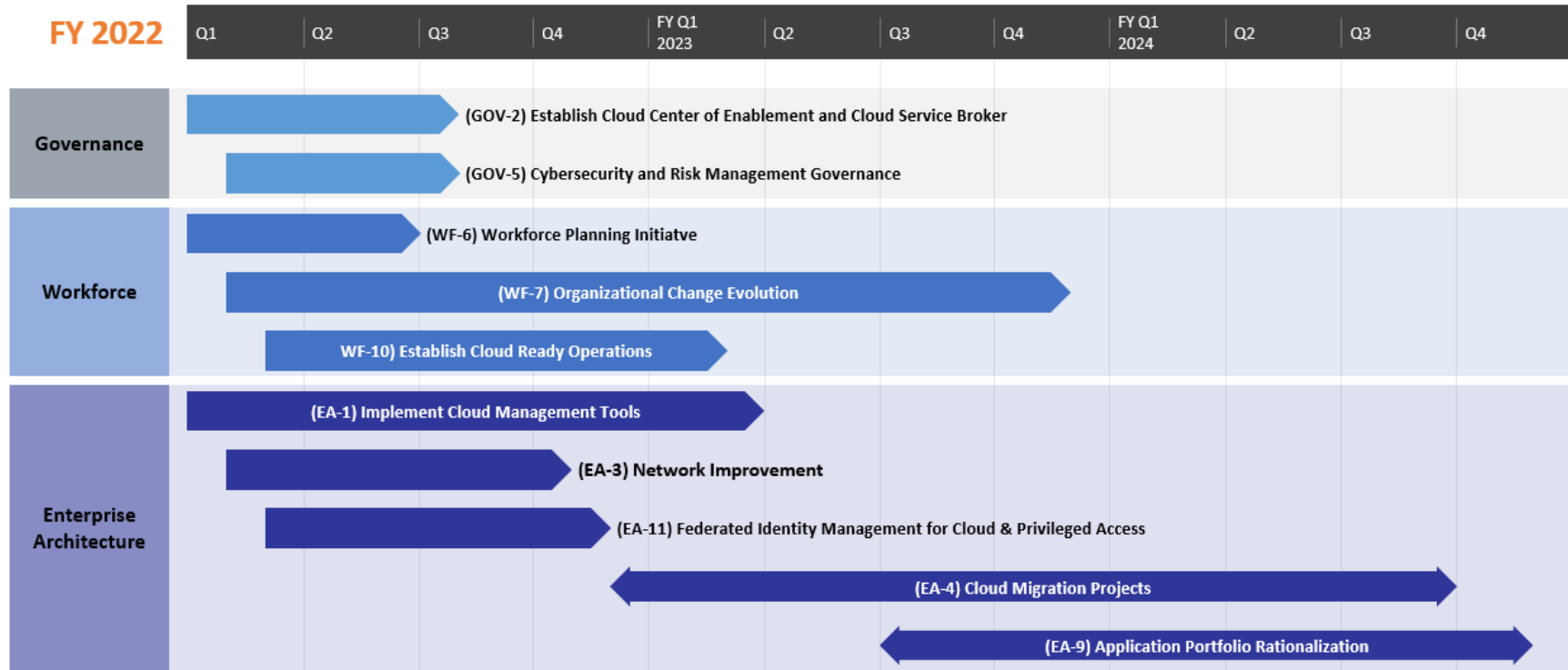


Exhibit 1.1.2: Key Projects and Estimated Timeline



## 1.2 Risk Planning

Risks detailed in Section 14.1 such as adjusting software licensing during migration, expanding network capacity for data migration, changes in business continuity needs, and applying security controls and management changes, are mitigated with the recommended projects. Risks around application performance and moving from traditional infrastructure monitoring to application observability, which is the how mobile and web apps are being used and consumed, must be planned and mitigated during individual application migration and modernization activities.

These risks and the State's unique characteristics, such as decentralized Agency operations and adoption, Agency-specific funding, regulatory requirements, and state and federal funding constraints, provide additional factors which could add a preparatory year to most projects and increase the costs by 20-30%. Benefits realization, based on Agency adoption rates, will be delayed beyond the 3-year timeline.

The estimated risk costs are based on the items below. If the recommended project start timeline exceeds one calendar year, the higher end of the range of 30% will need to be considered.

- Continued hardware costs at the current spend rates
- Continued current run-time costs
- Labor needed to promote the recommended projects for up to one calendar year

## 1.3 Future Innovation and Investment

Unisys provides a set of specific recommendations that are transitional, transformational, and innovative for the State of Washington Agencies to benefit by moving to the cloud. As such, they conform to the view of Washington State CIO Jim Weaver as expressed at the 2019 NASCIO Annual Conference: "Innovation is rarely, if ever, a huge jump into some transformational change. Rather, it's a continual and gradual change process with many small steps."

The recommended investments and their related returns and cost avoidance are based on an assumed willingness to adopt cloud technologies and Unisys experience with similarly sized clients in multiple industries, including other State governments. The return on investment (ROI) (Section 13) focuses on the hardware technology refresh costs with ranges from 0% to 107% depending on the selected projects, the number of participating Agencies, and related application servers. By completing all of the recommended projects from Exhibit 1.1.1 while aligning to the core assumptions in Section 3.2, the ROI is 47% with a net benefit of \$60 million over the three years following the 3-year strategy period.

The ROIs do not include the potential of \$56M in labor-related savings. This additional benefit is achievable by aligning overall labor supporting the State's current infrastructure by not backfilling open positions created by retirement and attrition of the State's workforce. A more efficient cloud environment will drive productivity opportunities that reduce the need for these available roles. These additional savings may also offset the cost incurred due to the cloud adoption risks from Section 14.1.





**Our recommendations span the three incremental categories:**

**Enterprise Architecture (EA):** Unisys found the majority of the State Agencies applications and IT assets are cloud-ready or technology-ready. We recommend moving these ready applications and assets to the public cloud with a migration strategy to support secure cloud adoption. We recommend using tools to automate IT Service Management processes, manage applications and asset lifecycles, and deploy Cloud Management tools with approved templates to automate delivery processes and measure Key Performance Indicator (KPI) metrics. (See Section 5.0)

**IT Workforce Management/Organizational Structure (WF):** Unisys recommends the State of Washington Agencies focus on People and Organizational changes because of the discovered gap in current cloud skills. A Training Plan is needed to enable an agile, flexible workforce. We recommend preparing employees for this transformational career change, including cloud solution training and training for future services. (See Section 7.0)

**Leadership/Culture/Governance (GOV):** Unisys recommends a new Federated Governance structure to adopt and operate as a cost-effective Cloud Service Broker. The Broker will include contracting, procurement, and fulfillment of cloud service requests. This will empower CTS leadership to innovate by providing a cloud platform for Agencies to become service-orientated, agile, and scalable to deliver citizen service excellence at a competitive cost. (See Sections 8.0,10.0, and 11.0)



## 2.0 Project Background

### 2.1 Cloud Readiness Project Background

As initiated, the statewide cloud computing readiness assessment, as required by ESHB 1109, Sec. 152 FOR THE CONSOLIDATED TECHNOLOGY SERVICES AGENCY, which states:

(9) \$750,000 of the general fund—state appropriation for the fiscal year 2020 is provided for the office to conduct a statewide cloud computing readiness assessment to prepare for the migration of core services to cloud services, including ways it can leverage cloud computing to reduce costs.

The statewide cloud computing readiness assessment must:

- (a) Inventory State Agency assets, associated service contracts, and other relevant information;
- (b) Identify impacts to State Agency staffing resulting from the migration to cloud computing, including:
  - (i) Skill gaps between current on-premises computing practices and how cloud services are procured, secured, administered, maintained, and developed; and
  - (ii) Necessary retraining and ongoing training and development to ensure State Agency staff maintain the skills necessary to effectively maintain information security and understand changes to enterprise architectures;
- (c) Identify additional resources needed by the Agency to enable sufficient cloud migration support to State Agencies; and
- (d) Be submitted as a report, by June 30, 2020, to the governor and the appropriate committees of the legislature that summarizes statewide cloud migration readiness and makes recommendations for migration goals.

As a result, Consolidated Technology Services (CTS) and the Office of the Chief Information Officer (OCIO) initiated the Cloud Compute Readiness Assessment Project with Unisys to assist with establishing a foundation for statewide cloud computing readiness and develop a framework for a cloud computing strategy.

### 2.2 Project Objectives

For this project, Unisys understood that the OCIO needed a holistic view of the application and infrastructure landscape across State Agencies to begin developing a roadmap and strategy for the adoption of and migration to cloud computing solutions.

Our statewide cloud readiness assessment needed to:

- a) Provide the OCIO with information necessary to develop an enterprise strategy for State Agencies to adopt and migrate to cloud computing solutions successfully.
- b) Support the OCIO in producing a report to the legislature on statewide cloud computing readiness and setting goals for enterprise cloud adoption.
- c) Provide State Agencies with foundational data to begin developing their cloud computing adoption and migration strategies.



## 3.0 Agency Pre-assessment Background

Unisys has confirmed that the State of Washington has invested more than \$3.4 billion in technology during the FY18-FY19 biennium. Those investments have helped the State make progress on many fronts, including increasing public access to government data while at the same time enhancing privacy protections for Washingtonians.

### 3.1 Unisys Understands Your Goals

Unisys understands that the State of Washington lacks a formal strategy to drive effective and efficient adoption of cloud computing solutions. State Agencies have already begun procuring cloud-based application and platform solutions, but without a strategic roadmap to guide the use of cloud services, maintaining state standards for technology architecture will be difficult. We understand that the OCIO needs a holistic view of the application and infrastructure landscape across State Agencies to develop a roadmap and strategy for adopting and migrating to cloud computing solutions.

### 3.2 Core Assumptions, Caveats, and Clarifications

Throughout the readiness assessment, the OCIO and Unisys identified and used the following assumptions and caveats as the data was collected and evaluated. These items should be kept in consideration when reviewing the data, inventories, recommendations, and strategies provided within this document:

- The readiness assessment focused primarily on seventy-nine (79) Agencies as a statewide sample. The assessment included surveys and inventories noted in Section Five (5). Sixteen (16) Agencies in the sample group had exceptions for providing the data requested. Agency exceptions for application infrastructure inventory include Agencies with no identified applications or related infrastructure, Agencies relying on other Agencies for all applications, or Agencies currently using only cloud services. Therefore, the total statewide sample group represents sixty-three (63) Agencies in-scope.
- Source data for financials and contract information include additional state entities. Unisys worked with the source information to remove or isolate the details associated with state organizations not included in this assessment. Some out-of-scope data may be represented in individual sections, including the contract and staffing data but does not have a material impact on the recommendations and related strategy.
- Cost estimates have been provided based on cloud and software vendor costs between January and March 2020. Actual costs for the project implementations may vary based on the State of Washington's choice of vendors, current vendor pricing, and updated project requirements.
- The cloud strategy is based on a 36-month timeline. Unisys assumes that the full realization of benefits will occur after the 36-month program (transition).
- Unisys reviewed statewide IT Spend by Government Function expenditures for benchmarking comparisons to other states. Following the best practices for the benchmark, Unisys used the State's cost pools and cost towers, including Higher Education, the Legislature, Court Systems, and State entities considered out of scope by the OCIO.



- The DES contract report was intended to include all the State Agencies, including Higher Education. Unisys reviewed the information and removed the out-of-scope Agencies and entities for this assessment. Ninety-three (93) Agencies, including sixty-one (61) Agencies related to this cloud readiness assessment, participated in the DES project.
- The recommended projects' estimated cost and durations are based on experience with similarly sized clients in multiple industries, including other State governments.
- The State's unique characteristics, such as decentralized Agency operations and adoption, Agency-specific funding, regulatory requirements, and state and federal funding constraints, are not defined directly into the recommended projects' costs and durations. These risk factors could add a preparatory year to most projects and increase the costs by 20-30%. Agency adoption rates will impact benefits realization and delay it beyond the 3-year timeline. The estimated risks' financial impact is based on continued hardware costs at current spend, continued run-time cost at current spend, and additional labor needed to promote the recommended projects for up to one calendar year.
- The cloud adoption estimates are based on 9,000 servers (80% of the 11,275 total server inventory). The typical enterprise does not migrate all servers to the public cloud and maintains 20-30% of application servers in private data centers or co-location facilities.

### 3.3 Financials

Unisys used the industry terms from the Technology Business Management (TBM) Council taxonomy for reporting on statewide technology investments. These standard reporting terms, known as 'Cost Pools' and 'Technology Towers,' allow Unisys to benchmark the State's IT spend against other public and private organizations.

#### 2018-19 INVESTMENT BY TECHNOLOGY TOWER

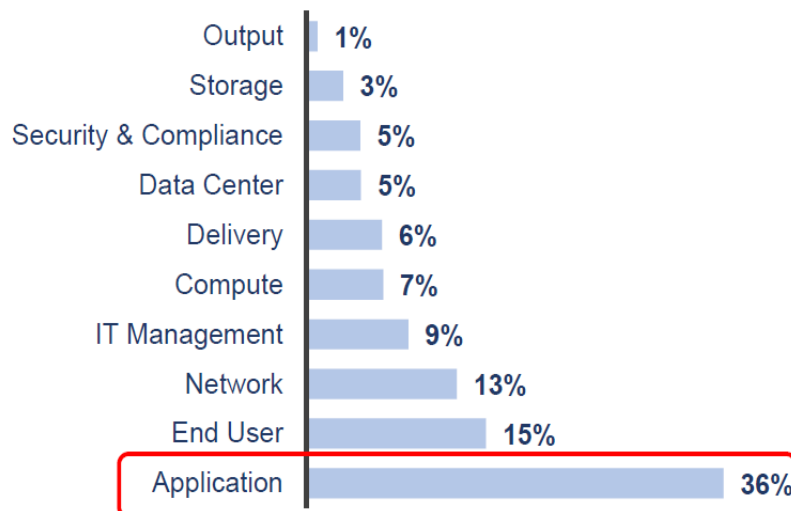


Exhibit 3.3.1: Investment by Technology Tower. FY18-FY19 Biennial Report Final<sup>1</sup>

<sup>1</sup> Office of the CIO (OCIO) Title: IT Biennial Report, March 5, 2020, page 13.  
[https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19\\_Biennial\\_Report\\_Final.pdf?2nh3yj](https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19_Biennial_Report_Final.pdf?2nh3yj)



### 3.3.1. IT Investment

The Office of the Chief Information Officer (OCIO) is required by RCW 43.105.220 to submit a state performance report on information technology (IT) each biennium.

Published on March 6, 2020, the FY1-19 IT Biennial Report and Submittal Memo was developed to address the requirements of RCW 43.105.220. It contains an analysis of progress made toward implementing the State's strategic technology plan, evaluating information technology performance, and analyzing major project performance and outcomes.

State Agencies invested ~\$3.4 billion in 2018-19. Based on the State IT Investment provided by the OCIO (Exhibit 3.3.1.1 below), Labor represents the most substantial proportion of overall IT spending and offers the opportunity to optimize in the journey to the cloud.

2018-19 State IT Investment (revised July 2020)				
Cost Pool	2018	2019	2018-19 Total	% of Spend
Internal labor	\$611,558,604	\$626,968,592	\$1,238,527,196	36%
Hardware	\$179,257,312	\$197,550,424	\$376,807,736	11%
Internal services*	\$182,201,614	\$187,725,958	\$369,927,572	11%
Software	\$168,259,364	\$195,713,749	\$363,973,113	11%
Other	\$147,470,876	\$151,430,368	\$298,901,244	9%
Outside services	\$110,943,883	\$154,375,575	\$265,319,458	8%
External labor	\$115,779,656	\$114,497,752	\$230,277,408	7%
Telecom	\$70,728,897	\$66,486,787	\$137,215,684	4%
Facilities & power	\$59,009,410	\$56,130,013	\$115,139,423	3%
<b>Total</b>	<b>\$1,645,209,616</b>	<b>\$1,750,879,218</b>	<b>\$3,396,088,834</b>	<b>100%</b>

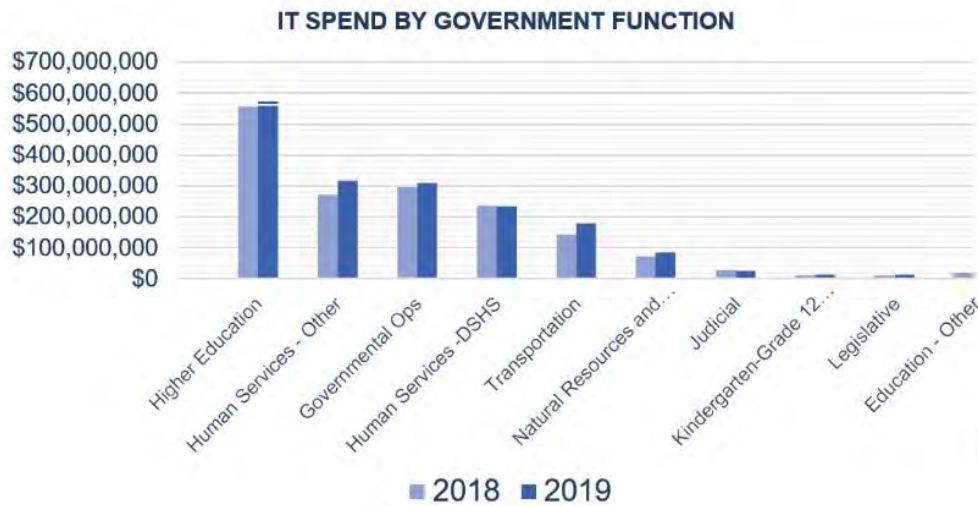
Exhibit 3.3.1.1: 2018-2019 State It Investments for the FY18-FY19 Biennial Report Final <sup>2</sup>

\*(NOTE: "Internal Services" contain Agency expenditures to central service Agencies)

### Assessment of Financial Considerations

Unisys understands that Higher Education continues to be the State leader in IT spending. However, the statute exempts them from OCIO requirements to assign IT costs to technology towers. Exhibit 3.3.1.2 below compares the IT Spend by Government Function

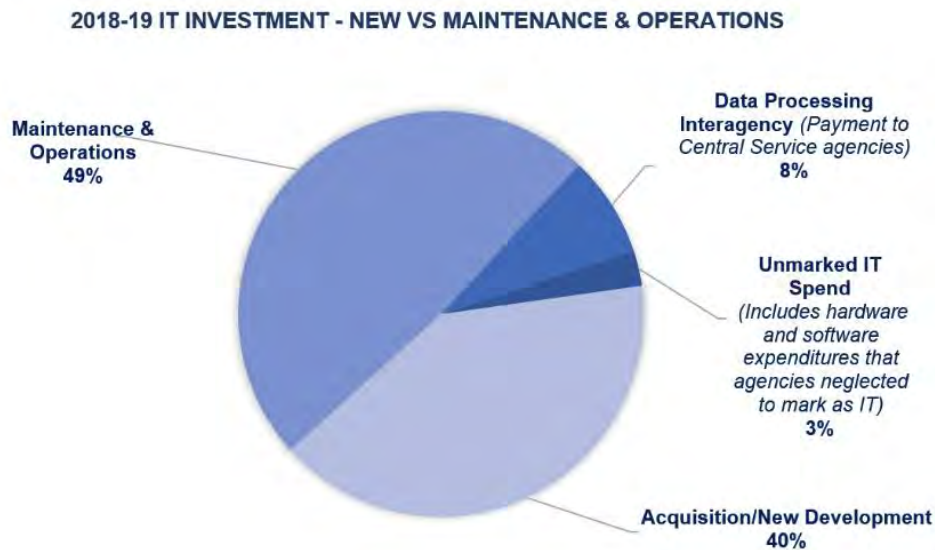
<sup>2</sup> Ibid, 13.



**Exhibit 3.3.1.2: Comparing IT spend by functions. FY18-FY19 Biennial Report Final<sup>3</sup>**

Unisys understands that Agencies are required to report technology investments by acquisitions /new development (i.e., new spend) and by maintenance and operations.

Exhibit 3.3.1.3 below includes an itemization of expenditures by new spending, maintenance and operations, payments to central service Agencies (classified as Data Processing Interagency), and unmarked IT spending. Unmarked IT spending includes hardware and software investments that Agencies did not identify as IT when coding the payment information into the Agency Financial Reporting System (AFRS).



**Exhibit 3.3.1.3: Itemized IT investment. FY18-FY19 Biennial Report Final<sup>4</sup>**

<sup>3</sup> Ibid, 14.

<sup>4</sup> Ibid, 15.



### Cloud-Based Subscription Accounting Current Tracking

The data collected has shown a trend starting in 2019, where new cloud-based subscriptions are recorded as “maintenance and operations” instead of “acquisitions/new development.” This practice will not allow the State to accurately estimate the current biennial cloud service spending.

The Unisys assessment's impact is minimal, but this is an important data point for the future. The State needs to be aware of the impact to forecast cloud spend for the next biennial budget.

### 3.3.2. Datacenter Migration

Unisys understands that the State Agencies have made progress moving their equipment and services out of their data centers, following the enactment of RCW 43.105.375. The biennium started with forty-two (42) Agencies having projects to migrate equipment and services from forty-seven (47) different Agency-specific facilities. Between FY17- FY19, Agencies completed seventeen (17) projects.

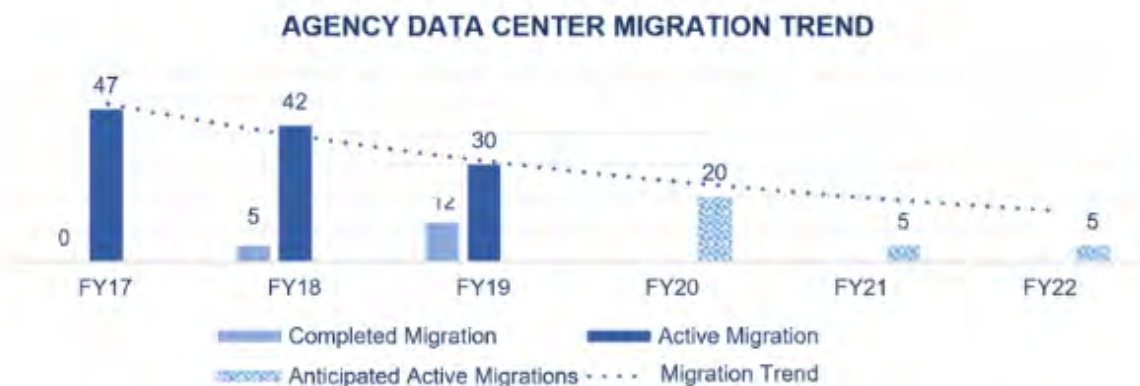


Exhibit 3.3.2.1: Trending current and future migrations. FY18-FY19 Biennial Report Final<sup>5</sup>

As of January 2020, twenty-seven (27) migration projects remained open. Seven (7) projects had waivers expired, two (2) have completed, and eighteen (18) are still scheduled. Most of the future migrations (sixteen) plan to use cloud services in-scope as part of the end state.

N#	Waiver Status	Agency	End Date	Destination
1	Expired	Human Rights Commission (tied to completion of Case Management Project)	3/31/2019	State Data Center
2	Expired	Criminal Justice Training Center	6/30/2019	External Cloud
3	Expired	Department of Agriculture	7/31/2019	State Data Center
4	Expired	Department of Transportation Phase 1	7/31/2019	Hybrid
5	Expired	Services for the Blind	12/31/2019	State Data Center
6	Expired	Department of Natural Resources	12/31/2019	State Data Center

<sup>5</sup> Ibid, 33.



N#	Waiver Status	Agency	End Date	Destination
7	Expired	Department of Labor & Industries	11/30/2019	State Data Center
8	Completed	Department of Social & Health Services	12/31/2019	State Data Center
9	Schedule at Risk	County Roads Administration Board	1/31/2020	State Data Center
10	On Schedule	Washington State Patrol	2/28/2020	Quincy Data Center
11	Completed	Liquor and Cannabis Board (tied to completion of SMP Project)	2/28/2020	Decommission
12	On Schedule	School for the Blind	3/31/2020	Hybrid
13	On Schedule	Washington Student Achievement Council	4/30/2020	Cloud
14	On Schedule	Washington State Historical Society	4/30/2020	External Cloud
15	On Schedule	State Investment Board	6/30/2020	External Cloud
16	On Schedule	Secretary of State	6/30/2020	State Data Center
17	On Schedule	Eastern Washington Historical Society	6/30/2020	External Cloud
18	On Schedule	State Parks	6/30/2020	Hybrid
19	On Schedule	Department of Revenue	7/31/2020	State Data Center
20	On Schedule	Department of Fish & Wildlife	11/30/2020	Hybrid
21	On Schedule	Board of Volunteer Fire Fighters	12/31/2020	Hybrid
22	On Schedule	Washington Horse Racing Commission	12/30/2020	External Cloud
23	On Schedule	Department of Health - Phase 1	12/31/2020	Hybrid
24	On Schedule	Department of Ecology	4/30/2021	Hybrid
25	On Schedule	Employment Security Department	6/30/2021	State Data Center
26	On Schedule	Department of Licensing	7/31/2021	Hybrid
27	On Schedule	Department of Corrections	11/30/2022	External Cloud

**Exhibit 3.3.2.2: State Data Center Migrations as of January 2020.<sup>6</sup>**

<sup>6</sup> OCIO, Migrations in Progress 20201, February 10, 2020, <https://ocio.wa.gov/Agency-data-center-migrations>





### 3.4 IT Workforce

Unisys understands that Puget Sound is one of the top four technical hubs in the nation with talent feeder schools like the University of Washington and global tech companies like Amazon and Microsoft. They attract top talent from around the world. The competition for talent is an ongoing challenge for State organizations.

We understand that the State CIO has prioritized workforce development and recruitment. The State CIO and Office of Financial Management’s (OFM) State Human Resources Office collaborated on a job class study for IT classifications. This multi-year effort was aimed at building a more modern, competitive job class structure and was concluded on June 30, 2019.

The new IT professional structure, which became effective in July 2019, was developed to:

- Ensure enterprise and organizational alignment and equity
- Improve opportunities for career growth
- Keep pace with the rate of IT industry change
- Improve the State’s ability to benchmark work internally and externally

Exhibit 3.4.1 below shows the number of classified positions (March 2020) statewide by job family (rows) and job level (columns) identified as part of the study:

Job Level - Mar2020	Entry	Journey	Senior / Specialist	Expert	Manager	Senior Manager	Job Family Totals	Percentage
Application Development	156	544	205	8	32	6	951	22%
IT Architecture	NA	12	100	7	18	8	145	3%
IT Business Analysis	48	292	40	0	10	1	391	9%
IT Customer Support	339	252	15	NA	28	NA	634	14%
IT Data Management	29	235	87	0	18	1	370	8%
IT Policy & Planning	0	7	18	0	35	43	103	2%
IT Project Management	9	92	67	1	19	6	194	4%
IT Quality Assurance	45	128	11	0	3	0	187	4%
IT Security	NA	72	55	4	7	9	147	3%
IT System Administration	171	586	150	1	19	4	931	21%
IT Vendor Management	2	5	2	0	3	1	13	0%
Network & Telecom	45	178	112	0	13	6	354	8%
<b>Total</b>	<b>844</b>	<b>2403</b>	<b>862</b>	<b>21</b>	<b>205</b>	<b>85</b>	<b>4,420</b>	<b>100%</b>

**Exhibit 3.4.1: Statewide Classified IT Professional Structure<sup>7</sup>**

<sup>7</sup> Office of Financial Management (OFM) Title: IT Professional Structure, March 30, 2020, <https://www.ofm.wa.gov/state-human-resources/compensation-job-classes/it-professional-structure>



The following chart from the FY18-FY19 Biennial Report shows similar percentages.

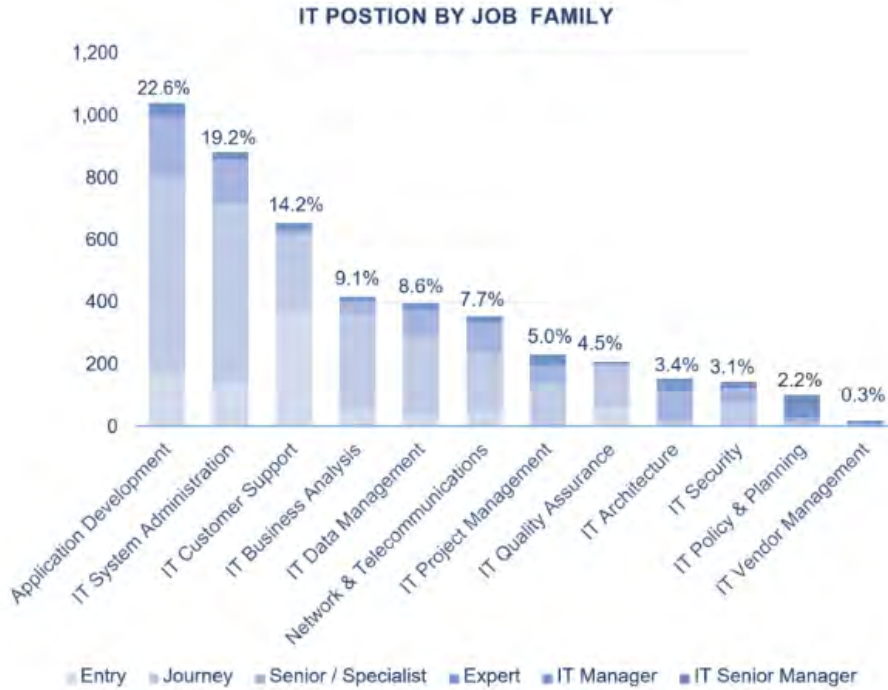


Exhibit 3.4.2: IT Positions by Job Family and Job Level. FY18-FY19 Biennial Report Final<sup>8</sup>

### 3.5 Enterprise Architecture

Enterprise Architecture (EA) (RCW 43.105.265) translates business vision and strategy into effective enterprise change.

Unisys understands that the EA helps show how information, business, and technology work together to accomplish the State of Washington’s business objectives. It is especially important to help guide the State in adopting new technologies such as the cloud, Internet of Things (IoT), machine learning, and other emerging technologies that will drive government services' digital transformation.

On a statewide basis, we understand that EA uses structured practices to analyze, plan, and oversee the transformation of technology strategies and policies over time and to assist Agencies in implementing IT investments that achieve desired business results.

The OCIO increased staffing of the state Enterprise Architecture program in the final months of the fiscal year 2019 to lead a collaborative, business outcome-driven approach to EA, focusing on enabling statewide digital transformation.

**The program’s FY18-19 priorities included:**

- Working with One Washington and the Health and Human Services coalition to define technical requirements and priorities.

<sup>8</sup> Office of Financial Management (OFM) Title: IT Professional Structure, March 30 2020, <https://www.ofm.wa.gov/state-human-resources/compensation-job-classes/it-professional-structure>



- Evaluating Agency-reported projects for strategic alignment and potential for sharing and reusing. Special emphasis was made to identify administrative and financial functions in the One Washington program's scope to minimize duplication and growth of shadow systems.
- Initiating the statewide cloud computing readiness assessment, as required by ESHB 1109. Sec. 152 FOR THE CONSOLIDATED TECHNOLOGY SERVICES AGENCY which states: (9) \$750,000 of the general fund – state appropriation for the fiscal year 2020 is provided for the OCIO to conduct a statewide cloud computing readiness assessment to prepare for the migration of core services to cloud services, including ways to leverage cloud computing to reduce costs.

**Cloud strategy:** Led by the OCIO in collaboration with executive branch Agencies, define a statewide government cloud computing strategy, including:

- Complete the statewide cloud computing readiness assessment and deliver the final report to the governor and legislature as required in the statute.
- Define a pragmatic and balanced approach to government cloud computing based on sound principles of business and technical benefits and fiscal responsibility.

**Modernization and transformation:** Supporting strategic transformation and modernization programs critical to advancing statewide digital government strategies such as: OFM - One Washington program to replace the State's decades-old financial and administrative applications with a modern enterprise resource planning (ERP) solution.

Statewide strategic infrastructure modernization projects include:

- Transitioning the State's shared mainframe computing platform to Mainframe as a Service.
- Enhancing the State's current network infrastructure and enabling IPv6 for all Agencies.
- Modernizing the State's identity and access management infrastructure to leverage new technologies and cloud-hosted capabilities.
- Continuing transition of Agencies' on-premises data centers by consolidating to the State Data Center (SDC) or migrating to cloud-hosted solutions.
- Enhancing the State's resilience and recovery options by moving to cloud-based disaster recovery services.

### 3.6 Assessment and Ranking of Technology Project Funding Request

The OCIO is required by law (RCW 43.105.235) to evaluate State Agency IT budget requests and submit recommendations to the Office of Financial Management (OFM) regarding funding all or part of the request. The OCIO does this by reviewing and ranking Agency-submitted technology-related decision packages (DPs) on an annual basis. As part of its evaluation activities for the biennial budget cycle, the OCIO identified 105 out of 164 DPs with an IT component submitted on or before the OFM budget submittal deadline of September 14.

The OCIO's goal is to help Agencies leverage IT innovation and make better business decisions. These 105 DPs were reviewed, scored, and prioritized by the OCIO and amount to \$433.9M.



Top 20 Agency DPs	Amount	Count
Grand Total	\$ 433,968,000.00	105
Supt of Public Instruction	\$ 145,911,000.00	2
Department of Labor and Industries	\$ 89,710,000.00	6
Dept of Social and Health Services	\$ 35,423,000.00	11
Department of Health	\$ 30,665,000.00	5
Office of Financial Management	\$ 29,931,000.00	2
Department of Transportation	\$ 12,304,000.00	4
Department of Ecology	\$ 11,745,000.00	6
Department of Retirement Systems	\$ 10,325,000.00	2
Military Department	\$ 9,975,000.00	2
Liquor and Cannabis Board	\$ 9,877,000.00	2
Department of Natural Resources	\$ 7,986,000.00	1
Department of Revenue	\$ 6,226,000.00	3
Department of Licensing	\$ 5,401,000.00	4
Employment Security Department	\$ 5,081,000.00	1
State Investment Board	\$ 4,269,000.00	1
Washington State Patrol	\$ 2,961,000.00	4
Department of Enterprise Services	\$ 2,449,000.00	1
Department of Corrections	\$ 1,747,000.00	10
State Board of Accountancy	\$ 1,742,000.00	1
Consolidated Technology Services	\$ 1,558,000.00	6

**Exhibit 3.6.1: Assessment and ranking of decision packages (DPs)<sup>9</sup>**

<sup>9</sup> OCIO, OCIO 19-21 Biennium IT Decision Package Final Funding Recommendation Report  
[https://ocio.wa.gov/sites/default/files/public/ITProjects/19-21 All Packages Biennial Budget Decision Package Fund List Final.docx](https://ocio.wa.gov/sites/default/files/public/ITProjects/19-21%20All%20Packages%20Biennial%20Budget%20Decision%20Package%20Fund%20List%20Final.docx)



## 4.0 Unisys CloudForte Assessment Methodology

Our experience has shown that in a complex initiative like this, the project is best performed in a phased manner. As a result, Unisys adapted our standard phased approach methodology to manage the activities around this initiative effectively.

We used this methodology to leverage the collective experience and materials from prior engagements, including deliverable templates and best practices.

### 4.1 Our Approach

Unisys followed a phased approach for this project with an emphasis on early results leveraging our experience and knowledge to guide the direction of the project. As presented, Unisys organized our joint work with the State in the following manner:

Phase 1 - Current State Assessment:

Current Environment – Program Initiation and Current State Benchmarking Analysis

Phase 2 - Future State Gap Analysis:

Target Environment – Gap Analysis and Future Opportunity Analysis

Phase 3 - Strategic Plan:

Transformation Planning, Recommendations, and Roadmap

Final Executive Report

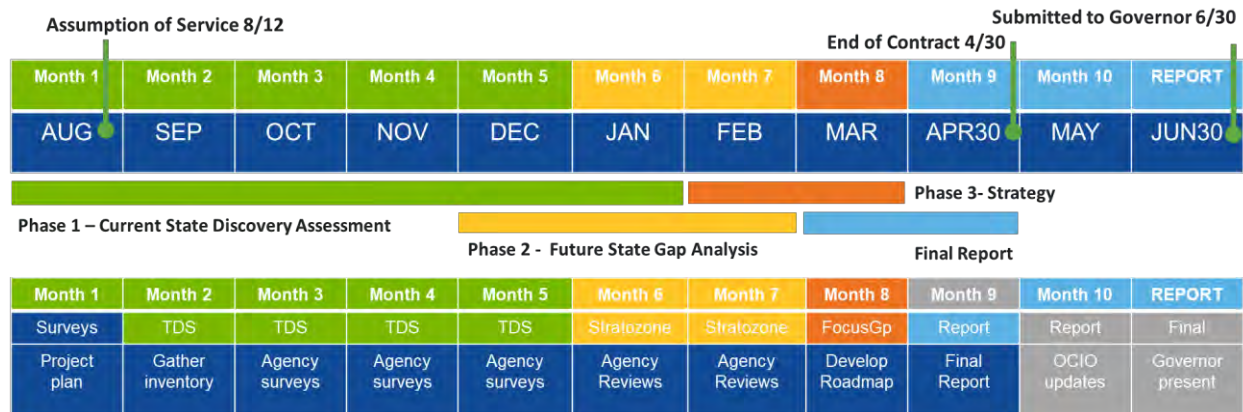


Exhibit 4.1.1: Unisys Approach for the Statewide Cloud Compute Readiness Assessment

### 4.2 Current State Assessment – Phase 1

The Current State Assessment phase focused on the existing IT environment that supports the platforms, applications, and business processes under consideration for migration to a cloud computing model. The goal is not to capture all the details of an IT environment's current state. Instead, it is to evaluate the current state relative to the capabilities that are required to adopt the cloud successfully.

<b>Objective</b>	This phase was primarily a discovery/data-gathering phase for the current environment and future requirements for the team to understand the State's current situation fully.
<b>Deliverables</b>	<p><b>Deliverable 1 - Scope and Work Plan Document</b></p> <ul style="list-style-type: none"> <li>It provided the overall methodology and approach to the provisioning of services as set forth herein, including a</li> </ul>



	<p>detailed description and the specific tasks that would need to be accomplished for the Service and Deliverables.</p> <ul style="list-style-type: none"> <li>• Additionally, it included the risks and constraints that Unisys believed this work would encounter and how to address these risks/limitations.</li> <li>• Lastly, the deliverable included a proposed high-level schedule/work plan for planning and implementation development activities.</li> </ul>
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### 4.3 Future State Gap Analysis – Phase 2

The Future Vision for a Cloud initiative consists of expected benefits, the scope of benefits, target maturity level, critical architectural decisions, essential characteristics, and guiding principles. Defining a vision for future cloud implementation requires a thorough understanding of the Cloud Compute Readiness Assessment initiative's motivational and operational context.

The Future Definition phase does not attempt to define a comprehensive blueprint for the future state. Instead, it focuses on the expected benefits and critical elements affecting the architecture that was used to guide the Cloud Readiness assessment.

<p><b>Objective</b></p>	<p>In this phase, the team performed analysis on the data gathered in the previous Phase 1</p>
<p><b>Deliverables</b></p>	<p><b>Deliverable 2 – Agency Readiness Criteria Checklist</b>        This report defined criteria used to measure the State of Washington Agencies’ ability to adapt successfully, use, and support cloud computing solutions with an associated checklist used to gauge current Agency readiness.</p>

### 4.4 Strategic Plan – Phase 3

The Unisys project team has developed a summary of the Strategy Session findings and have highlighted the significant considerations and opportunities in determining the preferred future IT cloud operating solution.

<p><b>Objective</b></p>	<p>Present a list of recommendations, strategic initiatives, and implementation roadmap to build the Target End-State defined in the previous phase.</p>
<p><b>Deliverables</b></p>	<p><b>Deliverable 3 – Statewide Cloud Readiness Report</b>        Report on future state options that include but are not limited to:</p> <ul style="list-style-type: none"> <li>• Technology asset and service contract inventory and evaluation</li> <li>• Statewide skills assessment and staffing impacts</li> <li>• Resources required to enable CTS to support statewide cloud adoption and migration</li> <li>• Cost/benefit analysis of adopting or migrating to cloud computing solutions</li> </ul>



- Common Cloud Computing Risks and Mitigation Strategies

## 5.0 Applications and Assets – Discovery

Seventy-nine (79) Agencies included in the assessment were provided surveys and spreadsheets to produce the inventories noted in the table below. The lists included the annual certifications for all applications per policies 112.10 and 112.20, the new guideline for IT assets which Unisys used for data gathering (as the procurement contract data was out of scope).

Unisys used third party software by Transitional Data Service’s (TDS): Transition Manager to collect, analyze, and track baseline data through the cloud readiness criteria activity. This tool assists in managing all stages of the discovery process to the consolidation of dependency data. The use of this tool delivered a high level of value in providing a centralized repository.

Unisys also used another third party software tool, StratoProbe from StratoZone. The StratoZone® Cloud Assessment and Planning Service (CAPS) delivered a robust assessment and cloud decision framework that answered questions essential to optimizing cost and reducing risk for the State of Washington.

### 5.1 Applications and Assets – Data Gathering

The following table includes information from the discovery and inventory activities:

- Applications: The number of Agency applications from the annual application inventory
- Devices: The number of related devices or servers based on the Agency’s provided inventories
- Physical: A breakout of the physical devices or servers
- StratoProbe: The volume of servers discovered by the StratoProbe tool

During the discovery phase, some Agencies reported their applications did not have any servers or Software as a Service component (e.g., Access Database application), shared an application with another Agency, or had no applications or servers. These Agencies are marked below as an exception for the project and were not required to provide additional application or asset information.

All Bundles – In-Scope Agencies	Applications	Devices	Physical	Exception	StratoProbe
ACB - Washington State Board of Accountancy	8	4			
AGR - Department of Agriculture	56	82	12		70
ARTS - Arts Commission	14	1			
ATG - Attorney General	35	35	1		
BIIA - Board of Industrial Insurance Appeals	13	25	3		
BTA - Washington State Board of Tax Appeals	4	1			



All Bundles – In-Scope Agencies	Applications	Devices	Physical	Exception	StratoProbe
BVFFRO - Board for Volunteer Firefighters and Reserve Officers	1	1			
CAAA - Washington State Commission on African American Affairs				X	
CAPA - Washington State Commission on Pacific American Affairs	1			X	
CDHY - Washington Center for Deaf and Hard of Hearing Youth	1			X	
CFC - Caseload Forecast Council	7	2	1		
CHA - Commission on Hispanic Affairs	1			X	
CJTC - Criminal Justice Training Commission	37	16			
COM - Department of Commerce	8	13	1		
COS - Citizens' Commission on Salaries				X	
CRAB - County Road Administration Board	11	13	5		
CRGC - Columbia River Gorge Commission	3	3	1		
CTS - Consolidated Technology Services (WaTech)	173	997	392		400
DAHP - Dept. of Archaeology and Historic Preservation	1	7			
DCYF - Department of Children, Youth, and Families	54	564	25		409
Added Agency applications (new and duplications)	2,097				
DES - Department of Enterprise Services	146	43	12		
DFI - Department of Financial Institutions	130	361			
DFW - Department of Fish and Wildlife	166	90			
DNR - Department of Natural Resources	73	297	93		
DOC - Department of Corrections	66	708			
DOH - Department of Health	516	833			
DOL - Department of Licensing	390	307	307		
DOR - Department of Revenue	379	1,176	1,176		1,176
DRS - Department of Retirement Systems	79	101			
DSB - Department of Services for the Blind	7	3	3		
DSHS - Department of Social and Health Services	564	1,235	1,235		1,235
DVA - Department of Veteran's Affairs	8	33			
ECY - Department of Ecology	224	395	24		





All Bundles – In-Scope Agencies	Applications	Devices	Physical	Exception	StratoProbe
ELUHO - Environmental and Land Use Hearings Office		2	2		
ERFC - Economic and Revenue Forecast Council	1			X	
ESD - Employment Security Department	101	141	141		
GMB - Gambling Commission	21	32	12		
GOIA - Governor's Office of Indian Affairs				X	
GOV - Office of the Governor	13			X	
HCA - Health Care Authority	174	293	13		
HUM - Human Rights Commission	1	2	1		
LCB - Liquor and Cannabis Board	178	106	20		
LEOFF - Law Enforcement Officers' and Fire Fighters' Retirement Board	1			X	
LNI - Labor and Industries	231	152	150		
LOT - Washington State Lottery	43	49	1		
LSDFA - Life Sciences Discovery Fund Authority	1			X	
LTGOV - Office of the Lieutenant Governor				X	
MIL - Washington State Military Department	17	33			
OAH - Office of Administrative Hearings	11	6	4		
OFM - Office of Financial Management	135	798	798		210
OIC - Office of the Insurance Commissioner	76	167	11		
OMWBE - Office of Minority and Women's Business Enterprises				X	
OSPI - Office of the Superintendent of Public Instruction	58	161			
PARKS - Washington State Parks and Recreation Commission	43	63	63		
PDC - Public Disclosure Commission	17	1			
PERC - Washington State Public Employment Relations Commission	2	2	1		
PLIA - Pollution Liability Insurance Agency	1			X	
PSP - Puget Sound Partnership	23	7	6		
RCO - Washington State Recreation and Conservation Office	37	4	3		
SAO - Office of the Washington State Auditor	76	73	8		



All Bundles – In-Scope Agencies	Applications	Devices	Physical	Exception	StratoProbe
SBCTC - Washington State Board for Community and Technical Colleges	5			X	
SCC - Washington State Conservation Commission	2			X	
SIB - Washington State Investment Board	12	29			
SOS - Secretary of State	66	105	105		
TBD - Current Duplications	0	0	0		
TIB - Transportation Improvement Board	6	4	4		
TRE - Washington State Treasury	1	42	13		
UTC - Utilities and Transportation Commission	24	59	54		55
WDVA - Department of Veterans Affairs		1			
WHCFA - Washington Health Care Facilities Authority	2	2	1		
WHRC - Washington Horse Racing Commission	1	1			
WSAC - Washington Student Achievement Council	8	14			
WSDOT - Washington State Department of Transportation	450	1,130	1,130		1,130
WSHFC - Washington State Housing Finance Commission	38	13			
WSHS - Washington State Historical Society	12	11	4		
WSP - Washington State Patrol	126	365	1		
WSSB - Washington State School for the Blind	46	55	25		
WSSDA - Washington State School Directors' Association	11	1			
WSTC - Washington State Transportation Commission				X	
WTB - Workforce Training and Education Coordinating Board	3	1	1		
WTSC - Washington Traffic Safety Commission	1	4	4		
<b>Total Inventories</b>	<b>7,348</b>	<b>11,275</b>	<b>5,867</b>		<b>4,685</b>

**Exhibit 5.1.1: Unisys Total Discovered Inventories for the Statewide Cloud Compute Readiness Assessment**



Unisys followed the State’s policies for storing, accessing, processing, and disposing of collected data. All discovery inventory summaries and Agency data sets are currently available on the OCIO SharePoint server.

### 5.1.1 Summary of Dependencies (Applications Mapped to Devices)

Application Dependency Bundle	Total	Orphan	Mapped	Percent
ACB - Washington State Board of Accountancy	4	0	4	100%
AGR - Department of Agriculture	82	56	26	32%
ARTS - Arts Commission	1	1	0	0%
ATG - Attorney General	35	0	35	100%
BIIA - Board of Industrial Insurance Appeals	25	20	5	20%
BTA - Washington State Board of Tax Appeals	1	1	0	0%
BVFFRO - Board for Volunteer Firefighters and Reserve Officers	1	1	0	0%
CFC - Caseload Forecast Council	2	0	2	100%
CJTC - Criminal Justice Training Commission	16	7	9	56%
COM - Department of Commerce	13	5	8	62%
CRAB - County Road Administration Board	13	7	6	46%
CRGC - Columbia River Gorge Commission	3	2	1	33%
CTS - Consolidated Technology Services (WaTech)	997	513	484	49%
DAHP - Dept. of Archaeology and Historic Preservation	7	4	3	43%
DCYF - Department of Children, Youth, and Families	564	50	514	91%
DES - Department of Enterprise Services	43	16	27	63%
DFI - Department of Financial Institutions	361	255	106	29%
DFW - Department of Fish and Wildlife	90	7	83	92%
DNR - Department of Natural Resources	297	43	254	86%
DOC - Department of Corrections	708	618	90	13%
DOH - Department of Health	833	311	522	63%
DOL - Department of Licensing	307	90	217	71%
DOR - Department of Revenue	1,176	895	281	24%
DRS - Department of Retirement Systems	101	21	80	79%



Application Dependency Bundle	Total	Orphan	Mapped	Percent
DSB - Department of Services for the Blind	3	0	3	100%
DSHS - Department of Social and Health Services	1,235	1,117	118	10%
DVA - Department of Veteran's Affairs	33	33	0	0%
ECY - Department of Ecology	395	314	81	21%
ELUHO - Environmental and Land Use Hearings Office	2	2	0	0%
ESD - Employment Security Department	141	0	141	100%
GMB - Gambling Commission	32	23	9	28%
HCA - Health Care Authority	293	262	31	11%
HUM - Human Rights Commission	2	0	2	100%
LCB - Liquor and Cannabis Board	106	19	87	82%
LNI - Labor and Industries	152	73	79	52%
LOT - Washington State Lottery	49	31	18	37%
MIL - Washington State Military Department	33	15	18	55%
OAH - Office of Administrative Hearings	6	2	4	67%
OFM - Office of Financial Management	798	200	598	75%
OIC - Office of the Insurance Commissioner	167	31	136	81%
OSPI - Office of the Superintendent of Public Instruction	161	149	12	7%
PARKS - Washington State Parks and Recreation Commission	63	58	5	8%
PDC - Public Disclosure Commission	1	0	1	100%
PERC - Washington State Public Employment Relations Commission	2	1	1	50%
PSP - Puget Sound Partnership	7	0	7	100%
RCO - Washington State Recreation and Conservation Office	4	0	4	100%
SAO - Office of the Washington State Auditor	73	44	29	40%
SIB - Washington State Investment Board	29	28	1	3%
SOS - Secretary of State	105	17	88	84%
TIB - Transportation Improvement Board	4	0	4	100%
TRE - Washington State Treasury	42	41	1	2%



Application Dependency Bundle	Total	Orphan	Mapped	Percent
UTC - Utilities and Transportation Commission	59	57	2	3%
WDVA - Department of Veteran's Affairs	1	1	0	0%
WHCFA - Washington Health Care Facilities Authority	2	2	0	0%
WHRC - Washington Horse Racing Commission	1	1	0	0%
WSAC - Washington Student Achievement Council	14	4	10	71%
WSDOT - Washington State Department of Transportation	1,130	1,130	0	0%
WSHFC - Washington State Housing Finance Commission	13	4	9	69%
WSHS - Washington State Historical Society	11	7	4	36%
WSP - Washington State Patrol	365	233	132	36%
WSSB - Washington State School for the Blind	55	15	40	73%
WSSDA - Washington State School Directors' Association	1	0	1	100%
WTB - Workforce Training and Education Coordinating Board	1	1	0	0%
WTSC - Washington Traffic Safety Commission	4	4	0	0%
Grand Total	11,275	6,842	4,433	39%

**Exhibit 5.1.1.1: Summary of Application Dependencies**

### 5.1.2 Total Types of Agency Applications per Annual Certification

2018 Totals	Applications	Percent	2019 Totals	Applications	Percent
Custom	2,685	57%	Custom	2692	57%
Hybrid	208	4%	Hybrid	214	5%
Hosted	28	1%	Hosted	26	1%
Custom Off the Shelf	1452	31%	Custom Off the Shelf	1,151	24%
SaaS	248	5%	SaaS	277	6%
Mainframe	105	2%	Mainframe	96	2%
Totals per Survey	4620		Totals per Survey	4,364	

**Exhibit 5.1.2.1: Total Types of Agency Applications**



### 5.1.3 Summary of Application and Infrastructure Discovery

Items	Totals	Percent
2019 Annual Certification Survey (baseline)	4,364	100%
IT Asset Request Survey (applications)	7,348	168%
Validation of Applications (reduction/deduplication)	-2,097	-48%
Net New Applications	887	20%
New Total Applications (in-scope)	<b>5,251</b>	100%
Mapped or Grouped Applications	2,289	44%
Orphan/Remnant Applications	2,969	56%
Total IT Assets	<b>11,275</b>	100%
Mapped or Grouped Inventory Devices	4,433	39%
Orphan/Remnant Devices	6,842	61%

**Exhibit 5.1.3.1: Total Applications and Infrastructure**

### 5.1.4 Summary of StratoZone Discovery

The StratoZone sample size: Agencies represent ~40% total in-scope assessment inventory.

Totals	Devices	Percent
Total Assets in Discovery Scan	4,284	100%
Windows OS	3,453	80%
Linux	831	20%

StratoFit Scores	Devices	Percent
High Readiness Score	2,883	67.3%
Medium Readiness Score	1,053	24.6%
Low Readiness Score	348	8.1%

Utilization	Devices	Percent
Memory	30% Average Used	70% Average Open
Storage	25% Average Used	75% Average Open
CPU	7% Average Used	11% Peak Used

**Exhibit 5.1.4.1: Summary of StratoZone Discovery**



### 5.1.4.1 StratoZone High-Level Findings

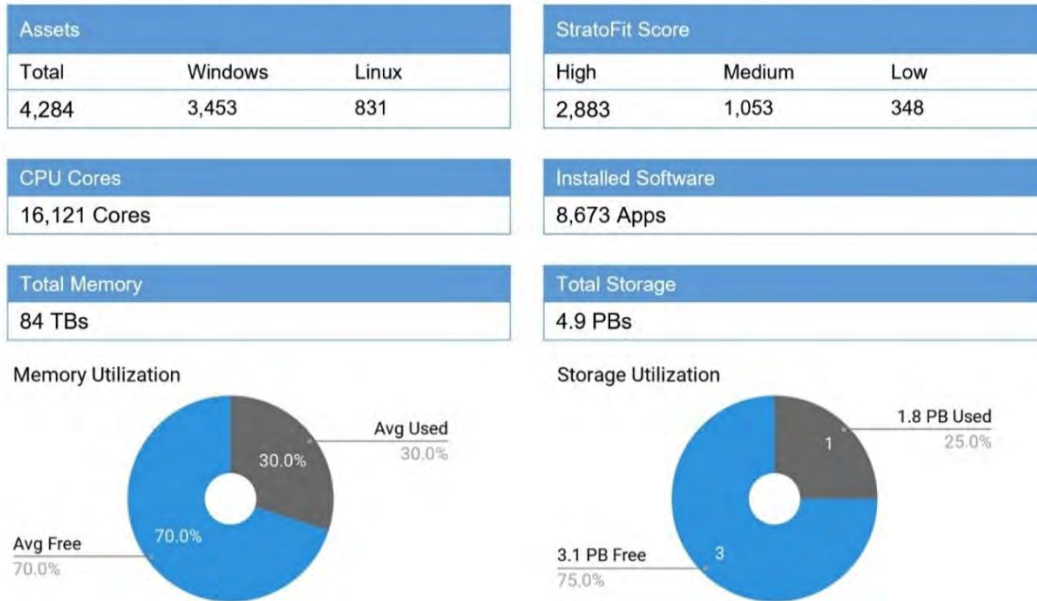


Exhibit 5.1.4.1.1: StratoZone High-level Findings

### 5.1.4.2 Asset Overview

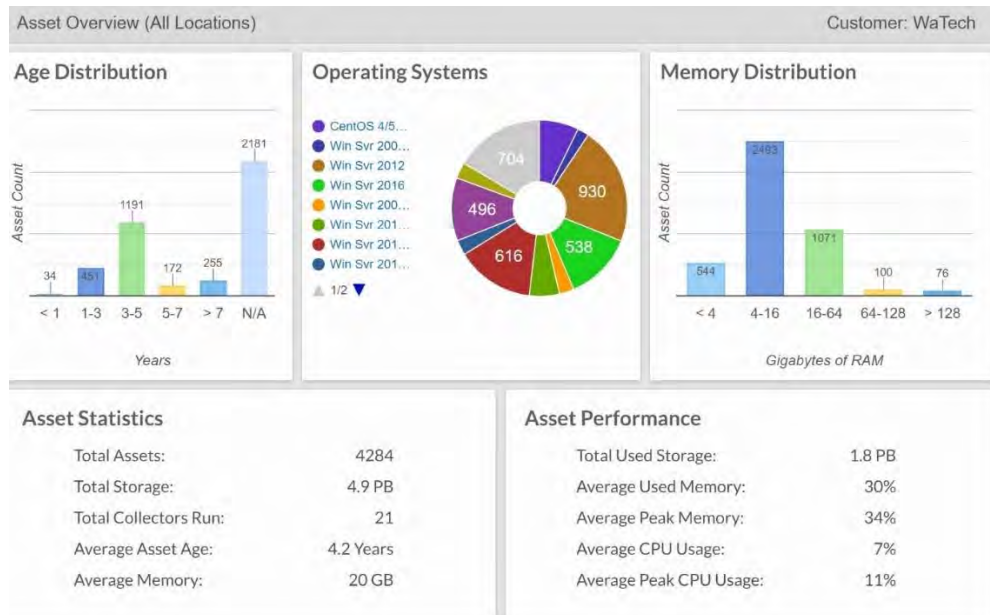


Exhibit 5.1.4.2.1: StratoZone Asset Overview



### 5.1.4.3 Asset Age



Exhibit 5.1.4.3.1: StratoZone Asset Age

### 5.1.4.4 Cloud Readiness

#### Cloud Readiness Score Distribution

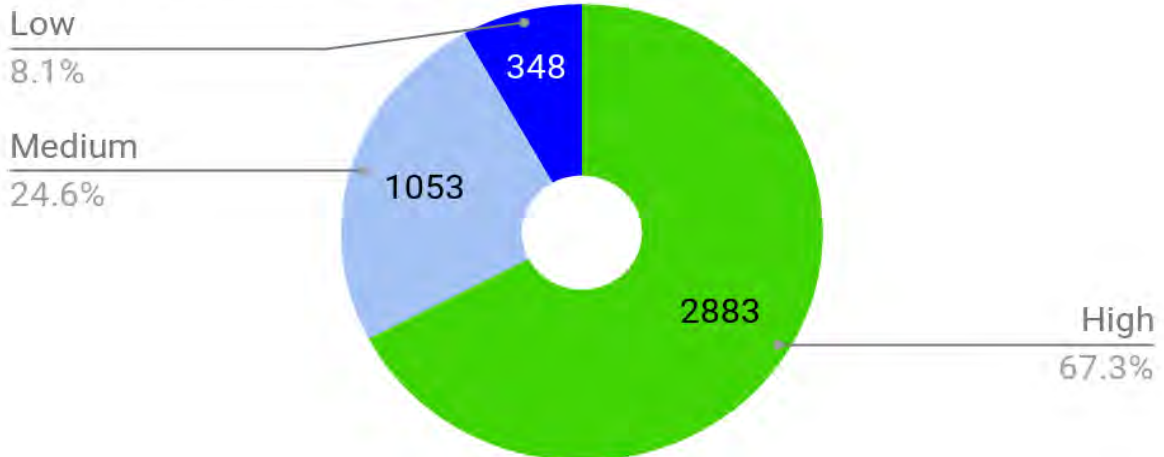
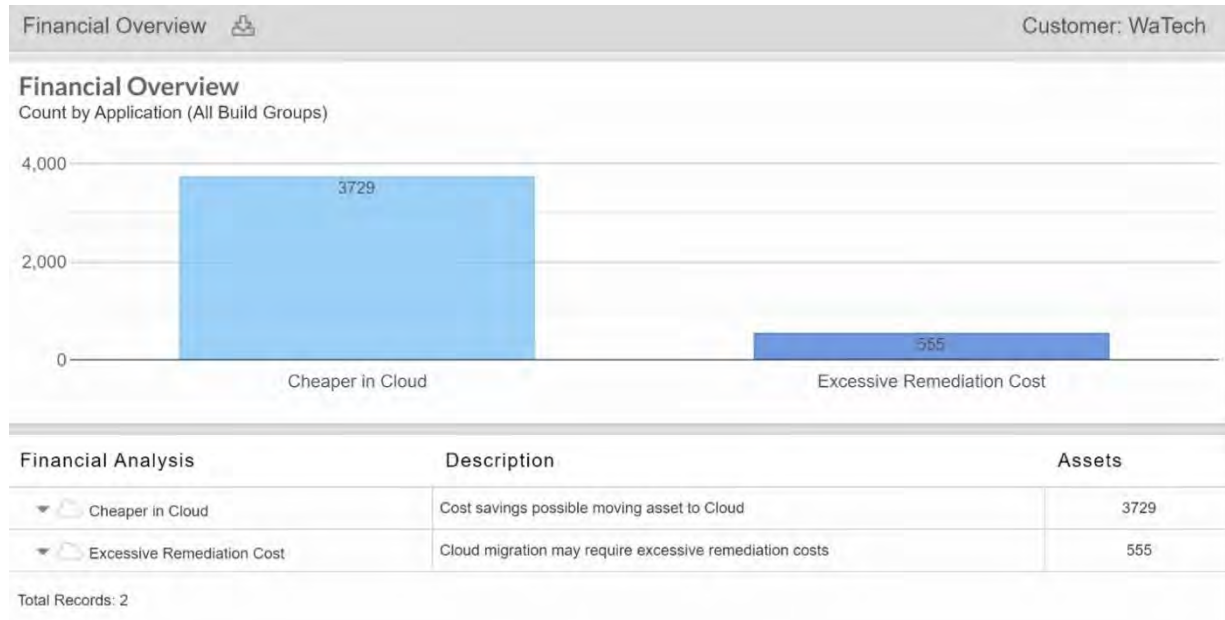


Exhibit 5.1.4.4.1: StratoZone Cloud Readiness





### 5.1.4.5 Financial Overview



**Exhibit 5.1.4.5.1: StratoZone Financial Overview**

## 5.2. Application and Asset – Analysis

### 5.2.1 Unisys Cloud Readiness Criteria Checklist (CRCC Tool)

A crucial part of the Unisys methodology is to provide our clients with a Cloud Readiness Criteria Checklist Tool (CRCC) to help gather relevant data and information from the business alignment perspective. Unisys used spreadsheets and survey questionnaires tailored to each client’s specific environment and objectives to collect this information during the assessment phase.

The CRCC Tool is a spreadsheet. It uses weighted evaluation criteria to score and identify hardware, software, and services (“core services”) as candidates for migration to a cloud solution (hereafter referred to generically as “components”) for their architectural compatibility and deployment readiness to the cloud. The criteria scores and weights are prepopulated in the tool; therefore, the tool can be used to evaluate components for their cloud suitability. However, it is expected that the evaluation criteria, scores, and weights will be customized to fit the current State of Washington standards: 112.10 for Applications and 112.20 for Infrastructure being used currently.

The CRCC focuses primarily on the evaluated architectural aspects of the application components. It should be noted that an element that is not architecturally compatible with cloud deployment could be rearchitected for cloud deployment. The CRCC tool does not attempt to measure the effort, risk, or benefit associated with doing such rearchitecting of components. The CRCC analysis is based solely on the current state of the application and infrastructure components being evaluated for cloud readiness. Other tools in the CloudForte Suite, like TDS Transition Manager and StratoZone, measured the effort, risk, and financial benefit.



The CRCC tool consists of multiple worksheets: Instructions, Criteria, Weighting, Components (Application and Infrastructure), and Analysis. At Unisys, we cover numerous categories of information such as workload, workflow, data management, access, availability, communication, data usage, complexity, security, user interface, user, type, and volume for analysis for total scoring. Then we make our recommendations to our clients.

Exhibit 5.2.1.1: Summary of Cloud Readiness Criteria Checklist (CRCC) Tool

### 5.2.2 CRCC Summary Scoring

	Totals	Applications	Percent
Total Applications Imported		4,364	100%
Out-of-Scope Applications		775	18%
Number of Evaluated Applications		3,588	82%
<b>Scoring Summary</b>			
Strong Candidate Scoring		3,199	89%
Good Candidate Scoring		68	1.5%
Low Candidate Scoring		321	9.0%

Exhibit 5.2.2.1: Cloud Readiness Criteria Checklist (CRCC) Summary Score

### 5.2.3 Unisys Questionnaire for Agency Cloud Readiness

The Unisys Questionnaire enables our team from advisory services to evaluate and determine maturity on multiple levels, including cloud architecture, operational effectiveness, and business alignment.

The questionnaire with a checklist scoring report illustrates the State’s cloud migration readiness across six perspectives: people, business, process, operations, technology, and security.

### 5.2.4 Unisys uNAV Questionnaire Scoring (with Evaluation Radar Example)

The results below are illustrative only, and each score is based on an individual’s response.

Scoring	Perspectives	Heat Map	No.	Questions	Score
	People	8.4	1	Human Resources	1
	Business	14	2	Program Management	2



Scoring	Perspectives	Heat Map	No.	Questions	Score
	Process	4	3	Communications and Governance	3
	Operations	18	4	Business Reason	4
	Technology	12	5	Business Case	3
	Security	9	6	Portfolio Management	1
			7	Deployment and Management	1
			8	Roles and Responsibility	5
			9	Future Cloud Operations	4
			10	Cloud Account Planning	3
			11	Cloud Vendor Experience	3
			12	Operational Cloud Security	2
			13	Documented Security Policy	1
			14	Budget Management	2
			15	Accounts Payable Management	3
			16	Federal Program Management	1
			17	Grant Management	1

### Cloud Readiness Checklist Radar

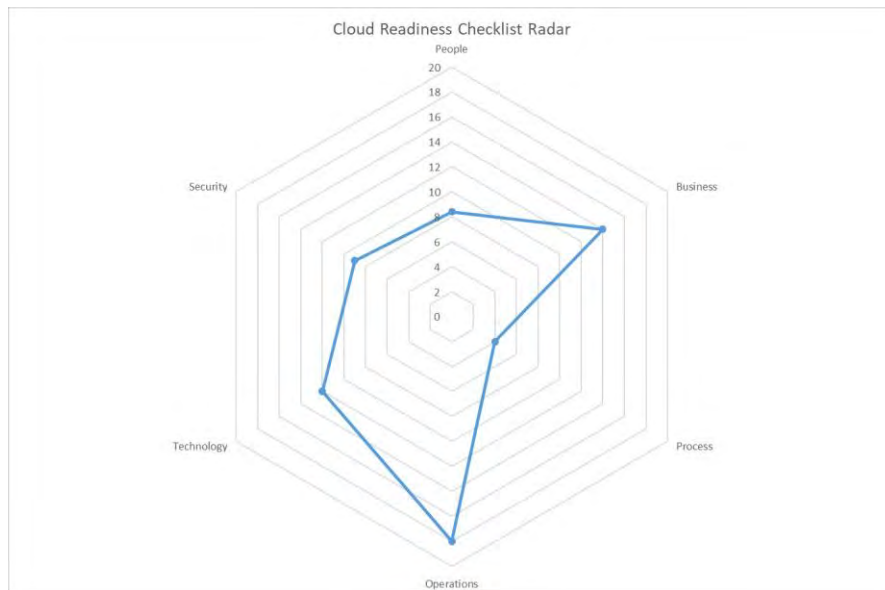


Exhibit 5.2.4.1: Illustration of the Unisys UNAV Cloud Readiness Questionnaire Tool

### Questionnaire Evaluation Criteria

Upon completing the questionnaire, you can use the provided takeaway report on the Score tab to help you plan and communicate with stakeholders.



Standard Cloud Readiness Criteria to Support Priorities, Targets, and Planning	Definitions and Answers
a. Define “cloud computing readiness” and the criteria that will be used to measure Agency readiness.	A cloud readiness assessment is an overarching process that encompasses organizational readiness, application discovery, and application assessments. The primary goal of a cloud readiness assessment is to provide a gap analysis of the organization and a list of applications that can be moved to the cloud smoothly, following a prescriptive cloud application assessment process.
b. Define the criteria that will be used to identify hardware, software, and services that will be considered a “core service” and a candidate for migration to a cloud solution.	IT services refer to the application of business and technical expertise to enable organizations in the creation, management, and optimization of or access to information and business processes.
c. Define “technology assets” within the context of cloud adoption and migration and the criteria used to determine inventory eligibility.	Information Technology Assets means the computer software, firmware, middleware, servers, systems, networks, workstations, data communications lines, and all other information technology equipment, used by and under the control of the Company and its Subsidiaries.
d. Create categories that encompass technology, skillsets, and organizational readiness.	<p><b>Business Drivers/Objectives</b>          This category refers to relevant aspects of the business outcomes and main traits of the Cloud initiative.</p> <p><b>Technology and Operational Aspects</b>          This category refers to the technology and operational requirements of the Cloud services.</p> <p><b>Risk Factors</b>          This category enables Unisys to effectively position cloud benefit and risk within a consistent decision model</p>
e. Create a readiness checklist and prioritize readiness activities.	The CRCC tool consists of five worksheets: Instructions, Criteria, Weighting, Components (Application and Infrastructure), and Analysis. Each of these worksheets is described in greater detail in subsequent sections.

**Unisys Methodology**

To analyze the applications, Unisys uses inventory data from the tool, along with specific survey responses with the application owners and business. We analyze the application portfolio by multiple criteria. We gather information from the applications of business owners through surveys and workshops during the data discovery phase.

Unisys scores each application with focus points, and the evaluation is performed in accordance with how the application fits into the enterprise as a whole. We analyze the application for the information and map them onto a matrix chart.

By describing how these assets relate and interact with one another, Unisys helps decision-makers see the impact their decisions have on everything from eliminating redundant applications to evaluating future cloud target applications.



## Cloud Readiness Criteria

The next step is to identify the applications for possible cloud migration based on enterprise architecture that includes business, data, application, and technical factors. It is imperative to consider what type of cloud environment—SaaS, PaaS, or IaaS—is best suited for the application.

A crucial part of our methodology is to provide our clients with a Cloud Readiness Criteria Assessment to help gather relevant data and information from the business alignment perspective. To collect this information during the assessment phase, Unisys uses workshops and questionnaires that we tailor for each client's specific environment and objectives.

At Unisys, we cover numerous information on areas such as workload, workflow, data management, access, availability, communication, data usage, complexity, security, user interface, user, type, and volume for analysis, and then we make our recommendation to our clients.

## Agency Readiness Criteria Checklist

A report that clearly defines the criteria that will be used to measure Agency ability to adapt successfully, use, and support cloud computing solutions and an associated checklist that will be used to gauge Agency readiness.

## StratoZone and Transition Manager

### Discovery, Inventory Analysis, and Cloud Readiness

The objective of this phase is to collect data from the target workloads and complete inventory analysis, including basic cloud readiness. The StratoProbe® discovery engine gathered workload, application, and network information and processed the following analytics:

- Inventory analysis
- Asset performance analysis
- Network dependency mapping
- Cloud-readiness scoring
- Application inventory analysis

### Activity 1: Basic Cloud Fit and Financial Analysis

The objective of this phase is to analyze your data further to provide insights into cloud readiness, potential savings from the cloud, consumption strategies including IaaS and PaaS alternatives, and to review your projected spend in the selected cloud providers. The expected output from this phase includes:

- Best-fit vendor-product match (IaaS)
- PaaS-fit analysis
- IaaS-fit analysis
- Cloud-spend estimates (by the vendor)
- TCO and ROI against benchmark baselines

### Activity 2: Basic Cloud Fit and Financial Analysis

The objective of this phase is to analyze your data further to provide insights into cloud readiness, potential savings from the cloud, consumption strategies including IaaS and PaaS alternatives, and to review your projected spend in the selected cloud providers. The expected output from this phase includes:

- Best-fit vendor-product match (IaaS)
- PaaS-fit analysis
- IaaS-fit analysis
- Cloud spend estimates (by the vendor)
- TCO and ROI against benchmark baselines



### StratoZone and Transition Manager

The cloud readiness score is impacted by the Agency's response to questions in the StratoZone® portal. Readiness scores (shown in the parameters below) are taken into consideration for the essential cloud readiness scoring along with your indicated preference for each parameter.

The StratoSlate® planning engine can be used to analyze further the impact of effort and cost, as well as a services engagement with StratoZone® or your delivery partner.

### Cloud Readiness Characteristics

- Agency preference regarding high-performance assets
- Agency ability to exit a selected public cloud provider
- Agency preference regarding older assets
- Agency preference to migrate certain higher-risk roles (ex: DB server)
- Agency desire to move assets with high network dependency
- Agency preference regarding remediating unsupported operating systems
- Agency assets were analyzed to determine the remediation level required for migration to public cloud Infrastructure as a Service (IaaS) products. Each asset was broadly categorized into a high, medium, or low fit group.

Assets with medium scores may require remediation before public cloud migration. Assets with low scores may not meet the minimum requirements for cloud adoption or are infrastructure components (e.g., VMWare ESXi servers) that will be made redundant with a migration to cloud services. Using the StratoSlate® planning engine, we can conduct additional analysis to determine the remediation type, associated cost, and effort level required for public cloud IaaS. Assets falling in the high, medium, and low remediation categories are shown below in Section 5.3.1.

This assessment identified assets that qualify for migration to Platform as a Service (PaaS) in the public cloud. These PaaS-qualifying assets are in Section 5.1.5. The PaaS categories are shown in your StratoZone® portal. Further analysis is necessary to determine the associated cost, risk, and effort level required to migrate these assets to a public cloud Platform as a Service.

#### Exhibit 5.2.4.2: Unisys Questionnaire for Agency Cloud Readiness Characteristics

## 5.3 Application and Asset – Key Findings

### 5.3.1 Discovery Key Findings

Unisys used our assessment methodology to establish an application and technology scoring baseline criteria for cloud readiness. As a result, Unisys found that using our Cloud Readiness Criteria Checklist Tool (CRCC), **the majority (89%)** of Agencies' applications and infrastructure scored as "strong candidates" in their readiness to move to the cloud.

Totals	Applications	Percent
Total Applications Imported	4,364	100%
Out-of-Scope Applications	775	18%
Number of Evaluated Applications	3,588	82%
<b>Scoring Summary</b>		



Strong Candidate Scoring	3,199	89%
Good Candidate Scoring	68	2%
Low Candidate Scoring	321	9.0%

\*The Strong Candidate Score includes workload, workflow, virtual architecture, data management, data usage, complexity metrics, security, user interface, user type, and volumes for analysis to provide a total score.

**Exhibit 5.3.1.1: Cloud Readiness Criteria Checklist (CRCC) Score**

**5.3.2 Validation Analysis**

Unisys took an additional step using the StratoZone product StratoProbe to discover, validate, and confirm the CRCC results. Using a sample of seven Agencies (two with 16 divisions) representing ~38% of the total applications and infrastructure, we were able to **confirm 92%** scored in the High to Medium readiness ratings. Both **scores correlate to an 82.5%** High-Medium or Strong Candidate average strength rating for all 11,275 servers that host 5,251 applications.

Totals	Devices	Percent
Total Assets in Discovery Scan	4,284	100%
Windows OS	3,453	80%
Linux	831	20%
StratoFit Scores	Devices	Percent
High Readiness Score	2,883	67.3%
Medium Readiness Score	1,053	24.6%
Low Readiness Score	348	8.1%
Utilization	Devices	Percent
Memory	30% Average Used	70% Average Open
Storage	25% Average Used	75% Average Open
CPU	7% Average Used	11% Peak Used

\*StratoFit scores the following characteristics: **capacity** (large storage capacity that may hinder the ability to move out of a cloud provider in the future), **performance** (a high-performance asset with a large number of CPUs), **age, operating systems** (an older operating system that may not be supported), and **other machine-based attributes** (high number of dependencies that may require additional considerations in cloud migration).

**Exhibit 5.3.2.1: StratoZone’s StratoFit Scores**

**5.3.3 Financial Opportunities**

The StratoZone Analysis provided insights into cloud readiness, potential savings from the cloud, consumption strategies, including IaaS and PaaS alternatives. Unisys used StratoZone to compare the State of Washington’s projected costs, or cloud spend, with selected cloud providers [Amazon Web Services (AWS), Microsoft Azure, Google Cloud, or Washington State Cloud].

Unisys observed an opportunity of **\$78M three-year cost saving** when comparing Azure with Washington State Cloud services.

The analysis methodology comparing Azure, AWS, Google, and Unisys noted the lack of competitive market pricing for Washington State Cloud compared to the private market leaders.



Unisys understands that according to RCW 43.105.006: “To successfully meet Agency needs and meet its obligation as the primary service provider for these services, the consolidated technology services Agency (CTS) must offer high-quality services at the lowest possible price.”

**Cloud Cost Estimate for 9,000 Servers (1-Year Reserved Cloud Pricing)**

Vendor	Total Monthly Cost	Annual Cost	Avg Server Cost	Annual Contact Savings
Azure (1-Year Reserved)	\$2,124,810.00	\$25,497,720.00	236.09	(\$20,734,920.00)
AWS (1-Year Term)	\$2,327,220.00	\$27,926,640.00	258.58	(\$18,306,000.00)
Google (1-Year Commit)	\$2,854,260.00	\$34,251,120.00	317.14	(\$11,981,520.00)
Washington State Cloud	\$3,852,720.00	\$46,232,640.00	428.08	\$0.00

**Cloud Cost Estimate for 9,000 Servers (3-Year Reserved Cloud Pricing)**

Vendor	Total Monthly Cost	Annual Cost	Avg Server Cost	Annual Contact Savings
Azure (3-Year Reserved)	\$1,700,910.00	\$20,410,920.00	188.99*	(\$25,821,720.00)
AWS (3-Year Term)	\$2,326,050.00	\$27,912,600.00	258.45	(\$18,320,040.00)
Google (3-Year Commit)	\$2,608,830.00	\$31,305,960.00	289.87	(\$14,926,680.00)
Washington State Cloud	\$3,852,720.00	\$46,232,640.00	428.08	\$0.00

**Exhibit 6.5.1.2: Cloud Service Contract Estimated Savings per Year (9,000 Servers)**

\*Disclosure: Average service pricing using vendor catalogs gathered from the StratoZone API. The current WaTech service catalog pricing for Washington State Cloud is used for this comparison. Please see Appendix F: Financial Considerations. \*Unisys used the Azure 3-Year Reserved pricing of our ROI calculations.

**Exhibit 5.3.3.1: Vendor Financial Analysis**

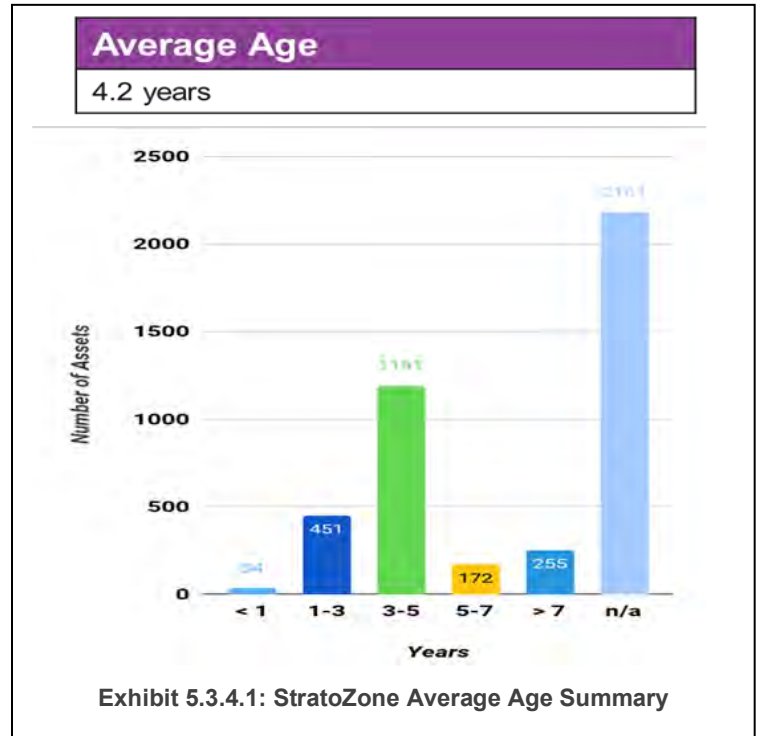




### 5.3.4 Application and Asset High-Risk Analysis

From the discovery, Unisys was able to observe a significant **technology refresh** future risk:

- Physical servers have an average age of 4.2 years. The industry typically refreshes server hardware every 3-5 years. Based on the average lifecycle, the State of Washington has an opportunity to adopt cloud services as an alternative to a technology refresh.
- Unisys also noted that 10% of the servers are already older than five years.
- Moving these workloads to the Cloud provides an opportunity to shift to an operational expense (OpEx) financial approach versus continuing the capital expense (CapEx) typically required as part of the hardware purchase during technology refresh.



- Typically hardware and appliance vendors will extend maintenance on the equipment beyond five years for a premium fee.

### 5.3.5 Asset Risk for CapEx Investment

Using both StratoProbe and Transition Manager, Unisys identified the current lifecycle state from the asset data provided by the Agencies. The industry standard for data center infrastructure, including servers and storage devices, is 3-5 years.

StratoProbe discovered a subset of the Agencies' assets and reported the age distribution (below) based on the physical server details. Transition Manager was used as a master inventory database.

The asset inventories included the in-service date information provided by the Agencies. The Transition Manager data includes the discovery data from StratoProbe.

StratoProbe End of Life Asset Risk	Servers	Percent
Asset Age Distribution 1-5 years	1,676	39%
Asset Age Distribution 5+ years	427	10%
Asset Age Distribution Unknown	2,181	51%
Total Servers in StratoZone Discovery	4,284	100%

Total End of Life Asset Risk	Servers	Percent
Asset Age Distribution 1-5 years	6,116	54%
Asset Age Distribution 5+ years	1,749	16%



Asset Age Distribution Unknown	3,410	30%
Total Servers	11,275	100%

Unisys estimates that the next technology refresh costs could be as high as \$211.7M in procuring CapEx investments in FY2021-23 based on the FY20 annual infrastructure investment of \$70,591,918.

### 5.3.6 Application and Asset Dependency Risk Analysis

In successful migration or modernization programs, application dependencies must be understood and tracked during cloud adoption. During the State of Washington assessment, Unisys collected the available applications and dependency information.

Over 61% of the Agencies cannot determine which IT assets host what applications and the dependencies that exist. The limited ability to identify the application dependencies presents a significant risk for the current readiness and must be planned into the future migration plans.

<b>Total IT Assets</b>	<b>11,275</b>	<b>100%</b>
Mapped or Grouped Devices	4,433	39%
Orphan/Remnant Devices	6,842	61%

### 5.3.7 IT Asset Provisioning and Utilization Analysis

Unisys noted that the StratoZone Utilization Analysis found that current IT server assets have been over-engineered and over-provisioned in the range of 70-76% for the sample Agencies representing 40% of the in-scope total. This over-provisioning cost the State of Washington unnecessary CapEx or wasted investment for data-center operations, which can be corrected and better managed (real-time) in future cloud OpEx.

IT Asset Provisioning and Current Utilization			
Memory	30% Average Used	70% Average Open	
Storage	25% Average Used	75% Average Open	
CPU	7% Average Used	11% Peak Used	

### 5.3.8 StratoZone Discovery Summary

StratoZone's discovery and analysis tools were deployed for ten (10) Agencies and analyzed 4,284 servers (approximately 40% of the total in-scope Agencies server inventory).

Totals (sample size ten Agencies with ~40% total inventory)	Devices	Percent
Total Assets in Discovery Scan	4,284	100%
Windows OS	3,453	80%
Linux	831	20%
<b>Physical vs. Virtual</b>	<b>4,284</b>	<b>100%</b>
Total Physical Devices	226	5.2%
Total Virtual Devices	4,058	94.7%
<b>Types of Servers</b>	<b>4,284</b>	<b>100%</b>
Application Servers	647	15.1%



Totals (sample size ten Agencies with ~40% total inventory)	Devices	Percent
Database Servers	566	13.2%
Web Servers	49	1.1%
Container Servers	1	~not significant (ns)%
Citrix Servers	4	~ns%
Middleware Servers	2	~ns%
Mail Servers	5	~ns%
Unknown Type	2,318	54.1%
StratoFit Scores		
High Readiness Score	2,883	67.3%
Medium Readiness Score	1,053	24.6%
Low Readiness Score	348	8.1%
Utilization		
Memory	30% Average Used	70% Average Open
Storage	25% Average Used	75% Average Open
CPU	7% Average Used	11% Peak Used

StratoProbe discovered that 94.7% of the asset inventory sample had virtualized workloads. A majority of the servers were Microsoft Windows servers running approximately two applications per asset. The average workload utilization is low and provides an opportunity to realign the servers' configurations to right-size or use fewer CPUs, less memory, and less storage.

The annual assessment survey stated that 81% of Total State of Washington Application Inventory in the 3-Tier structure and only 6% of total applications are in consumptive (SaaS) pricing models.

### 5.3.9 Total DR Coverage per Application and Agency

Unisys discovered the following Agencies have Disaster Recovery coverage for their applications:

DR Location	Agency	Total
AWS GOV	OIC - Office of the Insurance Commissioner	39
AWS, SDC, QDC	COM - Department of Commerce	5
Azure Storage	DES - Department of Enterprise Services	82
Backup of RCOQDHOST1+QDC, Quincy	RCO - Washington State Recreation and Conservation Office	1
Box.com	WSSDA - Washington State School Directors' Association	1
Cloud	CRGC - Columbia River Gorge Commission	1
Cloud Backup	LCB - Liquor and Cannabis Board	56
DR in Quincy	LCB - Liquor and Cannabis Board	1
DR Site	DOC - Department of Corrections	1
Eric Jones	DFW - Department of Fish and Wildlife	1
HUM Olympia or HUM Spokane	HUM - Human Rights Commission	1
IBM Boulder	DSHS - Department of Social and Health Services	15



DR Location	Agency	Total
AWS GOV	OIC - Office of the Insurance Commissioner	39
AWS, SDC, QDC	COM - Department of Commerce	5
Azure Storage	DES - Department of Enterprise Services	82
QDC	CTS - Consolidated Technology Services (WaTech)	8
	DFI - Department of Financial Institutions	24
	DSHS - Department of Social and Health Services	16
	UTC - Utilities and Transportation Commission	1
REPLICA VM from +SDC, Olympia	RCO - Washington State Recreation and Conservation Office	2
Replicate to +QDC, Quincy	RCO - Washington State Recreation and Conservation Office	11
SDC, Olympia	PSP - Puget Sound Partnership	1
	<b>Total Applications Covered by DR (5%)</b>	<b>267</b>
	Total Applications in Discovery Scope	5,224

### 5.3.10 Disaster Recovery Coverage and Investment Opportunity

Unisys discovered the following differences between the number of applications in the environment and the number currently supported by a Disaster Recovery solution. As part of cloud adoption, Agencies are recommended to evaluate their continuity needs and the available options presented by Cloud Services.

Using multiple availability zones, regions, and replication, Cloud Services can improve applications' resiliency, whether they currently have or do not have Disaster Recovery coverage.

Total Disaster Recovery Coverage		
Total Applications in Scope	5,224	100%
Total Applications Classified Mission Critical	941	18%
Total Applications Covered Today	267	5%
Total Gap in DR Coverage	674	13%
Total Applications Classified Business Essential	3,008	57.5%

### 5.3.11 Benchmarking Key Finding Details

Unisys discovered that the State of Washington (79 Agencies) spent \$18.2M in 2019, or 1.96%, versus the 8% benchmark for IT Spend Tower for Cloud Compute.

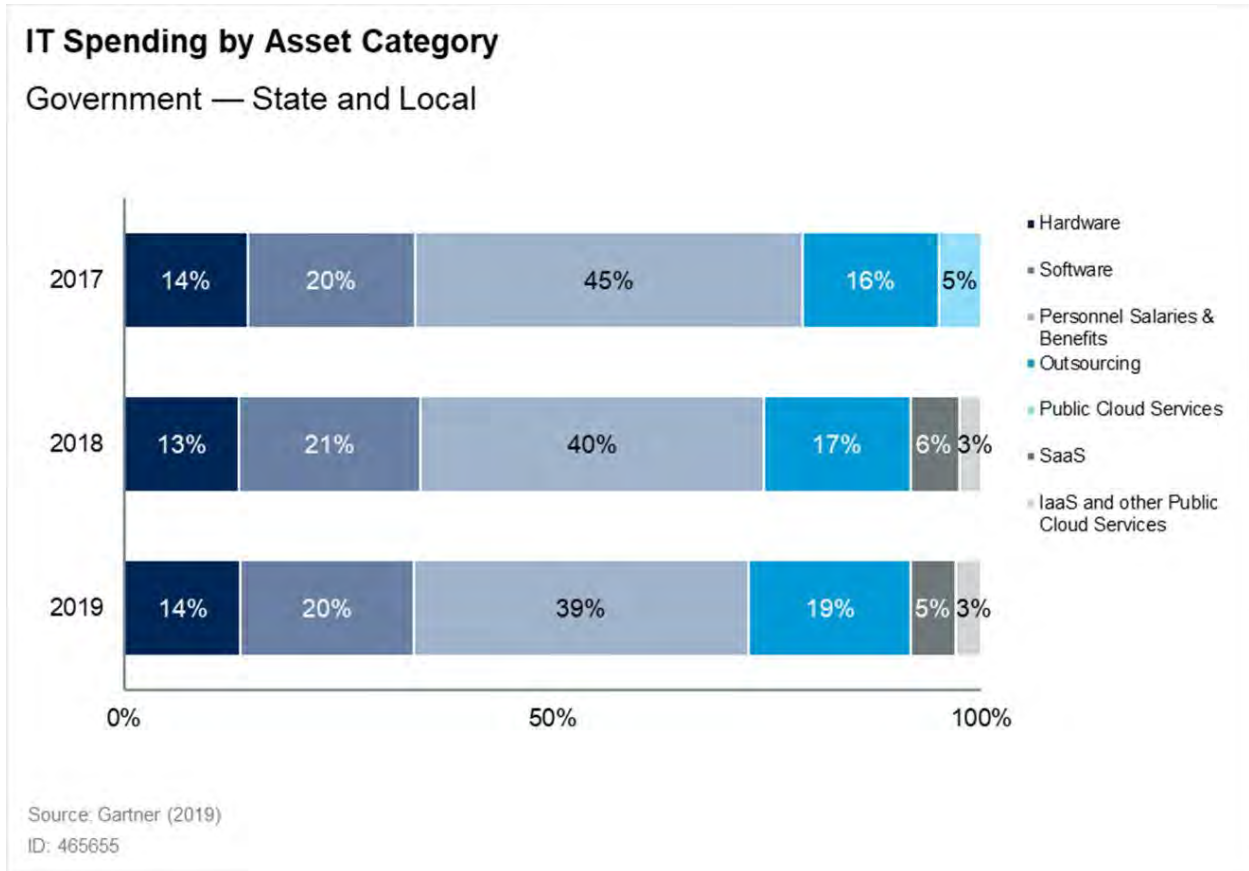


Exhibit 5.3.11.1: IT Spending Benchmark by Asset Category (Gartner)<sup>10</sup>

## 5.4 Application and Asset – Results

Unisys collected the inventories and evaluated state Agency technology assets, associated service contracts, and other relevant information. We conducted an inventory survey of Agency technology assets, and we assessed the results to determine which assets are good candidates for cloud computing solutions.

Our inventory findings confirm that the State of Washington Agencies have a “High Readiness” percentage of applications and infrastructure assets that are excellent candidates for moving to cloud computing solutions.

### 5.4.1 Results and Foundational Data

With the CRCC and StratoZone’s StratoFit Analyze and Plan results providing the foundational data, Unisys recommends the future transitioning of Agency applications and server assets to cloud computing services. The inevitable migration transition will enable the State to take

<sup>10</sup> Gartner Analyst(s): Stegman, Guevara, Michelogiannakis, Futela, Sharma, & Kaushal, IT Key Metrics Data 2020: Key Industry Measures: Government — State and Local Analysis: Multiyear, Published: 18 December 2019, page 14.



advantage of cost avoidance for the upcoming technology refresh and transform the use of optimized server configurations based on the following findings:

- A total of 11,275 servers were discovered in the inventory survey, with 82% of the application infrastructure residing on virtual servers. The use of virtualization and newer platform technologies helps produce a “Strong Candidate” or high readiness score for cloud adoption. Virtual servers also have fewer constraints (hardware dependencies, driver software, configuration elements) than physical servers when performing rehosting or “lift and shift” migrations to cloud environments. Rehosting an application to the cloud focuses on migrating the server and application without making major changes except for IP addressing, application interdependencies, and network data flow, such as load balancing and firewall settings.
- Physical servers (5,867) have an average age of 4.2 years. The industry typically refreshes server hardware every 3-5 years. Unisys also noted that 23% of the server instances are at or older than five years. Moving these workloads to the cloud provides an opportunity to shift to an operational expense (estimated three years = \$61.2M OpEx) financial approach versus continuing the capital expense (CapEx estimated at \$211.7M) typically required as part of the hardware purchase during technology refresh. Current over-provisioning and utilization factors suggest 70-75% CapEx was under-consumed by incorrectly sizing the asset.
- StratoProbe’s automated discovery identified and validated 94.7% of the Agency Asset Inventory Sample (4,284 servers) are virtualized servers. Based on the configuration data collected, these Virtualized Workloads were found to be over-provisioned and can be optimized during a transition to cloud services. As a result, the operating costs for the updated configurations can drive additional cost savings. The average cost of the right-sized configurations from the sample was applied to the full inventory quantities to estimate cloud services' annual costs.

## 5.5 Applications and IT Assets – Summary

Unisys found that the majority of the State Agencies' applications and IT assets are cloud-ready or technology-ready. We recommend moving to the public cloud with a migration strategy to support secure cloud adoption.

We also recommend using tools to automate IT Service Management processes, manage applications and asset lifecycles, and Cloud Management tools with approved templates to automate delivery processes and measure Key Performance Indicator (KPI) metrics.



## 6.0 Service Contracts – Discovery

### 6.1 Service Contract Inventory

Procurement contracts are used to supply services, technology, and resources for the State. As Agencies move to use cloud resources, these contracts must be evaluated to maintain alignment with the Agency's business objectives and technical plans. Unisys reviewed the associated Department of Enterprise Services (DES) Contracting Reports representing 86% of the IT Tower Service contracts.

The following recommendations and criteria may be used by an Agency to identify contracts or procurement vehicles that do not align with the future state or present restrictions to the schedule or use of specific technologies in the cloud.

#### 6.1.1 Type of Contracts

Technology and Services contracts that may be impacted by cloud services can fall into the categories below. Each of these categories may have separate contract documentation, including master purchasing agreements, statements of work, individual purchase agreements, and vendor documentation or guidance that need to be reviewed.

Category	Description
Hardware Procurement	Hardware procurement includes IT hardware such as servers, network devices, and storage systems. This category may also include firmware and hardware-specific OS licensing (e.g., mainframe OS)
Hardware Maintenance	Hardware maintenance includes the recurring support and maintenance services related to specific hardware. These contracts may be provided by the original equipment manufacturer (OEM) or a third party. OEM maintenance contracts typically include access to replacement hardware and updated firmware. Third-party hardware maintenance usually provides hardware replacements and is a good alternative after the manufacturer's warranty ends and when the OEM discontinues software updates.
Software Licensing	Software Licensing includes IT software licensing, Software as a Service licensing, and IT hardware-based software licensing (e.g., mainframe OS or Storage firmware). Cloud services may be handled as software licensing instead of Subscription-Based Services.
Software Maintenance	Software maintenance includes the recurring support and maintenance services related to specific software licensing.
Subscription-Based Services	Subscription-Based Services includes services that may have a monthly or annual pricing model. Cloud Services from AWS, Microsoft Azure, and Google Cloud Platform typically fall into this category.



Category	Description
Technology Services	Technology Services may include outsourcing agreements, custom development projects, staffing agreements, and project-based services. Cloud services may be handled as technology services instead of Subscription-Based Services.

### 6.1.2 Procurement Related Cloud Migration Risks

As an Agency plans to move to the cloud, it must consider the following questions related to the current procurement of services and technology. The answers to these questions and the next review criteria may represent risks to be mitigated in the planning, implementation, or migration to cloud services.

- 1) Do my contracts restrict the use of cloud services?
- 2) Do my contracts require changes in the services, licensing, maintenance, or technology to appropriately use cloud services?
- 3) Do my contracts support an early exit?
- 4) What happens when I place my unused software licensing “on the shelf”? Do I need to repurchase licensing or true-up the maintenance?

### 6.1.3 Criteria for Evaluating Procurement Elements

Evaluate the procurement contracts to identify if any agreements represent the above risks.

- 1) The following common keywords may present cloud migration restrictions for any licensing or services:
  - a. On-premise
  - b. Not cloud services
  - c. Pre-paid
  - d. Multi-year agreement
- 2) Cloud-usable product reusability can be impacted if any of the following limits are defined in the contracts or licensing agreements:
  - a. Cloud product licensing not included (e.g., cloud-based network software is a separate license from the on-premise network device)
  - b. Restricted to on-premise installations only
  - c. Physical CPU licensing-based only
  - d. Licensing assigned to specific serial numbers, IP addresses, or server names
- 3) Existing multi-year pre-paid licensing or maintenance may not restrict a cloud migration but could have a financial impact:
  - a. Multi-year pre-paid purchases may need to be canceled when the product is moved or discontinued as part of the migration.
  - b. The cost of the pre-paid purchase may not be refundable.





- 4) Professional Services, including long-term development contracts, project services, and outsourcing agreements may require changes to include cloud services.
  - a. Verify if agreements limit the location of the application or platform.
  - b. Verify if agreements need to add cloud services locations.
  - c. Verify if agreements require additional project services to support the migration.
  - d. Verify if agreements include financial constraints for work product delay.

In addition to risks, procurement vehicles may also provide benefits.

- 1) Bring your own licensing (BYOL)
  - a. Vendors such as Microsoft Azure and Oracle Cloud Infrastructure currently market BYOL as an option to reduce operating costs as long as the licenses are under the appropriate maintenance contracts or enterprise agreements.
  - b. Verify your agreements include the necessary provisions to use BYOL, where offered.
- 2) Services Credits
  - a. Some vendors include one-time and annual cloud services credits within some procurement or enterprise agreements.
  - b. Verify your agreements to ensure you can use the service credits and services brokered outside of the contract.
- 3) Training Credits
  - a. Vendors may include training credits as part of individual purchase agreements or enterprise agreements.
  - b. Verify your agreements include training credits. If so, ensure the training credits can be used for cloud-specific training, or the product training will cover differences between cloud versus on-premise implementations.

#### 6.1.4 Dept. of Enterprise Services Provided Master Contracts

The Unisys team has identified the following commodity contracts for IT Services available from the Department of Enterprise Services (DES). Many of these contracts cover staff augmentation and therefore have little or no potential impact for applications migrating to the cloud.

Contract #	Contract Title	Award Date	Exp. Date
215	Managed Print Services	2016090109-01-2016	2020063006-30-2020
419	Document Destruction Services	2019053105-31-2019	2025063006-30-2025
517	Communication Tower Engineering Analysis Services	2017070107-01-2017	2023063006-30-2023
612	Commercial Card Solutions	2013042304-23-2013	2020123112-31-2020
1014	Wireless Pooled Minutes	2014100210-02-2014	2021111511-15-2021
1015	Process Server Service	2017070107-01-2017	2023063006-30-2023
1114	NASPO Data Communications	2014060106-01-2014	2020053105-31-2020
1116	Offsite Data Storage Services	2016062006-20-2016	2022062006-20-2022
1413	WSCA (Ma268) Public Cloud Hosting Service	2012080108-01-2012	2021073107-31-2021



Contract #	Contract Title	Award Date	Exp. Date
2516	Digital Print & Quick Copy Services	2017090109-01-2017	2021080108-01-2021
2810	State Records Center Document Management	2010032903-29-2010	2027043004-30-2027
3017	Security Technology Services	2017081508-15-2017	2022073107-31-2022
4417	Parking Hardware, Software & Maintenance	2018050805-08-2018	2024050805-08-2024
4615	Ink and Toner	2015090109-01-2015	2020063006-30-2020
4718	NASPO ValuePoint Wireless Data, Voice, And Accessories	2019040104-01-2019	2024063006-30-2024
5116	Cloud Solutions	2017071407-14-2017	2026091509-15-2026
5214	Copiers, Printer & Related Devices	2015070107-01-2015	2020033103-31-2020
5414	Human Resource Performance Management Consult	2014120812-08-2014	2020120812-08-2020
5712	IT Research & Advisory Services	2005051305-13-2005	2020022902-29-2020
5815	Computer Equipment	2015033103-31-2015	2021073107-31-2021
6016	NASPO ValuePoint Software Resellers	2016110111-01-2016	2020040704-07-2020
7814	Enterprise Content Management Contract	20151019	20261026
8215	Information Technology Professional Services	2016020102-01-2016	2099020102-01-2099
9112	SAS- Software License Contract	1981022702-27-1981	2031022702-27-2031
9712	ESRI - Software Master Purchase Agreement	2011093009-30-2011	2021093009-30-2021

## 6.2 Review of Available Master Purchase Agreements

Unisys reviewed the following purchasing agreements available on the Department of Enterprise Services website. Only the Enterprise Content Management (ECM) agreements include verbiage that may restrict the use of cloud services.

Vendor	Contract #	Identified Risk	Identified Benefit
SAS	9112	Multi-Year Agreement	None Identified
ESRI	9712	None Identified	None Identified
Laserfiche	7814	On-Premise Licensing Only	None Identified
Hyland (Lexmark Enterprise Software)	7814	On-Premise Licensing Only	None Identified
OpenText	7814	On-Premise Licensing Only	None Identified

Unisys has not reviewed the NASPO master purchasing agreements or any individual purchase agreements.

### 6.2.1 Contract #05116 - NASPO Cloud Services

The Department of Enterprise Services offers a variety of procurement options with the National Association of State Procurement Officials (NASPO) ValuePoint Master Agreement program. These services cover multiple vendors and solutions.



These services include Software as a Service (SaaS), Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Professional Services options.

The Master Agreement defines each of the cloud services based on the following definitions.

Service	Definition
Infrastructure as a Service (IaaS)	The capability provided to the consumer to provision processing, storage, networks, and other fundamental computing resources where the consumer can deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components (e.g., host firewalls).
Platform as a Service (PaaS)	The capability provided to the consumer to deploy onto the cloud infrastructure consumer-created or -acquired applications created using programming languages and tools supported by the provider. This capability does not necessarily preclude the use of compatible programming languages, libraries, services, and tools from other sources. The consumer does not manage or control the underlying cloud infrastructure, including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations.
Software as a Service (SaaS)	The capability provided to the consumer to use the contractor’s applications running on a contractor’s infrastructure (commonly referred to as “cloud” infrastructure). The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email) or a program interface. The consumer does not manage or control the underlying cloud infrastructure, including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.

### 6.2.2 Vendors

Unisys reviewed the following vendor agreements available on the Department of Enterprise Services website. Only the Enterprise Content Management (ECM) agreements include verbiage that may restrict the use of cloud services.

Vendor	SAAS	IAAS	PAAS	Product	Price
Carahsoft	X	X	X	Accela, Acquia, Case Comm+G3: G38ons, CIS, DocuSign, F5 Networks, FireEye, Google, GovDelivery, Imperva, Okta, Palo Alto, ProofPoint, QTS, Qualtrics, Salesforce, SAP, Symantec, VMware	Price List
Environmental Science Research Institute (ESRI)				Professional services	



Vendor	SAAS	IAAS	PAAS	Product	Price
Unisys	X	X	X	Professional services	
CenturyLink	X	X	X	SaaS, PaaS, and IaaS, Voice & Unified Communications: Hosted VoIP, WebEx/Cisco Collaboration, Skype for Business. Managed & IT Services: Cloud Application Manager for Microsoft, AWS, and Google; Cloud Contact Center; Microsoft O365 Hybrid IT & Cloud – SAP, SAP HANA, Big Data Ddos Mitigation, Dedicated Cloud Compute vCloud, Value-Added Services – Colo, CPaaS, eLynk (Direct Cloud Connect), internet, network, managed services, professional services	Price Catalog
SHI	X	X	X	Price and product catalog	Price List
CDWG	X	X	X	Point of sale, mobility, security, software management	
DLT	X	X	X	AWS, Dell, Forescout, Google, Informatica, Intel, Oracle, Red Hat, Solar Winds, and Veritas	Price List
Quest	X			Contact Quest for your SaaS requirements	Price List
Deloitte	X	X	X	Cloud project execution, including cloud planning, engineering, migration, and operation services. Provider and reseller of major cloud platform IaaS, PaaS, and SaaS services.	Price File
B2Gnow	X				Product Catalog
CGI	X	X		CGI Advantage, a cloud-based Software as a Service (SaaS) ERP solution for mid-tier local governments that are delivered faster at an affordable and predictable cost	Price Catalog
Oracle	X	X	X		Price Catalog
Workday	X			Natively built cloud ERP solutions for finance, procurement, human capital management, and student administration	Price Catalog
CherryRoad	X	X	X		Price Catalog
Presidio Networked Solutions	X				Product Offering



## 6.3 Services Contracts – Analysis

Unisys reviewed the inventory of the Agency service contracts based on the Department of Enterprise Services (DES) Contract Report (source: <https://data.wa.gov/Procurements-and-Contracts/IT-Contracts-Report-2019/ach3-t84q>) provided to assess potential cost avoidance and to identify any potential issues with adopting or migrating to cloud computing solutions.

The report included ninety-three (93) Agencies with sixty-one (61) Agencies related to this cloud readiness assessment as of Dec 2019. For this assessment, Unisys removed the out-of-scope Agencies and entities for this assessment.

Based on the report data and rate of year-over-year declines, many contracts appear to be up for renewal or ending in fiscal years 2021 and 2022. As the contracts end or are renewed, the State has the opportunity to update and align the contracts to support adopting cloud and reducing risks by adding cloud vendors and locations, updating to permit software licensing on public cloud services, and including cloud as an option for software development.



### All Statewide Agency Analysis

Unisys reviewed the DES spreadsheet report and noted three (3) IT Towers (Data Center, IT Compute, and Storage) will be impacted during cloud adoption. The following table (Exhibit 6.3.1) shows the total contract values reported by all Agencies and entities participating in the DES Contract Report. This data was used as the data source for the In-Scope Agency costs.

