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WASHINGTON TECHNOLOGY SOLUTIONS

Washington's Consolidated Technology Services Agency

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November 30, 2021

TO: The Honorable Jay Inslee, Governor of Washington
The Honorable Christine Rolfes, Senate Ways & Means Committee
The Honorable Lynda Wilson, Senate Ways & Means Committee
The Honorable Timm Ormsby, House Appropriations Committee
The Honorable Drew Stokesbary, House Appropriations Committee
The Honorable Reuven Carlyle, Senate Environment, Energy, & Technology Committee
The Honorable Doug Ericksen, Senate Environment, Energy, & Technology Committee
The Honorable Javier Valdez, House State Government & Tribal Relations Committee
The Honorable Mike Volz, House State Government & Tribal Relations Committee

FROM: William S. Kehoe, Director and State Chief Information Officer

SUBJECT: Cloud Transition Task Force Report

Washington Technology Solutions is pleased to inform you that it has completed the Cloud Transition Task Force Report, pursuant to Chapter 40, Laws of 2021 Sec. 4 (HB 1274).

The report contains the findings and recommendations related to the impacts on labor of transitioning to the cloud, and associated training needs.

Please contact Derek Puckett, Director of Legislative Affairs, at (360) 407-7989 or derek.puckett@watech.wa.gov with any questions.

Attachment

cc: Brad Hendrickson, Secretary of the Senate
Bernard Dean, Chief Clerk, House of Representatives
Sarian Scott, Senate Ways & Means Committee
Jessica Van Horne, House Appropriations Committee
Angela Kleis, Senate Environment, Energy, & Technology Committee
Jason Zolle, House State Government & Tribal Relations Committee
Derek Puckett, WaTech

Office of the Chief Information Officer

Cloud Transition Task Force Report to the Legislature

November 30, 2021

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Executive Summary

The Washington State Legislature has determined that the state's information technology should move toward cloud services, with the expectation that this will deliver technical capacity, security, resiliency, disaster recovery capability and data analytics platforms and tools necessary to provide Washingtonians the services they require. (See Engrossed Second Substitute House Bill 1274 [E2SHB 1274].) Washington state agencies have started to transition state systems to cloud technology to bring those benefits to government services and Washington residents.

The Cloud Transition Task Force was created by the Legislature to review the impacts of these migrations on state staff and consider how best to meet the retraining needs to ensure that state employees are retained and fully supported through the transition. The following report summarizes the research and policy considerations addressed by the Task Force. As a result of this work, the Task Force agreed on the following findings and recommendations. Each of these findings and recommendations are explored more deeply in the body of the report.

> **Finding #1:** Agency approaches to migrating to cloud services should align with their portfolio modernization strategies.

The computing systems in place today are implemented, operated and maintained by a dedicated IT workforce that has developed extensive knowledge and understanding of the state's business environment. To retain these staff and their expertise in state systems, staff will need to complement their existing skills with training required to support the demands of new computing environments.

> **Finding #2:** The state's education and competencies tracking mechanisms need to be improved to provide data on competencies within the state IT workforce, and to measure progress toward preparing staff for cloud computing.

The state can take steps now to plan for and prepare workers for cloud migrations.

> **Finding #3**: More information about the state's future technology environment is needed before we can fully understand the skills that will be needed to support Washington's computing environment. However, training can begin now for skills commonly in demand in cloud computing environments.

Staff retraining will need to be an integral part of agencies' plans for the modernization of their business processes and technologies.

> **Finding #4:** Staff training planning is an integral component of an agency's cloud transition roadmap.

Cloud adoption is not just replacing existing technology, but includes a restructuring of business processes, data structures and reconfiguring systems to capitalize on the efficiencies offered by cloud computing. Managing change and addressing employee and leadership fears is critical to reducing resistance and promoting a successful transition.

> **Finding #5:** Agencies need to implement organizational change management during the planning process to ensure people and processes are well prepared for change.

A large-scale state migration to cloud services may prompt modifications to the state's current classification and compensation structures.

> **Finding #6:** Sound workforce planning is needed to ensure that state employees are prepared to address the challenges of the future technology environment and that the state's classification and compensation structure remains in sync with future needs.

As the state continues to evolve its systems, state IT staff will need to be retrained and provided opportunities to improve skills in new areas.