Tower	Contract Amount FY18		Contract Amount FY19		Contract Amount FY20	
Application	\$ 137,756,546.36	33.21%	\$ 197,633,470.62	35.21%	\$ 87,437,169.07	24.87%
Data Center	\$ 40,234,962.27	9.70%	\$ 44,315,871.75	7.89%	\$ 43,512,185.35	12.38%
End User	\$ 57,028,967.12	13.75%	\$ 85,037,329.23	15.15%	\$ 39,927,531.41	11.36%
Delivery	\$ 29,535,104.25	7.12%	\$ 33,046,535.67	5.89%	\$ 35,909,101.51	10.22%
Networks	\$ 31,286,889.12	7.54%	\$ 45,825,271.07	8.16%	\$ 26,349,147.92	7.50%
IT Compute	\$ 26,283,485.33	6.34%	\$ 37,643,330.69	6.71%	\$ 25,251,955.36	7.18%
Storage	\$ 20,921,370.23	5.04%	\$ 29,347,959.04	5.23%	\$ 23,563,556.56	6.70%
Platform	\$ 19,140,418.49	4.61%	\$ 21,687,791.55	3.86%	\$ 22,918,836.26	6.52%
Management	\$ 22,203,299.98	5.35%	\$ 29,298,629.16	5.22%	\$ 21,710,786.93	6.18%
Security	\$ 21,852,897.09	5.27%	\$ 27,293,396.70	4.86%	\$ 21,350,140.07	6.07%
Output	\$ 4,971,219.23	1.20%	\$ 3,270,295.45	0.58%	\$ 2,125,751.51	0.60%
Other	\$ 3,589,730.48	0.87%	\$ 6,932,159.30	1.23%	\$ 1,458,597.86	0.41%
Totals	\$ 414,804,889.95	100.00%	\$ 561,332,040.21	100.00%	\$ 351,514,759.81	100.00%

Tower	Contract Amount FY21		Contract Amount FY22		Total Contract Amount	
Application	\$ 63,691,327.64	27.07%	\$ 8,578,142.24	6.41%	\$ 495,096,655.92	29.18%
Data Center	\$ 35,945,466.93	15.28%	\$ 31,723,674.46	23.70%	\$ 195,732,160.76	11.54%
End User	\$ 23,137,880.01	9.83%	\$ 14,394,320.42	10.75%	\$ 219,526,028.18	12.94%
Delivery	\$ 17,086,135.11	7.26%	\$ 11,063,186.36	8.26%	\$ 126,640,062.90	7.46%
Networks	\$ 17,299,206.09	7.35%	\$ 12,795,031.87	9.56%	\$ 133,555,546.06	7.87%
IT Compute	\$ 15,970,877.27	6.79%	\$ 11,741,200.00	8.77%	\$ 116,890,848.66	6.89%
Storage	\$ 15,860,144.00	6.74%	\$ 12,036,416.00	8.99%	\$ 101,729,445.83	6.00%



Tower	Contract Amount FY21		Contract Amount FY22		Total Contract Amount	
Platform	\$ 15,835,747.00	6.73%	\$ 10,693,358.00	7.99%	\$ 90,276,151.30	5.32%
Management	\$ 15,154,427.47	6.44%	\$ 10,166,178.00	7.59%	\$ 98,533,321.54	5.81%
Security	\$ 14,544,464.20	6.18%	\$ 9,997,467.86	7.47%	\$ 95,038,365.93	5.60%
Output	\$ 754,815.78	0.32%	\$ 668,664.60	0.50%	\$ 11,790,746.57	0.69%
Other	\$ 14,033.03	0.01%	\$ 5,076.00	0.00%	\$ 11,999,596.67	0.71%
Totals	\$ 235,294,524.53	100.00%	\$ 133,862,715.81	100.00%	\$ 1,696,808,930.30	100.00%

**Exhibit 6.3.1: Key Service Contracts for the Agencies<sup>11</sup>**

Disclaimer: *DES Information Technology Contracts Report 2019*: Report accuracy is the responsibility of individual Agencies. DES reviewed Agency submissions for completeness. If the required columns were blank, such as missing contract numbers and missing total contract amount, DES rejected the Agency submission and required resubmission.

**In-Scope Agency Analysis**

The DES Contract Report for the in-scope Agency sample includes 61 Agencies out of the 79 In-Scope Agencies. This assessment shows significant drops year-over-year for the various contracts compared with 2019’s reported spending. These declines include a 35% drop into FY20, followed by 56% FY21, and 75% for FY22.

Tower	Contract Amount FY18		Contract Amount FY19		Contract Amount FY20	
Application	\$ 127,373,234.08	33.21%	\$ 186,778,557.99	35.21%	\$ 82,079,226.99	24.87%
Data Center	\$ 38,231,727.03	9.70%	\$ 43,627,168.34	7.89%	\$ 43,420,698.62	12.38%
End User	\$ 43,864,856.08	13.75%	\$ 71,718,425.66	15.15%	\$ 37,231,280.18	11.36%
Delivery	\$ 27,581,222.34	7.12%	\$ 30,460,716.45	5.89%	\$ 34,187,885.18	10.22%
Networks	\$ 25,092,635.81	7.54%	\$ 36,712,634.51	8.16%	\$ 25,101,021.55	7.50%
IT Compute	\$ 22,373,002.98	6.34%	\$ 35,453,192.87	6.71%	\$ 24,247,290.29	7.18%
Storage	\$ 18,280,839.38	5.04%	\$ 26,476,293.96	5.23%	\$ 23,157,679.48	6.70%
Platform	\$ 17,287,319.47	4.61%	\$ 19,541,805.95	3.86%	\$ 21,460,246.06	6.52%
Management	\$ 20,689,159.80	5.35%	\$ 28,501,274.90	5.22%	\$ 21,555,658.43	6.18%
Security	\$ 18,801,936.00	5.27%	\$ 25,501,887.53	4.86%	\$ 20,707,525.30	6.07%

<sup>11</sup> Department of Enterprise Services (DES), Information Technology Contracts Report; October 2019; <https://data.wa.gov/Procurements-and-Contracts/IT-Contracts-Report-2019/ach3-t84q>



Tower	Contract Amount FY18		Contract Amount FY19		Contract Amount FY20	
Output	\$ 4,196,174.76	1.20%	\$ 2,472,618.98	0.58%	\$ 1,732,285.67	0.60%
Other	\$ 2,968,869.60	0.87%	\$ 6,452,059.10	1.23%	\$ 1,042,735.52	0.41%
Totals	\$ 366,740,977.33	100.00%	\$ 513,696,636.24	100.00%	\$ 335,923,533.27	100.00%

Tower	Contract Amount FY21		Contract Amount FY22		Total Contract Amount	
Application	\$ 60,305,623.47	27.07%	\$ 6,216,149.37	6.41%	\$ 462,752,791.90	29.18%
Data Center	\$ 35,945,466.93	15.28%	\$ 31,723,674.46	23.70%	\$ 192,948,735.38	11.54%
End User	\$ 22,095,583.87	9.83%	\$ 13,775,562.09	10.75%	\$ 188,685,707.88	12.94%
Delivery	\$ 15,910,435.11	7.26%	\$ 9,961,486.36	8.26%	\$ 118,101,745.44	7.46%
Networks	\$ 16,639,948.79	7.35%	\$ 12,295,165.03	9.56%	\$ 115,841,405.69	7.87%
IT Compute	\$ 15,247,954.50	6.79%	\$ 11,587,436.00	8.77%	\$ 108,908,876.64	6.89%
Storage	\$ 15,543,109.00	6.74%	\$ 11,901,805.00	8.99%	\$ 95,359,726.82	6.00%
Platform	\$ 14,821,903.00	6.73%	\$ 9,955,436.00	7.99%	\$ 83,066,710.48	5.32%
Management	\$ 15,121,357.66	6.44%	\$ 10,166,178.00	7.59%	\$ 96,033,628.79	5.81%
Security	\$ 14,455,786.67	6.18%	\$ 9,974,025.28	7.47%	\$ 89,441,160.78	5.60%
Output	\$ 440,445.50	0.32%	\$ 430,664.60	0.50%	\$ 9,272,189.51	0.69%
Other	\$ 8,957.03	0.01%	\$ -	0.00%	\$ 10,472,621.25	0.71%
Totals	\$ 226,536,571.52	100.00%	\$ 127,987,582.19	100.00%	\$ 1,570,885,300.55	100.00%

**Exhibit 6.3.2: Key Service Contracts for the Cloud Readiness In-Scope Agencies<sup>12</sup>**

Disclaimer: *DES Information Technology Contracts Report 2019*: Report accuracy is the responsibility of individual Agencies. DES reviewed Agency submissions for completeness. If the required columns were blank, such as missing contract numbers and missing total contract amount, DES rejected the Agency submission and required resubmission.

<sup>12</sup> Department of Enterprise Services (DES), Information Technology Contracts Report; October 2019; <https://data.wa.gov/Procurements-and-Contracts/IT-Contracts-Report-2019/ach3-t84q>





### 6.3.1 Impact to IT Tower Contract Spend

Unisys understands that for the in-scope Agencies, the following IT Towers (definitions below) will be impacted (green = fully impacted and grey = limited impact) in the future by new cloud services:

Year	Data Center	IT Compute	Storage	Security	Platform
2018	\$ 38,231,727.03	\$ 22,373,002.98	\$ 18,280,839.38	\$ 18,801,936.00	\$ 17,287,319.47
2019	\$ 43,627,168.34	\$ 35,453,192.87	\$ 26,476,293.96	\$ 25,501,887.53	\$ 19,541,805.95
2020	\$ 43,420,698.62	\$ 24,247,290.29	\$ 23,157,679.48	\$ 20,707,525.30	\$ 21,460,246.06
2021	\$ 35,945,466.93	\$ 15,247,954.50	\$ 15,543,109.00	\$ 14,455,786.67	\$ 14,821,903.00
2022	\$ 31,723,674.46	\$ 11,587,436.00	\$ 12,036,416.00	\$ 9,974,025.28	\$ 9,955,436.00
Total	\$ 195,732,160.76	\$ 108,908,876.64	\$ 95,359,726.82	\$ 89,441,160.78	\$ 83,066,710.48
Impact	\$ 67,669,141.39	\$ 26,835,390.50	\$ 27,579,525.00	\$ 24,429,811.95	\$ 24,777,339.00

Exhibit 6.3.1.1: Impact to IT Tower Contract Spend



### 6.3.2 IT Tower Lexicon

The DES Contracts report used the following IT Towers and definitions. Some of these towers are similar to the financial reporting categories, but the report’s data should not be directly compared to how they are tracked within the enterprise financial systems. The categories in grey are out of scope for this cloud readiness assessment.

Data Center	IT Compute	Data Center	Security	Platform
<p><b>Enterprise Data Center:</b> Purpose-built data center facilities that house and protect critical IT equipment including space, power, environment controls, racks, cabling and “smart hand” support</p>	<p><b>Servers:</b> Physical and virtual servers running a version of Microsoft’s Windows Server or the Linux operating system; includes hardware, software, labor, and support services; Optional Level 3 categories include Windows, Linux, and public cloud compute.</p>	<p><b>Online Storage:</b> Central storage such as SAN, NAS and similar technologies for the distributed compute infrastructure; includes the equipment, software, and labor to run and operate; Option Level 3 categories include: on-premise, public cloud storage.</p>	<p><b>Disaster Recovery:</b> IT Disaster Recovery resources setting DR Policy, establishing process and means, dedicated failover facilities, performing DR testing; NOTE: DR designated equipment is included directly in its sub-tower (e.g., extra servers for DR are included in Compute tower).</p>	<p><b>Database:</b> Distributed database services focused on the physical database (versus the logical design) including DBAs, DBMS, tools, and operational support</p>
<p><b>Other Facilities:</b> Computer rooms and MDF/IDF/telco closets that house IT equipment in corporate headquarters, call centers, or other general-purpose office buildings</p>	<p><b>Unix:</b> Servers running vendor-specific, proprietary Unix operating systems (e.g., IBM AIX, Sun Solaris, HP UX); includes hardware, software, labor, and support services.</p>	<p><b>Offline Storage:</b> Offline storage resources used for archive, backup, and recovery to support data loss, data corruption, disaster recovery and compliance requirements of the distributed storage</p>	<p><b>Security:</b> IT Security resources setting policy, establishing process and means, measuring compliance, and responding to security breaches; Option Level 3 categories include cyber security.</p>	<p><b>Middleware:</b> Distributed platform, application, and system integration resources enabling cross-application development, communications, and information sharing</p>
	<p><b>Converged Infrastructure:</b> Purpose-built appliances that provide compute, storage, and network capabilities in one box</p>		<p><b>Compliance:</b> IT Compliance resources setting policy, establishing controls, and measuring compliance to relevant legal and compliance requirements: Optional Level 3 categories include data privacy.</p>	
<p><b>Out of Scope</b></p>	<p><b>Midrange:</b> Servers running IBM AS/400 platform including hardware,</p>	<p><b>Mainframe Online Storage:</b> Mainframe attached storage arrays and the associated</p>		<p><b>Mainframe Database:</b> Mainframe database services focused on the</p>



Data Center	IT Compute	Data Center	Security	Platform
	software, labor, and support services	equipment, software, and labor to run and operate		physical database (versus the logical design) including the DBAs, DBMS, tools, and operation support
-	<b>Mainframe:</b> Traditional mainframe computers and operations running legacy operating systems	<b>Mainframe Offline Storage:</b> Any storage resources used for archive, backup, and recovery to support data loss, data corruption, disaster recovery, and compliance requirements of the mainframe storage		<b>Mainframe Middleware:</b> Mainframe platform, application, and system integration resources enabling cross-application development, communication, and information sharing

Exhibit 6.3.2.1: Impact to IT Tower Contract Spend Areas for the Agencies<sup>13</sup>

### 6.3.3 IT Tower Spend per Agency and Vendor

Unisys reviewed the DES spreadsheet report and noted the following three (3) IT Towers (Data Center, IT Compute, and Storage) will be impacted during cloud adoption. The Agencies' provided Contract totals per year, and Vendors are provided below and separated by these three towers.

#### 6.3.3.1 Data Center

Sum of IT Tower: Data Center	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
<b>Agriculture, Dept of (AGR)</b>			\$ 6,676.15		
Right Systems Inc			\$ 6,676.15		
<b>Children, Youth, and Families, Dept of</b>			\$ 60,000.00		
Pbx Learning Institute, Inc.			\$ 60,000.00		
<b>Consolidated Technology Services (CTS)</b>	\$ 24,137,205.51	\$ 24,202,867.81	\$ 22,499,112.23	\$ 22,001,016.31	\$ 21,816,375.00
Accu-Tech	\$ 922.02	\$ 4,972.50			

<sup>13</sup> OCIO; TBM Taxonomy v2.0; August 11, 2017  
<https://ocio.wa.gov/sites/default/files/public/TBM/TBM%20Taxonomy%20v2.0%20Placemat.pdf?qa3arn>



Sum of IT Tower: Data Center	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
Beloco, LLC	\$ 2,561.15	\$ 28,227.22	\$ -		
Energys Delaware, Inc.		\$ 87,285.40			
FYI Properties	\$ 23,446,396.53	\$ 23,351,256.10	\$ 22,255,254.79	\$ 21,818,862.50	\$ 21,814,675.00
Graybar	\$ 75,877.33	\$ 54,184.73	\$ 14,439.27		
Instor Solutions, Inc.		\$ 17,174.31			
Pacific Power Group		\$ 112,518.92			
Performance Power Concepts	\$ 185,871.64	\$ 180,453.81	\$ 180,453.81	\$ 180,453.81	
Smith Fire Systems Inc		\$ 7,977.22			
Software Engineering of America			\$ 47,264.36		
SunGard Availability Services LP	\$ 423,876.84	\$ 357,117.60			
Treehouse Software					
Zayo Group	\$ 1,700.00	\$ 1,700.00	\$ 1,700.00	\$ 1,700.00	\$ 1,700.00
<b>Ecology, Dept of (ECY)</b>		\$ -	\$ 837,500.00	\$ 250,000.00	\$ -
Integrated Solutions Group, LCC		\$ -	\$ 100,000.00	\$ 100,000.00	\$ -
International Consulting Acq. Corp		\$ -	\$ 737,500.00	\$ 150,000.00	\$ -
<b>Health Care Authority (HCA)</b>	\$ -	\$ 95,911.13	\$ 138,722.01	\$ -	\$ -
Cabling & Technology Services (CTS)	\$ -	\$ -	\$ 50,965.77	\$ -	\$ -
Cerium Networks Inc	\$ -	\$ 95,911.13	\$ 87,756.24	\$ -	\$ -
<b>Investment Board, State (SIB)</b>	\$ 400,736.66	\$ 420,215.59	\$ 55,038.73	\$ -	\$ -
Oracle America	\$ -	\$ 4,566.05	\$ -	\$ -	\$ -
SS&C Technologies	\$ 400,736.66	\$ 415,564.99	\$ 55,038.73	\$ -	\$ -
Unisys Corporation	\$ -	\$ 84.55	\$ -	\$ -	\$ -
<b>Licensing, Dept of (DOL)</b>	\$ 258,455.13	\$ 401,822.72	\$ 668,280.60	\$ 93,335.62	\$ 19,863.46
APC Annual Support Cont. HLB/EDRC	\$ 7,819.18	\$ 14,874.67	\$ -	\$ -	\$ -
HP Software/Hardware Maintenance	\$ 250,635.95	\$ 252,307.98	\$ 252,307.98	\$ -	\$ -
Nutanix Hardware Maintenance	\$ -	\$ 80,947.56	\$ 288,359.51	\$ 50,405.51	\$ 19,863.46
Prism Pro Licensing (Nutanix Device)	\$ -	\$ 32,287.20	\$ 21,524.80	\$ 21,524.80	\$ -
VMWare Software Maintenance	\$ -	\$ 21,405.31	\$ 106,088.31	\$ 21,405.31	\$ -
<b>Liquor and Cannabis Board (LCB)</b>	\$ 11,002.00	\$ 43,555.00	\$ 11,361.00	\$ 11,361.00	



Sum of IT Tower: Data Center	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
CTS Allocations					
Denali Advanced Integration		\$ 32,194.00			
Eaton Corporation	\$ 11,002.00	\$ 11,361.00	\$ 11,361.00	\$ 11,361.00	
<b>Military Department (MIL)</b>	<b>\$ 12,373,578.07</b>	<b>\$ 16,037,075.66</b>	<b>\$ 18,402,101.12</b>	<b>\$ 13,241,365.00</b>	<b>\$ 9,887,436.00</b>
CenturyLink Communications	\$ 9,263,020.74	\$ 8,688,290.36	\$ 7,840,561.12	\$ 3,258,925.00	
Telecommunications Systems, Inc.	\$ 3,110,557.33	\$ 7,348,785.30	\$ 10,561,540.00	\$ 9,982,440.00	\$ 9,887,436.00
<b>Natural Resources, Department of (DNR)</b>		<b>\$ 309,885.00</b>	<b>\$ 102,276.00</b>	<b>\$ 107,389.00</b>	
DLT/Oracle			\$ 102,276.00	\$ 107,389.00	
Quantum Spatial Inc		\$ 238,385.00			
Rudeen and Associates		\$ 71,500.00			
<b>Puget Sound Partnership (PSP)</b>	<b>\$ 144,170.01</b>	<b>\$ 204,691.67</b>	<b>\$ 240,000.00</b>	<b>\$ 240,000.00</b>	
Recreation and Conservation Office (RCO)	\$ 144,170.01	\$ 204,691.67	\$ 240,000.00	\$ 240,000.00	
<b>Recreation and Conservation Funding Board (RCFB)</b>		<b>\$ 1,094.28</b>	<b>\$ 1,000.00</b>	<b>\$ 1,000.00</b>	
cloudPWR (Box.com reseller)		\$ 1,094.28	\$ 1,000.00	\$ 1,000.00	
<b>Retirement Systems, Department of (DRS)</b>	<b>\$ 2,831.40</b>	<b>\$ -</b>	<b>\$ 3,430.83</b>		
En Pointe Technologies Sales, LLC	\$ 2,831.40	\$ -	\$ 3,430.83		
<b>Revenue, Department of (DOR)</b>	<b>\$ 54,263.01</b>	<b>\$ 34,046.18</b>	<b>\$ 25,199.95</b>	<b>\$ -</b>	<b>\$ -</b>
AVTECH Software Inc	\$ -	\$ -	\$ 199.95	\$ -	\$ -
Gruber Technical Inc	\$ 8,165.02	\$ 10,266.96	\$ -	\$ -	\$ -
NC Power Systems Company	\$ 15,429.70	\$ 5,125.38	\$ -	\$ -	\$ -
Tyco Fire & Security Management	\$ 1,639.25	\$ 1,670.00	\$ -	\$ -	\$ -
Ware Enterprises Inc	\$ 29,029.04	\$ 16,983.84	\$ 25,000.00	\$ -	\$ -
<b>Secretary of State (SEC)</b>	<b>\$ 849,485.24</b>	<b>\$ 1,876,003.30</b>	<b>\$ 370,000.00</b>		
Hewlett Packard Enterprise Co	\$ 454,290.50	\$ 68,363.02	\$ 70,000.00		
Warranty Plus Service Ctr Inc	\$ 395,194.74	\$ 1,807,640.28	\$ 300,000.00		
<b>Grand Total</b>	<b>\$ 38,231,727.03</b>	<b>\$ 43,627,168.34</b>	<b>\$ 43,420,698.62</b>	<b>\$ 35,945,466.93</b>	<b>\$ 31,723,674.46</b>



### 6.3.3.2 IT Compute

Sum of IT Tower: Compute	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
<b>Accountancy, State Board of (ACB)</b>					
SHI International Corp-ForeScout					
<b>Children, Youth, and Families, Dept of</b>	<b>\$ 1,144,898.96</b>	<b>\$ 2,535,319.18</b>			
CTS Services	\$ 151,964.47	\$ 545,539.59			
Dell Marketing LP		\$ 11,370.51			
DES Technology Leasing	\$ 102,786.88	\$ 816,068.95			
Qwest	\$ 40,627.33	\$ 77,242.66			
Qwest Communications Company LLC	\$ 571,301.46	\$ 353,998.05			
Thornburg Computer Services LLC	\$ 21,447.42	\$ 277,906.03			
US Bank Purchasing Card Program	\$ 256,771.40	\$ 453,193.39			
<b>Consolidated Technology Services (CTS)</b>	<b>\$ 4,842,185.42</b>	<b>\$ 4,928,297.99</b>	<b>\$ 2,048,602.93</b>		
Atlassian		\$ 10.93			
CTS Tracking Contract for HP WSCA (DES MC 05815)	\$ 683,550.75	\$ 674,858.64			
CTS Tracking Contract for NetApp, Inc. (DES MC 05815-009)	\$ 4,000.00	\$ -			
IBM	\$ 2,890,298.80	\$ 3,259,221.23	\$ 2,048,602.93		
Nagios Enterprises LLC		\$ 6,290.00			
Pitney Bowes	\$ 54,122.64	\$ 56,287.53			
Sabey	\$ 776,795.02	\$ 571,975.94			
Sirius Computer Solutions	\$ 433,418.21	\$ 359,653.72			
<b>Corrections, Dept of (DOC)</b>					
Department of Information Services (DIS) - not in CMS					
IVOXY Consulting Inc.					
<b>Ecology, Dept of (ECY)</b>	<b>\$ -</b>	<b>\$ 1,198,121.14</b>	<b>\$ 1,392,984.00</b>	<b>\$ 1,500,000.00</b>	<b>\$ 1,700,000.00</b>
SHI International Corp	\$ -	\$ 1,198,121.14	\$ 1,392,984.00	\$ 1,500,000.00	\$ 1,700,000.00
<b>Enterprise Services, Dept of (DES)</b>	<b>\$ 78,704.00</b>		<b>\$ 150,000.00</b>		



Sum of IT Tower: Compute	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
Transource Services Corp	\$ 78,704.00		\$ 150,000.00		
<b>Financial Management, Office of (OFM)</b>	\$ -	\$ 7,859.06	\$ -	\$ -	\$ -
Articulate Global Inc	\$ -	\$ 7,859.06	\$ -	\$ -	\$ -
<b>Fruit Commission (FRUIT)</b>	\$ 32,573.62	\$ 55,151.83	\$ 11,064.42		
Yakima Networking	\$ 32,573.62	\$ 55,151.83	\$ 11,064.42		
<b>Health Care Authority (HCA)</b>	\$ 247,225.00	\$ 181,007.00	\$ 281,847.19	\$ 380.00	\$ -
Microsoft Corporation	\$ 197,225.00	\$ 140,153.00	\$ 171,415.19	\$ -	\$ -
Thornburg Computer Services	\$ 50,000.00	\$ 40,854.00	\$ 110,432.00	\$ 380.00	\$ -
<b>Health Care Facilities Authority, Washington (WHCFA)</b>	\$ 1,773.42	\$ 1,230.55	\$ -	\$ -	\$ -
Dell	\$ 1,773.42	\$ 1,230.55	\$ -	\$ -	\$ -
<b>Health, Dept of (DOH)</b>		\$ 48,004.56			
RICOH USA INC		\$ 48,004.56			
<b>Historical Society, Eastern Washington State (EWH)</b>	\$ 55,642.56	\$ 53,160.52	\$ 42,000.00	\$ 1,750.00	
Intrinium	\$ 55,642.56	\$ 53,160.52	\$ 42,000.00	\$ 1,750.00	
<b>Historical Society, Washington State (WSHS)</b>	\$ -	\$ 60,000.00	\$ 60,000.00	\$ -	\$ -
Blackpoint IT	\$ -	\$ 60,000.00	\$ 60,000.00	\$ -	\$ -
<b>Industrial Insurance Appeals, Board of (IND)</b>	\$ 20,907.57	\$ 259,705.46			
DES Technology Leasing		\$ 190,222.44			
HP Enterprises	\$ 20,907.57	\$ 13,447.48			
Ricoh (MFDs)		\$ 56,035.54			
<b>Insurance Commissioner, Office of the (INS)</b>	\$ 93,948.86	\$ 394,601.10			
CDW Government Inc		\$ 74,598.27			
End Pointe Technologies Sales	\$ 28,524.82				
Right Systems Inc	\$ 703.55				
Transource Services Corp	\$ 64,720.49	\$ 320,002.83			
<b>Investment Board, State (SIB)</b>	\$ 400,736.66	\$ 415,564.99	\$ 55,038.73	\$ -	\$ -
SS&C Technologies	\$ 400,736.66	\$ 415,564.99	\$ 55,038.73	\$ -	\$ -
<b>Labor and Industries, Dept of (L&amp;I)</b>	\$ 148,530.72	\$ 2,151,828.75	\$ 342,366.11	\$ 11,498.84	\$ -



Sum of IT Tower: Compute	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
Articulate Global Inc	\$ -	\$ 6,345.05	\$ 532.43	\$ -	\$ -
Citrix Systems Inc	\$ 19,584.00	\$ 19,655.71	\$ -	\$ -	\$ -
Department of Enterprise Services	\$ -	\$ 72,423.59	\$ -	\$ -	\$ -
Greenbox Inc	\$ 2,450.25	\$ 2,450.25	\$ -	\$ -	\$ -
Interactive Northwest Inc	\$ 3,760.00	\$ 3,760.00	\$ -	\$ -	\$ -
Ipswitch	\$ 1,085.73	\$ 997.00	\$ 1,115.64	\$ -	\$ -
IVOXY Consulting	\$ 15,703.25	\$ 516,750.80	\$ -	\$ -	\$ -
IVOXY Consulting LLC	\$ 87,778.54	\$ 633,144.53	\$ 79,219.20	\$ -	\$ -
Pro Forma	\$ -	\$ 24.82	\$ -	\$ -	\$ -
SHI International Corp	\$ 7,822.39	\$ 10,528.66	\$ 11,498.84	\$ 11,498.84	\$ -
Synchronous Technologies	\$ 10,346.56	\$ -	\$ -	\$ -	\$ -
WA State Consolidated Tech Svcs	\$ -	\$ 885,000.00	\$ 250,000.00	\$ -	\$ -
Warranty Plus Service Center, Inc.	\$ -	\$ -	\$ -	\$ -	\$ -
Warranty Plus Service Ctr, Inc	\$ -	\$ 748.34	\$ -	\$ -	\$ -
<b>Lake Washington Institute of Technology (LWIT)</b>		<b>\$ 108,368.75</b>			
SHI		\$ 108,368.75			
<b>Licensing, Dept of (DOL)</b>	<b>\$ 140,194.48</b>	<b>\$ 144,019.98</b>	<b>\$ 144,020.00</b>	<b>\$ 80,000.00</b>	<b>\$ -</b>
Consolidated Technology Services	\$ 80,000.00	\$ 80,000.00	\$ 80,000.00	\$ 80,000.00	\$ -
Vintelligence	\$ 60,194.48	\$ 64,019.98	\$ 64,020.00	\$ -	\$ -
<b>Liquor and Cannabis Board (LCB)</b>	<b>\$ 43,325.00</b>	<b>\$ 303,467.00</b>	<b>\$ 644,141.00</b>	<b>\$ 289,500.00</b>	
Hawkeye Information Systems Inc	\$ 816.00	\$ 4,083.00			
Infojini Inc	\$ 37,933.00	\$ 133,416.00	\$ 153,000.00		
Microsoft		\$ 70,500.00	\$ 84,000.00		
SHI			\$ 240,000.00	\$ 250,000.00	
Software House International		\$ 74,987.00	\$ 138,618.00	\$ 22,500.00	
SolarWinds, Inc		\$ 16,460.00	\$ 25,102.00	\$ 17,000.00	
Solimar Systems	\$ 1,971.00	\$ 1,971.00	\$ 1,971.00		
vandyke.com	\$ 555.00				





Sum of IT Tower: Compute	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
Zohn Inc	\$ 750.00	\$ 750.00	\$ 150.00		
Zoho Corporation	\$ 1,300.00	\$ 1,300.00	\$ 1,300.00		
<b>Military Department (MIL)</b>	<b>\$ 12,373,578.07</b>	<b>\$ 16,037,075.66</b>	<b>\$ 18,402,101.12</b>	<b>\$ 13,241,365.00</b>	<b>\$ 9,887,436.00</b>
CenturyLink Communications	\$ 9,263,020.74	\$ 8,688,290.36	\$ 7,840,561.12	\$ 3,258,925.00	
Telecommunications Systems, Inc.	\$ 3,110,557.33	\$ 7,348,785.30	\$ 10,561,540.00	\$ 9,982,440.00	\$ 9,887,436.00
<b>Natural Resources, Department of (DNR)</b>	<b>\$ 767,623.00</b>	<b>\$ 1,444,283.00</b>	<b>\$ 22,088.00</b>	<b>\$ 22,088.00</b>	
Bridge Data	\$ 8,139.00	\$ 259,205.00			
Dell/Dell EMC	\$ 2,809.00	\$ 83,017.00	\$ 17,888.00	\$ 17,888.00	
Synchronous	\$ 751,343.00	\$ 1,098,300.00			
Unisys	\$ 5,332.00	\$ 3,761.00	\$ 4,200.00	\$ 4,200.00	
<b>Public Disclosure Commission (PDC)</b>		<b>\$ 11,344.37</b>			
Amazon Web Services   SWV0138661		\$ 825.59			
Pantheon Systems Inc   SWV0209724		\$ 10,518.78			
<b>Puget Sound Partnership (PSP)</b>	<b>\$ 207,011.22</b>	<b>\$ 238,266.67</b>	<b>\$ 257,609.23</b>	<b>\$ 240,000.00</b>	
cloudPWR (Box.com reseller)	\$ 15,409.86	\$ 10,399.59	\$ 11,000.00		
Environmental Systems Research Institute, Inc. (ESRI)	\$ 3,808.00	\$ 5,724.77	\$ 6,609.23		
GovDelivery (renamed Granicus LLC)	\$ 15,881.25				
Granicus LLC (formerly GovDelivery)		\$ 12,500.00			
Hewlett Packard (reseller Warranty Plus)	\$ 27,742.10	\$ 4,950.64			
Recreation and Conservation Office (RCO)	\$ 144,170.01	\$ 204,691.67	\$ 240,000.00	\$ 240,000.00	
<b>Recreation and Conservation Funding Board (RCFB)</b>	<b>\$ 166,953.89</b>	<b>\$ 88,680.34</b>	<b>\$ 47,000.00</b>	<b>\$ 1,000.00</b>	
cloudPWR (Box.com reseller)		\$ 1,094.28	\$ 1,000.00	\$ 1,000.00	
Environmental Systems Research Institute, Inc. (ESRI)	\$ 39,331.20	\$ 40,000.00	\$ 40,000.00		
GeoEngineers	\$ 15,000.00	\$ 8,000.00	\$ 6,000.00		
Hewlett Packard (reseller Warranty Plus)	\$ 112,622.69	\$ 39,586.06			
<b>Retirement Systems, Department of (DRS)</b>	<b>\$ 28,931.45</b>	<b>\$ 32,581.45</b>			
Dell Marketing LP	\$ 18,577.06	\$ 32,581.45			



Sum of IT Tower: Compute	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
Presidio Network Solution	\$ 10,354.39	\$ -			
<b>Revenue, Department of (DOR)</b>	<b>\$ 840,161.62</b>	<b>\$ 968,606.25</b>	<b>\$ 800.00</b>	<b>\$ -</b>	<b>\$ -</b>
Apple Inc	\$ -	\$ -	\$ -	\$ -	\$ -
Department of Information Services	\$ -	\$ -	\$ -	\$ -	\$ -
HP Inc	\$ 78,595.24	\$ 180,366.80	\$ -	\$ -	\$ -
Microsoft Corporation	\$ 301,779.00	\$ 299,805.75	\$ -	\$ -	\$ -
Right Systems Inc	\$ 268,122.88	\$ 356,602.19	\$ -	\$ -	\$ -
SHI International Corp	\$ 190,880.42	\$ 131,111.51	\$ -	\$ -	\$ -
VMware Inc	\$ 784.08	\$ 720.00	\$ 800.00	\$ -	\$ -
<b>Secretary of State (SEC)</b>	<b>\$ 943,852.10</b>	<b>\$ 4,017,417.46</b>	<b>\$ 470,000.00</b>	<b>\$ 100,000.00</b>	
CDW Government Inc	\$ 94,366.86	\$ 2,141,414.16	\$ 100,000.00	\$ 100,000.00	
Hewlett Packard Enterprise Co	\$ 454,290.50	\$ 68,363.02	\$ 70,000.00		
Warranty Plus Service Ctr Inc	\$ 395,194.74	\$ 1,807,640.28	\$ 300,000.00		
<b>Treasurer, Office of the State (OST)</b>	<b>\$ 1,256.58</b>	<b>\$ 966.72</b>			
Dell - Server Maintenance		\$ 260.52			
HP - Server Maintenance	\$ 1,256.58	\$ 706.20			
<b>Utilities &amp; Transportation Comm (UTC)</b>		<b>\$ 6,529.76</b>	<b>\$ 133,236.79</b>	<b>\$ 372.66</b>	
CDW			\$ 133,236.79	\$ 372.66	
En Pointe		\$ 6,529.76			
<b>Grand Total</b>	<b>\$ 22,373,002.98</b>	<b>\$ 35,453,192.87</b>	<b>\$ 24,247,290.29</b>	<b>\$ 15,247,954.50</b>	<b>\$ 11,587,436.00</b>



### 6.3.3.3 Storage

Sum of IT Tower: Storage	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
<b>Commerce, Dept of (COM)</b>	\$ 27,893.00	\$ 121,336.00	\$ 868,869.00	\$ -	
Bitfocus Inc	\$ 411.00	\$ 33,950.00	\$ 850,689.00	\$ -	
HCA Admin Accounting	\$ 27,482.00	\$ 87,386.00	\$ 18,180.00		
Oregon State Treasury					
<b>Consolidated Technology Services (CTS)</b>	\$ 815,008.30	\$ 1,106,863.48	\$ 303,000.00		
Bridge Data Solutions		\$ 377,575.26			
EMC WSCA PC Contract Tracking (DES 05815-004)	\$ 58,623.48	\$ 102,596.54			
Offsite data storage services					
Presidio	\$ 382,861.07	\$ 275,023.94	\$ 303,000.00		
Unisys Corporation	\$ 365,451.06	\$ 274,167.80			
Worldwide Technology, Inc. (WWT)	\$ 8,072.69	\$ 77,499.94			
<b>Corrections, Dept of (DOC)</b>		\$ 26,916.27	\$ 5,176.13		
State of Montana - State Information Technology Services Division (SITSD)		\$ 26,916.27	\$ 5,176.13		
<b>Dairy Products Commission (DAIRY)</b>		\$ 5,220.00			
Corporate Computer Inc.		\$ 5,220.00			
<b>Eastern Washington University (EWU)</b>		\$ 38,475.00			
Amazon Web Services Inc		\$ 38,475.00			
<b>Environmental Hearings (ELUHO)</b>		\$ 5,180.00	\$ 2,800.00		
John Tacke		\$ 5,180.00	\$ 2,800.00		
<b>Financial Institutions, Dept of (DFI)</b>	\$ 19,872.00	\$ 30,294.83			
Cloud Pwr LLC	\$ 19,872.00	\$ 30,294.83			
<b>Fish and Wildlife, Dept of (DFW)</b>	\$ 2,199,516.56	\$ 2,372,058.14	\$ 2,267,447.00	\$ 2,025,000.00	\$ 2,010,000.00
Conga	\$ 101,750.00	\$ 112,447.00	\$ 112,447.00	\$ -	\$ -
EnfoTech	\$ 65,490.00	\$ 85,000.00	\$ 85,000.00	\$ -	\$ -
JMT Technology Group	\$ 1,991,113.81	\$ 2,075,128.50	\$ 2,000,000.00	\$ 2,000,000.00	\$ 2,000,000.00
Questica Ltd.	\$ -	\$ 58,658.89	\$ 25,000.00	\$ 25,000.00	\$ 10,000.00



Sum of IT Tower: Storage	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
Tero Consulting Ltd.	\$ 41,162.75	\$ 40,823.75	\$ 45,000.00	\$ -	\$ -
<b>Fruit Commission (FRUIT)</b>	<b>\$ 32,573.62</b>	<b>\$ 55,151.83</b>	<b>\$ 11,064.42</b>		
Yakima Networking	\$ 32,573.62	\$ 55,151.83	\$ 11,064.42		
<b>Health Care Authority (HCA)</b>	<b>\$ 1,788.00</b>	<b>\$ 1,788.00</b>	<b>\$ 1,788.00</b>	<b>\$ 1,788.00</b>	<b>\$ -</b>
ArchiveSocial	\$ 1,788.00	\$ 1,788.00	\$ 1,788.00	\$ 1,788.00	\$ -
<b>Health, Dept of (DOH)</b>		<b>\$ 48,004.56</b>			
RICOH USA INC		\$ 48,004.56			
<b>Historical Society, Eastern Washington State (EWH)</b>	<b>\$ 55,642.56</b>	<b>\$ 53,160.52</b>	<b>\$ 42,000.00</b>	<b>\$ 1,750.00</b>	
Intrinium	\$ 55,642.56	\$ 53,160.52	\$ 42,000.00	\$ 1,750.00	
<b>Historical Society, Washington State (WSHS)</b>	<b>\$ 7,500.00</b>	<b>\$ 67,500.00</b>	<b>\$ 60,000.00</b>	<b>\$ -</b>	<b>\$ -</b>
Blackpoint IT	\$ 7,500.00	\$ 67,500.00	\$ 60,000.00	\$ -	\$ -
<b>Industrial Insurance Appeals, Board of (IND)</b>	<b>\$ 7,537.00</b>	<b>\$ 7,591.48</b>			
Iron Mountain	\$ 7,537.00	\$ 7,591.48			
<b>Insurance Commissioner, Office of the (INS)</b>		<b>\$ 36,680.73</b>			
CDW Government Inc		\$ 36,680.73			
Right Systems Inc					
<b>Investment Board, State (SIB)</b>	<b>\$ 13,914.43</b>	<b>\$ 24,074.20</b>	<b>\$ 23,805.54</b>	<b>\$ -</b>	<b>\$ -</b>
cloudPWR LLC	\$ 13,914.43	\$ 24,074.20	\$ 23,805.54	\$ -	\$ -
<b>Labor and Industries, Dept of (L&amp;I)</b>	<b>\$ 33,246.70</b>	<b>\$ 38,279.35</b>	<b>\$ 8,000.00</b>	<b>\$ -</b>	<b>\$ -</b>
cloudPWR LLC	\$ 15,822.70	\$ 20,791.35	\$ -	\$ -	\$ -
IVOXY Consulting LLC	\$ -	\$ -	\$ 8,000.00	\$ -	\$ -
nextScan Inc	\$ 17,424.00	\$ 17,488.00	\$ -	\$ -	\$ -
<b>Lake Washington Institute of Technology (LWIT)</b>		<b>\$ 13,140.00</b>			
AWS		\$ 13,140.00			
<b>Law Enforcement Officers' and Fire Fighters' Plan 2 Retirement Board (LEOFF)</b>		<b>\$ 1,488.00</b>			
PageFreezer		\$ 1,488.00			
<b>Licensing, Dept of (DOL)</b>	<b>\$ -</b>	<b>\$ 360,767.46</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
Commvault	\$ -	\$ 360,767.46	\$ -	\$ -	\$ -



Sum of IT Tower: Storage	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
<b>Military Department (MIL)</b>	<b>\$ 12,373,578.07</b>	<b>\$ 16,406,950.66</b>	<b>\$ 18,402,101.12</b>	<b>\$ 13,241,365.00</b>	<b>\$ 9,887,436.00</b>
CenturyLink Communications	\$ 9,263,020.74	\$ 8,688,290.36	\$ 7,840,561.12	\$ 3,258,925.00	
Juvarre		\$ 67,875.00			
Microsoft		\$ 302,000.00			
Telecommunications Systems, Inc.	\$ 3,110,557.33	\$ 7,348,785.30	\$ 10,561,540.00	\$ 9,982,440.00	\$ 9,887,436.00
<b>Natural Resources, Department of (DNR)</b>	<b>\$ 218,031.00</b>	<b>\$ 840,961.00</b>	<b>\$ 180,509.00</b>	<b>\$ 167,837.00</b>	
CDW	\$ 180,119.00	\$ 718,720.00	\$ 168,048.00	\$ 151,837.00	
Kovarus		\$ 109,992.00			
SHI	\$ 37,912.00	\$ 12,249.00	\$ 12,461.00	\$ 16,000.00	
Six Degrees/Oracle					
<b>Pollution Liability Insurance Program, Washington (PLI)</b>	<b>\$ 2,428.00</b>	<b>\$ 4,369.00</b>	<b>\$ 4,369.00</b>	<b>\$ 4,369.00</b>	<b>\$ 4,369.00</b>
cloudPWR	\$ 2,428.00	\$ 4,369.00	\$ 4,369.00	\$ 4,369.00	\$ 4,369.00
<b>Public Disclosure Commission (PDC)</b>		<b>\$ 839.27</b>			
Amazon Web Services   SWV0138661		\$ 825.59			
Box		\$ 13.68			
<b>Puget Sound Partnership (PSP)</b>	<b>\$ 60,191.47</b>	<b>\$ 34,334.92</b>	<b>\$ 17,609.23</b>		
cloudPWR (Box.com reseller)	\$ 15,409.86	\$ 10,399.59	\$ 11,000.00		
Environmental Systems Research Institute, Inc. (ESRI)	\$ 3,808.00	\$ 5,724.77	\$ 6,609.23		
Granicus LLC (formerly GovDelivery)		\$ 12,500.00			
Hewlett Packard (reseller Warranty Plus)	\$ 27,742.10	\$ 4,950.64			
Presidio (NetApp reseller)	\$ 13,231.51	\$ 759.92			
<b>Recreation and Conservation Funding Board (RCFB)</b>	<b>\$ 1,042,833.34</b>	<b>\$ 648,517.08</b>	<b>\$ 347,564.00</b>	<b>\$ 1,000.00</b>	
cloudPWR (Box.com reseller)		\$ 1,094.28	\$ 1,000.00	\$ 1,000.00	
Environmental Systems Research Institute, Inc. (ESRI)	\$ 39,331.20	\$ 299,000.00	\$ 40,000.00		
GeoEngineers	\$ 15,000.00	\$ 8,000.00	\$ 6,000.00		
Hewlett Packard (reseller Warranty Plus)	\$ 112,622.69	\$ 39,586.06			
Paladin Data Systems	\$ 875,879.45	\$ 300,836.74	\$ 300,564.00		



Sum of IT Tower: Storage	Sum of Contract Amount FY18	Sum of Contract Amount FY19	Sum of Contract Amount FY20	Sum of Contract Amount FY21	Sum of Contract Amount FY22
<b>Revenue, Department of (DOR)</b>	\$ 203,267.10	\$ 142,088.13	\$ 140,000.00	\$ -	\$ -
Commvault Systems Inc	\$ 46,912.97	\$ 48,566.24	\$ 50,000.00	\$ -	\$ -
Hewlett Packard Company	\$ 16,352.98	\$ 9,302.85	\$ -	\$ -	\$ -
Quantum Corp	\$ 140,001.15	\$ 84,219.04	\$ 90,000.00	\$ -	\$ -
<b>Secretary of State (SEC)</b>	\$ 943,852.10	\$ 4,017,417.46	\$ 470,000.00	\$ 100,000.00	
CDW Government Inc	\$ 94,366.86	\$ 2,141,414.16	\$ 100,000.00	\$ 100,000.00	
Hewlett Packard Enterprise Co	\$ 454,290.50	\$ 68,363.02	\$ 70,000.00		
Warranty Plus Service Ctr Inc	\$ 395,194.74	\$ 1,807,640.28	\$ 300,000.00		
<b>Treasurer, Office of the State (OST)</b>	\$ 6,268.96	\$ 9,265.65	\$ 1,577.04		
Iron Mountain	\$ 6,268.96	\$ 9,265.65	\$ 1,577.04		
<b>Utilities and Transportation Comm. (UTC)</b>	\$ 117,149.52	\$ 1,275.94			
Iron Mountain	\$ 1,906.78	\$ 1,275.94			
Software One	\$ 115,242.74				
<b>Grand Total</b>	\$ 18,280,839.38	\$ 26,476,293.96	\$ 23,157,679.48	\$ 15,543,109.00	\$ 11,901,805.00

Exhibit 6.3.3.1: Key Service Contracts for the Agencies<sup>14</sup>

Disclaimer: Source DES Information Technology Contracts Report 2019 accuracy is the responsibility of individual Agencies. DES reviewed Agency submissions for completeness. If the required columns were blank, such as missing contract numbers and missing total contract amount, DES rejected the Agency submission and required resubmission.

<sup>14</sup> Department of Enterprise Services (DES), Information Technology Contracts Report, October 2019; <https://data.wa.gov/Procurements-and-Contracts/IT-Contracts-Report-2019/ach3-t84q>



## 6.4 Service Contracts – Key Findings

### 6.4.1 Top Contracting Vendors

Unisys reviewed the current top contracting vendors from the AFRS extract provided by the Office of the Chief Information Officer. Unisys has removed all sub-object coded expenses in the data received from the AFRS system per OCIO guidance:

- Internal services include IT services paid to multiple central service Agencies. Central services Agencies include the Department of Enterprises Services (DES), Office of Financial Management (OFM), WaTech, and in some instances, the Department of Social and Health Services (DSHS).
- When reporting IT expenditures at an enterprise level, it is important to understand that the initial investment in hardware, software, internal labor, etc., is paid by the Central Technology Service Agency (CTS). Those Agencies then package the costs and provide them to Agencies as a service. The charges to Agencies are to recover the cost of the initial investment made by CTS.

Unisys understands per RCW 43.105.060 that CTS is a vendor for the state and local government agencies. (NOTE: "Internal Services" contain Agency expenditures to central service Agencies)

Top Contracting Vendors	2019 Spend
CTS (CTS Allocations) *	\$ 66,626,452.53
CTS Services *	\$ 37,333,861.79
International Business Machines	\$ 33,397,043.30
SHI International Corp	\$ 30,362,536.35
Public Partnerships LLC	\$ 29,722,115.83
Fast Enterprises LLC	\$ 28,332,424.51
Client Network Services LLC	\$ 21,422,549.83
US Bank Purchasing Card Program	\$ 20,903,568.44
FYI Properties	\$ 16,891,270.25
DES Technology Leasing	\$ 16,274,116.48
Microsoft Corporation	\$ 15,467,694.94
Warranty Plus Service Ctr Inc	\$ 13,023,836.32
OST Banking Services	\$ 11,256,750.00
Deloitte Consulting LLP	\$ 10,882,865.20
Right Systems Inc	\$ 9,644,424.65
En Pointe Technologies Sales LLC	\$ 9,492,433.67
Verizon Wireless Services LLC	\$ 8,830,084.83
Cerium Networks Inc	\$ 7,733,563.49
CDW Government Inc	\$ 7,703,912.14
Treinen Associates Inc	\$ 7,191,829.75
Carahsoft Technology Corporation	\$ 6,619,072.52
OFM Enterprise Systems Fee	\$ 6,519,917.61
DSHS FSO Interagency	\$ 6,409,981.40
Qwest Corporation	\$ 5,545,397.03
Dell Marketing LP	\$ 4,899,445.59
Presidio Networked Solutions Inc	\$ 4,842,629.25
UW-Computing & Communications	\$ 4,598,980.80



Top Contracting Vendors	2019 Spend
Pro Innovation Inc	\$ 4,580,071.25
Unisys Corporation	\$ 4,281,451.69
Ivoxy Consulting LLC	\$ 4,260,197.99
CCTS/WaTech AST Commercial Services LLC	\$ 3,761,077.38
Qwest Communications Company LLC	\$ 3,732,774.63
Fidelity National Info Svcs Inc	\$ 3,725,897.66
Transource Services Corp	\$ 3,708,000.58
Qwest	\$ 3,489,938.90
HP Inc	\$ 3,447,269.77
Liberum LLC	\$ 3,432,912.83
Sierra Cedar Inc	\$ 3,371,376.46
Magna5 LLC	\$ 3,212,556.00
Kiehl Northwest LLC	\$ 3,210,910.20
Washington School Info Proc Coop	\$ 3,132,446.10
BPro Inc	\$ 3,113,378.00
Client Network Services Inc	\$ 2,952,111.62
StarTouch Inc	\$ 2,926,329.60
TALX Corporation	\$ 2,920,292.98
South Puget Sound Comm College	\$ 2,893,346.59
Avaya Inc	\$ 2,679,223.44
Zayo Group Holdings Inc	\$ 2,507,343.86
CSC Covansys Corporation	\$ 2,490,489.87
Motorola Solutions Inc	\$ 2,471,915.92
Codesmart Inc	\$ 2,456,607.12
Critical Logic Inc	\$ 2,450,894.48
Gartner Inc	\$ 2,428,026.98
Workgroup Connections Inc	\$ 2,353,978.48
DES Information Systems 422	\$ 2,319,642.88
Accenture LLP	\$ 2,274,278.00
Centurylink Inc	\$ 2,241,968.73
Thornburg Computer Services LLC	\$ 2,228,597.09
Linea Solutions Inc	\$ 2,193,242.54
Presidio Holdings Inc	\$ 2,143,593.65
Sharp Electronics Corporation	\$ 2,127,225.24
CTS Other	\$ 2,125,041.80
Optuminsight Inc	\$ 2,123,894.39
Johnson Mirmiran & Thompson Inc	\$ 2,075,128.50
SBCTC Fund 001	\$ 1,953,275.75
ImageSource Inc	\$ 1,949,468.71
Software Ag USA Inc	\$ 1,945,451.88
Astadia Inc	\$ 1,880,942.22
Environmental Systems Rsrch Inst	\$ 1,880,789.68
OFM Core Financials	\$ 1,811,686.59
Portable Computer Systems Inc	\$ 1,809,317.06
Cayzen Corporation	\$ 1,805,710.54
Controltec Inc	\$ 1,780,851.62





Top Contracting Vendors	2019 Spend
OFM K20 Network	\$ 1,753,593.64
CA Inc	\$ 1,703,858.20
Zones Inc	\$ 1,669,841.32
Harris Corporation	\$ 1,666,791.83
Frontier Communications	\$ 1,666,573.58
Tyler Technologies Inc	\$ 1,658,192.41
Leidos Inc	\$ 1,592,069.67
Woodburn Company Inc	\$ 1,583,410.38
Apptio Inc	\$ 1,559,997.30
SoftwareONE Inc	\$ 1,543,330.46
Hewlett Packard Enterprise Co	\$ 1,519,088.33
Ricoh USA Inc	\$ 1,518,988.02
Microsoft Corp	\$ 1,418,829.04
Open Text Inc	\$ 1,397,960.52
Enterprise Serv State & Local	\$ 1,255,560.00
Jamestown Sklallam Economic Dev	\$ 1,239,789.47
Oracle America Inc	\$ 1,230,706.57
Puget Sound Energy Inc	\$ 1,218,049.60
Sirius Computer Solutions Inc	\$ 1,216,956.87
OTB Solutions Group LLC	\$ 1,200,971.77
WA State Dept of Natural Resources	\$ 1,194,753.38
Network Computing Architects Inc	\$ 1,181,557.14
Legacy Solutions Corp	\$ 1,165,320.50
CenturyTel of Cowiche	\$ 1,101,041.48
Relm Wireless Corporation	\$ 1,090,205.75
Aronson Security Group Inc	\$ 1,085,801.23
{Various}*	\$ 16,070,740.51

**Exhibit 6.4.1.1: Top 100 Contracting Vendors**

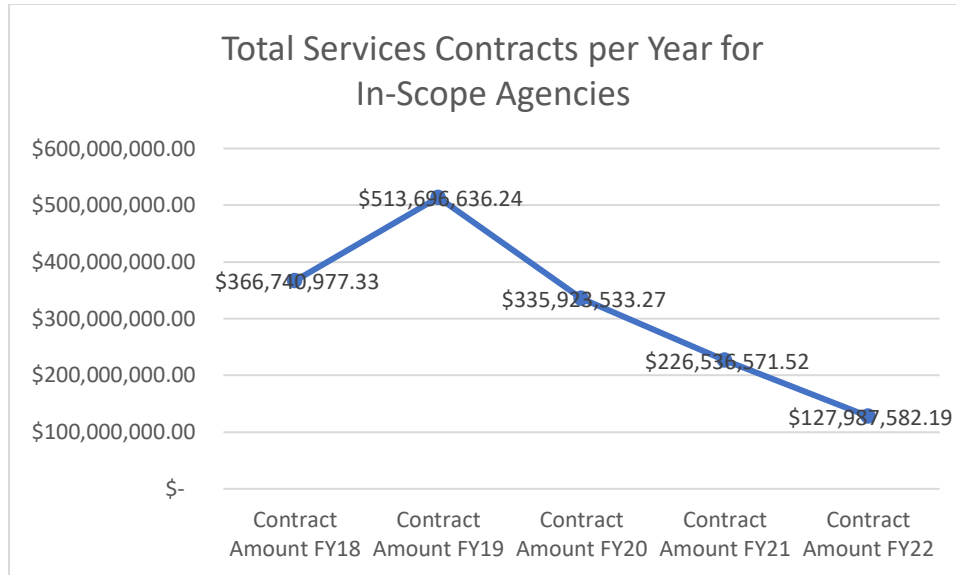
\*Various: includes vendors grouped into a total and could not be resolved by the AFRS system.

**6.4.2 Services Contracts Key Findings**

Unisys conducted an inventory review of the Agency service contracts provided by the Department of Enterprise Services (DES) Contract Report, which included 61 of the 79 Agencies participating in this readiness assessment. To assess potential cost savings and to identify any potential issues with adopting or migrating to cloud computing solutions, we have determined that most contracts are ending in 2021-2022.

As the contracts end or are renewed, the State has an opportunity to update and align the contracts to support adopting the cloud. This task includes reducing contract change requests by adding cloud vendors and locations, updating to permit software licensing on public cloud services, and including cloud as an option for software development.

Agencies may also experience other costs and additional time performing the request for proposal or renewal process related to any currently used contracts ending through 2022. These costs were not estimated or included in the Contract Report but should be factored in when evaluating the annual contract purchase activity.



**Exhibit 6.4.2.1.: Total In-Scope Service Contracts Significant Reduction per Year<sup>15</sup>**

The increased purchases shown above between FY18 and FY19 can be generated by cyclical purchases, including hardware refresh, major hardware or software procurements for new projects, changes in licensing requirements, and multi-year enterprise agreements and maintenance contracts.

The DES Contract Report shows significant drops year over year for the various contracts compared with 2019’s reported spending.

Fiscal Year	Estimated Decline from FY2019
FY2020	35%
FY2021	56%
FY2022	75%

While a preferred view of this annual decline is that the contracts and their related costs will not be required, the available data does not show a specific reason for the decline.

Multiple factors can impact this shift in spending and potentially level the annual contract procurements closer to an average of the FY18 and FY20 totals. Unisys’ experience with other states shows that Agencies budget and track future fiscal year contract spend for contracts with a recurring or well-defined annual spend (such as a multi-year third-party application development project or licensing agreement).

Additional contract spending remains planned in the budget and uses the available contracts as needed, or ad-hoc, during the fiscal year. This budgeted cost would not be identified as a future contract spend in the Contract Report since the Agencies may not have identified which contract vehicle would be used. These purchases must be recognized as some may shift to cloud services, and the remaining activity will level out the contract procurement trend.

<sup>15</sup> Department of Enterprise Services (DES), Information Technology Contracts Report, October 2019; <https://data.wa.gov/Procurements-and-Contracts/IT-Contracts-Report-2019/ach3-t84q>

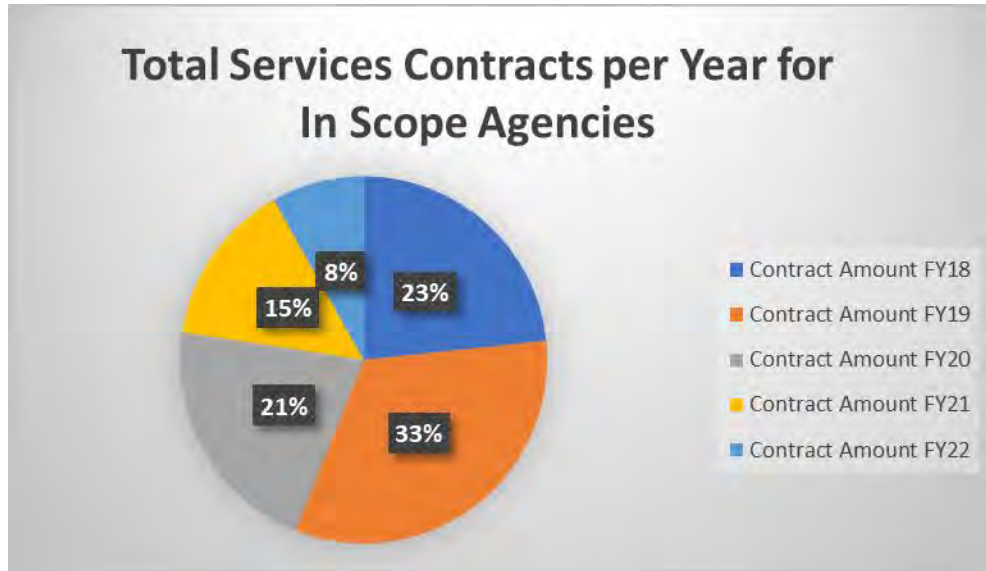


Exhibit 6.4.2.2: Total In-Scope Agency Service Contracts Percentage per Year<sup>16</sup>

Source DES IT Contracts Report 2019

### 6.4.3 Impact to IT Tower Contract Spend

Unisys understands that contracts supporting the Data Center, IT Compute, and Storage IT Towers (shaded in green) have the highest potential for cost avoidance and cost shifts during cloud adoption. The Security and Platform IT Towers (shaded in grey) will also contribute, depending on the migration approach and technology selections.

“Platform” was added as a formal cost tower in FY20 for financial reporting. The DES Contract’s project included data assigned to the Platform category as submitted by the Agencies.

Unisys cannot be more specific without sub-coded expenses and inventory dependencies than providing a range of impact.

Impact to IT Tower Contract Spend					
Year	Data Center	IT Compute	Storage	Security	Platform
2018	\$ 38,231,727.03	\$ 22,373,002.98	\$ 18,280,839.38	\$ 18,801,936.00	\$ 17,287,319.47
2019	\$ 43,627,168.34	\$ 35,453,192.87	\$ 26,476,293.96	\$ 25,501,887.53	\$ 19,541,805.95
2020	\$ 43,420,698.62	\$ 24,247,290.29	\$ 23,157,679.48	\$ 20,707,525.30	\$ 21,460,246.06
2021	\$ 35,945,466.93	\$ 15,247,954.50	\$ 15,543,109.00	\$ 14,455,786.67	\$ 14,821,903.00
2022	\$ 31,723,674.46	\$ 11,587,436.00	\$ 12,036,416.00	\$ 9,974,025.28	\$ 9,955,436.00
total	\$ 195,732,160.76	\$ 108,908,876.64	\$ 95,359,726.82	\$ 89,441,160.78	\$ 83,066,710.48
impact	\$ 67,669,141.39	\$ 26,835,390.50	\$ 27,579,525.00	\$ 24,429,811.95	\$ 24,777,339.00

Exhibit 6.4.3.1: Total In-Scope Service Contracts per Impact Tower<sup>17</sup>

<sup>16</sup> Department of Enterprise Services (DES), Information Technology Contracts Report, October 2019; <https://data.wa.gov/Procurements-and-Contracts/IT-Contracts-Report-2019/ach3-t84q>

<sup>17</sup> Department of Enterprise Services (DES), Information Technology Contracts Report, October 2019; <https://data.wa.gov/Procurements-and-Contracts/IT-Contracts-Report-2019/ach3-t84q>



## 6.5 Service Contracts – Results

Many contracts appear to end or will have lower usage/lower spending commitments in 2020-2022. This opportunity window can be used to update the contracts to support moving Agencies to the cloud, avoiding contracting constraints and stranded costs.

### 6.5.1 Cloud Services Contractor Cost Avoidance

Unisys has discovered that moving to the public cloud versus contracting with internal Consolidated Technology Services (CTS/WaTech) provides significant cost avoidance consideration depending on procurement comparisons of the top cloud vendors.

Unisys used the list prices (Mar 2020) for Azure, Amazon Web Services, and Google Cloud Services, provided through the StratoZone tool, and WaTech’s Washington State Cloud service catalog to provide the following estimates. A breakout of the costs is available in Section 12.4 and Appendix F.

Our estimates focus on 1- and 3-Year monthly (no up-front cost) reservations. Public cloud providers offer significant discounts for organizations that expect to use their resources over extended periods and agree to either up-front or monthly charges for these reservations. On-demand pricing can run 15-25% higher per month and is best suited for shorter-term deployments and auto-scaled resources.

Unisys' experience and industry feedback show that expecting a 100% migration to the public cloud is not attainable for most government and commercial organizations. Some applications will remain onsite for business or political needs, require physical infrastructure, or be more cost-effective to maintain as centralized but smaller data centers. The following exhibit shows the estimated cost avoidance for 80% or approximately 9,000 servers using cloud services. The 9,000 servers will be used throughout this assessment for the recommended projects, cost estimates, and return on investments. This estimate does not include any costs required to maintain the remaining 20% in their current environment or platform.

#### Cloud Cost Estimate for 9,000 Servers (1-Year Reserved Cloud Pricing)

Vendor	Total Monthly Cost	Annual Cost	Avg Server Cost	Annual Contact Savings
Azure (1-Year Reserved)	\$2,124,810.00	\$25,497,720.00	\$236.09	(\$20,734,920.00)
AWS (1-Year Term)	\$2,327,220.00	\$27,926,640.00	\$258.58	(\$18,306,000.00)
Google (1-Year Commit)	\$2,854,260.00	\$34,251,120.00	\$317.14	(\$11,981,520.00)
Washington State Cloud	\$3,852,720.00	\$46,232,640.00	\$428.08	\$0.00

#### Cloud Cost Estimate for 9,000 Servers (3 Year Reserved Cloud Pricing)

Vendor	Total Monthly Cost	Annual Cost	Avg Server Cost	Annual Contact Savings
Azure (3-Year Reserved)	\$1,700,910.00	\$20,410,920.00	\$188.99	(\$25,821,720.00)
AWS (3-Year Term)	\$2,326,050.00	\$27,912,600.00	\$258.45	(\$18,320,040.00)
Google (3-Year Commit)	\$2,608,830.00	\$31,305,960.00	\$289.87	(\$14,926,680.00)
Washington State Cloud	\$3,852,720.00	\$46,232,640.00	\$428.08	\$0.00

Exhibit 6.5.1.2: Cloud Service Contract Estimated Savings per Year (9,000 Servers)



The above estimates were based on the average server and storage costs. Additional cost avoidance may be attainable during migration. Agencies can select available Platform as a Service (PaaS) services for databases and web services, shift from third-party licensed software products to cloud vendor-supported platforms, and refactor their applications to use containers and serverless technologies.

### 6.5.2 Agency Sample Validation

Among the Statewide Cloud Readiness Assessment requirements, the OCIO asked ten (10) Agencies to provide expenditure estimates for a sample of their application inventories. Eight (8) of the ten Agencies responded and estimated annual costs they would need for server hardware refresh, maintenance, and support; storage hardware maintenance, and support; and data center operations costs. The provided cost data aligned with the contract Service Towers that would be most impacted by migration from on-premise assets to cloud services.

Sample	Applications	IT Compute	Storage	Data Center	Total Impacted Costs
Sample Agencies	35	\$552,620.88	\$145,397.83	\$88,298.84	\$786,317.55
Total Assessment	5,251	\$24,247,290.29	\$23,157,679.48	\$43,420,698.62	\$90,825,668.39

The net result of the Sample Agency Validation produced an average application cost of \$22,466.22, assuming all applications are eligible to migrate to the cloud, versus the Total Assessment Scope, which averaged \$17,296.83 or 23% higher.

Agencies (DES and OFM) using the Washington State Private Cloud did not provide data center costs as the facility costs are included in the private cloud pricing. Some Agencies also identified that they had consolidated many of their applications to a set of servers. This approach means that while they cannot separate the hardware cost per application, they are optimizing their costs through application infrastructure consolidation.

An Agency also identified its applications rely on HP NonStop hardware and software. Due to the platform's architecture and proprietary features, the efforts to migrate to the cloud will require additional planning and time to modify portions of the applications to move off NonStop.

## 6.6 Service Contracts – Summary

Procurement contracts provide flexibility and cost benefits through the purchasing power of the State of Washington. Based on the review of the DES contracts and the patterns in the DES Contract Report, the available contracts focus primarily on the product (hardware, software, and maintenance) or resources (staff augmentation and specialized contract services).

Cloud adoption has the potential to produce both cost avoidance and cost shifts. For infrastructure-related contract spend, the cost avoidance from not purchasing new hardware and support services is balanced with the new cloud vendor's monthly services costs. Other areas, including software licensing and application support, may see a shift from the current contracts to other providers or the cloud vendor. These actions and other ad hoc procurement activities can also be expected to keep contract spending near or slightly lower than FY2020 until cloud adoption reaches a reasonable threshold of about 20-30% of the servers and applications.



Adopting the cloud will require new contract models, including reportable metrics, service level agreements, discount management, cost-sharing, and supporting governance, to maintain operational and regulatory compliance.

Unisys recommends establishing a Cloud Service Broker federated governance structure (Section 9.4, 10, and 11) to support adapting current contracts and adding new contracts designed to enable Agencies to adopt cloud. The Cloud Broker role, collaborating with the Department of Enterprise Services (DES), provides services contracting and procurement. The role enables the State of Washington to optimize the In-Scope Agency IT spend in the next three years and support the continually changing business needs and obligations of the individual Agencies.

The State of Washington can benefit from cost avoidance for contracts that can be reduced, renegotiated, or eliminated by migrating core services to cloud solutions. Unisys was unable to be more specific without sub-coded expenses and inventory dependencies than providing a range of impact.

## 7.0 IT Staffing – Discovery

The Unisys team reviewed the current state staffing documentation that describes the cost of human resources related to maintaining the required staffing levels supporting the delivery of existing services in the State. In Sections 13.6 the team evaluated the relevant resource data from the current IT Spend Analysis output. The assessment analyzed the staffing patterns for both State employees and contractors and identified areas potential areas where staffing levels may shift with the possible realignment and adjustment for future cloud services in Sections 7.4.1 and 7.4.3.

### 7.1 Current Agency Staffing

Unisys understands that the Information Technology (IT) classification and compensation structure was updated and created in response to the State's need to have a flexible and adaptable structure to keep pace with the rate of change in the technology industry. The new structure was meant to foster recruitment, retention, and workforce management flexibility to compete in the expanding technology marketplace.

We understand that Puget Sound is one of the top four technical hubs in the nation with talent feeder schools like the University of Washington and global tech companies such as Amazon and Microsoft that attract top talent worldwide. The talent competition is an ongoing challenge for State organizations.

Unisys understands that the workforce is changing, including values and expectations, demographic diversity, education, work environment needs, and willingness to accept change.

#### 7.1.1 General Government Workforce by Agency

Total headcount of Executive Branch Workforce by In-Scope Agency. Headcount of executive branch employees, both permanent and non-permanent (excludes Legislative, Judicial, and Higher Education employees are out of scope). This count is as of 03/30/2020. Total State of Washington FTEs equals = 116,887 with 4,420 IT FTEs. The In-Scope Agencies equal 57% of the total FTE population and are supported by 3,352 IT FTEs.



Agency	Employee Count
Workforce Count	66,979
Archaeology & Historic Preservation	20
Board for Volunteer Firefighters	3
Board of Industry Insurance Appeals	147
Board of Pilotage Commissioner	3
Board of Tax Appeals	16
Caseload Forecast Council	11
Columbia River Gorge Comm.	8
Com Asian-Pacific Amer Affairs	2
Consolidated Technology Svcs	295
County Rd Administration Board	17
Deaf and Hard of Hearing Youth	174
Department of Agriculture	920
Department of Commerce	367
Department of Corrections	9,004
Department of Ecology	1,653
Department of Fish & Wildlife	1,929
Department of Health	1,951
Department of Licensing	1,353
Department of Transportation	6,882
Department of Veterans Affairs	928
Dept of Child Youth & Families	4,622
Dept of Enterprise Services	783
Dept of Financial Institutions	208
Dept of Labor & Industries	3,109
Dept. of Natural Resources	2,019
Dept of Retirement Systems	270
Dept of Revenue	1,200
Dept of Services for the Blind	96
Dept of Social & Health Serv.	16,447
East Wash State Historical Society	44
Economic & Revenue Forecast Council	5



Agency	Employee Count
Employment Security Department	2,219
Environmental and Land Use Hearings Office	15
Governor's Office of Indian Affairs	2
Human Rights Commission	23
Leoff Plan 2 Retirement Board	8
Liquor and Cannabis Board	352
Military Department	343
Office of Minority & Women's Business	24
Office of Financial Management	452
Office of State Auditor	397
Office of State Treasurer	61
Office of the Attorney General	1,442
Office of the Governor	92
Office of the Lieutenant Governor	7
Office of The Secretary of State	301
Office of Administrative Hearings	196
Office of Insurance Commissioner	240
Public Disclosure Commission	31
Public Employment Relations Commission	32
Puget Sound Partnership	47
Recreation and Conservation Funding Board	64
State Board of Accountancy	10
State Conservation Commission	24
State Health Care Authority	1,419
State Investment Board	108
State Lottery Commission	120
State Parks & Recreation Commission	853
State School for the Blind	145
Student Achievement Council	115
Supt. of Public Instruction	474
Transportation Commission	6
Transportation Improvement Board	10





Agency	Employee Count
Utilities & Transportation Commission	159
Washington Horse Racing Commission	36
WA Pollution Liability Insurance Program	18
Washington State Arts Commission	21
Washington State Gambling Commission	107
Washington State Patrol	2,275
WA State Housing Finance Commission	74
WA St Comm African-American Affairs	2
WA State Comm on Hispanic Affairs	3
WA St Criminal Justice Train Comm	60
Washington St. Historical Society	55
Washington Traffic Safety Commission	23
Workforce Train & Educ Coord Board	28

Exhibit 7.1.1.1: General Government Workforce by Agency<sup>18</sup>

## 7.1.2 Agency Staffing Counts

Unisys has identified the following current IT staffing position for the In-Scope Agencies based on the March 2020 Workforce Headcounts by Jobs report from the Office of Financial Management (OFM). The In-Scope Agency IT Staff represents 3352 of the 4420 (approximately 76%) statewide IT staff.

Agency IT Staffing	Sum of Employee Count
<b>Board of Industry Insurance Appeals</b>	<b>8</b>
IT APP DEVELOPMENT - JOURNEY	2
IT APP DEVELOPMENT - SR/SPEC	1
IT APP DEVELOPMENT - SRMGR	1
IT APP DEVELOPMENT - ENTRY	1
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN - JOURNEY	1
IT SYSTEM ADMIN - SR/SPEC	1
<b>Consolidated Technology Svcs</b>	<b>146</b>
IT APP DEVELOPMENT - JOURNEY	7
IT APP DEVELOPMENT - SR/SPEC	3

<sup>18</sup> OFM, General Service Salary Schedule for Non-Represented Employees; December 2019; Source: <https://ofm.wa.gov/state-human-resources/workforce-data-planning/workforce-data-trends/workforce/number-employees-and-headcount-trends>



Agency IT Staffing	Sum of Employee Count
IT APP DEVELOPMENT - MGR	1
IT ARCHITECTURE - SR/SPEC	4
IT BUSINESS ANALYST - JOURNEY	1
IT BUSINESS ANALYST - SR/SPEC	5
IT CUSTOMER SUPPORT - ENTRY	10
IT CUSTOMER SUPPORT - JOURNEY	1
IT CUSTOMER SUPPORT - MGR	1
IT CUSTOMER SUPPORT - SR/SPEC	1
IT DATA MANAGEMENT - JOURNEY	3
IT NETWORK & TELECOMS - ENTRY	7
IT NETWORK & TELECOMS - JOURNEY	21
IT NETWORK & TELECOMS - SR/SPEC	22
IT POLICY & PLANNING - JOURNEY	1
IT PROJECT MANAGEMENT - JOURNEY	6
IT QUALITY ASSURANCE - JOURNEY	1
IT SECURITY - JOURNEY	4
IT SECURITY - SR/SPEC	3
IT SUPPORT TECHNICIAN 1	12
IT SUPPORT TECHNICIAN 2	5
IT SYSTEM ADMIN - ENTRY	4
IT SYSTEM ADMIN - JOURNEY	16
IT SYSTEM ADMIN - SR/SPEC	7
<b>County Rd Administration Board</b>	<b>4</b>
IT APP DEVELOPMENT - JOURNEY	1
IT DATA MANAGEMENT - JOURNEY	1
IT SECURITY - JOURNEY	1
IT SYSTEM ADMIN - ENTRY	1
<b>Deaf and Hard of Hearing Youth</b>	<b>2</b>
IT CUSTOMER SUPPORT - JOURNEY	1
IT SYSTEM ADMIN - SR/SPEC	1
<b>Department of Agriculture</b>	<b>21</b>
IT APP DEVELOPMENT - JOURNEY	4
IT APP DEVELOPMENT - SR/SPEC	1
IT APP DEVELOPMENT - MGR	1
IT CUSTOMER SUPPORT - ENTRY	1
IT CUSTOMER SUPPORT - JOURNEY	9
IT NETWORK & TELECOMS - JOURNEY	1
IT POLICY & PLANNING - MGR	1
IT POLICY & PLANNING - SRMGR	1
IT SECURITY - JOURNEY	1
IT SYSTEM ADMIN - JOURNEY	1



Agency IT Staffing	Sum of Employee Count
<b>Department of Commerce</b>	<b>14</b>
IT APP DEVELOPMENT - JOURNEY	1
IT APP DEVELOPMENT - SR/SPEC	1
IT ARCHITECTURE - SR/SPEC	1
IT BUSINESS ANALYST - JOURNEY	2
IT BUSINESS ANALYST - SR/SPEC	1
IT CUSTOMER SUPPORT - ENTRY	1
IT CUSTOMER SUPPORT - JOURNEY	2
IT POLICY & PLANNING - SRMGR	1
IT SECURITY - SR/SPEC	1
IT SYSTEM ADMIN - JOURNEY	2
IT SYSTEM ADMIN - MGR	1
<b>Department of Corrections</b>	<b>164</b>
IT APP DEVELOPMENT - JOURNEY	9
IT APP DEVELOPMENT - SR/SPEC	2
IT APP DEVELOPMENT - ENTRY	1
IT ARCHITECTURE - SR/SPEC	1
IT ARCHITECTURE - MGR	3
IT BUSINESS ANALYST - ENTRY	2
IT BUSINESS ANALYST - JOURNEY	10
IT BUSINESS ANALYST - MGR	1
IT CUSTOMER SUPPORT - ENTRY	39
IT CUSTOMER SUPPORT - JOURNEY	2
IT CUSTOMER SUPPORT - MGR	3
IT DATA MANAGEMENT - SR/SPEC	4
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - ENTRY	1
IT NETWORK & TELECOMS - JOURNEY	6
IT NETWORK & TELECOMS - MGR	1
IT NETWORK & TELECOMS - SR/SPEC	3
IT POLICY & PLANNING - JOURNEY	1
IT POLICY & PLANNING - SR/SPEC	1
IT POLICY & PLANNING - SRMGR	2
IT PROJECT MANAGEMENT - JOURNEY	5
IT PROJECT MANAGEMENT - MGR	1
IT PROJECT MGMT - SR/SPEC	1
IT QUALITY ASSURANCE - ENTRY	1
IT QUALITY ASSURANCE - JOURNEY	4
IT QUALITY ASSURANCE - MGR	1
IT SECURITY - JOURNEY	7
IT SECURITY - SR/SPEC	3



Agency IT Staffing	Sum of Employee Count
IT SECURITY - SRMGR	1
IT SUPPORT TECHNICIAN 2	6
IT SYSTEM ADMIN - ENTRY	2
IT SYSTEM ADMIN - JOURNEY	30
IT SYSTEM ADMIN - SR/SPEC	8
IT SYSTEM ADMIN - MGR	1
<b>Department of Ecology</b>	<b>128</b>
IT APP DEVELOPMENT - JOURNEY	31
IT APP DEVELOPMENT - SR/SPEC	8
IT APP DEVELOPMENT - SRMGR	1
IT APP DEVELOPMENT - ENTRY	3
IT APP DEVELOPMENT - MGR	7
IT ARCHITECTURE - JOURNEY	1
IT ARCHITECTURE - SR/SPEC	3
IT BUSINESS ANALYST - ENTRY	3
IT BUSINESS ANALYST - JOURNEY	2
IT CUSTOMER SUPPORT - ENTRY	6
IT CUSTOMER SUPPORT - JOURNEY	12
IT CUSTOMER SUPPORT - MGR	2
IT DATA MANAGEMENT - ENTRY	3
IT DATA MANAGEMENT - MGR	1
IT DATA MANAGEMENT - SR/SPEC	2
IT DATA MANAGEMENT - JOURNEY	4
IT NETWORK & TELECOMS - JOURNEY	4
IT NETWORK & TELECOMS - SR/SPEC	1
IT POLICY & PLANNING - SRMGR	1
IT PROJECT MANAGEMENT - ENTRY	1
IT PROJECT MANAGEMENT - JOURNEY	11
IT PROJECT MANAGEMENT - SRMGR	1
IT PROJECT MGMT - SR/SPEC	2
IT SECURITY - JOURNEY	1
IT SECURITY - SR/SPEC	1
IT SECURITY - SRMGR	1
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN - ENTRY	1
IT SYSTEM ADMIN - JOURNEY	9
IT SYSTEM ADMIN - SR/SPEC	3
IT SYSTEM ADMIN - MGR	1
<b>Department of Fish &amp; Wildlife</b>	<b>69</b>
IT APP DEVELOPMENT - JOURNEY	11
IT APP DEVELOPMENT - SR/SPEC	4



Agency IT Staffing	Sum of Employee Count
IT APP DEVELOPMENT - ENTRY	4
IT APP DEVELOPMENT - MGR	1
IT ARCHITECTURE - SRMGR	1
IT BUSINESS ANALYST - JOURNEY	2
IT CUSTOMER SUPPORT - ENTRY	7
IT CUSTOMER SUPPORT - JOURNEY	2
IT DATA MANAGEMENT - ENTRY	2
IT DATA MANAGEMENT - JOURNEY	8
IT NETWORK & TELECOMS - JOURNEY	4
IT POLICY & PLANNING - MGR	1
IT POLICY & PLANNING - SRMGR	1
IT PROJECT MANAGEMENT - ENTRY	1
IT PROJECT MANAGEMENT - EXPERT	1
IT PROJECT MANAGEMENT - JOURNEY	1
IT SECURITY - JOURNEY	1
IT SECURITY - MGR	1
IT SECURITY - SR/SPEC	2
IT SECURITY - SRMGR	1
IT SUPPORT TECHNICIAN 2	8
IT SYSTEM ADMIN - JOURNEY	5
<b>Department of Health</b>	<b>163</b>
IT APP DEVELOPMENT - JOURNEY	21
IT APP DEVELOPMENT - SR/SPEC	8
IT ARCHITECTURE - SR/SPEC	4
IT ARCHITECTURE - MGR	1
IT BUSINESS ANALYST - JOURNEY	21
IT BUSINESS ANALYST - SR/SPEC	2
IT CUSTOMER SUPPORT - ENTRY	6
IT CUSTOMER SUPPORT - JOURNEY	11
IT CUSTOMER SUPPORT - MGR	1
IT DATA MANAGEMENT - SR/SPEC	4
IT DATA MANAGEMENT - JOURNEY	6
IT NETWORK & TELECOMS - ENTRY	1
IT NETWORK & TELECOMS - JOURNEY	1
IT NETWORK & TELECOMS - MGR	1
IT NETWORK & TELECOMS - SR/SPEC	3
IT NETWORK & TELECOMS - SRMGR	1
IT POLICY & PLANNING - MGR	2
IT POLICY & PLANNING - SR/SPEC	6
IT PROJECT MANAGEMENT - JOURNEY	7
IT PROJECT MANAGEMENT - MGR	2



Agency IT Staffing	Sum of Employee Count
IT PROJECT MANAGEMENT - SRMGR	1
IT PROJECT MGMT - SR/SPEC	5
IT QUALITY ASSURANCE - ENTRY	3
IT QUALITY ASSURANCE - JOURNEY	7
IT SECURITY - JOURNEY	1
IT SECURITY - MGR	1
IT SECURITY - SR/SPEC	1
IT SUPPORT TECHNICIAN 1	2
IT SUPPORT TECHNICIAN 2	4
IT SYSTEM ADMIN - ENTRY	4
IT SYSTEM ADMIN - JOURNEY	21
IT SYSTEM ADMIN - SR/SPEC	3
IT SYSTEM ADMIN - MGR	1
<b>Department of Licensing</b>	<b>123</b>
IT APP DEVELOPMENT - JOURNEY	15
IT APP DEVELOPMENT - SR/SPEC	3
IT APP DEVELOPMENT - ENTRY	7
IT APP DEVELOPMENT - MGR	1
IT ARCHITECTURE - SR/SPEC	2
IT ARCHITECTURE - SRMGR	1
IT BUSINESS ANALYST - JOURNEY	11
IT BUSINESS ANALYST - MGR	1
IT BUSINESS ANALYST - SR/SPEC	3
IT CUSTOMER SUPPORT - ENTRY	9
IT CUSTOMER SUPPORT - JOURNEY	6
IT CUSTOMER SUPPORT - MGR	1
IT DATA MANAGEMENT - SR/SPEC	1
IT DATA MANAGEMENT - JOURNEY	2
IT NETWORK & TELECOMS - ENTRY	1
IT NETWORK & TELECOMS - JOURNEY	5
IT NETWORK & TELECOMS - MGR	1
IT NETWORK & TELECOMS - SR/SPEC	1
IT POLICY & PLANNING - JOURNEY	1
IT PROJECT MANAGEMENT - JOURNEY	5
IT QUALITY ASSURANCE - ENTRY	13
IT QUALITY ASSURANCE - JOURNEY	4
IT SECURITY - JOURNEY	4
IT SECURITY - SR/SPEC	1
IT SUPPORT TECHNICIAN 1	2
IT SUPPORT TECHNICIAN 2	7
IT SYSTEM ADMIN - ENTRY	3



Agency IT Staffing	Sum of Employee Count
IT SYSTEM ADMIN - JOURNEY	5
IT SYSTEM ADMIN - SR/SPEC	6
IT VENDOR MANAGEMENT - JOURNEY	1
<b>Department of Transportation</b>	<b>281</b>
IT APP DEVELOPMENT - EXPERT	4
IT APP DEVELOPMENT - JOURNEY	36
IT APP DEVELOPMENT - SR/SPEC	11
IT APP DEVELOPMENT - ENTRY	9
IT APP DEVELOPMENT - MGR	4
IT ARCHITECTURE - MGR	1
IT BUSINESS ANALYST - JOURNEY	5
IT BUSINESS ANALYST - SR/SPEC	3
IT CUSTOMER SUPPORT - ENTRY	24
IT CUSTOMER SUPPORT - JOURNEY	33
IT CUSTOMER SUPPORT - MGR	7
IT DATA MANAGEMENT - ENTRY	1
IT DATA MANAGEMENT - MGR	2
IT DATA MANAGEMENT - SR/SPEC	9
IT DATA MANAGEMENT - JOURNEY	13
IT NETWORK & TELECOMS - ENTRY	2
IT NETWORK & TELECOMS - JOURNEY	14
IT NETWORK & TELECOMS - SR/SPEC	14
IT POLICY & PLANNING - MGR	4
IT POLICY & PLANNING - SR/SPEC	1
IT POLICY & PLANNING - SRMGR	5
IT PROJECT MANAGEMENT - JOURNEY	5
IT PROJECT MANAGEMENT - MGR	4
IT PROJECT MANAGEMENT - SRMGR	1
IT PROJECT MGMT - SR/SPEC	1
IT QUALITY ASSURANCE - JOURNEY	1
IT SECURITY - JOURNEY	1
IT SECURITY - MGR	1
IT SECURITY - SR/SPEC	1
IT SUPPORT TECHNICIAN 1	5
IT SUPPORT TECHNICIAN 2	3
IT SYSTEM ADMIN - ENTRY	10
IT SYSTEM ADMIN - EXPERT	1
IT SYSTEM ADMIN - JOURNEY	28
IT SYSTEM ADMIN - SR/SPEC	16
IT SYSTEM ADMIN - MGR	1
<b>Department of Veterans Affairs</b>	<b>8</b>



Agency IT Staffing	Sum of Employee Count
IT CUSTOMER SUPPORT - JOURNEY	1
IT CUSTOMER SUPPORT - SR/SPEC	1
IT NETWORK & TELECOMS - SR/SPEC	1
IT POLICY & PLANNING - SRMGR	1
IT PROJECT MGMT - SR/SPEC	1
IT SECURITY - SR/SPEC	1
IT SYSTEM ADMIN - JOURNEY	2
<b>Dept of Child Youth &amp; Families</b>	<b>162</b>
IT APP DEVELOPMENT - JOURNEY	33
IT APP DEVELOPMENT - SR/SPEC	4
IT APP DEVELOPMENT - ENTRY	3
IT APP DEVELOPMENT - MGR	1
IT ARCHITECTURE - MGR	2
IT BUSINESS ANALYST - JOURNEY	17
IT BUSINESS ANALYST - MGR	1
IT BUSINESS ANALYST - SR/SPEC	1
IT CUSTOMER SUPPORT - ENTRY	1
IT DATA MANAGEMENT - ENTRY	1
IT DATA MANAGEMENT - SR/SPEC	2
IT DATA MANAGEMENT - JOURNEY	19
IT NETWORK & TELECOMS - JOURNEY	7
IT NETWORK & TELECOMS - MGR	1
IT POLICY & PLANNING - SR/SPEC	1
IT POLICY & PLANNING - SRMGR	1
IT PROJECT MANAGEMENT - JOURNEY	3
IT PROJECT MGMT - SR/SPEC	5
IT QUALITY ASSURANCE - JOURNEY	9
IT SECURITY - JOURNEY	2
IT SECURITY - SR/SPEC	1
IT SUPPORT TECHNICIAN 2	16
IT SYSTEM ADMIN - ENTRY	3
IT SYSTEM ADMIN - JOURNEY	24
IT SYSTEM ADMIN - SR/SPEC	4
<b>Dept of Enterprise Services</b>	<b>32</b>
IT APP DEVELOPMENT - JOURNEY	7
IT APP DEVELOPMENT - SR/SPEC	1
IT APP DEVELOPMENT - ENTRY	1
IT ARCHITECTURE - JOURNEY	1
IT BUSINESS ANALYST - JOURNEY	4
IT BUSINESS ANALYST - MGR	1
IT SECURITY - SR/SPEC	1





Agency IT Staffing	Sum of Employee Count
IT SYSTEM ADMIN - ENTRY	2
IT SYSTEM ADMIN - JOURNEY	10
IT SYSTEM ADMIN - SR/SPEC	2
IT SYSTEM ADMIN - MGR	2
<b>Dept of Financial Institutions</b>	<b>13</b>
IT APP DEVELOPMENT - JOURNEY	1
IT APP DEVELOPMENT - SR/SPEC	1
IT ARCHITECTURE - MGR	1
IT BUSINESS ANALYST - SR/SPEC	1
IT CUSTOMER SUPPORT - ENTRY	1
IT CUSTOMER SUPPORT - JOURNEY	3
IT SECURITY - SR/SPEC	1
IT SYSTEM ADMIN - JOURNEY	3
IT SYSTEM ADMIN - SR/SPEC	1
<b>Dept of Labor &amp; Industries</b>	<b>304</b>
IT APP DEVELOPMENT - JOURNEY	66
IT APP DEVELOPMENT - SR/SPEC	5
IT APP DEVELOPMENT - ENTRY	18
IT APP DEVELOPMENT - MGR	4
IT ARCHITECTURE - JOURNEY	1
IT ARCHITECTURE - SR/SPEC	14
IT BUSINESS ANALYST - ENTRY	9
IT BUSINESS ANALYST - JOURNEY	42
IT BUSINESS ANALYST - SRMGR	1
IT BUSINESS ANALYST - MGR	3
IT CUSTOMER SUPPORT - ENTRY	19
IT CUSTOMER SUPPORT - JOURNEY	11
IT CUSTOMER SUPPORT - MGR	1
IT DATA MANAGEMENT - ENTRY	1
IT DATA MANAGEMENT - MGR	2
IT DATA MANAGEMENT - SR/SPEC	1
IT DATA MANAGEMENT - JOURNEY	22
IT NETWORK & TELECOMS - JOURNEY	7
IT NETWORK & TELECOMS - SR/SPEC	1
IT POLICY & PLANNING - JOURNEY	2
IT POLICY & PLANNING - MGR	6
IT POLICY & PLANNING - SR/SPEC	1
IT POLICY & PLANNING - SRMGR	5
IT PROJECT MANAGEMENT - ENTRY	1
IT PROJECT MANAGEMENT - JOURNEY	1
IT PROJECT MGMT - SR/SPEC	4



Agency IT Staffing	Sum of Employee Count
IT QUALITY ASSURANCE - ENTRY	1
IT QUALITY ASSURANCE - JOURNEY	3
IT QUALITY ASSURANCE - MGR	1
IT SECURITY - JOURNEY	4
IT SECURITY - MGR	1
IT SECURITY - SR/SPEC	1
IT SUPPORT TECHNICIAN 1	6
IT SUPPORT TECHNICIAN 2	4
IT SYSTEM ADMIN - ENTRY	3
IT SYSTEM ADMIN - JOURNEY	27
IT SYSTEM ADMIN - SR/SPEC	4
IT VENDOR MANAGEMENT - SR/SPEC	1
<b>Dept of Retirement Systems</b>	<b>53</b>
IT APP DEVELOPMENT - EXPERT	1
IT APP DEVELOPMENT - JOURNEY	8
IT APP DEVELOPMENT - SR/SPEC	8
IT APP DEVELOPMENT - ENTRY	2
IT ARCHITECTURE - SRMGR	1
IT BUSINESS ANALYST - JOURNEY	11
IT BUSINESS ANALYST - SR/SPEC	2
IT CUSTOMER SUPPORT - ENTRY	2
IT CUSTOMER SUPPORT - JOURNEY	1
IT DATA MANAGEMENT - SR/SPEC	1
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - JOURNEY	1
IT PROJECT MANAGEMENT - MGR	5
IT SUPPORT TECHNICIAN 1	1
IT SYSTEM ADMIN - JOURNEY	5
IT SYSTEM ADMIN - SR/SPEC	2
IT SYSTEM ADMIN - MGR	1
<b>Dept of Revenue</b>	<b>123</b>
IT APP DEVELOPMENT - JOURNEY	24
IT APP DEVELOPMENT - SR/SPEC	5
IT APP DEVELOPMENT - ENTRY	4
IT APP DEVELOPMENT - MGR	2
IT ARCHITECTURE - SR/SPEC	10
IT ARCHITECTURE - MGR	1
IT BUSINESS ANALYST - ENTRY	2
IT BUSINESS ANALYST - JOURNEY	3
IT BUSINESS ANALYST - SR/SPEC	1
IT CUSTOMER SUPPORT - ENTRY	8



Agency IT Staffing	Sum of Employee Count
IT CUSTOMER SUPPORT - JOURNEY	3
IT CUSTOMER SUPPORT - MGR	1
IT DATA MANAGEMENT - SR/SPEC	1
IT DATA MANAGEMENT - JOURNEY	8
IT NETWORK & TELECOMS - JOURNEY	3
IT NETWORK & TELECOMS - MGR	1
IT NETWORK & TELECOMS - SR/SPEC	1
IT POLICY & PLANNING - SRMGR	3
IT PROJECT MANAGEMENT - ENTRY	1
IT PROJECT MANAGEMENT - JOURNEY	3
IT PROJECT MGMT - SR/SPEC	4
IT QUALITY ASSURANCE - JOURNEY	9
IT QUALITY ASSURANCE - SR/SPEC	2
IT SECURITY - JOURNEY	2
IT SECURITY - SR/SPEC	3
IT SECURITY - SRMGR	1
IT SUPPORT TECHNICIAN 1	1
IT SUPPORT TECHNICIAN 2	2
IT SYSTEM ADMIN - ENTRY	2
IT SYSTEM ADMIN - JOURNEY	9
IT SYSTEM ADMIN - SR/SPEC	3
<b>Dept of Services for the Blind</b>	<b>13</b>
IT CUSTOMER SUPPORT - ENTRY	1
IT CUSTOMER SUPPORT - JOURNEY	8
IT NETWORK & TELECOMS - JOURNEY	1
IT SYSTEM ADMIN - ENTRY	1
IT SYSTEM ADMIN - JOURNEY	1
IT SYSTEM ADMIN - SRMGR	1
<b>Dept. of Social &amp; Health Serv.</b>	<b>625</b>
IT APP DEVELOPMENT - JOURNEY	56
IT APP DEVELOPMENT - SR/SPEC	48
IT APP DEVELOPMENT - SRMGR	2
IT APP DEVELOPMENT - ENTRY	5
IT APP DEVELOPMENT - MGR	2
IT ARCHITECTURE - EXPERT	1
IT ARCHITECTURE - JOURNEY	1
IT ARCHITECTURE - SR/SPEC	10
IT ARCHITECTURE - SRMGR	1
IT ARCHITECTURE - MGR	4
IT BUSINESS ANALYST - ENTRY	1
IT BUSINESS ANALYST - JOURNEY	38



Agency IT Staffing	Sum of Employee Count
IT BUSINESS ANALYST - MGR	1
IT BUSINESS ANALYST - SR/SPEC	7
IT CUSTOMER SUPPORT - ENTRY	29
IT CUSTOMER SUPPORT - JOURNEY	29
IT CUSTOMER SUPPORT - MGR	3
IT CUSTOMER SUPPORT - SR/SPEC	4
IT DATA MANAGEMENT - ENTRY	2
IT DATA MANAGEMENT - MGR	5
IT DATA MANAGEMENT - SR/SPEC	29
IT DATA MANAGEMENT - SRMGR	1
IT DATA MANAGEMENT - JOURNEY	22
IT NETWORK & TELECOMS - ENTRY	3
IT NETWORK & TELECOMS - JOURNEY	20
IT NETWORK & TELECOMS - SR/SPEC	16
IT NETWORK & TELECOMS - SRMGR	2
IT POLICY & PLANNING - JOURNEY	1
IT POLICY & PLANNING - MGR	10
IT POLICY & PLANNING - SR/SPEC	3
IT POLICY & PLANNING - SRMGR	6
IT PROJECT MANAGEMENT - ENTRY	2
IT PROJECT MANAGEMENT - JOURNEY	18
IT PROJECT MANAGEMENT - MGR	3
IT PROJECT MANAGEMENT - SRMGR	2
IT PROJECT MGMT - SR/SPEC	15
IT QUALITY ASSURANCE - ENTRY	1
IT QUALITY ASSURANCE - JOURNEY	31
IT QUALITY ASSURANCE - SR/SPEC	5
IT QUALITY ASSURANCE - MGR	1
IT SECURITY - JOURNEY	14
IT SECURITY - MGR	3
IT SECURITY - SR/SPEC	7
IT SECURITY - SRMGR	1
IT SUPPORT TECHNICIAN 2	3
IT SYSTEM ADMIN - ENTRY	24
IT SYSTEM ADMIN - JOURNEY	100
IT SYSTEM ADMIN - SR/SPEC	26
IT SYSTEM ADMIN - SRMGR	1
IT SYSTEM ADMIN - MGR	3
IT VENDOR MANAGEMENT - JOURNEY	1
IT VENDOR MANAGEMENT - SR/SPEC	1
IT VENDOR MANAGEMENT - SRMGR	1



Agency IT Staffing	Sum of Employee Count
<b>Dept. of Natural Resources</b>	<b>83</b>
IT APP DEVELOPMENT - JOURNEY	8
IT APP DEVELOPMENT - SR/SPEC	7
IT APP DEVELOPMENT - ENTRY	5
IT APP DEVELOPMENT - MGR	1
IT ARCHITECTURE - SR/SPEC	5
IT ARCHITECTURE - MGR	1
IT BUSINESS ANALYST - JOURNEY	4
IT CUSTOMER SUPPORT - ENTRY	1
IT CUSTOMER SUPPORT - JOURNEY	13
IT DATA MANAGEMENT - ENTRY	5
IT DATA MANAGEMENT - SR/SPEC	1
IT DATA MANAGEMENT - JOURNEY	11
IT NETWORK & TELECOMS - ENTRY	1
IT NETWORK & TELECOMS - JOURNEY	3
IT POLICY & PLANNING - MGR	1
IT POLICY & PLANNING - SR/SPEC	1
IT PROJECT MANAGEMENT - MGR	1
IT PROJECT MGMT - SR/SPEC	2
IT SECURITY - JOURNEY	1
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN - ENTRY	1
IT SYSTEM ADMIN - JOURNEY	9
<b>Employment Security Department</b>	<b>186</b>
IT APP DEVELOPMENT - JOURNEY	21
IT APP DEVELOPMENT - SR/SPEC	11
IT APP DEVELOPMENT - ENTRY	17
IT APP DEVELOPMENT - MGR	1
IT ARCHITECTURE - SR/SPEC	8
IT BUSINESS ANALYST - JOURNEY	16
IT BUSINESS ANALYST - SR/SPEC	4
IT CUSTOMER SUPPORT - ENTRY	15
IT CUSTOMER SUPPORT - JOURNEY	6
IT CUSTOMER SUPPORT - SR/SPEC	1
IT DATA MANAGEMENT - ENTRY	1
IT DATA MANAGEMENT - SR/SPEC	2
IT DATA MANAGEMENT - JOURNEY	4
IT NETWORK & TELECOMS - JOURNEY	1
IT NETWORK & TELECOMS - SR/SPEC	8
IT POLICY & PLANNING - SRMGR	1
IT PROJECT MANAGEMENT - MGR	2



Agency IT Staffing	Sum of Employee Count
IT PROJECT MGMT - SR/SPEC	8
IT QUALITY ASSURANCE - JOURNEY	11
IT QUALITY ASSURANCE - SR/SPEC	1
IT SECURITY - JOURNEY	2
IT SECURITY - SR/SPEC	5
IT SUPPORT TECHNICIAN 1	2
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN - ENTRY	3
IT SYSTEM ADMIN - JOURNEY	23
IT SYSTEM ADMIN - SR/SPEC	7
IT SYSTEM ADMIN - MGR	1
IT VENDOR MANAGEMENT - SR/SPEC	1
IT VENDOR MANAGEMENT - MGR	2
<b>Human Rights Commission</b>	<b>1</b>
IT SYSTEM ADMIN - SR/SPEC	1
<b>Liquor and Cannabis Board</b>	<b>30</b>
IT APP DEVELOPMENT - JOURNEY	1
IT APP DEVELOPMENT - SR/SPEC	3
IT BUSINESS ANALYST - JOURNEY	2
IT CUSTOMER SUPPORT - ENTRY	3
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - JOURNEY	1
IT POLICY & PLANNING - SRMGR	3
IT QUALITY ASSURANCE - ENTRY	1
IT QUALITY ASSURANCE - JOURNEY	3
IT SECURITY - EXPERT	1
IT SUPPORT TECHNICIAN 1	2
IT SYSTEM ADMIN - ENTRY	2
IT SYSTEM ADMIN - JOURNEY	5
IT SYSTEM ADMIN - SR/SPEC	2
<b>Military Department</b>	<b>23</b>
IT APP DEVELOPMENT - JOURNEY	2
IT ARCHITECTURE - JOURNEY	1
IT ARCHITECTURE - SR/SPEC	1
IT BUSINESS ANALYST - SR/SPEC	1
IT CUSTOMER SUPPORT - ENTRY	1
IT NETWORK & TELECOMS - JOURNEY	2
IT NETWORK & TELECOMS - SR/SPEC	3
IT POLICY & PLANNING - SRMGR	1
IT PROJECT MGMT - SR/SPEC	2
IT SECURITY - SR/SPEC	1



Agency IT Staffing	Sum of Employee Count
IT SECURITY - SRMGR	1
IT SUPPORT TECHNICIAN 2	2
IT SYSTEM ADMIN - JOURNEY	4
IT SYSTEM ADMIN - SR/SPEC	1
<b>Office of Administrative Hearings</b>	<b>8</b>
IT APP DEVELOPMENT - SR/SPEC	1
IT APP DEVELOPMENT - ENTRY	1
IT BUSINESS ANALYST - JOURNEY	2
IT CUSTOMER SUPPORT - ENTRY	1
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - JOURNEY	1
IT SECURITY – EXPERT	1
<b>Office of Insurance Commissioner</b>	<b>19</b>
IT APP DEVELOPMENT – JOURNEY	1
IT APP DEVELOPMENT - SR/SPEC	2
IT APP DEVELOPMENT – ENTRY	1
IT ARCHITECTURE - SR/SPEC	3
IT BUSINESS ANALYST - SR/SPEC	1
IT CUSTOMER SUPPORT – ENTRY	2
IT DATA MANAGEMENT - SR/SPEC	1
IT NETWORK & TELECOMS - JOURNEY	1
IT POLICY & PLANNING – SRMGR	2
IT QUALITY ASSURANCE - JOURNEY	2
IT SECURITY - SR/SPEC	1
IT SYSTEM ADMIN – JOURNEY	2
<b>Office of Financial Management</b>	<b>108</b>
IT APP DEVELOPMENT – JOURNEY	14
IT APP DEVELOPMENT - SR/SPEC	15
IT APP DEVELOPMENT – ENTRY	3
IT ARCHITECTURE - SR/SPEC	7
IT ARCHITECTURE – MGR	1
IT BUSINESS ANALYST – ENTRY	1
IT BUSINESS ANALYST – JOURNEY	17
IT DATA MANAGEMENT – MGR	2
IT DATA MANAGEMENT - SR/SPEC	4
IT DATA MANAGEMENT - JOURNEY	11
IT NETWORK & TELECOMS - SR/SPEC	2
IT POLICY & PLANNING – MGR	2
IT QUALITY ASSURANCE – ENTRY	3
IT QUALITY ASSURANCE - JOURNEY	4
IT QUALITY ASSURANCE - SR/SPEC	2



Agency IT Staffing	Sum of Employee Count
IT SECURITY – JOURNEY	2
IT SUPPORT TECHNICIAN 2	4
IT SYSTEM ADMIN – JOURNEY	6
IT SYSTEM ADMIN - SR/SPEC	7
IT VENDOR MANAGEMENT - JOURNEY	1
<b>Office of State Auditor</b>	<b>13</b>
IT APP DEVELOPMENT – JOURNEY	4
IT CUSTOMER SUPPORT – ENTRY	1
IT CUSTOMER SUPPORT - JOURNEY	1
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - JOURNEY	2
IT SECURITY - SR/SPEC	2
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN – JOURNEY	1
<b>Office of State Treasurer</b>	<b>11</b>
IT APP DEVELOPMENT – JOURNEY	3
IT APP DEVELOPMENT - SR/SPEC	2
IT DATA MANAGEMENT - SR/SPEC	1
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - ENTRY	1
IT NETWORK & TELECOMS - JOURNEY	1
IT NETWORK & TELECOMS – MGR	1
IT QUALITY ASSURANCE - JOURNEY	1
<b>Office of the Attorney General</b>	<b>37</b>
IT APP DEVELOPMENT – JOURNEY	2
IT APP DEVELOPMENT - SR/SPEC	2
IT APP DEVELOPMENT – ENTRY	1
IT APP DEVELOPMENT – MGR	1
IT ARCHITECTURE - SR/SPEC	1
IT CUSTOMER SUPPORT - JOURNEY	4
IT DATA MANAGEMENT - JOURNEY	5
IT PROJECT MANAGEMENT - JOURNEY	3
IT PROJECT MANAGEMENT – MGR	1
IT SECURITY – JOURNEY	2
IT SUPPORT TECHNICIAN 1	5
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN – ENTRY	3
IT SYSTEM ADMIN – JOURNEY	6
<b>Office of the Secretary of State</b>	<b>30</b>
IT APP DEVELOPMENT – JOURNEY	7
IT APP DEVELOPMENT - SR/SPEC	5





Agency IT Staffing	Sum of Employee Count
IT APP DEVELOPMENT – ENTRY	2
IT CUSTOMER SUPPORT – ENTRY	2
IT CUSTOMER SUPPORT - JOURNEY	2
IT DATA MANAGEMENT – ENTRY	1
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - JOURNEY	3
IT PROJECT MGMT - SR/SPEC	1
IT QUALITY ASSURANCE – ENTRY	1
IT SECURITY - SR/SPEC	3
IT SYSTEM ADMIN – JOURNEY	2
<b>Public Disclosure Commission</b>	<b>8</b>
IT APP DEVELOPMENT – JOURNEY	4
IT APP DEVELOPMENT - SR/SPEC	1
IT APP DEVELOPMENT – ENTRY	3
<b>Public Employment Relations Co</b>	<b>1</b>
IT SYSTEM ADMIN – JOURNEY	1
<b>Recreation and Conservation Fund</b>	<b>7</b>
IT CUSTOMER SUPPORT - JOURNEY	2
IT DATA MANAGEMENT - SR/SPEC	1
IT DATA MANAGEMENT - JOURNEY	1
IT POLICY & PLANNING – SRMGR	1
IT SYSTEM ADMIN – JOURNEY	2
<b>State Board of Accountancy</b>	<b>1</b>
IT CUSTOMER SUPPORT - JOURNEY	1
<b>State Health Care Authority</b>	<b>153</b>
IT APP DEVELOPMENT – EXPERT	1
IT APP DEVELOPMENT – JOURNEY	8
IT APP DEVELOPMENT - SR/SPEC	5
IT APP DEVELOPMENT - ENTRY	4
IT APP DEVELOPMENT - MGR	3
IT ARCHITECTURE - EXPERT	4
IT ARCHITECTURE - JOURNEY	1
IT ARCHITECTURE - SR/SPEC	1
IT ARCHITECTURE - SRMGR	1
IT BUSINESS ANALYST - ENTRY	3
IT BUSINESS ANALYST - JOURNEY	20
IT BUSINESS ANALYST - MGR	1
IT BUSINESS ANALYST - SR/SPEC	1
IT CUSTOMER SUPPORT - ENTRY	5
IT CUSTOMER SUPPORT - JOURNEY	5
IT CUSTOMER SUPPORT - SR/SPEC	1



Agency IT Staffing	Sum of Employee Count
IT DATA MANAGEMENT - MGR	3
IT DATA MANAGEMENT - SR/SPEC	4
IT DATA MANAGEMENT - JOURNEY	26
IT NETWORK & TELECOMS - JOURNEY	2
IT NETWORK & TELECOMS - SR/SPEC	4
IT QUALITY ASSURANCE - ENTRY	2
IT QUALITY ASSURANCE - JOURNEY	9
IT SECURITY – JOURNEY	3
IT SECURITY – MGR	1
IT SECURITY - SR/SPEC	2
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN - ENTRY	1
IT SYSTEM ADMIN - JOURNEY	22
IT SYSTEM ADMIN - SR/SPEC	4
IT SYSTEM ADMIN - SRMGR	2
IT SYSTEM ADMIN - MGR	3
<b>State Investment Board</b>	<b>1</b>
IT CUSTOMER SUPPORT - ENTRY	1
<b>State Lottery Commission</b>	<b>15</b>
IT APP DEVELOPMENT - JOURNEY	5
IT ARCHITECTURE - SR/SPEC	1
IT DATA MANAGEMENT - SR/SPEC	1
IT NETWORK & TELECOMS - JOURNEY	1
IT PROJECT MGMT - SR/SPEC	1
IT SECURITY - SR/SPEC	1
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN - ENTRY	2
IT SYSTEM ADMIN - JOURNEY	1
IT VENDOR MANAGEMENT - JOURNEY	1
<b>State Parks &amp; Recreation Comm</b>	<b>14</b>
IT APP DEVELOPMENT - JOURNEY	2
IT APP DEVELOPMENT - ENTRY	1
IT BUSINESS ANALYST - SR/SPEC	2
IT CUSTOMER SUPPORT - ENTRY	2
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - ENTRY	1
IT NETWORK & TELECOMS - SR/SPEC	1
IT SYSTEM ADMIN - JOURNEY	3
IT SYSTEM ADMIN - SR/SPEC	1
<b>State School for the Blind</b>	<b>2</b>
IT NETWORK & TELECOMS - JOURNEY	1



Agency IT Staffing	Sum of Employee Count
IT POLICY & PLANNING - MGR	1
<b>Student Achievement Council</b>	<b>1</b>
IT SUPPORT TECHNICIAN 2	1
<b>Supt. of Public Instruction</b>	<b>19</b>
IT APP DEVELOPMENT - JOURNEY	3
IT APP DEVELOPMENT - ENTRY	5
IT BUSINESS ANALYST - ENTRY	3
IT BUSINESS ANALYST - JOURNEY	1
IT CUSTOMER SUPPORT - ENTRY	1
IT CUSTOMER SUPPORT - JOURNEY	1
IT DATA MANAGEMENT - ENTRY	1
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - JOURNEY	1
IT SYSTEM ADMIN - ENTRY	1
IT SYSTEM ADMIN - JOURNEY	1
<b>Transportation Improvement Bd.</b>	<b>1</b>
IT SYSTEM ADMIN - JOURNEY	1
<b>Utilities &amp; Transportation Com</b>	<b>9</b>
IT APP DEVELOPMENT - JOURNEY	2
IT APP DEVELOPMENT - ENTRY	2
IT CUSTOMER SUPPORT - ENTRY	1
IT CUSTOMER SUPPORT - JOURNEY	2
IT PROJECT MANAGEMENT - JOURNEY	1
IT SYSTEM ADMIN - SR/SPEC	1
<b>WA St Criminal Justice Train C</b>	<b>3</b>
IT ARCHITECTURE - MGR	1
IT NETWORK & TELECOMS - JOURNEY	1
IT SYSTEM ADMIN - JOURNEY	1
<b>WA State Housing Finance comm</b>	<b>1</b>
IT NETWORK & TELECOMS - SRMGR	1
<b>WA Traffic Safety Commission</b>	<b>1</b>
IT NETWORK & TELECOMS - SR/SPEC	1
<b>WA St. Historical Society</b>	<b>1</b>
IT NETWORK & TELECOMS - JOURNEY	1
<b>Washington State Arts Comm.</b>	<b>1</b>
IT SUPPORT TECHNICIAN 1	1
<b>Washington State Gambling Comm</b>	<b>12</b>
IT APP DEVELOPMENT - JOURNEY	1
IT APP DEVELOPMENT - SR/SPEC	1
IT APP DEVELOPMENT - ENTRY	1
IT CUSTOMER SUPPORT - ENTRY	1



Agency IT Staffing	Sum of Employee Count
IT NETWORK & TELECOMS - JOURNEY	1
IT POLICY & PLANNING - SR/SPEC	1
IT QUALITY ASSURANCE - JOURNEY	5
IT SECURITY - JOURNEY	1
<b>Washington State Patrol</b>	<b>94</b>
IT APP DEVELOPMENT - JOURNEY	10
IT APP DEVELOPMENT - ENTRY	4
IT ARCHITECTURE - JOURNEY	1
IT ARCHITECTURE - SR/SPEC	1
IT ARCHITECTURE - MGR	1
IT BUSINESS ANALYST - ENTRY	2
IT BUSINESS ANALYST - JOURNEY	3
IT BUSINESS ANALYST - MGR	1
IT CUSTOMER SUPPORT - ENTRY	17
IT CUSTOMER SUPPORT - JOURNEY	9
IT CUSTOMER SUPPORT - MGR	2
IT DATA MANAGEMENT - SR/SPEC	2
IT DATA MANAGEMENT - JOURNEY	2
IT NETWORK & TELECOMS - ENTRY	2
IT NETWORK & TELECOMS - JOURNEY	2
IT NETWORK & TELECOMS - SR/SPEC	2
IT POLICY & PLANNING - JOURNEY	1
IT POLICY & PLANNING - MGR	1
IT POLICY & PLANNING - SRMGR	2
IT PROJECT MANAGEMENT - JOURNEY	3
IT PROJECT MANAGEMENT - MGR	1
IT PROJECT MGMT - SR/SPEC	2
IT SECURITY - JOURNEY	1
IT SECURITY - MGR	1
IT SUPPORT TECHNICIAN 2	1
IT SYSTEM ADMIN - ENTRY	7
IT SYSTEM ADMIN - JOURNEY	7
IT SYSTEM ADMIN - SR/SPEC	6
<b>Work Force Train &amp; Ed. Cor Bd.</b>	<b>2</b>
IT DATA MANAGEMENT - JOURNEY	1
IT NETWORK & TELECOMS - JOURNEY	1
<b>Grand Total Agencies in Scope</b>	<b>3,352</b>



Exhibit 7.1.2.1: Agency FTE by Job Level. <sup>19</sup>

### 7.1.3 Job Level Structures

With an aging State IT workforce, attracting and retaining highly skilled IT personnel continues to be a high priority, especially in a region where the State competes for talent with some of the biggest technology companies in the world.

The state CIO has prioritized workforce development and recruitment. The State CIO and OFM's State Human Resources office collaborated on a job class study for IT classifications. This multi-year effort aimed at building a more modern and competitive job class structure concluded June 30, 2019.

The new IT professional structure, which became effective in July 2019, was developed to:

- Ensure enterprise and organizational alignment and equity.
- Improve opportunities for career growth.
- Keep pace with the rate of IT industry change.
- Improve the state's ability to benchmark work internally and externally.

Over 56% of the classified IT positions align with three job families: application development, system administration, and IT customer support. At 55.9%, the journey job level has the highest percentage of all position classifications.

As the reclassification work was concluding, mixed results for State technology professionals began to surface across the state. In some cases, there is a perception that positions reclassified out of IT will result in employees leaving for other positions that remained in higher salaried IT positions. With the new classification in place, it will be essential to continue reviewing the State's ability to recruit and retain qualified IT professionals.

Unisys understands the organization's ITPS evaluation committee makes those allocation decisions. The committee requirements were established in rule WAC 357-13-058, and committees must include IT and HR professionals. The ITPS evaluation committee is trained to apply clearly defined criteria used to evaluate the work of a position captured in the IT position description. Evaluation results are input in the enterprise IT Position Evaluation Tool for position history and reporting purposes.

We understand that the ITPS salary schedule consists of 11 ranges and 13 steps. Progression through the salary schedule is the same as other general civil service salary schedules. The difference in the ITPS salary schedule is that each range is independent and not related to the different ranges. IT job classes (family + level) are assigned to one scale on the new salary schedule.

### 7.1.4 Job Code and Salary Range

Class Code	Job Class Title	Salary
485AD	IT APP DEVELOPMENT - EXPERT	Range 10IT

<sup>19</sup> Office of Financial Management (OFM), WorkforceHeadcountByJobs; March 2020; <https://www.ofm.wa.gov/state-human-resources/workforce-data-planning/workforce-data-trends/workforce/distribution-state-Agency>



Class Code	Job Class Title	Salary
483AD	IT APP DEVELOPMENT - JOURNEY	Range 05IT
487AD	IT APP DEVELOPMENT - SENIOR MANAGER	Range 11IT
484AD	IT APP DEVELOPMENT - SENIOR/SPECIALIST	Range 08IT
486AD	IT APP DEVELOPMENT - MANAGER	Range 10IT
482AD	IT APPLICATION DEVELOPMENT - ENTRY	Range 04IT
485A	IT ARCHITECTURE - EXPERT	Range 11IT
483A	IT ARCHITECTURE - JOURNEY	Range 04IT
487A	IT ARCHITECTURE - SENIOR MANAGER	Range 11IT
484A	IT ARCHITECTURE - SENIOR/SPECIALIST	Range 09IT
486A	IT ARCHITECTURE - MANAGER	Range 10IT
482BA	IT BUSINESS ANALYST - ENTRY	Range 03IT
485BA	IT BUSINESS ANALYST - EXPERT	Range 09IT
483BA	IT BUSINESS ANALYST - JOURNEY	Range 05IT
487BA	IT BUSINESS ANALYST - SENIOR MANAGER	Range 10IT
486BA	IT BUSINESS ANALYST - MANAGER	Range 09IT
484BA	IT BUSINESS ANALYST - SENIOR/SPECIALIST	Range 07IT
482CS	IT CUSTOMER SUPPORT - ENTRY	Range 01IT
483CS	IT CUSTOMER SUPPORT - JOURNEY	Range 03IT
486CS	IT CUSTOMER SUPPORT - MANAGER	Range 08IT
484CS	IT CUSTOMER SUPPORT - SENIOR/SPECIALIST	Range 05IT
482DM	IT DATA MANAGEMENT - ENTRY	Range 02IT
485DM	IT DATA MANAGEMENT - EXPERT	Range 09IT
486DM	IT DATA MANAGEMENT - MANAGER	Range 10IT
487DM	IT DATA MANAGEMENT - SENIOR MANAGER	Range 11IT
484DM	IT DATA MANAGEMENT - SENIOR/SPECIALIST	Range 07IT
483DM	IT DATA MANAGEMENT - JOURNEY	Range 06IT
482NT	IT NETWORK & TELECOMMUNICATIONS - ENTRY	Range 03IT
486NT	IT NETWORK & TELECOMMUNICATIONS - MANAGER	Range 09IT
487NT	IT NETWORK & TELECOMMUNICATIONS - SENIOR MANAGER	Range 11IT
483NT	IT NETWORK & TELECOMS - JOURNEY	Range 05IT
485NT	IT NETWORK AND TELECOMMUNICATIONS - EXPERT	Range 09IT
484NT	IT NETWORK AND TELECOMMUNICATIONS - SENIOR/SPECIALIST	Range 07IT
482PP	IT POLICY & PLANNING - ENTRY	Range 02IT
483PP	IT POLICY & PLANNING - JOURNEY	Range 03IT
486PP	IT POLICY & PLANNING - MANAGER	Range 10IT
487PP	IT POLICY & PLANNING - SENIOR MANAGER	Range 11IT
484PP	IT POLICY & PLANNING - SENIOR/SPECIALIST	Range 08IT
485PP	IT POLICY & PLANNING - EXPERT	Range 09IT
482PM	IT PROJECT MANAGEMENT - ENTRY	Range 05IT



Class Code	Job Class Title	Salary
485PM	IT PROJECT MANAGEMENT - EXPERT	Range 10IT
483PM	IT PROJECT MANAGEMENT - JOURNEY	Range 06IT
486PM	IT PROJECT MANAGEMENT - MANAGER	Range 10IT
487PM	IT PROJECT MANAGEMENT - SENIOR MANAGER	Range 11IT
484PM	IT PROJECT MANAGEMENT - SENIOR/SPECIALIST	Range 08IT
482QA	IT QUALITY ASSURANCE - ENTRY	Range 03IT
485QA	IT QUALITY ASSURANCE - EXPERT	Range 08IT
483QA	IT QUALITY ASSURANCE - JOURNEY	Range 05IT
484QA	IT QUALITY ASSURANCE - SENIOR/SPECIALIST	Range 07IT
486QA	IT QUALITY ASSURANCE - MANAGER	Range 09IT
487QA	IT QUALITY ASSURANCE - SENIOR MANAGER	Range 10IT
485S	IT SECURITY - EXPERT	Range 11IT
483S	IT SECURITY - JOURNEY	Range 05IT
486S	IT SECURITY - MANAGER	Range 10IT
487S	IT SECURITY - SENIOR MANAGER	Range 11IT
484S	IT SECURITY - SENIOR/SPECIALIST	Range 08IT
481C	IT SUPPORT TECHNICIAN 1	Range 42
481D	IT SUPPORT TECHNICIAN 2	Range 46
487SA	IT SYSTEM ADMIN - SRMGR	Range 09IT
482SA	IT SYSTEM ADMINISTRATION - ENTRY	Range 03IT
485SA	IT SYSTEM ADMINISTRATION - EXPERT	Range 09IT
483SA	IT SYSTEM ADMINISTRATION - JOURNEY	Range 06IT
484SA	IT SYSTEM ADMINISTRATION - SENIOR/SPECIALIST	Range 07IT
486SA	IT SYSTEM ADMINISTRATION - MANAGER	Range 08IT
485VM	IT VENDOR MANAGEMENT - EXPERT	Range 08IT
483VM	IT VENDOR MANAGEMENT - JOURNEY	Range 04IT
487VM	IT VENDOR MANAGEMENT - SENIOR MANAGER	Range 11IT
484VM	IT VENDOR MANAGEMENT - SENIOR/SPECIALIST	Range 07IT
482VM	IT VENDOR MANAGEMENT - ENTRY	Range 01IT
486VM	IT VENDOR MANAGEMENT - MANAGER	Range 10IT

Exhibit 7.1.3.1: Job Code and Salary Range<sup>20</sup>

<sup>20</sup> OFM, General Service Salary Schedule for Non-Represented Employees; December 2019; <https://ofm.wa.gov/state-human-resources/compensation-job-classes/compensation-administration/compensation-plan-components/salary-schedules>



### 7.1.5 Salary Ranges

Prepared by the Washington State Office of Financial Management, the General Service Salary Schedule only applies to job classes assigned to the Information Technology Professional Structure effective July 1, 2019, 3% increase.

Salary Range		Step G	Step H	Step I	Step J	Step K	Step L	Step M*
08IT	Annual	96,252	98,652	101,124	103,668	106,260	108,912	111,636
	Monthly	8,021	8,221	8,427	8,639	8,855	9,076	9,303
	Hourly	46.10	47.25	48.43	49.65	50.89	52.16	53.47
	Standby	3.23	3.31	3.39	3.48	3.56	3.65	3.74
09IT	Annual	101,064	103,584	106,188	108,840	111,564	114,360	117,204
	Monthly	8,422	8,632	8,849	9,070	9,297	9,530	9,767
	Hourly	48.40	49.61	50.86	52.13	53.43	54.77	56.13
	Standby	3.39	3.47	3.56	3.65	3.74	3.83	3.93

Salary Range		Step G	Step H	Step I	Step J	Step K	Step L	Step M*
10IT	Annual	106,104	108,756	111,480	114,252	117,108	120,036	123,048
	Monthly	8,842	9,063	9,290	9,521	9,759	10,003	10,254
	Hourly	50.82	52.09	53.39	54.72	56.09	57.49	58.93
	Standby	3.56	3.65	3.74	3.83	3.93	4.02	4.13
11IT	Annual	111,420	114,204	117,060	119,988	123,000	126,072	129,228
	Monthly	9,285	9,517	9,755	9,999	10,250	10,506	10,769
	Hourly	53.36	54.70	56.06	57.47	58.91	60.38	61.89
	Standby	3.74	3.83	3.92	4.02	4.12	4.23	4.33

Exhibit 7.1.5.1: General Service Salary Schedule for Information Technology Professionals<sup>21</sup>

### 7.1.6 Job Market Comparison

According to PayScale ([www.payscale.com](http://www.payscale.com)), Enterprise IT Architects with cloud computing skills and expertise earn an average annual salary of \$138,186 in the United States. Glassdoor shows slightly higher earnings of \$139,433. Senior Enterprise Architects are paid even more, with a current median salary of about \$146,000 per Glassdoor ([www.glassdoor.com](http://www.glassdoor.com)). Senior Systems Engineers with relevant cloud computing and networking certifications make \$108,739 a year on average per PayScale reports.

<sup>21</sup> OFM, General Service Salary Schedule for Non-Represented Employees; December 2019; <https://ofm.wa.gov/state-human-resources/compensation-job-classes/compensation-administration/compensation-plan-components/salary-schedules>





The average salary for a Cloud Solutions Architect is \$121,019.

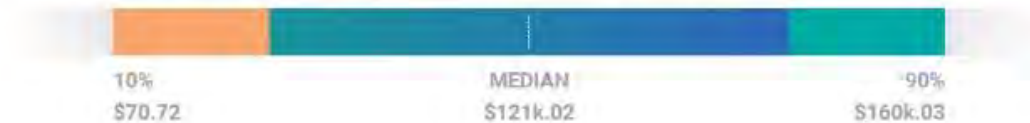


Exhibit 7.1.6.1: Average Cloud Solutions Architect Salary<sup>22</sup>

DevOps Engineers are averaging \$115,666 in annual base pay in the US, according to Glassdoor, and PayScale reports the average salary for the role at \$92,202 with the expectation to pay engineers with 10+ years of experience \$117,000. Because DevOps is extremely critical to cloud development projects and the delivery of new products and services, organizations offer bonuses and salary increases for additional certifications and continued education for cloud skills.

### 7.1.7 Training and Development

Unisys understands that Enterprise Services offers a variety of instructor-led courses at 1500 Jefferson in Olympia and the South Puget Sound Community College in Lacey, and courses can be customized to meet Agency needs. Some of the online courses are described below. Unisys could not identify any cloud computing or certification specific courses.

#### Learning Management System: Learning Management System (LMS)

- Using LMS (interface may be customized for your Agency)
- About the Learning Management System (LMS)
- Learn how to open a user account
- Log in to LMS
- Frequently asked questions (FAQ)

#### Instructor-Led Training: Leadership Development courses

- Leadership Development courses
- Browse by course title (alphabetical list)
- Browse by category
- How to register
- Reasonable accommodations

<sup>22</sup> PayScale ([www.payscale.com](http://www.payscale.com)), Enterprise IT Architects Source: [https://www.payscale.com/research/US/Job=Cloud\\_Solutions\\_Architect/Salary](https://www.payscale.com/research/US/Job=Cloud_Solutions_Architect/Salary)



- Training locations and maps
- Attendance policy
- Annual Training Schedule FY 20

### **Online and Remote Training**

- lynda.com Information and Registration/Access Instructions
- DES e-Learning Courses
- e-Learning Accessibility Resources
- Contracts and Procurement Training

### **Certificate Programs Available**

- Building Resilient Teams Certificate
- Business Analysis Certificate
- Graphic Design Certificate
- Human Resource Management Certificate
- Information Security Certificate
- Leadership Development Certificate
- Program Management Certificate
- Project Management Certificate
- Technical Solutions Delivery Certificate (Systems Analyst)

#### **Exhibit 7.1.7.1: General Government Workforce by Agency<sup>23</sup>**

### **7.1.8 Available Learning Technologies**

Unisys has also collected relevant information from the 2019 Training Industry Report<sup>24</sup> regarding current Learning Technology practices. The data represents a cross-section of industries and state/local government best practices for total training spending. All training-related expenditures for the year, including training budgets, technology spending, and staff salaries, are captured.

Training Delivery Methods used the following:

- Some 28% of hours were delivered with blended learning techniques, down significantly from 69.3% last year.
- Some 40.3% of training hours were delivered by a stand-and-deliver instructor in a classroom setting—up from 35.5% reported last year.
- 29.6% of hours were delivered via online or computer-based technologies, up from 25.6% last year. Virtual classroom/Webcast accounted for 15.4% of hours delivered, up from 10.2% last year.

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<sup>23</sup> Department of Enterprise Services (DES) Source: (<https://des.wa.gov/services/training-and-development>)

<sup>24</sup> Freifeld, Lorri, 2019 Training Industry Report; November 2019; p.28; <https://trainingmag.com/trgmag-article/2019-training-industry-report/>



- 4.9% of training hours were delivered via mobile devices, up from 1.7% in 2018. This year, 5.5% of training hours were delivered via social learning (versus no reported hours last year). Three new categories were added this year: augmented reality (1.6%), virtual reality (1.9%), and artificial intelligence (.6%).
- Instructor-led classroom training is used exclusively or mostly (90% to 100% of the time) by 9.7% of the organizations. More companies (38.1%) use it for 10% to 29% of their training. Most organizations are using a mixture of blended learning, instructor-led, virtual classroom, and online methods.
- Mandatory or compliance training continued to be done mostly online, with 80% of organizations doing at least some of it online and 29% entirely online (up from 28% last year). Online training also often is used for sales training (87%), desktop application training (81%), and IT/ systems training and profession/industry-specific training (both at 73%). Online delivery for customer service training was at 63%, followed by interpersonal skills training (61%) and management/ supervisory training (58%). Online training was least used for onboarding and executive development (53% and 47%, respectively).

The most often learning technologies use of the eleven (11) presented included:

- Learning management systems (LMSs) at 82%, up from 81% last year, followed by virtual classroom/ Webcasting/video broadcasting at 75%, up from 69% last year
- Rapid e-learning tools (48%, up from 45% last year)
- Application simulation tools (39%, up from 34% last year)
- Mobile applications at 34% (up from 30% last year)

At least 90% of large and midsize companies currently use LMSs vs. 71% of small companies.

The delivery methods least often used for training remained the same as last year:

- Podcasting at 21% (but up from 14% last year)
- Online performance support (EPSS) or knowledge management system at 28% (but up from 21% last year)
- Learning content management systems (LCMSs) at 27% (down from 30% last year)

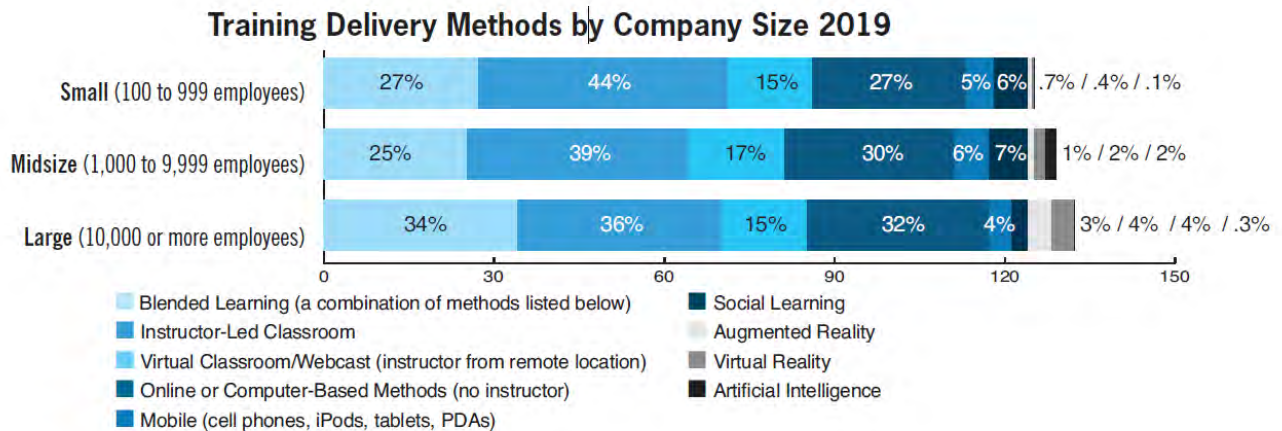


Exhibit 7.1.8.1: Learning Technologies<sup>25</sup>.

<sup>25</sup> Freifeld, Lorri, 2019 Training Industry Report; November 2019; p.28; <https://trainingmag.com/trgmag-article/2019-training-industry-report/>



### 7.1.9 Training Spend Per Benchmark

Overall, on average, companies spent \$1,286 per learner this year compared with \$986 per learner in 2018. Nonprofits spent the most per learner this year (\$1,889), followed by manufacturers/distributors (\$1,781). Midsize companies spent less (\$829) than large (\$1,544) and small (\$1,511) companies.

While spending more per learner, companies provided slightly fewer hours of training than last year. On average, employees received 42.1 hours of training per year, compared to 46.7 hours last year. Small companies provided the most hours of training this year (49.8). Small nonprofits had the highest average number of hours overall (89.8).

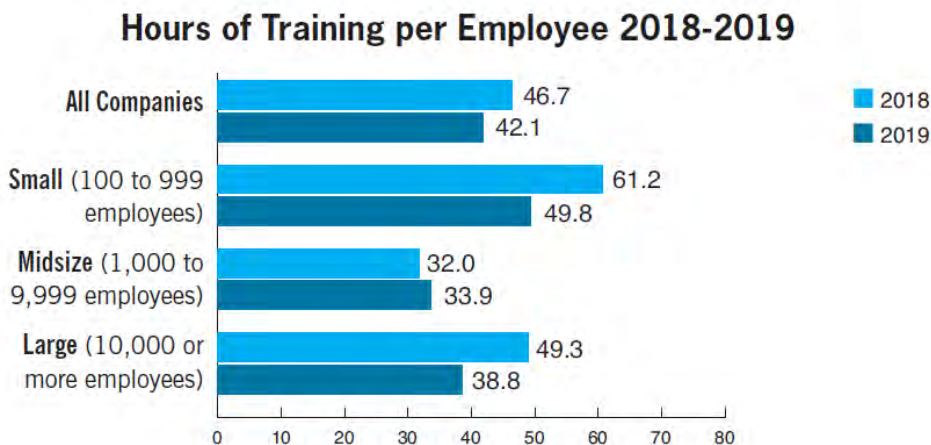
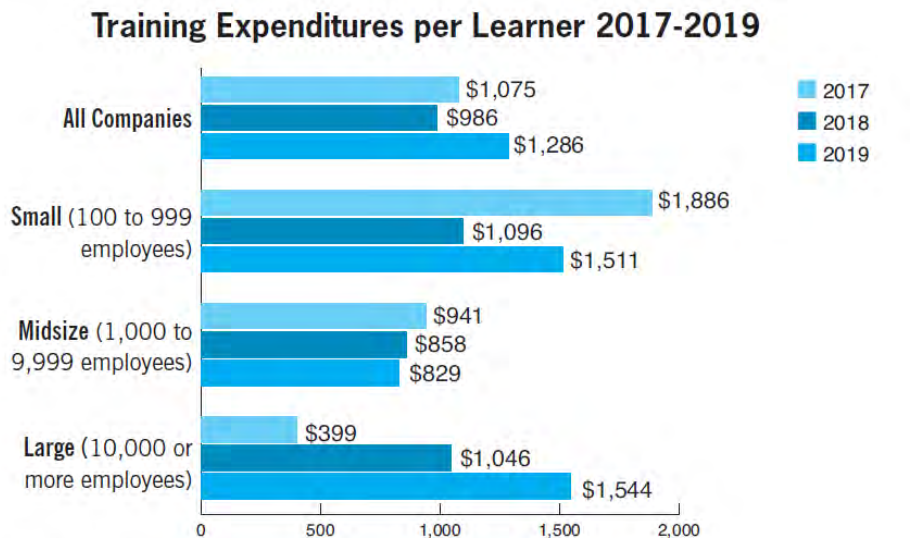


Exhibit 7.1.8.2: Learning Technologies<sup>26</sup>.

<sup>26</sup> Freifeld, Lorri, 2019 Training Industry Report; November 2019; p.21; <https://trainingmag.com/trgmag-article/2019-training-industry-report/>



### 7.1.10 Training Spend Per Agency

Unisys was unable to uniquely identify Agency training and career development costs spent to effectively maintain the knowledge and skills necessary to support the delivery of existing services in the State.

Agency training and career development costs (IT and non-IT) are tracked using the category below.

Description	Category Code	FY19 Total
Employee Professional Development and Training	*EG	\$2,157,242

The category, \*Employee Professional Development and Training (EG), includes both IT and non-IT career development with an annual In-Scope Agency investment of \$2.16M for thirty-four (34) Agencies (54% of the 63 In-Scope Agencies) for FY2019.

Following OCIO guidance, three other categories with minimal IT related training costs were:

- Training Services (CJ)
- Printing and Reproduction (EF)
- Other Contractual Services (ER)

These categories were removed from the review.



### 7.1.11 Job Family Descriptors

The State of Washington Human Resource Department has created a job family as defined with functional disciplines involving similar types of work requiring related training, skills, knowledge, and expertise. The current job families are described in the Job Descriptions Section below:

Exhibit 7.1.11: Job Family Descriptions. <sup>27</sup>

#### 7.1.11.1 Application Development

Job	Job Class Code
<b>Application Development</b>	<b>Common Positions</b>
<p><b>Definition:</b> Work that involves the design, documentation, development, modification, testing, installation, implementation, maintenance, and support of new or existing applications software</p>	<ul style="list-style-type: none"> <li>● Applications Developer</li> <li>● Software Developer</li> <li>● GIS Developer</li> <li>● Mobile App Developer</li> </ul>
<b>IT Worker</b>	<b>IT User</b>
Uses software development methods and tools to develop applications and databases for staff and/or the public to consume to perform their daily work	Uses specialized software to perform their work (modeling tools, Excel macros, PowerPoint, etc.)
Web Development: Develops user-interface (UI) design, coding, testing, and implementation of application components and web services; writes reusable code using industry and organization standard development tools and framework	Updates organization website content, links documents, posts pictures, monitors analytics
Designs and develops SQL database systems for large scale data tracking, reporting, and multi-user access	Creates an Access database to track data specific to them
Uses software development methods and tools to integrate and support Custom Off The Shelf (COTS) software and services. Coordinates with vendor technical staff on implementing and	Uses off-the-shelf tools to perform individual tasks and functions to perform work

<sup>27</sup> Office of Financial Management (OFM, OFM State Human Resource: IT Evaluator’s Handbook: Version 3: March 2019; [https://wfse.org/system/files/it\\_evaluators\\_handbook\\_march\\_2019\\_version3.pdf](https://wfse.org/system/files/it_evaluators_handbook_march_2019_version3.pdf)



coordinating system upgrades and enhancements	
Develops, tests, implements, and supports custom-developed business applications or development of custom features within a COTS system or proprietary application	Implements and tests configurable functionality in a business application
Uses a combination of Geographic Information System (GIS), web programming skills, and development tools to build GIS maps and data services that are created in a web map format; The web maps are combined with other web tools that allow the user to dynamically interact with the map to search for and display the information.	Uses GIS as one tool in order to conduct the scientific or engineering investigation
Develops mockup/prototype interaction designs, including users' interaction models, information architecture, wireframes, and screen flows	Participates as a subject matter expert in functional and user acceptance testing

### Application Development – Functional Competencies

Knowledge, skills, and abilities:

- Understands existing and emerging technologies and their applicability in the software implementation environment (e.g., vendor or open-source, Service-Oriented Architectures)
- Knows and considers available COTS software to make “build or buy” decisions
- Knows Internet standards relative to web technology development
- Considers web technology in relation to privacy standards and federal regulations
- Identifies and uses tools for information management and technology product design and development
- Able to analyze and refine systems requirements
- Analyzes and resolves complex problems, such as multiple product problems, dump analysis, or major conflicts caused by the new software versions
- Applies expert system analysis skills to maintain, monitor, and troubleshoot system performance and environment

Skilled in performing one or more of the following activities:

- Determines the overall technical design and structure of Internet services
- Identifies and uses modeling and simulation approaches/tools (e.g., dynamics modeling, cost/benefit analysis, costing, forecasting, sourcing models— build or buy) to make decisions
- Identifies criteria and integrates “go/no go” consideration stages into the development life cycle
- Compares the benefits and limitations of open source software with vendor-developed software
- Adopts and applies systems engineering perspectives and processes to software development
- Evaluates software quality and applicability in testing software capabilities
- Monitors software configuration changes to anticipate and address the impact of data reliability and customer satisfaction issues
- Tests debug and maintain detailed instructions (programs) for computers to follow and ensure the performance of their intended functions



- Conceives, designs, and tests logical structures for solving problems by computer
- Evaluates current collaborative web technologies and the benefits/risks associated with them
- Assesses delivery strategies, web technologies, oversight, and organizational implications for web-based development
- Monitors functionality, security, and integrity of Internet services
- Troubleshoots and resolves technical problems with the design and delivery of Internet services
- Translates systems requirements into application prototypes; plans and designs systems architecture; writes, debugs, and maintains code; determines and designs application architecture
- Designs user interfaces
- Works with customers to test applications
- Writes and maintains program documentation
- Designs user interfaces
- Conducts unit testing on code changes prior to release
- Develops and maintains functionality used by software applications, including change management, security, and authentication, application distribution, disaster recovery planning, support for data access, email connections, search routines, system-wide configurations, and reports
- Writes and maintains computer code programs using any one of a number of languages to fulfill a particular business function

### 7.1.11.2 IT Architecture

Job	Job Class Code
IT Architecture	Common Positions
<p><b>Definition:</b> Work that involves the analysis, planning, design, implementation, documentation, assessment, governance, and management of the structural and decision-making framework to align IT strategy, plans, and systems with the mission, goals, structure, and processes of the organization</p>	<ul style="list-style-type: none"> <li>• Chief or Senior Enterprise Architect</li> <li>• Enterprise Architect</li> <li>• IT Architect</li> <li>• Solutions Architect</li> </ul>
IT Worker	IT User
<p>Designs and develops a solution approach for integrating with other systems, securing user interactions with data, and executing workflow and triggers for a technology area based on federal, state, and organization requirements</p>	<p>Performs “SuperUser” support and training functions for an organization line of business area. This could be in the form of SharePoint SuperUser, Office Products SuperUser, Specialized Software SuperUser, etc.</p>
IT Architecture – Functional Competencies	
<p>Knowledge, skills, and abilities:</p> <ul style="list-style-type: none"> <li>• Demonstrates an understanding of basic architecture documentation (i.e., work product) methodologies at each level of a commonly used framework</li> <li>• Able to identify opportunities for improving systems that support business processes</li> </ul>	





- Able to provide guidance and support to customers and stakeholders on the use of the enterprise system
- Able to apply emerging and evolving technologies to current and future business needs at the enterprise, operational, and tactical levels
- Able to identify opportunities to improve enterprise-level systems to support business processes and utilize emerging technologies
- Ensures rigorous application of information security/assurance policies, principles, and practices to all components of the enterprise architecture
- Knowledgeable about key regulatory requirements and guidance relating to enterprise architecture

Skilled in performing one or more of the following activities:

- Provides enterprise architecture guidance, support, and coordination to customers and IT project teams
- Documents the enterprise architecture infrastructure, including the business units and key processes, using modeling techniques
- Ensures technical integration is achieved across the enterprise by participating in test planning, validation, and reviews
- Evaluates the impact of enterprise architecture products and services on IT investments, business operations, stakeholder satisfaction, and other outcomes
- Defines the policies and principles to guide technology decisions for the enterprise architecture
- Coordinates and conducts governance and portfolio management activities associated with ensuring compliance with the enterprise architecture
- Analyzes designs and implements enterprise-wide IT solutions (e.g., applications, platforms, security) that align with the organization’s structure, goals, and systems
- Identifies and uses various criteria (e.g., time, budget, etc.) to determine IT success and ensure alignment with stakeholder needs
- Follows the enterprise architecture transition plan for moving from baseline business and technology operating environment to the target environment

### 7.1.11.3 IT Business Analysis

Job	Job Class Code
<b>IT Business Analysis</b>	<b>Common Positions</b>
<p><b>Definition:</b> Work that involves applying analytical processes to the planning, design, and implementation of IT systems to meet the business requirements of customer organizations. It also includes the work of translating business needs to technical requirements. These activities apply to establishing new IT systems as well as improving existing IT systems.</p>	<ul style="list-style-type: none"> <li>• Systems Analyst</li> <li>• Business Analyst</li> </ul>
<b>IT Worker</b>	<b>IT User</b>
Elicits business requirements from business stakeholders and business subject matter experts; translates business requirements and function specs into technical requirements, reviews functional specifications and design documents for technical compliance against business	As a subject matter expert, provides business requirements, approves functional specifications and design documents, accepts deliverables



requirements, identifies gaps between functional spec and the capabilities of the technology, and manages small IT business project deliverables coordinating IT resources with resource managers	for business applications
Works with product specialists, usability specialists, and interaction designers to develop and iterate user interface designs based on research and usability test results	Participates as a business user or subject matter expert on Agency business projects involving the use of technology to represent the business needs of the organization; may have technical knowledge regarding the specific system or business requirement, but the focus of the job is representing the business as the subject matter expert
Assists in defining functional interaction requirements specifications and non-functional requirements (performance, availability, etc.)	
Surveys applicable technologies and reports on their strengths and weaknesses to address the business process; makes recommendations on the technology approach to use and identifies where new technology customizations are necessary to adapt the technology to the business needs of the organization	

### IT Business Analysis – Functional Competencies

Knowledge, skills, and abilities:

- Able to identify stakeholders and select appropriate business analysis techniques to manage requirements and assess the progress of the work
- Able to ensure stakeholders' actual underlying needs are understood and captured
- Able to understand and apply the usability engineering lifecycle, particularly user-centered analysis, and usability testing techniques
- Able to assess proposed solutions to determine the best solution to meet business needs
- Able to identify gaps and shortcomings in solutions and determine necessary workarounds or changes to the solution
- Able to work with stakeholders to identify and understand their needs, concerns, and working environment

Skilled in performing one or more of the following activities:

- Identifies business needs, refines, and clarifies the definition of that need, and defines a solution scope that can be feasibly implemented by the business
- Prioritizes and progressively clarifies and validates stakeholder and solution requirements in order to enable the project team to implement a solution that meets the needs of the sponsoring organization and stakeholders
- Analyzes stakeholder needs to define solutions, assess the current state of the business to identify and recommend improvements, and the verification and validation of the resulting requirements
- Manages conflicts, issues, and changes in order to ensure that stakeholders and the project team remain in agreement on the solution scope, how requirements are communicated to stakeholders, how knowledge gained by the business analyst is maintained for future use
- Ensures the solution delivered to stakeholders meets the business need(s) for which the project was undertaken by planning and facilitating user acceptance testing
- Uses Business Process Modeling (BPM) techniques for analyzing the “as-is” business processes and rules in-scope and then the “to-be” processes
- Works with the organization's approved Software Development Life Cycle (SDLC) methodology (waterfall, iterative, agile, scrum, etc.) that is applied to



the project

- Converts requirements into different types of models or diagrams using Unified Modeling Language (UML), each of which describes a particular aspect of the requirements
- Assesses deployed solutions to see how well they met the original need so the sponsoring organization can assess the performance and effectiveness of the solution

### 7.1.11.4 Customer Support

Job	Job Class Code
<b>Customer Support</b>	<b>Common Positions</b>
<p>Definition: Work that involves the planning and delivery of customer support services, including installation, configuration, troubleshooting, and customer assistance for customer technology, e.g., desktop computers, phones, laptops, email accounts, and video conferencing</p>	<ul style="list-style-type: none"> <li>• Technical Support Specialist</li> <li>• Customer Support Specialist</li> <li>• Help Desk Representative</li> <li>• Applications Administration</li> </ul>
IT Worker	IT User
<p>Provides technical support for business applications using IT tools such as remote desktop, configures automated systems to deploy software updates/installations, troubleshoots application connectivity issues, creates and maintains technical documentation of desktop management, and creates an organization standard PC image</p>	<p>Provides training and business process support on business applications</p>
<p>Provides technical advice and guidance relative to problems involving user interface, browser, hardware, and supporting software; troubleshoots and restores technical service and equipment troubles by analyzing, identifying, and diagnosing faults and symptoms</p>	<p>Serves as the initial point of contact for customers regarding IT issues; responsible for triaging (help tickets/requests) and, based upon specific criteria, processes, and procedures, forwards to appropriate technical experts</p>
<p>Coordinates efforts with the Help Desk to ensure all calls outside the customer environment are effectively resolved; similar to experienced Help Desk professional, with the added responsibility of interfacing directly with external customers to the business</p>	
Customer Support – Functional Competencies	
<p><b>Knowledge, skills, and abilities:</b></p> <ul style="list-style-type: none"> <li>• Uses knowledge of IT principles in the practical application of methods and practices to plan, implement, and coordinate services to diagnose and resolve problems and ensure continuous service</li> </ul>	



**Skilled in performing one or more of the following activities:**

- Performs Tier 2 or higher (complex) issue resolution for incoming help requests from end users, including installing and upgrading software, installing hardware, configuring systems and applications
- Serves as designated application or system lead for complex problem resolution and vendor interactions
- Creates standard PC imaging for installation on computer workstations
- Resolves application software issues within critical systems
- Develops metrics, critical success factors, and key indicators to monitor and assess results
- Ensures continuous customer support and contact with the customer
- Provides guidance to and monitors customer support services provided by paraprofessionals and/or professional staff
- Tests and executes bug fixes in applications
- Consults with vendors on resolutions for identified issues
- Evaluates unusual circumstances, considering different approaches and dealing with incomplete and conflicting data
- Plans the work and refines the methods and techniques used
- Researches and evaluates new customer service management systems
- Recommends purchase of systems where it is determined they would enhance the quality and effectiveness of the customer support program
- Oversees implementation of new systems and services and develops training guides for customer support employees
- Develops performance metrics to evaluate the efficiency and effectiveness of the customer support center and to apply results in increasing productivity, professionalism, and improving service quality
- Integrates metrics within existing performance measurement systems and guides customer support supervisors and managers in their application
- Develops resource reference materials for system users (user manuals, online help pages, tutorial videos, and web page content)
- Monitors system environment to identify availability and functionality issues
- Provides system outage and status communication to users; escalates according to established procedures
- Develops system release documentation and communication
- Performs end user application security access maintenance

**7.1.11.5 Data Management**

Job	Job Class Code
<b>Data Management</b>	<b>Common Positions</b>
<p>Definition: Work that involves the planning, development, implementation, designing, and administration of IT systems for the acquisition, storage, and retrieval of data. This does not include business users such as research and business analysts who use data systems to compile data for analysis.</p>	<ul style="list-style-type: none"> <li>• Database Developer</li> <li>• Database Administrator</li> <li>• Business Intelligence Specialist</li> <li>• Data Architect</li> </ul>



IT Worker	<ul style="list-style-type: none"> <li>Data Warehouse Specialist</li> </ul> IT User
Takes business requirements and designs, develops, tests, and implements organization databases; administers organization databases to include schema development, performance tuning, and integration between different business applications	Using standard or Custom Off The Shelf (COTS) or SaaS data query tools, writes data query scripts to extract business data from the data warehouse; uses ad hoc data query tools to extract business data from the data warehouse
Practices architectural techniques and tools for achieving consistent access to and delivery of data across the spectrum of data subject areas and data structure types in the enterprise to meet the data consumption requirements of all applications and business processes	Uses options presented by the application to make configuration changes to user-oriented application behaviors
Designs, tests, and implements data retrieval methods (including exports, proprietary reports, and database views)	Uses MS Access, Excel, or other standard database tools to manage data
	Interacts with applications through the user interface to accomplish business tasks

### Data Management – Functional Competencies

**Knowledge, skills, and abilities:**

- Ensures rigorous application of information security/assurance policies, principles, and practices in the delivery of data management services
- Ensures data recovery, maintenance, data integrity, and space requirements are met for physical database through formulations of policies, procedures, and standards to ensure effective data management enterprise-wide

**Skilled in performing one or more of the following activities:**

- Analyzes and defines data requirements and specifications to design, normalize, develop, install, and implement databases and data warehouses
- Maintains, monitors, and conducts performance tuning and backup and recovery of databases
- Installs, configures, and maintains database management systems software
- Analyzes and plans for anticipated changes in data capacity requirements
- Develops and administers data standards, policies, and procedures
- Develops and implements data mining and data warehousing programs
- Evaluates and provides recommendations on new database technologies and architectures
- Conducts data modeling techniques and methodology development
- Conducts physical schema design of table spaces, rollback segments, and data files
- Provides applications support, performance monitoring, maintaining database backup, and recovery environment
- Performs capacity planning and reporting, configures, and manages cloud data services for data management and analytics
- Provides tools and develops policies and procedures for creating and maintaining the data enterprise model
- Produces entity-relationship diagrams, data flow diagrams, database normalization schemata, logical to physical database mapping, data table



- parameters, etc.
- Supports the maintenance of metadata infrastructure
  - Coordinates database performance monitoring and tuning tasks, including the design of optimization and indexing schemes
  - Designs, creates, tests, performance tunes, maintains, and monitors data extract, transform and load jobs, and extract transform load (ETL)
  - Designs and documents ETL data structures, metadata, and ETL routines
  - Reviews, tests, and provides feedback to proposed data models and architecture relating to ETL requirements
  - Creates, tests, and maintains conceptual, logical, and physical models for business intelligence
  - Defines and implements enterprise information management strategy
  - Manages and maintains the data model repository
  - Creates and maintains Data Definition Language used to create physical data objects

### 7.1.11.6 IT Policy and Planning

Job	Job Class Code
<b>IT Policy and Planning</b>	<b>Common Positions</b>
<b>Definition:</b> Work that involves a wide range of IT management activities that typically extend and apply to an entire organization or major components of an organization. This includes strategic planning, capital planning and investment control, workforce planning, policy and standards development, resource management, knowledge management and auditing.	<ul style="list-style-type: none"> <li>• Enterprise Resource Planner</li> <li>• IT Policy and Planning Analyst</li> <li>• IT Auditor</li> </ul>
IT Worker	IT User
Plans, analyzes, and leads strategic business initiatives and legislative mandates that require the development, implementation, and integration of technology	Supports executive IT staff in researching, compiling data, and drafting documents for developing strategies for the use of available resources, defining departmental needs and priorities, long-range planning, and setting goals and objectives
Works with service owners and business owners to develop approaches in network design, secure data access, and data management to ensure operational resilience and availability	
Recommends implementing new technology solutions to improve a business system; provides recommendations for IT funding priorities based on organizational goals; participates in IT system audit and	Participates as a business user or subject matter expert on Agency business projects involving the use of technology to represent the business needs of the organization



provides recommendations for improvement; develops and implements a new policy to mitigate system risks

**IT Policy and Planning – Functional Competencies**

**Knowledge, skills and abilities:**

- Able to align IT investments with the organization’s mission (e.g., capital planning and investment control, Enterprise Performance Life Cycle)
- Able to use established analysis, business cases, and decision-making processes to evaluate capital investments in IT and IT-alternative investments
- Able to consider organizational strategic and performance plans to identify specific requirements and capital planning processes to drive the acquisition strategy (e.g., Enterprise Performance Life Cycle)
- Applies knowledge of the organization’s IT acquisition approach to compare, contrast, and evaluate acquisitions

**Skilled in performing one or more of the following activities:**

- Evaluates current and emerging best practices in IT relative to the enterprise’s strategic plan
- Acquires feedback from external organizations and end users
- Establishes and utilizes methodologies to compare and contrast cost, benefits, and risks
- Analyzes cost and economic data to assess the quality and communicate meaning to others
- Evaluates needs and a variety of potential IT-based solutions
- Identifies and designs shared solutions between organizations to leverage technology investments
- Develops metrics, critical success factors, and key indicators to monitor and assess results
- Develops security plans to protect the confidentiality, integrity, and availability of the organization's information, information systems, and networks in accordance with policies, procedures, and control techniques and organization and federal regulations

**7.1.11.7 Network and Telecommunications**

Job	Job Class Code
<b>Network and Telecommunications</b>	<b>Common Positions</b>
<p><b>Definition:</b> Work that involves the planning, analysis, design, development, testing, configuration, installation, implementation, integration, maintenance, and/or management of networked systems used for the transmission of information in voice, data, and/or video formats</p>	<ul style="list-style-type: none"> <li>• Network Administrator</li> <li>• Network Analyst</li> <li>• Network Architect</li> <li>• Telecommunications Specialist</li> <li>• Remote Access Administrator</li> </ul>
<b>IT Worker</b>	<b>IT User</b>



Uses network engineering methods, works with consultants and WaTech to design and support Agency LAN/WAN infrastructure	Performs end user acceptance testing for telecommunication projects Demonstrates new products to customers; gathers new requirements for customers
Uses structured language and command-line interfaces to navigate, evaluate, and design the state network	Calls vendors to do cabling for networks and phones; orders and tracks vendor circuits based on predesigned network requirements
Designs and represents physical and logical network topologies within a database	Manages warranty and maintenance contracts; maintains historical records, system support documents, and technical diagrams
Installs and configures physical and virtual network components to implement a network design	Performs data entry of predesigned network topologies using predefined network elements; maintains historical records, system support documents, and technical diagrams
Researches and evaluates emerging network equipment, technologies, and trends for continual realignment and improvement of the State network	
Engineers and designs new telecommunications systems	

### Network and Telecommunications – Functional Competencies

**Knowledge, skills and abilities:**

- Knowledge of capabilities and limitations of data transmission modes and media
- Knowledge of data transmission concepts, functions, and mechanisms
- Able to apply network systems knowledge to plan, design, and develop systems and properly deploy systems to support the organization
- Uses network engineering knowledge in design, operations, and security activities
- Skilled in the acquisition, technical acceptance, installation, testing, modification, or replacement of telecommunications equipment, services, and systems
- Able to analyze missions, plans, organization structure, current and planned infrastructures, and other related factors affecting enterprise network requirements

**Skilled in performing one or more of the following activities:**

- Evaluates the benefits and limitations of commonly used local wired and wireless voice and data communication architectures, devices, and protocols, as well as wide-area voice and data architectures, devices, and protocols
- Coordinates installation, maintenance, troubleshooting, and fine-tuning of the LAN and WAN including all hardware, software, security, telecommunications, and networking components
- Develops, plans, and designs for network modifications and enhancements





- Reviews proposed applications for compatibility and interoperability
- Analyzes LAN and WAN utilization statistics, performance measures, and system profiles to ensure network effectiveness and robustness
- Identifies potential performance or capacity problems and plans for changes to avert problems
- Evaluates available enterprise network systems, including performance, security, capacity, scalability, cost, and other relevant factors and recommends optimal network solutions
- Identifies and controls all LAN and WAN hardware and software configurations
- Develops technical standards and procedures for LAN and WAN development, implementation, and management
- Evaluates overall LAN and WAN performance against relevant standards
- Identifies and implements required corrective actions; devises solutions to prevent future interruptions

### 7.1.11.8 IT Project Management

Job	Job Class Code
<b>IT Project Management</b>	<b>Common Positions</b>
<p><b>Definition:</b> Work that involves the monitoring or management of technology projects using standard project management techniques; includes creating project estimates, reporting, resource, and capacity planning.</p>	<ul style="list-style-type: none"> <li>• IT Project Manager</li> <li>• IT Program Manager</li> <li>• IT Project Analyst</li> <li>• IT Program Analyst</li> <li>• Product Manager</li> <li>• IT Release Manager</li> </ul>
IT Worker	IT User
<p>Leads the development of strategic vision, roadmaps, and release plans for technology projects; coordinates releases and sprints across different technology workstreams and identifies potential technology gaps or collisions</p>	<p>Supports IT Project in drafting reports, communications, and other documentation for Project Manager approval; maintains status reports and ensures timely distribution</p>
<p>Reports directly to Executive Sponsor/CIO on project deliverables, resources, budget, and overall performance</p>	<p>As a member of a project team, participates as a business subject matter expert</p>
<p>Manages the work of technical teams, including project and product backlogs, the tracking and resolution of impediments, develops the key metrics required to monitor implementation success and triages issues in</p>	<p>Compiles, monitors, and analyzes budget data for IT projects; reports regular status and escalates identified issues; coordinates contracts and purchasing</p>



team velocity; works with business and product owners to reprioritize backlog work items and adjustments in scope, schedule, and budgets.

### IT Project Management – Functional Competencies

#### Knowledge, skills and abilities:

- Able to empower and inspire others to deliver successful change initiatives
- Able to identify, address, and resolve differences between individuals and/or interest groups
- Able to identify and/or develop frameworks and methodologies to ensure the management of change initiatives will be comprehensive and consistent across different initiatives. (In this context, “frameworks” means the parameters, constraints, or rules established to standardize delivery.)

#### Skilled in performing one or more of the following activities:

- Selects, develops, and manages IT teams
- Secures necessary resources for change initiatives from internal and/or external providers
- Manages contracts for the provision of goods and/or services to monitor compliance and manage variances
- Prepares and maintains change initiative definitions and requirements
- Determines the best means of satisfying requirements within the context of the change initiative’s objectives and constraints
- Prepares and maintains schedules for activities and events for change initiatives, taking into account dependencies and resource requirements
- Develops, implements, and updates resource allocation plans (other than for finance) for change initiatives, taking into account availabilities and scheduling
- Develops budgets for change initiatives, control forecast, and actual costs against the budgets
- Identifies and monitors risks (threats and opportunities), plans and implements responses to risks, and responds to other issues affecting change initiatives
- Develops, maintains, and applies quality management processes for change initiative activities and outputs
- Consolidates and documents the fundamental components, schedules, resource requirements, budgets, risks, opportunities and issues, and quality requirements of change initiatives
- Integrates change initiative outputs into business operations and addresses the readiness of users, compatibility of work systems, and the realization of benefits
- Plans and controls the finances of programs or portfolios and their related change initiatives as a means of driving performance and as part of the organization’s overall financial management
- Prepares and maintains overall schedules for resource use in related change initiatives to avoid bottlenecks and conflicting demands; determines sequences of outcomes to enable the efficient realization of benefits
- Establishes and maintains governance structures that define clear roles, responsibilities, and accountabilities for governance and delivery of change initiatives that align with organization practice
- Manages stakeholders, taking into account their levels of influence and particular interests
- Establishes and manages reviews at appropriate points, during and after change initiatives, to inform governance and provide evaluations of progress, methodologies, and continuing relevance
- Establishes protocols to alter the scope of change initiatives, implementing the protocols when necessary, and updating configuration documentation



including contracts

- Gathers independent evidence and validates change initiative is achieving its aims
- Prepares, gains approval of, refines, and updates business cases that justify the initiation and/or continuation of change initiatives in terms of benefits, costs, and risks

### 7.1.11.9 IT Security

Job	Job Class Code
<b>IT Security</b>	<b>Common Positions</b>
<b>Definition:</b> Work that involves ensuring the confidentiality, integrity, and availability of systems, networks, and data through the planning, analysis, development, implementation, maintenance, and enhancement of information systems security programs, policies, procedures, and tools	<ul style="list-style-type: none"> <li>• Information Systems Security Analyst/Specialist</li> <li>• Information Systems Security Officer</li> <li>• Network Security Officer</li> </ul>
IT Worker	IT User
Evaluates proposed system changes to maintain security and data protection policies	Has administrative rights to grant access to SharePoint, websites, Outlook groups, distribution lists
Responsible for conducting security audits and implementing corrective actions	Resets passwords, manages credentials, reports suspected security compromise
Develops and executes security policies, plans and procedures; designs and implements data network security measures; operates Network Intrusion Detection and Forensics; conducts performance analysis of information systems security incidents; develops COOP/DR plans and support certification	Serves as program SME assigned to work with IT staff to ensure program requests/requirements can be developed/designed and implemented within IT security and data protection parameters
Operates and manages all aspects of information systems, data availability, integrity, authentication, confidentiality, and non-repudiation; implements and monitors security measures for communication systems, networks, and provides advice that systems and personnel adhere to established security standards and governmental requirements for security on these systems	Performs “SuperUser” functions for an organization line of business area; ensures data being utilized and shared complies with security programs, policies, procedures, and tools



### IT Security – Functional Competencies

**Knowledge, skills and abilities:**

- Ability to promote awareness of security issues among management and ensuring sound security principles are reflected in the organization’s visions and goals
- Skilled in the development and implementation of programs to ensure that systems, network, and data users are aware of, understand, and adhere to systems security policies and procedures

**Skilled in performing one or more of the following activities:**

- Develops policies and procedures to ensure information systems reliability and accessibility and to prevent and defend against unauthorized access to systems, networks, and data
- Conducts risk and vulnerability assessments of planned and installed information systems to identify vulnerabilities, risks, and protection needs
- Conducts systems security evaluations, audits, and reviews
- Develops systems security contingency plans and disaster recovery procedures
- Participates in network and systems design to ensure the implementation of appropriate systems security policies
- Facilitates the gathering, analysis, and preservation of evidence used in the prosecution of computer crimes
- Assesses security events to determine the impact of implementing corrective actions and/or ensures the rigorous application of information security/information assurance policies, principles, and practices in the delivery of all IT services
- Performs penetration testing exercises

#### 7.1.11.10 Systems Administration

Job	Job Class Code
<p><b>Systems Administration</b></p>	<p><b>Common Positions</b></p>
<p><b>Definition:</b> Work that involves planning and coordinating the installation, testing, operation, troubleshooting, and maintenance of hardware, software systems, and systems environment; includes defining or coordinating common processes or procedures to support IT operations</p>	<ul style="list-style-type: none"> <li>• Systems Administrator</li> <li>• Operating System Administrator</li> <li>• Storage Administrator</li> <li>• Email Administrator</li> <li>• Enterprise Document Management Administrator</li> <li>• Identity/Access Management Administrator</li> <li>• Data Center Operations</li> <li>• Print Manager</li> <li>• Batch Scheduler</li> </ul>



IT Worker	IT User
Customizes, configures, and extends content management tools used by web content producers	Develops, publishes, and updates web content using content publishing tools, templates, and organization standards and best practices for content publishing
Analyzes, plans, tests, and implements application configuration changes that include system control data affecting application behaviors, including behaviors that affect integration with other systems	Participates in testing as a subject matter expert, including functional testing and user acceptance testing
Designs and prototypes applications; creates, maintains, and implements source code for application or program	Serves as business area point of contact for any upgrades or changes made and works with IT technical experts to evaluate potential impacts
Conducts testing: unit testing of application modules and their changes, integration testing of interaction of application modules and changes, as well as testing the interfaces between systems, load testing, and regression tests; responds to findings of tests (troubleshooting and repairing bugs)	Provides technical training to end users
Develops, prepares, and deploys system changes into technology environments (development, test, pre-production, production)	As a SharePoint site owner, maintains and administers the SharePoint site assigned

**Systems Administration – Functional Competencies**

**Knowledge, skills and abilities:**

- Ensures information security/assurance policies, principles, practices are an integral element of the operating environment
- Able to anticipate and forecast hardware requirements when software needs change
- Supports decisions to determine when hardware upgrades are required based on emerging software requirements
- Ensures system availability, functionality, integrity, and efficiency, and maintains system configuration
- Ensures customers receive current versions of supported software as they become available

**Skilled in performing one or more of the following activities:**

- Evaluates, selects, and installs compilers, assemblers, and utilities
- Integrates hardware and software components within the systems environment
- Evaluates new systems engineering technologies and their effect on the operating environment
- Monitors the systems environment to ensure effective performance
- Manages hardware and software obsolescence
- Plans and schedules the installation of new or modified hardware, operating systems, and software
- Addresses opportunities and challenges of implementing transformational technology (e.g., virtualization, cloud computing) into the federal environment
- Manages accounts, network rights, and access to systems and equipment
- Implements security procedures and tools to ensure rigorous security measures are in place



- Plans and schedules the installation of new or modified hardware and operating systems and applications software
- Manages accounts, network rights, and access to systems and equipment
- Manages systems resources, including performance, capacity, availability, serviceability, and recoverability
- Develops and documents systems administration standard operating procedures
- Resolves hardware/software interface and interoperability problems
- Maintains systems configuration
- Monitors and troubleshoots systems availability
- Recovers data in the event of hardware or software failure

### 7.1.11.11 IT Vendor Management

Job	Job Class Code
<b>IT Vendor Management</b>	<b>Common Positions</b>
<p><b>Definition:</b> Work that manages IT vendors and ensures that all service level agreements (SLAs) or underpinning contracts for IT services across the organization are delivered according to specifications; also includes working with IT, business units, and contract managers in identifying and evaluating technology services providers that are consistent with the organization's business strategy and architecture</p>	<ul style="list-style-type: none"> <li>• IT Vendor Manager</li> <li>• SLA Manager</li> <li>• Vendor Management Analysis</li> </ul>
IT Worker	IT User
<p>Researches different technology, assessing technology to fit within the existing environment, identifying proper technical criteria, and requirements for selection</p>	<p>Serves as contracts specialist to execute contracts in support of IT procurement and purchasing functions for a specialized area (IT) for an organization or an area of an organization; analyzes bids for multi-commodity purchase contracts and/or procurement of products, develops specifications, and analyzes bids for products and services</p>
<p>Serves as internal and external contact regarding system and service requirements, coordinates issues across multiple technology disciplines, and serves as the domain expert and an information manager</p>	<p>Submits standard maintenance and operations work orders to vendors via established procedures, participates in user acceptance testing, and/or verifies completion of work with technical staff</p>
<p>Develops and leads the implementation of all vendor management strategic planning; oversees contracts, contract management, procurement, vendor relationships, and asset management for the IT function; establishes the standards, procedures, and guidelines that direct</p>	



all aspects of IT vendor management, consistent with procurement and financial policies and controls	

**IT Vendor Management – Functional Competencies**

<p><b>Knowledge, skills, and abilities:</b></p> <ul style="list-style-type: none"> <li>• Establishes and formalizes vendor relationship to create mutually beneficial partnerships</li> <li>• Brings about vendor performance and client expectations</li> <li>• Recognizes, monitors, and manages vendor risk to the organization</li> <li>• Coordinates and oversees vendor relationships, contracts, performance, and risks</li> <li>• Balances contractual requirements against expectations to ensure both stakeholders and vendors work toward a common understanding of outcomes</li> <li>• Partners in the evaluation and negotiation of vendor contracts</li> </ul>
<p><b>Skilled in performing one or more of the following activities:</b></p> <ul style="list-style-type: none"> <li>• Monitors and maintains vendor contracts and outcomes</li> <li>• Measures and reports vendor progress on deliverables to senior/executive staff or project manager</li> <li>• Mediates disputes and differences of opinion</li> <li>• Leverages metrics, dashboards, and scorecards; extracts data from each quadrant of the life cycle analyses and uses data to oversee vendor performance</li> <li>• Establishes rules of engagement, guidelines, and principles by which actions can be taken</li> <li>• Establishes the appropriate governance structures to drive vendors to deliver the appropriate products and services to the required level of quality and risk, at the required time, place, and at the right price</li> <li>• Responsible for vendor performance, monitors and mitigates vendor risks, and maintains vendor relationships.</li> </ul>

**7.1.11.12 Quality Assurance (QA)**

Job	Job Class Code
<p><b>Quality Assurance (QA)</b></p> <p><b>Definition</b>            Work that involves monitoring the software engineering processes and methods used to ensure quality. QA is a supporting process that must</p>	<p><b>Common Positions</b></p> <ul style="list-style-type: none"> <li>• Application Testing Analyst</li> <li>• Software Quality Assurance Tester</li> </ul>



provide the independent assurance that all the work products, activities, and processes comply with the predefined plans. The methods by which this is accomplished are varied and may include ensuring conformance to one or more standards such as ISO 9000 or a model such as CMMI. QA encompasses the entire software development process, which includes processes such as requirements definition, software design, coding, source code control, code reviews, software configuration management, testing, release management, and product integration.

- Software Quality Assurance Specialist
- IT Project Quality Assurance Specialist
- Quality Assurance Manager
- Quality Assurance Analyst
- Testing Analyst (Development Unit testing); Functional, non- functional, integration, destructive, test automation
- Test Manager
- Configuration Manager
- Release Manager
- Information Assurance Analyst/Specialist

**IT Worker**

**IT User**

Analyzes business requirements, design documents for completeness, and testability; develops test plans, test scenarios, test cases, test data, and test scripts for different types of testing activities

Performs end user acceptance testing

Develops quality assurance plans by conducting hazard analyses; identifying critical control points and preventive measures; establishes critical limits, monitoring procedures, corrective actions, and verification procedures; monitors inventories

Submits work requests for bug fixes or system enhancements

Manages source code control and stored procedures between development lifecycles utilizing team foundation service (TFS); manages application control through whitelisting, system center configuration manager (SCCM) packages, updates, and version control; partners with test leads and architects to develop and establish Quality Assurance standards and best practices

Provides business user requirements for new or enhanced applications

**Quality Assurance (QA)– Functional Competencies**

**Knowledge, skills, and abilities:**

- Able to apply various assurance assessment methods (such as validation of security requirements, risk analysis, threat analysis, vulnerability assessments and scans, and assurance evidence) to determine if the software/system being assessed is sufficiently secure within tolerances
- Able to execute multiple phases of the test, including system, regression, and user acceptance testing
- Able to establish and specify the required or desired level of assurance for a specific software application, set of applications, or software-reliant system

**Skilled in performing one or more of the following activities:**





- Provides quality assurance support to the development, maintenance, or enhancement of systems through testing, problem reporting and analysis, and participation in system implementation
- Analyzes system requirements and creates test data and test plans to ensure that new and revised systems meet the customers' needs
- Works with users, system analysts, designers, and programmers to create and analyze various required project documents
- Participates in production implementation verification and system quality validation
- Plans, documents, evaluates, and tracks testing results to ensure system applications are free from defects
- Communicates and interacts with appropriate areas on problems, changes, and enhancements that may affect data, workflow, and/or functionality within IT software
- Complies with standards of the software development life cycle and follows strategies, plans, and procedures within IT software
- Plans prioritize all test-related tasks
- Writes test strategies and scripts
- Reviews test plans against business requirements
- Reviews code
- Uses tools such as a bug-tracking database or versioning systems
- Provides tool and documentation support for assurance assessment activities
- Researches, analyzes, and recommends best practices for assurance assessment methods and techniques
- Maintains a test documentation library
- Uses automated test tools to assess the quality of software
- Uses technical tools (such as SQL Queries, file managers) to create and manage test data and analyze test results

## 7.2 IT Staffing – Analysis

### 7.2.1 Leading Practices and Benchmarks per Employee

The Unisys team has documented the impact of current IT trends in government and industry with the maturity of emerging technologies and their relevance to CTS's service drivers. We utilized current spending knowledge and comparison of industry best practices in the field of IT solutions.

The State of Washington financial data is from the Basic Financial Statement (KPMG Auditors) and the CAFR19 November 2019 – Office of Financial Management (please see Appendix H: Statement of Revenue).

Per Gartner, by using multiple IT investment metrics, organizations are better able to view IT spending within the context of IT supply and demand requirements relative to business performance. The 2019 State and Local Government vertical industry average IT spending per employee is \$9,433, up from \$9,181 in 2018.



## 7.2.2 IT Full-Time Equivalents as a Percent of Employees

IT FTEs as a percentage of employees is a crucial measure of IT support and IT intensity from a human capital perspective. We define an IT FTE as follows: "An IT FTE represents the logical staff to support functions performed by the physical staff, measured in calendar time. This evaluation includes all staffing levels within the organization, from managers and project leaders to daily operations personnel, including insourced FTEs and contract FTEs. However, it excludes third-party vendor staff (for example, IT outsourcing), which is not operationally managed by the in-house staff, but rather is managed by the vendor." [Gartner]

## 7.2.3 Breakdown of Annual Information Technology Spend

### Government – Industry Breakdown of Annual IT Spending

Gartner Benchmarks for IT spending as a Percentage of Revenue equals \$1.58B or 3.1% of Annual Revenue of \$50.9B FY2019 per KPMG's CAFR19 report (see Appendix H: Statement of Revenue). The current IT Spend Benchmark for the State of Washington is \$1.580B versus a current spend of \$1.751B or 10.7% above the benchmark.

The State of Washington IT Staffing is 4,420 FTEs (March 2020) versus the current Benchmark for 2019 of 3.7% or 4,325 FTEs, reflecting that the State of Washington is over by 95 FTEs or ~2.2%. The FTE benchmark for the In-Scope Agencies is 2,479 versus 3,352 or over by 873 FTEs or 35%.



**INDUSTRY BREAKDOWN OF ANNUAL INFORMATION TECHNOLOGY SPENDING**

DATA INPUT		IT SPENDING BY SERVICE TOWER (USD)				IT STAFFING BY SERVICE TOWER (FTE)				
Client Name	State of Washington	Service Tower	Cost Distribution	Percent of Revenue Basis	Per Employee Basis	Service Tower	Staffing Distribution	IT Staff Count		
Client Industry	Government — State/Local (Operating Budget)	Data Center	12.0%	189,695,574	132,311,409	Data Center	5.0%	216		
Currency Selection	United States	End User Computing	19.0%	300,351,326	209,493,063	End User Computing	14.0%	605		
Currency Code	USD	IT Service Desk	6.0%	94,847,787	66,155,704	IT Service Desk	9.0%	389		
Client Annual Revenue	50,999,434,000	Voice Network	5.0%	79,039,823	55,129,754	Voice Network	2.0%	86		
Client Employee Count (FTE)	116,887	Data Network	7.0%	110,655,752	77,181,655	Data Network	3.0%	130		
DATA INPUT KEY		Application Development	12.0%	189,695,574	132,311,409	Application Development	13.0%	562		
	Manual Data Entry	Application Support	16.0%	252,927,433	176,415,211	Application Support	16.0%	692		
	Drop Down Menu Selection	IT Management	20.0%	316,159,291	220,519,014	IT Management	28.0%	1,211		
	Formulas No Entry	Finance & Administration	3.0%	47,423,894	33,077,852	Finance & Administration	10.0%	432		
		<b>Total</b>		<b>1,580,796,454</b>	<b>1,102,595,071</b>	<b>Total</b>		<b>4,325</b>		
OUTPUT METRICS		IT SERVICE TOWER SPENDING BY EXPENSE CATEGORY								
IT Spending as a Percent of Revenue	3.1%	Service Tower	Hardware	Software	Personnel	Occupancy	Connectivity	Disaster Rec.	Unallocated	Total
IT Spending per Employee	9.433	IT Service Desk	2.0%	5.0%	87.0%	3.0%	0.1%	0.0%	2.9%	100.0%
IT FTEs as a Percent of Employees	3.7%	Voice Network	31.0%	6.0%	36.0%	2.0%	23.0%	0.0%	2.0%	100.0%
IT Spending Run Phase	78.0%	End User Computing	35.0%	22.0%	39.0%	1.0%	0.0%	0.0%	3.0%	100.0%
IT Spending Grow Phase	14.0%	Data Network	42.0%	3.0%	45.0%	5.0%	0.0%	0.0%	5.0%	100.0%
IT Spending Transform Phase	8.0%	Data Center								
Number of Observations:	179	Storage	52.0%	13.0%	24.0%	3.0%	2.0%	2.0%	4.0%	100.0%
Average Observation Revenues (USD)	1,900,000,000	Linux	18.0%	26.0%	48.0%	3.0%	2.0%	1.0%	2.0%	100.0%
Average Observation Employee Count	10,600	Unix	30.0%	24.0%	35.0%	3.0%	3.0%	3.0%	2.0%	100.0%
Client Size Category (USD)	\$10B+	Windows	23.0%	24.0%	44.0%	2.0%	3.0%	2.0%	2.0%	100.0%

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EXPORT CLIENT REPORT

Exchange Rate: January 01, 2020  
Source: Gartner IT Key Metrics Data (December 2019)

Exhibit 7.2.3.1: Unisys Industry Technology Spending Benchmarks from Gartner Metrics Data<sup>28</sup>

<sup>28</sup> Unisys; Industry Breakdown of Annual Information Technology Spending, January 2020 (Unisys tool) Gartner IT Key Metrics Data (December 2019).

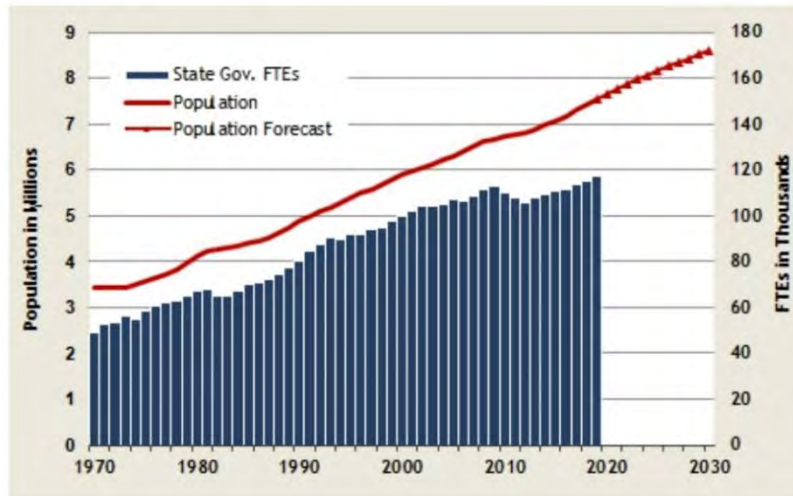


## Total FTE Population

# State government FTEs compared to population

## State Government Employment Including Higher Education

Operating and Capital Budget



- The number of full-time equivalent (FTE) state employees has generally tracked closely with growth in the state's total population.

Fiscal Year	State Government FTEs
2019	116,887
2018	114,988
2017	113,731
2016	111,204
2015	110,537
2014	108,893
2013	107,568
2012	105,920
2011	107,494

Exhibit 7.2.3.2: State of Washington FTEs including Higher Education<sup>29</sup>

<sup>29</sup> <https://www.ofm.wa.gov/washington-data-research/statewide-data/washington-trends/budget-drivers/state-government-ftes-compared-population>



## 7.2.4 FTE Benchmark

### Total IT FTEs State of Washington

Exhibit 3.4.1 below shows the number of classified positions (March 2020) by job family (rows) and job level (columns) identified as part of the study:

Job level - Mar2020	Entry	Journey	Senior / Specialist	Expert	Manager	Senior Manager	Job Family Totals	Percentage
Application Development	156	544	205	8	32	6	951	21.52%
IT Architecture	NA	12	100	7	18	8	145	3.28%
IT Business Analysis	48	292	40	0	10	1	391	8.85%
IT Customer Support	339	252	15	NA	28	NA	634	14.34%
IT Data Management	29	235	87	0	18	1	370	8.37%
IT Policy & Planning	0	7	18	0	35	43	103	2.33%
IT Project Management	9	92	67	1	19	6	194	4.39%
IT Quality Assurance	45	128	11	0	3	0	187	4.23%
IT Security	NA	72	55	4	7	9	147	3.33%
IT System Administration	171	586	150	1	19	4	931	21.06%
IT Vendor Management	2	5	2	0	3	1	13	0.29%
Network & Telecom	45	178	112	0	13	6	354	8.01%
<b>Total</b>	<b>844</b>	<b>2,403</b>	<b>862</b>	<b>21</b>	<b>205</b>	<b>85</b>	<b>4,420</b>	<b>100%</b>

Exhibit 7.2.4.1: Statewide IT Profession Structure<sup>30</sup>

<sup>30</sup> Office of Financial Management (OFM) Title: IT Professional Structure, March 30, 2020, <https://www.ofm.wa.gov/state-human-resources/compensation-job-classes/it-professional-structure>



**Updated Total IT FTEs for 2019 Benchmark Total employees = 3.7% or 4,325 FTEs**

**IT FTEs as a Percent of Employees**

Government — State and Local



**Breakouts by Operating Budget Size**

Operating Budget Size	IT FTEs as a Percent of Employees
Under \$250M	3.9%
\$250M - \$500M	4.7%
\$500M - \$1B	2.7%
\$1B - \$10B	4.3%
\$10B+	N/A

Source: Gartner (2019)  
ID: 465655

**Exhibit 7.2.4.2 Gartner’s IT Full-Time Equivalent as Percent of Employees<sup>31</sup>**

<sup>31</sup> Gartner Analyst(s): Stegman, Guevara, Michelogiannakis, Futela, Sharma, & Kaushal, IT Key Metrics Data 2020: Key Industry Measures: Government — State and Local Analysis: Multiyear, Published: 18 December 2019, page 10.



## 7.3 IT Staffing – Key Findings

### 7.3.1 Cloud Skills

Puget Sound is one of the top four technical hubs in the nation with talent feeder schools like the University of Washington and global tech companies such as Amazon and Microsoft. They attract top talent from around the world. The competition for talent is an ongoing challenge for state organizations.

In the current Job Family Descriptions in the Section above, only two, System Administration and Data Management, contain cloud skills.

### 7.3.2 Open Job Bulletin Positions

In a current search of Job Bulletin of open positions at careers.wa.gov, Unisys was able to find only two openings that require cloud skills:

#### **Enterprise Solution Architect**

**(IT Architecture, Sr/Specialist) (<http://www.careers.wa.gov>)**

The Department of Revenue (DOR) is looking for an accomplished IT professional with experience applying enterprise-level information technology architecture principles, problem-solving, and solution engineering. This position's primary role will be helping DOR identify and support opportunities to leverage secure, reliable, and efficient cloud solutions and services. If you are an experienced architect who is knowledgeable in cloud solutions, including its organizational challenges, technical constraints, and security concerns, this is an incredible opportunity to help Revenue become a **cloud-first Agency**.

The Enterprise Solution Architect will define, develop, and chair a cloud council that will represent Information Services and business stakeholders to help assess cloud-based solutions. This will include delivering recommendations around platform, application, system, process, and policy-related suitability of **cloud technology** to address business needs and information technology challenges. This position is a unique opportunity allowing you to will work with state authorities toward compliance with statewide direction and policy regarding **cloud computing**.

The objective of this position is to continue to mature DOR's architecture with a focus on building and supporting an ongoing cloud portfolio of services.”

[https://Agency.governmentjobs.com/washington/job\\_bulletin.cfm?jobID=2626619](https://Agency.governmentjobs.com/washington/job_bulletin.cfm?jobID=2626619)

#### **Application Developer (<http://www.careers.wa.gov>)**

At the Department of Enterprise Services (DES), we found the following opening for an Application Developer:

As a DES team member, you are trained to listen to our customers and develop work products around their satisfaction. We build and maintain a human-centered culture, a workplace where our customers are heard, and matter, and you are appreciated for the skills you bring to the team every day. We look for new team members who are dedicated to learning how we listen and understand our customer's expectations to create the solutions they need.

#### **Job Responsibilities:**

Understand customer's application requirements, IT, business priorities, and success measures to design and develop solutions to deliver end-to-end systems and experiences.



Apply deep technical knowledge and customer insights to create a data modernization conceptual design and architect solutions to meet business and IT needs.

Implement efficient DevOps practices using **Microsoft Azure DevOps** tools. Contribute toward building and maintaining Source Control, Code review system, Build System and delivery pipeline for continuous improvement and continuous delivery (CI/CD pipeline), and automated unit test framework.

- Design, implementation, and testing of both client-side and server-side code
- Contributing to team-wide fundamentals/infrastructure investments
- Collaborating with partner teams
- Building responsive web experiences that look great across multiple devices and browsers
- Investigating and prototyping new technologies and frameworks
- Writing and maintaining unit tests and automated integration tests
- Be committed to delivering the best experience for our customers

Whom we are looking for:

- A consistent history of successfully leading, designing, and implementing features
- Deep passion for working on solving deep technical challenges in complex on-premise and **cloud-based** projects
- Ability to translate technological options into business terms and interact with customers to create technology solutions to solve mission-critical business problems
- Produce high-quality code as per standards set by the team.
- Contribute to developing strong Engineering Practices. Design Documents, Coding guidelines, Source control, Code reviews, error logging, monitoring solutions, automated Unit tests, integration tests, automating
- Build and deployment process, etc.
- Experience in developing **native cloud** solutions
- Willingness to learn and grow in a diverse team environment
- Experience in solving complex software challenges
- Infectious enthusiasm for new technologies.

### 7.3.3 Strategic Workforce Planning

Strategic workforce planning looks at system-wide issues and strategies to:

- Support the organization's strategic plan (e.g., reorganization and redeployment)
- Address external workforce factors that affect the entire business (e.g., succession planning for retirement bubbles or staff reduction planning for budget cuts)
- Maintain organizational capacity (e.g., in-service training)
- Mitigate risk exposure (e.g., safety planning and Equal Employment Opportunity training)

The right management level at which to conduct strategic workforce planning depends on the organization's size, how it is structured, and how programs are managed and budgeted. Most strategic planning occurs at the senior leadership level. However, employers may also plan at the division, region, or program level.





### 7.3.4 Operational Workforce Planning

Operational workforce planning looks at work-unit issues and occurs at the supervisor level. The focus is on how to sustain the work unit’s ability to execute business strategies. Planning at this level may involve carrying out the organization’s strategic workforce planning strategies and responding to external workforce factors that impact a particular unit.

Workforce planning is the process of linking workforce strategies to desired business outcomes. The terms workforce planning, succession planning, human capital planning, and talent management are often used interchangeably. This guide will define workforce planning as the overall process of linking workforce strategies to desired business outcomes, staffing plans as the specific workforce strategies for recruiting, retaining, developing, and managing employees, and succession programs as the specific staffing strategies designed to develop an internal pool for anticipated vacancies.

### 7.3.5 Exit Surveys

Skilled and engaged employees are the asset that drives organizational success. An important goal for any employer is to keep valued employees. If employees are leaving, figuring out why is crucial. A thoughtful exit interview process can provide feedback for workplace improvement.



Exhibit 7.3.5.1: State of Washington HR Workforce Data Planning Statewide Exit-Survey<sup>32</sup>

<sup>32</sup>OFM, Employee Exit Survey; July 2019 <https://www.ofm.wa.gov/state-human-resources/workforce-data-planning/statewide-exit-survey>



Survey respondents rank their top three reasons for leaving. Compensation and pay were the most frequent first reason for leaving, with skill or career development a close second. The next group includes family or personal reasons and relocation.

### 7.3.6 Top Reasons to Leave State of Washington employment

Top reasons for leaving

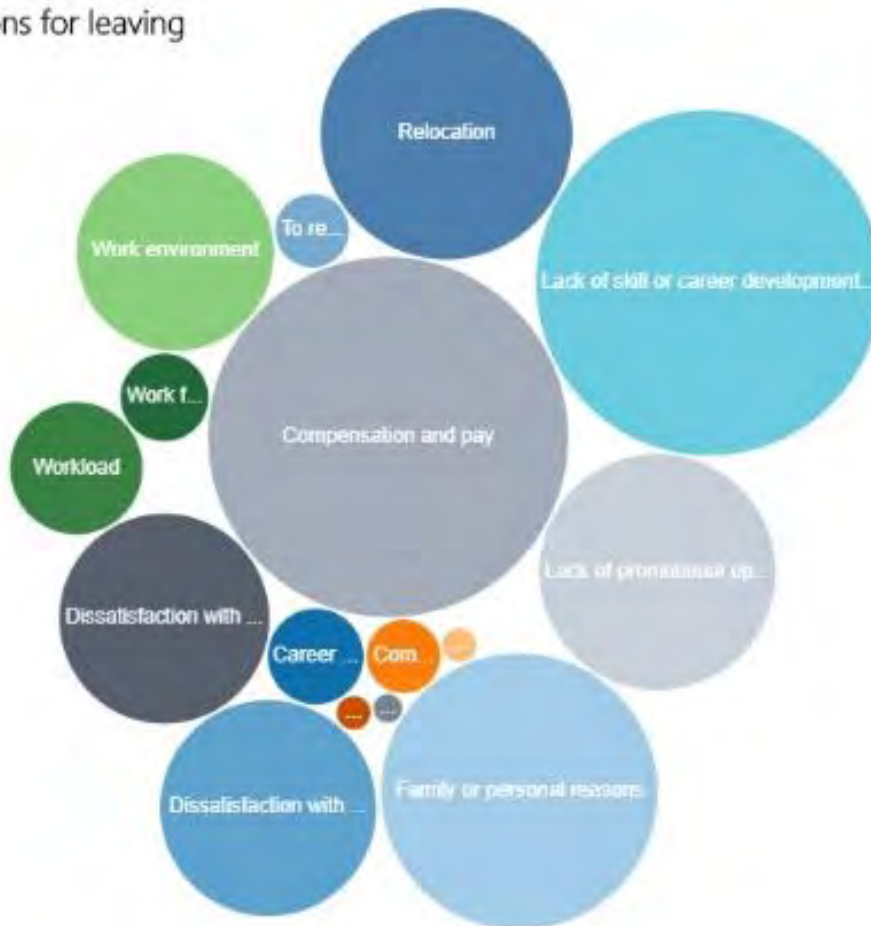


Exhibit 7.3.6.1: Statewide Exit Survey: Top reasons for leaving<sup>33</sup>

### 7.3.7 Exit Analysis

King County has the highest percentage of employees leaving due to compensation. Thurston County employees were more likely to list skill or career development as their primary reason. Most departing employees (73%) report their expected income to increase by at least 5% in their new position. Employees located by the I-5 corridor (but south of Snohomish County) appeared more likely to receive raises with their new job. A common perception is that employees leave due to a long commute, but the data suggest they are leaving for higher pay.

<sup>33</sup> OFM, Employee Exit Survey; July 2019 <https://www.ofm.wa.gov/state-human-resources/workforce-data-planning/statewide-exit-survey>



### 7.3.8 Compensation and Pay

The statewide exit survey was initiated to address concerns that state employees were moving to local governments. While both local government and private industry tend to pay departing employees more, higher numbers of employees are going to private industry.

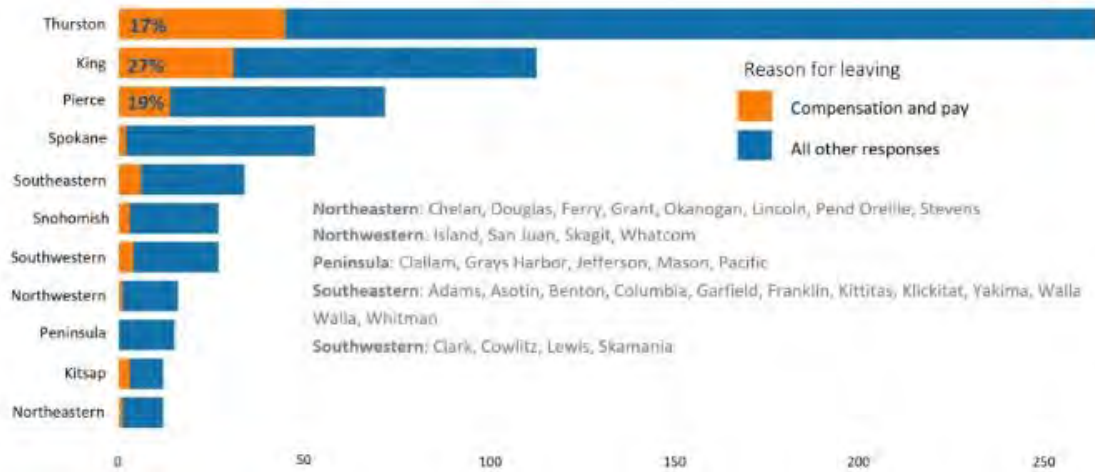


Exhibit 7.3.8.1: Statewide Exit Survey: Compensation as a top reason for leaving by county<sup>34</sup>

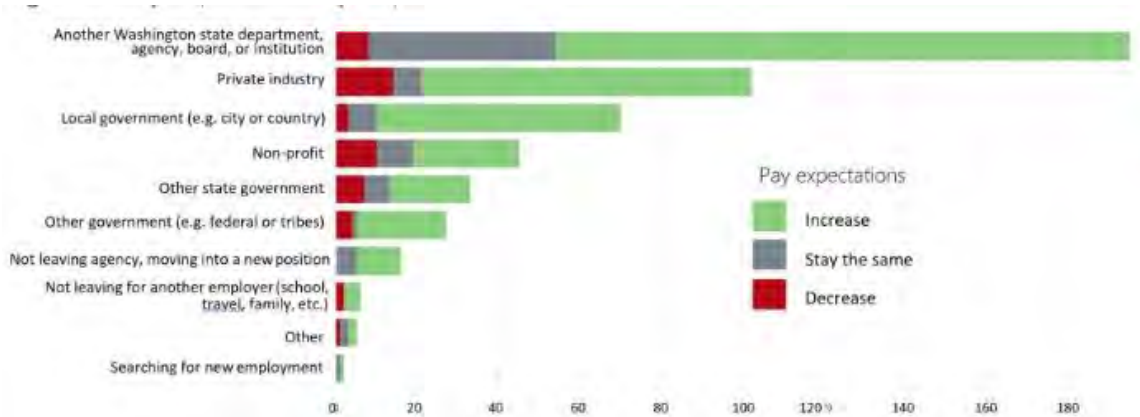


Exhibit 7.3.8.2: Statewide Exit Survey: Pay expectation by departure destination<sup>35</sup>

### 7.3.9 Departure Conclusion

Unisys understands the exit survey is essential because it provides more data-driven recommendations and best practices to Agencies. The data provide critical insight into actions that can improve retention:

<sup>34</sup> Ibid.

<sup>35</sup> Ibid.



- Focus on the supervisor relationship. Make sure supervisors are empowering their employees to do their job, not keeping them from performing at their highest skill level.
- Plan for skill and career development. Employees like to learn and grow. Agencies should provide opportunities to help employees succeed.
- If a departing, high-performing employee is leaving but was satisfied with the job, emphasize that the Agency played an important part in developing his or her career.

### 7.3.10 IT Staff Cloud Skills and Training Survey

Unisys understands that the State of Washington must take time to collect end user and employee data to discover short-term and predictable future Agency staffing cost-saving benefits. Unisys has provided OCIO with the following survey results illustrating the necessary cloud computing skillsets and managerial insight to develop an enterprise strategy for the state Agencies to migrate successfully to cloud computing solutions with the right staffing.

In the following survey, the responses to the questions are listed with the number of Agency respondents. Analysis of the responses is included in Section 7.4.3.

#### Statewide Cloud Readiness Assessment Cloud Skills and Training Survey

##### **Survey Question 1**

Please enter Agency name and contact information for the person completing this survey:

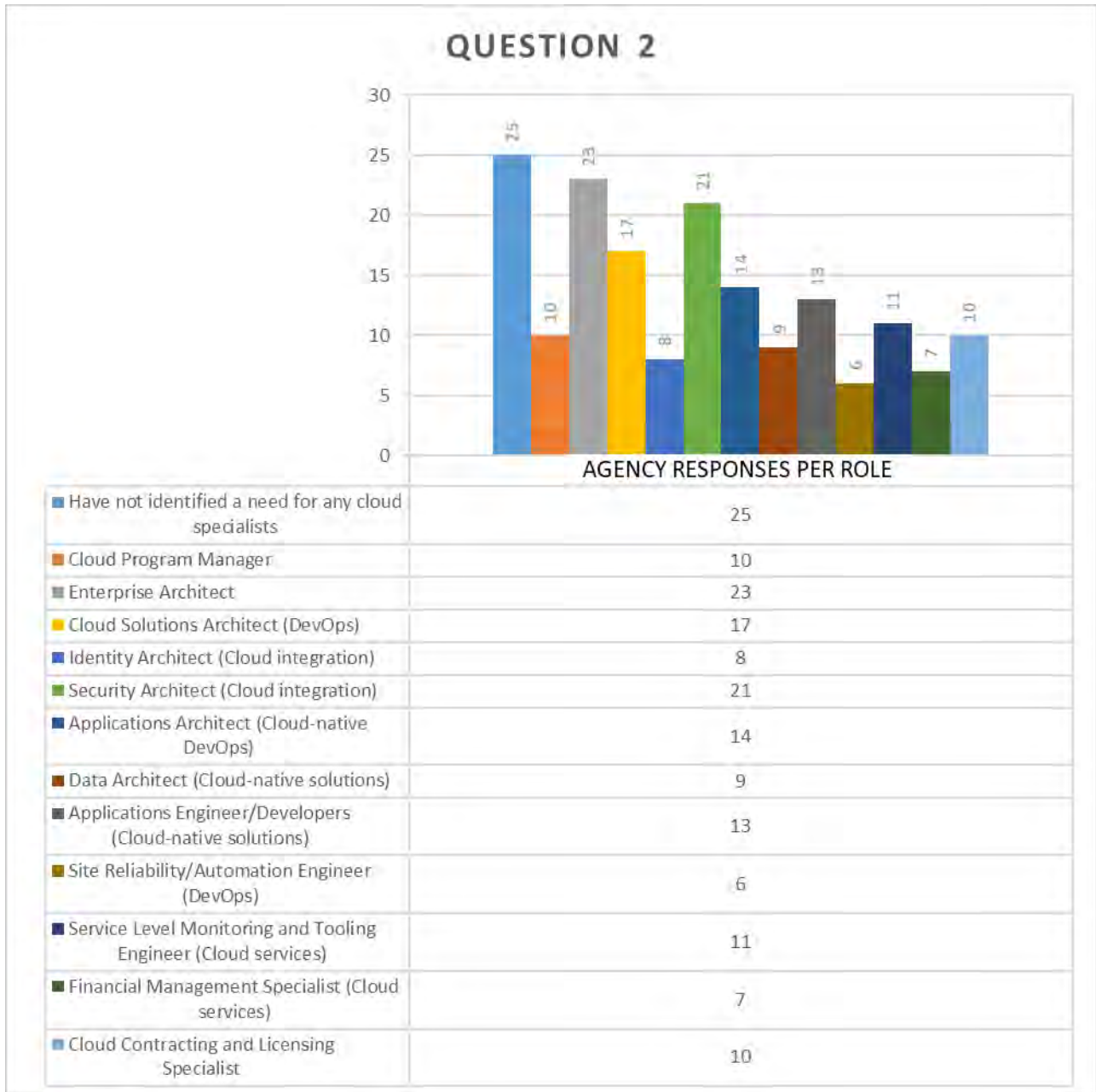
63 Total Agency Responses (79 In Scope) or 80% participation

##### **Survey Question 2**

Cloud adoption requires many roles and skills for success. Listed below are some of the critical roles needed to design, build, and operate cloud infrastructure and applications. Some roles may be combined into a single position, but each role has a unique skill set and educational requirements. Question: Has your Agency identified and defined a skill's description for any of the key roles listed here in order to support cloud adoption?

Please select all that apply.

Have not identified a need for any cloud specialists	25
Cloud Program Manager	10
Enterprise Architect	23
Cloud Solutions Architect (DevOps)	17
Identity Architect (Cloud integration)	8
Security Architect (Cloud integration)	21
Applications Architect (Cloud-native DevOps)	14
Data Architect (Cloud-native solutions)	9
Applications Engineer/Developers (Cloud-native solutions)	13
Site Reliability/Automation Engineer (DevOps)	6
Service Level Monitoring and Tooling Engineer (Cloud services)	11
Financial Management Specialist (Cloud services)	7





### Survey Question 3

3. Adding a cloud skill set to an organization may require a combination of training current personnel with additional or upgraded skills and retraining certain personnel into totally new roles. Question: Has your Agency evaluated which existing roles, job families, and related skills need to be modernized or replaced to support cloud adoption? Please check the answer the most closely applies.

Have not evaluated skills modernization.	19
Currently evaluating for skills modernization, but have not prioritized specific roles or job families.	19
Currently developing skills modernization plan and prioritizing specific personnel for training.	16
Skills modernization plan in place and actively pursuing training opportunities.	8

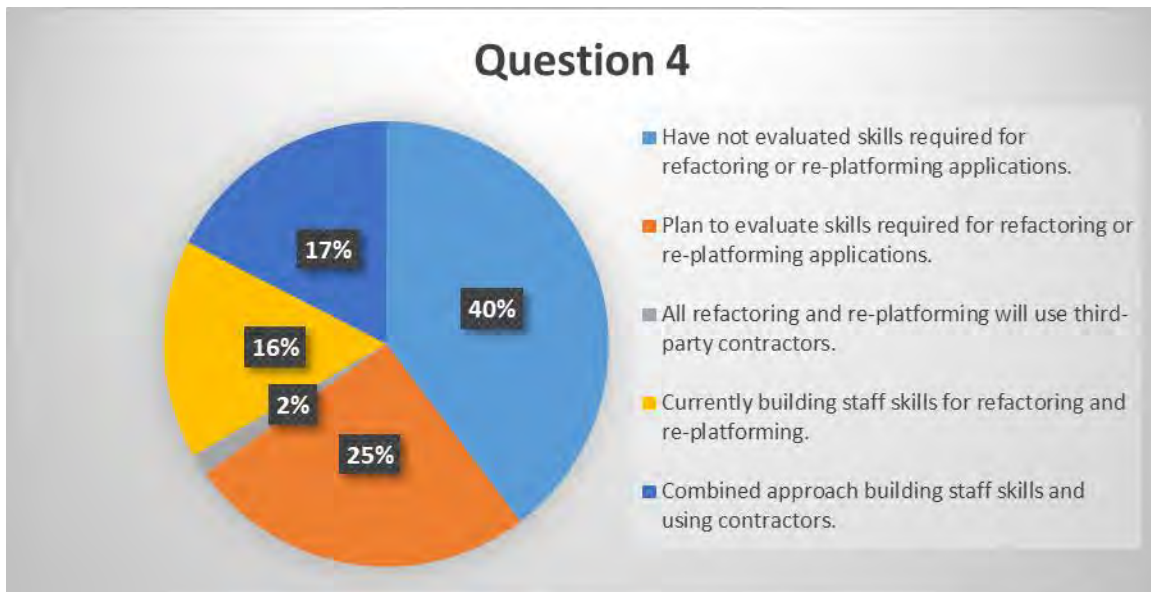




### Survey Question 4

The migration to the cloud can take multiple approaches. The skills required to re-platform [e.g., converting to use the platform as a service (PaaS) database] or refactor (e.g., breaking the application apart to use Kubernetes containers or Azure functions) an application to best use native cloud services requires a combination of cloud infrastructure and application development skills. Question: Has your Agency evaluated the skills specifically required to support refactoring and re-platforming legacy applications for cloud platforms? Please check the answer that most closely applies.

Have not evaluated skills required for refactoring or re-platforming applications.	25
Plan to evaluate skills required for refactoring or re-platforming applications.	16
All refactoring and re-platforming will use third-party contractors.	1
Currently building staff skills for refactoring and re-platforming.	10
Combined approach building staff skills and using contractors.	11

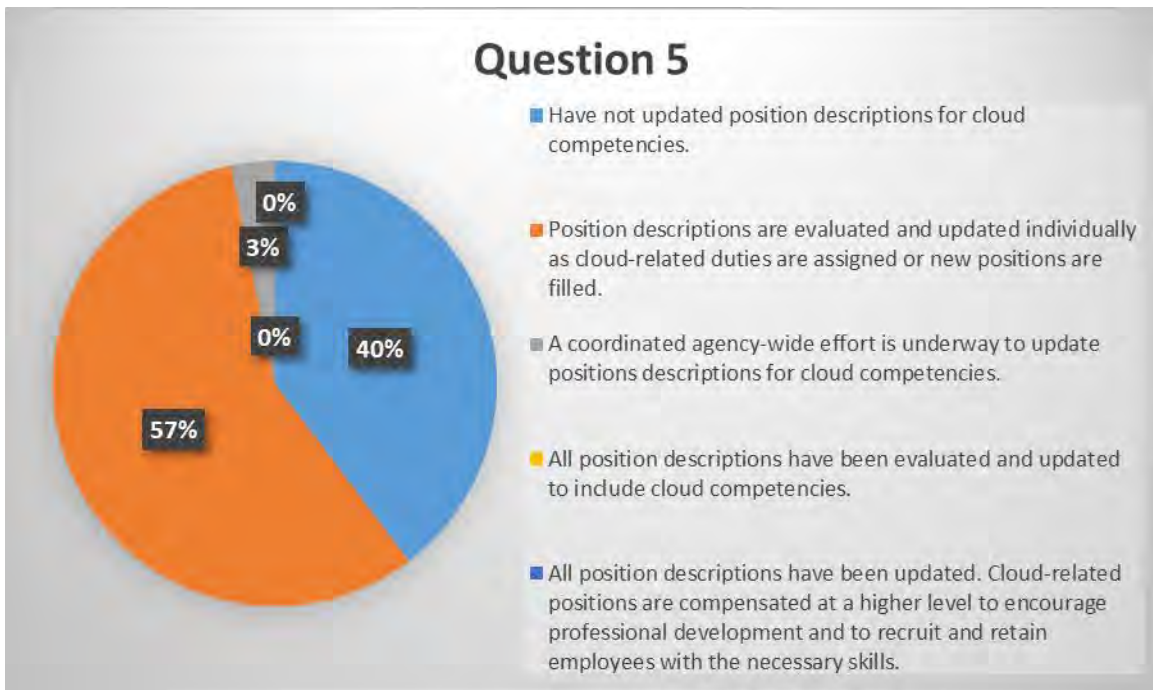




### Survey Question 5

Operating a cloud-based IT organization requires a variety of skills that differ from traditional IT roles. Updating position descriptions with the necessary experience, skills, and competencies enable recruiting the most appropriate candidates and provides a target for existing personnel to reposition themselves. Question: Have your employee's position descriptions been updated with experience, skills, and competencies appropriate to support cloud environments? Please select the answer that most closely applies.

Have not updated position descriptions for cloud competencies.	25
Position descriptions are evaluated and updated individually as cloud-related duties are assigned, or new positions are filled.	36
A coordinated Agency-wide effort is underway to update positions descriptions for cloud competencies.	2
All position descriptions have been evaluated and updated to include cloud competencies.	0
All position descriptions have been updated. Cloud-related positions are compensated at a higher level to encourage professional development and to recruit and retain employees with the necessary skills.	0



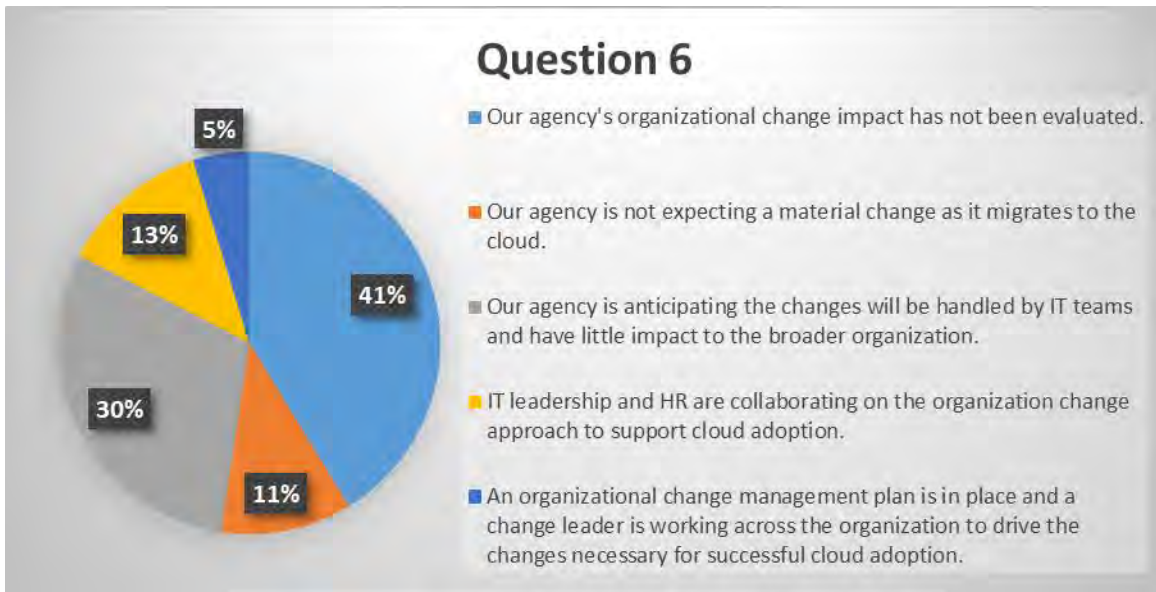




### Survey Question 6

Cloud adoption is not just a technology change. It will impact the culture and structure of the Agency's IT and related teams as it matures. The pace of adoption and alignment between business, application, and infrastructure teams will drive the evaluation of past practices due to an impact on the speed to deliver results and the interactions between the groups. Question: Has the Agency evaluated the impact that cloud adoption will have on the organization, including culture, structure, and resource management? Please select the answer that most closely applies.

Our Agency's organizational change impact has not been evaluated.	26
Our Agency is not expecting a material change as it migrates to the cloud.	7
Our Agency is anticipating the changes will be handled by IT teams and have little impact on the broader organization.	19
IT leadership and HR are collaborating on the organizational change approach to support cloud adoption.	8
An organizational change management plan is in place, and a change leader is working across the organization to drive the changes necessary for successful cloud adoption.	3

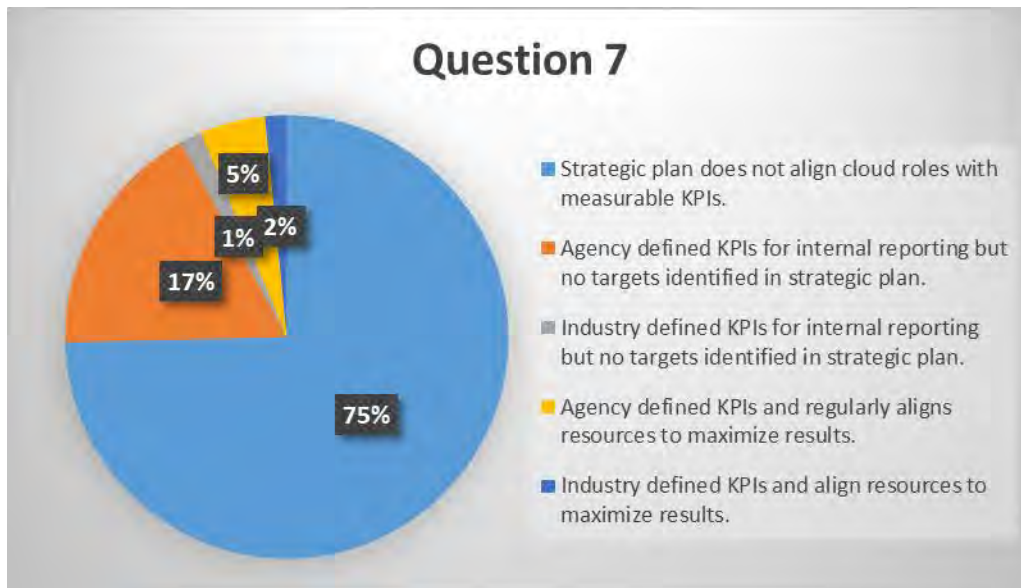




### Survey Question 7

As Agencies adopt cloud practices and tools, the usage of some resources will dramatically change. Using Key Performance Indicators (KPIs) is a good measure to ensure that the teams have the right resources to perform their roles and responsibilities. Question: Does your Agency's strategic plan include goals to align resources to cloud roles with measurable KPIs? Please select the answer that most closely applies.

Strategic plan does not align cloud roles with measurable KPIs.	47
Agency-defined KPIs for internal reporting, but no targets identified in strategic plan.	11
Industry-defined KPIs for internal reporting but no targets identified in strategic plan.	1
Agency-defined KPIs and regularly aligns resources to maximize results.	3
Industry-defined KPIs and align resources to maximize results.	1

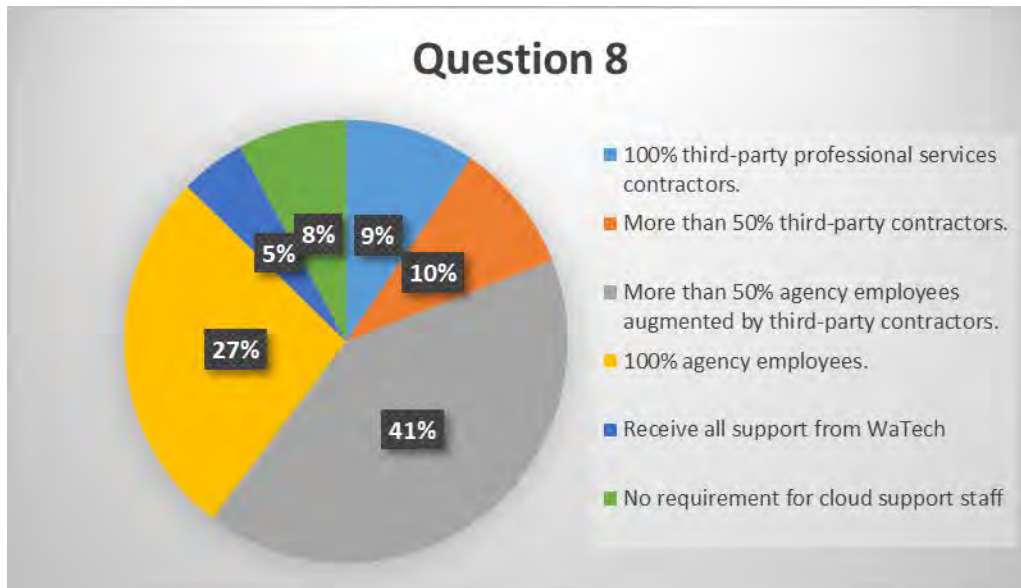




### Survey Question 8

Deploying and using cloud services requires a variety of skilled resources, some of which may need to be contracted. Please share the percentage of your cloud team that is internal, staff augmented (e.g., contractor reporting directly to the Agency), and third-party professional services (contractor managed by third parties). Question: What percentage of cloud support staff resources are internal versus contracted?