> **Finding #7:** The state will need to invest in retraining for the IT workforce as agencies transition to cloud services.

Each agency will need to develop a workforce retraining plan that syncs to their cloud adoption strategy and roadmap. An enterprise approach to retraining will ensure retraining efforts are coordinated and consistent across agencies.

> **Finding #8:** A funded, coordinated retraining program that defines and implements a well-planned approach aimed at building core competencies is needed.

Washington is home to one of the most vibrant technology sectors in the United States. Strategic industry partnerships can contribute to the success of an IT workforce training program.

> **Finding #9:** Strategic technology partnerships should be leveraged to plan and provide IT training that prepares the state's IT workforce in current and future core competencies.

The following recommendations are offered to address the findings identified above. For a more detailed discussion of each recommendation, please see pages 21-27.

Recommendation #1: Establish a Cloud Readiness Program within WaTech to assist agencies' plans and prepare for further transitioning to cloud computing.

The cloud readiness program should focus on developing appropriate tools and technical assistance to help agencies prepare agency-specific cloud transition roadmaps, associated training plans and organizational change management strategies.

Recommendation #2: Establish the Cloud Retraining Program to provide a coordinated approach to skills development and retraining.

The Cloud Retraining program and fund should be established within the Cloud Readiness Program to provide a coordinated approach to skills development and retraining to ensure IT staff can prepare appropriately for the state's transition to cloud computing.

Recommendation #3: Define career pathways and core competencies that will support opportunities for the state's IT workforce for advancement and transferability across agencies.

Defining core IT competencies can help guide staff in career and skills development and can be used to define clear retraining pathways.

Recommendation #4: Develop public/private partnerships with industry partners to ensure effective planning for staff retraining.

Private sector technology partners invest substantial resources into forecasting, defining, and delivering state-of-the-art technology to support the business of the state. State technology and political leaders understand that developing strong strategic relationships is key to sustained delivery of high-quality business solutions over time.

Retaining and preparing our state's IT workforce is essential to effectively carrying out the business of the state. It is imperative that we provide appropriately planned and funded support to ensure we provide the workforce with the necessary skills and knowledge to continue to serve Washington's residents, businesses, and communities efficiently and with high quality.

The Cloud Transition Task Force believes this report should lay the foundation for what will be ongoing migration to the cloud. The state will continually have to evaluate how best to meet the retraining needs to ensure that state employees are retained and fully supported, so the transition benefits not just state agencies but its employees as well.

Introduction

For over two decades the technology industry has been transitioning from on-premises solutions that have been custom-built to meet the specific needs of the organization, to cloud-based services that have the potential to provide greater flexibility, efficiency and security. More recently, Washington state agencies have started to transition state systems to cloud technology to bring those benefits to government services and Washington residents.

- In 2012, Washington's state chief information officer (CIO) articulated the state's original "**cloud first**" policy, encouraging state agencies to consider cloud services when replacing existing technology assets. Technology Strategy (wa.gov)

- In the 2019-21 biennial budget, the Legislature directed WaTech to undertake an assessment of the state's cloud readiness (referred to in this report as the Unisys Report). Unisys Deliverable 3 Statewide Cloud Computing Readiness Assessment-FINAL-103020.pdf (wa.gov)

- In January 2021 the state's Office of the CIO (OCIO) released the "Washington State Cloud Readiness Report," which summarized the statewide cloud readiness assessment and provided a cloud migration plan. This report recommended a new "*cloud only*" strategy (meaning agencies will adopt cloud solutions unless doing so imposes an unmanageable challenge.) Cloud Readiness Report.pdf (wa.gov)

- In June 2021 the Statewide Information Technology Strategic Plan 2021-2025 set forth advancing adoption of modern, cloud-based technologies as a key objective. 2021 - 2025 Technology Strategic Plan Published | OCIO (wa.gov)

- In 2021, the Legislature stated its intent that the state's information technology (IT) be migrated toward cloud computing. 1274-S2.SL.pdf (wa.gov) This intent statement supports a transformation in the state's computing environment that has been under way for over a decade.

This increasing emphasis on transitioning to cloud computing solutions promises a wide array of benefits for the state and the residents, businesses and communities it serves. Some of the benefits include:

WHAT IS CLOUD COMPUTING?