100% of third-party professional services contractors.	6
More than 50% of third-party contractors.	6
More than 50% of Agency employees augmented by third-party contractors.	26
100% of Agency employees.	17
Receive all support from WaTech.	3
No requirement for cloud support staff.	5
Other	0

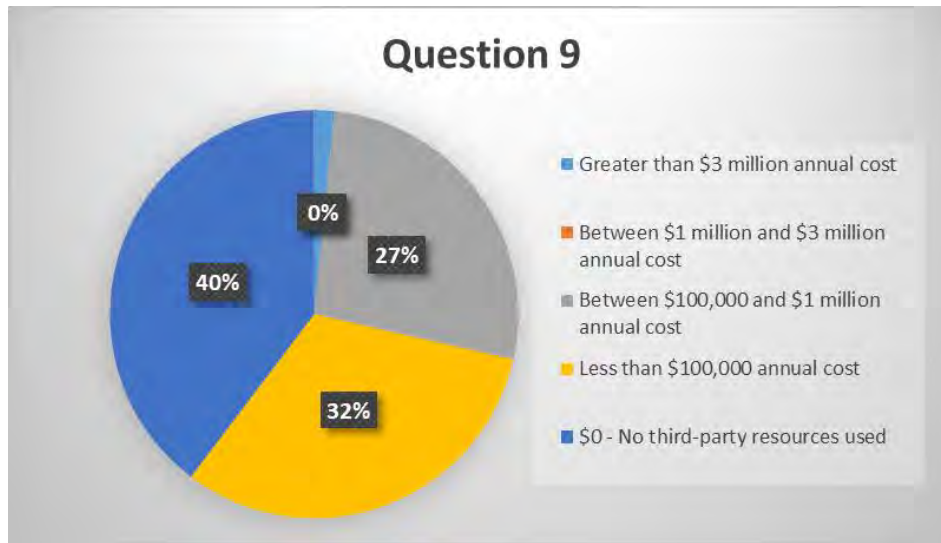




### Survey Question 9

Please share the annual cost of contracted staff resources required to deploy, develop, manage, and support the Agencies' cloud environment and applications. This could include staff augmentation for general support or a professional services contract for a specific project. Note: This is not the monthly fee paid for using a SaaS application or virtual servers from an IaaS vendor. Question: What is the estimated annual cost of your contracted cloud support staff?

Greater than \$3 million annual cost	1
Between \$1 million and \$3 million annual cost	0
Between \$100,000 and \$1 million annual cost	17
Less than \$100,000 annual cost	20
\$0 - No third-party resources used	25





### Survey Question 10

Major cloud vendors have developed training and certification programs to help customers transition to cloud-based services. As these services become increasingly diverse and complex, it is important that Agencies equip their IT staff with skills to keep up with the ever-expanding list of technology options available to procure and deploy. Question: Has your Agency's staff been certified by cloud vendor(s) targeted for cloud migrations (e.g., AWS, Azure, Google, IBM)?

No team members are certified by cloud vendors or have comparable experience.	18
No team members have certifications, but some members have experience.	26
5-10% of cloud team certified and others with experience.	12
25-40% of cloud team certified and others with comparable experience.	6
Majority of cloud team certified in the target technologies.	1





### Survey Question 11

Inadequate training can be a major risk factor in cloud adoption. Please identify the major barrier, if any, faced by your Agency. Question: What is the biggest barrier to offering cloud training for the Agency?

Inadequate training budgets.	11
Timeliness of training versus applying new skills in the environment.	12
Lack of quality training options without travel requirements.	0
Avoidance of business disruptions due to unavailable resources.	16
The Agency has no barriers to offering cloud training.	16
Agency has no need to offer cloud training.	8

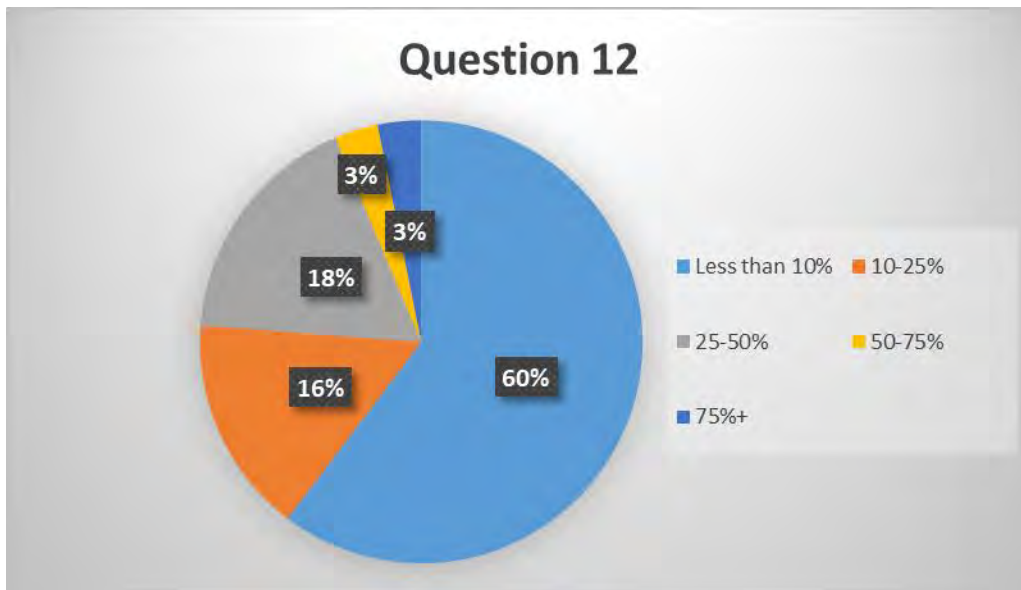




### Survey Question 12

Training budgets are always under pressure, with needs almost always outstripping available funds. As the wave of cloud migrations accelerate, training dollars must be prioritized to meet requirements. A multitude of training options exists, ranging from free to many thousands of dollars. Please describe how your Agency prioritizes training budgets for the development of cloud support skills. Question: How much of your training budget is allocated to cloud skills enhancement activities?

Less than 10%	38
10-25%	10
25-50%	11
50-75%	2
75%+	2

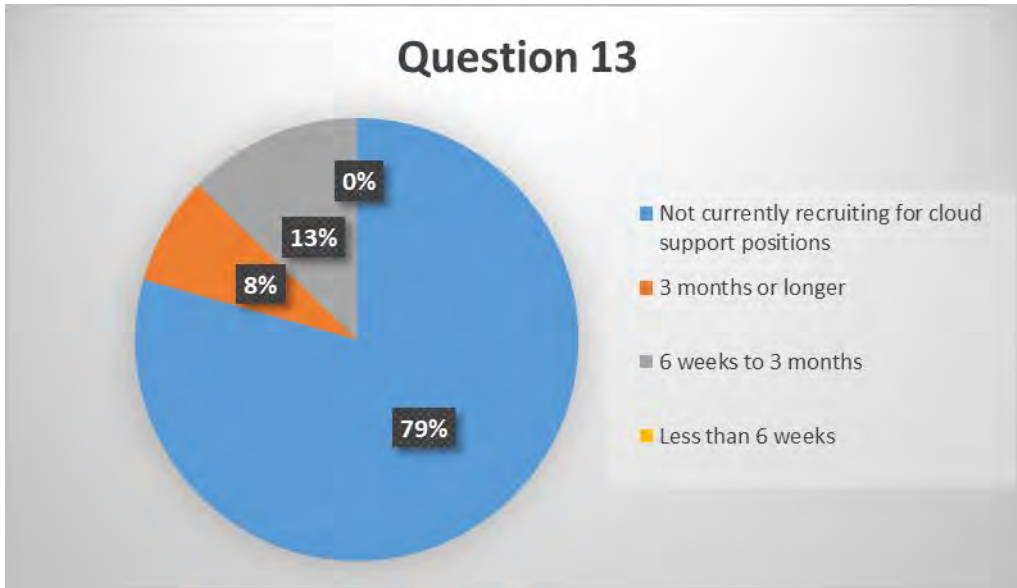




### Survey Question 13

It is often difficult to fill open positions for qualified technical professionals. Question: What is your Agency's average time to fill an open cloud support position?

Not currently recruiting for cloud support positions.	50
3 months or longer.	5
6 weeks to 3 months.	8
Less than 6 weeks.	0







### Survey Question 14

Cloud support skills are in high demand, and the pool of qualified candidates is often less than ideal. Please describe your Agency's experience attracting top talent. Question: What is the biggest hurdle to filling cloud positions?

Not recruiting for cloud positions.	36
Inability to attract top talent from larger markets like Seattle.	8
Retaining skilled staff seeking more lucrative opportunities.	6
Providing incentives to existing staff to upgrade their skills.	3
Funding not available for new positions.	10

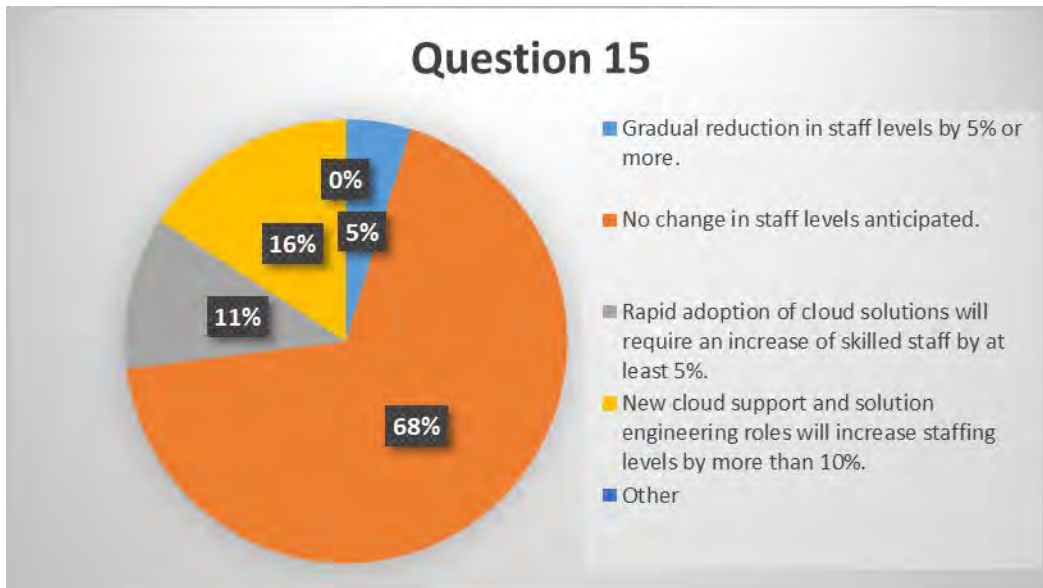




### Survey Question 15

In some environments, the adoption of cloud solutions allows for a reduction in staff levels as less hardware is managed on-premises. However, many times the staff levels stay the same or increase as more focus is placed on new cloud-centric roles. Based on your knowledge of existing infrastructure and potential for re-factoring and re-platforming applications, please describe how you expect cloud migration to impact overall staffing levels. Question: Over the next 5 years, what impact do you anticipate cloud migration will have on your overall FTE levels?

Gradual reduction in staff levels by 5% or more.	3
No change in staff levels anticipated.	43
Rapid adoption of cloud solutions will require an increase in skilled staff by at least 5%.	7
New cloud support and solution engineering roles will increase staffing levels by more than 10%.	10
Other	0

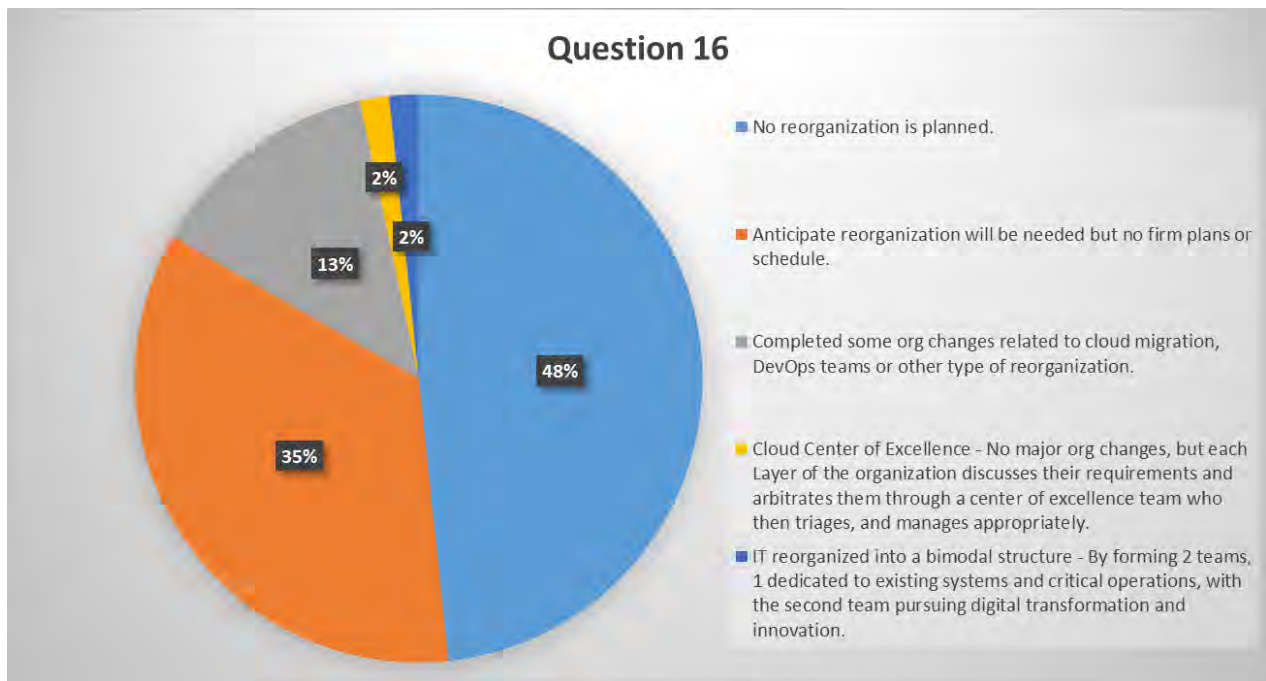




### Survey Question 16

A bimodal organization is comprised of two main modes: mode 1 and mode 2. Mode 1 is focused on keeping the lights on, whereas mode 2 is more focused on innovation and developing new capabilities. This can be represented across organizational boundaries or even within the same business unit, but both play a vital part in both the cloud journey but also the operational side of the day-to-day. Question: Has your Agency reorganized to support cloud solutions and technologies?

No reorganization is planned.	30
Anticipate reorganization will be needed but no firm plans or schedules.	23
Completed some org changes related to cloud migration, DevOps teams, or other types of reorganization.	8
Cloud Center of Excellence - No major org changes, but each layer of the organization discusses its requirements and arbitrates them through a center of excellence team who then triages and manages appropriately.	1
IT reorganized into a bimodal structure - By forming two teams, one dedicated to existing systems and critical operations, with the second team pursuing digital transformation and innovation.	1



## 7.4. IT Staffing – Results

### 7.4.1 IT Staffing by Job Role and Levels

Unisys studied the current staffing mix by job description and job level. When considering moving to cloud computing, the State of Washington needs to understand the impact of evolving and current staffing needs according to best practices and market KPIs and SLAs, including the following examples:



- Current industry benchmarks for server support headcounts have decreased steadily for the past six years, from 12.1% of current IT staff to just 5% today.
- Application Development workers are benchmarked at 13% compared to 22%; and,
- IT Service Desk area is benchmarked 9% versus 14%.

### Staffing Levels as of March 2020

The table below shows the number of classified positions by job family (rows) and job level (columns) identified in the statewide classified IT professional structure profile. This data is based on the March 2020 Workforce report produced by the Office of Financial Management (OFM).

The opportunity for change focuses on the IT Sys Admin job level, where current industry KPIs equal one FTE per 250-300 servers. Today, the State of Washington averages one FTE per 12 servers and continues increasing IT System Administration role hires.

Job level - Mar2020	Entry	Journey	Senior / Specialist	Expert	Manager	Senior Manager	Job Family Totals	Percentage
Application Development	156	544	205	8	32	6	951	22%
IT Architecture	NA	12	100	7	18	8	145	3%
IT Business Analysis	48	292	40	0	10	1	391	9%
IT Customer Support	339	252	15	NA	28	NA	634	14%
IT Data Management	29	235	87	0	18	1	370	8%
IT Policy & Planning	0	7	18	0	35	43	103	2%
IT Project Management	9	92	67	1	19	6	194	4%
IT Quality Assurance	45	128	11	0	3	0	187	4%
IT Security	NA	72	55	4	7	9	147	3%
IT System Administration	171	586	150	1	19	4	931	21%
IT Vendor Management	2	5	2	0	3	1	13	0%
Network & Telecom	45	178	112	0	13	6	354	8%
<b>Total</b>	<b>844</b>	<b>2,403</b>	<b>862</b>	<b>21</b>	<b>205</b>	<b>85</b>	<b>4,420</b>	<b>100%</b>

Exhibit 7.4.1.1: State of Washington IT Staffing (Statewide) March 2020

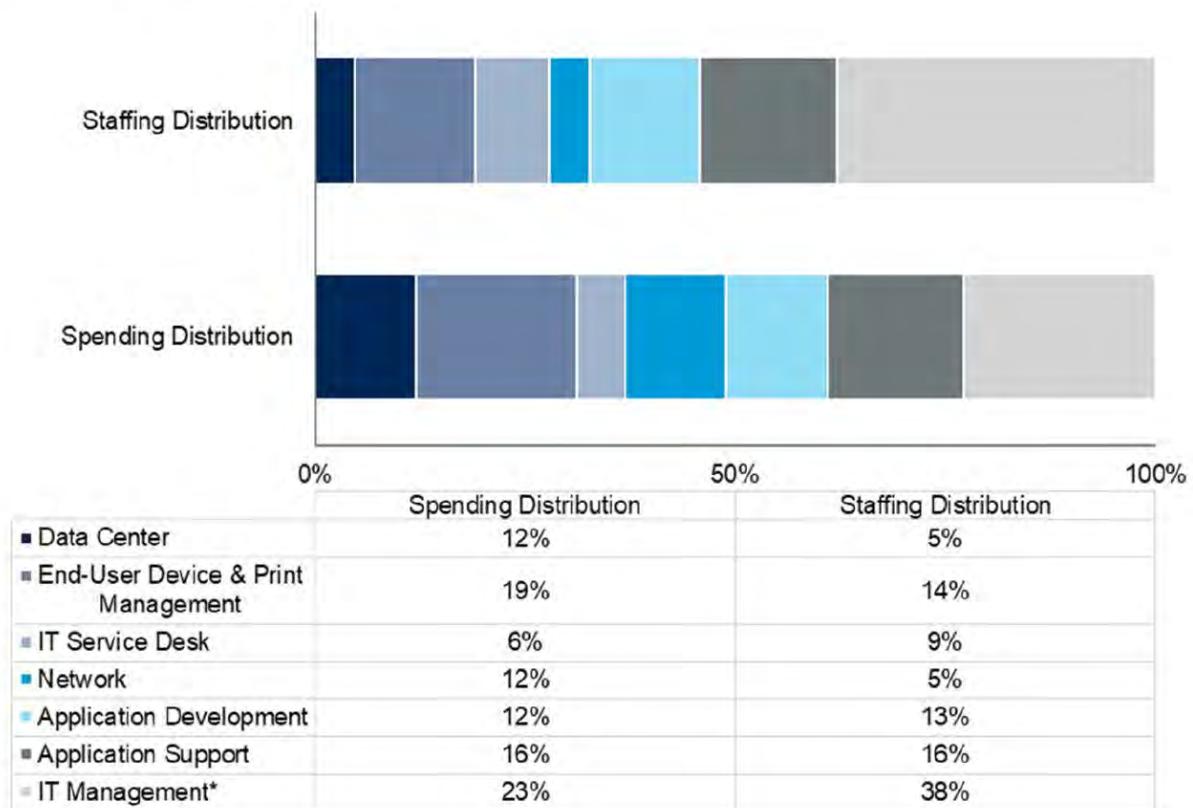


### 7.4.2 Gartner Benchmarks for State and Local Government

Unisys used the State of Washington staffing levels and compared the current mix to other state and local government benchmarks.

#### IT Spending and Staffing by IT Functional Area

Government — State and Local



Source: Gartner (2019)

\* IT Management includes Governance & Service Management, IT Security, IT Operations Management, and IT Service Continuity/DR  
 ID: 465655

Exhibit 7.4.2.1: Gartner IT Spend and Staffing by Function Area<sup>36</sup>

### 7.4.3 Skills Development Risks from Cloud Skills and Training Survey

Unisys has surveyed the Agency management to identify any impacts on State Agency staffing resulting from migrating to cloud computing. By collecting relevant information from the Agencies and after data analysis, Unisys has discovered a significant skills gap between current on-premises computing practices and how future cloud services will be procured, secured, administered, maintained, and developed. In the future cloud services, the efficiency standards

<sup>36</sup> Gartner Analyst(s): Eric Stegman, Jamie Guevara, Nick Michelogiannakis, Shreya Futela, Sneha Sharma, Shaivya Kaushal, IT Key Metrics Data 2020: Key Industry Measures: Government — State and Local Analysis: Multiyear, Published: 1 January 2020, page 15.



will impact cloud operations. For the State of Washington In-Scope Agencies, one FTE System Admin is estimated to manages 12 servers. With future cloud skills, one FTE manages up to 250 servers.

## Survey Results

Cloud adoption requires a combination of skills and experience to reach a consistent pace and reduce the risk of introducing new capabilities in the State environment. Based on the cloud skills survey (Section 7.3.10 Survey Question 10), Unisys found that 32% of the Agency respondents have staff with cloud certifications and experience. Growing each team's skills is vital to minimize cloud migration timelines, ensure security compliance, and make appropriate technology versus cost decisions.

Training current IT staff enables Agencies to enhance their existing skills and apply the existing environment experiences and Agency needs using the practices and cloud services effectively. The responses from Survey Question 11 highlight that 19% of the Agency respondents avoid training when the time between the training and applying it in actual operations impacts the investment value. Avoiding business disruptions when resources are unavailable for training (25% of respondents) also is a barrier for offering cloud training. Aligning the cloud training with the cloud adoption program's timeline and uses resources dedicated to the project can eliminate these barriers.

In addition to training, recruiting qualified IT staff provides support for the cloud adoption program. From the survey (Question 13), 79% of respondents are not actively recruiting for cloud roles. In Question 14, Sixteen (16) percent of the respondents indicate that funding is not available, and 21% recognize they compete with the broader Puget Sound market to attract and retain skilled staff. When Agencies plan their migrations and related activities, the time to acquire the skilled personnel must be included in the overall program to avoid delaying projects. Using shared staff from the Service Broker or other agencies can also help to balance the resource needs.

### 7.4.4 Labor Avoidance, Rebalancing, and Optimization

The table below compares the State's current job role distribution, updated in March 2020, (Exhibit 7.4.5.2) with Gartner's State and Local IT Staffing Benchmark. When considering moving to cloud computing, the State of Washington needs to understand the impact evolving current staffing needs according to best practices, market KPIs, and SLAs. Unisys sees optimization opportunities in the staffing of the Data Center Tower per the benchmark.

The Gartner benchmark is based on Service Towers and measured across the State's total IT staff, including In-Scope Agencies, out-of-scope Agencies, and other entities. The service towers do not precisely match the State of Washington Job Roles or families. Based on our ongoing use of the benchmark and the State's Job Roles, Unisys assigned various roles and families, as listed in the table below. IT Senior Managers and IT Managers are counted under IT Management and not included in their assigned Job Role.



### Total State-wide IT Population Benchmark with IS-scope Agency FTE Counts

Unisys notes that the Total State-wide IT Population is only 2% overstaffed with the following opportunities for optimization of the IT Labor workforce.

IT STAFFING BY SERVICE TOWER (FTE)	Gartner	Gartner	State of Washington	State of Washington	State of Washington	Opportunity for Optimization	State of Washington
Service Tower	Staffing Distribution	IT Staff Count	Job Role	IT Staff Count	Staffing Distribution	Difference	In-scope Agencies
Data Center	5.00%	216	IT Architecture IT Data Management IT System Administration	1,378	31%	1,162	1,107
End user Computing	14.00%	605	IT Customer Support	113	3%	-492	113
IT Service Desk	9.00%	389	IT Customer Support	493	11%	104	212
Voice Network	2.00%	86	Network & Telecommunications	combined	combined		combined
Data Network	3.00%	130	Network & Telecommunications	335	8%	119	235
Application Development	13.00%	562	Application Development IT Business Analysis IT Quality Assurance IT Project Management	1,646	37%	392	1,287
Application Support	16.00%	692	Application Development IT Business Analysis IT Quality Assurance IT Project Management	combined	combined		combined
IT Management	28.00%	1,211	IT Senior Manager IT Policy Planning/ IT Security	446	10%	-765	389



Finance & Administration	10.00%	432	IT Vendor Management	9	0.2%	-423	9
<b>Total</b>		4,325		4,420	100%	<b>95</b>	3,352

Exhibit 7.4.5.1: Gartner State and Local IT Staffing Benchmark

**Total Assessment IT Population benchmark for the In-Scope Agencies**

Unisys notes that the **In-Scope Agencies** IT Population is **35%** overstaffed with the following opportunities for optimization of the IT labor workforce.

IT STAFFING BY SERVICE TOWER (FTE)	Gartner	Gartner	State of WA	In-scope Agency	In-scope Agency	Opportunity for Optimization	State of WA
Service Tower	Staffing Distribution	IT Staff Count	Job Role	IT Staff Count	Staffing Distribution	Difference	In-scope Agency
<b>Data Center</b>	5.00%	124	IT Architecture IT Data Management IT System Administration	1,107	33%	<b>983</b>	1,107
<b>End user Computing</b>	14.00%	347	IT Customer Support	113	3%	-234	113
<b>IT Service Desk</b>	9.00%	223	IT Customer Support	212	7%	-11	212
<b>Voice Network</b>	2.00%	50	Network & Telecommunications	combined	combined		combined
<b>Data Network</b>	3.00%	74	Network & Telecommunications	235	7%	<b>111</b>	235
<b>Application Development</b>	13.00%	322	Application Development IT Business Analysis IT Quality Assurance IT Project Management	1,287	38%	<b>568</b>	1,287
<b>Application Support</b>	16.00%	397	Application Development IT Business Analysis IT Quality Assurance	combined	combined		combined





			IT Project Management				
<b>IT Management</b>	28.00%	694	IT Senior Manager IT Policy Planning/ IT Security	389	12%	-305	389
<b>Finance &amp; Administration</b>	10.00%	248	IT Vendor Management	9	0.3%	-239	9
<b>Total</b>		2,479		3,352	100%	<b>873</b>	3,352

Exhibit 7.4.5.2: Gartner State and Local IT Staffing Benchmark



### Attract and retain high-skilled technology staff in state government

Unisys understands that data captured in the 2019-21 biennium will inform the outcomes of the IT position restructure and determine if the changes in salary improved recruitment and retention efforts.

This is especially important given that more than half of the State's technology workforce is eligible to retire within the next five years, according to the state Human Resources office, which reports that the State's technology workforce is aging and retiring in higher numbers.

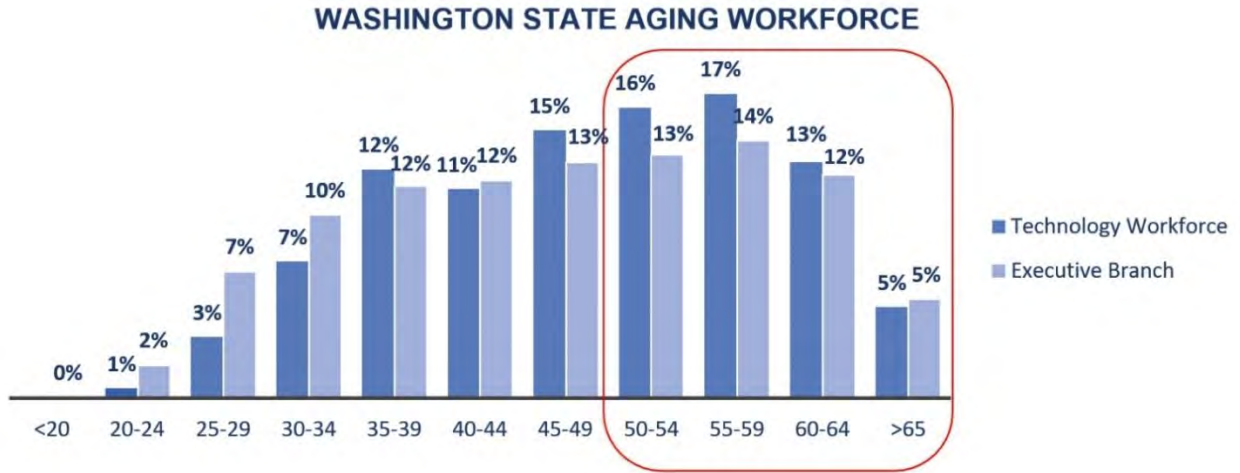
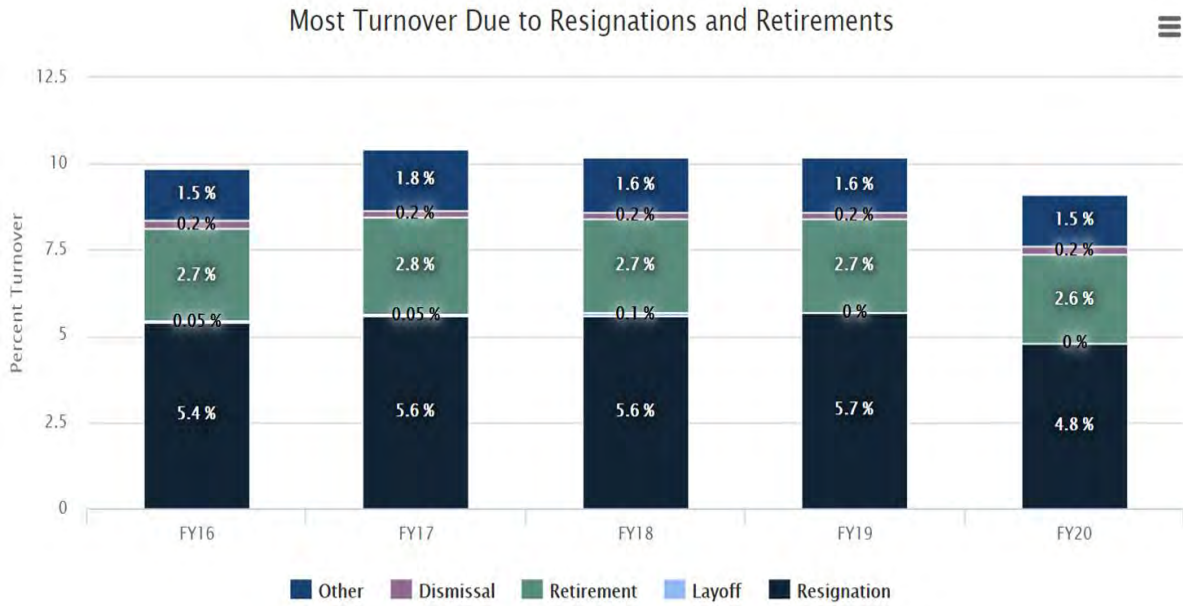


Exhibit 7.4.5.2: Washington State Workforce by Age<sup>37</sup>

<sup>37</sup> Office of the CIO (OCIO) Title: IT Biennial Report, March 5, 2020, page 13.  
[https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19\\_Biennial\\_Report\\_Final.pdf?2nh3yj](https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19_Biennial_Report_Final.pdf?2nh3yj)



## Staff Turnover Statistics



**Exhibit 7.4.5.3: Washington State Workforce Turnover Statistics<sup>38</sup>**

### Turnover Statistics

FY16	10.0%
FY17	10.4%
FY18	10.2%
FY19	10.2%
FY20	9.2%

<sup>38</sup> Office of Management, <https://www.ofm.wa.gov/state-human-resources/workforce-data-planning/workforce-data-trends/retention/workforce-turnover>



## Staff Turnover and Retirement

### Turnover – retirement

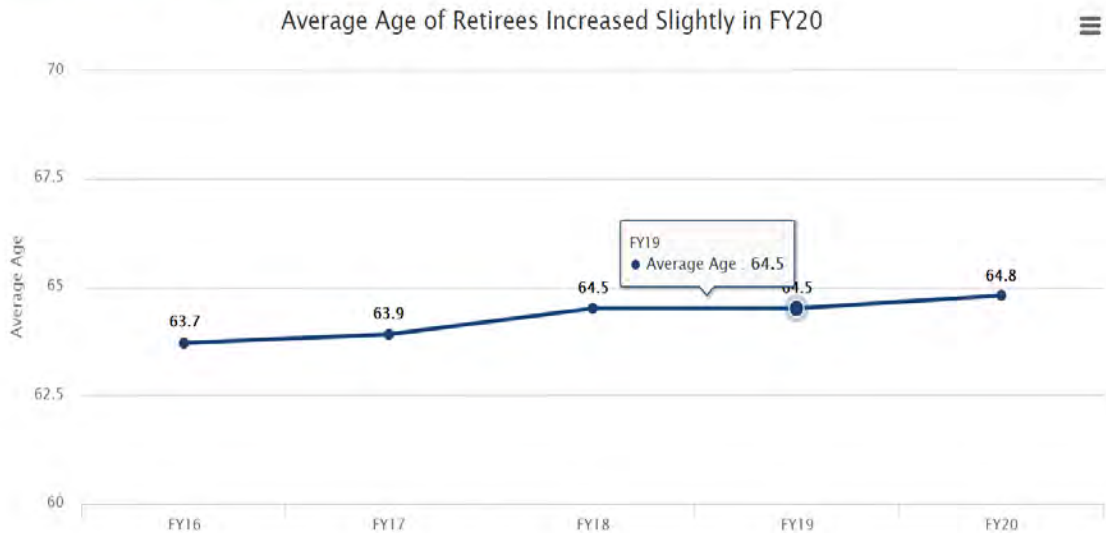


Exhibit 7.4.5.4: Washington State Workforce Turnover Statistics<sup>39</sup>

In-Scope IT Population	
50-54	534.24
55-59	567.63
60-64	434.07
>65	166.95
<b>FTEs</b>	<b>1,702.89</b>

## 7.5 IT Staffing – Summary

Successfully adopting cloud services requires an IT organization with a balance of skills and experience to support both the new cloud environment and technologies and the existing IT infrastructure, services, and applications. State of Washington Agencies have an opportunity to use their available IT system administration resources to balance the bimodal obligations for maintaining the current environment and implementing cloud services. To shift into the new operating practice, Agencies should consider the following recommendations.

Approximately 80% of respondents to the skills survey indicated that there is no recruiting for cloud skills. Updating new job requisitions and opportunities to include cloud-specific skills and experience, such as the following capabilities, will attract candidates interested in creating a cloud-focused organization.

<sup>39</sup> Office of Financial Management, <https://www.ofm.wa.gov/state-human-resources/workforce-data-planning/workforce-data-trends/retention/workforce-turnover>



Providing the additional requirements will help Agencies compete within the broader Puget Sound marketplace, identify, and engage with candidates with the right experience and skills to drive cloud adoption:

- Microsoft Azure, Amazon Web Services, and Google Cloud
- Infrastructure as Code (IaC)
- Automation using both cloud-native tools and third-party platforms like Red Hat Ansible or Terraform by HachiCorp

Develop an agile, cloud-focused workforce with a skills development plan to add cloud skills and experience throughout the IT organization. Additional funding for training will be required as over 40% of the skills survey respondents indicated their Agency has little to no cloud experience and no certifications. The State should plan on using the benchmark career development investment of \$900-1200/IT resource/year and focus on cloud-specific skills during the cloud adoption program. Adding cloud skills within the existing Agency resources is necessary to meet an accelerated approach to balance cost-effectively adopting cloud and using the existing Agency resources. Adopting cloud skills does not mean that current skills development plans should be discontinued or stopped. The focused approach is included in the recommended Workforce project WF-6.

Identify team members with interest in developing cloud skills and collaborate for cloud adoptions. These resources should be prioritized for cloud services training and certification. Cloud adoption requires a broad set of skills to support the software-defined functions in cloud services, which differ from the traditional IT infrastructure server, network, and storage experience. The resources supporting cloud adoption should be a mix of both IT infrastructure system administration and application development. These IT staff members will need to focus on cloud adoption, plan to work across the Agency's organization and towers, and collaborate closely with other Agencies, the Cloud Service Broker, and governance teams to share and reuse their experience. Cloud adoption can experience longer timelines and increased costs when IT staff continue to support the current operating environment.

Agencies should consider rebalancing their staffing needs based on the increased productivity driven by cloud adoption. In many cases, existing resources will be able to manage more servers and other cloud resources. Options to adjust the number of resources should focus on realigning resources to new or open roles across cloud operations, application development, security, and IT architecture. Strategically use staff-augmented resources, retirement, and resource attrition to balance the Agency and State needs and collaborate with the Service Broker and other Agencies to share skills and resources when appropriate.



## 8.0 Future State – Analysis

CTS and Agency organization structure and individual IT Staff were not evaluated in detail as part of this cloud readiness assessment. Using the information provided by the Cloud Skills and Training Survey (Section 7.3.10), the estimated workloads eligible for migration (Section 5.4), and recommended projects (Section 13.5), Unisys analyzed the future state to support the following cloud service roles and CTS Service models.

### 8.1 Future Cloud Services Roles

As part of the Cloud Skills and Training Survey (Section 7.3.10), Agencies identified additional cloud-focused roles that are needed to enable cloud migration support. The following table includes a list of skilled cloud roles typically used in mature cloud operations and adoption teams.

In the following review with CTS, the roles highlighted in green are critical roles for an enterprise cloud adoption or service broker team to support State Agencies’ cloud migration. These enterprise roles provide a shared support capability to provide governance across the State of Washington IT environment. The roles and resources can be shared to balance the Agency needs to additional resources with specific skills.

Agency-Identified Roles for Cloud Services	Count of Agency Responses per Role	Percent
Have not identified a need for any cloud specialists	24	37%
Cloud Program Manager	10	17%
Enterprise Architect	23	38%
Cloud Solutions Architect (DevOps)	17	28%
Identity Architect (Cloud Integration)	8	13%
Security Architect (Cloud Integration)	21	35%
Applications Architect (Cloud-Native DevOps)	14	23%
Data Architect (Cloud-Native Solutions)	9	15%
Applications Engineer/Developers (Cloud-Native Solutions)	13	22%
Site Reliability/Automation Engineer (DevOps)	6	10%
Service Level Monitoring and Tooling Engineer (Cloud Services)	11	18%
Financial Management Specialist (Cloud Services)	7	12%
Cloud Contracting and Licensing Specialist	10	17%

The number of resources required for each of these roles will vary by Agency and approach. In smaller Agencies, multiple roles can be performed by a single IT staff member, especially when using pooled resources from a Service Broker or a cross-agency collaborative team. Larger Agencies may choose to assign multiple staff members to a specific role to maximize the results.

Each cloud vendor has its unique support requirements, scripting constructs, optimizations, security practices, and reliability features. Depending on the complexity of an Agency’s implementation in each cloud, a single FTE performing any of these cloud roles may perform the tasks across multiple clouds. As the Agency’s cloud environment grows, dedicated resources may become focused on a specific cloud platform and limit the roles they perform.



The project management, financial management, and roles can apply their skills and responsibilities across multiple clouds, including Microsoft Azure, Amazon Web Services, and Google Cloud.

Technical roles such as Cloud Solutions Architect, Identity Architect, IT System Administrator, Data Architect, cloud-native Applications Engineer/Developer, and Site Reliability/Automation Engineer require vendor-specific skills and experience.

Key Performance Indicators (KPI) for various technologies are provided in Section 12.5.3. Most of these KPIs focus on activities performed by the IT System Administration Job roles. The shift per server to FTE volumes, from an estimated 12-20 servers per State of Washington administrator to 250-300 cloud servers, presents an opportunity to shift trained resources into new roles. The recommended projects in Section 13.5 estimate the number of hours required for the one-time implementation and ongoing support efforts for cloud adoption practices, migration, and associated tools.

In Section 7.5, Unisys recommends CTS plan to use a combination of existing resources interested in establishing the cloud broker capabilities and bringing in new skills to support the identified roles below.

Agency-Identified Roles for Cloud Services	Project FTE	Ongoing FTE	Project FTE	Ongoing FTE
	1,500 Servers / 10 Agencies		9,000 Servers/69 Agencies	
Cloud Program Manager	3.34	1.25	5.16	2.25
Enterprise Architect / Cloud Architect	6.00	2.38	23.25	6.38
Identity Architect (Cloud integration)	1.00	0.50	1.00	0.50
Security Architect (Cloud integration)	0.50	-	0.50	-
Site Reliability/Automation Engineer (DevOps)	5.88	6.23	22.38	17.88
Financial Management Specialist (Cloud services)	1.00	0.63	1.00	1.88
Cloud Contracting and Licensing Specialist	1.00	0.40	2.00	3.00

**Exhibit 8.1.1 Estimated Resources for Service Broker based on Recommended Projects**

The FTE estimates (Exhibit 8.1.1) are based on the recommended projects' level of effort (Section 13.5) for the Service Broker. These FTE counts represent an estimate of each project's associated roles except for the Application Modernization Assessment (EA-9). If the State of Washington decides to change the projects' scope or timeline, the number of resources required will change.

## 8.2 CTS Supporting State Agency Cloud Services

Unisys understands that CTS/WaTech offers IT Services tailored to Agencies within Washington State who do not have the technical staff to manage and administer technology needs and requirements. Through the cost-sharing, statewide scale, and consistent security, Agencies benefit from the centralized services that provide core technical support, equipment, and administration. We understand that the services and benefits include:

- Infrastructure services: The foundation for these services is a corporate core IT infrastructure consisting of physical and virtual servers. Agencies are provided with a



common technical platform with an established infrastructure security program.

- Local-area network (LAN) services: LAN services maintain the local network environment that supports connectivity within the Agency's building or suite.
- Endpoint management and desktop support services: This service provides support for daily IT operations. IT technicians manage the endpoints: installations, patching, upgrades, and general computer health. They are available remotely and onsite, depending on the need.
- Staff equipment provided: WaTech provides computers, monitors, keyboards for the Agency's permanent staff.
- Mobile Device Management (MDM) support: WaTech offers MDM security IT technical support through its vendor. Agencies will be responsible for purchasing mobile devices, services, and licensing fees.
- Server and server support services: WaTech provides server support through the Private Cloud (also known as the Washington State Cloud). Agencies will be responsible for server hosting fees and all migration costs into the environments.
- Chief Technology Officer consulting: The Chief Technology Officer provides consultation to support small Agencies aligning their business decisions with best practices and changes within the technology industry.
- Security services: These services include Vulnerability Assessment (VA), Logging and Monitoring (Security Information Event Management), technical support, and Chief Information Security Officer consulting.

These services provide a foundation for building services focused on the public cloud. The service catalog will also need to expand to provide the following additional capabilities and drive cloud adoption. CTS or a federated Service Broker can provide these capabilities.

- Cloud Design and Build: Provide services and resources to design the public cloud to meet the Agency and application-specific requirements using regulatory compliant configurations.
- Cloud Migration: Discover, Plan, Estimate, and Migration: Agency applications to the cloud using repeatable practices. This service is described further in Section 8.3.
- Cost Optimization: As the State uses cloud services, understanding the cost implications of the current environment and looking for opportunities to reduce costs, automation, and remove under-used services are vital to a well-run cloud environment.
- Cloud Operations: Provide the capabilities to run, monitor, and maintain cloud environments so that the application teams can focus on building business services.

### 8.3 CTS Supporting State Agency Cloud Migration Services

Unisys recommends future cloud migration services tailored to provide Agencies with sharable practices, resources, and tooling. Establishing a Cloud Migration Factory within CTS, a federated Service Broker, and some of the larger Agencies can accelerate the overall migration process, enable a repeatable execution of migrations, address the migration of services (not just servers), reduce risk, and focus on the Agency's business needs.





The concept is like the manufacturing process. At the beginning of the process, the team must assemble requirements for what the Factory Team is to build, confirm all the required components to develop the product, and develop the plan for the actual assembly of the product.

Unisys developed the following methodology for cloud migration and factory approach based on the global experience of migrating government and commercial clients to public and private cloud environments. Service providers and large IT organizations use similar cloud migration factory approaches to migrate large groups of applications while maintaining application and service availability. The factory approach uses a combination of capabilities to migrate applications and infrastructure services.

- People - project management, cloud and infrastructure architecture, cloud engineers
- Process - communications, planning, service management, agile development, and risk management
- Technology - discovery, analysis, automation, and migration tools

These capabilities create a virtual manufacturing line that drives consistency across the migration phases, reduces the total migration cycle and balances the staff needs to support migrations across multiple Agencies and applications.

The functions of the Cloud Migration Factory are:

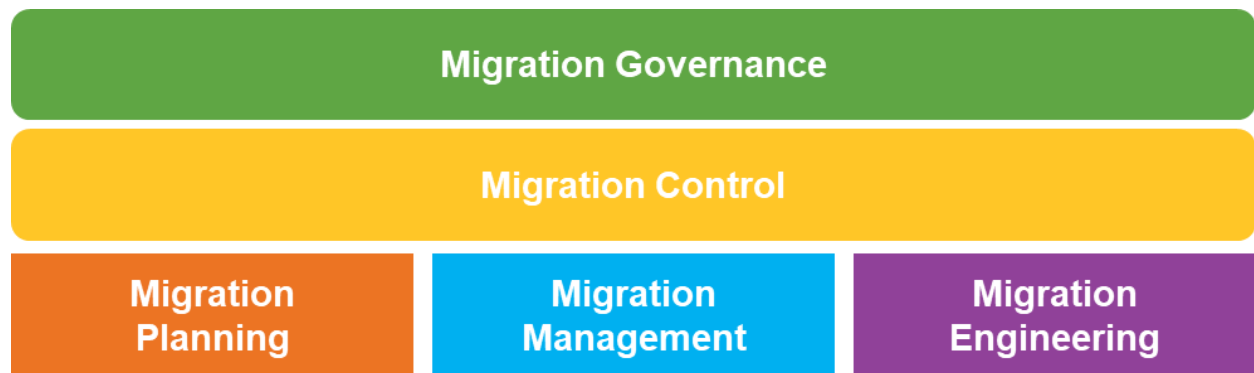


Exhibit 8.3.1 Migration Services Organization Model

**Migration Governance** provides program management and governance to ensure the migrations meet the requirements of the business by:

- Engaging all decision-makers through clear, tailored communications
- Managing the flow of project information between all stakeholders
- Tailoring interactions to the needs of the individual stakeholder and the program
- Providing a central point for all stakeholder communications, ensuring the flow is bi-directional and structured
- Maintaining a holistic view of the program, reporting transparently throughout the program
- Ensuring issues and risks are analyzed and addressed at the appropriate forums by the right people at a necessary level of detail

**Migration Control** manages the service data, migration schedule, and communications, coordinating the migration approach across the factory by:

- Managing reporting, meeting, and measurement activities that are continually reviewed and adapted to the phase of the migration



- Controlling the migration schedule execution to maintain a consistent throughput, smoothing the peaks and troughs of demand
- Driving structured communication across all participants and stakeholders

**Migration Planning** drives a complete discovery across the full in-scope environment, analyzes the environment and informs the target and approach decisions, and create a cloud migration schedule that integrates overall strategy with the business, technical, and resource constraints by:

- Driving a complete Discovery across the full in-scope environment
- Executing the analysis of the environment and informing the target and approach decisions
- Creating a migration schedule that integrates overall strategy with the business, technical, and resource constraints

**Migration Management** is the interface to Business and Application Teams through all phases, participating with the planning teams in the first phases, and leading the engineering teams in execution by:

- Coordinating the participation of the Business and Application Teams
- Supporting the Discovery across the full in-scope environment
- Performing the detailed analysis of the environment to define the target locations and technical migration approach methods to be used
- Owning the technical migration approach methods and ensuring their use by the teams throughout the execution
- Providing experienced migration problem management and resolution

**Migration Engineering** uses dedicated technical teams that will execute the service migrations following the specific migration approaches by:

- Performing over-the-wire V2V based migrations
- Providing technical and systems support to Agency Application teams in the rollback or DR-install migrations

When delivering cloud migration services, CTS or a Service Broker uses the Cloud Migration Factory program approach to perform cloud migrations across multiple Agencies, Applications, and workloads in parallel.

As illustrated in Exhibit 8.3.2, the migration factory concept of operations performs migrations in Agile sprints in a highly repeatable manner. This practice is achieved using focused migration teams assigned to specific applications and overlapping their project timelines to avoid single threading the migration tasks. Resources focused on project governance, communications, risk management, technical architecture, and automation development bolster the individual migration teams.



Focusing on the execution of a Cloud Migration program – establishing the Migration Factory is a key step

The team is a combination of Agency Infrastructure and Application Owners, Network Owners, Operations, and CTS/WaTech supporting the Unisys Migration Factory

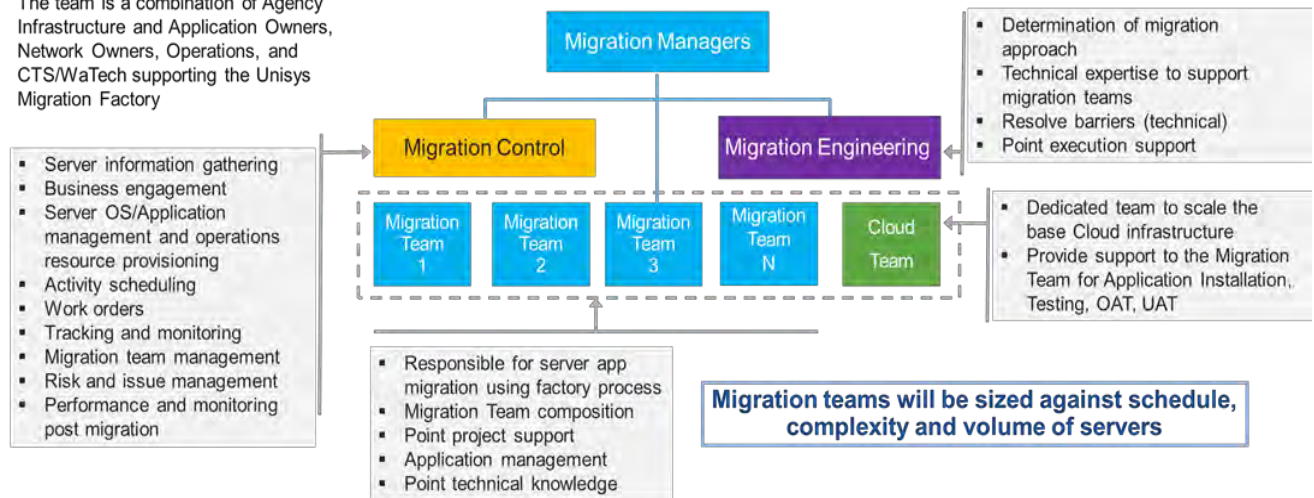


Exhibit 8.3.2 Cloud Migration Factory Project Organization Approach

## 8.4 Summary

Throughout this Future State - Analysis Section, the two main themes are the need to have the right skilled people and proper planning for CTS or Agencies to deliver cloud-related services to include application migration. The difference between traditional datacenter services and cloud services is significant and needs to be addressed in advance to ensure that the right planning is possible. What will enable existing State employees, new hires, and 3<sup>rd</sup> party contractors to meet these challenges is to have repeatable frameworks and governance that provide guideposts to success. Section 8.3 is an overview of the beginnings of what can be the State’s workload migration framework. Throughout this document, other examples and projects are identified that can be initiated to support the building of repeatable frameworks. Developing frameworks will reduce risk, cost, and benefit realization of cloud and migration services.

The impact for each Agency will differ in terms of needed support based on the size of a cloud service or migration project. For smaller Agencies, multiple roles can be performed by a single IT staff member. In comparison, larger Agencies may assign multiple staff members to a specific role to maximize the results. It is essential and recommended to use a trained pool of resources from a Service Broker or a cross-agency collaborative team to reduce risk and cost. Roles like project management, financial management, and monitoring roles can apply their skills and responsibilities across multiple clouds. Technical roles such as Cloud Solutions Architect and cloud-native Applications Engineer/Developer will require vendor-specific skills and experience. It is recommended to make these determinations during the planning portion of the project.

The need to provide timely and useful support is a critical success factor for cloud adoption as each new project will build on the success of other recommended projects. To manage technology needs and requirements, reduce risk and cost in cloud service support, Unisys recommends expanding the existing shareable support structure CTS (WaTech) offers to Agencies within Washington State that do not have the technical staff.

Migrations are considered a more complex activity over deploying new cloud services since migrations impact existing Agency application outcomes. Therefore, it is necessary to have a



repeatable migration framework to ensure consistency across Agencies. The concept is like a manufacturing process following the consistent principles for assembly, build, confirmation, and testing. Service providers and large IT organizations use similar cloud migration factory approaches to migrate large groups of applications while maintaining application and service availability. Using the combination of trained people, repeatable processes, and the right technology will reduce the overall risk and cost to the Agencies.

## 9.0 Future State – Strategy and Roadmap

### 9.1 Future State IT Environment Vision

As the State of Washington Agencies adopt cloud computing, they will need to define a roadmap that aligns with their business drivers and identify their current and future capabilities for delivering IT services. For most state and local governments, a practical approach combines the right mix of IT standardization, consolidation, and optimization. It introduces new capabilities such as self-service, resource pooling, and rapid elasticity.

The development of such a roadmap requires analysis across multiple dimensions involving business and technology considerations. Unisys has a framework for this analysis and roadmap development and references to additional documents and tools developed by Unisys to help organizations gain the most from transitioning to Cloud Computing.

The approach follows a basic methodology, the CloudForte Cloud Adoption Process, which is similar to the Unified Process in structure and purpose and is characterized as:

- Iterative and Lightweight - Key activities are repeated in multiple phases of the process and produce an incremental result for evaluation and further improvement at the end of each iteration. The process is not prescriptive and does not define specific artifacts or outcomes for each of the iterations.
- Usage Pattern and Workload-Driven - Implementation requirements are derived from the intended usage patterns for Cloud Computing. Applications and workloads are examined in the context of these usage patterns, and the resulting intersections of usage patterns and workloads form the basis for iteration within the phases.
- Lifecycle Complete and Adaptable - The process is end-to-end for the lifecycle of a Cloud Computing initiative within an enterprise. It assumes that the initiative will address cloud adoption for at least part of an existing (legacy) IT environment. The process is adaptable and intended to be tailored by its practitioners. It should complement, not replace, other methods that may be in use.

The drivers of Cloud Computing adoption are highly diverse between organizations and even within the same organization. Likewise, there is broad diversity between organizations in terms of operating models, risk sensitivities, and relationships between business and IT, among other factors.

For these reasons, initial activities focus on identifying the unique combination of forces influencing an organization's approach to Cloud Computing. Balancing these forces is one of the primary objectives of this pragmatic approach. This critical step supports developing an informed business strategy and rationalized architecture for Cloud Computing.



Finally, the Unisys CloudForte Cloud Adoption Process describes the essential considerations for synthesizing the identified forces and the architectural decisions into a comprehensive roadmap to Cloud Computing carefully tailored to the needs of the enterprise.

## 9.2 Process Defined

Unisys recommends an iterative process involving four phases to govern the CloudForte Cloud Adoption Process Approach described in this guide. The phases and major associated activities are:

1. **Advise** - Identify the primary forces driving the cloud strategy. Define the significant usage patterns to be supported and the major groupings of workloads to be deployed with these usage patterns. Measure current cloud-related capabilities in terms of maturity and adoption. Decompose and evaluate target workloads for cloud deployment. Evaluate potential service models for the target usage patterns and workloads. Estimate and compare the costs and benefits of potential deployment models. Validate target usage patterns and workloads with current and prospective consumers. Define preliminary budget and skills requirements.
2. **Transform** - Expand and refine target usage patterns; choose the service model(s) with prioritized workloads and desired capabilities. Define architectural building blocks and detailed deployment model. Define projects and project dependencies. Identify major areas of operational and organizational transformations. Validate designs with vendors and service providers. Create a roadmap.
3. **Operate (Build)** - Implement the design. Track progress against roadmap - capabilities development, and projects' budgets and schedules. Transition the implementation and put it into production operation. Track progress against goals - consumer impact and operating budgets.
4. **Optimize** - Implement tools and automation; add projects to drive cost and application optimization.

Advise	Transform	Operate	Optimize
<ul style="list-style-type: none"> <li>• Strategy</li> <li>• Discovery</li> <li>• Assess</li> <li>• Roadmap</li> <li>• Security Audit and Compliance</li> <li>• Unisys Cloud Architecture Navigator™</li> </ul>	<ul style="list-style-type: none"> <li>• Plan/ Design/ Validate /Deploy</li> <li>• Transform, Innovate and Migrate Services</li> <li>• Security (ID and Access Management)</li> <li>• Process and Governance</li> <li>• DevOps Enablement (including CI/CD)</li> <li>• Application and Infrastructure Modernization</li> <li>• (Re-host, Re-platform)</li> <li>• Organizational Change Management</li> </ul>	<ul style="list-style-type: none"> <li>• Cloud Managed Service Provider</li> <li>• Cloud Center of Enablement</li> <li>• Financial Management</li> <li>• Governance</li> <li>• Cloud Operations Management</li> <li>• Security Operations</li> <li>• Continual Service Improvement</li> <li>• Apps Management</li> <li>• Consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Automation Optimization</li> <li>• Cost Optimization</li> <li>• Data Analysis &amp; Visualization</li> <li>• Unisys Cloud Architecture Navigator Optimization</li> <li>• Apps Optimization</li> </ul>

Exhibit 9.2.1: Unisys CloudForte Adoption Process

While this process is end-to-end in terms of cloud adoption activities, the State of Washington approach is primarily concerned with the first three phases.



As the framework for a CloudForte Cloud Adoption Process approach, this process is flexible and should not supersede other effective methodologies that may already be in use. Preferably it should be adapted to these methods. The activities described can be readily adapted to other processes. The expected distribution of significant activities is described across the phases of the CloudForte Cloud Adoption Process as shown above in Exhibit 8.2.1. Note: Most of the Build and Operate phases' activities are beyond the scope of this assessment and are not shown in this illustration.

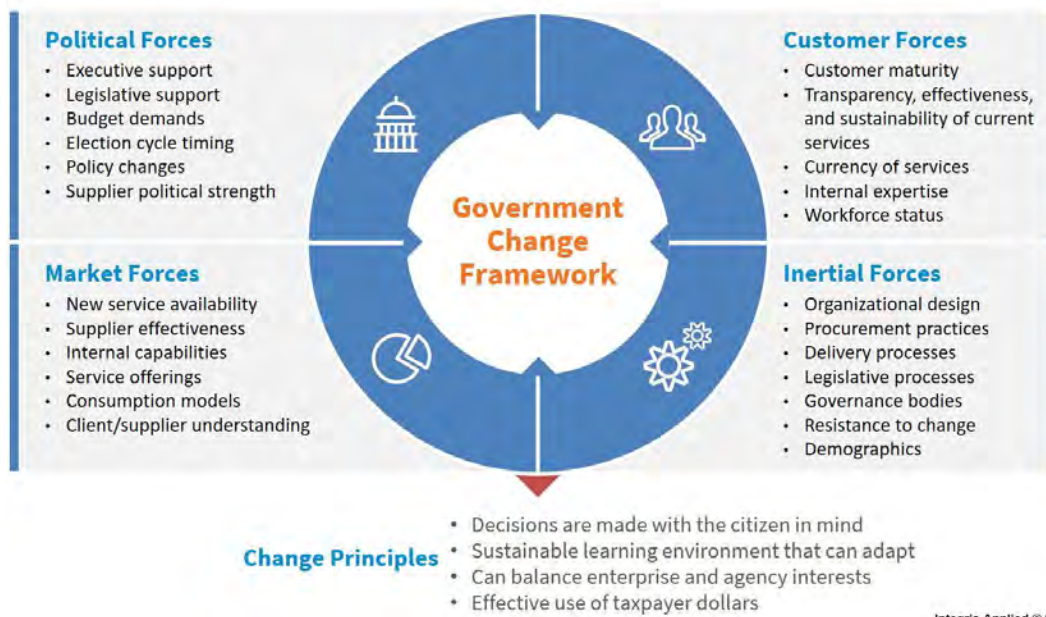
In practice, phase 1 (Advise) may not always be the most expedient starting point. However, cloud initiatives beginning with later phases will incur a particular 'debt' to earlier phases that will likely need to be dealt with at some point, at potentially higher risk and cost. For instance, beginning with Design activities to automate the provisioning of virtual machines may produce relatively quick visible benefits by leveraging existing server virtualization capabilities. However, this form of automation may not align with the ultimate goals of providing capabilities to provision complex and distributed applications environments. In turn, this approach may cause a redesign effort that eliminates server virtualization from parts of the architecture. Avoid this risk by completing the Assess phase first.

### 9.3 Forces for Cloud Adoption

Organizations approach cloud computing in a variety of contexts. Together with the problems to solve with cloud computing, these contexts make up the forces driving cloud adoption. Before defining architecture or prescribing solutions for a cloud computing initiative, it is essential to identify the forces behind it. What are the organization's expectations from the cloud, what drives the investment, and what role will the organization play in the consumption and delivery of cloud services?

#### State Government Forces

National Association of State Chief Information Officers (NASCIO) excels as the premier community and trusted resource for state CIOs identifying and promoting leading practices and innovations to support, enable, and transform the business of state government.





**Exhibit 9.3.1: Government Change Framework NASCIO Integris Applied 2017<sup>40</sup>**

Identifying the forces for cloud adoption, then, entails representing the range of viewpoints having a stake in the outcome of cloud adoption and the goals of these stakeholders. This activity is the first step toward an approach that is realizable and aligned to an organization's needs.

**Current Forces - NASCIO Survey 2018**

How does your state CIO organization plan to deliver or obtain IT services over the next three years (e.g., server and platform administration, backup, storage, software, hardware maintenance, network management, and service desk management)?

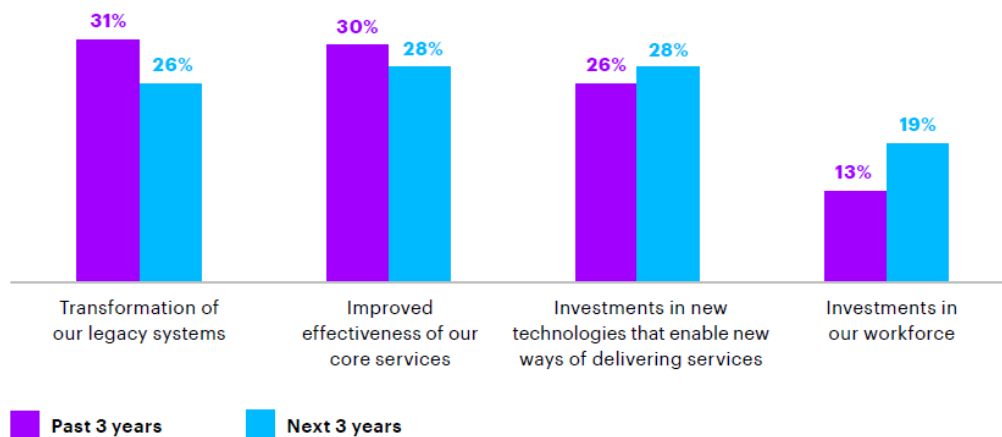
	Introduce	Maintain	Expand	Downsize
State-owned-and-operated data centers	0%	35%	14%	52%
Outsourcing service model	15%	26%	57%	2%
Managed service model	10%	23%	65%	2%
IT shared services model	0%	22%	75%	2%
"As a Service" models (SaaS, PaaS, IaaS)	14%	12%	75%	0%
State IT staff	0%	69%	10%	22%

**Exhibit 9.3.2: NASCIO and Integris Applied Survey 2018<sup>41</sup>**

**Innovation Forces – Accenture and NASCIO 2020**

Unisys understands the State of Washington and NASCIO work together to promote and enhance the critical role of information technology and innovation in state government, representing the range of viewpoints having a stake in the outcome of cloud adoption. We see a new direction in investments as described below:

**To the best of your ability, please estimate what percentage (adding up to 100%) of your innovation investments and efforts are dedicated to each of these activities:**



<sup>40</sup>NASCIO & Integris Applied, The State CIO Operating Model: Bridging Trends and Action March 13,2019, p7 [https://www.nascio.org/wpcontent/uploads/2019/11/NASCIO\\_StateCIOasBrokerModel.pdf](https://www.nascio.org/wpcontent/uploads/2019/11/NASCIO_StateCIOasBrokerModel.pdf)

<sup>41</sup> Ibid, p.4.



## 9.4 Service Provider versus Service Broker

One of the apparent forces affecting cloud adoption is the increasing availability of public cloud services that meet enterprises' IT needs. This shift drives the consumption of individual IT services away from internally provided services toward externally provided services. It also encourages a rethinking of the role of enterprise IT, where it traditionally functioned as the builder and provider of all IT services consumed by customers, partners, employees, and management.

The approach to cloud adoption must explicitly address which services are provided internally and consumed from public cloud providers and what role IT plays to each in the delivery of IT services. With the explosion of public cloud services, IT may increasingly function as a provider and as a broker for public cloud services to administer. Most enterprises are finding that a growing number of services available from public cloud providers can meet many of their IT needs. The three types of cloud service brokers are described below, along with the conditions and example scenarios where they are appropriate.

- **Aggregation:** Unify the management interface to multiple public cloud providers.
  - An Aggregation broker provides a unified management interface to multiple cloud providers. An Aggregation broker might provide a standard API for provisioning Java applications to cloud platforms from three different providers. Companies that want portability across multiple cloud providers may choose to develop or use the Aggregation broker capability.
- **Arbitrage:** Evaluate, audit, and acquire public cloud services based on capabilities, price, standards, and service level compliance.
  - Arbitrage of cloud services involves the continuous comparison of the price for specific equivalent services available from multiple providers. An Arbitration broker can add value only when there is a market for these services. Brokering is practical for only a narrow set of services today, primarily available in the IaaS service model. Companies consuming a large volume of commodity cloud services such as compute and storage may benefit from Arbitration capability.
- **Intermediation:** Provide higher-level service by integrating specific capabilities with lower-level services consumed from a public cloud provider.
  - An Intermediation broker provides higher-level service by integrating specific capabilities with lower-level services consumed from a public cloud provider. An Intermediation broker might build SaaS service on public IaaS. Organizations with strong software development capabilities and service delivery experience are in a position to broker service through Intermediation.

Within an enterprise IT context, these broker roles usually involve integration or interoperability between internal functions and public cloud providers. These hybrid scenarios stand to grow in relevance for most organizations. The decision between using publicly or privately provided services is dealt with in the Implementation phase and is not addressed directly in the roadmap creation process. However, minimal criteria for this decision will need to be defined to identify the broker capabilities to develop.

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<sup>42</sup> NASCIO & Accenture; The Future State CIO; January 15, 2020; p.7; [https://www.nascio.org/wp-content/uploads/2020/01/FutureStateCIO\\_DrivingInnovation.pdf](https://www.nascio.org/wp-content/uploads/2020/01/FutureStateCIO_DrivingInnovation.pdf)





The proportion of services provided internally versus consumed from public cloud providers focuses on public cloud services based on the combined economies of scale and ongoing provider investments. Following this direction, velocity, and impact on the State’s business needs, the State of Washington should plan to establish cloud broker capabilities.

For those services brokered by IT, the value added by the broker must be evident. The broker will be subject to demands for competitive pricing, faster delivery of new services, and continuous service improvement. The broker's existence depends on its positive contribution to the value chain, the total value of which must exceed the value of consuming those services directly from public cloud providers.

This contribution comprises values associated with control over security, pricing leverage, and integration with other services. The capabilities needed to contribute to the value chain and measure it must be developed to succeed with an internal cloud broker approach.

### 9.4.1 Broker Maturity Model

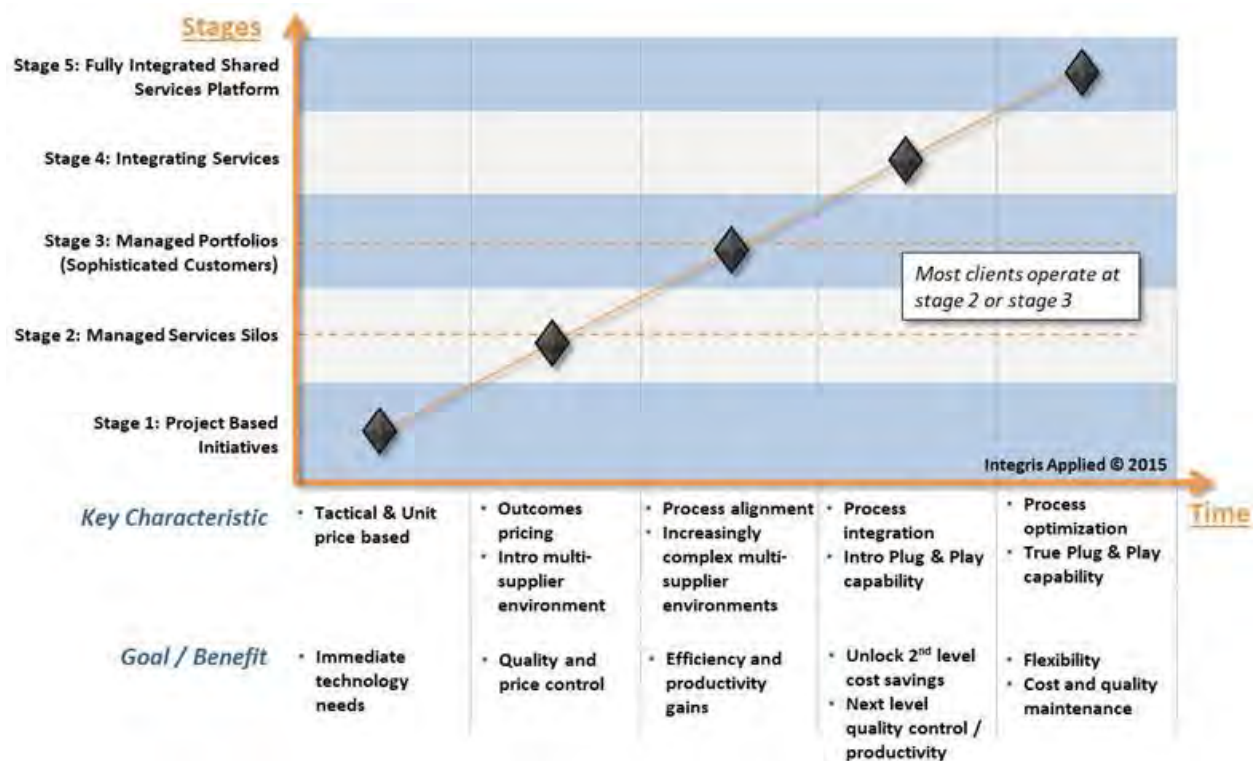


Exhibit 9.4.1.1: NASCIO and Ingria Applied Broker Maturity Models<sup>43</sup>

### 9.4.2 CTS as a Cloud Services Broker

Another critical decision that ultimately affects the future role of Consolidated Technology Services (CTS) is the type of broker capability needed to manage the demand and procurement for public cloud services. Most states are finding that a growing number of services available from public cloud providers can meet many of their IT and security needs. Unisys has identified the

<sup>43</sup> NASCIO & Integris Applied, The State CIO Operating Model: Bridging Trends and Action March 13,2019, p7  
[https://www.nascio.org/wpcontent/uploads/2019/11/NASCIO\\_StateCIOasBrokerModel.pdf](https://www.nascio.org/wpcontent/uploads/2019/11/NASCIO_StateCIOasBrokerModel.pdf)



following criteria that will support CTS in developing a cloud services broker on behalf of State Agencies:

1. How does the CTS organization build the platforms capable of managing multiple sources of **subscriptions** or supply?
2. How can CTS meet customer demand by becoming a “broker” of **services** relevant to Agencies and the citizens they serve?

The CTS “operating model” needs to address these questions by providing a **governance framework** for communicating to Agency stakeholders, establishing a **Center of Cloud Enablement (CCoE)** for the groups and forums necessary to navigate a cloud enterprise, and establishing the organizational capabilities necessary to create a “cloud brokerage” model for service delivery and evolution.

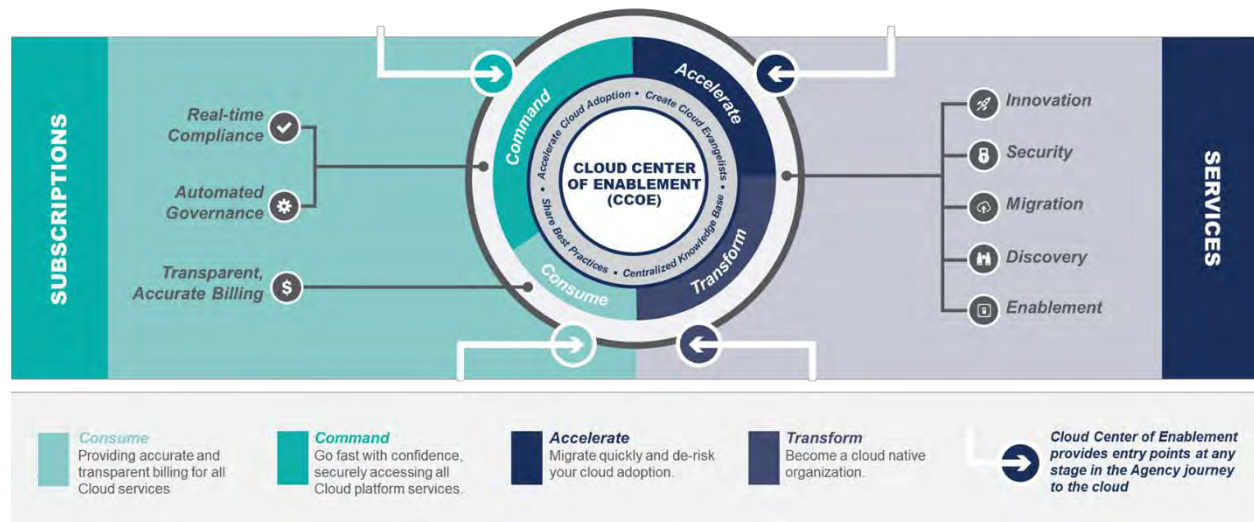


Exhibit 9.4.2.1: Cloud Center of Enablement (CCoE)

The differentiator a CTS Cloud Broker service provides over traditional data center tools is the ability to digitize the output of the CCoE and provide measurements. The broker is a critical management capability when Agency workloads span between multiple cloud service providers and private clouds. A cloud broker service will be defined and measured by the ability to report and measure the efficiency of the money being spent, set policies to comply with standards, and provide optimization recommendations across disparate virtualized and cloud environments in one easy-to-get-to place. CTS Financial Managers, Project Managers, and Compliance staff should easily log in and perform their tasks without the need for a systems administrator assistance.

Types of digitized Governance would be the deployment of guardrails based on user role, project budget, or target clouds. These guardrails would protect, for example, regulated workloads from being deployed in the wrong cloud or limiting what a user can spend based on the allocated budget. The cloud broker is not supposed to be a bottleneck for Agencies but a partner to ensure their resources are optimized and compliant to state policies without requiring any additional work.

Unisys sees opportunities and challenges for the CTS. We recommend that CTS use their ability to understand the Agency demand and sources of supply available to meet that demand and manage the current Washington State enterprise. CTS needs to build a transparent internal cloud platform (**at competitive market pricing**) that can change as rapidly as necessary to broker supply, demand, and expectations in a complex political environment.



## 9.5 Strategic versus Tactical

A significant factor influencing the approach to cloud adoption is whether those expectations are more strategic or tactical.

Expected tactical advantages of cloud computing may include:

- Reduced IT cycle time through streamlined deployment processes
- Improved service reliability during peak demand periods through rapid scaling capabilities
- Gains in efficiency through consolidation onto shared resources
- Simplified cost allocation through conventional metering and chargeback capabilities

Expected strategic advantages of Cloud Computing may include:

- Reduced time to market for new business initiatives
- Changes in the cost structure of IT to reflect actual costs of delivered service
- Reduced risk of experimentation with trial products and services
- Enhanced synergy with other strategic business initiatives, e.g., One Washington strategy

Expectations drive the planning and architectural decisions, so it is essential to start by characterizing the expectations in terms of strategic or tactical advantage. It will be beneficial to make service and architectural decisions based on your current maturity level and expected adoption rate within your adoption journey. It is not always the best decision to purchase premium services on day 1 of your journey. This choice will avoid the potential for stranded costs after standing up services with high license/subscription costs that need to be supported by administrators and are underutilized for long periods. As adoption and quantity of services grow, the premium services may become financially viable and can then be deployed to improve end user experiences and service management.

In addition to the first-order questions of provider versus consumer and strategic versus tactical advantage, many other forces combine to form an organization's cloud computing approach. These factors include the motivation driving the initiative, decision authority for the initiative, the intended business model, and risk tolerance. Gauge these factors from diverse viewpoints, including planning time horizon (short-term versus long-range), business impact (minor versus transformational), and market approach (protect position versus disrupt and challenge).

These forces are organized into two contexts: A Motivational Context comprising three forces - Business Drivers, Project Control, and Technology Adoption; and an Operating Model Context comprising three forces - Business Process Standardization, Business Process Integration, and Business Model for IT.

## 9.6 Motivational Context

The three forces (Business Drivers, Project Control, and Technology Adoption) described below combine to form a motivational context for approaching cloud adoption. A thorough understanding of these forces' direction and magnitude should be established in the Transformation phase of cloud adoption. Requirements for target usage patterns and workloads should be interpreted and refined in this context as part of the Assess phase.



Compromises on specific forces in the motivational context should be dealt with in the Assess and Design phases.

### 9.6.1 Business Drivers

The business drivers leading to IT investments are as varied as the organizations making them. Often, these drivers spring from a motivation to either save costs or increase business agility. Understanding what an organization expects from the cloud initiative broadly in terms of efficiency and business agility is essential in making design tradeoffs and constructing a roadmap for cloud adoption.

Cloud computing projects motivated by potential cost savings and increased efficiency are generally tactical and may have a return on investment target expressed as expense reductions. In that case, a common approach is to increase asset utilization through the consolidation of workloads onto less costly infrastructure. In contrast, business agility improvements, such as acceleration of product development and faster response to market conditions, are the kinds of strategic motivations typical of investments in cloud computing. Whether efficiency or business agility primarily motivates the cloud project will affect the approach. For example, cloud projects focused on efficiency may initially plan to consolidate applications onto shared infrastructure. In contrast, an agility-focused plan is more likely to introduce higher levels of automation early in the project.

### 9.6.2 Project Control

Control and responsibility for the IT organization's projects most often lie with the IT department today. However, this orientation is shifting toward more control in the hands of lines of business and the Agencies' or enterprises' operating units. This shift reflects a change to support business-driven IT operations. Cloud computing's self-service, ubiquitous access, and pay-for-use features exemplify that shift. Frequently, the IT organization's position of control has not aligned to reflect the business reality of direct and straightforward access to public cloud services by business units and workers. This situation commonly leads to "shadow IT," which carries potential security risks and unnecessary expenditures.

Where the actual authority and control for a cloud project lie within an Agency organization affects many aspects of the project's approach. Questions such as how resources are shared, how data protection policies are enforced, and how expenses are controlled are answered differently depending on whether a central IT department controls projects or control is distributed among the business consumers of IT. The balancing of cloud project control is a critical force that figures prominently in a practical approach to cloud adoption.

A related question arises in Agency (business) controlled cloud projects: What level of the Agency is responsible for the project? The IT department's traditional responsibilities of ensuring security, managing service levels, controlling costs, and vetting technology providers still need to be carried out. Are these duties conducted centrally or distributed to the parts of the business that manage cloud projects?

### 9.6.3 Technology Adoption

Technology adoption practices typically reflect an organization's tolerance for risk as well as its expectations of technological leverage to be gained in the market.



Innovators and early adopters will routinely accept a higher degree of risk in terms of the viability or reliability of a given technology to gain first-mover advantage. Mainstream adopters wait until a technology goes mainstream before introducing it into their environment to avoid any but minor risks. While early adoption has the potential to produce real market advantage, success with this strategy is not assured. Many innovative technologies fail to reach mainstream adoption, which may expose early adopters to reliability problems and a negative return on investment.

Whether an organization leans toward early adoption or mainstream adoption can be gauged simply by reviewing the existing technology portfolio. A portfolio dominated by mainstream products and technologies indicates a mainstream adoption bias. A portfolio that includes many products from new companies or unproven technologies indicates a bias toward early adoption. Mainstream adoption practices affect the approach to cloud projects by following another organization's or industry's lead and involve minimal levels of innovation. A strong preference for early adoption leads to an approach that accepts certain significant risks and accounts for the prospect of failure.

## 10.0 Future State – Cloud Service and Adoption Models and Overview

### 10.1 Service Model

The Unisys grouping of cloud computing service models into three layers - Software as a Service, Platform as a Service, Infrastructure as a Service - is a widely accepted representation of the practical implementations of cloud computing today.

The concept of layered service types is not rigid, but the distinction between the three service models is unambiguous. Simple definitions of the three models are:

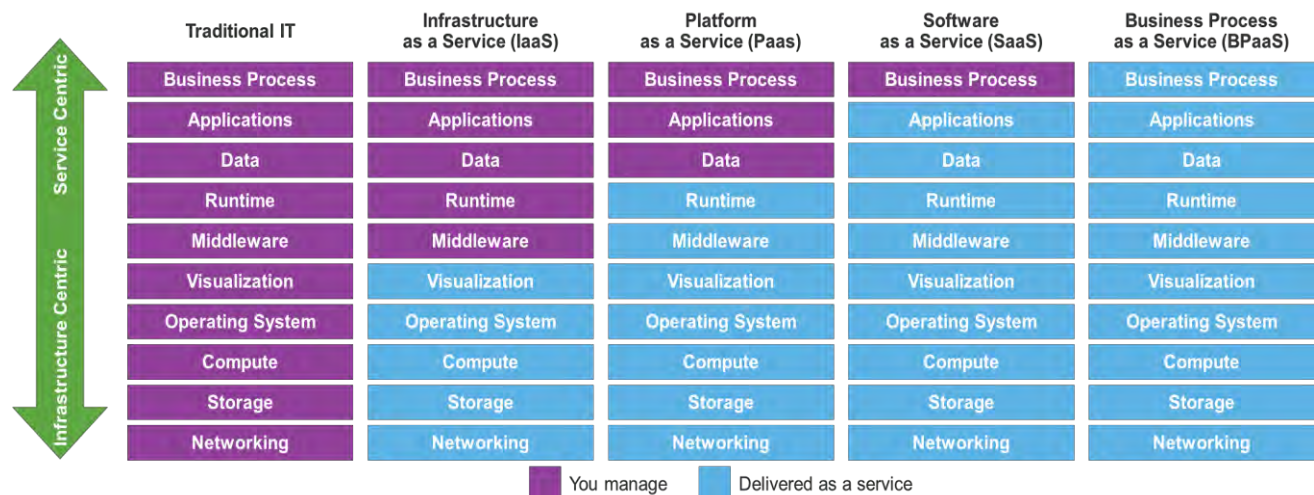


Exhibit 10.1.1: Unisys Service Models

- Platform as a Service (PaaS): Consumers use programming languages and tools supported by the PaaS provider and then control the deployed application. PaaS is designed to provide the necessary capabilities to allow developers to focus on the higher value activities of building and delivering applications while leaving the configuration and management associated with the provider's underlying platform.



- Infrastructure as a Service (IaaS): Consumers deploy and run arbitrary software and requisition from the IaaS provider the needed compute storage and networks to do so. IaaS is designed to allow consumers the choice of technology for the entire stack above the hardware while eliminating the complexity of the management of the physical infrastructure.
- Software as a Service (SaaS): Consumers use applications running on a cloud infrastructure. The SaaS provider manages or controls the underlying software and infrastructure. Relative to the other lower-layer service models, the functionality of SaaS offerings is less flexible by design. However, SaaS platforms aim to make up in direct value to users what they lack in flexibility.

## 10.2 Scale, Velocity, and Essential Characteristics

There are four characteristics described as essential for cloud computing by the National Institute of Standards and Technology (NIST). These characteristics must be interpreted in the context established earlier in the roadmap creation process and defined in a specific and measurable way. Scale and velocity are two key dimensions that should be used to add specificity and measurability to the definitions of these characteristics.

### Essential Characteristics<sup>44</sup>

- On-demand self-service - What does it mean to be "on-demand" and "self-service"? Is a sub-five-minute turnaround required for every request, or is it acceptable for a request form to be processed by a human who then initiates a review and, upon approval, commits the resources to provide the requested service within one week?
- Resource pooling - What is the size of a pool? I.e., how many resources can be aggregated in a single pool? Several factors must be considered when determining pool size, including the demand profile for the resource, the degree of resource transparency to the user, and the availability of technology to administer pools.
- Rapid elasticity - How fast is "rapid"? Does the same velocity definition for on-demand self-service apply to elasticity? What are the scale limitations for increasing capacity temporarily? Are there policy limitations as well as technical limitations to the scale and velocity of elasticity?
- Measured service - Are both volume and duration of service measured? Once the units of measurement are defined, the frequency of measurement will need to be defined for specific metrics, and how those metrics are used in cost allocation or billing must be established.

Use specific scale and velocity factors to define the State's essential characteristics in a specific and measurable way that supports the vision for cloud adoption.

### 10.2.1 Scale

Scale refers to the magnitude (size of the cloud under consideration), as well as the potential reach of the services it provides. Scale limitations are among the constraints imposed by specific

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<sup>44</sup> National Institute of Standards and Technology, NIST Cloud Computing Standards Roadmap, Special Publication 500-291, Pg. 14, <https://www.nist.gov/publications/nist-sp-500-291-nist-cloud-computing-standards-roadmap>



technologies common to cloud environments. For example, systems management tools that are designed to control and monitor 500 nodes from a central master may not be appropriate or may require complex hierarchical architecture for a 10,000 node cloud environment. Technological constraints are best addressed early in the planning process. An Enterprise-Internal Cloud consisting of both private and public cloud services for one autonomous division using mainstream technology may deem that a systems management limitation of 500 nodes is within the scaling goal of their cloud initiative. A more massive cloud may call for systems management technology that has greater horizontal scalability.

### 10.2.2 Velocity

Velocity refers to the rate of change and the rate of data processing in the cloud environment. The frequency of service versioning, the polling rate of service levels, and the latency between request and response are all velocity considerations that must be factored into the specification of cloud services.

- Broad network access - How broadly accessible do the services need to be? Are internal networks capable of providing access for all users in all regions to a given cloud service?

## 10.3 Roadmap Essentials

A roadmap identifies and plans the activities required to transition from the current state to a desired future state. A practical roadmap should coordinate multiple projects culminating in a common end goal that provides value more significant than the sum of the individual projects. An enterprise's roadmap for cloud adoption organizes the activities that will deliver the cloud capabilities necessary to produce the desired benefits over time.

The organization and management of the entire lifecycle for any transformative IT initiative will benefit from the use of a methodology designed for bringing about the transformation. The roadmap is one tool in that process. Unisys' definition of the CloudForte Cloud Adoption Process is intended to fill this need for end-to-end methodology and includes activities for creating a roadmap. However, this particular process is not compulsory, it is not comprehensive, and it is expected to complement any of the methods commonly employed by IT planners today.

The following sections describe significant activities in the process that contribute to roadmap development. Key insights necessary to develop a rationalized and complete roadmap for cloud adoption are discussed, as well as some of the critical transformations to anticipate along the way.

## 10.4 Strategic versus Tactical Path

Most Cloud Computing initiatives will follow a roadmap involving both strategic and tactical goals. An organization may want to pursue a strategic path to transform one application into a market breakthrough service using automated deployments and rapid elasticity. In parallel, it may also take a more tactical path for the rollout of server virtualization to increase asset utilization across the IT environment for an entire operating unit, i.e., wide adoption with a limited level of cloud maturity.

In this sense, the strategic versus tactical orientation should be factored into setting target maturity and adoption levels for each capability. First, identify those capabilities whose adoption needs to be expanded versus those capabilities that need greater maturity before wider adoption is



pursued. Figure 4–3 shows the arcs of strategic and tactical paths through increasing levels of maturity and adoption for cloud capabilities. Determining which path to pursue the capabilities associated with a set of IT assets (e.g., infrastructure, platforms, applications) provides a solid foundation for roadmap development.

Choosing the right paths through levels of maturity and adoption begins with an analysis of the results from a maturity assessment, so it is primarily an Assess phase activity. During the Design phase, plan to revisit the choices of strategic and tactical paths.

## 10.5 Key Transformations

In the roadmap, account for the growth in maturity and expanded adoption of cloud-enabling capabilities representing the planned transformation decisions. The following sections discuss some of these critical transformations and how an organization might approach them.

### 10.5.1 Roles Shifts and Automation

Traditional IT operations are typically responsible for operating the IT infrastructure, platforms, and applications that run the business. Operations include the monitoring and management of service levels to the end users of business services. In this traditional model, operations may call upon application developers to help resolve production problems, but the developers' primary role is to add features to the applications.

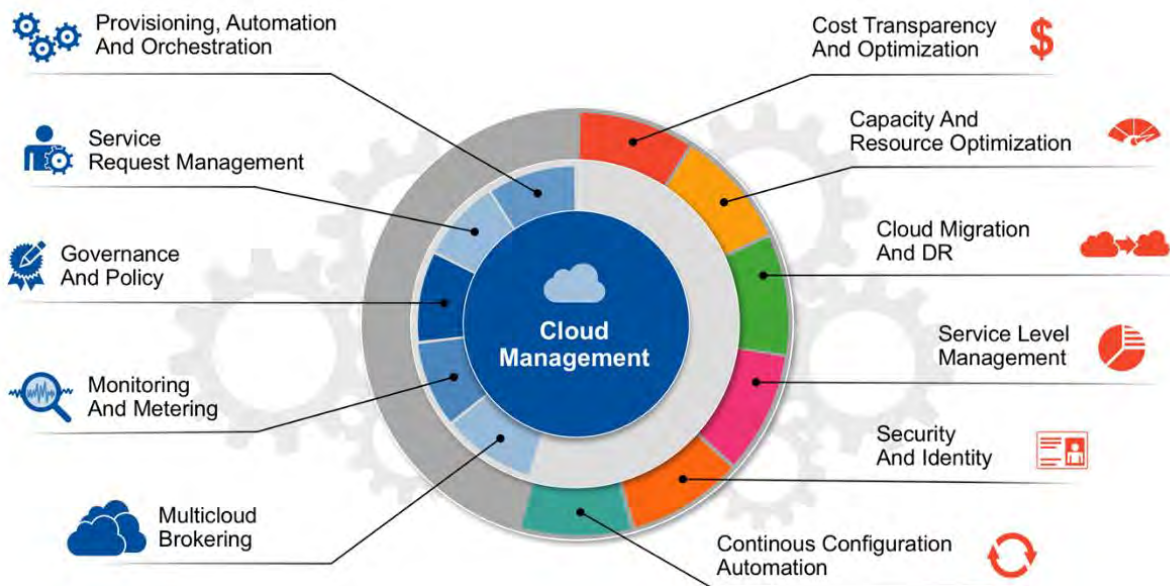


Exhibit 10.6.1: Cloud Management Automation - Gartner <sup>45</sup>

New capabilities introduced with cloud computing, such as automated provisioning/de-provisioning, elasticity, and self-service, lead to an increased pace of change. This advancement creates a challenge for IT organizations that are structured to directly manage all changes to any part of the running environment and may even discourage or impede change in the interest of

<sup>45</sup> Meinardi, Marco; Upcoming Research: Cloud Management Platforms, January 22, 2018; <https://blogs.gartner.com/marco-meinardi/files/2018/01/Screen-Shot-2018-01-20-at-15.38.35.png>





maintaining stability in the environment. Dealing with this challenge involves shifts in roles and increased automation of operational tasks to manage the pace of change effectively.

### 10.5.2 DevOps

For services running in a cloud, the traditional line between IT operations and application developer roles blurs and is replaced by a practical division of responsibilities that is more situational and less rigid. A DevOps approach integrates development and operations into a single role or shared responsibility between two or more roles. This merging of responsibilities from development and operations uses common toolsets across the disciplines:

- One tool to manage both application configuration and infrastructure configuration promotes the integration of Dev and Ops.
- A shared version control system that contains system provisioning scripts, as well as application code, is typical of a well functioning DevOps approach.
- Standard methods and tools for testing and quality assurance are also shared in a DevOps approach.

The transformation to a DevOps approach involves skills development and possible restructuring of organizational boundaries as well as retooling to a standard set of tools. Adaptation of the governance model for IT will also be necessary. The transition to DevOps is a multi-phase effort. It begins in the Assess phase by identifying affected roles and processes and continues in the Design phase with the refactoring of existing roles and processes or creating new ones. Improvements to the associated processes are ongoing in the Build and Operate phases. The roadmap should account for activities to handle the mechanics as well as the cultural impacts of this transformation.

## 10.6 Deployable Entities

Automation is not new to IT operations, but cloud services demand higher levels of automation than traditional IT customarily provides. Operating applications in the cloud involves the management of services as semi-autonomous entities. Applications use multiple elements (binaries, scripts, configuration, dependencies), and their deployment behaves as a single idempotent transaction. Complete services are managed as deployable entities and provisioned uniformly as a single payload to a baseline platform common to other deployable entities. The platform is not modified in the deployment. The changes are applied incrementally to the running system as part of the entity that is redeployed. This notion of deployable entities, where configuration and code for multiple subcomponents are encapsulated in a template or assembly, is a critical underpinning of cloud-scale automation. Deployable entities vastly simplify operations and serve as logical abstractions of the underlying detail involved in delivering cloud services.

## 10.7 Model Management and Late Binding

Abstraction involves a normalized method of either aggregating underlying subsystems into larger systems or disaggregating systems into smaller subsystems. Server pooling abstracts individual servers into an addressable collection of server capacity. Server virtualization abstracts the physical hardware by dividing the processing and I/O capacity of a server into smaller virtual machines. Higher levels of abstraction require complete representations, or models, of the underlying subsystems along with the policies, configurations, and relationships that describe the



system. In complex environments such as the cloud, Model Management becomes an essential capability and is the basis for maintaining deployable entities, among other core building blocks of the cloud architecture. For cloud service developers, Model Management is the main point of interaction with the cloud environment.

Systems that support high velocity (change across a large number of subsystems) rely on Model Management to define upfront those elements of a service. These systems are fixed or expected to change infrequently (“early binding”), allowing the dynamic elements of the service to be defined later when the service is launched. The “late binding” of components enables the rapid release of new features and quick correction of defects. This approach, in turn, reduces the risk of releasing new code and removes barriers to continuous service improvement.

The creation of models representing cloud services and major subsystems is a Design phase activity, as is the specification for Model Management infrastructure, which includes some form of the model repository. The creation of models can be significantly simplified through the use of introspection that captures a metadata description of a running reference system to be brought under Model Management. The roadmap should address which models are needed, how they will be created, and whether introspection would be possible and useful in the Model Management function.

As discussed earlier, the upfront “early binding” activities are concerned with building the cloud infrastructure and occur infrequently. These build-time efforts implement the operational capabilities of a cloud, such as resource pooling, rapid elasticity, and self-service. The “late binding” of service components is concerned with applications running in the environment and occur on shorter intervals, as frequently as, say, once an hour. These run-time activities include application deployment, dynamic provisioning and de-provisioning of capacity, and responding to problems in the running service.

Management of the overall system (infrastructure and applications) is typically separated into multiple control planes. One for management of the cloud infrastructure, which serves the needs of the cloud operator, and one or more for managing the applications running in the cloud, which serves the needs of the application owner.

## 10.8 Governance

One of the most challenging and often overlooked aspects of cloud adoption is the governance of activities according to a plan. A roadmap is only useful if its prescribed activities are carried out in a coordinated and consistent manner. A cloud program office should be established to administer governance of cloud adoption activities per the roadmap. The cloud program office is a steering function and may also have responsibility for financial management, resource planning, change management, and training related to cloud adoption activities. The program office defines the constituent projects that make up a cloud initiative and the goals of those projects in the Assess phase of the CloudForte Cloud Adoption Process. Project sequencing and dependencies are then defined in the Design phase. Ideally, the cloud adoption program office would be established as part of the Envision phase.

Using the basic framework of the CloudForte Cloud Adoption Process and major early phase activities described in this guide, a practitioner can begin to develop a roadmap that organizes the specific activities for an actual cloud initiative into phases. Refer back to Exhibit 9.2.1 for a guideline for organizing activities into phases.



As the roadmap takes shape, a continuous effort to maintain stakeholder involvement and support will help to streamline the process and to avoid rework and unnecessary compromises in later phases of the process.

## 10.9 Cloud Maturity Model

One of the essential inputs to a roadmap tailored to the specific needs of an organization is the level of maturity in its capabilities. Using an established model of maturity, such as the Unisys Cloud Maturity Model, is an efficient means of assessing an organization's capabilities. Maturity Assessment is a critical Assess phase activity that is essential to the creation of a rationalized roadmap. The results of maturity assessment are used to define the structure and organization (timeline, projects, project goals, dependencies) of the roadmap.

The Unisys Cloud Maturity Model (Exhibit 10.10.1) catalogs the capabilities involved in cloud computing along with the related measures of maturity and adoption needed to comprehensively assess the current state of these technical and business-focused capabilities in the existing environment. It is designed to be used as a diagnostic of the current environment and can also be used in roadmap development to set measurable goals for the assessed capabilities. The model serves as a framework for insight and discussion among various stakeholders in the cloud initiative, leading to a shared understanding of current capabilities and the gaps to be addressed in the course of cloud adoption.

	L1.Awareness - Adhoc	L2.Repeatable - Committed	L3.Defined - Proactive	L4.Measured-Service Aligned	L5.Optimized – Business Partner
People	Distributed; tech-centric	Siloed SMEs with hierarchy	Process-centric, matrix mgmt	Service-centric	Informal virtual teams
Roles	Specialists	Tech or Functional Teams	Integrated Cross Functional	Service & Business Delivery	Strategic Business Advisors
Skills	Jobs Defined	Multiple job levels	Tech Career Path	Skills Management	Business/IT rotation
Training	Ad hoc	Technology and Process	Personal Management	Service Mentoring	Hands On Experience
Process	Analysis	Capability Gains	Efficiency Gains	Velocity and Quality	Proactive
Governance	Repetitive decisions	Rigidly sequenced processes	Agency Governance	Central IT Governance	State and Citizen Governance
Standards /Automation	Tools Leverage	Operational Engineering	Service Engineering	Full CMDB & Performance Mgmt.	Real-time Automation
Integration	Point tools	Little / some	Extensive App Mapping	Automated self-service catalog	Multi-sourcing Management
Metrics	None	Major elements; some OLAs	SLAs complete	SLAs & KPIs guaranteed	Business and Citizen Value



	L1. Awareness - Adhoc	L2.Repeatable - Committed	L3. Defined - Proactive	L4.Measured- Service Aligned	L5.Optimized – Business Partner
Technology	Legacy	Provisional	Virtualized	Cloud Ready	Cloud Optimized
Standards & planning	Awareness of cloud computing	No Central IT Innovation	Virtualized Workloads	Portfolio Rationalization	Microservices and Stateless Design
Efficiency & economics	Usage known for key assets	Legacy Applications	Mostly 3-Tiered Applications	Managed SaaS	Hybrid & Public Clouds
Effectiveness & agility	Deploy in months	Siloed Development and Ops	Multiple Chargeback Models	More VMs than Containers	Automated Deployment Systems
Tools	Isolated use of tools	Very little automation	Automated Infrastructure	Cloud Risk Mitigation & Mgmt.	Self Service Tools
Leadership Role	Administrator	Point Person	Architect	Broker	Change Agent
Cost Accounting	Limited transparency for cost/price	Introducing RU pricing	Consumptive pricing	Competitive driven consumptive pricing	Market based pricing Multiple tech partners
Technology Access	Basic Services	Some Enterprise Services	Broad enterprise services with limited ability to add services	Competitive delivery solutions drives service change	Outcomes drive selection of service options
Control & Flexibility	Stakeholders not engaged & Decision making not transparent	Established ops forums & exception escalation process	Stakeholders participate in forums empowered to resolve escalations	Forums focus on customer / results	Governance focus on improvements

Exhibit 10.10.1: Unisys Cloud Maturity Model

### 10.9.1 Capabilities

The Unisys Cloud Maturity Model includes approximately sixty (60) capabilities that capture the best practices that Unisys has collected over the years while working with a wide variety of companies. These capabilities provide the detail necessary to measure and guide the progress of a cloud initiative.

### 10.9.2 Domains

The Cloud Maturity Model uses the concept of dimensions to classify and organize related capabilities. As depicted in Exhibit 10.12.1, there are four dimensions with associated attributes in the maturity model:

- **People** – Contains capabilities concerning the development of organizational competency around cloud computing, including the organizational structure and skills development, as well as executive sponsorship and organizational authority.
- **Process** – Contains capabilities concerning the governance structures and processes that support and guide the cloud efforts. These include policy management, risk management, and auditing capabilities. Maturity and adoption of adequate governance are leading indicators of the overall success of a cloud computing strategy.
- **Technology** – Contains capabilities concerning the definitions of the overall architecture and guidelines for various practitioners to ensure adherence to the architecture. Capabilities fundamental to cloud architectures, such as resource pooling, interoperability, and self-service, are considered in the model. Contains capabilities concerning the service infrastructure and tools that provide the technical foundation for the cloud initiative. Shared services, provisioning, and model packaging are particularly crucial in cloud infrastructure.
- **Leadership Role** - Contains capabilities concerning the post-deployment aspects of cloud service, i.e., the operations, administration, and management aspects of the cloud



environment. This role includes capabilities for the delivery of self-service functions and change management. It contains capabilities that provide the high-level constructs that allow the cloud initiative to proceed. This function includes such things as business motivation, expected benefits, guiding principles, expected costs, and funding model. Capabilities such as service selection and service level agreements gain relevance in cloud initiatives as well.

### 10.9.3 Maturity

The levels of maturity used in the Unisys Cloud Maturity Model (from highest to lowest) are:

- Level 5 – Optimized: Business Partner - Metrics are being consistently gathered and are being used to improve the capability incrementally. Assets are proactively maintained to ensure relevancy and correctness. The potential for market mechanisms to be used to leverage inter-cloud operations has been established.
- Level 4 – Measured: Service Aligned - The capability is being measured and quantitatively managed via some type of governance structure. Appropriate metrics are being gathered and reported.
- Level 3 – Defined: Proactive - The approach has been reviewed and accepted by affected parties. There has been buy-in to the documented approach, and the approach is always (or nearly always) followed.
- Level 2 – Repeatable: Committed - An approach has been decided upon and is being opportunistically applied. The approach has not been widely accepted, and redundant or overlapping approaches exist. It may be informally defined, or if documented, may exist primarily as “shelfware.”
- Level 1 – Awareness: Ad Hoc - Awareness of cloud computing is established, and some groups are beginning to implement elements of cloud computing. There is no cohesive cloud computing plan being followed.



## Maturity Models

Capability Maturity Model Integration is a process-level improvement training and appraisal program. Administered by the CMMI Institute, a subsidiary of ISACA, it was developed at Carnegie Mellon University. It is required by many U.S. Government contracts, especially in software development. Unisys uses the Capability Maturity Model to illustrate the current State of Washington IT operations. Unisys is mapping the State in L2 with aspirations to move to L4.

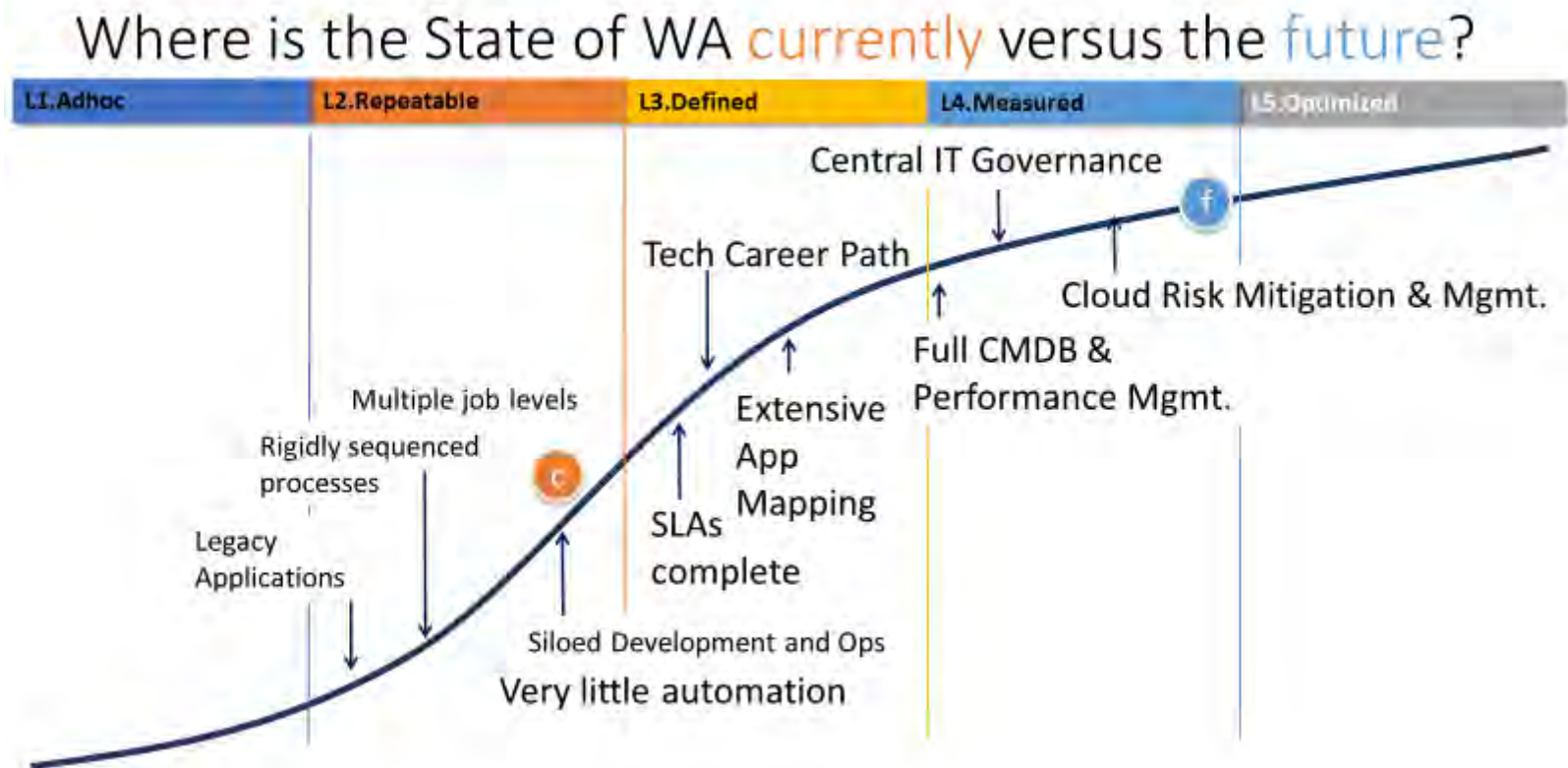
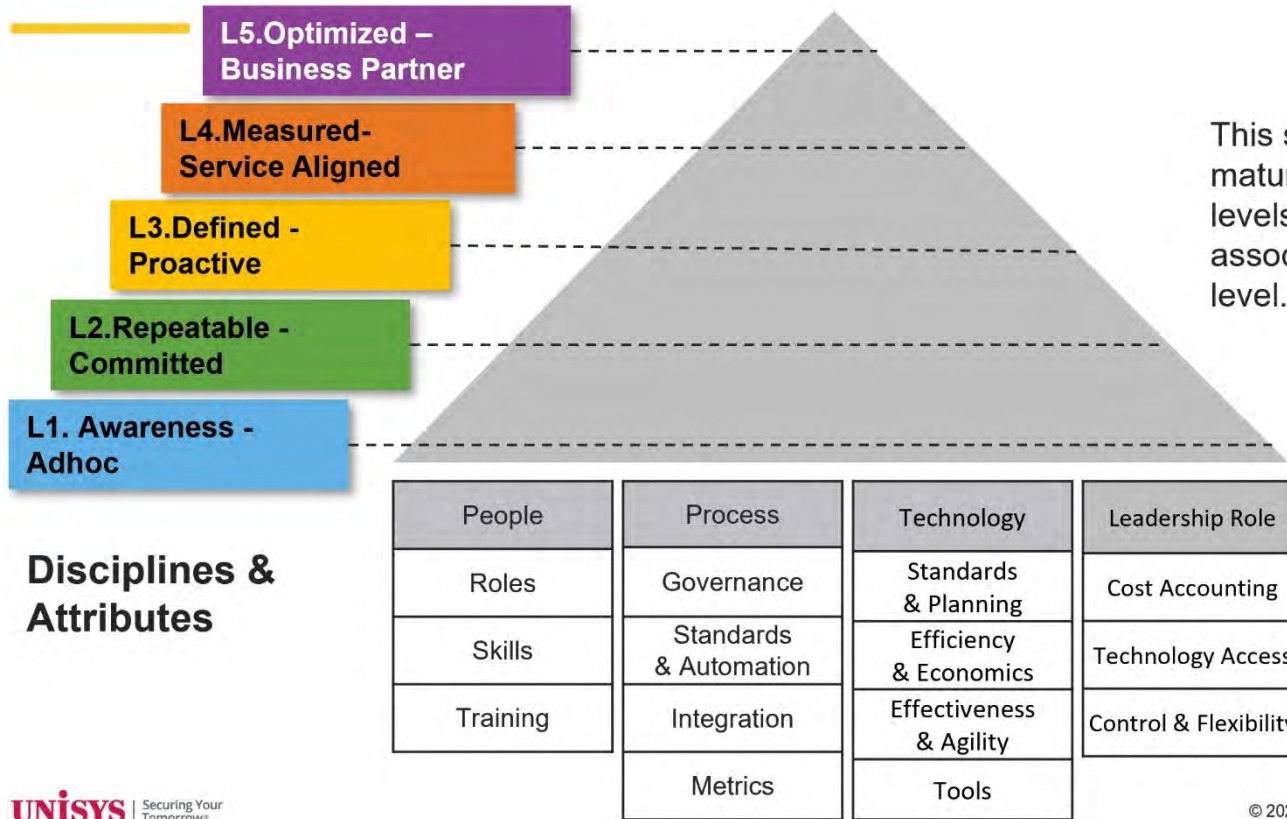


Exhibit 10.10.3.1: State of Washington Maturity Model



The levels and dimensions of the Maturity Model

# Unisys Maturity Score Model



This slide describes the maturity model across the 5 levels, 4 dimensions and the associated attributes at each level.

## Disciplines & Attributes

Exhibit 10.10.3.2: State of Washington Maturity Model Levels and Dimensions



### In the current Maturity Model

Unisys sees the maturity level of the current State of Washington in the L2 maturity domain. We see the State moving up to L3 and L4 in the future.

## Unisys Cloud Maturity Model (State of WA = L2)

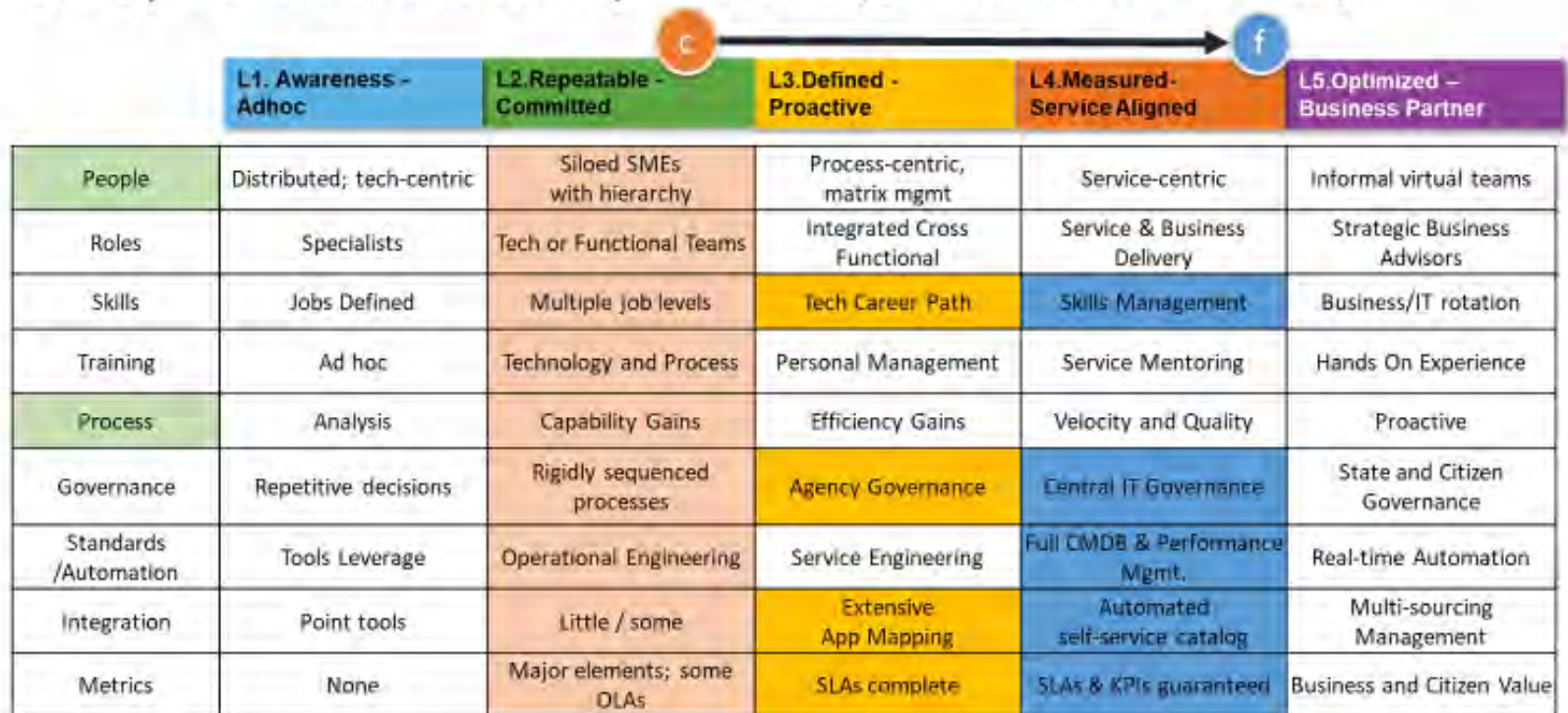


Exhibit 10.10.3.3: State of Washington Current and Future Maturity Model page 1





# Unisys Cloud Maturity Model (State of WA = L2)

Introduction	Current State		Future State	Recommendations	Appendices
	L1. Awareness - Adhoc	L2. Repeatable - Committed	L3. Defined - Proactive	L4. Measured - Service Aligned	L5. Optimized - Business Partner
Technology	Legacy	Provisional	Virtualized	Cloud Ready	Cloud Optimized
Standards & planning	Awareness of cloud computing	No Central IT Innovation	Virtualized Workloads	Portfolio Rationalization	Microservices and Stateless Design
Efficiency & economics	Usage known for key assets	Legacy Applications	Mostly 3-Tiered Applications	Managed SaaS	Hybrid & Public Clouds
Effectiveness & agility	Deploy in months	Siloed Development and Ops	Multiple Chargeback Models	More VMs than Containers	Automated Deployment Systems
Tools	Isolated use of tools	Very little automation	Automated Infrastructure	Cloud Risk Mitigation & Mgmt.	Self Service Tools
Leadership Role	Administrator	Point Person	Architect	Broker	Change Agent
Cost Accounting	Limited transparency for cost/price	Introducing RU pricing	Consumptive pricing	Competitive driven consumptive pricing	Market based pricing Multiple tech partners
Technology Access	Basic Services	Some Enterprise Services	Broad enterprise services with limited ability to add services	Competitive delivery solutions drives service change	Outcomes drive selection of service options
Control & Flexibility	Stakeholders not engaged & Decision making not transparent	Established ops forums & exception escalation process	Stakeholders participate in forums empowered to resolve escalations	Forums focus on customer/results	Governance focus on improvements

Exhibit 10.10.3.4: State of Washington Current and Future Maturity Model page 2



### Projects to Close the Gap

Unisys recommends that the State of Washington use the following identified gaps to build out projects that would transition and transform the organization from Level 2 Maturity to Levels 3 and 4, providing the next step to Optimization.

	L3 Defined -Proactive	L4. Measured – Services Aligned
People	Process-centric, matrix mgmt	Service-centric
Roles	Integrated Cross Functional	Service & Business Delivery
Skills	Tech Career Path	Skills Management
Training	Personal Management	Service Mentoring
Process	Efficiency Gains	Velocity and Quality
Governance	Agency Governance	Central IT Governance
Standards /Automation	Service Engineering	Full CMDB & Performance Mgmt.
Integration	Extensive App Mapping	Automated self-service catalog
Metrics	SLAs complete	SLAs & KPIs guaranteed

	L3 Defined -Proactive	L4. Measured – Services Aligned
Technology	Virtualized	Cloud Ready
Standards & planning	Virtualized Workloads	Portfolio Rationalization
Efficiency & economics	Mostly 3-Tiered Applications	Managed SaaS
Effectiveness & agility	Multiple Chargeback Models	More VMs than Containers
Tools	Automated Infrastructure	Cloud Risk Mitigation & Mgmt.
Leadership Role	Architect	Broker
Cost Accounting	Consumptive pricing	Competitive driven consumptive pricing
Technology Access	Broad enterprise services with limited ability to add services	Competitive delivery solutions drives service change
Control & Flexibility	Stakeholders participate in forums empowered to resolve escalations	Forums focus on customer / results

Exhibit 10.10.3.5: State of Washington Maturity Model Projects



## 11.0 Future State – Roadmap Creation Process

The Cloud Adoption Process Approach was introduced in Section 9.2. During the development of a future state cloud adoption roadmap, most of the activities focus on the “Advise” phase. As shown in Exhibit 11.1.1, four related activities support the roadmap creation process: Strategy, Discovery, Assess, and Roadmap. The analysis, results, and recommendations provided earlier in this document drive the roadmap. The recommended projects described in Section 13.5 are included in the roadmap.

Advise	Transform	Operate	Optimize
<ul style="list-style-type: none"> <li>• Strategy</li> <li>• Discovery</li> <li>• Assess</li> <li>• Roadmap</li> <li>• Security Audit and Compliance</li> <li>• Unisys Cloud Architecture Navigator™</li> </ul>	<ul style="list-style-type: none"> <li>• Plan/ Design/ Validate /Deploy</li> <li>• Transform, Innovate and Migrate Services</li> <li>• Security (ID and Access Management)</li> <li>• Process and Governance</li> <li>• DevOps Enablement (including CI/CD)</li> <li>• Application and Infrastructure Modernization</li> <li>• (Re-host, Re-platform)</li> <li>• Organizational Change Management</li> </ul>	<ul style="list-style-type: none"> <li>• Cloud Managed Service Provider</li> <li>• Cloud Center of Enablement</li> <li>• Financial Management</li> <li>• Governance</li> <li>• Cloud Operations Management</li> <li>• Security Operations</li> <li>• Continual Service Improvement</li> <li>• Apps Management</li> <li>• Consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Automation Optimization</li> <li>• Cost Optimization</li> <li>• Data Analysis &amp; Visualization</li> <li>• Unisys Cloud Architecture Navigator Optimization</li> <li>• Apps Optimization</li> </ul>

Exhibit 11.0.1: Unisys CloudForte Adoption Process

The following sections provide the supporting material and information to use this readiness assessment report to establish an approved program’s vision statement and charter.

### 11.1 Future State IT Environment Vision Document.

The cloud adoption program team will define a future state IT environment and vision document encompassing standards, architecture, operations, and organizations, rationalizing future processes, standards, metrics, and cost savings.

#### 11.1.1 Future Vision Definition

The Future Vision for a cloud initiative consists of expected benefits, the scope of benefits, target maturity level, critical architectural decisions, essential characteristics, and guiding principles. Defining a vision for the future cloud implementation requires a thorough understanding of the motivational and operational context for the cloud initiative, as established in the first phase of the process for creating a cloud roadmap. The Future Vision Definition does not attempt to define a comprehensive blueprint for the future state. Instead, it focuses on the State of Washington’s current strategy and vision. This vision will provide the expected benefits and critical elements affecting the architecture that will be used to guide the cloud initiative.



### 11.1.2 Expected Benefits

When an organization has followed its cloud roadmap to completion, certain benefits to the organization should be evident. What benefits are expected? The answers should readily derive from the motivational and operational contexts established in the Current Strategy phase. When creating a cloud roadmap, the expected benefits should be few (between two and four) and limited to the primary benefits being sought, and they should be described unambiguously. Exhibit 11.1.2.1 lists CTS (WaTech) current 2017-2021 vision, with the new Unisys examples of expected benefits to be associated with the future of Cloud Computing in 2021-2023.

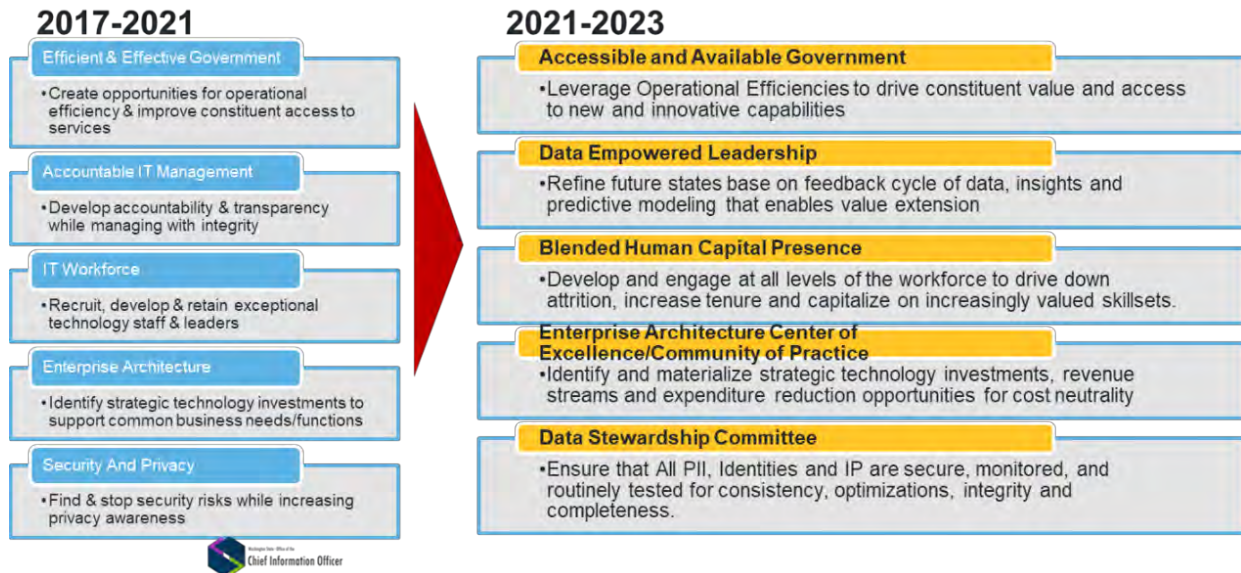


Exhibit 11.1.2.1: Future Cloud Computing Vision

## 11.2 Future State Governance Model

### 11.2.1 Understanding IT Cloud Governance

This deliverable Section assesses the current governance model and proposes how it should look in the future. The proposed governance model will define the role of IT and the scope of the IT function, define IT management principles, policies, and define IT management practices. The table below illustrates the Why, What, and How of governance.

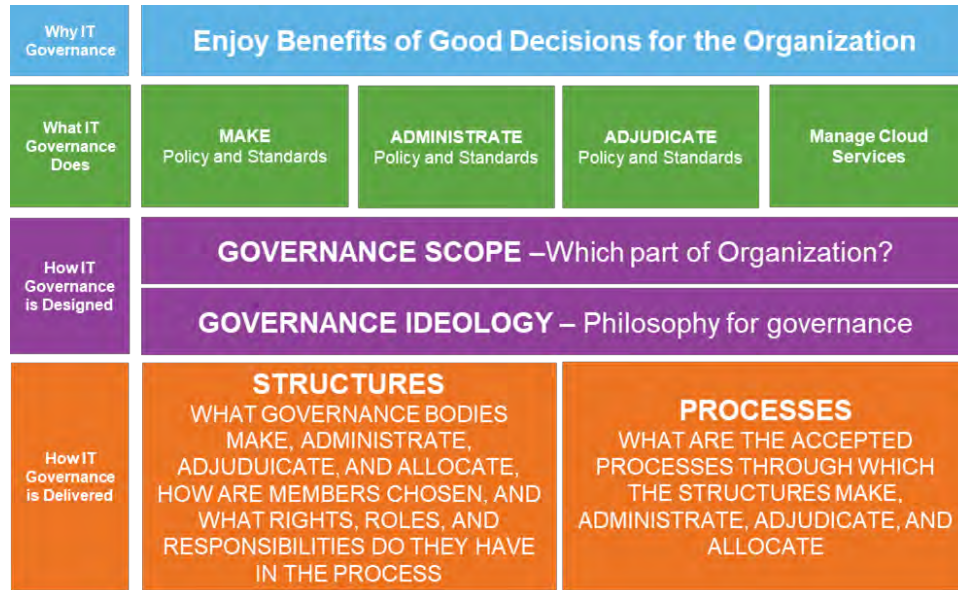


Exhibit 11.2.1.1: Understanding IT Cloud Governance

### 11.2.2 Key Domain Areas – Cloud Governance

IT Governance (ITG) is defined as the processes that ensure the effective and efficient use of IT in enabling an organization to achieve its goals (Gartner).

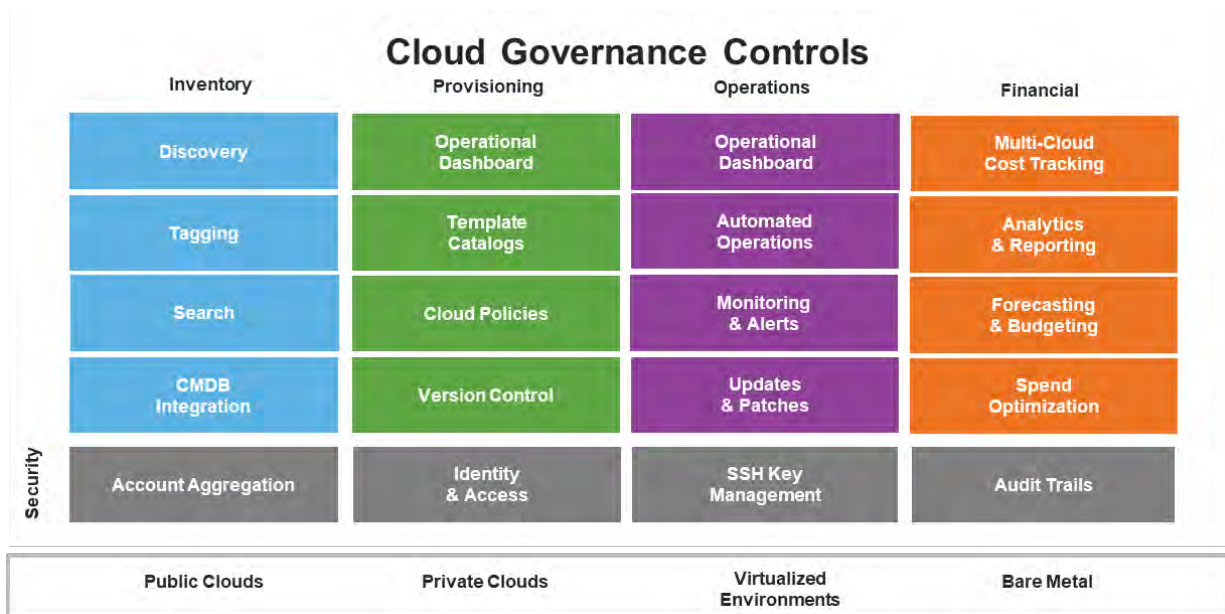


Exhibit 11.2.2.1: Understanding Cloud Governance Controls

### 11.2.3 Key Benefits of Cloud Governance

For the State of Washington, governance presents the following benefits:



- A Unified View of Cost and IT Utilization - IT and business leaders have a comprehensive view of IT assets, including cloud services and software, which helps the organization use the cloud more effectively and efficiently.
- Minimized Risk of Data Loss –Effective cloud governance practices bolster security and reduce the number of vulnerabilities that could be exposed to malicious outsiders.
- Reduced Wasted IT Spending - Effective cloud governance helps organizations get rid of unneeded cloud expenses and optimize cloud resources, resulting in better results for less money.

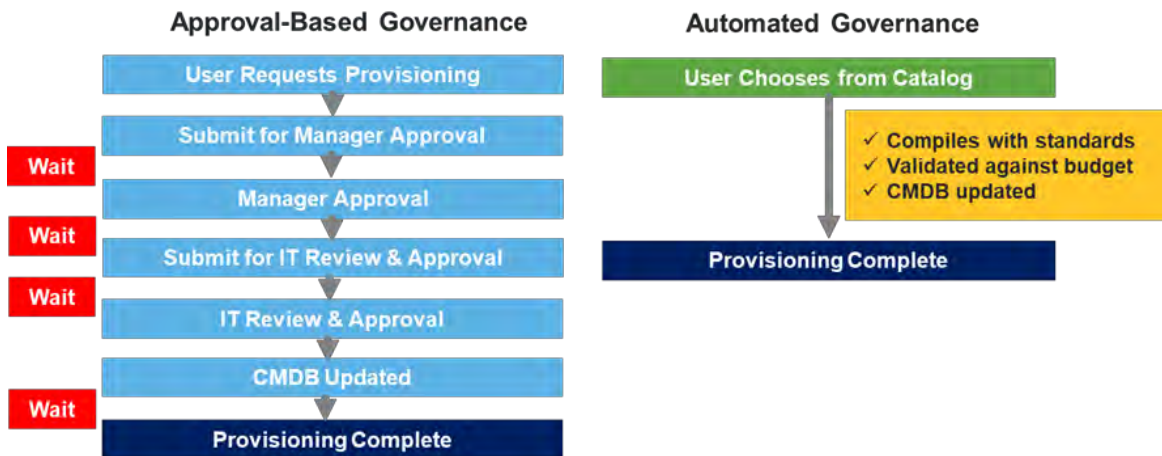


Exhibit 11.2.3.1: Key Benefits of Cloud Governance

## 11.3 Project Charter

This Project Charter deliverable section describes the overall project objectives, scope, outcomes, budget, significant milestones, timing, and stakeholders. It aligns critical project deliverables with the expectations of key stakeholder groups. This activity is performed through conducting meetings with the State management staff to gain agreement on the components of the Charter.

### 11.3.1 The Charter

**IT Charter Definition:** “an official agreement that provides guidelines and rules for IT and compute technology.” A charter is a document developed in a group setting to clarify team direction while establishing boundaries.

The charter has two purposes:

- First, it serves as a source for the team members to illustrate the focus and direction of the team.
- Second, it educates the organizational leaders and other workgroups, illustrating the direction of the team.

**Example:** Introduction to the Cloud Governance Working Group -

“The mission of this group is to design a universal set of principles and map these to emerging technologies and techniques for ensuring the privacy, confidentiality, availability, integrity, and security of data across private and public clouds.”



## 11.4 Governance Structure

### 11.4.1 Governance Charter High-Level View

The Governance Charter will define the roles and responsibilities of each party, what meetings and reviews will take place, and the processes around the issue, dispute, and variation management. Whereas the final Governance Charter will be agreed and finalized by both parties, Unisys agrees with the minimum requirements detailed below:

CCoE Steering Committee			
High-Level Terms of Reference	<ul style="list-style-type: none"> <li>• Benefits realization for the CCoE</li> <li>• Strategic direction and priorities of CCoE</li> <li>• Executive stakeholder management and communication</li> <li>• Resolution of escalated issues</li> <li>• Approval of significant change</li> </ul>	Attendees	<ul style="list-style-type: none"> <li>• State of Washington CCoE leads</li> <li>• State of Washington Agency/ Functional Leads</li> <li>• Vendor CCoE Account Manager</li> <li>• Vendor Service Manager</li> <li>• State of Washington Vendor Relationship Manager</li> <li>• State of Washington Transformation and Transition Leads (as required)</li> </ul>
Inputs	<ul style="list-style-type: none"> <li>• Escalated issues/risks</li> <li>• Service status reports (highest level of aggregation), SLAs</li> <li>• Balanced scorecard</li> <li>• Relationship health check reports</li> <li>• IT/Agency governance directives</li> </ul>	Outputs	<ul style="list-style-type: none"> <li>• CCoE strategy</li> <li>• Resolution of escalated issues</li> <li>• Risk mitigation actions</li> <li>• Directives to CCoE status concerns</li> <li>• Escalation to IT/Agency Governance Steering Committee</li> </ul>
Responsibilities	<ul style="list-style-type: none"> <li>• Ensuring that the CCoE realizes the benefits defined in the business case</li> <li>• Investment decisions within the CCoE budget</li> <li>• Review Level 1&amp;2 support performance by comparing key metrics with corresponding SLAs/OLAs</li> <li>• Provide final approval of major initiatives/changes</li> <li>• Review and approve significant changes to CCoE standards</li> <li>• Resolution of escalated issues, or escalation to IT/Agency Governance Steering Committee</li> </ul>	Escalation	<p>Escalation from:</p> <ul style="list-style-type: none"> <li>• Business/Functional Operating Committees</li> <li>• Vendor Management Steering Committee</li> <li>• Transition/Transformation Management Committee</li> </ul> <p>Escalation to:</p> <ul style="list-style-type: none"> <li>• IT/Agency Governance Steering Committee</li> <li>• Transition/Transformation Management Committee (deferring change responsibility)</li> </ul>



### CCoE Steering Committee

	<ul style="list-style-type: none"> <li>• Communication to key business stakeholders and customers</li> </ul>		
Frequency	<ul style="list-style-type: none"> <li>• Quarterly</li> </ul>		

### Vendor Management Steering Committee

High-Level Terms of Reference	<ul style="list-style-type: none"> <li>• Vendor performance</li> <li>• Vendor relationship management</li> <li>• Vendor issues resolution</li> <li>• Vendor transition management</li> </ul>	Attendees	<ul style="list-style-type: none"> <li>• State of Washington Vendor Relationship Manager</li> <li>• State of Washington Contracts Manager</li> <li>• State of Washington CCoE Leads</li> <li>• Vendor CCoE Account Manager</li> <li>• Vendor Contracts Manager</li> <li>• Onsite Relationship Managers</li> <li>• State of Washington Level 1 Support and Agency/ Functional Leads</li> </ul>
Inputs	<ul style="list-style-type: none"> <li>• Vendor performance status (metrics and measures)</li> <li>• SLAs/OLAs</li> <li>• Business stakeholders and customer feedback</li> <li>• Vendor issues and risks</li> <li>• Vendor contract and change requests</li> </ul>	Outputs	<ul style="list-style-type: none"> <li>• Vendor performance improvement actions</li> <li>• Issue resolution, or escalation</li> <li>• Risk mitigation actions</li> <li>• Change approvals/rejections</li> </ul>
Responsibilities	<ul style="list-style-type: none"> <li>• Monitor vendor performance</li> <li>• Manage vendor relationships</li> <li>• Monitor vendor efficiency savings delivery</li> <li>• Monitor vendor change delivery</li> <li>• Issue resolution</li> <li>• Vendor risk management</li> <li>• Vendor transition management</li> <li>• Contract change approval</li> <li>• Vendor pricing decisions</li> </ul>	Escalation	<p>Escalation from:</p> <ul style="list-style-type: none"> <li>• Agency/Functional Operating Committees</li> </ul> <p>Escalation to:</p> <ul style="list-style-type: none"> <li>• CCoE Steering Committee</li> <li>• Agency/Functional Operating Committee</li> </ul>
Frequency	<ul style="list-style-type: none"> <li>• Monthly</li> </ul>		





**Business / Functional Operating Committees**

<p>High-Level Terms of Reference</p>	<ul style="list-style-type: none"> <li>Operational responsibility for all Production Management activity within business/function</li> <li>Review of Service Level Performance</li> <li>Review of business/functional stability</li> <li>Resolve escalated issues</li> <li>Review the progress of business/functional change initiatives</li> </ul>	<p>Attendees</p>	<p>Separate Operating Committees are envisaged by Agency/Function</p> <ul style="list-style-type: none"> <li>Agency/Functional Lead</li> <li>Vendor Business / Functional Lead</li> <li>Level 2 State of Washington Domain Leads</li> <li>Level 2 Vendor Domain Leads</li> <li>Level 1 Support &amp; Horizontal State of Washington Lead</li> <li>Vendor Relationship Manager (as required)</li> </ul>
<p>Inputs</p>	<ul style="list-style-type: none"> <li>Business / functional Service Level reporting</li> <li>Escalated issues</li> <li>Incident reporting</li> </ul>	<p>Outputs</p>	<ul style="list-style-type: none"> <li>Issue resolution and risk mitigation</li> <li>Escalation of issues</li> <li>Actions to address instability</li> <li>Application onboarding plans</li> <li>Actions to address demand and supply imbalance</li> </ul>
<p>Responsibilities</p>	<ul style="list-style-type: none"> <li>Resolve escalated issues</li> <li>Manage mitigation of operational risk</li> <li>Manage stakeholder/customer relationships</li> <li>Escalate issues to business stakeholders and Steering committee</li> <li>Monitor and manage performance issues not resolved in domains</li> </ul>	<p>Escalation</p>	<p>Escalation from:</p> <ul style="list-style-type: none"> <li>Level 1 Support &amp; Horizontal Operating Committees</li> <li>Level 1 &amp; 2 Support Domain/Application Focus Meetings</li> <li>Domain Operating Committees</li> <li>Vendor Management Committee</li> </ul> <p>Escalation to:</p> <ul style="list-style-type: none"> <li>Steering Committee</li> <li>Vendor Management Committee</li> </ul>
<p>Frequency</p>	<ul style="list-style-type: none"> <li>Monthly</li> </ul>		



Level 2 Support Domain Operating Committees			
High-Level Terms of Reference	<ul style="list-style-type: none"> <li>Operational responsibility for the individual domain Level 2 Support Production Management</li> <li>Review of application stability &amp; incident management</li> <li>Review upcoming TCMs</li> <li>Resolve escalated issues</li> <li>Manage domain-specific change initiatives</li> <li>Review application onboarding</li> <li>Discuss/prioritize/approve change requests</li> <li>Prioritize Level 2 Support activities</li> </ul>	Attendees	Separate Operating Committees are envisaged by Domain <ul style="list-style-type: none"> <li>Level 2 Support State of Washington Domain Lead</li> <li>Level 2 Support Vendor Domain Lead</li> <li>Level 2 Support Vendor team members (as required)</li> </ul>
Inputs	<ul style="list-style-type: none"> <li>Domain status reports, including metrics and measures</li> <li>Escalated issues</li> <li>Demand and supply reporting</li> <li>Incident reporting</li> <li>TCM reporting</li> <li>Application onboarding requests</li> </ul>	Outputs	<ul style="list-style-type: none"> <li>Issue resolution and risk mitigation</li> <li>Escalation of issues</li> <li>Actions to address instability</li> <li>Application onboarding plans</li> <li>Actions to address demand and supply imbalance</li> </ul>
Responsibilities	<ul style="list-style-type: none"> <li>Resolve escalated issues</li> <li>Manage mitigation of operational risk</li> <li>Prioritize resources</li> <li>Monitor workload</li> <li>Manage stakeholder/customer relationships</li> <li>Escalate issues to Business stakeholders and Steering committee</li> <li>Monitor and manage performance issues</li> </ul>	Escalation	Escalation from: <ul style="list-style-type: none"> <li>Level 1 Support/Horizontal Operating Committees</li> <li>Level 1 &amp; 2 Support Domain/Application Focus Meetings</li> <li>Vendor Management Committee</li> </ul> Escalation to: <ul style="list-style-type: none"> <li>Agency / Functional Operating Committees</li> <li>Vendor Management Committee</li> </ul>
Frequency	<ul style="list-style-type: none"> <li>Bi-Weekly / Monthly</li> </ul>		



Level 1 Support & Horizontal Operating Committees			
High-Level Terms of Reference	<ul style="list-style-type: none"> <li>Operational responsibility for the separate business area Level 1 or horizontal support functions</li> <li>Monitor and manage SLA performance</li> <li>Review team quality performance</li> <li>Resolve escalated issues</li> <li>Knowledge management</li> <li>Manage process change initiatives</li> <li>Review application onboarding</li> <li>Level 2 stakeholder management activity</li> <li>Resource capacity planning</li> </ul>	Attendees	<p>Separate Operating Committees are envisaged for Level 1 Support by CTS/WaTech and horizontal support teams</p> <ul style="list-style-type: none"> <li>Level 1 Support &amp; Horizontal State of Washington Lead</li> <li>Level 1 Support Business Engagement Leads X2</li> <li>Level 1 Support &amp; Horizontal Vendor Lead</li> <li>Vendor Relationship Manager (as required)</li> <li>Level 1 Support Vendor Shift Leads (as required)</li> </ul>
Inputs	<ul style="list-style-type: none"> <li>SLA performance reports</li> <li>Escalated issues</li> <li>Reported process violations</li> <li>Transition / Change requirements</li> <li>Demand planning</li> </ul>	Outputs	<ul style="list-style-type: none"> <li>Issue resolution and risk mitigation</li> <li>Escalation of issues</li> <li>Actions to address instability</li> <li>Application onboarding plans</li> <li>Actions to address demand and supply imbalance</li> </ul>
Responsibilities	<ul style="list-style-type: none"> <li>Manage Level 1 Support or horizontal performance to SLAs</li> <li>Manage and plan stakeholder management activity</li> <li>Escalate issues to Level 2 Domain Operating Committees and the Steering Committee</li> <li>Resource capacity planning decisions</li> </ul>	Escalation	<p>Escalation from:</p> <ul style="list-style-type: none"> <li>Level 2 Domain Operating Committees</li> <li>Level 1 &amp; 2 Support Domain/Application Focus Meetings</li> </ul> <p>Escalation to:</p> <ul style="list-style-type: none"> <li>Steering Committee</li> <li>Level 2 Support Domain Operating Committees</li> <li>Agency/Functional Operating Committees</li> </ul>
Frequency	<ul style="list-style-type: none"> <li>Bi-Weekly/Monthly</li> </ul>		



**Level 1 Support/Horizontal & Level 2 Domain/Application Focus Meetings**

High-Level Terms of Reference	<ul style="list-style-type: none"> <li>• Review Level 1 Support trends for Domain or Application</li> <li>• Review Level 1 Support to Level 2 Support escalations</li> <li>• Identify Knowledge Base (run book) improvements</li> <li>• Escalated issues</li> <li>• Plan activity or application onboarding to Level 1 Support</li> <li>• Plan events</li> </ul>	Attendees	<p>Separate focus meetings by Application or Domain</p> <ul style="list-style-type: none"> <li>• Level 1 Support Vendor Business Lead</li> <li>• Level 2 Support Vendor team member</li> <li>• Level 1 Support State of Washington and Vendor Leads (as required)</li> <li>• Level 2 Support State of Washington and Vendor Domain Leads (as required)</li> </ul>
Inputs	<ul style="list-style-type: none"> <li>• Support trend reporting</li> <li>• Escalated Knowledge Base issues</li> <li>• Escalated issues</li> </ul>	Outputs	<ul style="list-style-type: none"> <li>• Actions to improve knowledge articles</li> <li>• Instability risks addressed</li> </ul>
Responsibilities	<ul style="list-style-type: none"> <li>• Improve Level 1 Support resolution rates</li> <li>• Reduce instability through improving the knowledge base</li> <li>• Process improvement through increased Level 1 &amp; 2 Support communications</li> </ul>	Escalation	<p>Escalation from:</p> <ul style="list-style-type: none"> <li>• Level 2 Support Domain Operating Committees</li> <li>• Level 1 Support &amp; Horizontal Operating Committees</li> </ul> <p>Escalation to:</p> <ul style="list-style-type: none"> <li>• Level 2 Support Domain Operating Committees</li> </ul>
Frequency	<ul style="list-style-type: none"> <li>• Bi-Weekly/Monthly</li> </ul>		

**Transition / Transformation Management Committee**

High-Level Terms of Reference	<ul style="list-style-type: none"> <li>• The overall direction of the transition and change initiatives</li> <li>• Process standards definition</li> <li>• Change initiatives monitoring and reporting</li> <li>• Transition project monitoring and reporting</li> <li>• Change the transition budget and priorities</li> <li>• Resolution of transition/change issues</li> <li>• Prioritization of activity</li> </ul>	Attendees	<ul style="list-style-type: none"> <li>• State of Washington Transformation Lead</li> <li>• Vendor Transformation Lead</li> <li>• Vendor Transformation Agents (as required)</li> <li>• State of Washington Transition Lead &amp; Benefits Realization Manager</li> <li>• Vendor Transition Lead</li> <li>• State of Washington Level 1 Support &amp; Horizontal / Level 2 Support Domain Leads</li> </ul>
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**Transition / Transformation Management Committee**

	<ul style="list-style-type: none"> <li>• Resourcing of projects</li> </ul>		<ul style="list-style-type: none"> <li>• State of Washington and Vendor Tools Team Lead</li> </ul>
Inputs	<ul style="list-style-type: none"> <li>• Transition project plans and status</li> <li>• Defined CCoE processes</li> <li>• Area process maturity status</li> <li>• Escalated transition/change issues</li> </ul>	Outputs	<ul style="list-style-type: none"> <li>• Transition/change program strategy</li> <li>• Prioritization of transition/change activity</li> <li>• Transition/change issue resolution</li> <li>• Project ownership assignments</li> </ul>
Responsibilities	<ul style="list-style-type: none"> <li>• Help drive the development of the process standardization</li> <li>• Prioritize and plan the roll-out of standardization</li> <li>• Plan and govern the onboarding transition activity</li> <li>• Benefits delivery tracking</li> <li>• Manage the on-going process standardization activity</li> <li>• Manage the status reporting</li> <li>• Monitor transition/change activity and report to the Steering Committee</li> </ul>	Escalation	<p>Escalation from:</p> <ul style="list-style-type: none"> <li>• Level 1 Support &amp; Horizontal Operating Committees</li> <li>• Level 2 Support Domain Operating Committees</li> <li>• Agency / Functional Operating Committees</li> <li>• CCoE Steering Committee</li> </ul> <p>Escalation to:</p> <ul style="list-style-type: none"> <li>• CCoE Steering Committee</li> </ul>
Frequency	<ul style="list-style-type: none"> <li>• Bi-Weekly/Monthly</li> </ul>		



### 11.4.2 Governance Charter High-Level View

The Governance Charter will define the roles and responsibilities of each party, what meetings and reviews will take place, and the processes around the issue, dispute, and variation management.

Whereas the final Governance Charter will be agreed and finalized by all parties, the minimum requirements have been described with members, roles, and responsibilities illustrated below in Exhibit 11.4.2.1.



Exhibit 11.4.2.1: Unisys CCoE Operational Governance Model



## 11.5 Charter Example: Table of Contents:

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## 11.6 Executive Overview

Cloud computing introduces a significant shift in how technology is obtained, used, and managed. It also shifts how organizations budget and pay for technology services. Cloud computing benefits organizations by:

- Enabling them to trade capital expense for variable expense
- Providing the advantages from massive economies of scale
- Facilitating agile capacity decisions



- Increasing business speed and agility
- Ending spend on money running and maintaining data centers
- Going global in minutes

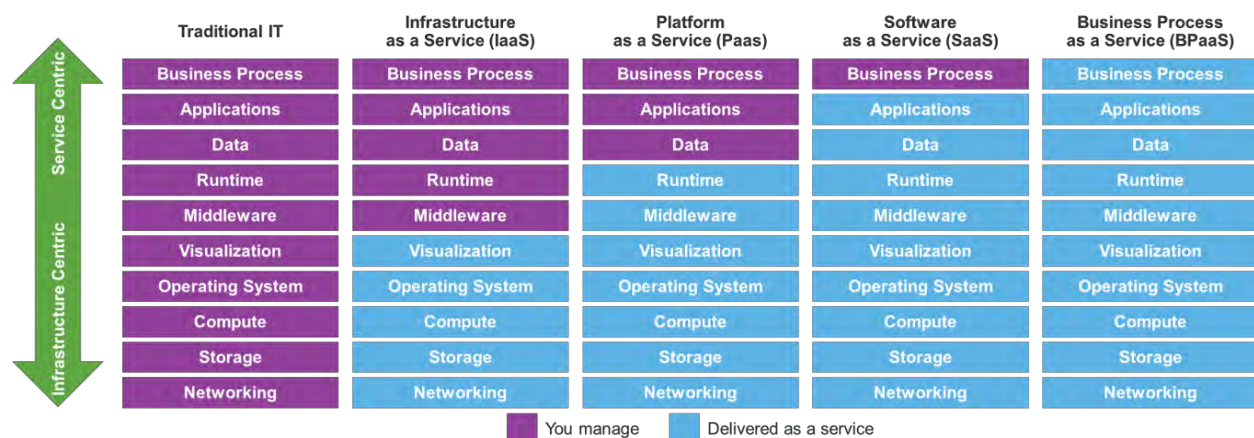
With public cloud services, the State of Washington can immediately provision the compute, storage, network, and database resources needed for any project. These resources launch and are ready for use by the project team within minutes. The environment can be reconfigured easily, updated quickly, scaled up or down automatically to meet usage patterns, optimize spending, or shut down resources temporarily or permanently. The billing for public cloud services becomes an operational expense rather than a capital expense.

Cloud adoption requires that fundamental changes are discussed and considered across the entire organization and that stakeholders across all organizational units—both outside and within IT—support these changes. The Unisys Cloud Adoption Framework provides guidance that supports each unit in your organization so that each area understands how to update skills, adapt existing processes, and introduce new processes to take maximum advantage of the services provided by cloud computing.

## 11.7 Scope of the Charter Document

It is essential to set forth a standard definition of terms and the general scope of this document. The term cloud is often overused in the modern IT lexicon and has lost some of its meaning to technology professionals, executives, and consumers. The definition of the cloud for the scope of this document refers to IaaS (Infrastructure as a Service) and PaaS (Platform as a Service) services offered by public cloud providers: AWS, Microsoft, and Google.

SaaS (Software as a Service) does not fall into the scope of this document. The governance and operation of SaaS services are handled by different State of Washington IT groups. The State of Washington Consolidated Technology Services (CTS/WaTech) team is responsible for the IaaS and PaaS services within the State of Washington IT.



### 11.7.1 Software as a Service (SaaS)

SaaS is an application offered to a user as a service. SaaS is a complete, turnkey application solution (i.e., no IT-organization-built solution is required). Users access SaaS via a user-centric





interface, such as a web browser or a rich internet application (RIA) mechanism (e.g., media player plug-in). Examples of SaaS: O365, Salesforce, Azure AD, Okta, ServiceNow.

### 11.7.2 Platform as a Service (PaaS)

PaaS is a managed application platform for building and operating applications and services. Like any application platform, a PaaS environment supplies development and runtime frameworks to support the presentation, business logic, data access, and communication capabilities. The PaaS environment must also supply supporting infrastructure capabilities, such as authentication, authorization, session management, transaction integrity, integration, performance management, capacity management, reliability, availability, and scalability. Examples of PaaS: database, storage, containers, web platforms.

### 11.7.3 Infrastructure as a Service (IaaS)

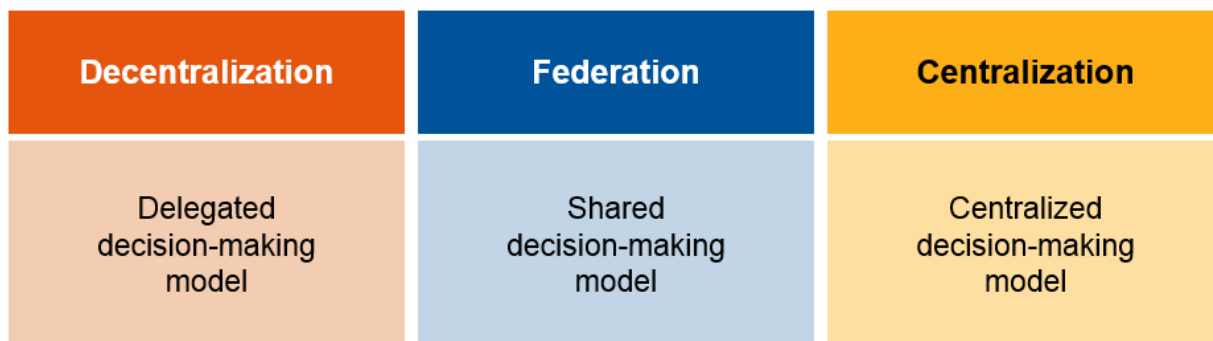
IaaS is a set of hardware or software capabilities that enable the service consumer to layer on the platform, data, or software solutions to deploy a complete IT offering. Consumers of IaaS range from software developers who want to deploy an application on scalable infrastructure services to IT administrators who look to replace on-premises infrastructure deployments with cloud-based services. IaaS solutions commonly offer management access to consumers via APIs or web-based consoles. Consumers leverage these interfaces to perform standard management functions on the infrastructure (e.g., create, start, stop, delete, and copy). Examples of IaaS include servers, networks, load balancers, security groups, Internet gateways.

The application or presentation layer is out of scope for this document. Governance and operation of applications will be handled by the respective line of business responsible for the application.

The CTS/WaTech team is not directly responsible for application support/operations, although there may be some overlap between cloud operations and application support. The boundaries between cloud operations teams and application teams will be carefully detailed and will include multiple models to accommodate anything from legacy IT to agile app development.

## 11.8 Governance

There are three different models available that organizations can leverage to build their governance approach.



The three approaches are:



### 11.8.1 A decentralized approach

**A decentralized approach** — Includes a delegated decision-making model. In this model, decision-making authority is distributed throughout a larger group. The decentralized model helps to empower employees by giving them more autonomy to make their own decisions. It can also facilitate the process of expansion. A possible disadvantage of a decentralized structure is that organizations must relinquish a bit of control, and decision-making can be a little more time-consuming. In a decentralized model, the silos will define the governance policies. If your organization has strong cloud expertise in all functional areas, this may be the right approach.

### 11.8.2 A centralized approach

**A centralized approach** — Includes a centrally controlled decision-making structure where all decisions and processes are handled strictly at the top of the executive level. Under this model, organizations need to create an independent governing body or empower all the different functional areas to work as a single unit to develop governance policies. Without cloud expertise in all the functional areas, a centralized approach may be preferred to leverage the expertise where it exists.

### 11.8.3 A federated approach

**A federated approach** — Is a shared decision-making model and a blend of decentralized and centralized models. The mix of this blend will vary from organization to organization. Federated approaches allow a few cloud areas to retain autonomy and define their governance policies, while the balance of governance is established through a committee approach.

## 11.9 Governance Levels

The State of Washington has adopted a federated governance model that incorporates aspects of the centralized and decentralized methods. There are three primary levels of governance within the State of Washington. One is at the enterprise level; the other two are at the network and Agency level. The State of Washington's cloud strategy should follow the principles of the federated model and mirror the federal government of the US.

- **Federal Government** — Provides the overarching architecture and rules. The five State of Washington Networks and the State of Washington must abide by the rules defined by the governance group. Additional rules can be added through a cloud Architect/Governance group. A highly governed exceptions policy should be introduced along with the Cloud Center of Excellence framework for continuous review.
- **State Government** — Rules defined at the federal level are inherited by default. However, there is an additional State of Washington Network-specific set of rules to support anything unique to that network while staying within the framework of the federal system.
- **City Government** — Agencies would inherit both the state and federal layer policies and standards, but the model provides a broad spectrum of additional policies, standards, and best practices that define how the work is completed and managed and allows for the uniqueness of the Agencies and the Agencies' customers. Agencies benefit from standards established at the federal and state level and have the freedom to innovate and manage according to approved architectures.



## 11.10 Cloud Center of Excellence

The Cloud Center of Excellence (CCoE) is the amalgamation of several sub-teams or roles. The CCoE is responsible for setting the direction and policies for the cloud environment. It is responsible for the decision-making processes, criteria, and policies involved in the planning, architecture, acquisition, deployment, operation, and management of the State of Washington’s public cloud environments.

### Cloud Center of Enablement (CCoE)

*Catalyzing your transformation to a cloud-first organization*

**# 1 Cloud Adoption Challenge is a Skills Gap**

**Achieve Critical Mass to be Self-Sustaining**

**CCoE is about Education, Engagement, and Transformation**

Educate and Engage in all aspects of your organization:  
**Operations, Contracting, Security – Everyone**

*Committed agents who are Cloud certified and well-versed in your cloud objectives will actively engage and transform your organization.*

Establish a community that creates, evangelizes, institutionalizes and shares best practices

*Cloud adoption is infectious. Give your cloud transformation a place to take root by establishing an open community to share institutional knowledge.*

**And use our established knowledge base as your foundation**

BEST PRACTICES	DEMOS	SOURCE CODE
LESSONS LEARNED	EVENT INFORMATION	CLOUD FORMATION TEMPLATES
USE CASES	REUSABLE ARTIFACTS	CLOUD MACHINE IMAGES (AMI'S)

Exhibit 11.10.1 Cloud Center of Enablement (CCoE)

This team comprises senior IT leaders with in-depth knowledge of the State of Washington’s operational business practices and IT standards. Members of this team or role have experience in strategy, planning, architecture, program, and project management.

Working in parallel are the members of the CTS/WaTech team, made up of lead engineers/architects in various IT departments who are also well versed in cloud technologies. They will be responsible for the day-to-day operations, management, resource management, and provisioning of the State of Washington’s cloud computing capability. Members of this team have experience in IT operations, systems administration, and DevOps.

Another component of the CCoE is the oversight team. This team is responsible for assessing risk, compliance, and ensuring that business and IT objectives are well defined and met. Members of this team have information security backgrounds and experience in compliance and risk, information security, system and network security, internal IT audit, and quality assurance.



## 11.11 Management and Operations Models

This Section identifies options and recommendations around the management of cloud environments, including roles and responsibilities. It includes account/subscription setup, access level to cloud resources, and cloud policies that can build a foundation for CTS/WaTech cloud operations.

Before examining the possible management models, it is crucial to understand what cloud operations entail and what services are offered through the CTS/WaTech Cloud Services team, which provides planning, architecture, deployment, and management services for cloud IaaS and PaaS environments. The following lists some of the services offered by CTS/WaTech:

- Discover, assess, and migrate existing Agency workloads to cloud infrastructure
- Provide billing/reporting and account/subscription setup
- Deploy cloud infrastructure, identity management, virtual private cloud/virtual network, and VPN/Direct Connect/NetBond connectivity
- Provide cloud automation & optimization, central logging & compliance auditing, and network security access management
- Provide OS support, systems engineering support, and database support
- Assist with DevOps, agile, and continuous integration/continuous deployment initiatives
- Perform proactive monitoring, systems security management, inventory management (CMDB), standard backups, DNS, and storage management
- Provide VM and database provisioning, management & patching of resources, compliance reporting, and event/incident/change/problem management

Operations within a cloud environment can be broken down into three layers to explain the boundaries between CTS/WaTech IT and Agency teams. The first layer is cloud infrastructure, and this may include the following types of resource actions:

1. Setting up an account/subscription within the consolidated billing structure or Enterprise Agreement
2. Configuring identity management for access to the AWS, Azure, or Google cloud portal
3. Creating RBAC (Role-Based Access Control) roles to perform certain functions on cloud infrastructure
4. Setting up and configuring virtual networks, subnets, and security groups
5. Establishing logging and security at the cloud infrastructure layer

The second layer is systems infrastructure and may include the following: virtual machines, appliances, databases, and how they are accessed and managed. The final layer of operations within a cloud environment is the application layer. The application layer may utilize components from the cloud infrastructure layer and the systems layer as well as serverless components and other services available in the cloud. The CTS/WaTech Cloud Services team can provide services for cloud infrastructure operations and systems operations. The Agency team will be responsible for application operations.



With a better understanding of the roles and boundaries that exist between CTS/WaTech IT and Agency teams, we will now take a closer look at the possible management models offered by the State of Washington Cloud Strategy Framework.

## 11.12 Management Model

There are three main approaches to cloud operation and management, as described below:

1. **CTS/WaTech IT Fully Managed Model** – In this model, CTS/WaTech IT cloud engineers will manage and provision all cloud resources. A request and approval process will be needed for development and the business to request cloud services. This model is the default option for Agencies with no cloud expertise among their personnel.
2. **CTS/WaTech IT Co-Managed Model** – In this model, CTS/WaTech IT cloud engineers provide guidance, constraints, and infrastructure setup and support for the environment. Individual Agency teams will be able to provision their resources and services in these environments. The CTS/WaTech IT team will create the necessary roles and permissions to allow the delegation of management to the Agency team. More experienced Agency teams will have more management and control privileges over their cloud environment.
3. **Agency Self-Managed Model** – Each Agency application team is responsible for servicing, managing, and operating of their cloud environments. This model is typically for Agency sandbox environments and is to be used for proof of concept and testing of new technologies. Client contract requirements may also provide a compelling reason for self-managed environments. If an Agency displays competency in cloud operations, it may be able to operate its cloud environment. The CTS/WaTech IT Team will provide guidelines and automation tools to meet the CTS/WaTech cloud standards. All requests for a self-managed environment will be reviewed by CTS/WaTech's State Office of Cybersecurity (OCS) to ensure the goals align with the overall cloud strategy.

A breakdown example of a co-managed model with an experienced Agency Team:

OCS IT Team	Agency Team
Design and Setup of the network and network security group	Provisioning of resources inside given resource group and provisioned virtual network – using OCS provided templates
Creation and Assignment of role-based access for Agency team members	Management of self-provisioned resources
Monthly review of operations	Access to network, storage, and compute layers
Creation of templates for provisioning resources	Access to the marketplace for 3rd party applications as needed
Operation monitoring, patching, and security deployment/review	

## 11.13 Operation and Architecture Models

With a good foundation established for operations management models, we will now address the possible types of operating environments and guidelines for them. Operating environments are divided into three general types: Production, Non-Production, and Sandbox as detailed below:



1. Production – this environment hosts applications and data that are critical and sensitive for operations with or for a client. This environment may also contain non-production data and workloads, but if there are any production workloads, the environment is considered production.
2. Non-Production – this environment hosts development, test, QA, staging, and any data or application that is not considered production. A non-production environment cannot contain any production workloads. If it contains production workloads, it is production.
3. Sandbox – this is an environment to test new technologies and perform proof of concept. The Agency team ultimately manages this environment. There is no connectivity allowed between the Sandbox environments and Production, Non-Production, or data center environments. Sandbox environments are only allocated for specific use cases that require root or owner-level control of the account/subscription. CTS/WaTech and OCS will review all Sandbox environment requests.

It is suggested that each Agency always maintain Production and Non-Production cloud environments. Depending on the size of the workloads, these environments may be separate cloud accounts/subscriptions. For smaller workloads, it is possible to host both production and non-production in the same cloud account/subscription and use isolation technologies to keep them properly separated.

## 11.14 Architectures

In addition to the three types of operating environments, four types of connectivity architecture further define an operating environment – referred to as A, B, C, and D architecture types.

### 11.14.1 Architecture A: Stand-Alone PaaS Architecture

This option is designed for public/internet-facing applications. The cloud service provider will manage all the infrastructure and the OS layer. Typically, we see web applications or web job/batch processing for the application layer and relational database services that allow connections from other cloud services or external systems. Private connectivity initiated from this environment to the on-premises network is not supported.

### 11.14.2 Architecture B: Stand-Alone PaaS/IaaS Networked Architecture

This option is like Architecture A except that virtual networks are provisioned to provide connectivity for internal (private) resources securely. However, this architecture must support access via the public/internet-facing applications for accessing the provisioned services and remote desktop/shell to the environment.

### 11.14.3 Architecture C: Hybrid IaaS Internal Networked Architecture

This option calls for extending the on-premises domain into a designated Azure data center. A site-to-site VPN or a dedicated connection is used to provide connectivity between the two locations. It is common to start with a site-to-site VPN over the Internet. As latency and bandwidth increase, the Agency may opt to switch to ExpressRoute to provide the needed performance. This architecture is secured from external access since all access to the VPC/VNET must come from the on-premises network; thus, existing security and control measures are in play. Typically, financial systems, Dev, and QA/Test environments subscribe to this architecture.



### 11.14.4 Architecture D: Hybrid PaaS and IaaS Networked Architecture

This option is like Architecture C regarding the extension of the on-premises domain to the cloud and connectivity. However, this option will allow internet traffic to reach some of the resources and services and allow connectivity from the public network back into the on-premises network. Deployment of multiple VPC/VNETs, multiple subnet segmentation, network security groups, firewalls, rules, policies, VPNs, and potential third-party virtual proxy/firewalls are needed to create and secure a demilitarized zone (DMZ) type of architecture similar to the on-premises solution for external access.

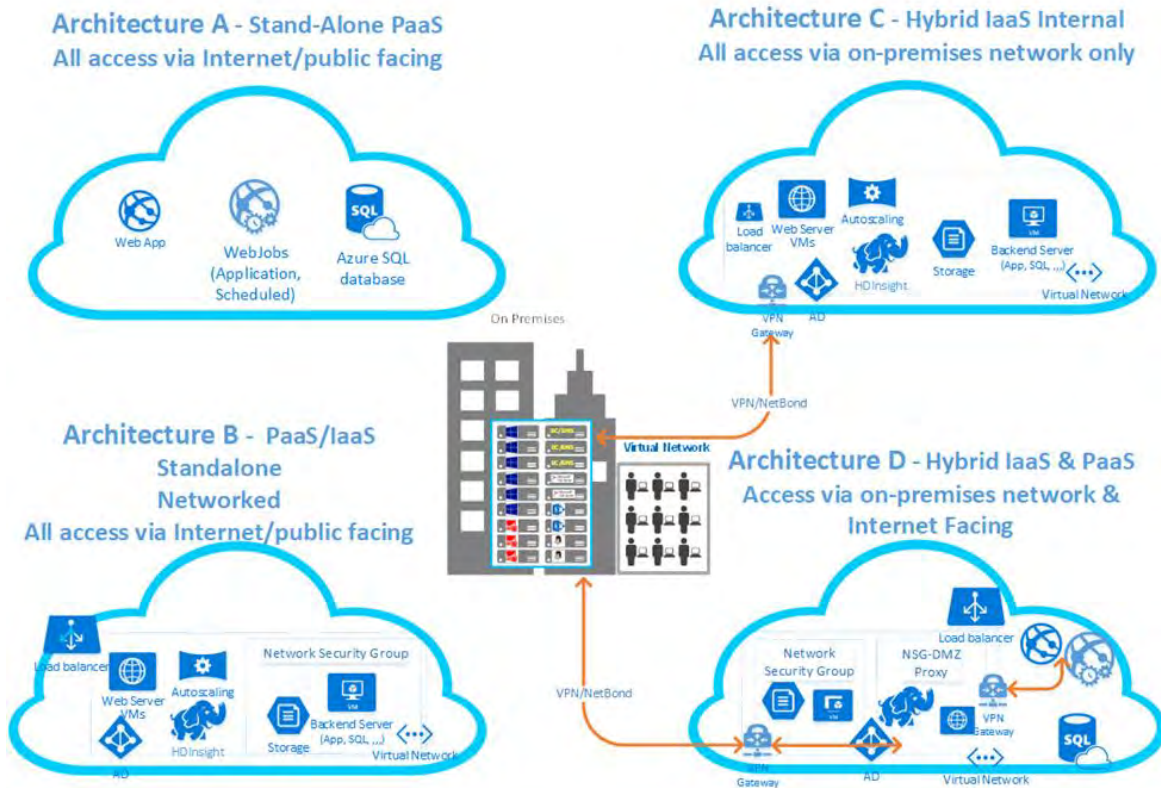


Exhibit 11.14.4.1: Operation and Architecture Models

Using the established definition, we can see that any cloud environment can be classified by three describing factors: management model, operating model, and architecture. For example, a cloud environment for an Agency that hosts their prod and non-prod workloads might be represented as a Co-Managed, Production, Architecture D environment. This classification system allows all stakeholders to communicate on the same level and is used by CTS/WaTech when specifying and building out new cloud environments.

As we conclude the Governance, Management, and Operating overview, we have established the general framework within which the State of Washington will operate in the cloud.

The remainder of the charter document focuses on the technical and operational details described in the overview.



End of Project Charter document sample.

## 12. Future State – Roadmap Plan

The future state roadmap includes a proposed project timeline for implementing the recommended projects (Section 13.5). This timeline focuses on the 36-month cloud adoption strategy program. Ongoing support and continuing operations are not depicted and are expected to pick up after most projects complete.

### 12.1 Transition and Transformation Program Timeline

In the following timeline graphic, the projects marked with a box arrow are anticipated to have a fixed start date and complete within the defined period. If the projects need to be extended, the project’s end date can be expected later in the timeline (extending the project’s duration). For the Cloud Migration (EA-4) and Application Portfolio Rationalization (EA-9) projects, the timeline can shift in both directions to support Agency-specific needs.

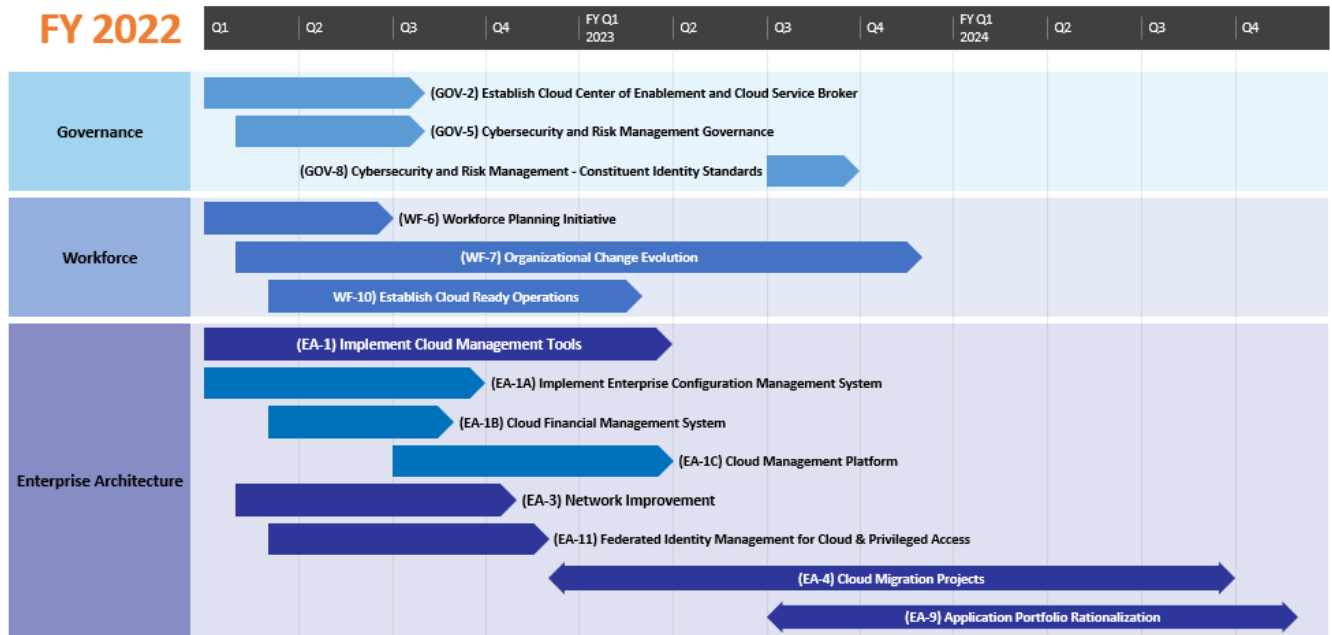


Exhibit 12.1.1: Transition and Transformation Program Timeline





This Roadmap Model involves the critical activities associated with implementing the new, recommended Cloud Strategy. Unisys has created high-level plans that depict the critical timelines (start and finish dates are still open or to be determined) and identify critical milestones. Unisys has also provided workstream types per phase, activity, and the deliverable for this task. The first section is the Program and Project Management or Manage Workstream.

Transition and Transformation Program	Start	Finish	Type	Work Stream
<b>MANAGE WORK STREAM</b>			<b>Work Stream</b>	<b>Manage</b>
<b>ENGAGEMENT DEFINITION</b>			<b>Phase</b>	<b>Manage</b>
<b>Program Engagement Definition</b>			Sub-Work Stream	Manage
Create Program Management Plans			Activity	Manage
Create Program Management Plan			Deliverable	Manage
Create Program Charter			Deliverable	Manage
Create Business Case			Deliverable	Manage
Create Preliminary Program Plan			Deliverable	Manage
Create Program Organization Chart			Deliverable	Manage
Create Program Financial Management Plan			Deliverable	Manage
Create Program Risk Management Plan			Deliverable	Manage
Create Program Quality Management Plan			Deliverable	Manage
Create Detailed Program Plan for Next Phase			Activity	Manage
Create Detailed Program Plan			Deliverable	Manage
<b>Project Engagement Definition</b>			Sub-Work Stream	Manage
Engagement Checklist			Checklist	Manage
Create Project Management Plans			Activity	Manage
Create Preliminary Project Management Plan			Deliverable	Manage
Create Project Charter			Deliverable	Manage
Create Business Case			Deliverable	Manage
Create Work Estimate			Deliverable	Manage
Create Preliminary Project Plan			Deliverable	Manage
Create GDC Internal Statement of Work			Deliverable	Manage
Create Knowledge Management Plan			Deliverable	Manage
Create Project Organization Chart			Deliverable	Manage
Create Project Financial Management Plan			Deliverable	Manage
Create Project Risk Management Plan			Deliverable	Manage
Create Project Quality Management Plan			Deliverable	Manage
Create Project Statement of Work (SOW)/Contract			Activity	Manage
Create Statement of Work (SOW)/Contract			Deliverable	Manage



Transition and Transformation Program	Start	Finish	Type	Work Stream
Create RQM Deliverables			Deliverable	Manage
Create Detailed Project Plan for Next Phase			Activity	Manage
Create Detailed Project Plan			Deliverable	Manage
<b>MOBILIZE</b>			<b>Phase</b>	<b>Manage</b>
<b>Program Mobilize</b>			Sub-Work Stream	Manage
Document Governance Model			Activity	Manage
Create Governance Model			Deliverable	Manage
Create Portfolio Management Plan			Activity	Manage
Create Portfolio Management Plan			Deliverable	Manage
Create Portfolio Optimization Model			Deliverable	Manage
Develop Program Control Policies			Activity	Manage
Create Program Control Policies Document			Deliverable	Manage
Conduct Program Capability Assessment			Activity	Manage
Create Program Capability Maturity Assessment and Improvement Plan			Deliverable	Manage
Create Program Capability Assessment Report			Deliverable	Manage
Establish and Deploy Program Management Office			Activity	Manage
Create Program Cloud Infrastructure and Rollout Plan			Deliverable	Manage
Establish and Implement Program Toolkit			Activity	Manage
Create Program Toolkit Plan			Deliverable	Manage
<b>Project Mobilize</b>			Sub-Work Stream	Manage
Engagement Checklist			Checklist	Manage
Establish Project Working Environment			Activity	Manage
Create Project Office Logistics Checklist			Deliverable	Manage
Create Project Cloud Infrastructure Plan			Deliverable	Manage
Establish and Implement Project Toolkit			Activity	Manage
Create Project Toolkit Plan			Deliverable	Manage
Develop Project Handbook			Activity	Manage
Document Roll-On & Roll-Off Procedures			Deliverable	Manage
Document Time and Expense Reporting Procedures			Deliverable	Manage
Create Project Contact Information			Deliverable	Manage
Conduct Project Kickoff			Deliverable	Manage
Develop Project Control Procedures			Activity	Manage
Update Project Management Plan			Deliverable	Manage
Detail Issues Management Plan			Deliverable	Manage



Transition and Transformation Program	Start	Finish	Type	Work Stream
Create Issues Log			Deliverable	Manage
Detail Change Control Plan			Deliverable	Manage
Detail Configuration Management Plan			Deliverable	Manage
Detail Requirements Management Plan			Deliverable	Manage
Detail Defect Management Plan			Deliverable	Manage
Finalize Project Risk Management Plan			Deliverable	Manage
Finalize Project Quality Management Plan			Deliverable	Manage
Detail Human Resource Management Plan			Deliverable	Manage
Detail Subcontractor Management Plan			Deliverable	Manage
Detail Procurement Plan			Deliverable	Manage
Finalize Project Financial Management Plan			Deliverable	Manage
Detail Status Report			Deliverable	Manage
Detail Knowledge Management Plan			Deliverable	Manage
Create Project Knowledge Transfer Plan			Activity	Manage
Develop Knowledge Transfer Plan			Deliverable	Manage
Develop Client Handover Checklist			Deliverable	Manage
Develop Transition Training Plan			Deliverable	Manage
<b>Change Mobilize</b>			Sub-Work Stream	Manage
Conduct Stakeholder Analysis			Activity	Manage
Create Stakeholder Analysis			Deliverable	Manage
Conduct Organizational Risk and Readiness Assessment			Activity	Manage
Determine Organizational Risk and Readiness Assessment Approach			Deliverable	Manage
Develop Organizational Risk and Readiness Assessment Report			Deliverable	Manage
Design Change Strategy			Activity	Manage
Develop Journey Map			Deliverable	Manage
Design Change Strategy			Deliverable	Manage
Develop and Deploy Leadership Strategy			Activity	Manage
Develop and Deploy Leadership Action Plans			Deliverable	Manage
Develop Communications			Activity	Manage
Conduct Communications Audience Assessment			Deliverable	Manage
Develop Communications Strategy and Plan			Deliverable	Manage
Develop Mobilization and Alignment Plan			Deliverable	Manage
Develop Project Team Training			Activity	Manage
Develop Project Team Training Participant Guide			Deliverable	Manage



Transition and Transformation Program	Start	Finish	Type	Work Stream
Develop Project Team Training Presentation			Deliverable	Manage
Develop Project Team Training Facilitator Guide			Deliverable	Manage
Develop Project Team Training Quick Reference Guide			Deliverable	Manage
Create Training Evaluation			Deliverable	Manage
Deploy and Support Project Team Training			Activity	Manage
Develop Project Team Training Schedule			Deliverable	Manage
<b>Quality Mobilize</b>			Sub-Work Stream	Manage
Conduct Pre-Execution Process Reviews			Activity	Manage
Create Pre-Execution Process Review Presentation			Deliverable	Manage
<b>PLAN</b>			<b>Phase</b>	<b>Manage</b>
<b>Program Plan</b>			Sub-Work Stream	Manage
Update Program Management Plan			Activity	Manage
Update Program Management Plan			Deliverable	Manage
Update Program Organization Chart			Activity	Manage
Update Program Organization Chart			Deliverable	Manage
Detail and Baseline Program Plan			Activity	Manage
Detail Program Plan			Deliverable	Manage
<b>Project Plan</b>			Sub-Work Stream	Manage
Engagement Checklist			Checklist	Manage
Update Project Management Plan			Activity	Manage
Update Project Management Plan			Deliverable	Manage
Update Project Organization Chart			Activity	Manage
Update Project Organization Chart			Deliverable	Manage
Detail and Baseline Project Plan			Activity	Manage
Verify Work Estimate			Deliverable	Manage
Detail Project Plan			Deliverable	Manage
<b>Change Plan</b>			Sub-Work Stream	Manage
Initiate Team Effectiveness Process			Activity	Manage
Develop and Conduct Team Effectiveness Assessment			Deliverable	Manage
Review and Refine Organizational Risk and Readiness Assessment			Activity	Manage
Review and Refine Organizational Risk and Readiness Assessment Report			Deliverable	Manage
Conduct Initial Communications			Activity	Manage
Update Communications Strategy and Plan			Deliverable	Manage
Conduct Organizational Impact Assessment			Activity	Manage



Transition and Transformation Program	Start	Finish	Type	Work Stream
Conduct Organizational Impact Assessment			Deliverable	Manage
Develop Cloud Workforce Transition Strategy and Plan			Activity	Manage
Develop Cloud Workforce Transition Strategy and Plan			Deliverable	Manage
Conduct Training Needs Assessment			Activity	Manage
Develop Training Needs Assessment			Deliverable	Manage
Develop Training Audience Analysis			Deliverable	Manage
Develop Instructional Analysis			Deliverable	Manage
Develop Training Approach			Activity	Manage
Develop Training Strategy			Deliverable	Manage
<b>EXECUTE &amp; CONTROL</b>			<b>Phase</b>	<b>Manage</b>
<b>Program Execute &amp; Control</b>			Sub-Work Stream	Manage
Conduct On-Going Program Management			Activity	Manage
Maintain Program Management Plan			Deliverable	Manage
Manage Program Plan			Deliverable	Manage
Manage Governance			Deliverable	Manage
Manage Portfolio			Deliverable	Manage
Manage Program Capability Improvement			Deliverable	Manage
Manage Program Control Policies			Deliverable	Manage
<b>Project Execute &amp; Control</b>			Sub-Work Stream	Manage
Engagement Checklist			Checklist	Manage
Conduct On-Going Project Management			Activity	Manage
Maintain Project Management Plan			Deliverable	Manage
Manage Project Plan			Deliverable	Manage
Manage Issues			Deliverable	Manage
Manage Issues Log			Deliverable	Manage
Manage Change Control			Deliverable	Manage
Manage Work Estimate			Deliverable	Manage
Manage Configuration Management			Deliverable	Manage
Create Configuration Audit Report			Deliverable	Manage
Manage Requirements			Deliverable	Manage
Manage Defects			Deliverable	Manage
Manage Project Risks			Deliverable	Manage
Manage Project Quality			Deliverable	Manage
Manage Roll-On & Roll-Off Procedures			Deliverable	Manage



Transition and Transformation Program	Start	Finish	Type	Work Stream
Manage Human Resources			Deliverable	Manage
Maintain Project Contact Information			Deliverable	Manage
Manage Subcontractors			Deliverable	Manage
Manage Procurement			Deliverable	Manage
Manage Project Finances			Deliverable	Manage
Manage Status Report			Deliverable	Manage
Manage Knowledge			Deliverable	Manage
<b>Change Execute &amp; Control</b>			Sub-Work Stream	Manage
Conduct On-Going Team Effectiveness Process			Activity	Manage
Conduct On-Going Team Effectiveness Assessment			Deliverable	Manage
Conduct On-Going Organizational Risk and Readiness Assessment			Activity	Manage
Review and Refine Organizational Risk Assessment Report			Deliverable	Manage
Conduct On-Going Communications			Activity	Manage
Update Communications Strategy and Plan			Deliverable	Manage
Conduct Role Impact Analysis			Activity	Manage
Create Role Catalog			Deliverable	Manage
Conduct Role Impact Analysis			Deliverable	Manage
Conduct Role Mapping			Activity	Manage
Conduct Role Mapping			Deliverable	Manage
Deploy Cloud Workforce Transition			Activity	Manage
Develop Employee Action Plans			Deliverable	Manage
Develop End User Training			Activity	Manage
Design Training Curriculum			Deliverable	Manage
Develop Web-Based Training Storyboard			Deliverable	Manage
Develop Training Participant Guide			Deliverable	Manage
Develop Instructor-Led Training Presentation			Deliverable	Manage
Develop Training Facilitator Guide			Deliverable	Manage
Develop Training Quick Reference Guide			Deliverable	Manage
Create Training Evaluation			Deliverable	Manage
Deploy and Support End User Training			Activity	Manage
Develop Training Schedule			Deliverable	Manage
Develop Training Logistics Overview			Deliverable	Manage
Develop Training Environment Requirements			Deliverable	Manage
Conduct Train the Trainer Workshop			Deliverable	Manage



Transition and Transformation Program	Start	Finish	Type	Work Stream
Measure Training Effectiveness			Activity	Manage
Develop Training Effectiveness Summary			Deliverable	Manage
<b>Quality Execute &amp; Control</b>			Sub-Work Stream	Manage
Conduct Quality Assurance Reviews and Audits			Activity	Manage
Create Process Review Report			Deliverable	Manage
Create Subcontractor Audit Report			Deliverable	Manage
Conduct Quality Control Reviews and Audits			Activity	Manage
Conduct Peer Review			Deliverable	Manage
Create Quality Control Verification Report			Deliverable	Manage
Create Quality Control Validation Report			Deliverable	Manage
Create Physical Configuration Audit Report			Deliverable	Manage
Create Functional Configuration Audit Report			Deliverable	Manage
<b>CLOSE</b>			<b>Phase</b>	<b>Manage</b>
<b>Change Close</b>			Sub-Work Stream	Manage
Create Post-Implementation Communications Plan			Activity	Manage
Create Post-Implementation Communications Plan			Deliverable	Manage
Create Post-Implementation Training Recommendations			Activity	Manage
Create Post-Implementation Training Recommendations			Deliverable	Manage
<b>Project Close</b>			Sub-Work Stream	Manage
Engagement Checklist			Checklist	Manage
Conduct Project Closure			Activity	Manage
Create Project Closure Agreement			Deliverable	Manage
Conduct Knowledge Transfer			Deliverable	Manage
Create Final Status Report			Deliverable	Manage
Complete Project Financial Closeout			Deliverable	Manage
Complete Project Qualification			Deliverable	Manage
Complete Knowledge Management Closeout			Deliverable	Manage
<b>Program Close</b>			Sub-Work Stream	Manage
Conduct Program Closure			Activity	Manage
Create Program Closure Agreement			Deliverable	Manage
Complete Program Closure			Deliverable	Manage
<b>LIFE CYCLE WORK STREAMS</b>				
<b>Cloud Broker (CB) Strategy</b>			<b>Work Stream</b>	<b>Cloud Broker</b>
Refine CB Scope Definition			Activity	Cloud Broker



Transition and Transformation Program	Start	Finish	Type	Work Stream
Conduct CB Subject Matter Expert (SME) Interviews			Deliverable	Cloud Broker
Conduct Cloud Broker Management (CBM) Workshop			Deliverable	Cloud Broker
Document Enterprise View of Current State Cloud Broker			Deliverable	Cloud Broker
Identify Business, Customer, and Stakeholder Requirement Measures			Deliverable	Cloud Broker
Establish Cloud Broker Management (CBM) Architecture			Activity	Cloud Broker
Establish CB Governance			Deliverable	Cloud Broker
Create CB Strategic Architecture			Deliverable	Cloud Broker
Identify CBM Methods and Cloud Tools			Deliverable	Cloud Broker
Document Standards for Process Modeling			Deliverable	Cloud Broker
<b>Cloud Integration (CI) Strategy</b>			<b>Work Stream</b>	<b>Cloud Integration</b>
Define Strategic CI Architecture			Activity	Cloud Integration
Document Strategic CI Architecture Criteria			Deliverable	Cloud Integration
Develop Strategic CI Architecture Document			Deliverable	Cloud Integration
Document Strategic CI Architecture Selection			Deliverable	Cloud Integration
Evaluate and Select CI Middleware			Activity	Cloud Integration
Document CI Middleware Selection Criteria			Deliverable	Cloud Integration
Compile CI Middleware Candidate Product Evaluations			Deliverable	Cloud Integration
Document Selected CI Product(s)			Deliverable	Cloud Integration
<b>Application Rationalization Strategy</b>			<b>Work Stream</b>	<b>Application Rationalization</b>
Define Strategic Software Architecture			Activity	Application Rationalization
Document Strategic Software Architecture Criteria			Deliverable	Application Rationalization
Develop Alternative Strategic Software Architectures			Deliverable	Application Rationalization
Document Strategic Software Architecture Selection			Deliverable	Application Rationalization
Evaluate and Select Software Operating Environment			Activity	Application Rationalization
Document Software Product Selection Criteria			Deliverable	Application Rationalization
Compile Candidate Software Product Evaluations			Deliverable	Application Rationalization
Document Selected Software Product(s)			Deliverable	Application Rationalization
<b>Cloud Infrastructure Strategy</b>			<b>Work Stream</b>	<b>Cloud Infrastructure</b>
Conduct Cloud Infrastructure Baseline			Activity	Cloud Infrastructure
Create Preliminary Current State Cloud Infrastructure Architecture			Deliverable	Cloud Infrastructure
Identify Critical Cloud Infrastructure Business Drivers			Deliverable	Cloud Infrastructure
Document Preliminary Current State Data Center Facility Design			Deliverable	Cloud Infrastructure
Document Preliminary Current State Cloud Infrastructure Security Strategy			Deliverable	Cloud Infrastructure
Document Preliminary Current State Disaster Recovery Strategy			Deliverable	Cloud Infrastructure





<b>Transition and Transformation Program</b>	<b>Start</b>	<b>Finish</b>	<b>Type</b>	<b>Work Stream</b>
Develop Cloud Infrastructure Conceptual Architecture			Activity	Cloud Infrastructure
Define Cloud Infrastructure Architecture Principles			Deliverable	Cloud Infrastructure
Define Preliminary Cloud Infrastructure Conceptual Architecture			Deliverable	Cloud Infrastructure
Define Preliminary Conceptual Data Center Facility Design			Deliverable	Cloud Infrastructure
Define Preliminary Conceptual Cloud Infrastructure Security Architecture			Deliverable	Cloud Infrastructure
Define Preliminary Conceptual Disaster Recovery Strategy			Deliverable	Cloud Infrastructure
<b>Testing Strategy</b>			<b>Work Stream</b>	<b>Testing</b>
Define Test Strategy and Approach			Activity	Testing
Develop Test Strategy			Deliverable	Testing
Develop Acceptance Test Strategy			Deliverable	Testing
Develop Production Regression Test Strategy			Deliverable	Testing
Document Test Organization Definition			Deliverable	Testing
Determine Test Tool(s)			Activity	Testing
Document Test Tool Selection Criteria			Deliverable	Testing
Compile Test Tool Candidate Product Evaluations			Deliverable	Testing
Document Test Tool Selection Results			Deliverable	Testing
Establish Test Metrics and Reporting			Activity	Testing
Develop Test Metrics Report			Deliverable	Testing
<b>Cloud Services Strategy</b>			<b>Work Stream</b>	<b>Cloud Services</b>
Assess Operational Environment			Activity	Cloud Services
Conduct Assessment of Service Support and Delivery			Deliverable	Cloud Services
Conduct Readiness Assessment for Operations			Deliverable	Cloud Services
Conduct Assessment of Outsourcer and Vendor Services			Deliverable	Cloud Services
Document Cloud Services Operational Strategy			Deliverable	Cloud Services
<b>DESIGN</b>			<b>Phase</b>	
<b>Cloud Broker Design</b>			<b>Work Stream</b>	<b>Cloud Broker</b>
CB Business Requirements			Sub-Phase	Cloud Broker
Identify Preliminary Current State CB Models			Activity	Cloud Broker
Conduct Current State CB Definition Workshops			Deliverable	Cloud Broker
Draft Preliminary Current State CB Models			Deliverable	Cloud Broker
Develop Preliminary CB Performance Issue Table			Deliverable	Cloud Broker
Finalize Current State CB Models			Activity	Cloud Broker
Conduct Current State CB Validation Workshops			Deliverable	Cloud Broker
Finalize Current State CB Models			Deliverable	Cloud Broker



Transition and Transformation Program	Start	Finish	Type	Work Stream
Finalize CB Performance Issue Table			Deliverable	Cloud Broker
Monitor, Measure and Assess Current State CB Performance			Activity	Cloud Broker
Gather Current State CB Performance Metrics			Deliverable	Cloud Broker
Determine Process for Measuring Current State CB Performance			Deliverable	Cloud Broker
Monitor, Measure and Assess Current State CB Performance			Deliverable	Cloud Broker
Set Current State CB Performance Baseline			Deliverable	Cloud Broker
Document CB Gap Analysis			Activity	Cloud Broker
Conduct Leading Practice CB Research			Deliverable	Cloud Broker
Document CB Gap Analysis			Deliverable	Cloud Broker
Finalize Current State and Define Future State CB Performance Targets			Activity	Cloud Broker
Complete Current State CB Assessment			Deliverable	Cloud Broker
Set Preliminary Future State CB Performance Targets			Deliverable	Cloud Broker
Develop Current State CB Performance/Future State Target Gaps			Deliverable	Cloud Broker
Conduct Root Cause and CB Opportunity Identification			Deliverable	Cloud Broker
CB Architecture			Sub-Phase	Cloud Broker
Govern and Manage CB Improvements through CB Architecture			Activity	Cloud Broker
Identify and Prioritize Cloud Broker for Action			Deliverable	Cloud Broker
Develop CB Improvement Roadmap			Deliverable	Cloud Broker
CB Problem Solving			Sub-Phase	Cloud Broker
Establish CB Improvement Team			Activity	Cloud Broker
Establish CB Improvement Project Goals, Problem Statement, and Metrics			Deliverable	Cloud Broker
Identify and Select CB Improvement Project Roles and Members			Deliverable	Cloud Broker
Document Lower-Level Current State Cloud Broker			Activity	Cloud Broker
Develop CB Data Collection Plan			Deliverable	Cloud Broker
Model Lower-Level Current State Cloud Broker			Deliverable	Cloud Broker
Establish Lower-Level CB Performance Metrics			Deliverable	Cloud Broker
Evaluate Data and CB Models			Activity	Cloud Broker
Identify and Narrow Root Cause of the Problem			Deliverable	Cloud Broker
Assess CB Enhancement Opportunities			Deliverable	Cloud Broker
Identify Possible Solutions for CB Improvement			Deliverable	Cloud Broker
CB Detail Design			Sub-Phase	Cloud Broker
Establish CB Design Team			Activity	Cloud Broker
Establish CB Design Project Goals, Problem Statement, and Metrics			Deliverable	Cloud Broker
Identify and Select CB Design Project Roles and Members			Deliverable	Cloud Broker



Transition and Transformation Program	Start	Finish	Type	Work Stream
Document Lower-Level Current State Cloud Broker for Design			Activity	Cloud Broker
Develop CB Data Collection Plan			Deliverable	Cloud Broker
Model Lower-Level Current State Cloud Broker			Deliverable	Cloud Broker
Establish Lower-Level CB Performance Metrics			Deliverable	Cloud Broker
Evaluate Data and CB Models for Design			Activity	Cloud Broker
Identify CB Capability Issues			Deliverable	Cloud Broker
Assess CB Enhancement Opportunities			Deliverable	Cloud Broker
Develop Future State CB Design Scenarios			Activity	Cloud Broker
Develop Future State CB Design Scenarios			Deliverable	Cloud Broker
Create Preliminary Future State CB Design			Activity	Cloud Broker
Conduct Future State CB Design Definition Workshops			Deliverable	Cloud Broker
Draft Preliminary Future State CB Design			Deliverable	Cloud Broker
Select Improvement Lever Recommendations			Deliverable	Cloud Broker
Develop Future State Capability Designs			Deliverable	Cloud Broker
Define Future State CB Performance Metrics			Activity	Cloud Broker
Define Future State CB Performance Metrics			Deliverable	Cloud Broker
Finalize Future State CB Performance Targets			Deliverable	Cloud Broker
Finalize Future State CB Design			Activity	Cloud Broker
Conduct Future State CB Design Validation Workshops			Deliverable	Cloud Broker
Develop Quick Win Recommendations			Deliverable	Cloud Broker
Complete Day One CB Designs			Deliverable	Cloud Broker
Finalize Future State CB Design			Deliverable	Cloud Broker
CB Improvement & Design Validation			Sub-Phase	Cloud Broker
Conduct CB Improvement & Design Validation			Activity	Cloud Broker
Develop CB Validation Approach			Deliverable	Cloud Broker
Conduct CB Validation			Deliverable	Cloud Broker
Assess CB Validation Results			Deliverable	Cloud Broker
Update Future State CB Design			Deliverable	Cloud Broker
Conduct CB Cost-Benefit Analysis (CBA)			Deliverable	Cloud Broker
Review CB Architectural Impacts			Activity	Cloud Broker
Review CB Architectural Impacts			Deliverable	Cloud Broker
Conduct Solution Design Workshop			Activity	Cloud Broker
Complete Solution Questionnaire			Deliverable	Cloud Broker
Conduct Solution Design Workshop			Deliverable	Cloud Broker



Transition and Transformation Program	Start	Finish	Type	Work Stream
Document Updated High-Level Future State Cloud Broker			Deliverable	Cloud Broker
Update Gap or Differentiating Requirements Definition			Deliverable	Cloud Broker
Cloud Integration Design			Work Stream	Cloud Integration
CI Requirements			Sub-Phase	Cloud Integration
Refine CI Implementation Approach			Activity	Cloud Integration
Develop Business Definition Document			Deliverable	Cloud Integration
Develop Preliminary Information Technology Requirements Document			Deliverable	Cloud Integration
Develop Preliminary Architecture Document			Deliverable	Cloud Integration
Create Preliminary Instance Diagram			Deliverable	Cloud Integration
Develop Preliminary Data Model Document			Deliverable	Cloud Integration
Define Cloud Tools and Computing Environment Specification			Deliverable	Cloud Integration
Define Preliminary Rollout (Deployment) Plan			Deliverable	Cloud Integration
Conduct CI Process Definition Workshop			Activity	Cloud Integration
Conduct Cross Team Design Round Table Meetings			Deliverable	Cloud Integration
Document Detailed Process Requirements and Data Specifications			Deliverable	Cloud Integration
Document CI Functional Requirements			Activity	Cloud Integration
Document Detailed Functional Requirements			Deliverable	Cloud Integration
Document CI Information Technology Requirements			Activity	Cloud Integration
Finalize Information Technology Requirements Document			Deliverable	Cloud Integration
CI Architecture (High-Level Design)			Sub-Phase	Cloud Integration
Create CI Process Architecture			Activity	Cloud Integration
Document Preliminary Process Implementation Design			Deliverable	Cloud Integration
Develop Preliminary Message Dictionary Document			Deliverable	Cloud Integration
Detail CI Architecture and Data Model			Activity	Cloud Integration
Finalize Architecture Document			Deliverable	Cloud Integration
Refine Data Model Document			Deliverable	Cloud Integration
Finalize Implementation Cloud Tools and Computing Environment Specification			Deliverable	Cloud Integration
Finalize Instance Diagram			Deliverable	Cloud Integration
Update Rollout (Deployment) Plan			Deliverable	Cloud Integration
Develop Preliminary Instructional Materials			Deliverable	Cloud Integration
Specify Preliminary Implementation Guidelines			Deliverable	Cloud Integration
CI Detailed Design			Sub-Phase	Cloud Integration
Develop CI Process Detailed Design			Activity	Cloud Integration
Develop User Interface Prototype			Deliverable	Cloud Integration



Transition and Transformation Program	Start	Finish	Type	Work Stream
Finalize Process Implementation Design (UT cases)			Deliverable	Cloud Integration
Finalize Message Dictionary Document			Deliverable	Cloud Integration
Develop CI Detailed Designs			Activity	Cloud Integration
Document Middleware Detailed Designs (UT cases)			Deliverable	Cloud Integration
Document Interface Detailed Designs (UT cases)			Deliverable	Cloud Integration
Finalize Data Model Document (UT cases)			Deliverable	Cloud Integration
Finalize Implementation Guidelines			Deliverable	Cloud Integration
Update Rollout (Deployment) Plan			Deliverable	Cloud Integration
Design CI Rollout (Deployment)			Activity	Cloud Integration
Document Deployment Preparation Detailed Design			Deliverable	Cloud Integration
Document Cutover Activities Detailed Design			Deliverable	Cloud Integration
Establish CI Development Environment			Activity	Cloud Integration
Install and Configure CI Development Cloud Tools and Middleware			Deliverable	Cloud Integration
Application Rationalization Design			Work Stream	Application Rationalization
Software Requirements			Sub-Phase	Application Rationalization
Refine Software Scope, Architecture, and Release Plan			Activity	Application Rationalization
Refine and Document Software Business Scope			Deliverable	Application Rationalization
Develop Preliminary Software Release Plan			Deliverable	Application Rationalization
Assimilate External Requirements for Software			Deliverable	Application Rationalization
Develop Preliminary Software Requirements Document			Deliverable	Application Rationalization
Develop Preliminary Software Architecture Document			Deliverable	Application Rationalization
Create Preliminary Software Instance Diagram			Deliverable	Application Rationalization
Develop Preliminary Software Data Model Document			Deliverable	Application Rationalization
Define Software Cloud Tools and Computing Environment Specification			Deliverable	Application Rationalization
Define Preliminary Software Rollout (Deployment) Plan			Deliverable	Application Rationalization
Conduct Software Use Case and Requirements Workshop			Activity	Application Rationalization
Conduct Cross Team Design Round Table Meetings			Deliverable	Application Rationalization
Document Software Use Cases and Data Specifications			Deliverable	Application Rationalization
Document Software Functional Requirements			Activity	Application Rationalization
Document Software Detailed Functional Requirements			Deliverable	Application Rationalization
Document Software Information Technology Requirements			Activity	Application Rationalization
Finalize Software Information Technology Requirements Document			Deliverable	Application Rationalization
Software Architecture (High-Level Design)			Sub-Phase	Application Rationalization



Transition and Transformation Program	Start	Finish	Type	Work Stream
Finalize Software Architecture and Update Software Release Plan			Activity	Application Rationalization
Finalize Software Architecture Document			Deliverable	Application Rationalization
Refine Software Data Model Document			Deliverable	Application Rationalization
Update Software Rollout (Deployment) Plan			Deliverable	Application Rationalization
Update Software Release Plan			Deliverable	Application Rationalization
Detail Software Environment Specifications			Activity	Application Rationalization
Finalize Software Cloud Tools and Computing Environment Specification			Deliverable	Application Rationalization
Finalize Software Instance Diagram			Deliverable	Application Rationalization
Specify Preliminary Application Rationalization Guidelines			Deliverable	Application Rationalization
Software Detailed Design			Sub-Phase	Application Rationalization
Complete Software User Interface Prototype and Detailed Design			Activity	Application Rationalization
Develop Software User Interface Prototype			Deliverable	Application Rationalization
Document Software User Interface Design (UT cases)			Deliverable	Application Rationalization
Complete Software Component and Data Detailed Designs			Activity	Application Rationalization
Document Software Component Designs (UT cases)			Deliverable	Application Rationalization
Finalize Software Data Model Document (UT cases)			Deliverable	Application Rationalization
Design Software Rollout (Deployment)			Activity	Application Rationalization
Document Software Deployment Preparation Detailed Design			Deliverable	Application Rationalization
Document Software Cutover Activities Detailed Design			Deliverable	Application Rationalization
Update Software Rollout (Deployment) Plan			Deliverable	Application Rationalization
Establish Software Environment and Finalize Software Release Plan			Activity	Application Rationalization
Finalize Application Rationalization Guidelines			Deliverable	Application Rationalization
Install and Configure Application Rationalization Cloud Tools and Middleware			Deliverable	Application Rationalization
Finalize Software Release Plan			Deliverable	Application Rationalization
Develop Preliminary Software Product Documentation			Activity	Application Rationalization
Develop Preliminary Software Installation or Upgrade Guide			Deliverable	Application Rationalization
Develop Software Operations, Administration, and Maintenance Manual			Deliverable	Application Rationalization
Develop Preliminary Software User Guide			Deliverable	Application Rationalization
Develop Preliminary Software Release Description			Deliverable	Application Rationalization
Develop Preliminary Software Sizing Guide			Deliverable	Application Rationalization
<b>Cloud Infrastructure Design</b>			<b>Work Stream</b>	<b>Cloud Infrastructure</b>
Cloud Infrastructure Baseline & Requirements			Sub-Phase	Cloud Infrastructure
Establish Network Performance Baseline			Activity	Cloud Infrastructure



Transition and Transformation Program	Start	Finish	Type	Work Stream
Create Preliminary Cloud Infrastructure Asset Inventory Report			Deliverable	Cloud Infrastructure
Document Current State Network Architecture			Deliverable	Cloud Infrastructure
Document Network Traffic Dependency Report			Deliverable	Cloud Infrastructure
Establish Application Performance Baseline			Activity	Cloud Infrastructure
Update Cloud Infrastructure Asset Inventory Report			Deliverable	Cloud Infrastructure
Document Current State Application Architecture			Deliverable	Cloud Infrastructure
Document Applications Traffic Dependency			Deliverable	Cloud Infrastructure
Establish Cloud Infrastructure Facility Baseline			Activity	Cloud Infrastructure
Document Current State Data Center Facility Design			Deliverable	Cloud Infrastructure
Establish Cloud Infrastructure Security Baseline			Activity	Cloud Infrastructure
Document Current State Network Access Controls			Deliverable	Cloud Infrastructure
Document Current State Application Access Controls			Deliverable	Cloud Infrastructure
Document Current State Facility Physical Access Controls			Deliverable	Cloud Infrastructure
Develop Cloud Infrastructure Requirements			Activity	Cloud Infrastructure
Document Traffic Dependency Future State Requirements			Deliverable	Cloud Infrastructure
Create/Finalize Future State Cloud Infrastructure Conceptual Architecture			Deliverable	Cloud Infrastructure
Document Future State Data Center Facility Requirements			Deliverable	Cloud Infrastructure
Document Future State Cloud Infrastructure Security Requirements			Deliverable	Cloud Infrastructure
Document Future State Disaster Recovery Requirements			Deliverable	Cloud Infrastructure
Create Cloud Infrastructure Gap Analysis			Deliverable	Cloud Infrastructure
Detailed Cloud Infrastructure Design			Sub-Phase	Cloud Infrastructure
Develop Data Center Facility Design			Activity	Cloud Infrastructure
Develop Detailed Future State Data Center Facility Design			Deliverable	Cloud Infrastructure
Develop Data Center Facility Cutover Schedule			Deliverable	Cloud Infrastructure
Develop Cloud Infrastructure Security Design			Activity	Cloud Infrastructure
Develop Detailed Cloud Infrastructure Security Architecture Design			Deliverable	Cloud Infrastructure
Develop Logical Cloud Infrastructure Design			Activity	Cloud Infrastructure
Define Cloud Infrastructure Logical Architecture			Deliverable	Cloud Infrastructure
Develop Disaster Recovery Plan Design			Activity	Cloud Infrastructure
Develop Detailed Cloud Infrastructure Disaster Recovery Plans			Deliverable	Cloud Infrastructure
Develop Cloud Infrastructure Technology Vendor Alternatives			Activity	Cloud Infrastructure
Identify Cloud Infrastructure Technology Vendor Alternatives			Deliverable	Cloud Infrastructure
Develop Physical Cloud Infrastructure Design			Activity	Cloud Infrastructure
Update Cloud Infrastructure Asset Inventory Report			Deliverable	Cloud Infrastructure



Transition and Transformation Program	Start	Finish	Type	Work Stream
Define Cloud Infrastructure Physical Architecture			Deliverable	Cloud Infrastructure
Develop Cloud Infrastructure Cutover Schedule			Deliverable	Cloud Infrastructure
Create Traffic Modeling and Simulation Plan			Deliverable	Cloud Infrastructure
Testing Design			Work Stream	Testing
Prepare - Multi-Unit Testing			Sub-Phase	Testing
Plan Multi-Unit Test			Activity	Testing
Develop Preliminary Multi-Unit Test Plan			Deliverable	Testing
Develop Preliminary Automated Multi-Unit Test Plan			Deliverable	Testing
Develop Preliminary Multi-Unit Test Procedures Specification			Deliverable	Testing
Specify Multi-Unit Tests and Data			Activity	Testing
Develop Preliminary Multi-Unit Test Cases			Deliverable	Testing
Develop Preliminary Multi-Unit Scripts			Deliverable	Testing
Develop Preliminary Multi-Unit Test Data			Deliverable	Testing
Develop Preliminary Multi-Unit Test Coverage Matrix			Deliverable	Testing
Develop Preliminary Multi-Unit Test Calendar			Deliverable	Testing
Prepare - System Testing			Sub-Phase	Testing
Plan System Test			Activity	Testing
Develop Preliminary System Test Plan			Deliverable	Testing
Develop Preliminary Automated System Test Plan			Deliverable	Testing
Develop Preliminary System Test Procedures Specification			Deliverable	Testing
Specify System Tests and Data			Activity	Testing
Develop Preliminary System Test Cases			Deliverable	Testing
Develop Preliminary System Test Scripts			Deliverable	Testing
Develop Preliminary System Test Data			Deliverable	Testing
Develop Preliminary System Test Coverage Matrix			Deliverable	Testing
Develop Preliminary System Test Calendar			Deliverable	Testing
Prepare - Performance Testing			Sub-Phase	Testing
Plan Performance Test			Activity	Testing
Develop Preliminary Performance Test Plan			Deliverable	Testing
Develop Preliminary Performance Test Procedures Specification			Deliverable	Testing
Specify Performance Tests and Data			Activity	Testing
Develop Preliminary Performance Test Cases			Deliverable	Testing
Develop Preliminary Performance Scripts			Deliverable	Testing
Develop Preliminary Performance Test Data			Deliverable	Testing





Transition and Transformation Program	Start	Finish	Type	Work Stream
Develop Preliminary Cloud Broker Test Coverage Matrix			Deliverable	Testing
Prepare - Acceptance Testing			Sub-Phase	Testing
Plan Acceptance Test			Activity	Testing
Develop Preliminary Acceptance Test Plan			Deliverable	Testing
Develop Preliminary Automated Acceptance Test Plan			Deliverable	Testing
Develop Preliminary Acceptance Test Procedures Specification			Deliverable	Testing
Specify Acceptance Tests and Data			Activity	Testing
Develop Preliminary Acceptance Test Cases			Deliverable	Testing
Develop Preliminary Acceptance Test Scripts			Deliverable	Testing
Develop Preliminary Acceptance Test Data			Deliverable	Testing
Develop Preliminary Acceptance Test Coverage Matrix			Deliverable	Testing
Develop Preliminary Acceptance Test Calendar			Deliverable	Testing
Prepare - Production Regression Testing			Sub-Phase	Testing
Plan Production Regression Test			Activity	Testing
Develop Preliminary Production Regression Test Plan			Deliverable	Testing
Develop Preliminary Automated Production Regression Test Plan			Deliverable	Testing
Develop Preliminary Production Regression Test Procedures Specification			Deliverable	Testing
Specify Production Regression Tests and Data			Activity	Testing
Develop Preliminary Production Regression Test Cases			Deliverable	Testing
Develop Preliminary Production Regression Test Scripts			Deliverable	Testing
Develop Preliminary Production Regression Test Data			Deliverable	Testing
Develop Preliminary Production Regression Test Coverage Matrix			Deliverable	Testing
Develop Preliminary Production Regression Test Calendar			Deliverable	Testing
Cloud Services Design			Work Stream	Cloud Services
Establish Service Requirements			Activity	Cloud Services
Document Detailed Functional Requirements			Deliverable	Cloud Services
Develop Cloud Services Plans			Activity	Cloud Services
Create Service Level Agreement			Deliverable	Cloud Services
Design Event Management Plan			Deliverable	Cloud Services
Document Service Support and Delivery Plan			Deliverable	Cloud Services
Identify Service Outsourcing Needs			Activity	Cloud Services
Develop Outsourcing Business Case			Deliverable	Cloud Services
Develop the Outsourcing Implementation Plan			Deliverable	Cloud Services
Define Cloud Migration and Transition Process			Activity	Cloud Services



Transition and Transformation Program	Start	Finish	Type	Work Stream
Develop Production Readiness Checklist			Deliverable	Cloud Services
Develop Cloud Migration Map and Transition Plan			Deliverable	Cloud Services
<b>BUILD</b>			<b>Phase</b>	
<b>Cloud Broker Build</b>			<b>Work Stream</b>	<b>Cloud Broker</b>
Determine CB Control and Deployment Plan			Activity	Cloud Broker
Incorporate Preliminary CB Improvement into Baseline			Deliverable	Cloud Broker
Develop CB Control and Deployment Plan			Deliverable	Cloud Broker
Determine Ongoing CBM Approach and Cloud Tools			Activity	Cloud Broker
Determine Ongoing CBM Approach and Cloud Tools			Deliverable	Cloud Broker
Update CB Policy and Procedure Documentation			Activity	Cloud Broker
Update CB Policy and Procedure Documentation			Deliverable	Cloud Broker
<b>Cloud Integration Build</b>			<b>Work Stream</b>	<b>Cloud Integration</b>
Develop Preliminary CI Support Plan			Activity	Cloud Integration
Update Instructional Materials			Deliverable	Cloud Integration
Document Preliminary Cutover Support Plan			Deliverable	Cloud Integration
Document Preliminary Production Support Plan			Deliverable	Cloud Integration
Configure CI Process			Activity	Cloud Integration
Configure and Unit Test Process and Data Implementation			Deliverable	Cloud Integration
Develop Process Build and Deployment Scripts			Deliverable	Cloud Integration
Configure CI Middleware			Activity	Cloud Integration
Configure and Unit Test Middleware Customizations			Deliverable	Cloud Integration
Develop Middleware Build and Deployment Scripts			Deliverable	Cloud Integration
Develop CI Interfaces			Activity	Cloud Integration
Develop and Unit Test Interface Modules			Deliverable	Cloud Integration
Develop Interface Build and Deployment Scripts			Deliverable	Cloud Integration
Develop CI Data Model			Activity	Cloud Integration
Configure and Unit Test Data Model Implementation			Deliverable	Cloud Integration
Develop Data Model Build and Deployment Scripts			Deliverable	Cloud Integration
Develop CI Rollout			Activity	Cloud Integration
Develop and Unit Test Deployment Preparation Scripts			Deliverable	Cloud Integration
Develop and Unit Test Cutover Scripts			Deliverable	Cloud Integration
<b>Application Rationalization Build</b>			<b>Work Stream</b>	<b>Application Rationalization</b>
Develop Preliminary Software Support Plan			Activity	Application Rationalization
Document Preliminary Software Cutover Support Plan			Deliverable	Application Rationalization



Transition and Transformation Program	Start	Finish	Type	Work Stream
Document Preliminary Software Production Support Plan			Deliverable	Application Rationalization
Develop Software User Interface			Activity	Application Rationalization
Develop and Unit Test Screen Code			Deliverable	Application Rationalization
Develop and Unit Test Navigation Code			Deliverable	Application Rationalization
Develop and Unit Test Data Entry Validation Code			Deliverable	Application Rationalization
Complete Unit Test Software User Interface Integration			Deliverable	Application Rationalization
Develop Software User Interface Build and Deployment Scripts			Deliverable	Application Rationalization
Develop Software Components			Activity	Application Rationalization
Develop and Unit Test Software Component Code			Deliverable	Application Rationalization
Develop and Unit Test Software Component Integration			Deliverable	Application Rationalization
Develop Software Component Build and Deployment Scripts			Deliverable	Application Rationalization
Develop Software Data Model			Activity	Application Rationalization
Develop and Unit Test Software Data Model Implementation			Deliverable	Application Rationalization
Develop and Unit Test Software Data Integration			Deliverable	Application Rationalization
Develop Software Data Model Build and Deployment Scripts			Deliverable	Application Rationalization
Develop Software Rollout			Activity	Application Rationalization
Develop and Unit Test Software Deployment Preparation Scripts			Deliverable	Application Rationalization
Develop and Unit Test Software Cutover Scripts			Deliverable	Application Rationalization
Finalize Software Product Documentation			Activity	Application Rationalization
Finalize Software Installation or Upgrade Guide			Deliverable	Application Rationalization
Finalize Software Operations, Administration, and Maintenance Manual			Deliverable	Application Rationalization
Finalize Software User Guide			Deliverable	Application Rationalization
Finalize Software Release Description			Deliverable	Application Rationalization
Finalize Software Sizing Guide			Deliverable	Application Rationalization
<b>Cloud Infrastructure Build</b>			<b>Work Stream</b>	<b>Cloud Infrastructure</b>
Establish Pre-Production Environment			Activity	Cloud Infrastructure
Procure Pre-Production Environment and Cloud Tools			Deliverable	Cloud Infrastructure
Build out Physical Pre-Production Environment Plan			Deliverable	Cloud Infrastructure
Configure Pre-Production Cloud Infrastructure Environment			Deliverable	Cloud Infrastructure
Conduct Cloud Infrastructure Asset Certification (Unit Testing)			Deliverable	Cloud Infrastructure
Validate & Update Cloud Infrastructure Design			Activity	Cloud Infrastructure
Perform Traffic Modeling and Simulation			Deliverable	Cloud Infrastructure
Finalize and Confirm Cloud Infrastructure Design			Deliverable	Cloud Infrastructure



Transition and Transformation Program	Start	Finish	Type	Work Stream
Update Cloud Infrastructure Security Design			Deliverable	Cloud Infrastructure
Update Technology Cloud Infrastructure Disaster Recovery Plan			Deliverable	Cloud Infrastructure
Finalize Cloud Infrastructure Cutover Schedule			Deliverable	Cloud Infrastructure
<b>Testing Build</b>			<b>Work Stream</b>	<b>Testing</b>
Build - Multi-Unit Test			Sub-Phase	Testing
Finalize Multi-Unit Tests and Data			Activity	Testing
Finalize Multi-Unit Test Cases			Deliverable	Testing
Finalize Multi-Unit Test Scripts			Deliverable	Testing
Finalize Multi-Unit Test Data			Deliverable	Testing
Finalize Multi-Unit Test Procedures Specification			Deliverable	Testing
Finalize Multi-Unit Test Coverage Matrix			Deliverable	Testing
Finalize Multi-Unit Test Calendar			Deliverable	Testing
Finalize Multi-Unit Test Plan			Deliverable	Testing
Finalize Automated Multi-Unit Test Plan			Deliverable	Testing
Prepare Multi-Unit Test Environment			Activity	Testing
Create Multi-Unit Test Environment			Deliverable	Testing
Prepare Multi-Unit Test Data			Deliverable	Testing
Execute and Document Multi-Unit Installation Verification Test Results			Deliverable	Testing
Perform Multi-Unit Test Readiness Review			Activity	Testing
Conduct Multi-Unit Test Readiness Review Checklist			Deliverable	Testing
Execute Multi-Unit Test Cycles			Activity	Testing
Execute and Document Multi-Unit Test Results			Deliverable	Testing
Manage Defects - Fix and Retest Cycles			Deliverable	Testing
Prepare Multi-Unit Test Summary Report			Deliverable	Testing
Build - System Test			Sub-Phase	Testing
Finalize System Tests and Data			Activity	Testing
Finalize System Test Cases			Deliverable	Testing
Finalize System Test Scripts			Deliverable	Testing
Finalize System Test Data			Deliverable	Testing
Finalize System Test Procedures Specification			Deliverable	Testing
Finalize System Test Coverage Matrix			Deliverable	Testing
Finalize System Test Calendar			Deliverable	Testing
Finalize System Test Plan			Deliverable	Testing
Finalize Automated System Test Plan			Deliverable	Testing



Transition and Transformation Program	Start	Finish	Type	Work Stream
Prepare System Test Environment			Activity	Testing
Create System Test Environment			Deliverable	Testing
Prepare System Test Data			Deliverable	Testing
Execute and Document System Installation Verification Test Results			Deliverable	Testing
Perform System Test Readiness Review			Activity	Testing
Conduct System Test Readiness Review Checklist			Deliverable	Testing
Execute System Test Cycles			Activity	Testing
Execute and Document System Test Results			Deliverable	Testing
Manage Defects - Fix and Retest Cycles			Deliverable	Testing
Prepare System Test Summary Report			Deliverable	Testing
Build - Performance Test			Sub-Phase	Testing
Finalize Performance Tests and Data			Activity	Testing
Finalize Performance Test Cases			Deliverable	Testing
Finalize Performance Test Scripts			Deliverable	Testing
Finalize Performance Test Data			Deliverable	Testing
Finalize Performance Test Procedures Specification			Deliverable	Testing
Finalize Cloud Broker Test Coverage Matrix			Deliverable	Testing
Finalize Performance Test Plan			Deliverable	Testing
Prepare Performance Test Environment			Activity	Testing
Create Performance Test Environment			Deliverable	Testing
Prepare Performance Test Data			Deliverable	Testing
Execute and Document Performance Installation Verification Test Results			Deliverable	Testing
Perform Performance Test Readiness Review			Activity	Testing
Conduct Performance Test Readiness Review Checklist			Deliverable	Testing
Execute Performance Test Cycles			Activity	Testing
Execute and Document Performance Test Results			Deliverable	Testing
Manage Defects - Fix and Retest Cycles			Deliverable	Testing
Prepare Performance Test Summary Report			Deliverable	Testing
<b>Cloud Services Build</b>			<b>Work Stream</b>	<b>Cloud Services</b>
Develop Cloud Services Operational Procedures			Activity	Cloud Services
Create Preliminary Production Process Guidebook			Deliverable	Cloud Services
Create Preliminary Production Run Book			Deliverable	Cloud Services
Define Service Outsourcing Approach			Activity	Cloud Services
Develop Requests for Proposal Checklist			Deliverable	Cloud Services



Transition and Transformation Program	Start	Finish	Type	Work Stream
Prepare Outsourcer Scoresheet			Deliverable	Cloud Services
<b>DEPLOY</b>			<b>Phase</b>	
<b>Cloud Broker Deploy</b>			<b>Work Stream</b>	<b>Cloud Broker</b>
Execute CB Control and Deployment Plan			Activity	Cloud Broker
Execute CB Control and Deployment Plan			Deliverable	Cloud Broker
Transfer Ownership to Process Owners			Deliverable	Cloud Broker
Implement Ongoing CBM and Cloud Tools			Activity	Cloud Broker
Implement Ongoing CBM and Cloud Tools			Deliverable	Cloud Broker
Finalize CB Policy and Procedure Documentation			Activity	Cloud Broker
Finalize CB Policy and Procedure Documentation			Deliverable	Cloud Broker
<b>Cloud Integration Deploy</b>			<b>Work Stream</b>	<b>Cloud Integration</b>
Finalize CI Support Plan			Activity	Cloud Integration
Finalize Instructional Materials			Deliverable	Cloud Integration
Finalize Cutover Support Plan			Deliverable	Cloud Integration
Finalize Production Support Plan			Deliverable	Cloud Integration
Finalize CI Rollout (Deployment) Preparations			Activity	Cloud Integration
Finalize Rollout (Deployment) Plan			Deliverable	Cloud Integration
Conduct CI Rollout			Activity	Cloud Integration
Establish Production Environment Readiness			Deliverable	Cloud Integration
Execute Cut Over Activities			Deliverable	Cloud Integration
<b>Application Rationalization Deploy</b>			<b>Work Stream</b>	<b>Application Rationalization</b>
Finalize Software Support Plan			Activity	Application Rationalization
Finalize Software Cutover Support Plan			Deliverable	Application Rationalization
Finalize Software Production Support Plan			Deliverable	Application Rationalization
Finalize Software Rollout (Deployment) Preparations			Activity	Application Rationalization
Finalize Software Rollout (Deployment) Plan			Deliverable	Application Rationalization
Conduct Software Rollout			Activity	Application Rationalization
Establish Software Production Environment Readiness			Deliverable	Application Rationalization
Execute Software Cut Over Activities			Deliverable	Application Rationalization
<b>Cloud Infrastructure Deploy</b>			<b>Work Stream</b>	<b>Cloud Infrastructure</b>
Establish Production Environment			Activity	Cloud Infrastructure
Procure Production Environment and Cloud Tools			Deliverable	Cloud Infrastructure
Build Out Physical Production Environment Plan			Deliverable	Cloud Infrastructure
Configure Production Environment Plan			Deliverable	Cloud Infrastructure



Transition and Transformation Program	Start	Finish	Type	Work Stream
Finalize Cloud Infrastructure Asset Inventory Report			Deliverable	Cloud Infrastructure
Finalize Cloud Infrastructure Asset Certification			Deliverable	Cloud Infrastructure
Sign-Off Final Cloud Infrastructure			Activity	Cloud Infrastructure
Create Cloud Infrastructure Hand-Over Evaluation (Survey)			Deliverable	Cloud Infrastructure
<b>Testing Deploy</b>			<b>Work Stream</b>	<b>Testing</b>
Finalize Acceptance Tests and Data			Activity	Testing
Finalize Acceptance Test Cases			Deliverable	Testing
Finalize Acceptance Test Scripts			Deliverable	Testing
Finalize Acceptance Test Data			Deliverable	Testing
Finalize Acceptance Test Procedures Specification			Deliverable	Testing
Finalize Acceptance Test Coverage Matrix			Deliverable	Testing
Finalize Acceptance Test Calendar			Deliverable	Testing
Finalize Acceptance Test Plan			Deliverable	Testing
Finalize Automated Acceptance Test Plan			Deliverable	Testing
Prepare Acceptance Test Environment			Activity	Testing
Create Acceptance Test Environment			Deliverable	Testing
Prepare Acceptance Test Data			Deliverable	Testing
Execute and Document Acceptance Installation Verification Test Results			Deliverable	Testing
Perform Acceptance Test Readiness Review			Activity	Testing
Conduct Acceptance Test Readiness Review Checklist			Deliverable	Testing
Execute/Support Client Acceptance Test Cycles			Activity	Testing
Execute and Document Acceptance Test Results			Deliverable	Testing
Manage Defects - Fix and Retest Cycles			Deliverable	Testing
Compile Acceptance Test Results			Activity	Testing
Prepare Acceptance Test Evaluation Report			Deliverable	Testing
<b>Cloud Services Deploy</b>			<b>Work Stream</b>	<b>Cloud Services</b>
Select Service Outsourcer			Activity	Cloud Services
Document Outsourcer Service Level Agreement			Deliverable	Cloud Services
Define Outsourcer Transition Plan			Deliverable	Cloud Services
Establish Service Operations Teams			Activity	Cloud Services
Document Operations Team Rosters			Deliverable	Cloud Services
Migrate Cloud Services Operations			Activity	Cloud Services
Execute Production Readiness Checklist			Deliverable	Cloud Services
Execute Cloud Migration Map and Transition Plan			Deliverable	Cloud Services



Transition and Transformation Program	Start	Finish	Type	Work Stream
Validate Cloud Migration to Cloud Services			Activity	Cloud Services
Finalize Production Process Guidebook			Deliverable	Cloud Services
Finalize Production Run Book			Deliverable	Cloud Services
Document Operations Acceptance			Deliverable	Cloud Services
<b>OPERATE</b>			<b>Phase</b>	
<b>Cloud Integration Operate</b>			<b>Work Stream</b>	<b>Cloud Integration</b>
Conduct CI Support			Activity	Cloud Integration
Conduct Preliminary Support Activities			Deliverable	Cloud Integration
Conduct Production Support Activities			Deliverable	Cloud Integration
<b>Application Rationalization Operate</b>			<b>Work Stream</b>	<b>Application Rationalization</b>
Conduct Software Support			Activity	Application Rationalization
Conduct Preliminary Software Support Activities			Deliverable	Application Rationalization
Conduct Production Software Support Activities			Deliverable	Application Rationalization
<b>Testing Operate</b>			<b>Work Stream</b>	<b>Testing</b>
Create Test Cases for Production Defect Remediation			Activity	Testing
Create Production Test Cases			Deliverable	Testing
Create Production Test Scripts			Deliverable	Testing
Create Production Test Data			Deliverable	Testing
Update Production Regression Tests and Data			Activity	Testing
Update Production Regression Test Cases			Deliverable	Testing
Update Production Regression Test Scripts			Deliverable	Testing
Update Production Regression Test Data			Deliverable	Testing
Update Production Regression Test Procedures Specification			Deliverable	Testing
Update Production Regression Test Coverage Matrix			Deliverable	Testing
Update Production Regression Test Calendar			Deliverable	Testing
Update Production Regression Test Plan			Deliverable	Testing
Update Automated Production Regression Test Plan			Deliverable	Testing
Execute Production Regression and Defect Remediation Test Cycles			Activity	Testing
Execute and Document Production Test Summary Report			Deliverable	Testing
Report Defects - Fix and Retest Cycles			Deliverable	Testing
<b>Cloud Services Operate</b>			<b>Work Stream</b>	<b>Cloud Services</b>
Conduct Cloud Services			Activity	Cloud Services
Manage Services Support and Delivery Activities			Deliverable	Cloud Services
Maintain Configuration Controls			Deliverable	Cloud Services





Transition and Transformation Program	Start	Finish	Type	Work Stream
Manage Events, Incidents, and Problems			Deliverable	Cloud Services
Monitor and Maintain Operational Security			Deliverable	Cloud Services
Manage Service Resources and Staff Performance			Deliverable	Cloud Services
Maintain Cloud Services Plans and Processes			Deliverable	Cloud Services
Maintain Cloud Migration Map and Transition Plan			Deliverable	Cloud Services
Manage Continuous Improvement of Service			Deliverable	Cloud Services
Conduct Service Performance Measurements			Activity	Cloud Services
Document Current State Performance			Deliverable	Cloud Services
Conduct Customer Evaluation Survey			Deliverable	Cloud Services
Develop Service Action Report			Deliverable	Cloud Services



## 12.2 Service Portfolio

Cloud computing is the delivery of on-demand computing resources (computer power, database storage, and applications and other IT resources) over the internet. It is achieved by using a network of remote servers hosted on the internet rather than local servers. A cloud service is any service made available to users on-demand via the internet from a cloud computing provider's server instead of being provided from an Agency's on-premise servers. Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) are the three categories of cloud services that should be offered to the State of Washington.