Contrary to what the term suggests, "the cloud" is not a monolithic, single entity. Instead, it is an approach to computing that allows applications and infrastructure to use a network of remote servers hosted on the internet to store, manage and process data, rather than a local server or a personal computer. There are three types of cloud computing:

Private Cloud – dedicated to a single organization.

Public Cloud – dedicated to multiple organizations.

Hybrid Cloud – a mixture of On-Premises, Private Cloud and Public Cloud.

- Improved reliability and resiliency, including the ability to rapidly scale capacity.
- Quicker deployment of new technology-based solutions and IT resources.
- Pay based on use (rather than provisioning for a certain number of resources) provides an opportunity to reduce costs.
- Enhanced security.

The state is already recognizing the benefits of cloud computing, as WaTech and some agencies have already started migrating some resources to the cloud and are implementing cloud-based platform and software solutions. Throughout the COVID-19 pandemic, cloud computing services provided the capacity necessary for state employees to transition to remote work, analyze public health datasets to provide critical insights that facilitated disease management, and keep the public informed in a constantly changing environment.

However, some stakeholders have also expressed concerns that this cloud transition does not make sense for all services and could have negative impacts on the state's IT workforce, and ultimately could result in the loss of IT jobs in state government. Others are concerned that finding and retaining qualified technology workers is becoming increasingly difficult in this new environment. To retain the IT workforce we have today with the extensive knowledge and understanding of the state's business environment, the state will need to provide sufficient retraining to ensure they can be successful in a cloud-enabled environment.

This report examines the expected impact of the cloud transition on the state's IT workforce and provides recommendations to ensure IT staff and others affected by the shift to cloud computing remain active and contributing participants in delivering state services.

IT Workforce Impacts of the State's Transition to Third-Party Cloud Services

Today's state technology environment is aging. While the state has made progress in implementing cloud services in the past two decades, much work remains. The State Cloud Readiness Report suggests that approximately 9,000 servers and 3,300 applications may be favorable candidates for the cloud (Cloud Readiness Report. Cloud readiness criteria included, for example, high-performance assets, older assets and high network dependency. This does not, however, mean all these assets are prioritized for migration in the immediate future. It is prudent to align migrations with the agency's portfolio modernization strategy, focusing on migrating systems when they should logically be replaced (e.g., when a service is reaching end of life.)

While the term "the cloud" is used quite often, it is something of a misnomer. Cloud computing is not a monolithic entity, but rather refers to several approaches to delivering technology solutions using a network of servers hosted on the internet. In some cases, vendors develop pre-built Software-as-a-Service (SaaS) applications that require limited training for IT administrators. In other cases, vendors provide Infrastructure- or Platform-as-a-Service (IaaS and PaaS) solutions that require IT staff to update their existing skills with new concepts that unlock the value of these services. To understand the future of the state's cloud computing environment, it is important to understand how and when agencies plan to migrate their legacy systems.

Some agencies have made significant strides in adopting cloud technologies. For example, in 2017 when the state's Health Benefit Exchange's (HBE) hardware was approaching end of life, they decided to transition to a cloud platform. Today, the HBE is now taking the next step to re-architect its systems on the vendor's commercial cloud platform to allow them to take full advantage of the efficiencies that implementing cloud-native architecture can provide. However, most agencies have been measured in the speed of their adoption and have learned through the implementation of each new cloud service. In most cases, agencies are waiting until an application or a service is coming to end of life and needs

replacement to make the transition. And, as cloud services have matured and security has improved, more foundational changes are being considered. For example, WaTech recently migrated the state's on-premises mainframe computing to a managed Mainframe-as-a-Service approach. Further IaaS and PaaS migrations are planned.

- **Finding #1:** Agency approaches to migrating to cloud services should align with their portfolio modernization strategies. *See Recommendation #1.*

The computing systems in place today are implemented, operated and maintained by a dedicated IT workforce that has developed extensive knowledge and understanding of the state's business environment and how technology is used to support the state's business.

To understand how transitioning to cloud services will impact the current IT workforce, it helps to understand where we are today. Exhibit 1 depicts the state's current number of classified IT positions by job family (rows) and levels (columns). These figures include higher education staff.

As of: July 22, 2021	Entry	Journey	Senior / Specialist	Expert	IT Manager	IT Senior Manager	Total number by job family	Percent of ITPS
Application Development	142	575	258	7	38	7	1,027	22.1%
IT Architecture	N/A	13	120	8	1	8	150	3.2%
IT Business Analysis	39	318	65	0	13	1	436	9.4%
IT Customer Support	307	282	18	N/A	34	N/A	641	13.8%
IT Data Management	26	225	100	0	16	1	368	7.9%
IT Policy & Planning	0	7	20	0	29	43	99	2.1%
IT Project Management	14	100	87	1	20	6	228	4.9%
IT Quality Assurance	39	140	14	0	3	0	196	4.2%
IT Security	N/A	67	71	3	10	10	161	3.5%
IT System Administration	167	609	181	1	21	6	985	21.2%
IT Vendor Management	1	3	4	0	3	2	13	0.3%
Network & Telecommunications	39	158	127	0	14	6	344	7.4%
Total number by job level	774	2497	1065	20	202	90	4,648	100.0%

Exhibit 1: State of Washington IT Staffing, July 22, 2021

The current state IT workforce comprises approximately 4,600 staff. More than 75% of the state's IT workers are over 40, suggesting that most likely completed their formal IT education prior to the rise of cloud-based services. As the state continues to evolve its systems, state IT staff will need to complement their existing skills with skills required to support the demands of new computing environments.
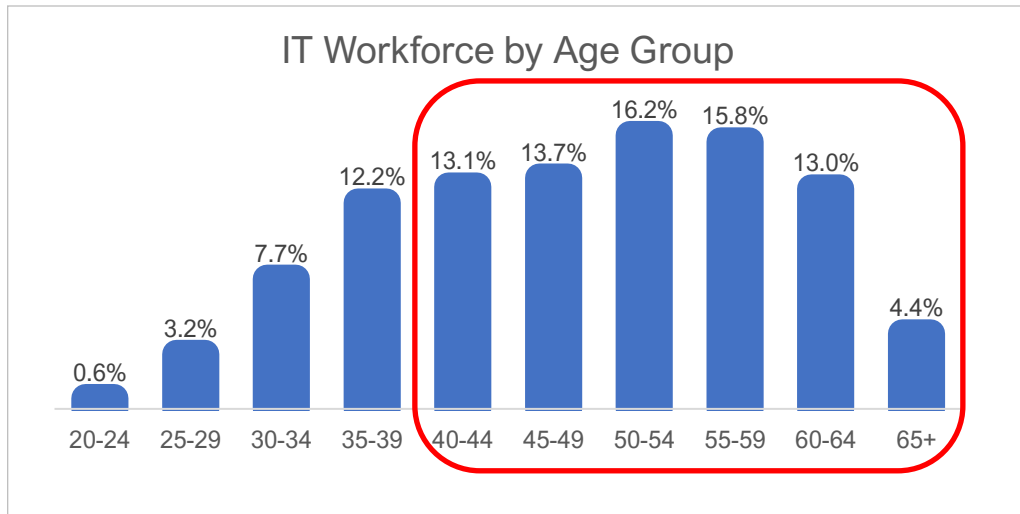
Exhibit 2: Washington State Workforce by Age, FY21
(Note: Does not include higher education, Washington Management Service,
Executive Management Service or Exempt employees.)

According to the State Human Resources (HR) division in the Office of Financial Management (OFM), approximately 76% of the IT workforce have been with the state for five or more years and have gained substantial knowledge and expertise about the state's computing environment and the lines of business that they support. This expertise is essential in developing, implementing and operating systems that continue to meet the needs of state government and the citizens it serves.

Today's state IT workforce largely reflects the current computing environment, emphasizing skills required to maintain and operate outdated on-premises architectures and legacy technology. The transition to cloud computing will alter the skills needed from the state's technology employees. According to a recent survey of agency IT organizations only about 30% of the organizations have staff who are experienced or certified in cloud support skills. This is difficult to verify, however, as the state does not currently maintain comprehensive data on the skills, competencies, and certifications of the IT workforce. While some tracking mechanisms do exist (e.g., the Washington State Learning Center and the Human Resource Management System) neither collect adequate data on its own to provide a sufficiently comprehensive picture to identify skills gaps.