Unisys has looked at today's major cloud service platforms and provided the following overview:


























**Amazon Web Services (AWS)** – a comprehensive, evolving cloud computing platform provided by Amazon. AWS delivers a mix of IaaS, PaaS, and SaaS. (Source: <https://aws.amazon.com/products/>)

# Cloud Products

Amazon Web Services offers a broad set of global cloud-based products including compute, storage, databases, analytics, networking, mobile, developer tools, management tools, IoT, security and enterprise applications. These services help organizations move faster, lower IT costs, and scale. AWS is trusted by the largest enterprises and the hottest start-ups to power a wide variety of workloads including: web and mobile applications, game development, data processing and warehousing, storage, archive, and many others.



## Explore Our Products

- |  |  |   |  |  |
|--|--|---|--|--|
| <br>Analytics               | <br>Application Integration | <br>AR & VR              | <br>AWS Cost Management             | <br>Blockchain                    |
| <br>Business Applications   | <br>Compute                 | <br>Containers           | <br>Customer Engagement             | <br>Database                      |
| <br>Developer Tools         | <br>End User Computing      | <br>Game Tech            | <br>Internet of Things              | <br>Machine Learning              |
| <br>Management & Governance | <br>Media Services          | <br>Migration & Transfer | <br>Mobile                          | <br>Networking & Content Delivery |
| <br>Quantum Technologies    | <br>Robotics                | <br>Satellite            | <br>Security, Identity & Compliance | <br>Storage                       |



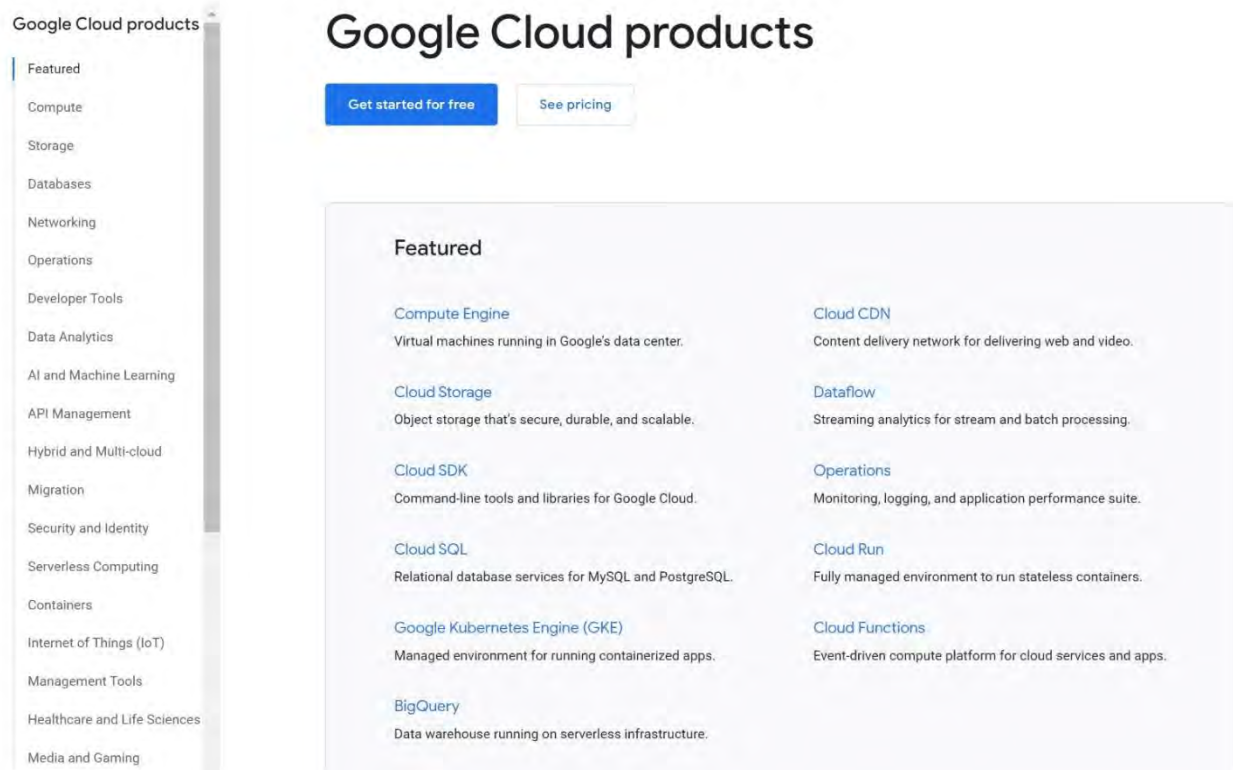
Microsoft Azure (formerly known as Windows Azure) – Microsoft’s public cloud computing platform provides a range of cloud services through a global network of Microsoft-managed data-centers. (Source: <https://azure.microsoft.com/en-us/services/>)

The screenshot displays the Microsoft Azure website with a navigation bar at the top containing links for Overview, Solutions, Products, Documentation, Pricing, Training, Marketplace, Partners, Support, Blog, and More. A search bar and user account options are also visible. The main content area features a grid of service categories, each with an icon, a title, and a brief description.

Service Category	Description
Internet of Things	Power your digital transformation, collect untapped data, and find new insights by connecting your devices, assets, and sensors.
AI platform	AI productivity for every developer and every scenario.
SAP on Azure	Bring cloud scale and agility to your mission-critical SAP workloads.
Blockchain	Quickly develop and deploy distributed apps on the blockchain of your choice.
Hybrid cloud applications	Maximize productivity by empowering developers to build and deploy applications the same way, whether your app runs on Azure or Azure Stack.
Oracle on Azure	Run your Oracle® database and enterprise applications on Azure.
DevOps	Bring together people, processes, and products to enable continuous delivery of value to your customers and coworkers.
Mobile	Reach your customers everywhere, on every device, with a single mobile app build.
E-commerce	Give customers what they want with a personalized, scalable, and secure shopping experience.
Azure governance	Ensure compliance using the cloud governance capabilities built into Azure.
Confidential computing	Protect your data and code while it's in use in the cloud.
Dynamics on Azure	Fuel business growth by bringing together enterprise resource planning (ERP) and cloud services.
LOB applications	Modernize your internal line of business (LOB) apps to meet today's IT challenges.
Development and test	Simplify and speed up the process of building and testing applications across every platform.
Business intelligence	Drive better, faster decision making by analyzing your data for deeper insights.
Big data and analytics	Make the most informed decision possible by analyzing all the data you need in real time.
Modern data warehouse	Handle exponential data growth without leaving security, scalability, or analytics behind.
Business SaaS apps	Use business insights and intelligence from Azure to build software as a service (SaaS) apps.
Backup and archive	Protect your data and applications no matter where they reside to avoid costly business interruptions.
Disaster recovery	Protect all your major IT systems while ensuring apps work when you need them most.
Digital marketing	Connect with customers worldwide with digital campaigns that are personalized and scalable.
Digital media	Deliver high-quality videos to your customers anywhere, anytime, on any device.
High-performance computing	Tap into unlimited resources to scale your high-performance computing (HPC) jobs.
Microservice applications	Deliver scalable, reliable applications faster to meet the ever-changing demands of your customers.



**Google Cloud** – Google Cloud Platform is a suite of public cloud computing services by Google. It runs on the same infrastructure that Google uses internally for its end user products, such as Google Search and YouTube. This platform includes a range of hosted services: compute, storage, and application development that run on Google hardware. Google Cloud Platform services can be accessed by software developers, cloud administrators, and other enterprise-IT professionals over the public internet or through a dedicated network connection. (Source: <https://cloud.google.com/>)



**Oracle Cloud** – Cloud service offerings from Oracle Corporation provide servers, storage, network, applications, and services through a global network of Oracle’s managed data centers. The services are provided over the internet, on-demand.

### WaTech Service and Project Portfolio

Washington Technology Solutions (WaTech) is "the Consolidated Technology Services (CTS) Agency" (RCW 43.105.006) for Washington State, providing enterprise IT services, support, strategy, and security for public Agencies and municipalities.

CTS/WaTech operates the state’s core technology services - the central network and data center – and provides strategic and comprehensive information security to protect state networks from growing cyber threats.

Through the Office of the Chief Information Officer (OCIO), the Agency leads the implementation of a strategic direction and enterprise architecture for information technology and oversees the portfolio of major IT projects for state government. Within the OCIO, the Office of Privacy and Data Protection leads Washington’s effort to protect the state and citizens’ data and privacy through advocacy and education. (Source: <https://watech.wa.gov/services/>)



Washington's Consolidated Technology Services Agency

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## Services

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Exhibit 12.2.1: WaTech Service Portfolio Offerings

Unisys recommends Cloud solutions be offered for all Agency customers through the precise definition of a Cloud portfolio of end-to-end services. These services will need to be tailored to the Agencies, Boards, and Commissions' varying requirements, leading to a standards-based architecture (federated or centralized) whereby features and costs are transparent to the user community.

For example, Disaster Recovery as a Service for the Portfolio Offering should include:

- An appropriate recovery strategy that meets business needs and identifies recovery time objectives (RTOs), and the impact of an extended outage.
- Select recovery strategies based on business needs and using technical capabilities as a secondary criteria
- Selecting the appropriate recovery strategy for mission-critical operations involves the tradeoff between time and money (rebuild in months to continuous operations in minutes).



## Examples of DR Services

AWS provides a set of cloud-based disaster recovery services that enable fast recovery of IT infrastructure and data. The service, CloudEndure Disaster Recovery, continuously replicates servers (including operating system, system state configuration, databases, applications, and files) into a low-cost staging area in the client's target AWS account and preferred region. In the case of a disaster, the client can instruct CloudEndure Disaster Recovery to automatically launch thousands of servers in their fully provisioned state in minutes. By replicating servers into a low-cost staging area while still being able to launch fully provisioned machines within minutes, CloudEndure Disaster Recovery can significantly reduce the cost of disaster recovery infrastructure.

### How it works

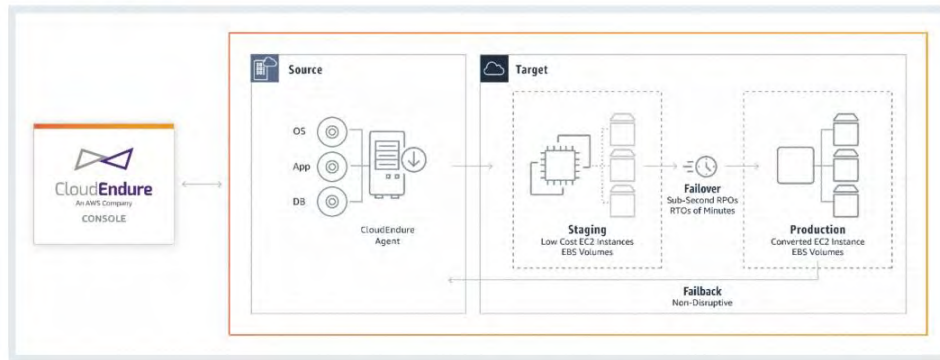


Exhibit 12.2.2: AWS CloudEndure Portfolio Offering

Microsoft's Azure Site Recovery offers ease of deployment, cost-effectiveness, and dependability for business continuity. The service provides disaster recovery by deploying replication, failover, and recovery processes through Site Recovery to help keep applications running during planned and unplanned outages. Site Recovery is a cloud-native disaster recovery as a service (DRaaS).

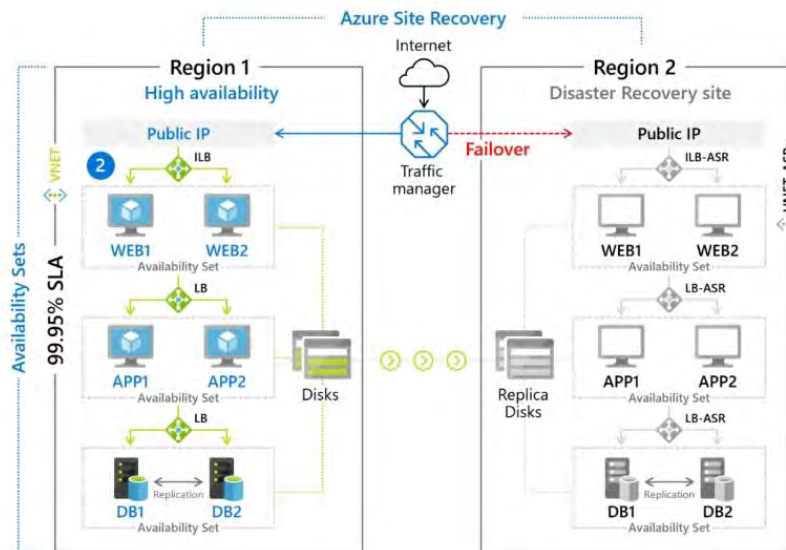


Exhibit 12.2.3: Microsoft Azure Site Recovery Portfolio Offering



Azure Site Recovery replicates an Azure VM to a different Azure region directly from the Azure portal. As a fully integrated offering, Site Recovery is automatically updated with new Azure features as they are released.

Azure Site Recovery minimizes recovery issues by sequencing the order of multi-tier applications running on multiple virtual machines, ensures compliance by testing the client's disaster recovery plan without impacting production workloads or end users, and keeps applications available during outages with automatic recovery from on-premises to Azure or Azure to another Azure region.

### **Accelerate Cloud Migration**

The acceleration of cloud migration is personal to each Agency. It is supported by the goal of a Service Portfolio to provide enterprise services that solve real problems that are common to the majority of Agencies. One such common service is disaster recovery. Unisys recommends creating a DR service that can be integrated into current and future application migrations with lowered risk. Lowered risk means having a fully documented service description with expected SLAs, estimated cost calculators through available cloud tools, and a sample architecture so application owners can clearly understand how it aligns with their application. Acceleration to cloud is about communication and transparency of the cloud service to the Agency decision-makers. This style of communication and transparency needs to be at the forefront of the Service Portfolio.

## **12.3 Contract Performance Metrics**

Measuring performance is a critical factor in evaluating the validity of a vendor's recommendations. However, this is not straightforward, and there is no single tool that will deliver such a measurement out of the box. It will need to be a combination of tools, analytics, and historical information (if available). For this response, the assumption is that historical performance data is available at least based on the environment's originally documented expectations.

The metrics that will need to be collected from both the original and new cloud environments include the following:

- Availability metrics – i.e., 99.9%, or 99.95%
- Network Throughput – i.e., 500mb, 1GB, or 10GB
- Average Planned Downtime/Maintenance Windows – i.e., Service is down or not in a functional state
- Compute, Network (if available), and Storage Utilization

The combination of these metrics in an analytical tool like PowerBI should be used to virtualize the metrics to show the improvement. Unisys recommends this use case should be part of the cloud broker service and not a State responsibility to perform. This report should be a standard vendor deliverable.

Recommended Service Level Objectives are provided in Section 12.5 below. Cloud vendors such as Amazon Web Services, Microsoft Azure, and Google Cloud also maintain specific service levels and remediation. Their overviews are located in Appendix G.



## 12.4 Direct Charge Mechanisms for Pricing from Cloud Vendors

This Section outlines the direct charges for different server configurations provided by each cloud provider. The costs described below were used in the cost estimates in Section 5.3.3. These costs are based on the WaTech Service Catalog and vendor list pricing, as of March 2020, collected using the StrataProbe tool. The costs below are based on a 3-Year term. Monthly on-demand and 1-Year term pricing are also available from each of the cloud vendors.

### StratoZone Report: Three-Year Contracting per Device Size

Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
AWS (3-Year Term)	\$1,107,212.33	4,284	\$258.45	\$39,859,643.92
c5.2xlarge	\$5,744.56	35	\$164.13	\$206,804.12
c5.4xlarge	\$178,693.24	217	\$823.47	\$6,432,956.50
c5.9xlarge	\$3,365.89	7	\$480.84	\$121,172.04
c5.xlarge	\$14,200.25	214	\$66.36	\$511,209.02
c5n.4xlarge	\$4,218.06	4	\$1,054.51	\$151,850.12
c5n.xlarge	\$62.64	1	\$62.64	\$2,255.12
f1.2xlarge	\$13,405.04	8	\$1,675.63	\$482,581.35
f1.4xlarge	\$9,386.77	4	\$2,346.69	\$337,923.89
m5a.4xlarge	\$52,292.15	41	\$1,275.42	\$1,882,517.36
m5a.8xlarge	\$54,520.02	24	\$2,271.67	\$1,962,720.82
r4.xlarge	\$476.16	5	\$95.23	\$17,141.89
r5a.16xlarge	\$5,433.05	1	\$5,433.05	\$195,589.93
r5a.2xlarge	\$41,532.35	66	\$629.28	\$1,495,164.66
r5a.4xlarge	\$51,321.30	42	\$1,221.94	\$1,847,566.66
r5a.8xlarge	\$18,445.33	9	\$2,049.48	\$664,031.96
r5a.large	\$1,018.34	18	\$56.57	\$36,660.16
r5a.xlarge	\$1,570.75	6	\$261.79	\$56,547.07
t2.2xlarge	\$67,075.97	175	\$383.29	\$2,414,734.90
t2.micro	\$62.77	7	\$8.97	\$2,259.59
t2.nano	\$6.53	1	\$6.53	\$235.09
t2.small	\$1,206.08	28	\$43.07	\$43,418.85
t2.xlarge	\$80,090.76	499	\$160.50	\$2,883,267.33
t3.2xlarge	\$3,462.64	15	\$230.84	\$124,654.94
t3.large	\$1,396.87	6	\$232.81	\$50,287.32





Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
t3.medium	\$530.97	7	\$75.85	\$19,114.75
t3.micro	\$22.18	2	\$11.09	\$798.54
t3.small	\$115.87	14	\$8.28	\$4,171.33
t3.xlarge	\$6,217.31	27	\$230.27	\$223,823.29
t3a.2xlarge	\$96,024.08	323	\$297.29	\$3,456,866.73
t3a.large	\$66,765.19	668	\$99.95	\$2,403,546.76
t3a.medium	\$44,013.97	845	\$52.09	\$1,584,502.87
t3a.micro	\$80.87	14	\$5.78	\$2,911.15
t3a.nano	\$35.26	2	\$17.63	\$1,269.32
t3a.small	\$2,608.42	179	\$14.57	\$93,903.17
t3a.xlarge	\$103,087.18	698	\$147.69	\$3,711,138.65
x1.16xlarge	\$11,951.94	2	\$5,975.97	\$430,269.76
x1e.2xlarge	\$17,637.42	9	\$1,959.71	\$634,947.18
x1e.4xlarge	\$26,863.62	14	\$1,918.83	\$967,090.14
x1e.8xlarge	\$110,628.58	26	\$4,254.95	\$3,982,628.92
x1e.xlarge	\$11,641.96	21	\$554.38	\$419,110.66
<b>Azure (3-Year Reserved)</b>	<b>\$809,648.30</b>	<b>4,284</b>	<b>\$188.99</b>	<b>\$29,147,338.77</b>
D16s v3	\$32,598.03	45	\$724.40	\$1,173,528.92
D2s v3	\$60,021.40	674	\$89.05	\$2,160,770.45
D4s v3	\$48,361.30	371	\$130.35	\$1,741,006.92
D8s v3	\$54,987.97	186	\$295.63	\$1,979,567.06
DS1 v2	\$190.77	5	\$38.15	\$6,867.65
E16-8s v3	\$333.02	1	\$333.02	\$11,988.66
E16s v3	\$28,332.91	41	\$691.05	\$1,019,984.63
E20s v3	\$17,981.72	19	\$946.41	\$647,341.83
E2s v3	\$15,083.81	226	\$66.74	\$543,017.16
E32s v3	\$8,996.00	9	\$999.56	\$323,856.10
E4-2s v3	\$2,459.61	24	\$102.48	\$88,545.89
E4s v3	\$27,801.81	155	\$179.37	\$1,000,865.30
E8-4s v3	\$4,899.55	16	\$306.22	\$176,383.92
E8s v3	\$28,641.93	66	\$433.97	\$1,031,109.52
F16s v2	\$147,448.83	217	\$679.49	\$5,308,157.82
F1s	\$5,048.83	201	\$25.12	\$181,757.80



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
F2s v2	\$45,931.70	893	\$51.44	\$1,653,541.10
F32s v2	\$10,828.61	14	\$773.47	\$389,829.92
F4s v2	\$86,947.94	860	\$101.10	\$3,130,125.71
F8s v2	\$44,913.43	194	\$231.51	\$1,616,883.63
M16ms	\$22,806.08	16	\$1,425.38	\$821,018.81
M32ms	\$72,731.45	26	\$2,797.36	\$2,618,332.17
M64	\$9,282.50	2	\$4,641.25	\$334,170.15
M64ls	\$2,745.18	1	\$2,745.18	\$98,826.61
M8ms	\$30,273.92	22	\$1,376.09	\$1,089,861.06
<b>Google Cloud 3 Year Commit</b>	<b>\$1,241,815.46</b>	<b>4,284</b>	<b>\$289.87</b>	<b>\$44,705,356.67</b>
e2-highcpu-16	\$7,061.14	13	\$543.16	\$254,201.09
e2-highcpu-2	\$1,481.79	23	\$64.43	\$53,344.55
e2-highcpu-4	\$39,800.74	204	\$195.10	\$1,432,826.55
e2-highcpu-8	\$24,540.00	39	\$629.23	\$883,440.08
e2-highmem-16	\$47,124.66	40	\$1,178.12	\$1,696,487.83
e2-highmem-2	\$23,744.61	215	\$110.44	\$854,806.12
e2-highmem-4	\$45,133.74	165	\$273.54	\$1,624,814.60
e2-highmem-8	\$46,830.61	76	\$616.19	\$1,685,901.87
e2-standard-16	\$55,605.46	44	\$1,263.76	\$2,001,796.70
e2-standard-2	\$130,766.21	1,112	\$117.60	\$4,707,583.50
e2-standard-4	\$195,135.34	887	\$219.99	\$7,024,872.08
e2-standard-8	\$117,544.57	263	\$446.94	\$4,231,604.48
m1-ultramem-40	\$128,026.60	27	\$4,741.73	\$4,608,957.75
m1-ultramem-80	\$8,190.59	1	\$8,190.59	\$294,861.30
n1-custom-1-1024	\$442.43	19	\$23.29	\$15,927.54
n1-custom-1-10240	\$155.27	1	\$155.27	\$5,589.83
n1-custom-1-12288	\$110.67	1	\$110.67	\$3,984.24
n1-custom-1-13824	\$208.81	1	\$208.81	\$7,517.28
n1-custom-1-2048	\$4,783.48	179	\$26.72	\$172,205.33
n1-custom-1-256	\$71.86	2	\$35.93	\$2,587.13
n1-custom-1-3072	\$296.30	5	\$59.26	\$10,666.91
n1-custom-1-32768	\$176.83	1	\$176.83	\$6,366.03
n1-custom-1-4096	\$25,762.72	304	\$84.75	\$927,457.95



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
n1-custom-1-512	\$42.36	1	\$42.36	\$1,524.97
n1-custom-1-5120	\$57.77	1	\$57.77	\$2,079.89
n1-custom-1-6144	\$1,104.00	10	\$110.40	\$39,743.96
n1-custom-1-768	\$11.83	1	\$11.83	\$425.82
n1-custom-1-8192	\$5,613.42	27	\$207.90	\$202,083.16
n1-custom-1-8448	\$303.91	2	\$151.95	\$10,940.62
n1-custom-1-98304	\$1,545.49	2	\$772.75	\$55,637.81
n2-custom-10-16128	\$650.64	5	\$130.13	\$23,423.08
n2-custom-10-24064	\$1,830.32	13	\$140.79	\$65,891.60
n2-custom-10-262144	\$9,444.44	6	\$1,574.07	\$339,999.67
n2-custom-10-32768	\$36,492.32	84	\$434.43	\$1,313,723.52
n2-custom-10-73472	\$605.30	1	\$605.30	\$21,790.80
n2-custom-10-8192	\$523.78	1	\$523.78	\$18,856.06
n2-custom-12-12032	\$178.55	1	\$178.55	\$6,427.74
n2-custom-12-12288	\$3,405.70	4	\$851.42	\$122,605.03
n2-custom-12-16128	\$1,553.76	3	\$517.92	\$55,935.36
n2-custom-12-16384	\$1,636.88	3	\$545.63	\$58,927.84
n2-custom-12-163840	\$2,156.20	2	\$1,078.10	\$77,623.18
n2-custom-12-196608	\$8,035.22	2	\$4,017.61	\$289,268.01
n2-custom-12-24576	\$162.18	1	\$162.18	\$5,838.54
n2-custom-12-262144	\$18,636.57	7	\$2,662.37	\$670,916.57
n2-custom-12-27136	\$335.80	2	\$167.90	\$12,088.94
n2-custom-12-32768	\$60,728.50	64	\$948.88	\$2,186,226.14
n2-custom-12-49152	\$2,897.97	3	\$965.99	\$104,326.81
n2-custom-12-65536	\$21,072.33	19	\$1,109.07	\$758,604.02
n2-custom-12-73728	\$731.84	1	\$731.84	\$26,346.34
n2-custom-12-8192	\$151.07	1	\$151.07	\$5,438.44
n2-custom-12-98304	\$5,404.26	5	\$1,080.85	\$194,553.45
n2-custom-16-278528	\$2,336.82	1	\$2,336.82	\$84,125.37
n2-custom-16-64512	\$279.70	1	\$279.70	\$10,069.23
n2-custom-20-130816	\$1,797.68	1	\$1,797.68	\$64,716.38
n2-custom-20-17920	\$1,708.13	7	\$244.02	\$61,492.62
n2-custom-20-261632	\$8,302.06	5	\$1,660.41	\$298,874.09



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
n2-custom-20-32512	\$16,414.85	7	\$2,344.98	\$590,934.65
n2-custom-20-32768	\$3,016.86	3	\$1,005.62	\$108,606.87
n2-custom-20-65536	\$4,972.94	4	\$1,243.24	\$179,025.84
n2-custom-20-98048	\$2,372.47	2	\$1,186.23	\$85,408.88
n2-custom-2-14080	\$67.36	1	\$67.36	\$2,424.82
n2-custom-2-16128	\$111.21	2	\$55.61	\$4,003.64
n2-custom-2-16384	\$149.57	2	\$74.79	\$5,384.60
n2-custom-2-17408	\$249.57	2	\$124.79	\$8,984.60
n2-custom-2-1792	\$198.82	1	\$198.82	\$7,157.69
n2-custom-2-2048	\$723.05	21	\$34.43	\$26,029.68
n2-custom-2-20480	\$193.43	1	\$193.43	\$6,963.35
n2-custom-2-24576	\$958.63	4	\$239.66	\$34,510.54
n2-custom-2-2816	\$80.03	1	\$80.03	\$2,880.96
n2-custom-2-3840	\$979.71	34	\$28.82	\$35,269.65
n2-custom-2-4096	\$308.80	10	\$30.88	\$11,116.76
n2-custom-24-32768	\$1,767.46	1	\$1,767.46	\$63,628.54
n2-custom-2-4352	\$61.13	2	\$30.57	\$2,200.68
n2-custom-24-49408	\$7,141.11	1	\$7,141.11	\$257,080.01
n2-custom-2-4608	\$58.79	2	\$29.39	\$2,116.30
n2-custom-24-65536	\$4,500.57	4	\$1,125.14	\$162,020.45
n2-custom-2-6144	\$178.17	5	\$35.63	\$6,413.98
n2-custom-2-65536	\$350.55	1	\$350.55	\$12,619.75
n2-custom-2-7936	\$42.45	1	\$42.45	\$1,528.11
n2-custom-2-8192	\$453.43	12	\$37.79	\$16,323.65
n2-custom-2-9216	\$37.18	1	\$37.18	\$1,338.39
n2-custom-32-65536	\$2,182.58	1	\$2,182.58	\$78,572.92
n2-custom-4-12032	\$458.52	5	\$91.70	\$16,506.77
n2-custom-4-12288	\$63.04	1	\$63.04	\$2,269.52
n2-custom-4-13056	\$410.86	1	\$410.86	\$14,790.83
n2-custom-4-131072	\$5,207.73	3	\$1,735.91	\$187,478.32
n2-custom-4-15872	\$182.63	2	\$91.31	\$6,574.66
n2-custom-4-16128	\$282.25	4	\$70.56	\$10,161.03
n2-custom-4-16384	\$1,130.57	15	\$75.37	\$40,700.59



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
n2-custom-4-2048	\$49.16	1	\$49.16	\$1,769.80
n2-custom-4-24064	\$77.01	1	\$77.01	\$2,772.42
n2-custom-4-24576	\$325.31	4	\$81.33	\$11,711.17
n2-custom-4-3072	\$151.06	3	\$50.35	\$5,438.16
n2-custom-4-32768	\$112.13	1	\$112.13	\$4,036.76
n2-custom-4-33536	\$301.47	1	\$301.47	\$10,853.00
n2-custom-4-36864	\$339.37	1	\$339.37	\$12,217.41
n2-custom-4-3840	\$832.29	13	\$64.02	\$29,962.30
n2-custom-4-4096	\$477.29	9	\$53.03	\$17,182.39
n2-custom-4-40960	\$268.45	1	\$268.45	\$9,664.29
n2-custom-4-4608	\$249.93	5	\$49.99	\$8,997.39
n2-custom-4-4864	\$215.48	4	\$53.87	\$7,757.21
n2-custom-4-5120	\$101.64	2	\$50.82	\$3,658.86
n2-custom-4-5888	\$690.53	9	\$76.73	\$24,859.24
n2-custom-4-6144	\$56.53	1	\$56.53	\$2,035.07
n2-custom-4-7936	\$2,844.80	39	\$72.94	\$102,412.80
n2-custom-4-8192	\$1,578.82	25	\$63.15	\$56,837.43
n2-custom-4-9728	\$276.54	1	\$276.54	\$9,955.51
n2-custom-4-98304	\$4,043.58	3	\$1,347.86	\$145,568.74
n2-custom-6-10240	\$255.43	1	\$255.43	\$9,195.36
n2-custom-6-12032	\$186.85	2	\$93.42	\$6,726.44
n2-custom-6-12288	\$83.09	1	\$83.09	\$2,991.27
n2-custom-6-16384	\$9,590.03	26	\$368.85	\$345,241.14
n2-custom-6-24576	\$997.50	3	\$332.50	\$35,909.94
n2-custom-6-3072	\$158.52	2	\$79.26	\$5,706.85
n2-custom-6-30720	\$4,834.76	1	\$4,834.76	\$174,051.32
n2-custom-6-32256	\$1,202.54	3	\$400.85	\$43,291.48
n2-custom-6-32512	\$567.66	1	\$567.66	\$20,435.58
n2-custom-6-32768	\$7,907.91	13	\$608.30	\$284,684.72
n2-custom-6-49152	\$443.52	1	\$443.52	\$15,966.66
n2-custom-6-5120	\$146.05	2	\$73.03	\$5,257.87
n2-custom-6-6144	\$767.17	3	\$255.72	\$27,618.29
n2-custom-6-7680	\$412.76	1	\$412.76	\$14,859.23



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
n2-custom-6-8192	\$294.64	1	\$294.64	\$10,607.13
n2-custom-6-98304	\$3,816.99	4	\$954.25	\$137,411.73
n2-custom-8-16384	\$129.35	1	\$129.35	\$4,656.52
n2-custom-8-17920	\$156.41	1	\$156.41	\$5,630.61
n2-custom-8-196608	\$8,625.54	1	\$8,625.54	\$310,519.47
n2-custom-8-24576	\$359.01	3	\$119.67	\$12,924.50
n2-custom-8-32256	\$1,160.08	3	\$386.69	\$41,762.75
n2-custom-8-32768	\$383.11	2	\$191.56	\$13,792.07
n2-custom-8-4096	\$89.04	1	\$89.04	\$3,205.53
n2-custom-8-65536	\$238.02	1	\$238.02	\$8,568.87
n2-custom-8-73728	\$9,052.43	2	\$4,526.21	\$325,887.46
n2-custom-8-7936	\$628.74	6	\$104.79	\$22,634.55
n2-custom-8-8192	\$100.61	1	\$100.61	\$3,621.99
n2-custom-8-81920	\$1,246.54	1	\$1,246.54	\$44,875.26
n2-custom-8-98304	\$1,992.47	1	\$1,992.47	\$71,728.77
n2-highmem-32	\$10,213.90	4	\$2,553.48	\$367,700.56
n2-highmem-64	\$4,745.83	1	\$4,745.83	\$170,849.96
<b>Washington State Cloud</b>	<b>\$1,833,534.71</b>	<b>4,284</b>	<b>\$428.00</b>	<b>\$66,007,249.69</b>
2 X huge 32 x 768	\$35,334.00	4	\$8,833.50	\$1,272,024.00
2X-Huge	\$10,277.90	1	\$10,277.90	\$370,004.40
3X-Huge 48 x 768	\$23,516.10	2	\$11,758.05	\$846,579.60
4XL 32 x 64	\$2,063.70	1	\$2,063.70	\$74,293.20
Huge 24 x 768	\$684,268.90	464	\$1,474.72	\$24,633,680.40
Large 4 x 12	\$27,016.80	77	\$350.87	\$972,604.80
Large 4 x 16	\$109,806.20	294	\$373.49	\$3,953,023.20
Large 4 x 20	\$6,489.70	16	\$405.61	\$233,629.14
Large 4 x 24	\$20,631.10	45	\$458.47	\$742,719.60
Large 4 x 28	\$880.40	2	\$440.20	\$31,694.40
Large 4 x 32	\$64,878.59	116	\$559.30	\$2,335,629.18
Large 4 x 4	\$58,800.80	230	\$255.66	\$2,116,828.80
Large 4 x 8	\$180,933.14	630	\$287.20	\$6,513,592.93
Large 6 x 10	\$358.00	1	\$358.00	\$12,888.00
Large 6 x 12	\$1,173.00	3	\$391.00	\$42,228.00



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
Large 6 x 8	\$3,290.30	9	\$365.59	\$118,450.77
Medium 2 x 4	\$80,813.75	543	\$148.83	\$2,909,294.85
Medium 2 x 12	\$14,046.10	60	\$234.10	\$505,659.60
Medium 2 x 16	\$40,857.38	162	\$252.21	\$1,470,865.82
Medium 2 x 2	\$5,463.10	45	\$121.40	\$196,671.60
Medium 2 x 8	\$132,357.00	635	\$208.44	\$4,764,852.00
Small 1 x 12	\$978.80	4	\$244.70	\$35,236.80
Small 1 x 2	\$13,907.20	202	\$68.85	\$500,659.20
Small 1 x 4	\$37,044.57	309	\$119.89	\$1,333,604.49
Small 1 x 6	\$1,209.10	11	\$109.92	\$43,527.60
Small 1 x 8	\$5,797.30	28	\$207.05	\$208,702.80
X-Large 8 x 16	\$79,255.10	134	\$591.46	\$2,853,183.60
X-Large 8 x 24	\$39,905.39	55	\$725.55	\$1,436,594.20
X-Large 8 x 32	\$97,947.70	131	\$747.69	\$3,526,117.20
X-Large 8 x 48	\$23,061.80	23	\$1,002.69	\$830,224.72
X-Large 8 x 8	\$31,171.80	47	\$663.23	\$1,122,184.80

Exhibit 12.4.1: Direct Charge Mechanisms or Pricing from Cloud Vendors

## 12.5 Service Level Objectives/Agreements Models.

The following SLAs contain descriptions that outline the service level categories and where and when they are provided. The SLAs will define the State's expected, minimum, and interim performance levels.

### 12.5.1 Service Level Categories

The SLA type provides performance levels used for those service elements requiring an agreed-to and an expected service level.

Category	Service Level Categories	Expected	Minimum	Measurement Window	SLA Type
Availability	Business and Infrastructure Application Availability - Server	99.99%	99.95%	Monthly	Critical Service Level
Availability	Successful Backups – Server	99.75%	99.50%	Monthly	Critical Service Level
Availability	Server Availability - Tier 1 - Individual Server	99.95%	99.90%	Monthly	Critical Service Level
Availability	Server Availability - Tier 2 - Individual Server	99.90%	99.50%	Monthly	Critical Service Level
Incident & Problem Management	Resolution Time - Severity 1 - Server	96.72%	95.00%	Monthly	Critical Service Level



Category	Service Level Categories	Expected	Minimum	Measurement Window	SLA Type
Incident & Problem Management	Resolution Time - Severity 2 - Server	96.72%	95.00%	Monthly	Critical Service Level
Incident & Problem Management	Resolution Time - Severity 3 - Server	96.00%	95.00%	Monthly	Critical Service Level
Incident & Problem Management	Resolution Time - Severity 4 - Server	95.00%	93.00%	Monthly	Key Measurement
Incident & Problem Management	Root Cause Analysis Delivery - Server	95.00%	90.00%	Monthly	Key Measurement
Incident & Problem Management	Corrective Actions - Server	95.00%	90.00%	Monthly	Key Measurement
Service Management	Service Request Fulfillment - Server	98.00%	95.00%	Monthly	Critical Service Level
Service Management	Solution Proposal Delivery - Server	95.00%	90.00%	Monthly	Critical Service Level
Service Management	Project Implementation - Server	95.00%	90.00%	Monthly	Critical Service Level
Service Management	CMDB Reconciliation - Server	95.00%	90.00%	Monthly	Critical Service Level
Service Management	Change Management Effectiveness - Server	98.00%	95.00%	Monthly	Key Measurement
Service Management	Invoice Dispute Resolution - Server	96.50%	93.00%	Quarterly	Key Measurement
Service Management	Major Incident Management Response Time	95.00%	95.00%	Monthly	Critical Service Level
Operations Management	Security and Vulnerability Patching - Server	99.00%	95.00%	Monthly	Key Measurement
Operations Management	License and Maintenance Renewal Timeliness - Server	99.50%	99.00%	Monthly	Key Measurement
Request Management	Standard Virtual or Cloud Server Provisioning	98.00%	95.00%	Monthly	Critical Service Level
Request Management	Identity Provisioning	98.00%	95.00%	Monthly	Critical Service Level
Request Management	Data Center Backup Restore Request	98.00%	95.00%	Monthly	Critical Service Level
Request Management	Standard Physical Server Provisioning	98.00%	95.00%	Monthly	Critical Service Level
Request Management	Custom Server Provisioning	98.00%	95.00%	Monthly	Critical Service Level
Request Management	Hardware Refresh Timeliness - Server	95.00%	90.00%	Monthly	Key Measurement
Request Management	De-Provisioning Timeliness - Server	95.00%	90.00%	Monthly	Key Measurement
Request Management	Solution ROM Delivery - Server	95.00%	90.00%	Monthly	Key Measurement

**Exhibit 12.5.1.1: Service Level Categories**





## 12.5.2 KPI Definitions

The Key Performance Indicators (KPI) Units and Definitions provide performance metrics as related to cloud service elements.

Unit	Definition	Cloud-Related
Per Application Instance	Number of instances of the application (installed software, J2EE run-time, web-server node, etc.)	Yes
Per Cloud Configured TB	Volume of Cloud Storage (Object, File, managed disk) configured within the cloud platform	Yes
Per Container	Number of containers in the cloud environment. The containers may be supported by Docker or cloud-native container management services	Yes
Per Database Instance	Number of database instances running on each database server instance or cluster	Yes
Per-User Identity	Number of User Identities managed with Federated Identity services including Active Directory, Azure AD, AWS Directory Services, or other federated identity tools	Yes
Per Kubernetes Managed Container	Number of Kubernetes (K8S) managed containers in the cloud environment. A dedicated Kubernetes platform may manage the containers or a cloud vendor-supplied service	Yes
Per Master/Management Server	Number of backup management/master servers or device controllers in the environment.	No
Per Protected Cloud Instance (Server, Database, Storage, etc.)	Number of server instances, database instances, or storage protected by the cloud-native backup services	Yes
Per Server Instance	Number of server instances with the specified operating systems running in the environment	Yes
Per Server Instance Protected	Number of server instances protected by the backup platform or service	No
Per Server Instance Protected, Backup Server or Backup Device	Number of server instances protected by the backup platform, the related backup servers, or backup devices	No
Per Server Instance, Network Device, or Storage Device	Number of service instances, physical network devices, or physical storage devices in the environment	No
Per Storage Device	Number of physical storage devices (arrays, network-attached storage) in the environment	No



Unit	Definition	Cloud-Related
Per URL / Synthetic Transaction	Number of URLs or synthetic transactions requested to be monitored in the environment	Yes
Per Useable TB	Volume of useable storage in terabytes (TB) in the environment	No
Per Virtualization Host	Number of physical virtualization hosts in the environment	No

Exhibit 12.5.2.1: KPI Definitions

### 12.5.3 Key Performance Indicators

The table below illustrates the Unisys Service Tiers and baseline KPI units for staffing managed services; for example, 1 FTE could monitor 4,500 Linux servers. Depending on the service tier, a system administrator could manage from 150 to 275 total servers.

Service Tower	Technology / Function	Unit	Suggested KPI Values
ITSM / Shared Tools	Monitoring – Server, Network, Storage, Backup	Per Device Instance (Server, Network, Storage, Backup)	4,500
ITSM / Shared Tools	Monitoring – Database	Per Database Instance	8,000
ITSM / Shared Tools	Monitoring- URL or Synthetic Transaction	Per URL / Synthetic Transaction	800
ITSM / Shared Tools	Infrastructure Discovery	Per Server Instance, Network Device, or Storage Device	15,000
ITSM / Shared Tools	Configuration / Asset Management	Per Server Instance, Network Device, or Storage Device	15,000
ITSM / Shared Tools	Capacity Management	Per Server Instance, Network Device, or Storage Device	1,500
Identity Management	Identity Services	Per-User Identity	8,000
Server	Servers (Windows, Linux, VMWare ESX, Microsoft Hyper-V)	Per Server Instance or Virtualization Host	150
Storage	Storage Management	Per Useable TB	1,000
Storage	Backup - Protected Servers	Per Server Instance Protected	500
Storage	Backup - Master / Management Servers	Per Master/Management Server	50
Network	Switch, Router	Per Network Device	500
Network / Network Security	Firewall, IDS/IPS	Per Network Device	35
Network / Network Security	Load Balancer	Per Network Device	35
Application Services	Middleware Apps - IIS, Apache, WebLogic, WebSphere, Tomcat, Jboss, OAS, or equivalent	Per Application Instance	125
Database	Database Management	Per Database Instance	100



Service Tower	Technology / Function	Unit	Suggested KPI Values
Cloud Services	Cloud Account	Per Account or Subscription	10
Cloud Services	Cloud – Servers (Windows, Linux)	Per Server Instance	300
Cloud Services	Cloud - Database-iaaS	Per Database Instance	100
Cloud Services	Cloud - Database-PaaS	Per Database Instance	200
Cloud Services	Cloud - Backup Targets (Cloud Native)	Per Protected Cloud Instance (Server, Database, Storage, etc.)	600
Cloud Services	Cloud - Storage (AWS S3/Glacier/EFS, Azure File Storage/Blobs)	Per Cloud Configured TB	1,500
Cloud Services	Cloud - Containers -Docker	Per Container	500
Cloud Services	Cloud - Containers - Kubernetes	Per Kubernetes Managed Container	400

**Exhibit 12.5.3.1: Key Performance Indicators**



## 13. Business Case Analysis

### 13.1 Approach

Unisys has developed the return on investment (ROI) analysis for the State of Washington's cloud adoption using a "bottom-up" approach with a low and high estimate for the servers migrated to the cloud.

1. The **LOW estimate** is based on migrating 1,500 out of 11,275 servers (approximately 13%) with the participation of ten (10) In-Scope Agencies.
2. The **HIGH estimate** is based on migrating 9,000 out of 11,275 servers (approximately 80%) with the participation of all sixty-eight (68) In-Scope Agencies. Based upon Unisys experience with similar environments, eighty (80) percent is used for the high estimate because there will always be some applications that are not cloud-ready or must be located on-premises which will prevent moving those servers to the cloud.

These estimates are based on the cloud services analysis using a 3-year average commit price for an Azure cloud server of \$188.99 per server per month (see sections 13.3.2 and Appendix F). If the cloud migrations include third-party solutions (e.g., firewalls, load balancers, management tools), the related costs will change the corresponding ROI.

#### A. Minimum Transformation Projects:

At a minimum level, the Governance (GOV-2) and Enterprise Architecture (EA-4) projects are critical since they provide the foundation and path for using cloud services. They also directly contribute to the return on investment and cost control opportunities, including hardware refresh, rebalancing labor models, and contract-based purchases.

- EA-4: performing the agency-specific cloud migration projects (described in Section 13.5 and Appendix J).
- GOV-2: establishing the Cloud Service Broker and Cloud Communities of Excellence (CCoE), enabling new skills for ongoing operations and optimization (described in Section 13.5 and Appendix J).

Even though these initiatives position the State to use cloud technologies, personnel skills, operational efficiencies, and cloud practices, adoption would be limited throughout the 3-year strategy.

#### B. Enhanced Transformation Projects:

The cloud adoption with technology and operational enhancements includes all the recommended projects listed below. These projects provide an optimized model with a balance of people, process, and technology innovations to maximize the adoption results.

The enhanced projects offer an opportunity to avoid backfilling resigning and retiring FTEs within the Datacenter Services area due to greater standardization, automation, and configuration drift management.

Each of the following projects is described in greater detail in Appendix J.

- EA-1A - Enterprise Application and Infrastructure Configuration Management System (CMS)
- EA-1B - Cloud Financial Management System



- EA-1C - Cloud Management Platform
- GOV-2 - Establish CCoE and Cloud Service Broker
- EA-3 - Network Optimization Assessment for Cloud Services
- EA-4 - Cloud Migration Projects
- GOV-5 - Cybersecurity and Risk Management Governance
- WF-6 - Workforce Planning Initiative
- WF-7 - Organizational Change Management
- WF-10 - Establish Cloud Ready Operations
- EA-11 - Federated Identity Management - Cloud and Privileged Access

## 13.2 Building a Business Case for Agency Cloud Transition

The following four business case models will take into account the low and high boundaries, as well as the Minimum and/or Enhanced Transformation projects to provide the different ROI estimates below:

- **Model 1** – 1,500 servers will be migrated to the cloud.  
Minimal Transformation Projects, EA-4, and GOV-2 will be executed.
- **Model 2** – 1,500 servers will be migrated to the cloud.  
Enhanced Transformation Project EA-1A, EA-1B, EA-1C, EA-3, GOV-5, WF-6, WF-7, WF-10 and EA-11 will be executed.
- **Model 3** – 9,000 will be migrated to the cloud.  
Minimal Transformation Projects, EA-4, and GOV-2 will be executed.
- **Model 4** – 9,000 will be migrated to the cloud.  
Enhanced Transformation Project EA-1A, EA-1B, EA-1C, EA-3, GOV-5, WF-6, WF-7, WF-10 and EA-11 will be executed.

The following assumptions are made across all the business cases:

- **Cloud Services** cost for Azure servers is estimated at \$188.99 per server per month for the lowest 3-Year commit rate.
- **Cloud Adoption & Migration** (CA&M) refers to the two foundational projects EA-4 and GOV-2. It is assumed in all models that the In-Scope Agencies will execute the projects to enable forward motion on any other program benefits.
- The **Adoption & Migration Enhancement** (A&ME) projects refer to EA-1A, EA-1B, EA-1C, EA-3, GOV-5, WF-6, WF-7, WF-10, and EA-11, which enable the in-scope Agencies to better rationalize their technology service platforms.
- **Run-Time Costs** represent the annual operational costs of the *Cloud Adoption and Migration* projects.
- **Hardware-Related Costs** represent the annual operational costs of the current servers as derived from the State's IT Equipment – Maintenance Agreements (EE E110) and Fiscal Year 2020 hardware expenses for Converged Hardware, Servers, Offline Storage, and Online Storage. (Section 13.4)
- **Transition** includes the project costs for the CA&M and A&ME projects associated with the model.
- The business case models do not account for any FTE labor cost avoidance.



### 13.2.1 Model 1: Cloud Adoption and Migration (Low Estimate/Minimum Transformation)

This model is based upon the low estimate of migrating 1,500 servers. As shown in the following table, subtracting the Future Costs (new Cloud Services) from the Current Costs yields a potential 3-year Net Benefit of \$14M and a total ROI of 86%.

LOW ESTIMATE – 1,500 SERVERS					
	1-24 Months				
FUTURE COSTS	Transition	YR1	YR2	YR3	Total
Cloud Services		\$3,401,820.00	\$3,401,820.00	\$3,401,820.00	\$10,205,460.00
Cloud Adoption & Migration	\$4,724,187.84				\$4,724,187.84
Adoption & Migration Enhancements					\$0.00
Run-Time Costs		\$475,422.22	\$475,422.22	\$475,422.22	\$1,426,266.67
<b>Total Costs</b>	\$4,724,187.84	\$3,877,242.22	\$3,877,242.22	\$3,877,242.22	\$16,355,914.51
CURRENT COSTS	Transition	YR1	YR2	YR3	Total
Productivity - Indirect					
Hardware-Related Costs <sup>1</sup>		\$10,137,665.19	\$10,137,665.19	\$10,137,665.19	\$30,412,995.56
<b>Total Benefits</b>	\$0.00	\$10,137,665.19	\$10,137,665.19	\$10,137,665.19	\$30,412,995.56
NET BENEFITS	Transition	YR1	YR2	YR3	Total
	-\$4,724,187.84	\$6,260,422.96	\$6,260,422.96	\$6,260,422.96	\$14,057,081.05
RETURN ON INVESTMENT	Transition	YR1	YR2	YR3	Total
	-100%	161%	161%	161%	86%

<sup>1</sup> The hardware-related costs are based on 13% of the annual hardware cost of \$77,982,039.89 (Section 13.4).



### 13.2.2 Model 2: Cloud Adoption with Technology and Operational Enhancements (Low Estimate/Enhanced Transformation)

This model is also based upon the low estimate of 1,500 servers. However, it includes the additional Adoption and Migration projects which add \$8.376M in cost. The yearly Run-Time Costs also increase to \$2.323M. The table below illustrates a 3-year Net Benefit of \$139K and an ROI of 0%. The low Net Benefit and ROI is expected since only a small group of 1,500 servers are migrated. This approach establishes an optimized base model to invest in training people, optimizing processes, and technology innovations with tools to maximize cloud service benefits. Productivity – Indirect or Soft savings (which have not been quantified) will impact future staffing levels with increased efficiency and automation to improve ROI.

LOW ESTIMATE – 1,500 SERVERS					
FUTURE COSTS	1-24 Months			YR3	Total
	Transition	YR1	YR2		
Cloud Services		\$3,401,820.00	\$3,401,820.00	\$3,401,820.00	\$10,205,460.00
Cloud Adoption & Migration	\$4,724,187.84				\$4,724,187.84
Adoption & Migration Enhancements	\$8,375,815.00				\$8,375,815.00
Run-Time Costs		\$2,322,655.56	\$2,322,655.56	\$2,322,655.56	\$6,967,966.67
<b>Total Costs</b>	\$13,100,002.84	\$5,724,475.56	\$5,724,475.56	\$5,724,475.56	\$30,273,429.51
CURRENT COSTS	Transition	YR1	YR2	YR3	Total
Productivity - Indirect					
Hardware-Related Costs <sup>2</sup>		\$10,137,665.19	\$10,137,665.19	\$10,137,665.19	\$30,412,995.56
<b>Total Benefits</b>	\$0.00	\$10,137,665.19	\$10,137,665.19	\$10,137,665.19	\$30,412,995.56
NET BENEFITS	Transition	YR1	YR2	YR3	Total
	-\$13,100,002.84	\$4,413,189.63	\$4,413,189.63	\$4,413,189.63	\$139,566.05
RETURN ON INVESTMENT	Transition	YR1	YR2	YR3	Total
	-100%	77%	77%	77%	0%

<sup>2</sup> The hardware-related costs are based on 13% of the annual hardware cost of \$77,982,039.89 (Section 13.4).



### 13.2.3 Model 3: Cloud Adoption and Migration (High Estimate/Minimum Transformation)

This model is based upon a high estimate of migrating 9,000 servers, representing about 80% of the total number of in-scope servers. As shown in the following table, subtracting the Future Costs (new Cloud Services) from the Current Costs yields a 3-year Net Benefit of \$96.9M and a 107% ROI.

HIGH ESTIMATE – 9,000 SERVERS					
FUTURE COSTS	1-24 Months Transition	YR1	YR2	YR3	Total
Cloud Services		\$20,410,920.00	\$20,410,920.00	\$20,410,920.00	\$61,232,760.00
Cloud Adoption & Migration	\$23,244,909.64				\$23,244,909.64
Adoption & Migration Enhancements					\$0.00
Run--Time Costs		\$1,924,573.33	\$1,924,573.33	\$1,924,573.33	\$5,773,720.00
<b>Total Costs</b>	\$23,244,909.64	\$22,335,493.33	\$22,335,493.33	\$22,335,493.33	\$90,251,389.64
CURRENT COSTS	Transition	YR1	YR2	YR3	Total
Productivity - Indirect					
Hardware-Related Costs <sup>3</sup>		\$62,385,631.91	\$62,385,631.91	\$62,385,631.91	\$187,156,895.74
<b>Total Benefits</b>	\$0.00	\$62,385,631.91	\$62,385,631.91	\$62,385,631.91	\$187,156,895.74
NET BENEFITS	Transition	YR1	YR2	YR3	Total
	-\$23,244,909.64	\$40,050,138.58	\$40,050,138.58	\$40,050,138.58	\$96,905,506.10
RETURN ON INVESTMENT	Transition	YR1	YR2	YR3	Total
	-100%	179%	179%	179%	107%

<sup>3</sup> The hardware-related costs are based on 80% of the annual hardware cost of \$77,982,039.89 (Section 13.4).





### 13.2.4 Model 4: Cloud Adoption Technology and Operational Enhancements (High Estimate / Enhanced Transformation)

This model is also based upon migrating 9,000 servers. The A&ME projects add another \$21.102M in cost and increase the annual Run-Time Costs to \$7.173M. As shown in the table below, the 3-year Net Benefit is \$60.057M, and the ROI is 47%.

This is a reasonable net benefit and ROI for enhanced cloud migration and adoption for 9,000 servers. Moving additional servers to the cloud will improve these numbers. This approach establishes an optimized model to invest in future training, optimizing processes, and technology innovations with tools to maximize cloud service benefits. Productivity – Indirect or Soft savings (which have not been quantified) will impact future staffing levels with increased efficiency and automation to improve ROI.

HIGH ESTIMATE – 9,000 SERVERS						
FUTURE COSTS	1-24 Months Transition	YR1	YR2	YR3	Total	
Cloud Services		\$20,410,920.00	\$20,410,920.00	\$20,410,920.00	\$61,232,760.00	
Cloud Adoption & Migration	\$23,244,909.64				\$23,244,909.64	
Adoption & Migration Enhancements	\$21,102,680.00				\$21,102,680.00	
Run-Time Costs		\$7,173,096.67	\$7,173,096.67	\$7,173,096.67	\$21,519,290.00	
<b>Total Costs</b>	<b>\$44,347,589.64</b>	<b>\$27,584,016.67</b>	<b>\$27,584,016.67</b>	<b>\$27,584,016.67</b>	<b>\$127,099,639.64</b>	
CURRENT COSTS	Transition	YR1	YR2	YR3	Total	
Productivity - Indirect						
Hardware-Related Costs <sup>4</sup>		\$62,385,631.91	\$62,385,631.91	\$62,385,631.91	\$187,156,895.74	
<b>Total Benefits</b>	<b>\$0.00</b>	<b>\$62,385,631.91</b>	<b>\$62,385,631.91</b>	<b>\$62,385,631.91</b>	<b>\$187,156,895.74</b>	
NET BENEFITS	Transition	YR1	YR2	YR3	Total	
	-\$44,347,589.64	\$34,801,615.25	\$34,801,615.25	\$34,801,615.25	\$60,057,256.10	
RETURN ON INVESTMENT	Transition	YR1	YR2	YR3	Total	
	-100%	126%	126%	126%	47%	

<sup>4</sup> The hardware-related costs are based on 80% of the annual hardware cost of \$77,982,039.89 (Section 13.4).



## Adoption Disclaimer

It is important to note that the four ROI models are based upon the In-Scope Agencies' assumed willingness to adopt cloud technologies and Unisys' experience with similarly sized clients in multiple industries, including other State governments. The State of Washington has unique characteristics, such as decentralized Agency operations and approval, Agency-specific funding, regulatory requirements, and federal funding constraints, providing additional risk factors that could add an additional year to most projects, increasing costs 20%-30%, and delay benefit realization based on Agency adoption rates.

## Labor Savings Disclaimer

The Net Benefits and ROI presented in the previous four models do not include any FTE labor cost avoidance. This benefit is possible with the expected reduction in overall IT FTE labor workforce to support the in-scope Agencies' current infrastructure. With investments in training for new cloud skills and career advancement, the gaps created by resignations and retirements will provide new cost avoidance by not needing to backfill the old legacy positions. These positions will not be needed in a more efficient cloud environment.

*The remainder of section 13 provides the supporting details and assumptions used to drive the four ROI models and additional labor savings scenarios.*

## 13.3 Cloud Services Supporting Details

### 13.3.1 Cloud Services Costing Methodology

Unisys used StratoZone in the State of Washington engagement, which included a readiness assessment of ten Agencies with one or more data collectors deployed in the environment. The data was automatically aggregated, analyzed, and staged for additional planning functions. The phases and tasks of the readiness assessment are shown below:

#### Phase 1: Discovery, Inventory Analysis, and Cloud Readiness

The objective of this phase is to collect data from the target workloads and complete inventory analysis, including basic cloud readiness. The StratoProbe® discovery engine gathered workload, application, and network information and processed the following analytics:

- Inventory analysis
- Asset performance analysis
- Network dependency mapping
- Cloud-readiness scoring
- Application inventory analysis



## Phase 2: Basic Cloud Fit and Financial Analysis

The objective of this phase is to analyze your data further to provide insights into cloud readiness, potential savings from the cloud, consumption strategies including IaaS and PaaS alternatives, and your projected spend in the selected cloud providers. The expected output from this phase includes:

- Best-fit vendor-product match – Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)-fit analysis
- IaaS-fit analysis
- Cloud-spend estimates (by the vendor)
- Total Cost of Ownership (TCO) and Return on Investment (ROI) against benchmarks

### 13.3.2 Financial Comparison

Unisys conducted a basic financial comparison for each of the Agency assets (see Appendix F: Financial Considerations) within the designated groups. This comparison is conducted at the infrastructure-level, using the process shown below:

#### Step 1: Performance-based right-sizing

We right-sized each asset’s capacity for a public-cloud metered model. Asset capacity includes CPU, memory, bandwidth, up-time, OS licensing, and storage performance.

#### Step 2: Selection of best-fit public cloud product

We selected the best-fit cloud products from each of the State’s designated vendors, based on capacity, performance, and price.

#### Step 3: Compare to benchmark environment

We compared your assets to the best-match cloud virtual server sizes and selected the closest match from your cloud providers. At this stage, the financial comparison does not account for all cost-of-ownership components. Excluded items typically relate to third-party products (such as DR or monitoring) that are sometimes required to operate assets in the public cloud.

Additionally, this analysis does not take into consideration application modernization, Platform-as-a-Service migrations, or other cloud-native enhancements that may be available to your asset inventory. Using the StratoZone planning engine, Unisys determined the following for average server costing per month and per total 3-Year commit. Please see Section 12.4 and Appendix F for StratoZone details. We chose Azure (3-Year Reserved) for the ROI analysis.

StratoZone Planning Report	Azure (3-Year Reserved)	AWS (3-Year Term)	Google Cloud 3-Year Commit	Washington State Cloud
Compute	\$303,476.73	\$ 353,369.80	\$ 287,394.87	\$ 1,323,467.81
Operating System	\$4,365.40	\$ 290,660.72	\$ 435,342.80	\$ -
Storage	\$476,803.43	\$ 418,974.31	\$ 486,753.49	\$510,066.90
Egress	\$25,002.74	\$ 44,207.50	\$ 32,324.30	\$ -



Agency Sample Total (monthly)	\$809,648.30	\$ 1,107,212.33	\$ 1,241,815.46	\$ 1,833,534.71
Total 36 month (3YR)	\$29,147,338.77	\$39,859,643.92	\$44,705,356.67	\$66,007,249.69
Saving vs. WA State Cloud	\$(36,859,910.92)	\$(26,147,605.77)	\$( 21,301,893.02)	\$ -
Average cost/server per month	\$ 188.99	\$ 258.45	\$ 289.87	\$ 428.00
Estimated Total (9,000 servers)	\$61,232,760.00	\$83,737,800.00	\$93,917,880.00	\$138,672,000.00

### 13.4 Current Hardware Related Costs

The current spend trend comes from the Technology Business Management (TBM) FY20 IT Resource Tower Costs as reported by the OCIO for the In-Scope Agencies (Converged Infrastructure, Servers, Offline and Online Storage provide the base for HW ROI analysis):

IT Tower Costs	Sum of Cost
<b>Compute</b>	
Converged Infrastructure	\$5,755,153.32
Servers	\$35,558,250.77
<b>Storage</b>	
Offline Storage	\$7,189,951.71
Online Storage	\$22,088,562.47
<b>Compute + Storage Subtotal</b>	<b>\$70,591,918.27</b>
<b>Maintenance</b>	
EE E110 - IT Equipment - Maintenance Agreements	\$7,390,121.62
<b>Annual Hardware Cost Total</b>	<b>\$77,982,039.89</b>
ROI Models 1-2 (1,500 servers) - 13%	\$10,131,665.19
ROI Models 3-4 (9,000 servers) - 80%	\$62,385,631.91
<b>Average Cloud Services (\$188.99)</b>	
ROI Models 1-2 (1,500 servers) - 13%	<b>\$3,401,820.00</b>
ROI Models 3-4 (9,000 servers) - 80%	<b>\$20,410,920.00</b>



## 13.5 Adoption, Migration and Enhancement Projects

Unisys recommends the following projects with key opportunities identified. Our workshop confirmed the need for the seventy-nine (79) Agencies to collaborate and focus efforts to move to the cloud. Cloud computing will optimize operations and services with significant financial impact in cost avoidance for IT assets, centralized procurement, and rebalanced staffing.

Projects Governance (GOV-2) and Enterprise Architecture (EA-4) directly contribute to cost avoidance opportunities for a hardware refresh, changing labor approaches (i.e.: Cloud Community of Excellence – CCoE support model), and ongoing contract procurements. Each project is important to driving successful cloud adoption projects and contributes to the ROI goals identified in Section 13.1. Excluding any projects could result in a lower-than-expected cost avoidance, introduce unintended risks (including the Cloud Computing risks in Section 14.1), and jeopardize future productivity gains.

### 13.5.1 Minimum Transformation Projects:

Project (sequence)	Key Opportunities	Benefits
Governance (GOV) Project 2: Establish Cloud Community of Excellence (CCoE) and Enterprise Cloud Service Broker	<ul style="list-style-type: none"> <li>Define criteria for vendor selection</li> <li>Establish a Community of Practices</li> </ul>	<ul style="list-style-type: none"> <li>Improve procurement, contracting, and project management by establishing consistent service levels, cost structures, and metrics for cloud adoption</li> </ul>
EA Project 4: Cloud Migration Projects	<ul style="list-style-type: none"> <li>Evaluate and plan application migrations</li> <li>Migrate selected applications to the cloud</li> </ul>	<ul style="list-style-type: none"> <li>Shift costs to OpEx and on-demand solutions with cost management and governance.</li> <li>Reduce or eliminate Agency data centers for cloud services</li> <li>Support budget and business changes by right-sizing application infrastructure</li> </ul>

### 13.5.2 Enhancement Transformation Projects:

In addition to the above Minimum Transformation projects, the Enhanced transformation projects will equip the State to operate in a more efficient manner within the public cloud. Examples would include increased standardization, automation, and configuration drift management through projects such as EA-1, EA-11 and WF-6. As discussed in section 13.6.1, the WF Project 6: Workforce Planning Initiative provides a potential cost avoidance of approximately \$56.5 million over 3 years.



Project (sequence)	Key Opportunities	Benefits
Enterprise Architecture (EA) Project 1: Cloud Management Tools	<ul style="list-style-type: none"> <li>Establish an application infrastructure inventory management program</li> <li>Provide shared cloud automation tools</li> <li>Add continuous cloud financial management across the enterprise</li> </ul>	<ul style="list-style-type: none"> <li>Tracks applications and infrastructure to maintain assets more consistently</li> <li>Identifies opportunities to reduce operational costs as applications retire or move to the Cloud</li> </ul>
GOV Project 5: Cybersecurity and Risk Management Governance	<ul style="list-style-type: none"> <li>Deploy security frameworks and data protection</li> </ul>	<ul style="list-style-type: none"> <li>Manage and provide enterprise standard security services in the Cloud using standardized security tools, platforms, and approaches</li> </ul>
EA Project-3 Network Optimization for Cloud Services	<ul style="list-style-type: none"> <li>Evaluate network bandwidth and data flow changes required to support cloud adoption</li> </ul>	<ul style="list-style-type: none"> <li>Improves network capacity and resilience for Agency locations as applications shift from on-premise to cloud environments</li> <li>Takes advantage of available network services to support cloud use</li> </ul>
EA Project 11: Federated Identity Management	<ul style="list-style-type: none"> <li>Establish cloud-focused federated identity services and platform</li> <li>Provide a flexible platform to support privileged access management, multi-factor authentication, and Active Directory (AD) integration</li> </ul>	<ul style="list-style-type: none"> <li>Provides a single sign-on and integration for cloud services and administrative access.</li> <li>Promotes improved security and user experience by using the state employee's Active Directory ID to access cloud services and applications</li> </ul>
WF Project 6: Workforce Planning Initiative	<ul style="list-style-type: none"> <li>Skills Management Process</li> </ul>	<ul style="list-style-type: none"> <li>Invests in training staff and career development</li> <li>Rebalance IT staff and retirements</li> <li>Reduce external labor</li> </ul>
WF Project 10: Establish Cloud Ready Operations	<ul style="list-style-type: none"> <li>Establish Agency cloud adoptions and operations team(s)</li> <li>Implement cloud accounts and landing zone environments based on Agency requirements</li> </ul>	<ul style="list-style-type: none"> <li>Uses standards, tools, operations based on the Agency scale and current needs</li> <li>Drives cloud adoption through bi-modal operations for cloud and current IT services</li> </ul>
WF Project 7: Organizational Change Management Evolution	<ul style="list-style-type: none"> <li>Develop an organizational change management strategy</li> </ul>	<ul style="list-style-type: none"> <li>Provides the process guidance, communications, and collaboration to support the Agencies to maximize the results of cloud adoption</li> </ul>
EA Project 9: Portfolio Rationalization & Cloud Optimization	<ul style="list-style-type: none"> <li>Identify application modernization candidates to use available cloud services</li> </ul>	<ul style="list-style-type: none"> <li>Aligns applications' technology use and costs to appropriate cloud services to benefit from the scalability and newer services</li> </ul>

Exhibit 13.4.1: Key Projects and Opportunities



### 13.5.3 General Project Assumptions and Details

The projects can be executed independently, although to maximize efficiencies and savings, there are complementary dependencies that provide the greatest value. Projects are separated into two types.

- Enterprise projects are anticipated to be led by the Service Broker or similar central team along with Agency participation with a limited project duration.
- Agency-directed projects are anticipated to be led and run by each Agency individually with support from the Service Broker based on the Agency's schedule.

Unisys estimated the recommended projects' cost and durations based upon experience with similarly sized clients in multiple industries, including other State governments. The State of Washington's unique characteristics listed below may directly impact the recommended projects' costs and durations. These factors could add a preparatory year to most projects and increase the costs by 20-30%.

- Decentralized Agency operations and adoption
- Agency-specific funding
- Regulatory requirements
- State and federal funding constraints

Each project includes the following details to provide the estimate:

- Project Labor
  - State labor estimated based on labor rates from the staffing data provided by the State
  - Third-party project or consulting services based on industry market labor rates
  - Professional services – software vendor project services based on estimates from the vendor
- Ongoing Labor
  - State labor estimated based on labor rates from the staffing data provided by the State
- Software Licensing
  - Software licensing and annual maintenance – based on vendor estimates
  - Software as a Services monthly or annual licensing – based on vendor estimates
- The low estimate is based on a minimum participation of 10 Agencies
- The high estimate is based on the full participation of 69 Agencies with application infrastructure.
- Project start time is tied to the completion of preparatory tasks and approvals, i.e., executive sponsorship, funding, resource identification, etc. that need to happen beforehand.



### 13.5.4 Project Cost Summary (low estimate\*)

Unisys has provided two project cost estimates for discussion and planning using a low and high range of options and level of FTE participation. The low estimate is based on ten (10) Agencies participating in each project. **Please See Appendix J: Business Case Investments for Project Details.**

Project Number	Project	Project Duration (Months)	Project Hours (Monthly)	Project Hours (Total)	Project Cost	Run-Time Cost	Total Cost
EA-1A	Enterprise Application and Infrastructure Configuration Management System (CMS)	9	1,280.00	8,520.00	\$1,007,760.00	\$1,305,600.00	\$2,313,360.00
EA-1B	Cloud Financial Management System	6	1,350.00	7,300.00	\$550,200.00	\$1,130,580.00	\$1,680,780.00
EA-1C	Cloud Management Platform	9	1,280.00	7,540.00	\$1,296,360.00	\$650,800.00	\$1,947,160.00
GOV-2	Establish CCoE and Cloud Service Broker	7	1,960.00	9,760.00	\$1,014,840.00	\$1,426,266.67	\$2,441,106.67
EA-3	Network Optimization Assessment for Cloud Services	6	865.00	3,125.00	\$230,975.00	\$-	\$230,975.00
EA-4	Cloud Migration Projects	20	5,160.00	28,900.00	\$3,709,347.84	\$-	\$3,709,347.84
GOV-5	Cybersecurity and Risk Management Governance	6	980.00	9,600.00	\$802,320.00	\$-	\$802,320.00
WF-6	Workforce Planning Initiative	6	950.00	5,700.00	\$572,220.00	\$470,400.00	\$1,042,620.00
WF-7	Organizational Change Management	12	1,850.00	20,840.00	\$1,525,160.00	\$-	\$1,525,160.00
WF-10	Establish Cloud Ready Operations	8	1,710.00	6,660.00	\$572,580.00	\$-	\$572,580.00
EA-11	Federated Identity Management - Cloud and Privileged Access	9	2,040.00	9,840.00	\$1,742,280.00	\$1,984,320.00	\$3,726,600.00
GOV-8	Cybersecurity and Risk Management - Constituent Identity Standards	3	480.00	1,440.00	\$75,960.00	\$-	\$75,960.00
EA-9	Application Portfolio Rationalization	12	7,420.00	22,230.00	\$2,523,580.00	\$-	\$2,523,580.00
<b>Business Case Totals</b>							
<b>Total Project Hours</b>		141,455.00	<b>Required for Transition</b>		\$13,024,042.84	\$6,967,966.67	\$19,992,009.51





Project Number	Project	Project Duration (Months)	Project Hours (Monthly)	Project Hours (Total)	Project Cost	Run-Time Cost	Total Cost
<b>Average Hours per Month</b>		3,929.31	<b>Recommended for Optimization</b>		\$2,599,540.00	\$-	\$2,599,540.00
<b>Target Months</b>		36	<b>Total</b>		\$15,623,582.84	\$6,967,966.67	\$22,591,549.51

**\*Disclaimer:** Unisys is providing an estimate of cost; actual costs may vary due to changes in-scope, requirements, or approach.

### 13.5.5 Project Cost Summary (high estimate\*)

The high estimate is based on sixty-eight (68) Agencies participating in each project. **Please See Appendix J: Business Case Investments for Project Details.**

Project Number	Project	Project Duration	Project Hours (Monthly)	Project Hours (Total)	Project Cost	Run-Time Cost	Total Cost
EA-1A	Enterprise Application and Infrastructure Configuration Management System (CMS)	9	4,660.00	21,540.00	\$2,321,880.00	\$4,531,200.00	\$6,853,080.00
EA-1B	Cloud Financial Management System	9	7,650.00	40,670.00	\$2,333,020.00	\$4,091,580.00	\$6,424,600.00
EA-1C	Cloud Management Platform	9	2,280.00	16,480.00	\$2,727,980.00	\$2,356,270.00	\$5,084,250.00
GOV-2	Establish CCOE and Cloud Service Broker	7	3,840.00	16,520.00	\$1,370,680.00	\$5,773,720.00	\$7,144,400.00
EA-3	Network Optimization Assessment for Cloud Services	9	3,315.00	11,720.00	\$831,160.00	\$-	\$831,160.00
EA-4	Cloud Migration Projects	24	32,120.00	164,560.00	\$21,874,229.64	\$-	\$21,874,229.64
GOV-5	Cybersecurity and Risk Management Governance	6	1,980.00	11,880.00	\$923,040.00	\$-	\$923,040.00
WF-6	Workforce Planning Initiative	6	2,600.00	15,600.00	\$1,438,980.00	\$1,462,200.00	\$2,901,180.00
WF-7	Organizational Change Management	18	4,660.00	21,540.00	\$7,070,240.00	\$-	\$6,853,080.00
WF-10	Establish Cloud Ready Operations	12	3,730.00	14,900.00	\$1,156,700.00	\$-	\$1,156,700.00
EA-11	Federated Identity Management - Cloud and Privileged Access	9	3,840.00	17,040.00	\$2,121,480.00	\$3,304,320.00	\$5,425,800.00
GOV-8	Cybersecurity and Risk Management - Constituent Identity Standards	3	1,130.00	3,390.00	\$178,200.00	\$-	\$178,200.00



Project Number	Project	Project Duration	Project Hours (Monthly)	Project Hours (Total)	Project Cost	Run-Time Cost	Total Cost
EA-9	Application Portfolio Rationalization	18	47,960.00	135,000.00	\$15,344,360.00	\$-	\$15,344,360.00
<b>Business Case Totals</b>							
<b>Total Project Hours</b>		490,840.00	<b>Required for Transition</b>		\$44,169,389.64	\$21,519,290.00	\$65,471,519.64
<b>Average Hours Per Month</b>		13,634.44	<b>Recommended for Optimization</b>		\$15,522,560.00	\$-	\$15,522,560.00
<b>Target Months</b>		36	<b>Total</b>		\$59,691,949.64	\$21,519,290.00	\$80,994,079.64

**\*Disclaimer: Unisys is providing an estimate of cost; actual costs may vary due to changes in-scope, requirements, or approach.**

## 13.6 Additional Potential Savings

There are two additional savings opportunities the cloud adoption may provide for the State of Washington: IT Staffing Needs and One Washington.

### 13.6.1 IT Staffing Needs

Implementing the Enhancement Transformation projects discussed previously will improve the efficiency of the future operation environment. The table below demonstrates the staffing distribution based on the Gartner Benchmark for the Data Center employees. Appendix I provides a detailed business case analysis using the Gartner benchmarks.

IT STAFFING BY SERVICE TOWER (FTE)	Gartner	Gartner	State of WA	In-scope Agency	In-scope Agency	Opportunity for Optimization
Service Tower	Staffing Distribution	IT Staff Count	Job Role	IT Staff Count	Staffing Distribution	Difference
Data Center	5.00%	124	IT Architecture	1,107	33%	983
			IT Data Management			
			IT System Administration			

**Exhibit 13.6.1: Gartner Benchmark for State and Local IT Staffing for Service Towers**



Cloud adoption has the greatest impact on the Data Center Tower (IT Architecture, IT Data Management, and IT Systems Administration). The State has 1,107 people supporting those roles for the in-scope agencies. The State has a current overall 10% annual resignation and retirement rate. By executing the Enhanced Transformation projects in addition to the Minimum Transformation projects, the state can accomplish similar efficiencies by aligning its in-place workforce.

The table below shows the savings that can be realized by not backfilling the 300 resignations and retirements over a three-year period. While additional analysis needs to be done to verify the potential, Unisys would be remiss if we did not include it as an additional potential saving. The average salary used for this calculation is \$91,104.79 with 3% standard of living cost included.

Average Salary	\$91,104.79		3% standard living cost (compounded)			
Non-backfill strategy	FY20	reduction	FY21	FY22	FY23	Total
Data Center IT Population Current Spend plus Rehire	\$100,853,002	1,107	\$103,878,593	\$106,994,950	\$110,204,799	\$321,078,342
Resign & Retired Trend 10%--Non-Backfill Roles-	FY21	-111	(\$10,085,300)	(\$10,085,300)	(\$10,085,300)	(\$30,256,011)
	FY22	-100		(\$9,076,770)	(\$9,076,770)	(\$18,153,640)
	FY23	-90			(\$8,169,093)	(\$8,169,183)
Data Center IT Population FTE Totals		807	\$93,793,292	\$87,832,880	\$82,873,635	\$264,499,507
			-111	-100	-90	-300
<b>10% Non-Backfill Cost Avoidance</b>						<b>\$56,578,834</b>

### 13.6.2 One Washington

The One Washington program led by the OFM is intended to replace the State’s decades-old financial and administrative applications with a modern enterprise resource planning (ERP) solution operating in the cloud as a “Software as a Service” model. The five systems in the ERP systems have application links and dependencies back to the Agencies. This SaaS model in the cloud will facilitate the transformation and migration with improved functionality, user-friendly technology (non-COBOL-based), simpler maintenance, and better remote access.

Unisys discovered the following Agency applications have current ERP dependencies, which will provide additional cost savings and cost avoidance by migrating to cloud services:

AGENCY APPS	Agency Financial Reporting System (AFRS)	Human Resource Management System (HRMS)	Travel and Expense Management System (TEMS)	Enterprise Contract Management System (ECMS)
Custom/ In-house & Commercial Off the Shelf (COTS)	138	124	10	30
Mainframe	23	15	4	3



Unisys noted that more than 60% of the major technology projects under OCIO oversight were dedicated to addressing legacy modernization and business transformation efforts. The reported budget for these multi-year **projects totals over \$1.39 billion.** [IT Biennial Report]

Unisys understands the current application support function dominates the State's IT workforce investment. The largest proportion of labor is dedicated to maintenance and operations efforts. That said, Unisys assumes that the State is already analyzing the potential benefits in this area. Quotes from Forrester and McKinsey support these potential savings.

Forrester:

"Moving to the cloud with new and old systems running in parallel during modernization activities will not provide immediate cost savings. Cost savings and developer productivity will occur as the developer teams accelerate to open cloud environments using the latest technologies, such as Kubernetes, containers, DevOps tools, and native cloud techniques. Per the Forrester study: Initially, the productivity improvement averages 20% and increases to 40% by Year 3 as developers become more familiar." <sup>46</sup>

McKinsey:

"Using an agile transformation to modernize an IT infrastructure organization isn't easy, but it is worthwhile. In our experience, agile approaches can enable IT infrastructure groups to boost their productivity by 25 to 30 percent in six to 18 months, depending on the size of the organization." McKinsey: Insights, 2018.

## 13.7 Financial ROI Summary

The ROI models presented in this section demonstrate that migrating the In-Scope Agency servers to the cloud has the potential to generate a positive ROI for the State of Washington. The greatest net benefits are achieved by migrating 9,000 servers (80% of 11,275 servers) to the cloud. Those net benefits range from \$60M to \$97M over three (3) years post-transformation. As discussed previously, Unisys recommends implementing both the foundation and enhanced cloud migration projects even though the potential ROI is reduced from \$97M to \$60M because doing so provides the State with efficiency improvements that can support the future growth of cloud-based services.

The Gartner staffing analysis combined with the efficiencies created by the enhanced cloud migration projects support the hypothesis that the IT staffing levels can be reduced by attrition and generate \$56M in additional benefits over a three (3) year period, bringing the total potential ROI to \$116M.

Of course, these ROI benefits assume that the In-Scope Agencies are willing to adopt cloud technologies. Moreover, they assume that the risk factors associated with the State's decentralized Agency operations and approval, Agency-specific funding, regulatory requirements, and federal funding constraints. The State may also have other risk factors that require consideration.

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<sup>46</sup> Forrester, McKee, The Total Economic Impact™ Of IBM Cloud for VMware Solutions September 2019, p.14



## 14.0 Cloud Computing Risks and Mitigation Strategies

### 14.1 Common Cloud Computing Risks

Adopting, migrating, using, supporting, and socializing cloud computing solutions introduce risks and complexities that can be anticipated and mitigated as Agencies develop their plans. The following described risks and mitigations are recommended for the State of Washington Agencies to consider and address through the cloud adoption lifecycle as an ongoing practice.

#### Using Third-Party Products versus Cloud-Native Services

A typical initial approach to adopting cloud technologies involves replicating the data center experience and capabilities, such as networking, storage, and compute resources, in a cloud subscription instead of the on-premise data center. This approach broadly results in additional licensing, cloud consumption, and operational costs with little to no business benefits, including visibility into underlying technical aspects, process flow, or compliance standards. Cloud-native technologies differ from vendor to vendor. Most available offerings support and provide operational services that would be comparable to a data center and third-party licensed cloud products, except for unique technical domains for each provider such as Artificial Intelligence, Serverless, or continuous monitoring.

As a result, unoptimized cloud resources can increase OpEx and engineering toil, and adversely impact overall service delivery and availability to end users. It is noteworthy that some third-party products and integrations do not support services beyond the traditional network compute and storage Infrastructure as a Service (IaaS) offerings of AWS, Azure, or Google.

#### Mitigation Strategies

- Before migrating workloads and consumer-facing services, develop a cloud-native consumption strategy that considers application availability, security, compliance, regulatory requirements, scalability, and operational monitoring to direct the underlying technical components instead of apples-to-apples. This additional diligence often results in the increased cost-effectiveness of the services provided.
- During migration efforts, experiment with non-customer facing environments to determine the optimal services a product consists of that can result in the upskilling of the labor force and provide strategic innovation that can be applied across an organization.
- Consider transitioning from statically defined, semi-permanent resources such as a manually provisioned server to an ephemeral resource that can be created and destroyed without manual effort or approval.
- After migration, monitor the ongoing costs and support activities to determine if workloads and services are appropriate, sustainable, and strategically relevant.



Activities included in projects GOV-2 Establish CCoE and Cloud Service Broker, GOV-5 Cybersecurity, and Risk Management Governance and WF-10 Establish Cloud-Ready Operations help manage this risk. The cost avoidance and return on investment estimates include cloud-native costs.

### **Limited Application Dependency and configuration inventory and tracking**

Services provided to internal and external parties comprise applications, integrations, infrastructure resources, data, and secure delivery mechanisms that connect user and product. This activity includes understanding the application and infrastructure dependencies and the lifecycle that is responsible for delivering the offerings. These dependencies are crucial to developing the migration plan and identifying the other services and groups or types of users that will be impacted during migrations and other major changes for the application, including deployment, scalability, development, and monitoring.

#### **Mitigation Strategies**

- Maintain a complete inventory of offerings, including application and infrastructure inventory mappings, availability reporting, and automated configuration management.
- Develop a high-level continuous discovery methodology that tracks and identifies cloud consumption based on the hierarchical breakdown of accounts, organizations, environments, services, and resources.

This risk and the related mitigation strategies are included in the project EA-1 Configuration Management System. The overview of the project is in Section 13.5.1.

### **Software Licensing for Migration**

In addition to consuming the infrastructure resources during a migration, several software vendors, including IBM and Oracle, apply different software licensing requirements for physical servers, virtual servers, and cloud deployments, which must be factored into the overall TCO. The licensing differences include changes in license to CPU ratios, networking resources, and overall usage, requiring additional licensing for migration periods extending beyond 30-60 days.

#### **Mitigation Strategies**

- Negotiate with software vendors to permit extended migration periods without duplicating software licensing.
- Evaluate server and platform as a service (PaaS) configuration to remain within existing licensing purchases.
- If feasible, evaluate consolidation and cloud-native solutions to reduce reliance on vendor licensed software. (e.g., AWS and Azure offer PostgreSQL databases that are fully compatible with some Oracle and Microsoft SQL database configurations).
- Align migration schedules to reduce the volume of additional licenses to support migration.
- Leverage cloud-native licensing services to empower business-driven access.



## Large Data Transfers during Migrations

The most common cloud migration method is to transfer data from the data center to the cloud to populate such services as file systems, volumes, and databases. Cloud services provide multiple avenues for transferring data such as public and private networking, on-site physical storage devices, and more. However, since cloud services are based on usage, large volumes and transfers may require longer timeframes and increased monitoring as compared to cloud-native creation, as well as generate an increase in the network, storage, and other cloud resource costs.

### Mitigation Strategies

- Separate the application data into smaller blocks for various systems, users, configurations, and backups.
- Retire unused data before migration and infrequently accessed data post-migration.
- Add additional network capacity, security, and monitoring between the data center and cloud to support the additional traffic during the migration.
- Use cloud storage migration services such as AWS Snowball and Azure Data Box.

## Relying on Cloud Providers to Provide a Secure, Compliant Cloud without Further Action

Each cloud provider has certified its services to meet FedRAMP controls and standards. This approach provides a strong foundation for organizations to build their environments and applications. However, the cloud also allows flexibility for building environments that may not meet security and regulatory controls or data protection standards or provide appropriate access to parties involved.

### Mitigation Strategies

- Use standard landing zone configurations and tools such as AWS Control Tower and Azure Blueprints to build compliant environments.
- Define and configure policies within the cloud toolset to monitor, alert, and restrict actions to maintain compliance using least-privileged models.
- Regularly evaluate, analyze, rectify, and verify any changes through a secure source of truth.

This risk and the related mitigation strategies are key aspects of the recommended project GOV 5 Cybersecurity and Risk Management Governance.

## Experimentation and Project Failure

Cloud Services introduces new technologies and capabilities beyond traditional data-center offerings such as networking, storage, and compute. These technologies can also take into account the economies of scale that the cloud offers, removing the need for up-



front investment in time, money, and commitment. As a result, many organizations have developed a culture and operations practice that treats project failures negatively and limits the ability to validate ideas through iterative experimentation.

#### Mitigation Strategies

- Encourage experimentation by providing limited funding to work with new technologies and adjust controls to enable short-duration projects with no ramifications for failure.
- Create an innovation environment with appropriate controls to enable testing of new capabilities without impacting daily development, testing, and production operations for existing services.
- Set up a monitoring and environment promotion framework that gradually incorporates high value, low-risk capabilities into existing services over time, including rollback.
- Embrace a blameless post-mortem for operational failures that include the entire team focusing on resolving services and learning, not finger-pointing.

Collaboration with the CCoE started as part of GOV-2 Establish CCoE, and Cloud Service Broker supports shifting to an experimentation-without-failure-ramifications model.

#### Cloud Spend Variability and Visibility

Using cloud services presents the opportunity to shift to operational expenses and consumption billing. This shift also can cause issues for organizations relying on fixed budgets. Some services include elements that are billed based on usage patterns and allocation. Other services are billed specifically on usage patterns. These billing approaches can generate variability in monthly cloud costs. Choices to activate features for testing or support activities can generate unexpected costs in that service and other related functions. Also, for organizations managing budgeted funds across multiple cost centers, an approach to track and allocate the cloud costs appropriately is required and is not automatically provided upon cloud account creation.

#### Mitigation Strategies

- Provide access to and configure the cloud services billing dashboards. These dashboards should be available to both the cloud operations and support team, financial management, and IT leadership.
- Configure budget management within the cloud services policies to maintain cloud services usage within the monthly funding and provide alerts to services that exceed their allowances, projections, or remain idle, over-provisioned, or statically allocated.
- Define the cloud cost management approach to allocate costs to the appropriate cost center. The approach may require additional cloud accounts, tagging strategies, or billing activities outside of the cloud platform.
- Establish capacity and billing review procedures and processes to track and manage cloud services costs. These activities should be designed to encourage looking for opportunities to improve configurations, reduce costs, and remove unneeded services.





Cloud Financial Management tools are included in the recommended project EA-1B Cloud Financial Management. These tools provide a consolidated, multi-cloud view into cloud costs and provide recommendations to update selected services.

### **Identity Management as a Security Control**

Cloud Services rely extensively on role-based access control (RBAC) to grant access and privileges within the management system and many cloud services. Suppose the approach to identity management is not carefully planned. In that case, users may be granted too much or too little access, risking open access to secure resources and services unintentionally impacted due to actions taken with the wrong permissions.

#### **Mitigation Strategies**

- Integrate the organization's directory services (e.g., Active Directory) with the cloud services identity manager. This approach will enable maintaining a single sign-on and user identity across the cloud environments.
- Define an RBAC and group policy model that can start small and expand as new services and projects identify requirements. Maintaining flexibility will allow the use of the common identity process to grow and improve alongside the use of cloud services.
- Plan for multiple groups accessing the cloud management tools for different purposes. Many cloud services now require access to the management portal and command-line interface to perform functions that traditionally would be part of the application developer or support team's responsibilities.
- Align the cloud management portal's access policies with the organization's privileged access management policies, including password complexity, timeouts, and use of multi-factor authentication.
- Minimize console access to users using groups, roles, and permission boundaries in favor of temporary token-based access to improve overall cloud fluency and visibility.

The recommended project EA-11 Federated Identity Management provides Software as a Service (SaaS) identity management tools and integration to the organization's directory services to establish a single connection point to manage access to cloud services.



## Network Security Changes as Applications Move Outside the Datacenter

Many organizations maintain a secure exterior connection, but internal resources may have unrestricted access to their applications, integrations, data, and network accounts. As these applications are moved into a cloud, the application flows must be identified and enforced per internal security requirements. Organizations must also determine if the cloud environment will be treated as a trusted environment like the internal network or an untrusted external environment.

### Mitigation Strategies:

- Leverage cloud-native security best practices when building the underlying collection of services used to host applications previously existing on-premise.
- Design software-defined network segmentation based on workload and provide an endpoint abstraction in front of critical workloads such as a load balancer or proxy.
- Create a log and event aggregation strategy to stream, analyze, store, and correct application and service-related configurations during initial cloud migration.
- Review vendor documentation and validate if the application defaults were used on the application and rectify to minimize unauthorized access.
- Use discovery tools to collect active services, dependencies, and incidents.
- Conduct periodic reviews of overall network design, application vulnerabilities, threat landscape, and usage abnormalities.

This risk and mitigation are included in projects EA-1 Configuration Management System and EA-4 Cloud Migrations. The overview of the projects is in Section 13.5.1.

## Application SLAs and Timeouts

As applications are hosted in different environments, the integration connectivity that provides business services could be impacted. The impact and mitigation depend on the architecture of the applications that are loosely coupled or make use of an enterprise system bus.

### Mitigation Strategies:

- Extend ESB to the cloud
- Use cloud-native services and message brokers
- Migrate application sets (business services) versus individual Application servers
- Track application performance with tools (AppDynamics, etc.)
- Adjust SLAs and provide service dashboards to end users to promote transparency



## Shifting from Monitoring to Observability<sup>47</sup>

Infrastructure environments maintain monitoring capabilities for infrastructure to track availability and performance. As applications are migrated cloud and changed to use more cloud-native features, existing monitoring tools and techniques may not provide holistic visibility and observability requirements. Capabilities including log analysis and proactive automation-driven resolution help manage auto-scaling, auto-healing, continuous deployment and integration, monitoring application performance or behavior, and gaining visibility into many of the Platform as a Service (PaaS) deployments.

### Mitigation Strategies

- Include agile planning using cloud-native monitoring and automation tools into the architecture as part of the migration and application development lifecycles.
- Evaluate third-party application performance and observability tools such as Dynatrace, New Relic, or Datadog to gain additional insight into application behavior and drive automation activities within cloud services.

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<sup>47</sup> Nucleus Research; The Unexpected Challenges of Cloud Transformation, Document U108, August 2020



## 14.2 Strategies for Business Continuity and Disaster Recovery

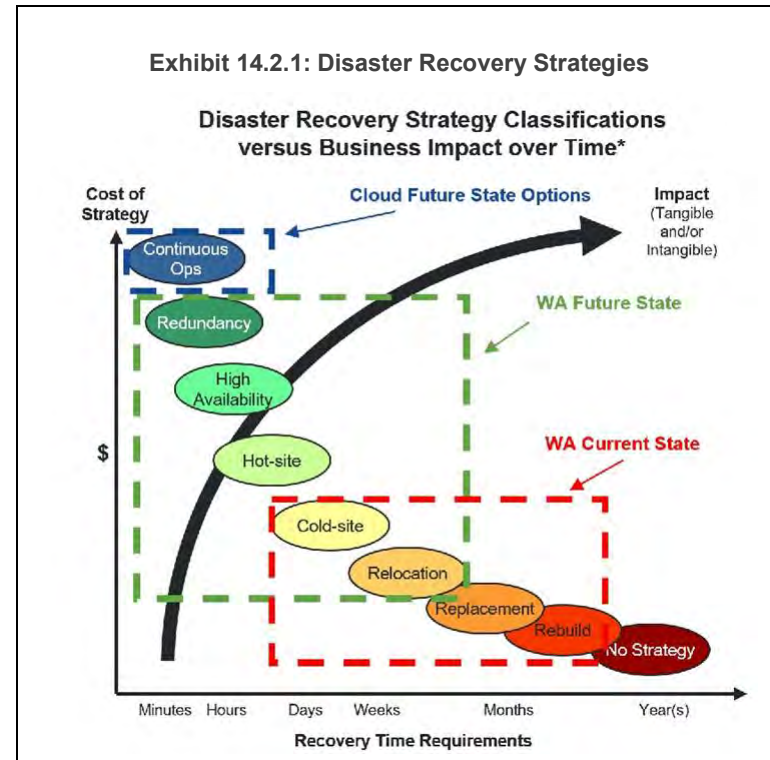
Unisys recommends offering Disaster Recovery (DR) solutions for Agencies through the precise definition of a DR portfolio with end-to-end services. These services will be tailored within the standards-based enterprise reference architecture for DR to support the varying requirements of the Agencies

The Agency can move to the cloud with confidence by providing a portfolio offering support for a broad set of Disaster Recovery Strategies (Exhibit 14.3.1 and Section 12.2).