- **Finding #2:** The state's education and competencies tracking mechanisms need to be improved to provide data on competencies within the state IT workforce, and to measure progress toward preparing staff for cloud computing. *See Recommendation #2.*

It is also important to note that this transition to cloud computing does not just affect IT workers. This will be a transformation that affects agencies' business staff as well because modernization will require a reexamination of business processes, workflows, and the ways data are used to inform business decisions and the ways technology will be used to inform the provision of state services. Providing mechanisms for training business staff about how to maximize the benefits of these changes will be critical as well.

The skill sets of today's workforce continues to reflect needs based on the state's predominantly on-premises compute environment, and technologies that do not fully capitalize on the efficiencies associated with the elastic platforms, tools and services available in cloud environments. Retraining will be key to the state's ability to retain these individuals and the expertise they have developed. And, as the state moves deeper into cloud computing, the need for retraining will be ongoing as the speed of technology changes will require that staff continually update their skills.

Industry research can provide some insights into the skills and workforce changes that can be anticipated in a transition to cloud services.

Industry research suggests that while there will likely be reduced demand within some current job classifications, there is likely to be job growth in other new or existing IT job classifications. These job-growth opportunities include new and emerging technologies and development environments (dev/ops, artificial intelligence). These opportunities also include stronger emphasis on integration capabilities and business-centric roles, such as user experience/usability, assessing internal processes and needs and mapping them to vendor solutions, and architecting hybrid environments and managing their implementation.

A Gartner report recently illustrated that while there may be reduced demand in some job classes, there is an expected increase in other existing job classes to support the new cloud infrastructure. *Gartner, Build A Future-Ready IT Workforce: Trends and Practices, Presented by Lily Mok, 4/29/2021.*

The Impact of Application Migration to the Cloud on IT Functions: What's Hot, What's Not

Architecture
- Physical Server Configuration
- DC Storage Architecture

- Cloud Architecture
- Network Architecture
- Security Architecture
- Information/Data Architecture

Business Applications
- Application Configuration
- Low-Level System Test and Debug

- Business Analytics
- IT Process Automation/ Scripting/"Light" Programming
- High-Level System Configuration
- Web-Scale Application Development

Business Process
- Build vs. Buy Input
- Vendor Selection Advice

- Business Process Knowledge
- Business Process Improvement
- Collaborative Requirement Development
- Vendor and SLA Management

IT Infrastructure Management
- Storage Management
- System and DBMS Optimization
- IT Infrastructure Patching, Reporting and Troubleshooting
- Physical Management of IT Infrastructure

- Security and Risk Management
- Cloud Infrastructure and Network Management
- Data Management and Integration
- IT Service Continuity/HA

Cooling Off

Heating Up

ID: 350029

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Exhibit 3: *Cloud Migration Impacts IT Skills Requirements, Gartner, 2021*

Gartner also illustrates the **new** roles and skills that will be needed as cloud technology becomes the industry standard.

New Roles and Skills Areas Emerge in the World of Cloud and Dev Ops
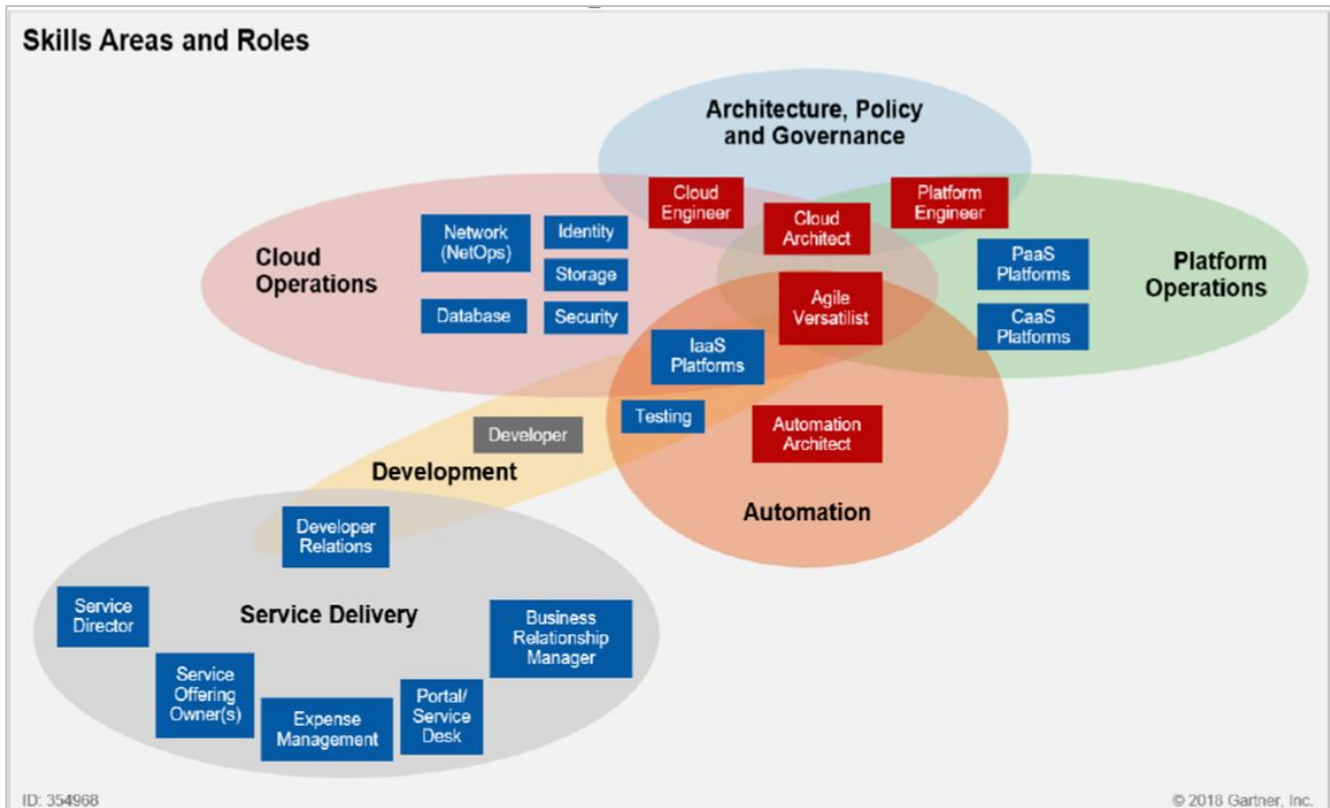
Exhibit 4: New Roles and Skills Emerge in the World of Cloud and DevOps, Gartner, 2021

These industry reports, however, reflect industry-wide changes. It is somewhat more difficult to discern the specific shifts that will take place with the state's IT workplace.

The Unisys report notes that the greatest change in Washington over the next five years is likely to be in the IT system administrator level. Data varies depending on the source, but Gartner benchmarking data suggest that server administrators who manage 30 servers on-premises today could reasonably manage 10 times more servers residing in the cloud. Other areas where the Unisys report suggests further shifts are likely to include:

- Server support. Current industry benchmarks for server support FTEs decreased from 12.1% of staff six years ago, to 5% today.

- Application Development. Application development workers are benchmarked at 13% compared to 22% in Washington.

- Service Desk. IT service desk FTEs are benchmarked at 9% versus 14% in Washington.

It should be noted that benchmarked data is general and should not be seen as one-size-fits all. Washington's decentralized technology environment that supports a wide array of agencies, each with different lines of business, does not easily crosswalk to data from a single organization. State agencies have very specific technology needs and specific federal and state law requirements. For example, a standard for state hospitals would likely not fit well for Washington's Lottery. Additionally, systems like the state's child support enforcement management system must meet federal certification requirements that could require different staffing levels. Benchmarking agencies to organizations with similar lines of business (e.g., law enforcement, public health, environmental protection, human services, health care and so on) would provide more precise comparisons.

The Unisys report provides some insight into future cloud services roles that are needed to enable cloud *migration* support and how many agencies have started planning for the specific role. As part of the Cloud Skills and Training Survey, agencies identified additional cloud-focused roles that are needed to enable cloud migration support. Sixty-four state CIOs were presented a list of skilled cloud roles typically used to mature cloud operations and adoption teams. They were then asked to identify which roles the agency has defined skills descriptions. The two right columns indicate the number and percentage of agencies that had responded they have defined a skills description for the role. (For example, 21 agencies indicated they have developed a skills description for the role of "Security Architect.") The items highlighted in green are critical roles for an *enterprise* cloud adoption or service broker team to support state agencies' cloud migration. These roles and resources can be shared to balance the agency needs for 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%

Exhibit 5: Agency-identified Roles for Cloud Services, Unisys Cloud Readiness Assessment, 2020

Mapping today's available staff skills with the needs of the future cloud environments will be critical to the state's successful transition and its ability to support, retain and realign the state's IT workforce. State agencies will need to identify how they will support, retrain and retain the existing workforce to operate in the new cloud environments.