Service Portfolio includes:

- Develop an appropriate recovery strategy that meets business needs, identified recovery time objectives (RTOs), and the impact of an extended outage.
- Select the appropriate recovery strategies based on business needs and use technical capabilities as the secondary criteria.
- Select the appropriate recovery strategy for mission-critical operations based on the tradeoff between time and money (rebuild in months to continuous operations in minutes).

Cloud adoption also provides options to improve service continuity during the migration. Otherwise, as part of new application deployments, Agencies must evaluate their continuity needs in conjunction with the available cloud service level capabilities. Using multiple availability zones in a single region can improve the availability and resiliency for applications that do not require a full recovery or can withstand a single region outage. Applications requiring additional continuity can be designed to support multiple regions using manual or automated recovery and replication approaches or multi-region availability practices. While some of the continuity solutions require application architecture modifications, using a mixture of multi-region and multi-availability zone approaches can provide cost-effective options. The DR portfolio must also include required documentation, planning, and testing tasks to ensure the Agency can execute the selected DR service.





## Appendix A: Agencies and Points of Contact

As identified by the OCIO in October 2019, the following Agency points of contacts included in the assessment are noted below:

Agency Name	Agency Director	Agency CIO	Agency Project Contact
ACB - Washington State Board of Accountancy	Charles Satterlund	Michelle Tuscher	Michelle Tuscher
AGR - Department of Agriculture	Derek Sandison	Kevin Greene	Susie Fry
ARTS - Arts Commission	Karen Hanan	Terry West	Terry West
ATG - Attorney General	Shane Esquibel	Rick Griffith	Martin Singleton
BIIA - Board of Industrial Insurance Appeals	Linda Williams / David Threedy	John Hanson Jr	Keith Fester
BTA - Washington State Board of Tax Appeals	Kate Adams		Robert Chavez
BVFFRO - Board for Volunteer Firefighters and Reserve Officers	Hailey Blankenship		Hailey Blankenship
CAAA - Washington State Commission on African-American Affairs	Ed Prince		Charlotte Kerney
CAPAA - Washington State Commission on Pacific American Affairs	Hasegawa Toshiko		Rosa Mai
CDHY - Washington Center for Deaf and Hard of Hearing Youth	Rick Hauan	Mark Lee	Mark Lee
CFC - Caseload Forecast Council	Elaine Deschamps	Kathleen Turnbow	Erik Cornellier
CHA - Commission on Hispanic Affairs	Maria Siguenza		Myra Hernandez
CJTC - Criminal Justice Training Commission	Sue Rahr	Jeff Wilcox	Jeff Wilcox
Columbia River Gorge Commission	Krystyna Wolniakowski		Connie Acker
COM - Department of Commerce	Lisa Brown	Randy Ayers (TBD)	Laramie Brown
COS - Citizen's Commission on Salaries	Lindsay Matthews / Teri Wright		Lindsay Matthews
CRAB - County Road Administration Board	John Koster	Eric Hagenlock	Scott Campbell
CTS - Consolidated Technology Services (WaTech)	James Weaver	Scott West	Bill Moneer
DAHP - Dept. of Archaeology and Historic Preservation	Allyson Brooks	Allyson Brooks	Morgan Mclemore



Agency Name	Agency Director	Agency CIO	Agency Project Contact
DCYF - Department of Children, Youth, and Families	Ross Hunter	Aaron Mason	Jenn Stevens
DES - Department of Enterprise Services	Chris Liu	Dawn Tatman	Connie Dove
DFI - Department of Financial Institutions	Charles Clark	Phil Davis	Phil Davis
DFW - Department of Fish and Wildlife	Kelly Susewind	Matthew Oram	Valerie Robinson
DNR - Department of Natural Resources	Hillary Franz	Michelle Benton	George Williams/Michiko Quach
DOC - Department of Corrections	Stephen Sinclair	Debbie Kendall	Michael Pearson
DOH - Department of Health	John Wiseman	Jennifer McNamara	Stephanie Goebel
DOL - Department of Licensing	Teresa Berntsen	Vel Rajagopal	Brandee Neumann
DOR - Department of Revenue	Vikki Smith	David Sorrell	Chuck Bishop
DRS - Department of Retirement Systems	Tracy Guerin	Rose Bossio	Darrell Davenport
DSB - Department of Services for the Blind	LouOma Durand	Mary Craig	Tom Baugh
DSHS - Department of Social and Health Services	Cheryl Strange	Debbie Frost	Kelly Schmitt
DVA - Department of Veteran's Affairs	Alfie Alvarado-Ramos	Jeff Kiper	James Topel
ECY - Department of Ecology	Maia Bellon	Cristie Fredrickson	Mark Solie
ELUHO - Environmental and Land Use Hearings Office	Nina Carter		Nina Carter
ERFC - Economic and Revenue Forecast Council	Steve Lerch	Desiree Monroy	Desiree Monroy
ESD - Employment Security Department	Suzi Levine	Nicholas Stowe / Jairus Rice	Justin Weiler
GMB - Gambling Commission	David Trujillo	TBD	Chris Stanley
GOIA - Governor's Office of Indian Affairs	Craig Bill		Mystique Hurtado
GOV - Office of the Governor	David Postman		Will Harkrider
HCA - Health Care Authority	Sue Birch	Jerry Britcher	Kevin Grover
HUM - Human Rights Commission	Sharon Ortiz		Jed VanKrieken
LCB - Liquor and Cannabis Board	Jane Rushford	Mary Mueller	Pasha Naini
LEOFF - Law Enforcement Officers' and Fire Fighters' Retirement Board	Steve Nelsen	Tammy Harman	Tim Valencia / Tammy Harman
LNI - Labor & Industries	Joel Sacks	Dave Marty	Dave Marty



Agency Name	Agency Director	Agency CIO	Agency Project Contact
LOT - Washington State Lottery	Marcus Glaspur	Crystal Fischer	Corey Emery
LSDFA - Life Sciences Discovery Fund Authority	Mark Hertle		N/A
LTGOV - Office of the Lieutenant Governor	Libby Hollingshead		Mikhail Carpenter
MIL - Washington State Military Department	Bret Daugherty	Mark Glenn	Richard Warner
OAH - Office of Administrative Hearings	Lorraine Lee	Brian Thomas	Bob Murphy
OFM - Office of Financial Management	David Schumacher	Chris Lamb	Will Harkrider
OIC - Office of the Insurance Commissioner	Commissioner Kreidler	Bryce Carlen	Sue Hedrick
OMWBE - Office of Minority & Women's Business Enterprises	Lisa Van Der Lugt		Sarah Erdmann
OSPI - Office of the Superintendent of Public Instruction	Jamila Thomas	Steve Young	Ted Loran
PARKS - Washington State Parks and Recreation Commission	Don Hoch	Harley Graves	Chris Kennedy
PDC - Public Disclosure Commission	Peter Lavallee	James Gutholm	James Gutholm
PERC - Washington State Public Employment Relations Commission	Mike Sellars	Robbie Duffield	Robbie Duffield
PLIA - Pollution Liability Insurance Agency	Russ Olsen	Xyzlinda Marshall	Xyzlinda Marshall
PSP - Puget Sound Partnership	Laura Blackmore	Greg Tudor	Greg Tudor
RCO - Washington State Recreation and Conservation Office	Kaleen Cottingham	Greg Tudor	Greg Tudor
SAO - Office of the Washington State Auditor	Pat McCarthy / Keri Rooney	Michael Marty	Michael Marty
SBCTC - Washington State Board for Community and Technical Colleges	Jan Yoshiwara	Grant Rodeheaver	Grant Rodeheaver
SCC - Washington State Conservation Commission	Kirk Robinson	Brian Cochrane	Brian Cochrane
SIB - Washington State Investment Board	Theresa Whitmarsh	Stephen Backholm	Stephen Backholm
SOS - Secretary of State	Kim Wyman	Michael Huntley	Michael Huntley
TIB - Transportation Improvement Board	Ashley Probart	Gregg Plummer	Gregg Plummer
TRE - Washington State Treasury	Duane Davidson	Jeffery Sharp	Patrick Bohlig
UTC - Utilities and Transportation Commission	Dave Danner	Brian Gillespie	Brian Gillespie



Agency Name	Agency Director	Agency CIO	Agency Project Contact
WHCFA - Washington Health Care Facilities Authority	Donna Murr	Shannon Govia	Shannon Govia
WHRC - Washington Horse Racing Commission	Doug Moore		Doug Moore
WSAC - Washington Student Achievement Council	Michael Meotti	David Mitchell	David Mitchell
WSDOT - Washington State Department of Transportation	Roger Millar	Matthew Modarelli	Terry Landes
WSHFC - Washington State Housing Finance Commission	Kim Herman	Bob Woodard	Bob Woodard
WSHS - Washington State Historical Society	Jennifer Kilmer		Misty Reese
WSP - Washington State Patrol	John Batiste	Tom Wallace	Andre Tessier
WSSB - Washington State School for the Blind	Scott McCallum	Danya Borowski	Danya Borowski
WSSDA - Washington State School Directors' Association	Tim Garchow		Cassandra Heide
WSTC - Washington State Transportation Commission	Reema Griffith		Joanna Jones
WTB - Workforce Training and Education Coordinating Board	Eleni Papadakis	Robert Hinsch	Robert Hinsch
WTSC - Washington Traffic Safety Commission	Darrin Grondel	Staci Hoff	Tommy Weed





## Appendix B: Technology Business Management Cost: Taxonomy and Definitions

### Technology Business Management Cost Transparency Foundation: Taxonomy and Definitions (TBM Council V2)

“To facilitate communication and gain alignment between IT, Finance, and Business areas we recognized a common language or taxonomy was needed. The program initially used a ‘custom’ taxonomy to identify pools of cost and technologies which resulted in everyone speaking a common language. That, however, led to missed opportunities in executive-level reporting. To close the gap on the reporting, beginning fiscal year 2017 the program moved to industry-standard TBM Taxonomy governed and maintained by the TBM Council Board Committee on Standards.” [OCIO]

### Fiscal Year 2018 TBM Taxonomy for Cost Pools and Technology Towers

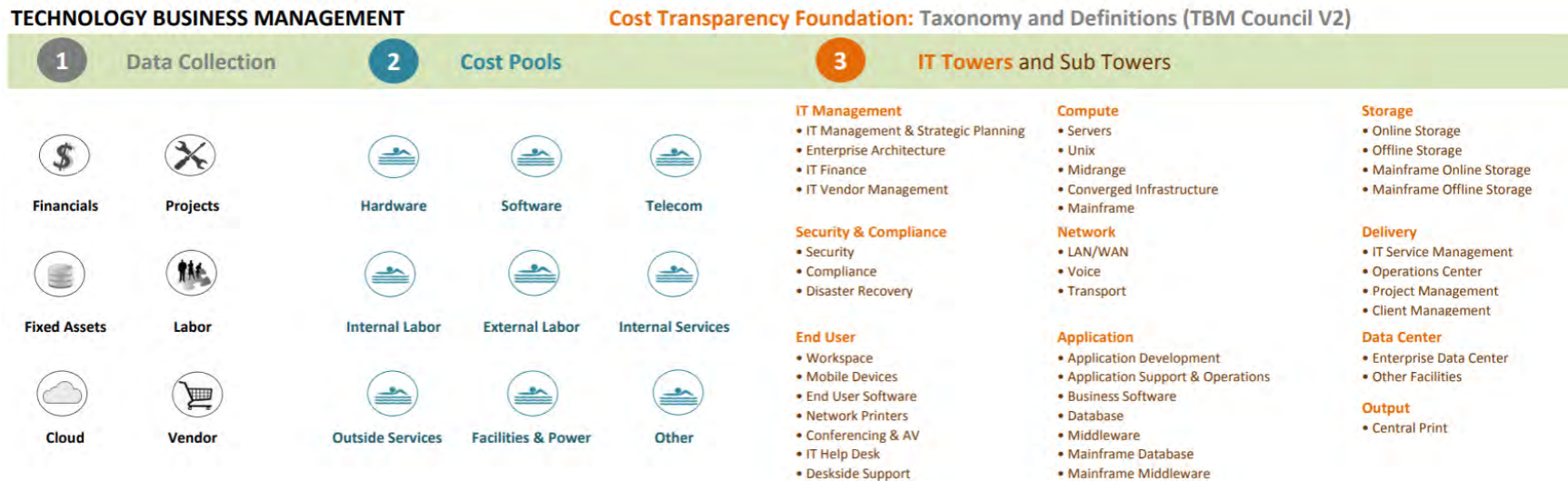


Exhibit B.1: Taxonomy and Definitions <sup>48</sup>

<sup>48</sup> Chief Information Officer (OCIO), TBM Taxonomy, <https://ocio.wa.gov/sites/default/files/public/TBM/TBM%20Taxonomy%20v2.0%20Placemat.pdf?f1k89j>



## Appendix C: Chart of Accounts to 2.0 Cost Pool Mapping

### Chart of Accounts for Cost Pool Mapping

Source: Office of the Chief Information Officer (OCIO spreadsheet)

Object	Object Title	SubObject	SubObject Title	Sub-subobject	Sub-subobject Title	Cost Pool	Cost SubPool	Account	Is Labor
A	A - SALARIES AND WAGES	AA	State Classified			Internal Labor	Internal Labor	AA	Yes
A	A - SALARIES AND WAGES	AA	State Classified	SW01	Regular Salaries	Internal Labor	Internal Labor	AA SW01	Yes
A	A - SALARIES AND WAGES	AA	State Classified	SW02	Shift Differential	Internal Labor	Internal Labor	AA SW02	Yes
A	A - SALARIES AND WAGES	AA	State Classified	SW03	Standby	Internal Labor	Internal Labor	AA SW03	Yes
A	A - SALARIES AND WAGES	AA	State Classified	SW04	Assignment Pay	Internal Labor	Internal Labor	AA SW04	Yes
A	A - SALARIES AND WAGES	AA	State Classified	SW07	Salary Advance	Internal Labor	Internal Labor	AA SW07	Yes
A	A - SALARIES AND WAGES	AB	Higher Education Classified			Internal Labor	Internal Labor	AB	Yes
A	A - SALARIES AND WAGES	AC	State Exempt			Internal Labor	Internal Labor	AC	Yes
A	A - SALARIES AND WAGES	AC	State Exempt	SW01	Regular Salaries	Internal Labor	Internal Labor	AC SW01	Yes
A	A - SALARIES AND WAGES	AC	State Exempt	SW03	Standby	Internal Labor	Internal Labor	AC SW03	Yes
A	A - SALARIES AND WAGES	AD	Higher Education Exempt			Internal Labor	Internal Labor	AD	Yes
A	A - SALARIES AND WAGES	AE	State Special			Internal Labor	Internal Labor	AE	Yes
A	A - SALARIES AND WAGES	AE	State Special	SW13	Board and Commission Member Compensation	Internal Labor	Internal Labor	AE SW13	Yes
A	A - SALARIES AND WAGES	AE	State Special	SW14	Specified Rate Compensation	Internal Labor	Internal Labor	AE SW14	Yes
A	A - SALARIES AND WAGES	AF	Higher Education Faculty			Internal Labor	Internal Labor	AF	Yes
A	A - SALARIES AND WAGES	AG	Commissioned State Patrol Officers			Internal Labor	Internal Labor	AG	Yes
A	A - SALARIES AND WAGES	AH	Higher Education Graduate Assistants			Internal Labor	Internal Labor	AH	Yes
A	A - SALARIES AND WAGES	AJ	State Other			Internal Labor	Internal Labor	AJ	Yes
A	A - SALARIES AND WAGES	AK	Higher Education Other			Internal Labor	Internal Labor	AK	Yes
A	A - SALARIES AND WAGES	AL	Higher Education Students			Internal Labor	Internal Labor	AL	Yes



Object	Object Title	SubObject	SubObject Title	Sub-subject	Sub-subject Title	Cost Pool	Cost SubPool	Account	Is Labor
A	A - SALARIES AND WAGES	AL	Higher Education Students	SW15	Work Study	Internal Labor	Internal Labor	AL SW15	Yes
A	A - SALARIES AND WAGES	AN	Justices and Judges			Internal Labor	Internal Labor	AN	Yes
A	A - SALARIES AND WAGES	AR	Elected Officials			Internal Labor	Internal Labor	AR	Yes
A	A - SALARIES AND WAGES	AS	Sick Leave Buy-Out			Internal Labor	Internal Labor	AS	Yes
A	A - SALARIES AND WAGES	AS	Sick Leave Buy-Out	SW01	OASI Taxable	Internal Labor	Internal Labor	AS SW01	Yes
A	A - SALARIES AND WAGES	AT	Terminal Leave			Internal Labor	Internal Labor	AT	Yes
A	A - SALARIES AND WAGES	AU	Overtime and Callback			Internal Labor	Internal Labor	AU	Yes
A	A - SALARIES AND WAGES	AU	Overtime and Callback	SW11	Callback	Internal Labor	Internal Labor	AU SW11	Yes
A	A - SALARIES AND WAGES	AU	Overtime and Callback	SW12	Overtime	Internal Labor	Internal Labor	AU SW12	Yes
A	A - SALARIES AND WAGES	AU	Overtime and Callback	SW13	Overtime for Holidays	Internal Labor	Internal Labor	AU SW13	Yes
A	A - SALARIES AND WAGES	AU	Overtime and Callback	SW14	Shift Differential Overtime	Internal Labor	Internal Labor	AU SW14	Yes
A	A - SALARIES AND WAGES	AU	Overtime and Callback	SW17	Assignment Pay Overtime	Internal Labor	Internal Labor	AU SW17	Yes
B	B - EMPLOYEE BENEFITS	BA	Old Age, Survivors, and Disability Insurance			Internal Labor	Internal Labor	BA	Yes
B	B - EMPLOYEE BENEFITS	BB	Retirement and Pensions			Internal Labor	Internal Labor	BB	Yes
B	B - EMPLOYEE BENEFITS	BC	Medical Aid and Industrial Insurance			Internal Labor	Internal Labor	BC	Yes
B	B - EMPLOYEE BENEFITS	BC	Medical Aid and Industrial Insurance	SW33	Medical Aid Fund	Internal Labor	Internal Labor	BC SW33	Yes
B	B - EMPLOYEE BENEFITS	BC	Medical Aid and Industrial Insurance	SW34	Supplemental Pension	Internal Labor	Internal Labor	BC SW34	Yes
B	B - EMPLOYEE BENEFITS	BC	Medical Aid and Industrial Insurance	SW35	Accident Fund	Internal Labor	Internal Labor	BC SW35	Yes
B	B - EMPLOYEE BENEFITS	BD	Health, Life, and Disability Insurance			Internal Labor	Internal Labor	BD	Yes
B	B - EMPLOYEE BENEFITS	BE	Allowances			Internal Labor	Internal Labor	BE	Yes
B	B - EMPLOYEE BENEFITS	BE	Allowances	SW21	Commute Trip Reduction	Internal Labor	Internal Labor	BE SW21	Yes
B	B - EMPLOYEE BENEFITS	BE	Allowances	SW22	Cellular device	Internal Labor	Internal Labor	BE SW22	Yes
B	B - EMPLOYEE BENEFITS	BF	Unemployment Compensation			Internal Labor	Internal Labor	BF	Yes



Object	Object Title	SubObject	SubObject Title	Sub-subobject	Sub-subobject Title	Cost Pool	Cost SubPool	Account	Is Labor
B	B - EMPLOYEE BENEFITS	BG	Supplemental Retirement Payments			Internal Labor	Internal Labor	BG	Yes
B	B - EMPLOYEE BENEFITS	BH	Hospital Insurance (Medicare)			Internal Labor	Internal Labor	BH	Yes
B	B - EMPLOYEE BENEFITS	BR	Other Postemployment Benefits			Internal Labor	Internal Labor	BR	Yes
B	B - EMPLOYEE BENEFITS	BP	Net Pension Liability Adjustment (Proprietary Accounts Only)			Internal Labor	Internal Labor	BP	Yes
B	B - EMPLOYEE BENEFITS	BT	Shared Leave Provided - Sick Leave			Internal Labor	Internal Labor	BT	Yes
B	B - EMPLOYEE BENEFITS	BU	Shared Leave Provided - Personal Holiday			Internal Labor	Internal Labor	BU	Yes
B	B - EMPLOYEE BENEFITS	BV	Shared Leave Provided - Annual Leave			Internal Labor	Internal Labor	BV	Yes
B	B - EMPLOYEE BENEFITS	BW	Shared Leave Received			Internal Labor	Internal Labor	BW	Yes
B	B - EMPLOYEE BENEFITS	BZ	Other Employee Benefits			Internal Labor	Internal Labor	BZ	Yes
C	C - PROFESSIONAL SERVICE CONTRACTS	CA	Management and Organizational Services			Outside Services	Managed Service Providers	CA	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CB	Legal and Expert Witness Services			Outside Services	Consulting	CB	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CC	Financial Services			Outside Services	Consulting	CC	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CD	Computer and Information Services			Outside Services	Managed Service Providers	CD	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CE	Social Research Services			Outside Services	Consulting	CE	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CF	Technical Research Services			Outside Services	Consulting	CF	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CG	Marketing Services			Outside Services	Consulting	CG	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CH	Communication Services			Outside Services	Consulting	CH	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CJ	Training Services			Outside Services	Consulting	CJ	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CK	Recruiting Services			Outside Services	Consulting	CK	No
C	C - PROFESSIONAL SERVICE CONTRACTS	CZ	Other Professional Services			Outside Services	Consulting	CZ	No
E	E - GOODS AND OTHER SERVICES	EA	Supplies and Materials			Other	Other	EA	No
E	E - GOODS AND OTHER SERVICES	EB	Communications and Telecommunications Services			Telecom	Telecom	EB	No
E	E - GOODS AND OTHER SERVICES	EC	Utilities			Facilities & Power	Expense	EC	No



Object	Object Title	SubObject	SubObject Title	Sub-subject	Sub-subject Title	Cost Pool	Cost SubPool	Account	Is Labor
E	E - GOODS AND OTHER SERVICES	ED	Rentals and Leases - Land and Buildings			Facilities & Power	Lease	ED	No
E	E - GOODS AND OTHER SERVICES	EE	Repairs, Alterations, and Maintenance			Hardware	Maintenance. & Support	EE	No
E	E - GOODS AND OTHER SERVICES	EF	Printing and Reproduction			Other	Other	EF	No
E	E - GOODS AND OTHER SERVICES	EG	Employee Professional Development and Training			Other	Other	EG	No
E	E - GOODS AND OTHER SERVICES	EH	Rentals and Leases - Furnishings and Equipment			Facilities & Power	Lease	EH	No
E	E - GOODS AND OTHER SERVICES	EI	Retailer Commissions			Facilities & Power	Expense	EI	No
E	E - GOODS AND OTHER SERVICES	EJ	Subscriptions			Other	Other	EJ	No
E	E - GOODS AND OTHER SERVICES	EK	Facilities and Services			Facilities & Power	Expense	EK	No
E	E - GOODS AND OTHER SERVICES	EL	Data Processing Services (Interagency)			Internal Services	Managed Service Providers	EL	No
E	E - GOODS AND OTHER SERVICES	EM	Attorney General Services			Internal Services	Consulting	EM	No
E	E - GOODS AND OTHER SERVICES	EN	Personnel Services			Other	Other	EN	No
E	E - GOODS AND OTHER SERVICES	EP	Insurance			Other	Other	EP	No
E	E - GOODS AND OTHER SERVICES	ER	Other Contractual Services			External Labor	External Labor	ER	No
E	E - GOODS AND OTHER SERVICES	ER	Other Contractual Services	SW31	Employee Parking	External Labor	External Labor	ER SW31	No
E	E - GOODS AND OTHER SERVICES	ES	Vehicle Maintenance and Operating Costs			Other	Other	ES	No
E	E - GOODS AND OTHER SERVICES	ET	Audit Services			Internal Services	Consulting	ET	No
E	E - GOODS AND OTHER SERVICES	EV	Administrative Hearings Services			Internal Services	Consulting	EV	No
E	E - GOODS AND OTHER SERVICES	EW	Archives and Records Management Services			Internal Services	Consulting	EW	No
E	E - GOODS AND OTHER SERVICES	EX	OMWBE Services			Internal Services	Consulting	EX	No
E	E - GOODS AND OTHER SERVICES	EY	Software Licenses, Maintenance, and Subscription-Based Computing Services			Software	Expense	EY	No
E	E - GOODS AND OTHER SERVICES	EZ	Other Goods and Services			Other	Other	EZ	No
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FA	Net Cost of Goods Sold			Other	Other	FA	No
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FB	Purchases			Other	Other	FB	No



Object	Object Title	SubObject	SubObject Title	Sub-subobject	Sub-subobject Title	Cost Pool	Cost SubPool	Account	Is Labor
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FC	Returned Purchases			Other	Other	FC	No
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FD	Freight-In			Other	Other	FD	No
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FE	Discounts			Other	Other	FE	No
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FF	Inventory Adjustment			Other	Other	FF	No
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FG	Direct Labor			Other	Other	FG	No
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FH	Raw Materials (Direct Materials)			Other	Other	FH	No
F	F - COST OF GOODS SOLD (Proprietary Funds Only)	FJ	Manufacturing Overhead			Other	Other	FJ	No
G	G - TRAVEL	GA	In-State Subsistence and Lodging			Other	Other	GA	No
G	G - TRAVEL	GA	In-State Subsistence and Lodging	SW41	Meals Taxable	Other	Other	GA SW41	No
G	G - TRAVEL	GA	In-State Subsistence and Lodging	SW42	Meals Taxable - Board and Commission Members	Other	Other	GA SW42	No
G	G - TRAVEL	GB	In-State Air Transportation			Other	Other	GB	No
G	G - TRAVEL	GC	Private Automobile Mileage			Other	Other	GC	No
G	G - TRAVEL	GD	Other Travel Expenses			Other	Other	GD	No
G	G - TRAVEL	GF	Out-of-State Subsistence and Lodging			Other	Other	GF	No
G	G - TRAVEL	GF	Out-of-State Subsistence and Lodging	SW46	Meals Taxable - Out of State	Other	Other	GF SW46	No
G	G - TRAVEL	GG	Out-of-State Air Transportation			Other	Other	GG	No
G	G - TRAVEL	GN	Motor Pool Services			Other	Other	GN	No
J	J - CAPITAL OUTLAYS	JA	Noncapitalized Assets			Hardware	Expense	JA	No
J	J - CAPITAL OUTLAYS	JB	Noncapitalized Software			Software	Expense	JB	No
J	J - CAPITAL OUTLAYS	JC	Furnishings and Equipment			Hardware	Expense	JC	No
J	J - CAPITAL OUTLAYS	JD	Library Resources			Other	Other	JD	No
J	J - CAPITAL OUTLAYS	JE	Land			Other	Other	JE	No
J	J - CAPITAL OUTLAYS	JF	Buildings			Other	Other	JF	No
J	J - CAPITAL OUTLAYS	JG	Highway Construction			Other	Other	JG	No



Object	Object Title	SubObject	SubObject Title	Sub-subobject	Sub-subobject Title	Cost Pool	Cost SubPool	Account	Is Labor
J	J - CAPITAL OUTLAYS	JH	Improvements Other Than Buildings (Non-State Highway System)			Other	Other	JH	No
J	J - CAPITAL OUTLAYS	JJ	Grounds Development			Other	Other	JJ	No
J	J - CAPITAL OUTLAYS	JK	Architectural and Engineering Services			Other	Other	JK	No
J	J - CAPITAL OUTLAYS	JL	Capital Planning			Other	Other	JL	No
J	J - CAPITAL OUTLAYS	JM	Art Collections, Library Reserve Collections, and Museum and Historical Collections			Other	Other	JM	No
J	J - CAPITAL OUTLAYS	JN	Relocation Costs			Other	Other	JN	No
J	J - CAPITAL OUTLAYS	JQ	Software			Software	Expense	JQ	No
J	J - CAPITAL OUTLAYS	JR	Intangible Assets			Other	Other	JR	No
J	J - CAPITAL OUTLAYS	JZ	Other Capital Outlays			Other	Other	JZ	No
M	M - INTERFUND OPERATING TRANSFERS	MA	Interfund Operating Transfers In			Other	Other	MA	No
M	M - INTERFUND OPERATING TRANSFERS	MB	Interfund Operating Transfers Out			Other	Other	MB	No
M	M - INTERFUND OPERATING TRANSFERS	MC	Interfund Transfers In - Principal			Other	Other	MC	No
M	M - INTERFUND OPERATING TRANSFERS	MD	Interfund Transfers In - Interest			Other	Other	MD	No
M	M - INTERFUND OPERATING TRANSFERS	MI	Interfund Transfers Out - Interest			Other	Other	MI	No
M	M - INTERFUND OPERATING TRANSFERS	MM	Agency Incentive Savings Transfers Out			Other	Other	MM	No
M	M - INTERFUND OPERATING TRANSFERS	MP	Interfund Transfers Out - Principal			Other	Other	MP	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NA	Direct Payments to Clients			Other	Other	NA	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NB	Payments to Providers for Direct Client Services			Other	Other	NB	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NF	Workers' Compensation Payments			Other	Other	NF	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NH	Public Employee Benefit, Basic Health, and Community Health Service Payments			Other	Other	NH	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NL	Lottery Prize Payments			Other	Other	NL	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NR	Loan Disbursements			Other	Other	NR	No



Object	Object Title	SubObject	SubObject Title	Sub-subobject	Sub-subobject Title	Cost Pool	Cost SubPool	Account	Is Labor
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NT	Pension Refund Payments			Other	Other	NT	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NU	Pension Benefit Payments			Other	Other	NU	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NW	Special Employment Compensation			Other	Other	NW	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NY	Participant Withdrawals			Other	Other	NY	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NZ	Other Grants and Benefits			Other	Other	NZ	No
N	N - GRANTS, BENEFITS, AND CLIENT SERVICES	NZ	Other Grants and Benefits	SW91	Employee Awards - Taxable	Other	Other	NZ SW91	No
P	P - DEBT SERVICE	PA	Principal			Other	Other	PA	No
P	P - DEBT SERVICE	PB	Interest			Other	Other	PB	No
P	P - DEBT SERVICE	PC	Other Debt Costs			Other	Other	PC	No
P	P - DEBT SERVICE	PD	Principal COP Lease/Purchase Agreements			Hardware	Lease	PD	No
P	P - DEBT SERVICE	PE	Interest COP Lease/Purchase Agreements			Hardware	Lease	PE	No
S	S - INTERAGENCY REIMBURSEMENTS	SA	Salaries and Wages			External Labor	External Labor	SA	No
S	S - INTERAGENCY REIMBURSEMENTS	SB	Employee Benefits			External Labor	External Labor	SB	No
S	S - INTERAGENCY REIMBURSEMENTS	SC	Professional Service Contracts			External Labor	External Labor	SC	No
S	S - INTERAGENCY REIMBURSEMENTS	SE	Goods and Other Services			Hardware	Expense	SE	No
S	S - INTERAGENCY REIMBURSEMENTS	SG	Travel			External Labor	External Labor	SG	No
S	S - INTERAGENCY REIMBURSEMENTS	SJ	Capital Outlays			Other	Other	SJ	No
S	S - INTERAGENCY REIMBURSEMENTS	SN	Grants, Benefits, and Client Services			Other	Other	SN	No
S	S - INTERAGENCY REIMBURSEMENTS	SP	Debt Service			Other	Other	SP	No
S	S - INTERAGENCY REIMBURSEMENTS	SZ	Unidentified			Other	Other	SZ	No
T	T - INTRA-AGENCY REIMBURSEMENTS	TA	Salaries and Wages			Other	Other	TA	No
T	T - INTRA-AGENCY REIMBURSEMENTS	TB	Employee Benefits			Other	Other	TB	No
T	T - INTRA-AGENCY REIMBURSEMENTS	TC	Professional Service Contracts			Other	Other	TC	No
T	T - INTRA-AGENCY REIMBURSEMENTS	TE	Goods and Other Services			Other	Other	TE	No
T	T - INTRA-AGENCY REIMBURSEMENTS	TG	Travel			Other	Other	TG	No
T	T - INTRA-AGENCY REIMBURSEMENTS	TJ	Capital Outlays			Other	Other	TJ	No
T	T - INTRA-AGENCY REIMBURSEMENTS	TN	Grants, Benefits, and Client Services			Other	Other	TN	No





Object	Object Title	SubObject	SubObject Title	Sub-subobject	Sub-subobject Title	Cost Pool	Cost SubPool	Account	Is Labor
T	T - INTRA-AGENCY REIMBURSEMENTS	TP	Debt Service			Other	Other	TP	No
T	T - INTRA-AGENCY REIMBURSEMENTS	TZ	Unidentified			Other	Other	TZ	No
W	W - OTHER	WA	Depreciation/Amortization			Facilities & Power	Depreciation	WA	No
W	W - OTHER	WB	Amortization			Other	Other	WB	No
W	W - OTHER	WC	Bad Debts			Other	Other	WC	No
W	W - OTHER	WD	Change in Capitalization Policy			Other	Other	WD	No
W	W - OTHER	WE	Pollution Remediation (General Long-Term Obligations Subsidiary Account Only)			Other	Other	WE	No
W	W - OTHER	WF	Capital Asset Adjustment (General Capital Assets Subsidiary Account Only)			Other	Other	WF	No
W	W - OTHER	WP	Net Pension Liability Adjustment (General Long-Term Obligations Subsidiary Account Only)			Other	Other	WP	No
W	W - OTHER	WR	Other Postemployment Benefits (General Long-Term Obligations Subsidiary Account Only)			Other	Other	WR	No

**Exhibit C.1: Chart of Accounts for Cost Pool Mapping**



## Appendix D: 2019 IT Annual Spend per Agency

### Annual IT Spend for the State of Washington Agencies

The Unisys team reviewed the existing financial data and Agency profiles derived from the current onsite analysis activities to identify the total annual spending patterns for all IT Cost Pools and IT Cost Towers from the Agency Financial Reporting System (AFRS).

#### In-Scope Seventy-nine (79) Agencies

In-Scope Agencies Spend	Sum of Cost
Archaeology & Historic Preservation	\$ 374,281.84
Bd for Vol Firefighter and Res Off	\$ 5,262.82
Board of Industry Insurance Appeals	\$ 1,866,024.64
Board of Pilotage Commissioners	\$ 3,890.90
Board of Tax Appeals	\$ 142,933.04
Bond Retirement and Interest	\$ 13,708.65
Caseload Forecast Council	\$ 154,569.00
Childhood Deafness & Hearing Loss	\$ 618,807.41
Columbia River Gorge Commission	\$ 38,496.64
Comm on Asian-Pacific Amer Affairs	\$ 8,853.33
Comm on Salaries Elected Officials	\$ 5,790.67
Consolidated Technology Services	\$ 144,079,799.92
County Road Administration Board	\$ 1,430,871.42
Department of Agriculture	\$ 6,961,000.71
Department of Children, Youth, and Family	\$ 38,247,215.46
Department of Commerce	\$ 4,542,225.77
Department of Corrections	\$ 54,022,744.63
Department of Early Learning (DEL)	\$ (0.00)
Department of Ecology	\$ 24,881,859.28
Department of Enterprise Services	\$ 13,420,417.45
Department of Fish and Wildlife	\$ 22,233,330.04
Department of Health	\$ 35,133,315.15
Department of Labor and Industries	\$ 68,383,138.03
Department of Licensing	\$ 58,187,950.01
Department of Natural Resources	\$ 20,407,132.84
Department of Retirement Systems	\$ 11,016,236.99
Department of Revenue	\$ 36,166,305.52
Department of Transportation	\$ 80,448,284.20
Department of Veterans Affairs	\$ 3,836,367.31
Dept of Financial Institutions	\$ 3,833,287.52
Dept of Services for the Blind	\$ 2,678,570.31
Dept of Social and Health Services	\$ 233,727,357.55
East Wash State Historical Society	\$ 121,250.21
Economic & Revenue Forecast Council	\$ 12,798.09



Employment Security Department	\$ 60,476,981.04
Environmental and Land Use Hearings Office	\$ 127,572.58
Governor's Office of Indian Affairs	\$ 11,254.92
Human Rights Commission	\$ 228,925.45
LEOFF Plan 2 Retirement Board	\$ 145,011.41
Liquor and Cannabis Board	\$ 9,702,417.50
Military Department	\$ 5,940,143.27
Office of Minority & Women's Business	\$ 81,527.57
Office of Administrative Hearings	\$ 2,222,265.58
Office of Attorney General	\$ 12,254,927.22
Office of Financial Management	\$ 25,513,787.90
Office of Insurance Commissioner	\$ 5,273,869.63
Office of Lieutenant Governor	\$ 39,708.89
Office of State Auditor	\$ 4,061,766.13
Office of State Treasurer	\$ 1,927,969.51
Office of the Governor	\$ 175,000.22
Office of the Secretary of State	\$ 15,817,387.44
Public Disclosure Commission	\$ 899,652.35
Public Employment Relations Comm	\$ 595,326.73
Puget Sound Partnership	\$ 453,260.16
Recreation and Conservation Funding Boar	\$ 2,032,199.24
State Board of Accountancy	\$ 502,276.94
State Conservation Commission	\$ 90,414.53
State Investment Board	\$ 3,485,843.20
State Lottery Commission	\$ 2,995,568.36
State Parks and Recreation Commission	\$ 5,125,365.67
State School for the Blind	\$ 604,259.37
Statute Law Committee	\$ 292,469.05
Student Achievement Council	\$ 2,583,395.14
Supt of Public Instruction	\$ 13,244,542.46
Transportation Commission	\$ 40,315.11
Transportation Improvement Board	\$ 137,388.04
Utilities and Transportation Comm	\$ 2,653,267.83
WA Pollution Liability Insurance Program	\$ 1,169,142.01
WA ST Comm African-American Affairs	\$ 13,183.07
WA ST Criminal Justice Train Comm	\$ 705,855.61
WA State Comm on Hispanic Affairs	\$ 11,155.43
Wash State Health Care Authority	\$ 50,700,163.93
Wash Traffic Safety Commission	\$ 102,656.34
Washington Horse Racing Commission	\$ 42,237.46
Washington State Arts Commission	\$ 148,274.63
Washington State Gambling Comm	\$ 1,529,424.18
Washington State Historical Society	\$ 254,179.83
Washington State Patrol	\$ 37,650,533.56
Workforce Train & Educ Coord Board	\$ 75,530.60
<b>Grand Total</b>	<b>1,139,142,474.44</b>



## Out of Scope Agency IT Spend

Out of Scope Agencies	Sum of Cost
Administrative Office of the Courts	\$ 26,321,871.84
Central Washington University	\$ 631,199.91
Commission on Judicial Conduct	\$ 149,467.06
Community/Technical College System	\$ 35,158,817.78
Court of Appeals	\$ 387,664.75
Eastern Washington University	\$ 8,517,750.63
House of Representatives	\$ 375,362.22
Forensic Investigations Council	\$ 14.40
Freight Mobility Strategic Invest	\$ 3,110.11
Joint LEG Audit & Review Committee	\$ 535,167.49
Joint Legislative Systems Committee	\$ 10,050,421.82
Joint Transportation Committee	\$ 4,002.39
LEG Evaluation & Account Prog Comm	\$ 1,115,842.73
Life Sciences Discovery Fund Auth	\$ 257.76
Office of Civil Legal Aid	\$ 16,951.46
Office of Legislative Support Services	\$ 73,288.12
Office of Public Defense	\$ 421,566.76
Office of State Actuary	\$ 247,364.31
Senate	\$ 215,039.77
State Law Library	\$ 79,534.23
Statute Law Committee	\$ 292,469.05
Supreme Court	\$ 68,456.74
The Evergreen State College	\$ 4,729,792.25
University of Washington	\$ 491,558,968.61
Washington State University	\$ 11,938,213.87
Western Washington University	\$ 19,134,790.17
<b>Grand Total</b>	<b>\$ 612,607,399.10</b>



## Appendix E: Cost Pool Mapping

### Chart of Accounts for Cost Pool Mapping

Source: Office of the Chief Information Officer (OCIO spreadsheet)

### Total Cost Pools for Statewide Agencies

Source: Office of the Chief Information Officer (OCIO Spreadsheet)

Cost Pools	Sum of Cost
External Labor	\$ 114,497,752.28
Facilities & Power	\$ 56,130,013.28
Hardware	\$ 197,550,424.07
Internal Labor	\$ 626,968,591.59
Internal Services*	\$ 187,725,958.20
Other	\$ 151,430,368.47
Outside Services	\$ 154,375,575.33
Software	\$ 195,711,921.47
Telecom	\$ 66,486,786.93
<b>Grand Total</b>	<b>\$ 1,750,877,391.62</b>

\*Per OCIO Guidance: (NOTE: "Internal Services" contain Agency expenditures to central service Agencies)

### 2019 AFRS Statewide Cost Pool per Agency

Source: Office of the Chief Information Officer (OCIO Spreadsheet)

Unisys has removed all sub-object coded expenses in the data received from the AFRS system per OCIO guidance.

Agencies	Sum of Cost
<b>Administrative Office of the Courts</b>	<b>\$ 26,321,871.84</b>
External Labor	\$ 169,010.22
Facilities & Power	\$ 85.42
Hardware	\$ 958,878.95
Internal Labor	\$ 15,798,155.46
Internal Services	\$ 1,277,054.13
Other	\$ 1,413,703.54
Outside Services	\$ 2,661,877.48
Software	\$ 3,858,595.37
Telecom	\$ 184,511.27
<b>Archaeology &amp; Historic Preservation</b>	<b>\$ 374,281.84</b>
External Labor	\$ 98,046.38
Facilities & Power	\$ 13,974.41
Hardware	\$ 1,329.04
Internal Services	\$ 174,554.97
Software	\$ 73,180.51
Telecom	\$ 13,196.53
<b>Bd for Vol Firefighter and Res Off</b>	<b>\$ 5,262.82</b>
Internal Services	\$ 3,824.62
Software	\$ 1,438.20



Agencies	Sum of Cost
<b>Board of Industry Insurance Appeals</b>	<b>\$ 1,866,024.64</b>
External Labor	\$ 10,991.48
Facilities & Power	\$ 96,302.92
Hardware	\$ 94,819.45
Internal Labor	\$ 941,845.87
Internal Services	\$ 390,176.54
Other	\$ 2,299.34
Software	\$ 27,883.72
Telecom	\$ 301,705.32
<b>Board of Pilotage Commissioners</b>	<b>\$ 3,890.90</b>
Facilities & Power	\$ (33.71)
Internal Services	\$ 1,885.63
Software	\$ 2,038.98
<b>Board of Tax Appeals</b>	<b>\$ 142,933.04</b>
External Labor	\$ 6,205.32
Hardware	\$ 19,217.68
Internal Services	\$ 95,864.15
Other	\$ 309.93
Software	\$ 15,283.45
Telecom	\$ 6,052.51
<b>Bond Retirement and Interest</b>	<b>\$ 13,708.65</b>
Internal Services	\$ 23.20
Software	\$ 13,685.45
<b>Caseload Forecast Council</b>	<b>\$ 154,569.00</b>
Facilities & Power	\$ 1,719.37
Hardware	\$ 15,514.72
Internal Services	\$ 102,372.04
Other	\$ 31.59
Outside Services	\$ 12,950.00
Software	\$ 18,987.99
Telecom	\$ 2,993.29
<b>Central Washington University</b>	<b>\$ 631,199.91</b>
Internal Services	\$ 588,499.91
Outside Services	\$ 42,700.00
<b>Childhood Deafness &amp; Hearing Loss</b>	<b>\$ 618,807.41</b>
External Labor	\$ 7,447.86
Facilities & Power	\$ 13,777.59
Hardware	\$ 245,374.54
Internal Services	\$ 97,378.14
Other	\$ 94,364.05
Software	\$ 104,524.52
Telecom	\$ 55,940.71
<b>Columbia River Gorge Commission</b>	<b>\$ 38,496.64</b>
External Labor	\$ 11,671.47
Facilities & Power	\$ 1,882.20
Hardware	\$ 519.23
Internal Services	\$ 5,230.28



Agencies	Sum of Cost
Software	\$ 11,766.67
Telecom	\$ 7,426.79
<b>Comm on Asian-Pacific Amer Affairs</b>	<b>\$ 8,853.33</b>
External Labor	\$ 2,475.00
Facilities & Power	\$ 531.83
Hardware	\$ 1,380.43
Internal Services	\$ 2,565.76
Software	\$ 253.35
Telecom	\$ 1,646.96
<b>Comm on Salaries Elected Officials</b>	<b>\$ 5,790.67</b>
Internal Services	\$ 2,534.83
Other	\$ 202.18
Software	\$ 2,400.00
Telecom	\$ 653.66
<b>Commission on Judicial Conduct</b>	<b>\$ 149,467.06</b>
Hardware	\$ 4,116.93
Internal Labor	\$ 123,219.25
Internal Services	\$ 10,199.80
Other	\$ 5,534.88
Software	\$ 2,808.77
Telecom	\$ 3,587.43
<b>Community/Technical College System</b>	<b>\$ 35,158,817.78</b>
Internal Services	\$ 4,657,067.18
Outside Services	\$ 498,840.79
Software	\$ 30,002,909.81
<b>Consolidated Technology Services</b>	<b>\$ 144,079,799.92</b>
External Labor	\$ 7,619,172.85
Facilities & Power	\$ 19,575,007.33
Hardware	\$ 6,873,713.53
Internal Labor	\$ 42,627,639.94
Internal Services	\$ 12,317,693.85
Other	\$ 15,377,835.48
Outside Services	\$ 1,322,252.39
Software	\$ 22,503,830.57
Telecom	\$ 15,862,653.98
(blank)	\$ -
<b>County Road Administration Board</b>	<b>\$ 1,430,871.42</b>
External Labor	\$ 30,506.38
Facilities & Power	\$ 2,651.84
Hardware	\$ 88,884.46
Internal Labor	\$ 648,272.89
Internal Services	\$ 63,821.94
Other	\$ 317.08
Outside Services	\$ 55,000.00
Software	\$ 531,517.47
Telecom	\$ 9,899.36
<b>Court of Appeals</b>	<b>\$ 387,664.75</b>



Agencies	Sum of Cost
Hardware	\$ 75,472.60
Internal Services	\$ 120,381.79
Software	\$ 185,800.20
Telecom	\$ 6,010.16
<b>Department of Agriculture</b>	<b>\$ 6,961,000.71</b>
External Labor	\$ 19,771.20
Facilities & Power	\$ 519,001.79
Hardware	\$ 80,983.82
Internal Labor	\$ 2,196,141.85
Internal Services	\$ 1,491,666.68
Other	\$ 280,328.14
Outside Services	\$ 936,954.16
Software	\$ 929,253.79
Telecom	\$ 506,899.28
<b>Department of Children, Youth, and Family</b>	<b>\$ 38,247,215.46</b>
External Labor	\$ 2,509,998.53
Facilities & Power	\$ 3,431,159.32
Hardware	\$ 296,412.01
Internal Labor	\$ 14,879,397.84
Internal Services	\$ 3,826,636.62
Other	\$ 160,247.05
Outside Services	\$ 5,593,514.71
Software	\$ 4,468,308.25
Telecom	\$ 3,081,541.13
<b>Department of Commerce</b>	<b>\$ 4,542,225.77</b>
External Labor	\$ (8,096.64)
Facilities & Power	\$ 84,075.93
Hardware	\$ 611,863.86
Internal Labor	\$ 1,742,705.50
Internal Services	\$ 806,299.89
Other	\$ 145,215.86
Outside Services	\$ 77,536.20
Software	\$ 915,026.98
Telecom	\$ 167,598.19
<b>Department of Corrections</b>	<b>\$ 54,022,744.63</b>
External Labor	\$ 1,375,214.05
Facilities & Power	\$ 5,389,929.82
Hardware	\$ 4,735,638.20
Internal Labor	\$ 17,889,311.04
Internal Services	\$ 12,651,792.68
Other	\$ 1,909,590.88
Outside Services	\$ 98,692.92
Software	\$ 8,172,193.02
Telecom	\$ 1,800,382.02
<b>Department of Ecology</b>	<b>\$ 24,881,859.28</b>
External Labor	\$ 129,255.47
Facilities & Power	\$ 422,351.26





Agencies	Sum of Cost
Hardware	\$ 2,844,479.10
Internal Labor	\$ 11,682,639.58
Internal Services	\$ 2,702,535.31
Other	\$ 245,810.41
Outside Services	\$ 2,250,614.61
Software	\$ 3,775,333.89
Telecom	\$ 828,839.65
<b>Department of Enterprise Services</b>	<b>\$ 13,420,417.45</b>
External Labor	\$ 506,089.03
Facilities & Power	\$ 7,309.61
Hardware	\$ 1,773,350.32
Internal Labor	\$ 3,148,290.31
Internal Services	\$ 4,209,006.71
Other	\$ 459,437.76
Outside Services	\$ 268,007.47
Software	\$ 2,850,414.77
Telecom	\$ 198,511.47
<b>Department of Fish and Wildlife</b>	<b>\$ 22,233,330.04</b>
External Labor	\$ 22,228.36
Facilities & Power	\$ 1,601,990.61
Hardware	\$ 1,174,392.81
Internal Labor	\$ 9,764,673.65
Internal Services	\$ 2,871,398.51
Other	\$ 136,866.54
Outside Services	\$ 2,738,435.84
Software	\$ 2,515,650.13
Telecom	\$ 1,407,693.59
<b>Department of Health</b>	<b>\$ 35,133,315.15</b>
External Labor	\$ 1,298,079.21
Facilities & Power	\$ 717,263.78
Hardware	\$ 2,140,642.95
Internal Labor	\$ 22,066,386.32
Internal Services	\$ 3,752,969.57
Other	\$ (3,860,163.76)
Outside Services	\$ 3,635,191.38
Software	\$ 4,387,100.62
Telecom	\$ 995,845.08
<b>Department of Labor and Industries</b>	<b>\$ 68,383,138.03</b>
External Labor	\$ 3,381,716.75
Facilities & Power	\$ 4,345,233.46
Hardware	\$ 670,080.52
Internal Labor	\$ 30,024,019.94
Internal Services	\$ 12,782,372.55
Other	\$ 405,498.53
Outside Services	\$ 6,727,753.47
Software	\$ 8,516,072.67
Telecom	\$ 1,530,390.14



Agencies	Sum of Cost
<b>Department of Licensing</b>	<b>\$ 58,187,950.01</b>
External Labor	\$ 1,432,817.51
Facilities & Power	\$ 1,290,706.26
Hardware	\$ 5,100,884.08
Internal Labor	\$ 18,086,687.41
Internal Services	\$ 7,893,909.94
Other	\$ 383,309.93
Outside Services	\$ 8,897,526.62
Software	\$ 14,514,646.10
Telecom	\$ 587,462.16
<b>Department of Natural Resources</b>	<b>\$ 20,407,132.84</b>
External Labor	\$ 297,855.96
Facilities & Power	\$ 1,302,135.95
Hardware	\$ 5,210,917.78
Internal Labor	\$ 5,965,063.61
Internal Services	\$ 2,393,552.45
Other	\$ 195,493.09
Outside Services	\$ 709,895.58
Software	\$ 2,962,076.58
Telecom	\$ 1,370,141.84
<b>Department of Retirement Systems</b>	<b>\$ 11,016,236.99</b>
Facilities & Power	\$ 181,347.18
Hardware	\$ 170,485.97
Internal Labor	\$ 5,700,849.35
Internal Services	\$ 2,458,864.01
Other	\$ 177,425.57
Outside Services	\$ 1,148,459.37
Software	\$ 1,178,805.54
<b>Department of Revenue</b>	<b>\$ 36,166,305.52</b>
External Labor	\$ 59,114.62
Facilities & Power	\$ -
Hardware	\$ 12,994,456.02
Internal Labor	\$ 15,344,453.17
Internal Services	\$ 2,834,336.74
Other	\$ 124,530.35
Outside Services	\$ 1,439,955.98
Software	\$ 2,867,096.06
Telecom	\$ 502,362.58
<b>Department of Transportation</b>	<b>\$ 80,448,284.20</b>
External Labor	\$ 4,384,441.43
Facilities & Power	\$ 164,314.03
Hardware	\$ 10,209,639.90
Internal Labor	\$ 33,472,509.16
Internal Services	\$ 5,697,552.73
Other	\$ 3,712,943.17
Outside Services	\$ 6,509,812.82
Software	\$ 10,463,705.64



Agencies	Sum of Cost
Telecom	\$ 5,833,365.32
<b>Department of Veterans Affairs</b>	<b>\$ 3,836,367.31</b>
External Labor	\$ 104,342.80
Facilities & Power	\$ 288,746.25
Hardware	\$ 58,522.94
Internal Labor	\$ 862,436.92
Internal Services	\$ 924,037.53
Other	\$ 53,239.38
Outside Services	\$ 706,133.07
Software	\$ 623,899.79
Telecom	\$ 215,008.63
<b>Dept of Financial Institutions</b>	<b>\$ 3,833,287.52</b>
Hardware	\$ 587,907.28
Internal Labor	\$ 1,638,996.96
Internal Services	\$ 541,466.60
Other	\$ 24,791.93
Outside Services	\$ 397,167.02
Software	\$ 548,703.71
Telecom	\$ 94,254.02
<b>Dept of Services for the Blind</b>	<b>\$ 2,678,570.31</b>
External Labor	\$ 251,552.24
Facilities & Power	\$ 20.00
Hardware	\$ 47,560.04
Internal Labor	\$ 345,139.79
Internal Services	\$ 280,963.77
Other	\$ 37,647.61
Outside Services	\$ 1,625,135.61
Software	\$ 38,971.28
Telecom	\$ 51,579.97
<b>Dept of Social and Health Services</b>	<b>\$ 233,727,357.55</b>
External Labor	\$ 40,173,695.17
Facilities & Power	\$ 7,340,091.13
Hardware	\$ 14,282,657.89
Internal Labor	\$ 75,998,038.62
Internal Services	\$ 28,731,070.69
Other	\$ 1,484,434.25
Outside Services	\$ 37,698,289.28
Software	\$ 15,645,837.70
Telecom	\$ 12,373,242.82
<b>East Wash State Historical Society</b>	<b>\$ 121,250.21</b>
External Labor	\$ 45,922.98
Facilities & Power	\$ 14,492.60
Hardware	\$ 3,585.58
Internal Services	\$ 22,422.59
Other	\$ 5,230.14
Software	\$ 20,799.75
Telecom	\$ 8,796.57



Agencies	Sum of Cost
<b>Eastern Washington University</b>	<b>\$ 8,517,750.63</b>
External Labor	\$ 3,065,128.58
Facilities & Power	\$ 215,413.99
Hardware	\$ 995,781.12
Internal Labor	\$ 3,865,969.28
Internal Services	\$ 282,963.46
Other	\$ 30,237.09
Outside Services	\$ 62,257.11
<b>Economic &amp; Revenue Forecast Council</b>	<b>\$ 12,798.09</b>
External Labor	\$ 2,064.00
Facilities & Power	\$ 1,500.00
Internal Services	\$ 4,502.02
Software	\$ 4,111.31
Telecom	\$ 620.76
<b>Employment Security Department</b>	<b>\$ 60,476,981.04</b>
External Labor	\$ (38,026.97)
Facilities & Power	\$ 520,849.21
Hardware	\$ 8,657,169.24
Internal Labor	\$ 19,847,534.11
Internal Services	\$ 4,435,774.31
Other	\$ 2,982,196.71
Outside Services	\$ 16,122,888.10
Software	\$ 6,678,953.69
Telecom	\$ 1,269,642.64
<b>Environmental and Land Use Hearings Office</b>	<b>\$ 127,572.58</b>
External Labor	\$ 11,220.00
Internal Services	\$ 99,877.01
Other	\$ 483.00
Software	\$ 8,422.35
Telecom	\$ 7,570.22
<b>Forensic Investigations Council</b>	<b>\$ 14.40</b>
Internal Services	\$ 14.40
<b>Freight Mobility Strategic Invest</b>	<b>\$ 3,110.11</b>
Internal Labor	\$ 960.00
Internal Services	\$ 2,150.11
<b>Governor's Office of Indian Affairs</b>	<b>\$ 11,254.92</b>
Facilities & Power	\$ 1,817.14
Internal Services	\$ 2,425.64
Software	\$ 2,400.00
Telecom	\$ 4,612.14
<b>House of Representatives</b>	<b>\$ 375,362.22</b>
Internal Services	\$ 304,942.08
Software	\$ 70,420.14
<b>Human Rights Commission</b>	<b>\$ 228,925.45</b>
External Labor	\$ 7,789.10
Facilities & Power	\$ 10,149.44
Hardware	\$ 8,390.86



Agencies	Sum of Cost
Internal Labor	\$ 113,738.39
Internal Services	\$ 78,409.94
Other	\$ 4,256.14
Software	\$ 2,139.00
Telecom	\$ 4,052.58
<b>Joint LEG Audit &amp; Review Committee</b>	<b>\$ 535,167.49</b>
External Labor	\$ 35,640.00
Hardware	\$ 35,563.66
Internal Services	\$ 23,222.49
Outside Services	\$ 22,000.00
Software	\$ 418,741.34
<b>Joint Legislative Systems Committee</b>	<b>\$ 10,050,421.82</b>
Hardware	\$ 1,130,052.55
Internal Labor	\$ 6,959,377.66
Internal Services	\$ 279,546.56
Other	\$ 133,093.57
Software	\$ 1,541,230.96
Telecom	\$ 7,120.52
<b>Joint Transportation Committee</b>	<b>\$ 4,002.39</b>
Internal Services	\$ 2,795.48
Software	\$ 1,206.91
<b>LEG Evaluation &amp; Account Prog Comm</b>	<b>\$ 1,115,842.73</b>
External Labor	\$ 56,160.00
Internal Labor	\$ 916,631.87
Internal Services	\$ 38,761.96
Other	\$ 13,335.33
Outside Services	\$ 61,050.00
Software	\$ 29,903.57
<b>LEOFF Plan 2 Retirement Board</b>	<b>\$ 145,011.41</b>
External Labor	\$ 109,658.04
Facilities & Power	\$ 3,179.05
Hardware	\$ 13,198.39
Internal Services	\$ 8,121.98
Other	\$ 85.51
Software	\$ 8,511.28
Telecom	\$ 2,257.16
<b>Life Sciences Discovery Fund Auth</b>	<b>\$ 257.76</b>
Internal Services	\$ 257.76
<b>Liquor and Cannabis Board</b>	<b>\$ 9,702,417.50</b>
External Labor	\$ 1,277,004.20
Facilities & Power	\$ 290,598.63
Hardware	\$ 779,510.91
Internal Labor	\$ 3,031,169.00
Internal Services	\$ 697,124.89
Other	\$ 64,872.83
Outside Services	\$ 1,044,971.00
Software	\$ 2,168,950.35



Agencies	Sum of Cost
Telecom	\$ 348,215.69
<b>Military Department</b>	<b>\$ 5,940,143.27</b>
External Labor	\$ 189,917.89
Facilities & Power	\$ 125,481.28
Hardware	\$ 323,013.26
Internal Labor	\$ 1,878,120.80
Internal Services	\$ 686,972.80
Other	\$ 89,280.56
Outside Services	\$ 202,040.00
Software	\$ 771,768.27
Telecom	\$ 1,673,548.41
<b>Office of Minority &amp; Women's Business</b>	<b>\$ 81,527.57</b>
External Labor	\$ 20,849.23
Facilities & Power	\$ 2,388.01
Hardware	\$ 2,945.97
Internal Services	\$ 38,168.47
Software	\$ 10,287.58
Telecom	\$ 6,888.31
<b>Office of Administrative Hearings</b>	<b>\$ 2,222,265.58</b>
Facilities & Power	\$ 287,922.00
Hardware	\$ 14,987.59
Internal Labor	\$ 1,175,536.23
Internal Services	\$ 363,415.99
Other	\$ 18,965.59
Outside Services	\$ 3,500.00
Software	\$ 112,659.67
Telecom	\$ 245,278.51
<b>Office of Attorney General</b>	<b>\$ 12,254,927.22</b>
Facilities & Power	\$ 1,143,554.46
Hardware	\$ 977,372.52
Internal Labor	\$ 4,194,246.26
Internal Services	\$ 1,945,460.61
Other	\$ 547,360.55
Outside Services	\$ 69,005.52
Software	\$ 2,758,813.23
Telecom	\$ 619,114.07
<b>Office of Civil Legal Aid</b>	<b>\$ 16,951.46</b>
Internal Services	\$ 3,384.53
Outside Services	\$ 2,360.00
Software	\$ 11,206.93
<b>Office of Financial Management</b>	<b>\$ 25,513,787.90</b>
External Labor	\$ 2,984,223.87
Facilities & Power	\$ 179,947.34
Hardware	\$ 620,452.59
Internal Labor	\$ 8,394,264.86
Internal Services	\$ 2,805,740.41
Other	\$ 125,042.81



Agencies	Sum of Cost
Outside Services	\$ 3,291,061.72
Software	\$ 1,057,355.73
Telecom	\$ 6,055,698.57
<b>Office of Insurance Commissioner</b>	<b>\$ 5,273,869.63</b>
External Labor	\$ 37,450.84
Facilities & Power	\$ 45,426.29
Hardware	\$ 610,243.08
Internal Labor	\$ 2,376,896.61
Internal Services	\$ 636,156.07
Other	\$ 442,276.55
Outside Services	\$ 425,264.58
Software	\$ 699,196.81
Telecom	\$ 958.80
<b>Office of Legislative Support Services</b>	<b>\$ 73,288.12</b>
Internal Services	\$ 34,839.22
Software	\$ 38,448.90
<b>Office of Lieutenant Governor</b>	<b>\$ 39,708.89</b>
Hardware	\$ 6,784.46
Internal Services	\$ 5,167.60
Other	\$ 5,667.95
Software	\$ 5,893.73
Telecom	\$ 16,195.15
<b>Office of Public Defense</b>	<b>\$ 421,566.76</b>
Internal Services	\$ 104,591.89
Software	\$ 316,974.87
<b>Office of State Actuary</b>	<b>\$ 247,364.31</b>
External Labor	\$ 33,440.00
Internal Services	\$ 17,190.55
Software	\$ 179,929.77
Telecom	\$ 16,803.99
<b>Office of State Auditor</b>	<b>\$ 4,061,766.13</b>
Facilities & Power	\$ 57,632.94
Hardware	\$ 311,403.30
Internal Labor	\$ 1,741,377.09
Internal Services	\$ 739,991.28
Other	\$ 27,415.80
Outside Services	\$ 695,845.49
Software	\$ 386,906.22
Telecom	\$ 101,194.01
<b>Office of State Treasurer</b>	<b>\$ 1,927,969.51</b>
External Labor	\$ 26,083.31
Hardware	\$ 171,450.95
Internal Labor	\$ 1,420,216.19
Internal Services	\$ 219,831.03
Other	\$ 1,454.44
Software	\$ 60,862.93
Telecom	\$ 28,070.66



Agencies	Sum of Cost
<b>Office of the Governor</b>	<b>\$ 175,000.22</b>
Facilities & Power	\$ 7,913.74
Hardware	\$ 6,500.36
Internal Services	\$ 116,827.82
Other	\$ 3,074.51
Software	\$ 8,637.77
Telecom	\$ 32,046.02
<b>Office of the Secretary of State</b>	<b>\$ 15,817,387.44</b>
External Labor	\$ -
Facilities & Power	\$ 23,253.96
Hardware	\$ 5,082,334.38
Internal Labor	\$ 2,884,321.64
Internal Services	\$ 1,001,232.03
Other	\$ 89,148.01
Outside Services	\$ 428,010.69
Software	\$ 6,126,808.79
Telecom	\$ 182,277.94
(blank)	\$ -
<b>Public Disclosure Commission</b>	<b>\$ 899,652.35</b>
External Labor	\$ 3,000.00
Facilities & Power	\$ 20,302.88
Hardware	\$ 20,452.11
Internal Labor	\$ 627,994.47
Internal Services	\$ 76,595.38
Other	\$ 1,792.62
Software	\$ 135,835.84
Telecom	\$ 13,679.05
<b>Public Employment Relations Comm</b>	<b>\$ 595,326.73</b>
External Labor	\$ 355,208.46
Facilities & Power	\$ 10,072.86
Hardware	\$ 18,173.72
Internal Services	\$ 131,901.97
Other	\$ 435.75
Software	\$ 67,317.35
Telecom	\$ 12,216.62
<b>Puget Sound Partnership</b>	<b>\$ 453,260.16</b>
External Labor	\$ -
Facilities & Power	\$ 7,510.87
Hardware	\$ 12,736.79
Internal Labor	\$ 149,258.65
Internal Services	\$ 133,654.68
Other	\$ 2,046.86
Software	\$ 114,878.19
Telecom	\$ 33,174.12
<b>Recreation and Conservation Funding Boar</b>	<b>\$ 2,032,199.24</b>
External Labor	\$ (163,579.98)
Facilities & Power	\$ 2,465.13





Agencies	Sum of Cost
Hardware	\$ 30,599.99
Internal Labor	\$ 809,531.00
Internal Services	\$ 165,521.58
Other	\$ 26,283.12
Outside Services	\$ 1,056,233.97
Software	\$ 88,298.10
Telecom	\$ 16,846.33
<b>Senate</b>	<b>\$ 215,039.77</b>
Internal Services	\$ 206,565.79
Software	\$ 8,473.98
<b>State Board of Accountancy</b>	<b>\$ 502,276.94</b>
External Labor	\$ 5,250.00
Facilities & Power	\$ 1,561.53
Hardware	\$ 3,832.59
Internal Labor	\$ 210,630.04
Internal Services	\$ 86,204.54
Outside Services	\$ 119,963.11
Software	\$ 72,559.30
Telecom	\$ 2,275.83
<b>State Conservation Commission</b>	<b>\$ 90,414.53</b>
Facilities & Power	\$ 195.00
Hardware	\$ 28,035.49
Internal Services	\$ 17,984.44
Outside Services	\$ 39,005.00
Telecom	\$ 5,194.60
<b>State Investment Board</b>	<b>\$ 3,485,843.20</b>
External Labor	\$ 1,420,417.35
Facilities & Power	\$ 9,330.19
Hardware	\$ 147,446.46
Internal Labor	\$ 1,195,800.87
Internal Services	\$ 251,629.41
Other	\$ 98,547.60
Outside Services	\$ 19,947.71
Software	\$ 281,843.03
Telecom	\$ 60,880.58
<b>State Law Library</b>	<b>\$ 79,534.23</b>
Facilities & Power	\$ 2,841.97
Hardware	\$ 16,085.69
Internal Services	\$ 9,496.38
Software	\$ 51,110.19
<b>State Lottery Commission</b>	<b>\$ 2,995,568.36</b>
External Labor	\$ 476.91
Facilities & Power	\$ 23,192.28
Hardware	\$ 394,937.63
Internal Labor	\$ 1,821,071.72
Internal Services	\$ 479,446.28
Other	\$ 33.52



Agencies	Sum of Cost
Software	\$ 196,919.60
Telecom	\$ 79,490.42
<b>State Parks and Recreation Comm</b>	<b>\$ 5,125,365.67</b>
External Labor	\$ 334,404.81
Facilities & Power	\$ 387,385.89
Hardware	\$ 864,144.06
Internal Labor	\$ 1,345,588.95
Internal Services	\$ 1,245,337.35
Other	\$ 146,010.50
Outside Services	\$ 45,630.56
Software	\$ 323,334.36
Telecom	\$ 433,529.19
<b>State School for the Blind</b>	<b>\$ 604,259.37</b>
External Labor	\$ 585.17
Facilities & Power	\$ 8,062.09
Hardware	\$ 115,862.66
Internal Labor	\$ 226,103.10
Internal Services	\$ 91,870.55
Other	\$ 8,135.70
Outside Services	\$ 2,073.15
Software	\$ 140,524.67
Telecom	\$ 11,042.28
<b>Statute Law Committee</b>	<b>\$ 292,469.05</b>
External Labor	\$ 68,160.00
Hardware	\$ 23,493.89
Internal Labor	\$ 144,772.38
Internal Services	\$ 38,157.02
Other	\$ 1,535.00
Software	\$ 16,348.53
Telecom	\$ 2.23
<b>Student Achievement Council</b>	<b>\$ 2,583,395.14</b>
External Labor	\$ 4,564.02
Facilities & Power	\$ 46,735.17
Hardware	\$ 65,545.16
Internal Labor	\$ 1,634,935.03
Internal Services	\$ 208,918.67
Other	\$ 99,848.00
Outside Services	\$ 105,446.55
Software	\$ 323,963.70
Telecom	\$ 93,438.84
<b>Supreme Court</b>	<b>\$ 68,456.74</b>
Hardware	\$ 5,074.41
Internal Services	\$ 61,009.71
Software	\$ 2,372.62
<b>Supt of Public Instruction</b>	<b>\$ 13,244,542.46</b>
External Labor	\$ 485,208.14
Facilities & Power	\$ 141,003.73



Agencies	Sum of Cost
Hardware	\$ 1,657,105.31
Internal Labor	\$ 3,222,404.42
Internal Services	\$ 493,337.98
Other	\$ 401,117.87
Outside Services	\$ 3,160,122.02
Software	\$ 3,601,332.91
Telecom	\$ 82,910.08
<b>The Evergreen State College</b>	<b>\$ 4,729,792.25</b>
External Labor	\$ 32,927.59
Facilities & Power	\$ 6,157.86
Hardware	\$ 755,534.76
Internal Labor	\$ 2,384,185.32
Internal Services	\$ 91,171.18
Other	\$ 119,192.50
Outside Services	\$ 66,137.10
Software	\$ 1,243,271.75
Telecom	\$ 31,214.19
<b>Transportation Commission</b>	<b>\$ 40,315.11</b>
External Labor	\$ 10.00
Hardware	\$ 16,021.80
Internal Labor	\$ 3,840.00
Internal Services	\$ 4,635.33
Other	\$ 10,776.73
Software	\$ 1,304.16
Telecom	\$ 3,727.09
<b>Transportation Improvement Board</b>	<b>\$ 137,388.04</b>
Facilities & Power	\$ 4,757.78
Hardware	\$ 4,855.10
Internal Labor	\$ 64,586.82
Internal Services	\$ 54,117.56
Software	\$ 8,650.78
Telecom	\$ 420.00
<b>University of Washington</b>	<b>\$ 491,558,968.61</b>
External Labor	\$ 8,034,096.21
Facilities & Power	\$ 5,048,529.37
Hardware	\$ 87,132,238.82
Internal Labor	\$ 186,365,837.96
Internal Services	\$ 43,855,349.81
Other	\$ 121,113,988.04
Outside Services	\$ 35,094,323.98
Software	\$ 1,033,525.64
Telecom	\$ 3,881,078.78
<b>Utilities and Transportation Comm</b>	<b>\$ 2,653,267.83</b>
External Labor	\$ 152,734.20
Facilities & Power	\$ 47,681.21
Hardware	\$ 405,393.81
Internal Labor	\$ 919,245.95



Agencies	Sum of Cost
Internal Services	\$ 789,872.83
Other	\$ 4,674.94
Outside Services	\$ 10,364.82
Software	\$ 256,302.50
Telecom	\$ 66,997.57
<b>WA Pollution Liability Insurance Program</b>	<b>\$ 1,169,142.01</b>
External Labor	\$ 9,754.59
Facilities & Power	\$ 9,108.19
Hardware	\$ 9,035.08
Internal Labor	\$ 38,409.64
Internal Services	\$ 46,798.70
Other	\$ 756,386.90
Outside Services	\$ 321,345.34
Software	\$ (28,483.76)
Telecom	\$ 6,787.33
<b>WA ST Comm African-American Affairs</b>	<b>\$ 13,183.07</b>
Facilities & Power	\$ 531.82
Hardware	\$ 1,615.88
Internal Services	\$ 2,282.27
Software	\$ 3,631.71
Telecom	\$ 5,121.39
<b>WA ST Criminal Justice Train Comm</b>	<b>\$ 705,855.61</b>
External Labor	\$ 51,637.67
Facilities & Power	\$ 4,233.99
Hardware	\$ 151,969.90
Internal Labor	\$ 126,046.71
Internal Services	\$ 125,701.14
Other	\$ 5,708.93
Outside Services	\$ 56,417.50
Software	\$ 149,700.17
Telecom	\$ 34,439.60
<b>WA State Comm on Hispanic Affairs</b>	<b>\$ 11,155.43</b>
External Labor	\$ 236.09
Facilities & Power	\$ 531.82
Hardware	\$ 1,230.56
Internal Services	\$ 2,767.31
Other	\$ 700.00
Software	\$ 2,504.45
Telecom	\$ 3,185.20
<b>Wash State Health Care Authority</b>	<b>\$ 50,700,163.93</b>
External Labor	\$ 27,386,819.28
Facilities & Power	\$ 454,402.26
Hardware	\$ 1,297,738.53
Internal Labor	\$ 12,101,057.79
Internal Services	\$ 2,701,680.19
Other	\$ 327,975.64
Outside Services	\$ 3,649,150.34



Agencies	Sum of Cost
Software	\$ 2,480,413.84
Telecom	\$ 300,926.06
<b>Wash Traffic Safety Commission</b>	<b>\$ 102,656.34</b>
Facilities & Power	\$ 19,876.47
Internal Services	\$ 62,862.72
Other	\$ 652.89
Software	\$ 12,557.09
Telecom	\$ 6,707.17
<b>Washington Horse Racing Commission</b>	<b>\$ 42,237.46</b>
External Labor	\$ 1,531.18
Facilities & Power	\$ 5,686.98
Hardware	\$ 3,177.21
Internal Services	\$ 21,469.65
Other	\$ 206.59
Outside Services	\$ 5,193.60
Software	\$ 2,108.62
Telecom	\$ 2,863.63
<b>Washington State Arts Commission</b>	<b>\$ 148,274.63</b>
External Labor	\$ 106.25
Facilities & Power	\$ 11,325.56
Hardware	\$ 9,995.20
Internal Labor	\$ 8,754.95
Internal Services	\$ 59,005.74
Other	\$ 314.22
Software	\$ 56,480.33
Telecom	\$ 2,292.38
<b>Washington State Gambling Comm</b>	<b>\$ 1,529,424.18</b>
External Labor	\$ 83,034.22
Facilities & Power	\$ 3,483.82
Hardware	\$ 204,632.54
Internal Labor	\$ 730,531.74
Internal Services	\$ 211,134.36
Other	\$ 67,532.76
Software	\$ 92,140.35
Telecom	\$ 136,934.39
<b>Washington State Historical Society</b>	<b>\$ 254,179.83</b>
External Labor	\$ 49,309.76
Hardware	\$ 41,098.89
Internal Services	\$ 52,177.45
Other	\$ 2,018.78
Software	\$ 92,814.77
Telecom	\$ 16,760.18
<b>Washington State Patrol</b>	<b>\$ 37,650,533.56</b>
External Labor	\$ 3,368,752.89
Facilities & Power	\$ 23,020.90
Hardware	\$ 7,741,316.22
Internal Labor	\$ 15,479,789.83



Agencies	Sum of Cost
Internal Services	\$ 3,120,077.58
Other	\$ 386,375.26
Outside Services	\$ 1,725,908.13
Software	\$ 4,285,172.05
Telecom	\$ 1,520,120.70
<b>Washington State University</b>	<b>\$ 11,938,213.87</b>
Internal Services	\$ 864,934.98
Outside Services	\$ 210,120.25
Software	\$ 10,863,158.64
<b>Western Washington University</b>	<b>\$ 19,134,790.17</b>
External Labor	\$ 1,054,979.75
Facilities & Power	\$ 106,930.00
Hardware	\$ 5,250,205.99
Internal Labor	\$ 7,610,979.83
Internal Services	\$ 135,501.50
Other	\$ 293,355.90
Outside Services	\$ 205,241.22
Software	\$ 3,487,423.46
Telecom	\$ 990,172.52
<b>Workforce Train &amp; Educ Coord Board</b>	<b>\$ 75,530.60</b>
Internal Services	\$ 62,941.45
Software	\$ 12,589.15
<b>Grand Total</b>	<b>\$ 1,750,877,391.62</b>

**Per OCIO Guidance:**

- The total cost for internal services in 2019 is \$187,725,958. This cost includes IT charges to multiple central service Agencies. Anything coded with sub-object EL is considered central service charges. When reporting at an enterprise level, the central service charges (identified as sub-object EL in AFRS) are excluded to avoid double-counting the initial investment.
- Internal services include IT services paid to multiple central service Agencies. Central services Agencies include the Department of Enterprises Services (DES), Office of Financial Management (OFM), WaTech, and in some instances, the Department of Social and Health Services (DSHS).
- When reporting IT expenditures at an Enterprise level, it is important to understand that the initial investment in hardware, software, internal labor, etc. is paid by the Central Service Agency [CTS]. Those Agencies then package the costs and provide it to Agencies as a service. The charges to Agencies are to recover the cost of the initial investment made by the central service Agency.



## Appendix F: Cloud Vendor Financial Considerations

### StratoZone Financial Comparison

The cloud costs below are based on an average of available configurations with the cost noted in the first row. StratoZone discovery provided the Server/Device sizing / monthly pricing per Cloud Vendor for the 3-Year contract term.

### StratoZone Summary

Cost Component (Monthly)	Azure (3-Year Reserved)	AWS (3-Year Term)	Google Cloud 3 Year Commit	WaTech Data Center
Hosting Location:	West US 2	AWS (US-West)	Iowa (us-central1)	North America
Compute	\$303,476.73	\$ 353,369.80	\$ 287,394.87	\$ 1,323,467.81
Operating System	\$4,365.40	\$ 290,660.72	\$ 435,342.80	\$ -
Storage	\$476,803.43	\$ 418,974.31	\$ 486,753.49	\$510,066.90
Egress	\$25,002.74	\$ 44,207.50	\$ 32,324.30	\$ -
Other	\$ -	\$ -	\$ -	\$ -
<b>Total (monthly)</b>	<b>\$809,648.30</b>	<b>\$ 1,107,212.33</b>	<b>\$ 1,241,815.46</b>	<b>\$ 1,833,534.71</b>
Average cost/server p month	<b>\$ 188.99</b>	<b>\$ 258.45</b>	<b>\$ 289.87</b>	<b>\$ 428.00</b>

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### StratoZone Three Year Contracting per Device Size

Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
AWS (3-Year Term)	\$1,107,212.33	4284	\$258.45	\$39,859,643.92
c5.2xlarge	\$5,744.56	35	\$164.13	\$206,804.12
c5.4xlarge	\$178,693.24	217	\$823.47	\$6,432,956.50
c5.9xlarge	\$3,365.89	7	\$480.84	\$121,172.04
c5.xlarge	\$14,200.25	214	\$66.36	\$511,209.02
c5n.4xlarge	\$4,218.06	4	\$1,054.51	\$151,850.12
c5n.xlarge	\$62.64	1	\$62.64	\$2,255.12
f1.2xlarge	\$13,405.04	8	\$1,675.63	\$482,581.35
f1.4xlarge	\$9,386.77	4	\$2,346.69	\$337,923.89
m5a.4xlarge	\$52,292.15	41	\$1,275.42	\$1,882,517.36



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
m5a.8xlarge	\$54,520.02	24	\$2,271.67	\$1,962,720.82
r4.xlarge	\$476.16	5	\$95.23	\$17,141.89
r5a.16xlarge	\$5,433.05	1	\$5,433.05	\$195,589.93
r5a.2xlarge	\$41,532.35	66	\$629.28	\$1,495,164.66
r5a.4xlarge	\$51,321.30	42	\$1,221.94	\$1,847,566.66
r5a.8xlarge	\$18,445.33	9	\$2,049.48	\$664,031.96
r5a.large	\$1,018.34	18	\$56.57	\$36,660.16
r5a.xlarge	\$1,570.75	6	\$261.79	\$56,547.07
t2.2xlarge	\$67,075.97	175	\$383.29	\$2,414,734.90
t2.micro	\$62.77	7	\$8.97	\$2,259.59
t2.nano	\$6.53	1	\$6.53	\$235.09
t2.small	\$1,206.08	28	\$43.07	\$43,418.85
t2.xlarge	\$80,090.76	499	\$160.50	\$2,883,267.33
t3.2xlarge	\$3,462.64	15	\$230.84	\$124,654.94
t3.large	\$1,396.87	6	\$232.81	\$50,287.32
t3.medium	\$530.97	7	\$75.85	\$19,114.75
t3.micro	\$22.18	2	\$11.09	\$798.54
t3.small	\$115.87	14	\$8.28	\$4,171.33
t3.xlarge	\$6,217.31	27	\$230.27	\$223,823.29
t3a.2xlarge	\$96,024.08	323	\$297.29	\$3,456,866.73
t3a.large	\$66,765.19	668	\$99.95	\$2,403,546.76
t3a.medium	\$44,013.97	845	\$52.09	\$1,584,502.87
t3a.micro	\$80.87	14	\$5.78	\$2,911.15
t3a.nano	\$35.26	2	\$17.63	\$1,269.32
t3a.small	\$2,608.42	179	\$14.57	\$93,903.17
t3a.xlarge	\$103,087.18	698	\$147.69	\$3,711,138.65
x1.16xlarge	\$11,951.94	2	\$5,975.97	\$430,269.76
x1e.2xlarge	\$17,637.42	9	\$1,959.71	\$634,947.18
x1e.4xlarge	\$26,863.62	14	\$1,918.83	\$967,090.14
x1e.8xlarge	\$110,628.58	26	\$4,254.95	\$3,982,628.92
x1e.xlarge	\$11,641.96	21	\$554.38	\$419,110.66
<b>Azure (3-Year Reserved)</b>	<b>\$809,648.30</b>	<b>4284</b>	<b>\$188.99</b>	<b>\$29,147,338.77</b>
D16s v3	\$32,598.03	45	\$724.40	\$1,173,528.92
D2s v3	\$60,021.40	674	\$89.05	\$2,160,770.45
D4s v3	\$48,361.30	371	\$130.35	\$1,741,006.92
D8s v3	\$54,987.97	186	\$295.63	\$1,979,567.06
DS1 v2	\$190.77	5	\$38.15	\$6,867.65
E16-8s v3	\$333.02	1	\$333.02	\$11,988.66
E16s v3	\$28,332.91	41	\$691.05	\$1,019,984.63
E20s v3	\$17,981.72	19	\$946.41	\$647,341.83
E2s v3	\$15,083.81	226	\$66.74	\$543,017.16
E32s v3	\$8,996.00	9	\$999.56	\$323,856.10
E4-2s v3	\$2,459.61	24	\$102.48	\$88,545.89
E4s v3	\$27,801.81	155	\$179.37	\$1,000,865.30
E8-4s v3	\$4,899.55	16	\$306.22	\$176,383.92





Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
E8s v3	\$28,641.93	66	\$433.97	\$1,031,109.52
F16s v2	\$147,448.83	217	\$679.49	\$5,308,157.82
F1s	\$5,048.83	201	\$25.12	\$181,757.80
F2s v2	\$45,931.70	893	\$51.44	\$1,653,541.10
F32s v2	\$10,828.61	14	\$773.47	\$389,829.92
F4s v2	\$86,947.94	860	\$101.10	\$3,130,125.71
F8s v2	\$44,913.43	194	\$231.51	\$1,616,883.63
M16ms	\$22,806.08	16	\$1,425.38	\$821,018.81
M32ms	\$72,731.45	26	\$2,797.36	\$2,618,332.17
M64	\$9,282.50	2	\$4,641.25	\$334,170.15
M64ls	\$2,745.18	1	\$2,745.18	\$98,826.61
M8ms	\$30,273.92	22	\$1,376.09	\$1,089,861.06
Google Cloud 3 Year Commit	\$1,241,815.46	4284	\$289.87	\$44,705,356.67
e2-highcpu-16	\$7,061.14	13	\$543.16	\$254,201.09
e2-highcpu-2	\$1,481.79	23	\$64.43	\$53,344.55
e2-highcpu-4	\$39,800.74	204	\$195.10	\$1,432,826.55
e2-highcpu-8	\$24,540.00	39	\$629.23	\$883,440.08
e2-highmem-16	\$47,124.66	40	\$1,178.12	\$1,696,487.83
e2-highmem-2	\$23,744.61	215	\$110.44	\$854,806.12
e2-highmem-4	\$45,133.74	165	\$273.54	\$1,624,814.60
e2-highmem-8	\$46,830.61	76	\$616.19	\$1,685,901.87
e2-standard-16	\$55,605.46	44	\$1,263.76	\$2,001,796.70
e2-standard-2	\$130,766.21	1112	\$117.60	\$4,707,583.50
e2-standard-4	\$195,135.34	887	\$219.99	\$7,024,872.08
e2-standard-8	\$117,544.57	263	\$446.94	\$4,231,604.48
m1-ultramem-40	\$128,026.60	27	\$4,741.73	\$4,608,957.75
m1-ultramem-80	\$8,190.59	1	\$8,190.59	\$294,861.30
n1-custom-1-1024	\$442.43	19	\$23.29	\$15,927.54
n1-custom-1-10240	\$155.27	1	\$155.27	\$5,589.83
n1-custom-1-12288	\$110.67	1	\$110.67	\$3,984.24
n1-custom-1-13824	\$208.81	1	\$208.81	\$7,517.28
n1-custom-1-2048	\$4,783.48	179	\$26.72	\$172,205.33
n1-custom-1-256	\$71.86	2	\$35.93	\$2,587.13
n1-custom-1-3072	\$296.30	5	\$59.26	\$10,666.91
n1-custom-1-32768	\$176.83	1	\$176.83	\$6,366.03
n1-custom-1-4096	\$25,762.72	304	\$84.75	\$927,457.95
n1-custom-1-512	\$42.36	1	\$42.36	\$1,524.97
n1-custom-1-5120	\$57.77	1	\$57.77	\$2,079.89
n1-custom-1-6144	\$1,104.00	10	\$110.40	\$39,743.96
n1-custom-1-768	\$11.83	1	\$11.83	\$425.82
n1-custom-1-8192	\$5,613.42	27	\$207.90	\$202,083.16
n1-custom-1-8448	\$303.91	2	\$151.95	\$10,940.62
n1-custom-1-98304	\$1,545.49	2	\$772.75	\$55,637.81
n2-custom-10-16128	\$650.64	5	\$130.13	\$23,423.08
n2-custom-10-24064	\$1,830.32	13	\$140.79	\$65,891.60



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
n2-custom-10-262144	\$9,444.44	6	\$1,574.07	\$339,999.67
n2-custom-10-32768	\$36,492.32	84	\$434.43	\$1,313,723.52
n2-custom-10-73472	\$605.30	1	\$605.30	\$21,790.80
n2-custom-10-8192	\$523.78	1	\$523.78	\$18,856.06
n2-custom-12-12032	\$178.55	1	\$178.55	\$6,427.74
n2-custom-12-12288	\$3,405.70	4	\$851.42	\$122,605.03
n2-custom-12-16128	\$1,553.76	3	\$517.92	\$55,935.36
n2-custom-12-16384	\$1,636.88	3	\$545.63	\$58,927.84
n2-custom-12-163840	\$2,156.20	2	\$1,078.10	\$77,623.18
n2-custom-12-196608	\$8,035.22	2	\$4,017.61	\$289,268.01
n2-custom-12-24576	\$162.18	1	\$162.18	\$5,838.54
n2-custom-12-262144	\$18,636.57	7	\$2,662.37	\$670,916.57
n2-custom-12-27136	\$335.80	2	\$167.90	\$12,088.94
n2-custom-12-32768	\$60,728.50	64	\$948.88	\$2,186,226.14
n2-custom-12-49152	\$2,897.97	3	\$965.99	\$104,326.81
n2-custom-12-65536	\$21,072.33	19	\$1,109.07	\$758,604.02
n2-custom-12-73728	\$731.84	1	\$731.84	\$26,346.34
n2-custom-12-8192	\$151.07	1	\$151.07	\$5,438.44
n2-custom-12-98304	\$5,404.26	5	\$1,080.85	\$194,553.45
n2-custom-16-278528	\$2,336.82	1	\$2,336.82	\$84,125.37
n2-custom-16-64512	\$279.70	1	\$279.70	\$10,069.23
n2-custom-20-130816	\$1,797.68	1	\$1,797.68	\$64,716.38
n2-custom-20-17920	\$1,708.13	7	\$244.02	\$61,492.62
n2-custom-20-261632	\$8,302.06	5	\$1,660.41	\$298,874.09
n2-custom-20-32512	\$16,414.85	7	\$2,344.98	\$590,934.65
n2-custom-20-32768	\$3,016.86	3	\$1,005.62	\$108,606.87
n2-custom-20-65536	\$4,972.94	4	\$1,243.24	\$179,025.84
n2-custom-20-98048	\$2,372.47	2	\$1,186.23	\$85,408.88
n2-custom-2-14080	\$67.36	1	\$67.36	\$2,424.82
n2-custom-2-16128	\$111.21	2	\$55.61	\$4,003.64
n2-custom-2-16384	\$149.57	2	\$74.79	\$5,384.60
n2-custom-2-17408	\$249.57	2	\$124.79	\$8,984.60
n2-custom-2-1792	\$198.82	1	\$198.82	\$7,157.69
n2-custom-2-2048	\$723.05	21	\$34.43	\$26,029.68
n2-custom-2-20480	\$193.43	1	\$193.43	\$6,963.35
n2-custom-2-24576	\$958.63	4	\$239.66	\$34,510.54
n2-custom-2-2816	\$80.03	1	\$80.03	\$2,880.96
n2-custom-2-3840	\$979.71	34	\$28.82	\$35,269.65
n2-custom-2-4096	\$308.80	10	\$30.88	\$11,116.76
n2-custom-24-32768	\$1,767.46	1	\$1,767.46	\$63,628.54
n2-custom-2-4352	\$61.13	2	\$30.57	\$2,200.68
n2-custom-24-49408	\$7,141.11	1	\$7,141.11	\$257,080.01
n2-custom-2-4608	\$58.79	2	\$29.39	\$2,116.30
n2-custom-24-65536	\$4,500.57	4	\$1,125.14	\$162,020.45
n2-custom-2-6144	\$178.17	5	\$35.63	\$6,413.98
n2-custom-2-65536	\$350.55	1	\$350.55	\$12,619.75



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
n2-custom-2-7936	\$42.45	1	\$42.45	\$1,528.11
n2-custom-2-8192	\$453.43	12	\$37.79	\$16,323.65
n2-custom-2-9216	\$37.18	1	\$37.18	\$1,338.39
n2-custom-32-65536	\$2,182.58	1	\$2,182.58	\$78,572.92
n2-custom-4-12032	\$458.52	5	\$91.70	\$16,506.77
n2-custom-4-12288	\$63.04	1	\$63.04	\$2,269.52
n2-custom-4-13056	\$410.86	1	\$410.86	\$14,790.83
n2-custom-4-131072	\$5,207.73	3	\$1,735.91	\$187,478.32
n2-custom-4-15872	\$182.63	2	\$91.31	\$6,574.66
n2-custom-4-16128	\$282.25	4	\$70.56	\$10,161.03
n2-custom-4-16384	\$1,130.57	15	\$75.37	\$40,700.59
n2-custom-4-2048	\$49.16	1	\$49.16	\$1,769.80
n2-custom-4-24064	\$77.01	1	\$77.01	\$2,772.42
n2-custom-4-24576	\$325.31	4	\$81.33	\$11,711.17
n2-custom-4-3072	\$151.06	3	\$50.35	\$5,438.16
n2-custom-4-32768	\$112.13	1	\$112.13	\$4,036.76
n2-custom-4-33536	\$301.47	1	\$301.47	\$10,853.00
n2-custom-4-36864	\$339.37	1	\$339.37	\$12,217.41
n2-custom-4-3840	\$832.29	13	\$64.02	\$29,962.30
n2-custom-4-4096	\$477.29	9	\$53.03	\$17,182.39
n2-custom-4-40960	\$268.45	1	\$268.45	\$9,664.29
n2-custom-4-4608	\$249.93	5	\$49.99	\$8,997.39
n2-custom-4-4864	\$215.48	4	\$53.87	\$7,757.21
n2-custom-4-5120	\$101.64	2	\$50.82	\$3,658.86
n2-custom-4-5888	\$690.53	9	\$76.73	\$24,859.24
n2-custom-4-6144	\$56.53	1	\$56.53	\$2,035.07
n2-custom-4-7936	\$2,844.80	39	\$72.94	\$102,412.80
n2-custom-4-8192	\$1,578.82	25	\$63.15	\$56,837.43
n2-custom-4-9728	\$276.54	1	\$276.54	\$9,955.51
n2-custom-4-98304	\$4,043.58	3	\$1,347.86	\$145,568.74
n2-custom-6-10240	\$255.43	1	\$255.43	\$9,195.36
n2-custom-6-12032	\$186.85	2	\$93.42	\$6,726.44
n2-custom-6-12288	\$83.09	1	\$83.09	\$2,991.27
n2-custom-6-16384	\$9,590.03	26	\$368.85	\$345,241.14
n2-custom-6-24576	\$997.50	3	\$332.50	\$35,909.94
n2-custom-6-3072	\$158.52	2	\$79.26	\$5,706.85
n2-custom-6-30720	\$4,834.76	1	\$4,834.76	\$174,051.32
n2-custom-6-32256	\$1,202.54	3	\$400.85	\$43,291.48
n2-custom-6-32512	\$567.66	1	\$567.66	\$20,435.58
n2-custom-6-32768	\$7,907.91	13	\$608.30	\$284,684.72
n2-custom-6-49152	\$443.52	1	\$443.52	\$15,966.66
n2-custom-6-5120	\$146.05	2	\$73.03	\$5,257.87
n2-custom-6-6144	\$767.17	3	\$255.72	\$27,618.29
n2-custom-6-7680	\$412.76	1	\$412.76	\$14,859.23
n2-custom-6-8192	\$294.64	1	\$294.64	\$10,607.13
n2-custom-6-98304	\$3,816.99	4	\$954.25	\$137,411.73



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
n2-custom-8-16384	\$129.35	1	\$129.35	\$4,656.52
n2-custom-8-17920	\$156.41	1	\$156.41	\$5,630.61
n2-custom-8-196608	\$8,625.54	1	\$8,625.54	\$310,519.47
n2-custom-8-24576	\$359.01	3	\$119.67	\$12,924.50
n2-custom-8-32256	\$1,160.08	3	\$386.69	\$41,762.75
n2-custom-8-32768	\$383.11	2	\$191.56	\$13,792.07
n2-custom-8-4096	\$89.04	1	\$89.04	\$3,205.53
n2-custom-8-65536	\$238.02	1	\$238.02	\$8,568.87
n2-custom-8-73728	\$9,052.43	2	\$4,526.21	\$325,887.46
n2-custom-8-7936	\$628.74	6	\$104.79	\$22,634.55
n2-custom-8-8192	\$100.61	1	\$100.61	\$3,621.99
n2-custom-8-81920	\$1,246.54	1	\$1,246.54	\$44,875.26
n2-custom-8-98304	\$1,992.47	1	\$1,992.47	\$71,728.77
n2-highmem-32	\$10,213.90	4	\$2,553.48	\$367,700.56
n2-highmem-64	\$4,745.83	1	\$4,745.83	\$170,849.96
<b>Washington State Cloud</b>	<b>\$1,833,534.71</b>	<b>4284</b>	<b>\$428.00</b>	<b>\$66,007,249.69</b>
2 X huge 32 x 768	\$35,334.00	4	\$8,833.50	\$1,272,024.00
2X-Huge	\$10,277.90	1	\$10,277.90	\$370,004.40
3X-Huge 48 x 768	\$23,516.10	2	\$11,758.05	\$846,579.60
4XL 32 x 64	\$2,063.70	1	\$2,063.70	\$74,293.20
Huge 24 x 768	\$684,268.90	464	\$1,474.72	\$24,633,680.40
Large 4 x 12	\$27,016.80	77	\$350.87	\$972,604.80
Large 4 x 16	\$109,806.20	294	\$373.49	\$3,953,023.20
Large 4 x 20	\$6,489.70	16	\$405.61	\$233,629.14
Large 4 x 24	\$20,631.10	45	\$458.47	\$742,719.60
Large 4 x 28	\$880.40	2	\$440.20	\$31,694.40
Large 4 x 32	\$64,878.59	116	\$559.30	\$2,335,629.18
Large 4 x 4	\$58,800.80	230	\$255.66	\$2,116,828.80
Large 4 x 8	\$180,933.14	630	\$287.20	\$6,513,592.93
Large 6 x 10	\$358.00	1	\$358.00	\$12,888.00
Large 6 x 12	\$1,173.00	3	\$391.00	\$42,228.00
Large 6 x 8	\$3,290.30	9	\$365.59	\$118,450.77
Medium 2 x 4	\$80,813.75	543	\$148.83	\$2,909,294.85
Medium 2 x 12	\$14,046.10	60	\$234.10	\$505,659.60
Medium 2 x 16	\$40,857.38	162	\$252.21	\$1,470,865.82
Medium 2 x 2	\$5,463.10	45	\$121.40	\$196,671.60
Medium 2 x 8	\$132,357.00	635	\$208.44	\$4,764,852.00
Small 1 x 12	\$978.80	4	\$244.70	\$35,236.80
Small 1 x 2	\$13,907.20	202	\$68.85	\$500,659.20
Small 1 x 4	\$37,044.57	309	\$119.89	\$1,333,604.49
Small 1 x 6	\$1,209.10	11	\$109.92	\$43,527.60
Small 1 x 8	\$5,797.30	28	\$207.05	\$208,702.80
X-Large 8 x 16	\$79,255.10	134	\$591.46	\$2,853,183.60
X-Large 8 x 24	\$39,905.39	55	\$725.55	\$1,436,594.20



Row Labels	Total Monthly Cost	Number of Devices	monthly / total size	36 months
X-Large 8 x 32	\$97,947.70	131	\$747.69	\$3,526,117.20
X-Large 8 x 48	\$23,061.80	23	\$1,002.69	\$830,224.72
X-Large 8 x 8	\$31,171.80	47	\$663.23	\$1,122,184.80

### StratoZone One Year Contracting per Device Size

Vendor with sizing	Provider Total Monthly Cost	StratoZone servers	Average cost p size
AWS (1-Year Term)	\$ 1,106,477.25	4279	\$ 258.58
a1.2xlarge	\$ 4,835.97	35	\$ 138.17
a1.4xlarge	\$ 104,570.22	161	\$ 649.50
a1.xlarge	\$ 11,672.77	211	\$ 55.32
c5.4xlarge	\$ 56,190.22	56	\$ 1,003.40
f1.2xlarge	\$ 13,017.97	8	\$ 1,627.25
f1.4xlarge	\$ 9,692.23	4	\$ 2,423.06
m5a.4xlarge	\$ 52,492.84	44	\$ 1,193.02
m5a.8xlarge	\$ 57,741.81	31	\$ 1,862.64
r5a.16xlarge	\$ 37,676.49	9	\$ 4,186.28
r5a.2xlarge	\$ 50,540.27	82	\$ 616.34
r5a.4xlarge	\$ 55,898.33	43	\$ 1,299.96
r5a.8xlarge	\$ 49,274.99	22	\$ 2,239.77
r5a.large	\$ 23,164.62	184	\$ 125.89
r5a.xlarge	\$ 34,455.28	118	\$ 291.99
t2.2xlarge	\$ 64,411.12	175	\$ 368.06
t2.micro	\$ 61.43	6	\$ 10.24
t2.nano	\$ 6.51	1	\$ 6.51
t2.small	\$ 1,094.63	27	\$ 40.54
t2.xlarge	\$ 79,031.40	494	\$ 159.98
t3.2xlarge	\$ 3,807.54	15	\$ 253.84
t3.large	\$ 1,163.68	6	\$ 193.95
t3.medium	\$ 491.10	7	\$ 70.16
t3.micro	\$ 21.25	2	\$ 10.63
t3.small	\$ 135.77	14	\$ 9.70
t3.xlarge	\$ 6,329.07	31	\$ 204.16
t3a.2xlarge	\$ 65,114.54	216	\$ 301.46
t3a.large	\$ 61,797.27	666	\$ 92.79
t3a.medium	\$ 41,817.42	845	\$ 49.49
t3a.micro	\$ 89.21	15	\$ 5.95
t3a.nano	\$ 31.18	2	\$ 15.59
t3a.small	\$ 2,626.65	179	\$ 14.67
t3a.xlarge	\$ 83,678.57	536	\$ 156.12
x1.16xlarge	\$ 13,546.73	2	\$ 6,773.37
x1e.2xlarge	\$ 5,412.10	1	\$ 5,412.10
x1e.4xlarge	\$ 2,414.52	1	\$ 2,414.52
x1e.8xlarge	\$ 100,312.20	18	\$ 5,572.90



Vendor with sizing	Provider Total Monthly Cost	StratoZone servers	Average cost p size
x1e.xlarge	\$ 4,197.10	5	\$ 839.42
z1d.3xlarge	\$ 7,662.28	7	\$ 1,094.61
<b>Azure (1-Year Reserved)</b>	<b>\$ 1,010,215.34</b>	<b>4279</b>	<b>\$ 236.09</b>
D16s v3	\$ 37,505.62	44	\$ 852.40
D2s v3	\$ 69,863.75	672	\$ 103.96
D4s v3	\$ 59,346.59	371	\$ 159.96
D8s v3	\$ 66,066.63	186	\$ 355.20
DS1 v2	\$ 7,257.13	205	\$ 35.40
E16-8s v3	\$ 497.71	1	\$ 497.71
E16s v3	\$ 34,935.86	41	\$ 852.09
E20s v3	\$ 25,314.39	26	\$ 973.63
E2s v3	\$ 19,585.26	226	\$ 86.66
E32s v3	\$ 11,973.11	9	\$ 1,330.35
E4-2s v3	\$ 3,447.56	24	\$ 143.65
E4s v3	\$ 34,198.87	155	\$ 220.64
E8-4s v3	\$ 6,214.73	16	\$ 388.42
E8s v3	\$ 34,029.43	66	\$ 515.60
F16s v2	\$ 171,505.68	217	\$ 790.35
F2s v2	\$ 58,208.20	893	\$ 65.18
F32s v2	\$ 9,685.75	7	\$ 1,383.68
F4s v2	\$ 110,673.54	859	\$ 128.84
F8s v2	\$ 55,688.19	194	\$ 287.05
M16ms	\$ 33,407.02	16	\$ 2,087.94
M32ms	\$ 107,176.02	26	\$ 4,122.15
M64	\$ 12,150.28	2	\$ 6,075.14
M64ls	\$ 3,912.52	1	\$ 3,912.52
M8ms	\$ 37,571.49	22	\$ 1,707.79
<b>Google Cloud 1 Year Commit</b>	<b>\$ 1,357,061.10</b>	<b>4279</b>	<b>\$ 317.14</b>
e2-highcpu-16	\$ 7,735.98	13	\$ 595.08
e2-highcpu-2	\$ 1,631.30	23	\$ 70.93
e2-highcpu-4	\$ 42,234.22	203	\$ 208.05
e2-highcpu-8	\$ 25,599.86	39	\$ 656.41
e2-highmem-16	\$ 49,963.71	39	\$ 1,281.12
e2-highmem-2	\$ 26,048.59	215	\$ 121.16
e2-highmem-4	\$ 49,075.24	165	\$ 297.43
e2-highmem-8	\$ 50,382.02	76	\$ 662.92
e2-standard-16	\$ 57,874.58	43	\$ 1,345.92
e2-standard-2	\$ 140,279.54	1110	\$ 126.38
e2-standard-4	\$ 210,736.38	887	\$ 237.58
e2-standard-8	\$ 126,789.39	263	\$ 482.09
m1-megamem-96	\$ 10,501.49	1	\$ 10,501.49
m1-ultramem-40	\$ 117,533.04	17	\$ 6,913.71
n1-custom-1-1024	\$ 531.92	19	\$ 28.00
n1-custom-1-10240	\$ 163.04	1	\$ 163.04
n1-custom-1-12288	\$ 118.44	1	\$ 118.44



Vendor with sizing	Provider Total Monthly Cost	StratoZone servers	Average cost p size
n1-custom-1-13824	\$ 216.58	1	\$ 216.58
n1-custom-1-2048	\$ 5,670.70	178	\$ 31.86
n1-custom-1-256	\$ 80.45	2	\$ 40.23
n1-custom-1-3072	\$ 325.42	5	\$ 65.08
n1-custom-1-32768	\$ 184.60	1	\$ 184.60
n1-custom-1-4096	\$ 27,621.65	304	\$ 90.86
n1-custom-1-512	\$ 46.79	1	\$ 46.79
n1-custom-1-5120	\$ 64.71	1	\$ 64.71
n1-custom-1-6144	\$ 1,178.91	10	\$ 117.89
n1-custom-1-768	\$ 16.40	1	\$ 16.40
n1-custom-1-8192	\$ 5,781.39	27	\$ 214.13
n1-custom-1-8448	\$ 319.44	2	\$ 159.72
n1-custom-1-98304	\$ 1,561.03	2	\$ 780.52
n2-custom-10-16128	\$ 902.13	5	\$ 180.43
n2-custom-10-24064	\$ 2,540.24	13	\$ 195.40
n2-custom-10-262144	\$ 9,910.60	6	\$ 1,651.77
n2-custom-10-32768	\$ 41,476.65	84	\$ 493.77
n2-custom-10-73472	\$ 682.99	1	\$ 682.99
n2-custom-10-8192	\$ 570.97	1	\$ 570.97
n2-custom-12-12032	\$ 234.93	1	\$ 234.93
n2-custom-12-12288	\$ 3,631.77	4	\$ 907.94
n2-custom-12-16128	\$ 1,729.58	3	\$ 576.53
n2-custom-12-16384	\$ 1,813.12	3	\$ 604.37
n2-custom-12-163840	\$ 2,342.66	2	\$ 1,171.33
n2-custom-12-196608	\$ 8,222.89	2	\$ 4,111.44
n2-custom-12-24576	\$ 225.38	1	\$ 225.38
n2-custom-12-262144	\$ 19,289.20	7	\$ 2,755.60
n2-custom-12-27136	\$ 464.97	2	\$ 232.49
n2-custom-12-32768	\$ 65,056.66	64	\$ 1,016.51
n2-custom-12-49152	\$ 3,127.60	3	\$ 1,042.53
n2-custom-12-524288	\$ 11,673.69	3	\$ 3,891.23
n2-custom-12-65536	\$ 22,704.19	19	\$ 1,194.96
n2-custom-12-73728	\$ 821.74	1	\$ 821.74
n2-custom-12-8192	\$ 205.36	1	\$ 205.36
n2-custom-12-98304	\$ 5,878.33	5	\$ 1,175.67
n2-custom-16-278528	\$ 2,461.13	1	\$ 2,461.13
n2-custom-16-524032	\$ 15,529.50	5	\$ 3,105.90
n2-custom-16-64512	\$ 381.20	1	\$ 381.20
n2-custom-20-130816	\$ 1,968.61	1	\$ 1,968.61
n2-custom-20-17920	\$ 2,357.79	7	\$ 336.83
n2-custom-20-261632	\$ 9,095.80	5	\$ 1,819.16
n2-custom-20-32512	\$ 17,120.00	7	\$ 2,445.71
n2-custom-20-32768	\$ 3,319.48	3	\$ 1,106.49
n2-custom-20-65536	\$ 5,447.64	4	\$ 1,361.91
n2-custom-20-98048	\$ 2,645.14	2	\$ 1,322.57



Vendor with sizing	Provider Total Monthly Cost	StratoZone servers	Average cost p size
n2-custom-2-131072	\$ 678.01	1	\$ 678.01
n2-custom-2-14080	\$ 82.89	1	\$ 82.89
n2-custom-2-16128	\$ 142.29	2	\$ 71.14
n2-custom-2-16384	\$ 180.65	2	\$ 90.32
n2-custom-2-17408	\$ 280.65	2	\$ 140.32
n2-custom-2-1792	\$ 208.11	1	\$ 208.11
n2-custom-2-2048	\$ 920.86	21	\$ 43.85
n2-custom-2-20480	\$ 208.97	1	\$ 208.97
n2-custom-2-24576	\$ 1,020.78	4	\$ 255.20
n2-custom-2-2816	\$ 89.86	1	\$ 89.86
n2-custom-2-3840	\$ 1,333.09	34	\$ 39.21
n2-custom-2-4096	\$ 414.12	10	\$ 41.41
n2-custom-24-32768	\$ 1,880.55	1	\$ 1,880.55
n2-custom-2-4352	\$ 82.47	2	\$ 41.24
n2-custom-24-49408	\$ 7,267.64	1	\$ 7,267.64
n2-custom-2-4608	\$ 80.41	2	\$ 40.20
n2-custom-24-65536	\$ 5,041.73	4	\$ 1,260.43
n2-custom-2-6144	\$ 236.39	5	\$ 47.28
n2-custom-2-65536	\$ 366.09	1	\$ 366.09
n2-custom-2-7936	\$ 55.07	1	\$ 55.07
n2-custom-2-8192	\$ 606.52	12	\$ 50.54
n2-custom-2-9216	\$ 50.49	1	\$ 50.49
n2-custom-32-65536	\$ 2,353.30	1	\$ 2,353.30
n2-custom-4-12032	\$ 574.28	5	\$ 114.86
n2-custom-4-12288	\$ 86.33	1	\$ 86.33
n2-custom-4-13056	\$ 434.56	1	\$ 434.56
n2-custom-4-131072	\$ 5,303.36	3	\$ 1,767.79
n2-custom-4-15872	\$ 233.10	2	\$ 116.55
n2-custom-4-16128	\$ 383.75	4	\$ 95.94
n2-custom-4-16384	\$ 1,513.30	15	\$ 100.89
n2-custom-4-2048	\$ 66.89	1	\$ 66.89
n2-custom-4-24064	\$ 106.70	1	\$ 106.70
n2-custom-4-24576	\$ 445.17	4	\$ 111.29
n2-custom-4-3072	\$ 205.91	3	\$ 68.64
n2-custom-4-32768	\$ 143.21	1	\$ 143.21
n2-custom-4-33536	\$ 332.55	1	\$ 332.55
n2-custom-4-36864	\$ 370.45	1	\$ 370.45
n2-custom-4-3840	\$ 1,075.40	13	\$ 82.72
n2-custom-4-4096	\$ 646.85	9	\$ 71.87
n2-custom-4-40960	\$ 299.53	1	\$ 299.53
n2-custom-4-4608	\$ 345.52	5	\$ 69.10
n2-custom-4-4864	\$ 292.51	4	\$ 73.13
n2-custom-4-5120	\$ 140.43	2	\$ 70.21
n2-custom-4-5888	\$ 868.85	9	\$ 96.54
n2-custom-4-6144	\$ 76.48	1	\$ 76.48





Vendor with sizing	Provider Total Monthly Cost	StratoZone servers	Average cost p size
n2-custom-4-7936	\$ 3,660.91	39	\$ 93.87
n2-custom-4-8192	\$ 2,105.44	25	\$ 84.22
n2-custom-4-9728	\$ 298.44	1	\$ 298.44
n2-custom-4-98304	\$ 4,136.81	3	\$ 1,378.94
n2-custom-6-10240	\$ 285.91	1	\$ 285.91
n2-custom-6-12032	\$ 249.76	2	\$ 124.88
n2-custom-6-12288	\$ 114.69	1	\$ 114.69
n2-custom-6-16384	\$ 10,468.17	26	\$ 402.62
n2-custom-6-24576	\$ 1,112.32	3	\$ 370.77
n2-custom-6-3072	\$ 211.71	2	\$ 105.85
n2-custom-6-30720	\$ 4,876.37	1	\$ 4,876.37
n2-custom-6-32256	\$ 1,329.87	3	\$ 443.29
n2-custom-6-32512	\$ 610.24	1	\$ 610.24
n2-custom-6-32768	\$ 8,306.06	13	\$ 638.93
n2-custom-6-49152	\$ 490.13	1	\$ 490.13
n2-custom-6-5120	\$ 201.46	2	\$ 100.73
n2-custom-6-589824	\$ 4,642.73	1	\$ 4,642.73
n2-custom-6-6144	\$ 851.95	3	\$ 283.98
n2-custom-6-7680	\$ 441.85	1	\$ 441.85
n2-custom-6-8192	\$ 324.01	1	\$ 324.01
n2-custom-6-98304	\$ 4,017.86	4	\$ 1,004.46
n2-custom-8-16384	\$ 171.48	1	\$ 171.48
n2-custom-8-17920	\$ 199.37	1	\$ 199.37
n2-custom-8-196608	\$ 8,687.70	1	\$ 8,687.70
n2-custom-8-24576	\$ 498.75	3	\$ 166.25
n2-custom-8-32256	\$ 1,312.33	3	\$ 437.44
n2-custom-8-32768	\$ 485.17	2	\$ 242.59
n2-custom-8-4096	\$ 124.50	1	\$ 124.50
n2-custom-8-589824	\$ 4,776.10	1	\$ 4,776.10
n2-custom-8-65536	\$ 300.18	1	\$ 300.18
n2-custom-8-73728	\$ 9,175.54	2	\$ 4,587.77
n2-custom-8-7936	\$ 853.98	6	\$ 142.33
n2-custom-8-8192	\$ 138.29	1	\$ 138.29
n2-custom-8-81920	\$ 1,308.69	1	\$ 1,308.69
n2-custom-8-98304	\$ 2,054.62	1	\$ 2,054.62
n2-highmem-32	\$ 11,316.39	4	\$ 2,829.10
n2-highmem-64	\$ 5,296.47	1	\$ 5,296.47
<b>Washington State Cloud</b>	<b>\$ 1,831,755.51</b>	<b>4279</b>	<b>\$ 428.08</b>
2 X huge 32 x 768	\$ 35,334.00	4	\$ 8,833.50
2X-Huge	\$ 10,277.90	1	\$ 10,277.90
3X-Huge 48 x 768	\$ 23,516.10	2	\$ 11,758.05
4XL 32 x 64	\$ 2,063.70	1	\$ 2,063.70
Huge 24 x 768	\$ 683,404.00	463	\$ 1,476.03
Large 4 x 12	\$ 27,016.80	77	\$ 350.87
Large 4 x 16	\$ 109,806.20	294	\$ 373.49



Vendor with sizing	Provider Total Monthly Cost	StratoZone servers	Average cost p size
Large 4 x 20	\$ 6,489.70	16	\$ 405.61
Large 4 x 24	\$ 20,631.10	45	\$ 458.47
Large 4 x 28	\$ 880.40	2	\$ 440.20
Large 4 x 32	\$ 64,878.59	116	\$ 559.30
Large 4 x 4	\$ 58,554.80	229	\$ 255.70
Large 4 x 8	\$ 180,921.14	630	\$ 287.18
Large 6 x 10	\$ 358.00	1	\$ 358.00
Large 6 x 12	\$ 1,173.00	3	\$ 391.00
Large 6 x 8	\$ 3,290.30	9	\$ 365.59
Medium 2 x 4	\$ 80,813.75	543	\$ 148.83
Medium 2 x 12	\$ 14,046.10	60	\$ 234.10
Medium 2 x 16	\$ 40,857.38	162	\$ 252.21
Medium 2 x 2	\$ 5,463.10	45	\$ 121.40
Medium 2 x 8	\$ 131,965.80	633	\$ 208.48
Small 1 x 12	\$ 978.80	4	\$ 244.70
Small 1 x 2	\$ 13,829.70	201	\$ 68.80
Small 1 x 4	\$ 36,980.57	309	\$ 119.68
Small 1 x 6	\$ 1,209.10	11	\$ 109.92
Small 1 x 8	\$ 5,797.30	28	\$ 207.05
X-Large 8 x 16	\$ 79,255.00	134	\$ 591.46
X-Large 8 x 24	\$ 39,905.39	55	\$ 725.55
X-Large 8 x 32	\$ 97,824.20	131	\$ 746.75
X-Large 8 x 48	\$ 23,061.80	23	\$ 1,002.69
X-Large 8 x 8	\$ 31,171.80	47	\$ 663.23



## Appendix G: General SLA Agreement Terms

### Terms and Services Levels: Microsoft Azure

Source: <https://www.microsoftvolumelicensing.com/Downloader.aspx?DocumentId=17887>

#### General Terms

#### Definitions

**“Applicable Monthly Period”** means for a calendar month in which a Service Credit is owed, the number of days that you are a subscriber for a Service.

**“Applicable Monthly Service Fees”** means the total fees paid by you for a Service that are applied to the month in which a Service Credit is owed.

**“Downtime”** is defined for each Service in the Services Specific Terms below. Except for Microsoft Azure Services, Downtime does not include Scheduled Downtime. Downtime does not include unavailability of a Service due to limitations described below and in the Services Specific Terms.

**“Error Code”** means an indication that an operation has failed, such as an HTTP status code in the 5xx range.

**“External Connectivity”** is bi-directional network traffic over supported protocols such as HTTP and HTTPS that can be sent and received from a public IP address.

**“Incident”** means (i) any single event, or (ii) any set of events, that result in Downtime.

**“Management Portal”** means the web interface, provided by Microsoft, through which customers may manage the Service.

**“Scheduled Downtime”** means periods of Downtime related to network, hardware, or Service maintenance or upgrades. We will publish notice or notify you at least five (5) days prior to the commencement of such Downtime.

**“Service Credit”** is the percentage of the Applicable Monthly Service Fees credited to you following Microsoft’s claim approval.

**“Service Level”** means the performance metric(s) set forth in this SLA that Microsoft agrees to meet in the delivery of the Services.

**“Service Resource”** means an individual resource available for use within a Service.

**“Success Code”** means an indication that an operation has succeeded, such as an HTTP status code in the 2xx range.

**“Support Window”** refers to the period of time during which a Service feature or compatibility with a separate product or service is supported.

**“User Minutes”** means the total number of minutes in a month, less all Scheduled Downtime, multiplied by the total number of users.

#### Terms

#### Claims

In order for Microsoft to consider a claim, you must submit the claim to customer support at Microsoft Corporation including all information necessary for Microsoft to validate the claim, including but not limited to: (i) a detailed description of the Incident; (ii) information regarding the time and duration of the Downtime; (iii) the number and location(s) of affected users (if applicable); and (iv) descriptions of your attempts to resolve the Incident at the time of occurrence.



For a claim related to Microsoft Azure, we must receive the claim within two months of the end of the billing month in which the Incident that is the subject of the claim occurred. For claims related to all other Services, we must receive the claim by the end of the calendar month following the month in which the Incident occurred. For example, if the Incident occurred on February 15th, we must receive the claim and all required information by March 31st.

We will evaluate all information reasonably available to us and make a good faith determination of whether a Service Credit is owed. We will use commercially reasonable efforts to process claims during the subsequent month and within forty-five (45) days of receipt. You must be in compliance with the Agreement in order to be eligible for a Service Credit. If we determine that a Service Credit is owed to you, we will apply the Service Credit to your Applicable Monthly Service Fees.

If you purchased more than one Service (not as a suite), then you may submit claims pursuant to the process described above as if an individual SLA covered each Service. For example, if you purchased both Exchange Online and SharePoint Online (not as part of a suite), and during the term of the subscription, an Incident caused Downtime for both Services. You could be eligible for two separate Service Credits (one for each Service), by submitting two claims under this SLA. In the event that more than one Service Level for a particular Service is not met because of the same Incident, you must choose only one Service Level under which to make a claim based on the Incident. Unless as otherwise provided in a specific SLA, only one Service Credit is permitted per Service for an Applicable Monthly Period.

## **Service Credits**

Service Credits are your sole and exclusive remedy for any performance or availability issues for any Service under the Agreement and this SLA. You may not unilaterally offset your Applicable Monthly Service Fees for any performance or availability issues.

Service Credits apply only to fees paid for the particular Service, Service Resource, or Service tier for which a Service Level has not been met. In cases where Service Levels apply to individual Service Resources or to separate Service tiers, Service Credits apply only to fees paid for the affected.

Service Resource or Service tier, as applicable. The Service Credits awarded in any billing month for a particular Service or Service Resource will not, under any circumstance, exceed your monthly service fees for that Service or Service Resource, as applicable, in the billing month. If you purchased Services as part of a suite or other single offer, the Applicable Monthly Service Fees and Service Credit for each Service will be pro-rated.

If you purchased a Service from a reseller, you will receive a service credit directly from your reseller, and the reseller will receive a Service Credit directly from us. The Service Credit will be based on the estimated retail price for the applicable Service, as determined by us in our reasonable discretion.

## **Limitations**

This SLA and any applicable Service Levels do not apply to any performance or availability issues:



1. Due to factors outside our reasonable control (for example, natural disaster, war, acts of terrorism, riots, government action, or a network or device failure external to our data centers, including at your site or between your site and our data center);
2. That result from the use of services, hardware, or software not provided by us, including, but not limited to, issues resulting from inadequate bandwidth or related to third-party software or services;
3. That results from failures in a single Microsoft Datacenter location, when your network connectivity is explicitly dependent on that location in a non-geo-resilient manner;
4. Caused by your use of a Service after we advised you to modify your use of the Service, if you did not modify your use as advised;
5. During or with respect to preview, pre-release, beta or trial versions of a Service, feature, or software (as determined by us) or to purchases made using Microsoft subscription credits;
6. That result from your unauthorized action or lack of action when required, or from your employees, agents, contractors, or vendors, or anyone gaining access to our network by means of your passwords or equipment, or otherwise resulting from your failure to follow appropriate security practices;
7. That result from your failure to adhere to any required configurations, use supported platforms, follow any policies for acceptable use, or your use of the Service in a manner inconsistent with the features and functionality of the Service (for example, attempts to perform operations that are not supported) or inconsistent with our published guidance;
8. That result from faulty input, instructions, or arguments (for example, requests to access files that do not exist);
9. That result from your attempts to perform operations that exceed prescribed quotas or that resulted from our throttling of suspected abusive behavior;
10. Due to your use of Service features that are outside of associated Support Windows; or
11. For licenses reserved, but not paid for, at the time of the Incident.

## Cloud Services and Virtual Machines

For Cloud Services, we guarantee that when you deploy two or more role instances in different fault and upgrade domains, at least one role instance will have Role Instance Connectivity at least 99.95% of the time.

For all Virtual Machines that have two or more instances deployed in the same Availability Set, we guarantee you will have Virtual Machine Connectivity to at least one instance at least 99.95% of the time.

For any Single Instance Virtual Machine using premium storage for all disks, we guarantee you will have Virtual Machine Connectivity of at least 99.9%.

## Terms and Service Levels: Amazon Web Services

Source: <https://aws.amazon.com/legal/service-level-agreements>

### Service Commitment

AWS will use commercially reasonable efforts to make the Included Products and Services each available with a Monthly Uptime Percentage (defined below) of at least 99.99%, in each case



during any monthly billing cycle (the “Service Commitment”). In the event any of the Included Products and Services do not meet the Service Commitment, you will be eligible to receive a Service Credit as described below.

## Definitions

“Monthly Uptime Percentage” is calculated by subtracting from 100% the percentage of minutes during the month in which any of the Included Products and Services, as applicable, was in the state of “Region Unavailable.” Monthly Uptime Percentage measurements exclude downtime resulting directly or indirectly from any Amazon Compute Services SLA Exclusion (defined below). “Availability Zone” and “AZ” mean an isolated location within a region identified by a letter identifier following the region code (e.g., us-west-1a).

“Region Unavailable” and “Region Unavailability” mean:

For Regions with only one AZ, when that AZ and one AZ in any other Region, in which you are running an instance or task (one or more containers), as applicable, are concurrently “Unavailable” to you.

For all other Regions, when more than one AZ within the same Region, in which you are running an instance or task (one or more containers), as applicable, are concurrently “Unavailable” to you.

“Unavailable” and “Unavailability” mean:

For Amazon EC2, Amazon ECS, or Amazon Fargate, when all your running instances or running tasks, as applicable, have no external connectivity.

For Amazon EBS, when all your attached volumes perform zero read write IO, with pending IO in the queue.

A “Service Credit” is a dollar credit, calculated as set forth below, that we may credit back to an eligible account.

## Terms and Services Levels: Google Cloud

Source: <https://cloud.google.com/terms/sla>

During the Term of the agreement under which Google has agreed to provide Google Cloud Platform to Customer (as applicable, the "Agreement"), the Covered Service will provide a Monthly Uptime Percentage to Customer of at least 99.99% (the "Service Level Objective" or "SLO"). If Google does not meet the SLO, and if Customer meets its obligations under this SLA, Customer will be eligible to receive the Financial Credits described below. This SLA states Customer’s sole and exclusive remedy for any failure by Google to meet the SLO. Capitalized terms used in this SLA, but not defined in this SLA, have the meaning set forth in the Agreement. If the Agreement authorizes the resale or supply of Google Cloud Platform under a Google Cloud partner or reseller program, then all references to Customer in this SLA mean Partner or Reseller (as applicable), and any Financial Credit(s) will only apply for impacted Partner or Reseller order(s) under the Agreement.



## Appendix H: Statement of Revenue

### Comprehensive Annual Financial Report (CAFR)

#### CAFR19 November 2019 – Office of Financial Management

##### Washington State's Economic and Revenue Outlook

General Fund: State revenues grew 10 percent in the fiscal year 2018 and 3.3 percent in the fiscal year 2019. General Fund-State revenues are forecasted to increase 9.2 percent in the fiscal year 2020, 4.3 percent in the fiscal year 2021, and 3.2 percent in the fiscal year 2022. The expanding economy, strong gains in hiring, and sound housing markets have had a positive effect on revenue growth and should keep revenues growing at a sound pace.

#### Statement of Revenues, Expenditures, and Changes in Fund Balances

##### GOVERNMENTAL FUNDS

For the Fiscal Year Ended June 30, 2019

(expressed in thousands)

	General	Higher Education Special Revenue	Higher Education Endowment	Nonmajor Governmental Funds	Total
<b>REVENUES</b>					
Retail sales and use taxes	\$ 11,952,070	\$ —	\$ —	\$ 154,146	\$ 12,106,216
Business and occupation taxes	4,447,626	—	—	4,359	4,451,985
Property taxes	2,339,469	1,019,116	—	—	3,358,585
Excise taxes	1,146,348	48,599	—	440,595	1,635,542
Motor vehicle and fuel taxes	—	—	—	1,671,195	1,671,195
Other taxes	1,915,048	373,381	—	324,155	2,612,584
Licenses, permits, and fees	130,170	1,096	—	1,894,045	2,025,311
Other contracts and grants	295,579	1,122,786	—	152,946	1,571,311
Timber sales	1,715	—	12,129	142,971	156,815
Federal grants-in-aid	13,295,781	1,463,827	—	1,203,683	15,963,291
Charges for services	50,455	2,778,576	—	727,419	3,556,450
Investment income (loss)	114,079	123,752	281,069	126,965	645,865
Miscellaneous revenue	300,242	159,117	2,047	550,304	1,011,710
Contributions and donations	—	—	151,943	—	151,943
Unclaimed property	74,631	—	—	—	74,631
<b>Total Revenues</b>	<b>36,063,213</b>	<b>7,090,250</b>	<b>447,188</b>	<b>7,392,783</b>	<b>50,993,434</b>

Exhibit H.1: CAFR19 Basic Financial Statement November 2019<sup>49</sup>

Unisys confirmed the total revenues from the CAFR19 and put this into our benchmark tool.

<sup>49</sup> Office of Financial Management (OFM), 2019 Comprehensive Annual Financial Report, November 22, 2019; p.44.

<https://www.ofm.wa.gov/sites/default/files/public/accounting/report/CAFR/2019/CAFR19.pdf>



Revenue Forecasts 2019-2021

Economic & Revenue Forecast Council

State of Washington

Economic & Revenue Review: February 19, 2020

2019-21 Biennium alternative General Fund-State forecasts



\$Millions (cash basis)	2019-21 Biennium	Difference From the baseline <sup>#</sup>
<b>February 2020 Baseline (55%)</b>	<b>\$50,611</b>	
<b>February 2020 Alternative Forecasts</b>		
<b>Optimistic (15%)</b>	<b>\$52,043</b>	<b>\$1,432</b>
<b>Pessimistic (30%)</b>	<b>\$48,832</b>	<b>(\$1,780)</b>
<b>Probability Weighted Average</b>	<b>\$50,292</b>	<b>(\$319)</b>
<b>GCEA*</b>	<b>\$50,556</b>	<b>(\$55)</b>

\*Based on the Governor's Council of Economic Advisors' economic assumptions  
#May not add to total due to rounding

Economic and Revenue Forecast Council

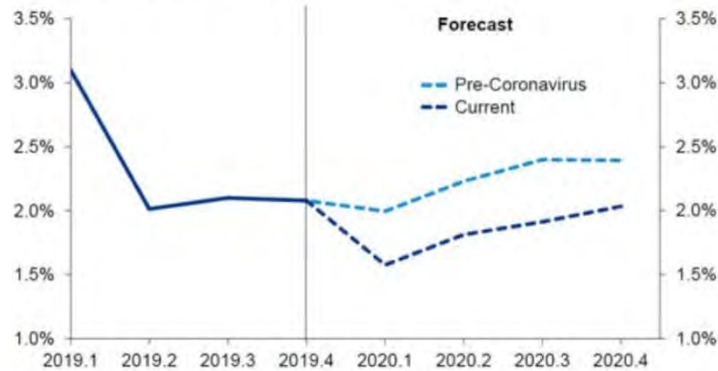


KPMG Economics: Coronavirus reduces 2020 GDP growth

Disruptions of supply chains, financial market volatility, and slowing Chinese demand for U.S. goods contribute to a weaker outlook for 2020

U.S. Real GDP Growth

Seasonally-adjusted Annualized Rate



Source: KPMG Economics, Macroeconomic Advisors by IHS Markit

Economic and Revenue Forecast Council

Exhibit H.2: Economic and Revenue Forecast Council February 2020<sup>50</sup>

<sup>50</sup> Office of the Economic and Revenue Forecast; Revenue Review Meeting, February 18, 2020; p14 & 21, [Councilrfc.wa.gov/sites/default/files/public/documents/forecasts/rev20200219.pdf](http://Councilrfc.wa.gov/sites/default/files/public/documents/forecasts/rev20200219.pdf)





## Appendix I: Business Case Options

### Business Case Analysis

#### Why Building the Business Case is Important?

In general, the most critical issue in developing a business case and building a cloud transition strategy is stakeholder involvement. Building a very detailed model with many assumptions is hard analytical work but not sufficient – not compelling enough. A business case and its assumptions need to be developed in collaboration with the real stakeholders affected by the suggested change. If done correctly, the business case is the most critical tool for the management team responsible for executing the cloud transition strategy. Ownership and accountability are more important than precision and details.

Any investment opportunity always needs to start with answering the question: "Why? Why should we care about this investment? How does it fit with our Agency mission and program priorities?" There's no shortage of investment opportunities in most government environments and suggested reasons to prioritize virtually everything.

All U.S. federal IT investment opportunities compete for resources, as shown by Exhibit 300s (<https://ocio.commerce.gov/page/commerce-and-omb-exhibit-30053-guidance>). The related budget justification and reporting requirements for significant IT and non-IT investments, and the State of Washington is required by law (RCW 43.105.235) to evaluate state Agency IT budget requests and submit recommendations to the Office of Financial Management (OFM) regarding funding.

Beyond pure cost justification, however, resources include time, managerial attention, direct expenses, indirect costs, and the opportunity cost of undertaking any given initiative. The opportunity cost means, "What we are not able to do if we pursue this investment?" The strategy is just as much what to do as what not to do. In addition to the strategically aligned reasons (with costs and benefits), there is a need to assess the risks, particularly in the typical risk-averse government environment. All strategic arguments come with risks associated with undertaking each investment, which need to be compared with the risks of not undertaking it.

For example, not executing a cloud transition strategy could lead to an Agency stuck with fixed-cost (and high-cost) IT that will fail to provide Agency programs with the underlying platform to pursue digital transformation strategic initiatives. An Agency that fails to undertake this will continue to operate IT at a high cost and likely draw unwanted attention. When building a business case, the author must answer the question of "Why?" The case provides a clear understanding of the assumed risks and the impact of the potential investment.

#### What Is a Business Case for a Government Cloud Transition?

A business case is an articulated reason to invest. A business case can be, in its purest form, a simple motivation to purchase something, or it can be a comprehensive analysis of outcomes matched with investments over time. The strategic implication, coupled with the size of the investment, should dictate how in-depth and thorough the analysis should be.

A full cloud transition strategy merits a robust business-case analysis. It will impact Agency strategy, operations, and talent management over the years, if not decades. Doing this right will increase the probability of a successful transformation through the organization.



## Strategic Arguments

A business case for a cloud transition strategy provides additional agility for the Agency, including program outcomes it will lead to, such as:

- Faster constituent service times
- The ability to analyze a set of data to make decisions faster
- The ability to execute a new program service with a low fixed cost
- The ability to respond to unanticipated traffic from an unexpected event

Even for less profound reasons, the most important thing is to be clear about why the investment should be undertaken before any deeper financial models are developed.

## Financial Arguments

Financial evaluation is the core of any business case and what most people refer to as the business case. In its purest form, it follows this logic: "If we invest X, we expect Y in return." For most government organizations, cost-saving has been the primary expected return (Y) to date, though improved program effectiveness and Agency performance are increasingly becoming prime considerations. In most cases, a move from CapEx to OpEx is considered a value-adding transition, especially in rapidly changing operating environments where agility is the key.

## Risks

All investment decisions are about taking on and managing associated risks. A business case must include a thorough risk analysis. The key is to compare the current state with future state, with and without making the suggested investment. Within this analysis, Unisys described financial risks like improper cloud subscription reporting and managing cloud costs within a fixed budget. These risks, unless mitigated, need to be carried forward into the business case. The State of Washington would be at risk as their cloud business cases and projects will be at risk of failure because the future state will be because the current state is not well understood. The delays and financial impact may be minimal or large enough to cause issues, especially in a biennial budget cycle.

The purpose is to net out the risks associated with an investment. For each investment, there are accompanying new risks or changed weights on existing risks. Undertaking the investment will, however, also impact other risks that will be changed. For example, deciding to take on a few replacements of existing applications to SaaS solutions would introduce new risks with new vendors, new processes introduced in the Agency. However, it would also reduce the risks of inconsistent outcomes from business processes and IT availability risks from providing these from the existing data center. Failure to anticipate the future state by not undertaking the investment would also involve more strategic risks such as a weaker constituent experience or operating programs at a higher cost. The key is to look at the net impact of risks to the organization.

## Who Are the Key Stakeholders?

The OCIO and the Agency IT leadership team typically own the cloud transition strategy and the supporting business case. The CISO needs to be an integral part of this function.

The business case needs to be developed with the key stakeholders affected by the suggested change. The biggest reason for a failed business case development is not the financial aspects or the strategic reasoning behind it but lack of ownership from the key stakeholders.

Further:



- **The program leader or Agency LOB leader** impacted by the suggested change needs to be the owner of the expected investment outcome. This assignment is an absolute requirement. IT cannot drive the change without clear ownership and accountability from the program side.
- **The Office of Financial Management (OFM)** needs to sign off on and own the financial assumptions. The business case needs to be developed with the company's mission strategy as the underlying foundation. If possible, Unisys recommends that the IT executive in charge of building the business case work directly with a designated budget officer to leverage templates and assumptions.

## Building a Business Case for Agency Cloud Transition

The starting point is always a business reason. The reason can be to solve a specific problem or seize an identified opportunity. It is critical that whatever the reason, it is clearly understood and articulated. For a cloud transition strategy, there could be a range of reasons, depending on Agency goals — from new business models and expanding a constituency base for broader program reach to driving IT efficiencies for infrastructure.

### Hard Savings Versus Soft Savings

In a cloud transition business case, it is important to take into consideration the disruptive nature cloud has on IT, especially in the public sector, where multiple legislative policies can easily collide with the cultural norms of IT. Even once, simple activities like measuring productivity and performance are different. The business case needs to identify and support these new norms as they can impact everything from employee evaluations to how to buy a service. Understanding strategically how all these attributes align can be a challenge.

For example, the strategic reason for moving to a cloud service may be to create a more agile and flexible IT service that enables faster innovation. This approach is quantified based on rationalizing a service and increasing utilization of existing IT infrastructure through the cloud, saving more than what the investment entails. It is often referred to as hard savings versus soft savings or intangibles.



Exhibit I.1: Trackvia - Survey of Soft Savings<sup>51</sup>

The intangible benefits are, in many cases, the more strategic reasons, but they are not always as easy to quantify. If an investment is a strategic priority and results in cost savings, it is often better to stop there. Credibility is easily lost if a business case includes too many vague assumptions. In many cases, for discrete cloud service investments, there might be specific metrics for that service. For example, for a cloud-native database service, metrics for high availability and transactions per second could be the investment driver. The business case should use whatever specific metrics will be affected directly by the investment as an argument for the business case.

By combining cloud services agility and automation options with the Service Broker and cloud enablement teams proposed in recommended projects, Agencies can also benefit from the organizational transformation through productivity gains. McKinsey research (2018) found that many commercial IT infrastructure support organizations see “25-30 percent productivity improvements in six to 18 months” because of transformation projects focusing on cloud adoption, technology, and developing a well-rounded and agile cloud operations team. Agencies can benefit from similar productivity shifts to balance maintaining the current IT infrastructure and implementing cloud services. The productivity gains will vary based on the Agency size, selected projects, and adoption of automation and updated processes.

The recommended projects in Section 13.5 align with the approaches highlighted in Exhibit I.2 for agile organizations.

<sup>51</sup> Var, Charles; Switching to the Cloud (Infographic); April 21, 2014; Blog - <https://trackvia.com/blog/cloud-computing/increase-productivity-switching-cloud/>



A modern agile IT infrastructure organization relies on well rounded engineers to work closely with developers and deliver solutions efficiently, making extensive use of automation.




	Traditional organization	Agile organization
 Technology	<ul style="list-style-type: none"> <li>Highly customized infrastructure, provisioned on request</li> <li>Significant manual effort required from infrastructure teams</li> </ul>	<ul style="list-style-type: none"> <li>Standardized infrastructure service offerings with largely automated delivery</li> <li>Self-service tools let application developers configure and control infrastructure on their own, with appropriate guardrails</li> </ul>
 Organization and talent	<ul style="list-style-type: none"> <li>Technology- or function-specific teams</li> <li>Staff with highly specialized skill sets focused on operations and administration</li> </ul>	<ul style="list-style-type: none"> <li>Integrated, cross-functional teams (or squads) build well-defined infrastructure service offerings</li> <li>Infrastructure engineers with sophisticated development skills</li> </ul>
 Processes	<ul style="list-style-type: none"> <li>Rigidly sequenced processes, with many handoffs among groups of specialists</li> <li>Repetitive tasks (such as deployment and incident resolution) performed manually</li> </ul>	<ul style="list-style-type: none"> <li>Squads responsible for end-to-end delivery of service offerings</li> <li>Processes in which repetitive work is automated and streamlined</li> </ul>

Exhibit I.2: McKinsey 2018: Transforming IT infrastructure organizations using agile<sup>52</sup>

## Total Cost of Ownership

The total cost of ownership (TCO) is a commonly used method for comparing the overall cost structures of two or more scenarios. When developing the cost comparison for the cloud transition strategy, it is essential to include all the affected IT cost elements. At a minimum, the cost elements shown below need to be included. Actual costs should be derived from existing budget or accounting systems and cross-checked with the list provided in the Section that follows to make sure all elements are covered.

The next step is to make some assumptions about what the TCO would be three years out without executing the cloud transition strategy. This estimate is done by extrapolating current expenses with assumptions of how each element would change. That TCO should be used as a real comparison with the expected TCO from executing the cloud transition strategy.

<sup>52</sup> Comella-Dorda, Dean, Leo, McNamara, and Sachdeva; Transforming IT infrastructure organizations using agile, September 25, 2018; p.4; Transforming-IT-infrastructure-organizations-using-agile.pdf



## TCO Baseline

When the existing situation's TCO baseline is established, the TCO for the executed cloud transition strategy should be estimated by starting with the same categories as for the comparison. Further:

- **Software:** Add all expected SaaS and cloud management application subscriptions. Deduct all currently existing SW licenses and maintenance fees that are expected to be eliminated.
- **Database (DB):** Use the same logic as for application SW licenses. Add DB subscription costs from PaaS providers as well as potential storage from IaaS providers. Note that PaaS and IaaS terms are blurring, with vendors providing services across these terms. However, for modeling purposes, it is helpful to separate the two terms.
- **Hardware (HW):** The logic is the same, although it can be more challenging to assess what HW will no longer be needed or replaced. As part of the overall rationalization effort of executing the cloud transition strategy, it is critical to sunset non-needed assets and not replace them.
- **Facilities (data center):** We recommend that the TCO comparison be made with the expected future state TCO. That is particularly important for the facility's cost assessment as the government strives to reduce and consolidate data centers. If an organization can eliminate a data center or avoid building or upgrading one, this cost avoidance needs to be reflected in the TCO comparison.
- **IT staff:** The goal here is to ensure that the TCO's net-new staffing composition is reflected. Based on a talent management strategy, what are the expected roles and skills that are needed in-house? How are they being compensated? Again, it is the net effect that is critical to assess. What roles are no longer needed, and what net-new roles are in place?
- **IT consultants:** IT consultants are closely related to IT staff. The dependence and need for IT consultants will be a function of the talent management strategy and how effectively it is executed.

## Vendor TCO calculators

<https://azure.microsoft.com/en-us/pricing/tco/calculator/>

<https://awstcocalculator.com/>

<https://cloud.google.com/products/calculator>



## Business Case: Gartner Benchmarks for State and Local Government

### Analysis

Unisys understands that the State of Washington IT and Agency leaders are constantly challenged with dynamic and disruptive market conditions while the organization is evolving, and technology is changing. Unisys used the 2019 edition of the Gartner IT Key Metrics Data (ITKMD) series to provide insights into the latest industry trends to help state and local governments change, make fact-based decisions, and help answer critical questions like these:

- Are you measuring the alignment between business and IT?
- Are your staffing and investment levels competitive in infrastructure and operations?
- Are you measuring your technology performance?
- Can you prove the success of current and future IT investments?

The Gartner ITKMD series of reports was established in 1995 to support strategic IT investment decisions. The annual publication delivers more than 3,000 metrics across 90 documents and covers 21 different industries. It allows the State of Washington to rapidly identify high-level IT spending, staffing, technology, and performance trends. Gartner Benchmark Observations for Government – State/Local.

Table 2. Number of Observations, Average Revenue and Enterprise Employees Industry	Number of		Revenue Scale		IT FTEs as a Percent of Employees: by Revenue Scale		
	Observations	Cross Industry	\$1B- \$10B	\$10B+	\$500M- \$1B	\$1B- \$10B	\$10B+
All Industries (Cross-Industry)	3172	Yes	2.80%	2.10%	5.4%	4.6%	3.3%
Banking and Financial Services	343	No	6.30%	5.00%	9.7%	10.8%	7.8%
Chemicals	61	No	1.30%	1.10%	2.9%	2.8%	2.7%
Construction, Materials and Natural Resources	174	No	1.10%	1.10%	1.8%	1.6%	1.6%
Consumer Products	123	No	2.20%	1.90%	2.7%	2.8%	2.8%
Education	210	No	4.80%	Not Available	4.4%	3.4%	Not Available
Energy	69	No	1.40%	80.00%	Not Available	4.9%	4.9%
Food and Beverage Processing	136	No	1.20%	1.30%	2.3%	1.9%	1.7%
Government — National/International (Operating Budget)	190	No	7.50%	8.90%	8.8%	6.0%	6.4%
<b>Government — State/Local (Operating Budget)</b>	<b>179</b>	<b>No</b>	<b>3.00%</b>	<b>3.10%</b>	<b>4.2%</b>	<b>3.0%</b>	<b>3.9%</b>
Healthcare Providers	130	No	4.30%	3.90%	2.6%	3.1%	4.0%
Industrial Electronics and Electrical Equipment	76	No	2.40%	1.80%	2.9%	2.2%	2.1%
Industrial Manufacturing	169	No	1.80%	1.50%	2.0%	1.7%	2.1%

Exhibit I.3. Gartner IT Spending Industry Benchmark Observations<sup>53</sup>

Notes: (1) The revenue figures reported are final and official for 2019; the 2020 revenue figures were not announced or were otherwise unavailable at the time of this publication. (2) Government operating budget is used as a proxy for "revenue"; however, it is not included in the all-industry average for revenue. (3) The all-industry enterprise full-time equivalent (FTE) average includes government FTE's.

<sup>53</sup> Unisys; Industry Breakdown of Annual Information Technology Spending, January 2020 (Unisys tool) Gartner IT Key Metrics Data (December 2019).



## State and Local Government Spend

### Government – Industry Breakdown of Annual IT Spending

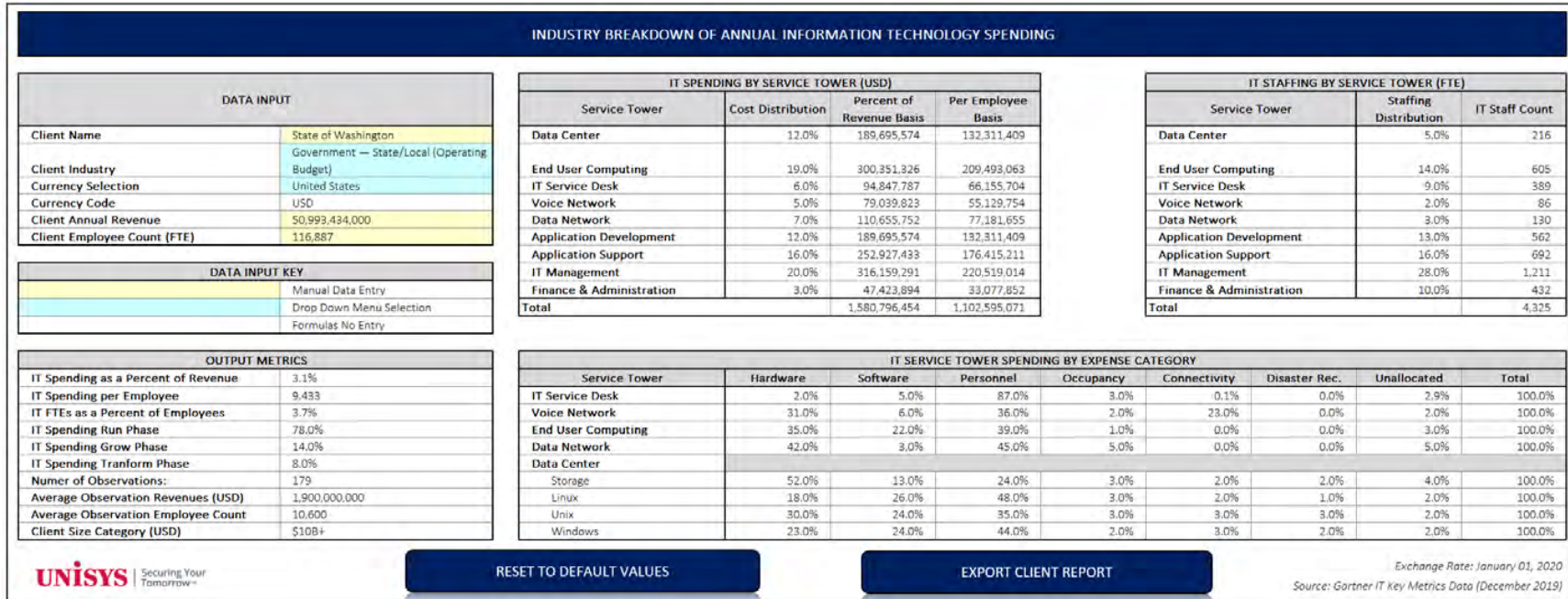


Exhibit I.4: Unisys Industry Breakdown of Annual Spend<sup>54</sup>

Gartner Benchmarks for IT Spending as a Percentage of Revenue equal \$1.58B or 3.1% of Annual Revenue of \$50.9B FY2019 per KPMG’s CAFR19 report (see Appendix H: Statement of Revenue). The current IT Spend Benchmark for the State of Washington is \$1.580B versus a current spend of \$1.751B or 10.7% above the benchmark. The state-wide State of Washington IT Staffing is 4,420 FTEs (March 2020) versus the current Benchmark for 2019 of 3.7% or 4,325 FTEs, indicating the State of Washington is over by 95 FTEs or ~2.2%. The FTE benchmark for the In-Scope Agencies is 2,479 versus 3,352 or over by 873 FTES or 35%.

<sup>54</sup> Unisys; Industry Breakdown of Annual Information Technology Spending, January 2020 (Unisys tool) Gartner IT Key Metrics Data (December 2019).





### Gartner State and Local Government - IT Staffing by Service Tower (Total Statewide)

As an output from using the Gartner benchmark tool, the following tables are produced for staffing distribution with IT staff counts and IT spending benchmarks for Services Towers illustrating cost distribution and percentage of revenue guidelines to compare current State of Washington staffing and spend.

IT STAFFING BY SERVICE TOWER (FTE)		
Service Tower	Staffing Distribution	IT Staff Count
Data Center	5.0%	216
End User Computing	14.0%	605
IT Service Desk	9.0%	389
Voice Network	2.0%	86
Data Network	3.0%	130
Application Development	13.0%	562
Application Support	16.0%	692
IT Management	28.0%	1,211
Finance & Administration	10.0%	432
<b>Total</b>		<b>4,325</b>

Exhibit I.5: Industry Breakdown: IT Staffing by Service Tower

### Gartner State and Local Government - IT Staffing by Service Tower (Total In-Scope Agencies)

IT STAFFING BY SERVICE TOWER (FTE)		
Service Tower	Staffing Distribution	IT Staff Count
Data Center	5.0%	124
End User Computing	14.0%	347
IT Service Desk	9.0%	223
Voice Network	2.0%	50
Data Network	3.0%	74
Application Development	13.0%	322
Application Support	16.0%	397
IT Management	28.0%	694
Finance & Administration	10.0%	248
<b>Total</b>		<b>2478</b>

Exhibit I.6: Industry Breakdown: IT Staffing by Service Tower (in-Scope Agencies)



## State of Washington Spend

### Government – Industry Breakdown of Annual IT Spending

The State of Washington Agencies invested ~\$3.4 billion in 2018-19, based on Agency portfolio information submitted by the OCIO.

Cost Pool	2018	2019	2018-19 Total	% of Spend
Internal labor	\$611,558,604	\$626,968,592	\$1,238,527,196	36%
Hardware	\$179,257,312	\$197,550,424	\$376,807,736	11%
Internal services*	\$182,201,614	\$187,725,958	\$369,927,573	11%
Software	\$168,259,364	\$195,713,749	\$363,973,113	11%
Other	\$115,779,656	\$151,430,368	\$267,210,024	9%
Outside services	\$110,943,883	\$154,375,575	\$265,319,458	8%
External labor	\$147,470,876	\$114,497,752	\$261,968,628	7%
Telecom	\$70,728,897	\$66,486,787	\$137,215,684	4%
Facilities & power	\$59,009,410	\$56,130,013	\$115,139,423	3%
<b>Total</b>	<b>\$1,645,209,616</b>	<b>\$1,750,879,219</b>	<b>\$3,396,088,836</b>	<b>100%</b>

Exhibit I.7: 2018-2019 State It Investments for the FY18-FY19 Biennial Report Final <sup>55</sup>

\*(NOTE: "Internal Services" contain Agency expenditures to central service Agencies)

## Gartner State and Local Government Spend

<sup>55</sup> Office of the CIO (OCIO) Title: IT Biennial Report, March 5, 2020, page 13. [https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19\\_Biennial\\_Report\\_Final.pdf?2nh3yj](https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19_Biennial_Report_Final.pdf?2nh3yj) p.13.



## IT Spending by Service Tower

IT SPENDING BY SERVICE TOWER (USD)				
Service Tower	Cost Distribution	Percent of Revenue Basis	Operate Basis 78%	Grow/Transform 22%
Data Center	12%	\$189,695,574.48	\$147,962,548.09	\$41,733,026.39
End User Computing	19%	\$300,351,326.26	\$234,274,034.48	\$66,077,291.78
IT Service Desk	6%	\$94,847,787.24	\$73,981,274.05	\$20,866,513.19
Voice Network	5%	\$79,039,822.70	\$61,651,061.71	\$17,388,760.99
Data Network	7%	\$110,655,751.78	\$86,311,486.39	\$24,344,265.39
Application Development	12%	\$189,695,574.48	\$147,962,548.09	\$41,733,026.39
Application Support	16%	\$252,927,432.64	\$197,283,397.46	\$55,644,035.18
IT Management	20%	\$316,159,290.80	\$246,604,246.82	\$69,555,043.98
Finance & Administration	3%	\$47,423,893.62	\$36,990,637.02	\$10,433,256.60
<b>Total</b>		<b>\$1,580,796,454.00</b>	<b>\$1,233,021,234.12</b>	<b>\$347,775,219.88</b>

Exhibit I.8: Gartner IT Spend by Service Tower<sup>56</sup>

The “run, grow, and transform” the business framework is a starting point for the overall process of measuring, forecasting, and communicating IT value. Gartner believes that the initial language and metrics used for business value are critical success factors in the organization's ability to make sound IT investment decisions.

Unisys understands that the current 105 Decision Packages (DPs) that were reviewed, scored, and prioritized by the OCIO amount to \$433.9M or **25%** above the (\$348M) Grow/Transform benchmark.

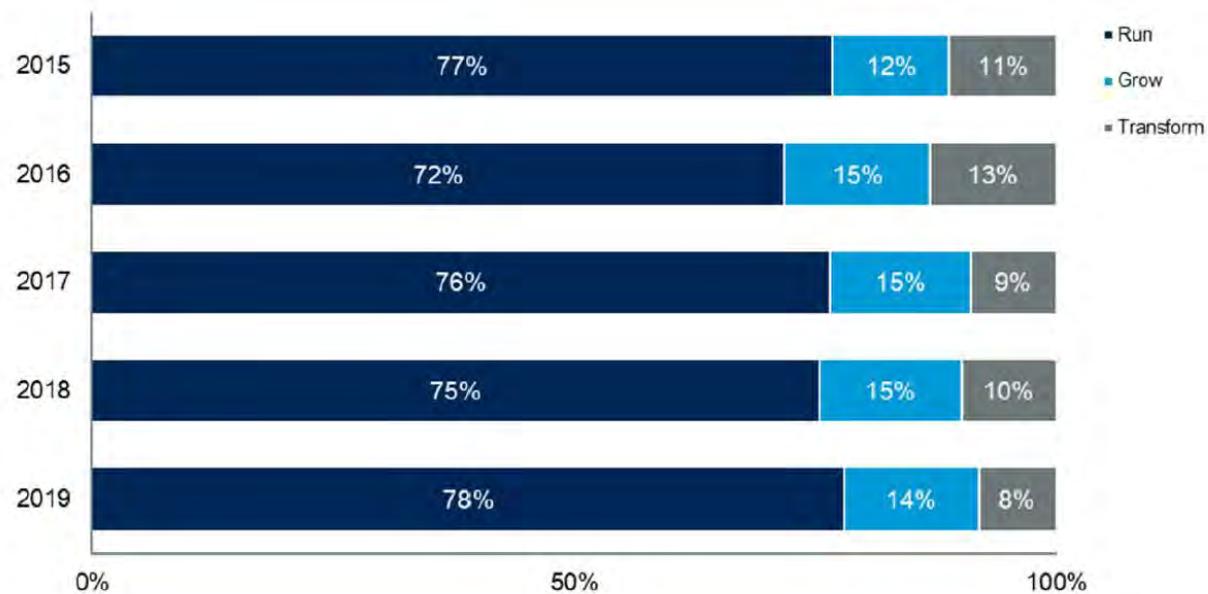
### Deriving IT Value from Run, Grow, and Transform Business Framework

The distribution of IT spending to run, grow, and transform the Agency’s business provides a view of the IT investment profile or "portfolio" to support business performance. In some industries, it is common to see a high "run" focus — typically because Agencies are not planning significant changes in their business models to support initiative-driven activities. As a result, the IT organization often is viewed as performing a "cost center" role.

<sup>56</sup>Unisys; Industry Breakdown of Annual Information Technology Spending, January 2020 (Unisys tool) Gartner IT Key Metrics Data (December 2019).



## IT Spending to Run, Grow and Transform the Business Government — State and Local



Source: Gartner (2019)  
ID: 465655

**Exhibit I.9: IT Spending to Run, Grow, and Transform the Business** <sup>57</sup>

The run, grow, and transform business framework should always be viewed in service terms concerning how IT will enable the Agencies to grow or transform public services, operate more efficiently, and spend within budget.

<sup>57</sup> Gartner Analyst(s): Eric Stegman, Jamie Guevara, Nick Michelogiannakis, Shreya Futela, Sneha Sharma, Shaivya Kaushal, IT Key Metrics Data 2020: Key Industry Measures: Government — State and Local Analysis: Multiyear, Published: 1 January 2020, page 13.



## Gartner Reference Model: Leverage Cloud Computing to Reduce Costs

Unisys has taken a “bottom-up” approach to calculate the cost avoidance by migrating to cloud services. We understand that the migration for the in-scope Agencies represents an opportunity to transform and optimize their current operations and future budget restraints due to issues like the Covid-19 pandemic.

Unisys has built the financial model based on the environment metrics from Gartner 2020 IT Key Metrics for Data Center Operations representing Server and Storage migration transformation. This migration is time-based on a three-year process and percentage of completion. Our assumption is to include the migration of 9,000 servers from the total 11,275, representing 80% of the in-scope Agencies assets found from our Discovery assessment. The summary also includes a Cost of Living/Inflation rate of 3% compounded.

### Cost Avoidance Summary

In-Scope Cloud Migration Transformation	Weight	Year 1	Year 2	Year 3	Total Saving
Bottom Up Cost Avoidance	migration percentage	25%	85%	100%	
<b>Server Transformation</b>					
Total Migration Transformation	80%	\$8,510,561.07	\$29,803,984.85	\$36,115,416.94	\$74,429,962.85
<b>Storage Transformation</b>					
Total Migration Transformation	80%	\$6,028,010.67	\$21,110,093.36	\$25,580,466.07	\$52,718,570.10
Estimated Avoidance Total		\$14,538,571.73	\$50,914,078.21	\$61,695,883.01	\$127,148,532.95

The following two sections provide the detail supporting the above summary table providing current spending trends versus the Gartner operational metric.



### Server Transformation Models per Gartner metrics

Unisys has built the server model based on the environment metrics from Gartner 2020 IT Key Metrics for Data Center Operations representing server migration transformation. This migration is time-based on a three-year process and percentage of completion. Our assumption is to include the migration of 9,000 servers from the total 11,275, representing 80% of the in-scope Agencies assets found from our Discovery assessment.

Server Transformation	Weight	Year 1	Year 2	Year 3	Total
<b>Blended Linux/Windows x86 Servers</b>	migration	25%	85%	100%	
Spend Trend		\$ 42,552,805	\$ 43,829,389	\$ 45,144,271	\$ 131,526,465.98
<b>Avoidance due to migration</b>	<b>80%</b>	<b>\$ 8,510,561</b>	<b>\$ 29,803,985</b>	<b>\$ 36,115,417</b>	<b>\$ 74,429,962.85</b>
Hardware	30%	\$ 2,553,168	\$ 8,941,195	\$ 10,834,625	\$ 22,328,988.86
Software	30%	\$ 2,553,168	\$ 8,941,195	\$ 10,834,625	\$ 22,328,988.86
Personnel	25%	\$ 2,127,640	\$ 7,450,996	\$ 9,028,854	\$ 18,607,490.71
Contractors	15%	\$ 1,276,584	\$ 4,470,598	\$ 5,417,313	\$ 11,164,494.43
					<b>\$ 74,429,962.85</b>

The following models represent key cost avoidance environment metrics from Gartner 2020 IT Key Metrics for Data Center Operations, depending on the quantity of servers. The State of Washington In-Scope would be a Large environment, and the cost avoidance is described in percentages.

Blended Linux/Windows x86 Servers			
Environment	Small	Medium	Large
Linux OS Instances	<400	400 - 1,800	>1,800
Monthly Price /OS Instance	\$362.08	\$315.67	\$260.42
Hardware	30%		
Software	30%		
Personnel	25%		
Contractors	16%		
OS Instances / FTE	242	246	313
Linux OS Instances /Physical Device	4.8	4.6	7.1
Linux Server Cores / OS Instance	3.2	4.8	3.2

Source: IT Key Metrics: 2020 December 6, 2019. Pricing reflected above is in US dollars and is globally weighted.



Windows Servers			
Environment	Small	Medium	Large
Windows OS Instances	<1,200	1,200 - 3,150	>3,150
Monthly Price /OS Instance	\$214.92	\$204.00	\$150.58
Hardware	31%		
Software	26%		
Personnel	27%		
Contractors	16%		
OS Instances / FTE	202	287	337
Windows OS Instances /Physical Device	4.9	5.6	6.0
Windows Server Cores / OS Instance	3.30	3.60	3.40

Source: IT Key Metrics: 2020 December 6, 2019. Pricing reflected above is in US dollars and is globally weighted.

### Storage Transformation Models per Gartner metrics

Unisys has built the storage model based on the environment metrics from Gartner 2020 IT Key Metrics for Data Center Operations, supporting the server migration transformation. This migration is time-based on a three-year process and percentage of completion. Our assumption is to include the migration of 9,000 servers from the total 11,275, representing 80% of the in-scope Agencies assets found from our Discovery assessment.

Storage Transformation	Weight	Year 1	Year 2	Year 3	Total
	migration	25%	85%	100%	
Spend Trend		\$ 30,140,053	\$ 31,044,255	\$ 31,975,583	\$ 93,159,891
<b>Avoidance due to migration</b>	<b>80%</b>	<b>\$ 6,028,011</b>	<b>\$ 21,110,093</b>	<b>\$ 25,580,466</b>	<b>\$ 52,718,570</b>
Hardware	67%	\$ 4,038,767	\$ 14,143,763	\$ 17,138,912	\$ 35,321,442
Software	16%	\$ 964,482	\$ 3,377,615	\$ 4,092,875	\$ 8,434,971
Personnel	8%	\$ 482,241	\$ 1,688,807	\$ 2,046,437	\$ 4,217,486
Contractors	9%	\$ 542,521	\$ 1,899,908	\$ 2,302,242	\$ 4,744,671
					<b>\$ 52,718,570</b>



## Gartner Metrics

The following models represent key cost avoidance environment metrics from Gartner 2020 IT Key Metrics for Data Center Operations, depending on the storage environment. The State of Washington in-scope would be a Large environment, and the cost avoidance is described in percentages.

Storage			
Environment	Small	Medium	Large
Raw Configured Storage	< 3PB's	3 - 10 PB's	> 10 PB's
Monthly Price / Raw Configured TB's	\$79.50	\$66.25	\$41.92
Hardware	67%		
Software	16%		
Personnel	8%		
Contractors	9%		
Raw Configured TB's / FTE	2259	4160	5496

Source: IT Key Metrics: 2020 December 6, 2019. Pricing reflected above is in US dollars and is globally weighted.

## FY20 IT Resource Tower Costs

The current spend trend comes from the Technology Business Management (TBM) FY20 IT Resource Tower Costs<sup>58</sup> as reported by the OCIO for the in-scope Agencies (Converged Infrastructure, Servers, Offline and Online Storage provide the base for HW ROI analysis):

IT Tower Costs	Sum of Cost
<b>Application</b>	<b>\$ 265,473,317.50</b>
Application Development	\$ 74,606,214.00
Application Support & Operations	\$ 124,440,037.11
Business Software	\$ 66,427,066.39
<b>Compute</b>	<b>\$ 75,280,669.85</b>
Converged Infrastructure	\$ 5,755,153.32
High Performance Computing	\$ 13,634.21
Mainframe	\$ 26,918,369.24

<sup>58</sup> OCIO, OCIO Monthly Reporting Metrics, August 2020, <https://ocio.wa.gov/ocio-monthly-reporting-metrics>





IT Tower Costs	Sum of Cost
Midrange	\$ 3,469,847.66
Servers	\$ 35,293,109.59
Unix	\$ 3,830,555.83
<b>Data Center</b>	<b>\$ 50,141,058.45</b>
Enterprise Data Center	\$ 29,087,886.90
Other Facilities	\$ 21,053,171.54
<b>Delivery</b>	<b>\$ 51,588,676.59</b>
Client Management	\$ 21,721,068.94
IT Service Management	\$ 9,279,191.19
Operations Center	\$ 14,786,809.75
Program, Product and Project Management	\$ 5,801,606.71
<b>End User</b>	<b>\$ 160,366,443.62</b>
Conferencing & AV	\$ 9,529,650.83
Deskside Support	\$ 41,720,872.15
End User Software	\$ 17,602,229.95
IT Help Desk	\$ 21,025,609.04
Mobile Devices	\$ 17,591,925.44
Network Printers	\$ 7,564,968.74
Workspace	\$ 45,331,187.46
<b>IT Management</b>	<b>\$ 85,959,356.22</b>
Enterprise Architecture	\$ 18,668,337.25
IT Finance	\$ 10,371,635.62
IT Management & Strategic Planning	\$ 41,364,672.33
IT Vendor Management	\$ 15,554,711.02
<b>Network</b>	<b>\$ 140,878,338.56</b>
LAN/WAN	\$ 75,340,810.03
Transport	\$ 19,387,130.54
Voice	\$ 46,150,397.99
<b>Output</b>	<b>\$ 9,422,290.90</b>



IT Tower Costs	Sum of Cost
Central Print	\$ 9,422,290.90
<b>Platform</b>	<b>\$ 55,551,148.09</b>
Database	\$ 20,364,974.28
Mainframe Database	\$ 5,107,777.11
Mainframe Middleware	\$ 11,777,573.25
Middleware	\$ 18,300,823.45
<b>Security &amp; Compliance</b>	<b>\$ 61,350,160.90</b>
Compliance	\$ 18,023,539.35
Disaster Recovery	\$ 14,000,622.09
Security	\$ 29,325,999.47
<b>Storage</b>	<b>\$ 38,099,887.85</b>
Mainframe Offline Storage	\$ 4,536,597.09
Mainframe Online Storage	\$ 4,301,103.01
Offline Storage	\$ 7,189,951.71
Online Storage	\$ 22,072,236.04
<b>Grand Total</b>	<b>\$ 994,111,348.53</b>

### Hardware Spend

The Unisys team reviewed the existing financial data to identify the total IT Equipment annual maintenance spending patterns for all IT Cost Pools and IT Cost Towers from the Agency Financial Reporting System (AFRS).

Hardware	Sum of Total
EE - Not Specified	\$ 2,024,865.64
EE E000 - Repairs, Alterations & Maintenance	\$ 282,114.50
EE E010 - Building	\$ 243,186.09
EE E020 - Leasehold Improvements	\$ 8,466.66
EE E040 - Equipment	\$ 181,414.83
EE E050 - IT Equipment	\$ 4,108,102.66
EE E060 - Radio Equipment	\$ 358,996.75
EE E070 - Security Equipment	\$ 14,760.00
EE E080 - Building - Maintenance Agreements	\$ 235,303.55



Hardware	Sum of Total
EE E090 - Equipment - Maintenance Agreements	\$ 247,092.58
EE E100 - Grounds	\$ 731.81
EE E110 - IT Equipment - Maintenance Agreements	\$ 7,390,121.62
EE E120 - Furniture	\$ 187.62
JA - Not Specified	\$ 6,515,346.00
JA A000 - Noncapitalized Assets	\$ 24,984.91
JA A010 - IT Equipment	\$ 30,370,814.03
JA A020 - Office Furniture & Equipment	\$ 856,623.58
JA A030 - Radio Equipment	\$ 1,578,375.47
JA A040 - Security Equipment	\$ 25,425.87
JA A050 - Specialized Equipment	\$ 420,347.00
JA A060 - Telecommunication Equipment	\$ 3,894,202.57
JA A070 - Vehicle Equipment	\$ 932.02
JA A080 - Buildings and Bldg. Improvements	\$ -
JA A100 - Household/Living Furnishings	\$ 7,436.53
JA A130 - Machinery and Tools	\$ 1,224.72
JA A140 - Safety Equipment	\$ -
JC - Not Specified	\$ 3,187,362.74
JC C000 - Furnishings and Equipment	\$ 29,598.44
JC C010 - Heavy Equipment	\$ 14,121.57
JC C020 - IT Equipment	\$ 22,548,043.00
JC C030 - Office Furniture and Equipment	\$ 7,676.42
JC C040 - Radio Equipment	\$ 1,242,600.10
JC C050 - Security Equipment	\$ 793,523.01
JC C060 - Specialized Equipment	\$ 209,648.81
JC C070 - Telecommunication Equipment	\$ 1,283,732.11
JC C100 - Laboratory Equipment	\$ 9,544.30
JC C140 - Vehicles	\$ 140,951.94
PD - Not Specified	\$ 10,033,076.01
PD D000 - Principal COP Lease/Purch Agreements	\$ 699,539.59
PE - Not Specified	\$ 2,527,874.17



Hardware	Sum of Total
PE E000 - Interest COP Lease/Purch Agreements	\$ 210,881.52
SE - Not Specified	\$ (561,306.04)
<b>Grand Total</b>	<b>\$ 101,167,924.70</b>

## CapEx versus OpEx to Reduce Costs

### Physical Server Hardware Costs (CapEx)

In this report, Unisys analysis noted the following key findings: Physical servers have an average age of 4.2 years, which is a high-risk factor where the industry typically refreshes physical server hardware every 3-5 years; therefore, for the State of Washington, an estimate of \$104.4M physical server technology refresh needs to be revalued versus past procurement where servers have historically been over-provisioned and under-utilized. These estimated costs include physical server hardware. They do not include storage outside of the server (such as Primary Storage Arrays, local server storage expansions, operating system software, or virtualization management software). These additional costs would need to be evaluated based on the actual refresh needs and those assets' lifecycle.

Dell or HP Intel Server Configurations	Estimated Price
2 Socket / 8 Cores / 96 GB RAM	8,240.80
2 Socket / 16 Total Cores / 192 GB RAM	9,321.06
2 Socket / 20 Total Cores / 384 GB RAM	13,124.89
2 Socket / 36 Total Cores / 768 GB RAM	21,963.80
2 Socket / 32 Total Cores / 768 GB RAM	26,984.69
2 Socket / 32 Total Cores / 1500 GM RAM (Virtual Host)	27,177.76
Average	17,802.17
Estimated Physical Server Count per Discovery	5,867
total CapEx	\$104,445,311.83

Exhibit I.10: CapEx ESTIMATE Target Vendor Pricing with Unisys Costs



## Overprovisioning Costs

StratoZone Sample: IT Asset Provisioning and Current Utilization		
Memory	30% Average Used	70% Average Open
Storage	25% Average Used	75% Average Open
CPU	7% Average Used	11% Peak Used
Current over-provisioned and unused CapEx investment (extrapolated estimate)	\$29,244,687.08	40% sample discovery

Exhibit I.11: Over-Provisioning Cost Estimate

## Cloud OpEx Costs

When compared with the above potential CapEx purchases, Unisys analysis noted the following key findings per annual vendor pricing terms the scenario for 9,000 (80%) devices) using 3-Year Reserved Public Cloud options. The Opex savings are based on the estimated 3-year total CapEx of \$211,722,754.81, using the FY20 expenditures for hardware as the annual average (\$70,591,918.27). This estimate includes the cost for infrastructure technology, such as servers, storage arrays, backup infrastructure, server operating system licensing, and virtualization management software. The cloud adoption program will impact these components.

Please note the following explanation of CapEx cost per Section 13.4 IT Resource Tower Costs:

Tower	Total
Converged Infrastructure	\$5,755,153.32
Servers	\$35,558,250.77
Offline Storage	\$7,189,951.71
Online Storage	\$22,088,562.47
Annual Total (excludes maintenance which is OpEx)	<b>\$70,591,918.27</b>
3 Year Total	<b>\$211,775,754.81</b>



### Cloud OpEx ESTIMATE for 9,000 Servers Using 3-Year Term for Public Cloud

Vendor	Total Monthly Cost	Devices	Avg Server Cost	3 Year Total Cost	OPEX Savings
Azure (3-Year Reserved)	\$ 1,700,910.00	9,000	188.99	\$ 61,232,760.00	\$150,542,994.81
AWS (3-Year Term)	\$ 2,326,050.00	9,000	258.45	\$ 83,737,800.00	\$128,037,954.81
Google 3 Year Commit	\$ 2,608,830.00	9,000	289.87	\$ 93,917,880.00	\$117,857,874.81
Washington State Cloud	\$ 3,852,720.00	9,000	428.08	\$ 138,697,920.00	\$73,077,834.81

Exhibit I.12: Cloud OpEx versus CapEx to Reduce Costs

### Gartner Metrics: Leverage Cloud Computing to Reduce Staffing Costs

Unisys understands that the total server inventory for the in-scope Agencies is 11,275, and we are estimating a migration of 80% of that inventory or 9,000 servers. 80% is based on realistic industry standards and benchmarks. The migration to the cloud for the In-Scope Agencies represents an opportunity to transform and optimize their current staffing population.

#### IT Staffing Benchmarks - Example of Opportunity

According to Industry KPI's and Gartner benchmarks, the State of Washington In-Scope Agencies will have an optimization opportunity to **reposition and retrain current Data Center FTEs from a current state staffing level** of 1,107 FTEs to an estimated count of 36 FTEs per benchmarks for the future state.

#### Gartner Metric

The Gartner benchmark for server-to-FTE ratio for Data Center Staffing is 1 FTE to 313 servers.

Blended Linux/Windows x86 Servers			
Environment	Small	Medium	Large
Linux OS Instances	<400	400 - 1,800	>1,800
Monthly Price /OS Instance	\$362.08	\$315.67	\$260.42
OS Instances / FTE	242	246	313

Source: IT Key Metrics: 2020 December 6, 2019. The pricing reflected above is in US dollars and is globally weighted.



### Future Impact for Data Center Support FTEs

Unisys understands that this example represents a potential future state with considerable impact to just one group (includes the roles for the Data Center Tower: IT Architecture, IT Data Management, IT System Administration) versus the other IT groups where the impact of new cloud services transformation and disruption will occur.

Current State	Totals	Future State	Cloud	On-site
In-Scope Servers	11275	In-Scope Servers	9,000	2,275
Benchmark FTE Ratio 1 to x Servers*	313	Benchmark FTE Ratio 1 to x Servers*	313	313
Estimated Data Center FTE Count	36	Estimated Data Center FTE Count	29	7

Unisys recommends preparing to reposition current roles to include the IT Service Desk, Network, Application Development, and Support FTEs. Unisys has compared the Gartner 2020 IT Key Metrics for State and Local Government against the In-Scope Agencies' current staffing in the next section.

### Gartner Benchmark - IT Staffing by Service Tower (Total In-Scope Agencies)

The Gartner benchmark compares the Staffing Distribution and IT Staff Count as represented in **2,478 FTEs** for the total In-Scope Agencies' population.

IT STAFFING BY SERVICE TOWER (FTE)		
Service Tower	Staffing Distribution	IT Staff Count
Data Center	5.0%	124
End User Computing	14.0%	347
IT Service Desk	9.0%	223
Voice Network	2.0%	50
Data Network	3.0%	74
Application Development	13.0%	322
Application Support	16.0%	397
IT Management	28.0%	694
Finance & Administration	10.0%	248
<b>Total</b>		<b>2478</b>

Exhibit I.13: Industry Breakdown: Gartner IT Staffing by Service Tower (with in-Scope Agencies population)



### Current State In-Scope Agencies IT Staffing

Today, the total In-Scope Agencies IT Staffing currently equals **3,352 FTEs**. The number of IT resources is **873 FTEs (35%)** over the benchmark. In-Scope Agencies need to identify opportunities to reposition and retrain in the following IT Service Towers:

IT STAFFING BY SERVICE TOWER (FTE)	Gartner	Gartner	State of WA	In-Scope Agency	In-Scope Agency	Opportunity for Optimization
Service Tower	Staffing Distribution	IT Staff Count	Job Role	IT Staff Count	Staffing Distribution	Difference
Data Center	5.00%	124	IT Architecture IT Data Management IT System Administration	1,107	33%	<b>983</b>
End-User Computing	14.00%	347	IT Customer Support	113	3%	-234
IT Service Desk	9.00%	223	IT Customer Support	212	6%	-11
Voice Network	2.00%	50	Network & Telecommunications	combined	combined	combined
Data Network	3.00%	74	Network & Telecommunications	235	7%	<b>111</b>
Application Development	13.00%	322	Application Development IT Business Analysis IT Quality Assurance IT Project Management	combined	combined	combined
Application Support	16.00%	397	Application Development IT Business Analysis IT Quality Assurance IT Project Management	1,287	38%	<b>568</b>
IT Management	28.00%	694	IT Senior Manager IT Policy Planning/ IT Security	389	12%	-305
Finance & Administration	10.00%	248	IT Vendor Management	9	0.3%	<b>-239</b>
<b>Total</b>		<b>2,479</b>		<b>3,352</b>	100%	<b>873</b>

**Exhibit I.14: Gartner Benchmark for State and Local IT Staffing for Service Towers**





## Workforce Project 6: State HR and Labor Relations

Unisys understands the State Human Resources/Labor Relations Section manages the collective bargaining process on behalf of the Governor with union-represented state employees. We understand the mission to negotiate labor agreements that enable state managers and employees to perform their jobs more effectively and adjust to the future challenges that cloud services will provide.

The State Human Resources/Labor Relations Section is under the Office of Financial Management's administrative arm. It will need to coordinate with all aspects of budget development, revenue forecasting, public compensation, and benefits systems, making them an important partner in providing future resources, staffing training, and career development processes.

In our Workforce Project 6, Unisys recommends future investment in training staffing for new roles and new career development due to the impact of future cloud services and technologies. This project addresses current IT staffing's rebalancing with the reality of the current 10% year-over-year retirement and resignation issues. This project also addresses the opportunity to shift or reposition FTEs to replace External Labor Contractors versus any future mandated reduction in the workforce. The current average salary of an IT FTE is equal to \$91,104.80 (unburdened); therefore, the In-Scope Agencies' focus is to address the over staffing cost of 873 FTEs at a current spend of \$79.5M.

### External Labor Repositioning Opportunity

#### State of Washington Annual IT Labor Spending

Unisys understands the current annual IT Labor (Internal and External) Spending from the IT Biennial Report:

Cost Pool	2018	2019	2018-19 Total	% of Labor Spend
Internal labor	\$611,558,604	\$626,968,592	\$1,238,527,196	83%
External labor	\$147,470,876	\$114,497,752	\$261,968,628	17%
<b>Total labor</b>	<b>\$759,029,480</b>	<b>\$741,466,344</b>	<b>\$1,500,495,824</b>	<b>100%</b>

Exhibit I.15: 2018-2019 State IT Investments for the FY18-FY19 Biennial Report Final <sup>59</sup>

<sup>59</sup> Office of the CIO (OCIO) Title: IT Biennial Report, March 5, 2020, page 13. [https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19\\_Biennial\\_Report\\_Final.pdf?2nh3yj](https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19_Biennial_Report_Final.pdf?2nh3yj) p.13.



### Internal Versus External Labor

From the IT Biennial Report, Unisys understands that Application support dominates the state’s IT workforce investment, trailed by end-user support, IT management, delivery (project and client management), and other technology services where there is an opportunity to reposition current Internal State FTEs to replace External Labor (see below).

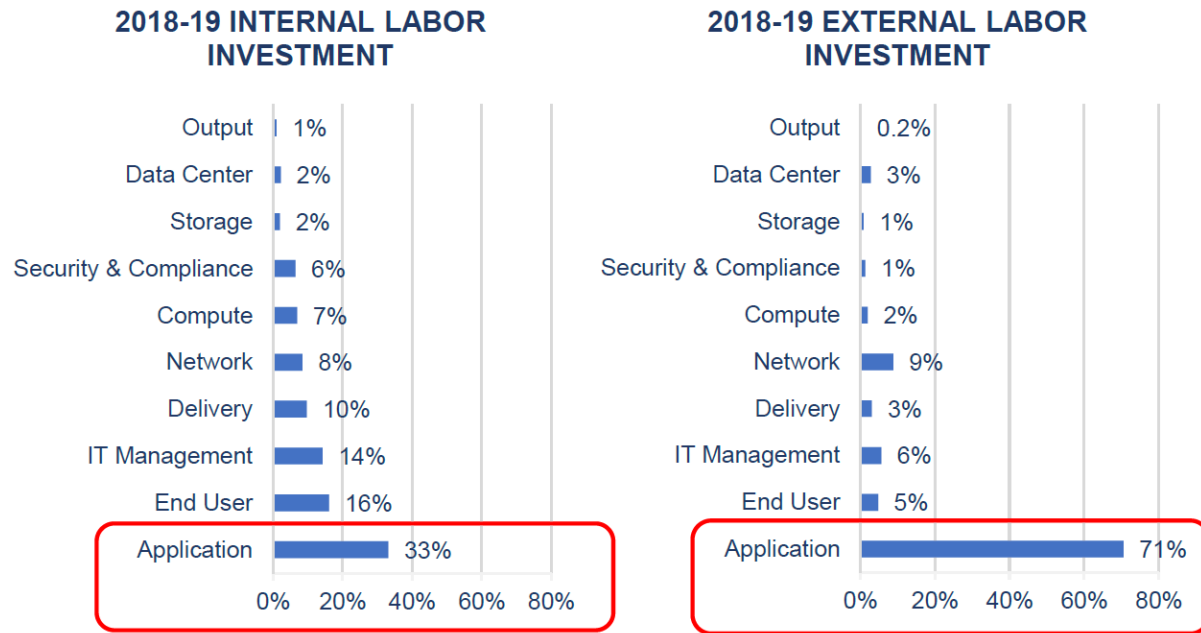


Exhibit I.16: Internal and external labor investment by technology tower. FY18-FY19 Biennial Report Final<sup>60</sup>

The data in Exhibit I.16 shows the largest proportion of labor costs dedicated to maintenance and operations efforts. Unisys estimates this trend will continue due to new and old systems running in parallel during rehosting to the cloud and modernization activities.

<sup>60</sup> Office of the CIO (OCIO) Title: IT Biennial Report, March 5, 2020, page 25. [https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19\\_Biennial\\_Report\\_Final.pdf?2nh3yj](https://ocio.wa.gov/sites/default/files/public/Reports/FY18-FY19_Biennial_Report_Final.pdf?2nh3yj)



### Focus Group of IT FTEs: Insourced Versus Contractor

Unisys notes the In-scope Agencies should focus on an opportunity in the current **External Labor Group**: External Data Center, Storage, Security, Compute, Network, IT Management, and End User spend for future cost avoidance.

Statewide Cost Pool	2018	2019	2018-19 Total	2Yr Avg
Internal labor	\$611,558,604	\$626,968,592	\$1,238,527,196	\$619,263,598
External labor	\$147,470,876	\$114,497,752	\$261,968,628	\$130,984,314
<b>Total labor</b>	<b>\$759,029,480</b>	<b>\$741,466,344</b>	<b>\$1,500,495,824</b>	<b>100%</b>

### Example - Future Impact for Data Center Support FTEs

We have provided a 6% Internal to External Repositioning FTE example opportunity in the current External Data Center, Storage, and Compute spend, which projects a **\$23.6M** cost avoidance in three years.

Internal Labor Investment		Totals	External Labor Investment		Totals
Output	1%	\$6,192,635.98	Output	0.20%	\$261,968.63
Data Center*	2%	\$12,385,271.96	Data Center*	3%	\$3,929,529.42
Storage*	2%	\$12,385,271.96	Storage*	1%	\$1,309,843.14
Security & Compliance	6%	\$37,155,815.88	Security & Compliance	1%	\$1,309,843.14
Compute*	7%	\$43,348,451.86	Compute*	2%	\$2,619,686.28
Network	8%	\$49,541,087.84	Network	9%	\$11,788,588.26
Delivery	10%	\$61,926,359.80	Delivery	3%	\$3,929,529.42
IT Management	15%	\$92,889,539.70	IT Management	5%	\$6,287,247.07
End User	16%	\$99,082,175.68	End User	5%	\$6,549,215.70
Application	33%	\$204,356,987.34	Application	71%	\$92,998,862.94
Total (burdened cost)	100%	\$619,263,598.00	Total	100.00%	\$130,984,314.00
<b>Internal Data Center FTEs*</b>		<b>\$68,118,995.78</b>	<b>External Data Center FTEs*</b>		<b>\$7,859,058.84</b>
<b>3-YR reposition estimate</b>					<b>\$23,577,176.52</b>



### Staff Resignation and Retirement Trends

Unisys understands for the in-scope Agencies that there is a current 10% trend in FTEs that resign and retire for the IT population. We recommend a new cost avoidance strategy of elimination or non-backfilling for these IT staffing positions; this strategy is represented in the table below. See Section 7.4.5 Labor Avoidance, Rebalancing, and Optimization.

Non-Backfill Strategy	FY20	Reduction in Population	FY21	FY22	FY23	Total
General IT Population Current Spend plus rehire	\$305,383,262.77	3352	\$314,544,761	\$323,981,103	\$333,700,537	\$972,229,753
Resign & Retired Trend 10%-FTEs -Non-backfill roles-	FY21	-335	(\$31,454,476)	(\$31,454,476)	(\$31,454,476)	(\$94,363,763)
	FY22	-302		(\$29,133,563)	(\$29,133,563)	(\$58,267,428)
	FY23	-272			(\$26,962,288)	(\$26,962,560)
<i>New Cost Estimate</i>	Total Non-backfill roles	-908				
<b>General IT Population FTE Totals</b>	<b>3352</b>	<b>2444</b>	<b>\$283,090,285</b>	<b>\$263,393,064</b>	<b>\$246,150,209</b>	<b>\$792,636,002</b>
			<b>-335</b>	<b>-302</b>	<b>-272</b>	<b>-908</b>
<b>Total Cost Avoidance</b>						<b>\$179,593,751</b>

Exhibit I.17: Staff Resignation and Retirement Trends



## Appendix J: Business Case Investment Options

### Cloud Service Projects

#### Enterprise Architecture Projects

#### Cloud Management Tools: Configuration Management System

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost	
EA1A	Service Asset and Configuration Management	9 months	\$1,007,760.00 - \$2,321,880.00	\$1,305,600.00 – \$4,531,200.00	
<b>Project Type</b>		Enterprise (led by the Service Broker with Agency participation)			
<b>Description</b>					
Implementing a Service Asset and Configuration Management (SACM) tool, such as Device42 or ServiceNow Discovery and CMDB, within the Service Management platform provides the State of Washington with a single system to track assets through their lifecycle. The processes and tools also identify relationships between business services and their components across the daily activities performed on the IT infrastructure.					
<b>Outcomes / Objectives</b>			<b>Key Activities / Sub-Projects</b>		
<ul style="list-style-type: none"> <li>Support and enhance the Change Management Process by enabling increased data / fact-based decision making.</li> <li>Improve incident time to resolution by enabling quicker assessment of an Incident’s impact.</li> <li>For example, if a system impacted is still active via failover, the CMDB provides the resolver the details on the related components.</li> <li>This service enables the resolver teams to focus on and prioritize outages over service degradations that may not impact the overall operations.</li> </ul>			<p>Key activities for this project will be dependent on the broader transformation program. Several key activities will include the following:</p> <ul style="list-style-type: none"> <li>Deploy and configure Asset &amp; Configuration Management workflows (SACM) (1-2 Months)</li> <li>Implement a Configuration Management Database (CMDB)</li> <li>Deploy Discovery tools to maintain the CMDB and related asset data (3-6 Months)</li> <li>Map business services to IT assets (6 Months)</li> <li>Automation &amp; Operations Assessment (review Change and Incident ticket data and related personnel)</li> <li>Cloud Management Services (Pilot / Proof of Concept)</li> <li>Cloud Management Services (Implementation Project)</li> </ul>		
<b>Benefits</b>			<b>Cost Breakdown – Per Year</b>		



<ul style="list-style-type: none"> <li>▪ Enables the resolver teams to focus on and prioritize business impacting outages over service degradations</li> <li>▪ Increases visibility into Business / IT service interactions by establishing key data to map business systems to individual assets and IT components</li> <li>▪ Improves cross-system impact identification during change planning and implementation</li> </ul>	Year 1 – \$1,232,880.00 - \$3,048,120.00 Year 2 - \$540,240.00 - \$1,902,480.00 Year 3 - \$540,240.00 - \$1,902,480.00
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**Assumptions**

<ul style="list-style-type: none"> <li>▪ Project duration estimated: 6 months</li> <li>▪ Configuration management licensing based on 12,000 servers</li> <li>▪ Licensing includes application dependency, software license management, and online discovery</li> <li>▪ Project EA1A is a major dependency for other EA Projects</li> </ul>
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**Cloud Management Tools: Dashboards**

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost	
EA1B	Cloud Financial System Tools - Dashboard	6 months	\$550,200.00 - \$2,333,020.00	\$1,130,580.00- \$4,091,580.00	
<b>Project Type</b>		Enterprise (led by the Service Broker with Agency participation)			
<b>Description</b>					
Implementing a Cloud Financial Management system (such as VMWare. Morpheus, CloudHealth or Apptio Cloudability) within the Service Management platform provides the State of Washington with a single system to track assets through their lifecycle and identify relationships between business services and their components across the daily activities performed on the IT infrastructure.					
<b>Outcomes / Objectives</b>		<b>Key Activities / Sub-Projects</b>			
<ul style="list-style-type: none"> <li>▪ The project focuses on enabling enterprise financial management, optimization recommendations, and cloud billing</li> <li>▪ Ongoing services include capacity management and Agency reporting back to Agencies for cloud use.</li> </ul>		Key activities for this project will be dependent on the broader transformation program. Several key activities will include the following: <ul style="list-style-type: none"> <li>▪ These dashboards are for tracking the fundamental metrics and additional KPIs.</li> <li>▪ Custom cloud cost dashboards feature dozens of different cost and usage metrics that can be combined and displayed in thousands of different ways: build, customize, and iterate on the cloud cost dashboard for Agency needs.</li> </ul>			



	<ul style="list-style-type: none"> <li>Using the solution’s portal or APIs with unit cost, Agencies can see how cloud spending translates into valuable business metrics and deliverables.</li> </ul>
<b>Benefits</b>	<b>Cost Breakdown – Per Year</b>
<ul style="list-style-type: none"> <li>From product to finance, decisions are being made every day across the State of Washington that rely on access to cloud spending and usage data.</li> <li>Agency should ask: “Should we re-budget any of our departments?” “Is this service tier cost-effective?” “Are our resources provisioned correctly?”</li> <li>While access to basic spend numbers is a common need, the question of which numbers to use will vary widely depending on the user role and responsibilities.</li> </ul>	Year 1 – \$653,820.00 - \$2,727,640.00 Year 2 – \$432,480.00 - \$1,638,480.00 Year 3 – \$594,480.00 - \$2,058,480.00
<b>Assumptions</b>	
<ul style="list-style-type: none"> <li>Project duration estimated: 6 months</li> <li>Cloud Financial Management tool cost based on percent (1.5%) of monthly cloud costs.</li> <li>The project focuses on public cloud financial management, cloud optimization recommendations, and cloud billing</li> <li>Ongoing support efforts include capacity management and Agency-specific cloud usage reporting</li> </ul>	

### Cloud Management Tools: Cloud Automation

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost
EA1C	Cloud Management Platform	9 Months	\$1,296,360.00 - \$2,727,980.00	\$650,800.00 – \$2,356,270.00
<b>Project Type</b>		Enterprise (led by the Service Broker with Agency participation)		
<b>Description</b>				
<p>An integrated automation approach and architecture are required to maximize the use of cloud and on-premise infrastructure while also reducing operational costs through standardization and process controls. This project includes assessing current IT management and monitoring tools, automation, and service management data. Following the assessment, an architecture including automation, IT system management, and monitoring will be developed, with recommendations for updating, replacing, or procuring additional tools to support the overall architecture.</p>				



Outcomes / Objectives	Key Activities / Sub-Projects
<ul style="list-style-type: none"> <li>▪ Reduce call volumes for user service requests through workflow automation</li> <li>▪ Improve resolution times and optimize automation strategy based on L1 -L3 ticket and personnel analysis</li> <li>▪ Pilot Cloud Broker, Automation, and Management (CMP) for several sample applications to gain experience and understand scale for the next phase</li> </ul>	<p>Key activities for this project will be dependent on the broader transformation program. Several key activities will include the following:</p> <ul style="list-style-type: none"> <li>▪ Automation &amp; Operations Assessment (Review Change and Incident ticket data and related personnel)</li> <li>▪ IT Management and monitoring tools assessment</li> <li>▪ Create IT Management, Monitoring and Automation architecture, and roadmap</li> <li>▪ Deploy updates and new technologies to support architecture</li> <li>▪ Expand Service Catalog (1-3 months)</li> <li>▪ Cloud Management Services (Pilot / Proof of Concept)</li> <li>▪ Cloud Management Services (Implementation Project)</li> </ul>
Benefits	Cost Breakdown – Per Year
<ul style="list-style-type: none"> <li>▪ Ensures State of Washington focuses IT spend on most relevant, core, strategic value components</li> <li>▪ Consolidates management capabilities</li> <li>▪ Provides Agency-accessible self-service capabilities</li> <li>▪ Improves user satisfaction for request fulfillment</li> <li>▪ Reduces cost of IT operations across the IT management estate including management, monitoring, and automation</li> </ul>	<p>Year 1 – \$423,386.67 - \$1,014,843.33            Year 2 - \$1,148,973.33 – \$2,670,496.67            Year 3 - \$374,800.00 – \$1,398,910.00</p>
Assumptions	
<ul style="list-style-type: none"> <li>▪ Project duration: 9 months</li> <li>▪ Cloud Management Platform service costs based on a percentage of monthly cloud costs.</li> <li>▪ The project focuses on both private and public cloud management for IT Operations and Agency users.</li> <li>▪ Ongoing support efforts include capacity management and Agency-specific cloud usage reporting</li> </ul>	

## Network Optimization Assessment for Cloud Services





#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost
EA-3	Network Optimization Assessment for Cloud Services	9 Months	\$230,975.00 - \$831,160.00	Not Applicable

**Project Type** Enterprise (led by the Service Broker with Agency participation)

**Description**

The network is a critical component for enabling cloud adoption and migration activities. This project evaluates the capacity and other network adjustments required to support moving applications and data from Agency data centers to cloud services. In some cases, additional bandwidth, changes to network security architecture and practices, and network resilience may be required to support applications in cloud environments effectively.

Outcomes / Objectives	Key Activities / Sub-Projects
<ul style="list-style-type: none"> <li>Provide plans to reduce the risk of network capacity impacting cloud migrations and adoption</li> <li>Identify potential opportunities to change network designs as the core services move away from the Agency Headquarters</li> <li>Identify network security changes required to maintain application flows as applications move in the environment.</li> </ul>	<p>Key activities for this project will be dependent on the broader transformation program. Several key activities will include the following:</p> <ul style="list-style-type: none"> <li>Identify major network connections impacted by cloud migrations</li> <li>Evaluate current and future capacity needs for both during and after migrations</li> <li>Develop a plan and business case for upgrades, changes, and workarounds</li> </ul>
Benefits	Cost Breakdown – Per Year
<ul style="list-style-type: none"> <li>Identifies State of Washington network needs and opportunities to improve network capacity and resilience</li> <li>Manages network impacting migration by identifying limitations before migrations occur</li> </ul>	<p>Year 1 – \$230,975.00 - \$831,160.00            Year 2 – Not Applicable            Year 3 – Not Applicable</p>

**Assumptions**

- Project duration: 9 months
- Network changes not included in assessment costs
- Using Gartner industry averages, this project has the potential to uncover significant cost savings.

**Agency Migrations to the Cloud**



#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost	
EA4	Agency Migration to Cloud	24 months	\$3,709,347.84 - \$21,874,229.64	NA	
<b>Project Type</b>		Agency directed with support from Service Broker			
<b>Description</b>					
<p>The Data Center Migration Program includes the consolidation of workloads from the current Agency data centers into the cloud. This project will perform the migration activities required to move the application workloads to the cloud versus new on-premise environments at the CTS Data Centers. This project will be performed in conjunction with the cloud migration projects to maintain application dependencies. Cloud migration activities are dependent on EA-1 Tool activities.</p>					
<b>Outcomes / Objectives</b>			<b>Key Activities / Sub-Projects</b>		
<p>The stated outcomes based on the analysis will be to transition out of all data centers in the State to public cloud vendors within the 24-month timeframe.</p>			<p>Key activities for this project will be dependent on the broader transformation program. Several key activities will include the following:</p> <ul style="list-style-type: none"> <li>• Set up Migration Factory teams to perform workload migrations</li> <li>• Set up the design and environments in CTS Centers to support the workload migrations</li> <li>• Perform the workload migrations using a Wave / Event-based approach</li> </ul>		
<b>Benefits</b>			<b>Cost Breakdown – Per Year</b>		
<ul style="list-style-type: none"> <li>• Allows Agency application owners to take advantage of Platform as a Service, purchase subscriptions over licenses, and increase application availability.</li> <li>• Produces documented strategy and plan to migrate each of State of Washington’s applications to the cloud or regional data centers</li> <li>• Performs a Proof of Concept migration to the cloud</li> <li>• Continues using Tools for Performance collection and cloud readiness analysis</li> <li>• Ensures the State of Washington focuses IT spend on protecting important data while providing the ability to protect different storage tiers at lower overall costs</li> </ul>			<p>Year 1 – \$572,450.30 - \$3,355,254.85            Year 2 – \$2,215,641.38 - \$13,105,088.01            Year 3 – \$921,256.17 - \$5,413,886.78</p>		



### Assumptions

- Estimated project duration: 22 months
- Project Dependent on Projects EA1A, EA1B, GOV2, WF3
- Agency Project Duration based on size: Small (4 months), Medium (6 months), Large (16 Months)
- Number of Agencies: Small (40), Medium (18), Large (10)
- The project includes Application Dependency and planning tool, such as TDS Transition Manager for 11,500 servers for four (4) months and at 30% per month for the remainder of the project
- 3<sup>rd</sup> Party migration tools (Carbonite Migrate, Cloudamize) are estimated based on 30% of 11,500 servers. Cloud-native migration tools (Azure Migrate, AWS CloudEndure) expected to support 70% of the migrations
- The project includes setup and deployment of migration tools, dashboard, and monitoring of migration activities
- The project includes migration of all data to public cloud services or Washington State Cloud
- The project includes setting up and testing DR functionality
- The project focuses on cloud migration using rehosting (lift and shift) and limited re-platforming (Database Platform as a Service) approaches
- The project does not include public cloud costs (servers, storage, connectivity)

### Agency Application Portfolio Rationalization

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost	
EA9	Application Portfolio Rationalization	18 months	\$2,523,580.00 - \$15,344,360.00	NA	
<b>Project Type</b>		Agency Directed with support from Service Broker			
<b>Description</b>					
The Application Portfolio Rationalization Program includes the consolidation of workloads from the current Agency data centers into the cloud. Application portfolio rationalization is the act of streamlining the existing application portfolio with an explicit goal of improving efficiency, reducing complexity, and lowering the total cost of ownership (TCO) through a myriad of processes. Application Rationalization also takes the form of specifically selecting Agency applications based on their positive effect on the business, balancing the value and cost of all existing proposed applications, and continuously monitoring application value in real-time and adjusting it accordingly.					
<b>Outcomes / Objectives</b>			<b>Key Activities / Sub-Projects</b>		
Identify the applications, estimate the effort required, and develop plans to support modernizing the applications. Using refactoring and re-platforming activities, the applications can be migrated to use newer			Key activities for this project will be dependent on the broader transformation program. Several key activities will include the following:		



<p>cloud technologies, including containers, serverless, and cloud-native database platforms</p>	<ul style="list-style-type: none"> <li>• Identify eligible applications to evaluate for modernization</li> <li>• Prioritize applications based on business needs, cost impact, and opportunities to align application capacity with business patterns.</li> <li>• Evaluate application code and configurations for refactoring and modernization project activities</li> <li>• Propose projects to modernize the selected applications</li> </ul>
<p><b>Benefits</b></p> <p>Provides:</p> <ul style="list-style-type: none"> <li>• Value Stream Mapping of Deployment, Automation, and Operation policies</li> <li>• Infrastructure as Code POC</li> <li>• Monitoring POC</li> <li>• PII Real-time Migration</li> <li>• XaaS/ Continuous Delivery</li> <li>• Budget, Cost Control, Fiscal Management managing budget reduction</li> <li>• Integrated evaluation with One Washington Enterprise Financial Management program</li> </ul>	<p><b>Cost Breakdown – Per Year</b></p> <p>Year 1 – Not Applicable          Year 2 - \$1,261,790.00 - \$7,672.180.00          Year 3 - \$1,261,790.00 - \$7,672.180.00</p>
<p><b>Assumptions</b></p>	
<ul style="list-style-type: none"> <li>▪ Estimated project duration:9-12 months per Agency</li> <li>▪ Project dependent on individual Agency completion of EA4</li> <li>▪ 3<sup>rd</sup> Party Software such as code analysis not estimated</li> <li>▪ The project recommended for an Agency to use new and additional features in the public cloud</li> </ul>	



## Federated Identity Management – Cloud and Privileged Access

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost	
EA11	Federated Identity Management – Cloud and Privileged Access	9 months	\$1,742,280.00 - \$2,121,480.00	\$1,984,320.00 – \$3,304,320.00	
<b>Project Type</b>		Enterprise (Led by the Service Broker with Agency participation)			
<b>Description</b>					
<p>As the state continues to adopt a broader ecosystem of cloud and vendor-specific services, a consistent identity is needed for each state employee and third parties performing work on behalf of the Agencies. A Federated Identity platform, such as Ping Identity, Okta, or Microsoft Azure AD, is an important capability to enable consistent and secure access to cloud services and applications. These platforms include capabilities to support multiple source directories (such as Active Directory), Role-Based Access Control (RBAC), Multi-Factor Authentication (MFA), and authentication integrations using LDAP, SAML, and OAuth protocols. Federated identities also help reduce security and compliance risk by providing a single sign-on (SSO) and provide one place to make privilege and application access changes.</p>					
<b>Outcomes / Objectives</b>			<b>Key Activities / Sub-Projects</b>		
Establish a Federated Identity service to use for accessing cloud resources Enable MFA for privileged access to cloud services and resources Provide application access to support SSO initiatives			Key activities for this project will be dependent on the broader transformation program. Several key activities will include the following: <ul style="list-style-type: none"> <li>• Select and procure Federated Identity Service</li> <li>• Integrate with existing directory services</li> <li>• Integrate with the cloud environment</li> <li>• Identify the first set of applications for conversion (e.g., Microsoft 365)</li> <li>• Enable MFA for privileged users and administrators</li> </ul>		
<b>Benefits</b>			<b>Cost Breakdown – Per Year</b>		
<ul style="list-style-type: none"> <li>• Provides Single Sign-On with optional MFA</li> <li>• Provides single platform to provide identity services</li> </ul>			Year 1 – \$1,742,280.00 – 2,121,480.00 Year 2 - \$992,160.00 - \$1,652,160.00 Year 3 - \$992,160.00 - \$1,652,160.00		
<b>Assumptions</b>					
<ul style="list-style-type: none"> <li>▪ Estimated project duration: 9 months</li> </ul>					



## Governance & Risk Management Projects

### Establish Enterprise Cloud Service Broker

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost	
GOV2	Establish Enterprise Cloud Service Broker (CSB)	3 months	\$1,014,840.00 - \$1,370,680.00	\$1,426,266.67 - \$5,573,720.00	
<b>Project Type</b>		Enterprise (led by the Service Broker with Agency participation)			
<b>Description</b>					
<p>As part of the overall Transition and Transformation program, the Cloud Services Broker is a Governance entity that manages the use, performance, and delivery of cloud services. It negotiates relationships between cloud providers and Agency consumers. As cloud computing evolves, the integration of cloud services may be too complicated for Agencies to manage alone. This project involves establishing the business model, contracts, and collaborative organization of the Service Broker to include the people and processes.</p> <p>According to Gartner, Cloud Services Brokerage (CSB) is an IT role and business model. An enterprise uses CSB to add value to one or more (public or private) cloud services on behalf of one or more consumers of that service via three primary roles: <u>aggregation, integration, and customization brokerage</u>. A CSB enabler provides technology to implement CSB, and a CSB provider offers combined technology, people, and methodologies to implement and manage CSB-related projects.</p>					
<b>Outcomes / Objectives</b>			<b>Key Activities / Sub-Projects</b>		
<p>Service brokers are the link between the Agency and the cloud service provider. The broker holds information about the services provided, carries out the details of ordering, provisioning, connecting these services to the application being built by the Agency, and automates steps that used to be performed by IT operations with multiple infrastructure management tools.</p>			<p>Key activities for this project will be dependent on the broader transition and transformation program. Several key activities will include the following:</p> <ul style="list-style-type: none"> <li>• Define criteria for IT services vendor selection and relations</li> <li>• Define Service Levels, Objectives and Key Results (OKR), success criteria</li> </ul>		
<b>Benefits</b>			<b>Estimated Cost Breakdown – Per Year</b>		
<ul style="list-style-type: none"> <li>• Provides cloud-ready resources, processes, and enterprise tools</li> <li>• Establishes updated relations and contracts with Cloud providers, service providers, and professional services organizations</li> <li>• Updates operational processes to reflect a focus on planning and preparation and reduce the friction of repeatability</li> </ul>			<p>Year 1 – \$1,089,906.67 - \$1,674,560.00            Year 2 – \$675,600.00 - \$2,734,920.00            Year 3 – \$675,600.00 - \$2,734,920.00</p>		
<b>Assumptions</b>					



- Estimated project duration: 3 months
- This project is dependent on Projects EA-1A, EA-1B, and EA1C for tool deployment or integration.

## Establish Cybersecurity & Risk Management Governance

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost
GOV5	Cybersecurity & Risk Management Governance	6 Months	\$802,320.00 - \$923,040.00	NA
<b>Project Type</b>		Enterprise (Led by the Service Broker with Agency participation)		
<b>Description</b>				
IT governance (ITG) is defined as the processes that ensure the effective and efficient use of IT in enabling an organization to achieve its goals. As part of the overall Transition and Transformation program, IT security governance is the system by which an organization directs and controls IT security. Governance specifies the accountability framework and provides oversight to ensure that risks are adequately mitigated, while management ensures that controls are implemented to mitigate risks.				
<b>Outcomes / Objectives</b>		<b>Key Activities / Sub-Projects</b>		
Information Security Governance and Risk Management involve identifying an organization's information assets and the development, documentation, and implementation of policies, standards, procedures, and guidelines that ensure confidentiality, integrity, and availability.		Key activities for this project will be dependent on the broader transition and transformation program. Several key activities will include the following: <ul style="list-style-type: none"> <li>• Establish cloud security standards for cloud vendor internet communication use (align to current security capabilities such as WAF, SIEM, IDS to ensure cloud vendor internet maintains security for cloud-hosted applications)</li> <li>• Establish Enterprise Cloud Data Security Policies and controls (Update to support all regulatory types)</li> <li>• Establish Federated Identity standards to support cloud and SaaS models</li> </ul>		
<b>Benefits</b>		<b>Estimated Cost Breakdown – Per Year</b>		
Provides: <ul style="list-style-type: none"> <li>• Security frameworks and data protection training and awareness</li> <li>• Digital Government framework for digital services</li> <li>• Cloud services security strategy (align to the state security</li> </ul>		Year 1 – \$802,320.00 - \$923,040.00 Year 2 – Not Applicable Year 3 – Not Applicable		



standard, NIST 800-171, FedRAMP, federal regulations)

**Assumptions**

- Estimated project duration: 6 months
- Ongoing support provided by GOV2 project

**Establish Cybersecurity & Risk Management Governance - Constituent Identity Standards**

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost
GOV8	Cybersecurity Governance - Constituent Identity Standards	3 Months	\$75,960.00 - \$178,200.00	NA
<b>Project Type</b>		Enterprise (Led by the Service Broker with Agency participation)		
<b>Description</b>				
Federated Identities provide benefits for state employees and constituents. Following the results of the Federated Identity project (EA11), establishing the standards and approach for offering constituents a single identity will provide easier access and management to State services and improve security by applying controls once across multiple applications and services.				
<b>Outcomes / Objectives</b>		<b>Key Activities / Sub-Projects</b>		
Define a shared approach for enabling a single identity for constituents for multiple state applications and services		Key activities for this project will be dependent on the broader transition and transformation program. Several key activities will include the following: <ul style="list-style-type: none"> <li>• Establish Constituent Identity standards and approach to support Federated Identity</li> </ul>		
<b>Benefits</b>		<b>Estimated Cost Breakdown – Per Year</b>		
<ul style="list-style-type: none"> <li>• Establishes cloud-focused federated identity services and platform to enable enterprise Identity services and management (use as a greenfield service for cloud platforms and SaaS); must include Privileged Access management, MFA, AD integration (multi-domain sources) and focus on Agency-specific use versus cross-enterprise sharing during this phase)</li> <li>• Establish Constituent Identity standards and approach to</li> </ul>		Year 1 – Not Applicable Year 2 – Not Applicable Year 3 – \$75,960.00 – 178,200.00		





support Federated Identity

**Assumptions**

- Estimated project duration: 3 months
- Project estimated to begin in month 25

**IT Workforce Projects**

**IT Workforce: Workforce Planning Initiative**

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost	
WF6	Workforce Planning Initiative	6 Months	\$572,580.00 - \$1,438,980.00	\$470,400.00 - \$1,462,200.00	
Project Type		Enterprise (led by the Service Broker with Agency participation)			
<b>Description</b>					
Workforce planning is a continual process used to align the needs and priorities of the organization with those of its workforce to ensure it can meet its legislative, regulatory, service, and production requirements and organizational objectives.					
<b>Outcomes / Objectives</b>			<b>Key Activities / Sub-Projects</b>		
Implement Strategic Workforce Planning <ul style="list-style-type: none"> <li>▪ Problem Solving and Prevention. High-stress work environments make conflict management a challenge</li> <li>▪ Forecasting expected labor costs</li> <li>▪ Leadership Planning: hiring the right people in the right positions to ensure success and make daily operations run smoothly</li> <li>▪ Improving KPIs</li> </ul>			Key activities for this project will be dependent on the broader transformation program. <ul style="list-style-type: none"> <li>▪ Define Guidance on Agency organization changes to support Bi-Modal / Cloud specific team structures</li> <li>▪ Training and use case focus on improving quality through automation and development lifecycle practices, and collaboration</li> </ul>		
<b>Benefits</b>			<b>Estimated Cost Breakdown – Per Year</b>		
Provides <ul style="list-style-type: none"> <li>▪ Skills Management Process including focus career roadmap and on realigning skills to meet current and future cloud capabilities</li> <li>▪ Skills Inventory System</li> </ul>			Year 1 – \$648,300.00 - \$1,695,420.00 Year 2 - \$197,160.00 - \$ 602,880.00 Year 3 - \$197,160.00 - \$ 602,880.00		



- Skills Development Program including certification and experience roadmap
- Agency ability to respond quickly and more strategically to change as the organization and managers can recognize emerging challenges in the market, workforce, and business
- Improved Agency efficiency, effectiveness, and productivity as employees possess the right skills and are a good fit for the job

### Assumptions

Estimated project duration: 6 months

The project includes Agency efforts to plan realignment to support bi-modal operations (existing IT operations and cloud operations). Cloud skills and training will be required to maximize the benefits of cloud adoption.

Low Estimate

Agency Participation: 10 Agencies

Year 1 is estimated at 50 training resources at \$1200/resources

Year 2-3 is estimated at 50 training resources at \$900/resource/year

High Estimate

Agency Participation: 68 Agencies

Year 1 is estimated at 1000 training resources at \$1200/resources

Year 2-3 is estimated at 1000 training resources at \$900/resource/year

## IT Workforce: Organizational Change Management

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost	
WF7	Organizational Change Management	12 months	\$1,525,160.00 - \$7,070,240.00	NA	
<b>Project Type</b>		Agency Directed with support from Service Broker			
<b>Description</b>					
Change management is the process, tools, and techniques to manage the people side of change to achieve the required business outcomes. Change management incorporates the organizational tools that can help individuals make successful personal transitions resulting in the adoption and realization of change.					



There are three primary stages for the State of Washington making a strategic change: 1) realizing that the current strategy is no longer suitable for the State's situation; 2) establishing a vision for the State's future direction, and 3) implementing the change and setting up new systems to support it.

Outcomes / Objectives	Key Activities / Sub-Projects
<ul style="list-style-type: none"> <li>▪ Change management is a process that helps ease any organizational transitions</li> <li>▪ Aid on the people side of change.</li> <li>▪ Help “employees to understand, commit to, accept, and embrace changes in their current business environment.”</li> </ul>	Key activities for this project will be dependent on the broader transformation program. <ul style="list-style-type: none"> <li>▪ Organizational Change Management Strategy (including success criteria and OKRs)</li> <li>▪ Documentation and Evangelism POC Customer Relationship Management</li> </ul>
Benefits	Estimated Cost Breakdown – Per Year
<ul style="list-style-type: none"> <li>▪ Organizational Change Management Strategy (including success criteria and OKRs)</li> <li>▪ Documentation and Evangelism POC</li> <li>▪ Customer Relationship Management</li> </ul>	Year 1 – \$953,225.00 - \$3,048,120.00 Year 2 - \$571,935.00 - \$1,902,480.00 Year 3 – \$0.00 - \$1,902,480.00
Assumptions	
<ul style="list-style-type: none"> <li>• Estimated project duration: 16 months over 24 months</li> <li>• Dependent on Projects EA4 and WF6</li> </ul>	

### IT Workforce: Establish Cloud-Ready Operations

#	Project	Implementation Timeline	Implementation Estimated Costs	Estimated Runtime / Operational Cost
WF10	Establish Cloud-Ready Operations	12 months	\$572,580.00 - \$1,156,700.00	NA
<b>Project Type</b>		Agency-directed with support from Service Broker		
<b>Description</b>				
Cloud Services requires a different approach and skills than traditional IT services to adopt effectively. By building up the Workforce Initiative and CCoE projects, Agencies will be able to build cloud teams capable of setting up the cloud environment and preparing to support the migration projects.				
Outcomes / Objectives		Key Activities / Sub-Projects		



<ul style="list-style-type: none"><li>▪ Establish Agency cloud adoptions and operations team(s)</li><li>▪ Identify existing cloud vendor use and integrate with strategic tools</li><li>▪ Evaluate and update existing cloud vendor use for operational and security alignment based on enterprise cloud standards</li><li>▪ Implement additional cloud vendor accounts and landing zone environments based on need</li></ul>	<p>Key activities for this project will be dependent on the broader transformation program.</p> <ul style="list-style-type: none"><li>▪ Organizational Change Management Strategy (including success criteria and OKRs)</li><li>▪ Documentation and Evangelism POC Customer Relationship Management</li></ul>
<b>Benefits</b>	<b>Estimated Cost Breakdown – Per Year</b>
<ul style="list-style-type: none"><li>▪ Establishes a bimodal team to balance building the new environments while maintaining the current IT services effectively</li><li>▪ Builds cloud environments that meet Agency standards and security controls</li></ul>	<p>Year 1 – \$429,435.00 - \$867,525.00 Year 2 – \$143,145.00 - \$289,175.00 Year 3 – Not Applicable</p>
<b>Assumptions</b>	
<ul style="list-style-type: none"><li>• Estimated project duration: 12 months</li><li>• Dependent on Projects CCoE and Service Broker (GOV2) and Workforce Planning (WF6)</li><li>• Labor can take on some efforts related to Cloud Migration (EA4).</li></ul>	