Gartner has developed skill roadmap templates to provide industry guidance on upscaling skill sets and redeploying existing IT staff resources. Providing consistent and ongoing growth and development opportunities to upscale skills and abilities allows organizations to retain valued workers with organizational and historical knowledge and reduces onboarding, training costs and productivity loss related to hiring new talent. Additionally, providing staff with training across the enterprise provides them with transferable skills to promote within or across agencies and increases the states "bench strength" in cloud computing across the enterprise.
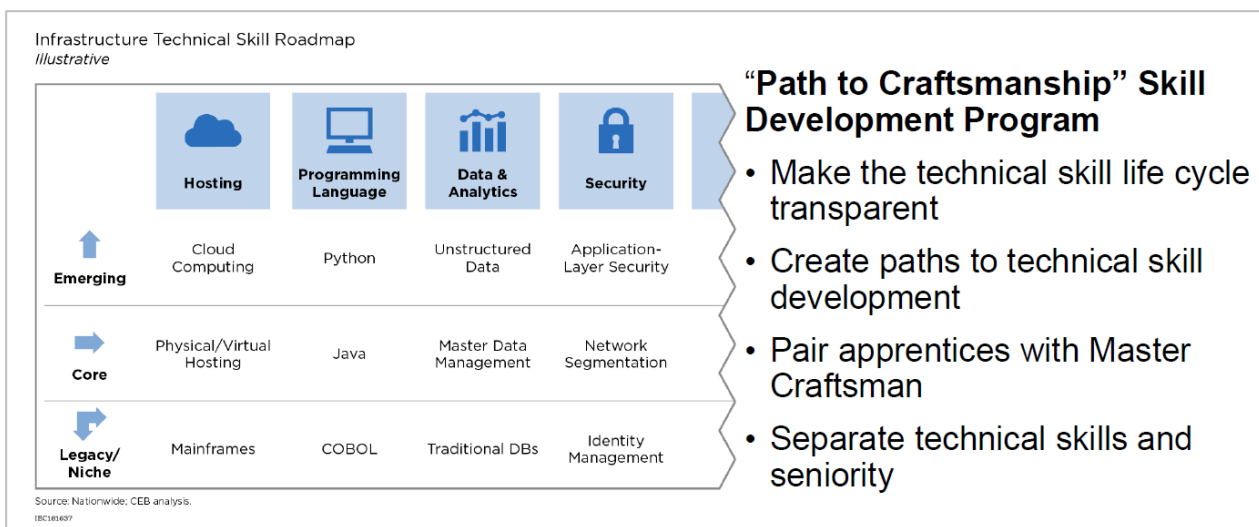
Exhibit 6: Infrastructure Technical Skill Roadmap, Gartner, 2021

Shifts in the IT skills needed will become clearer as each agency's cloud migration strategy is further defined.

The state's updated "cloud only" strategy means that agencies must adopt cloud solutions for all new IT system investments and that existing IT systems must be migrated to cloud solutions unless doing so imposes an unmanageable challenge. State policy will be updated to limit acquisition of new physical compute and storage hardware, and applications and data moved to cloud-hosted solutions in the coming years. While the timeframe for this plan may shift depending on availability of funding to support the work, this strategy helps identify the IT job classifications that will most likely be affected over the next several years.

The state's readiness assessment identifies enterprise services to be migrated at a high level. This provides a starting point for mapping out the impacts to our IT workforce due to the migration of *enterprise* services such as One Washington, and network modernization.

Agencies, however, will need to document all their current on-premises and legacy applications with target dates for migration to the cloud. Agencies will need to evaluate cloud solutions that prioritize either a commercial Software-as-a-Service, or centrally enabled Infrastructure-as-a-Service, Platform-as-a-Service, or other offerings for hosting commercial software, custom developed software and legacy applications. It is worth noting, in the past, migrations focused on replacing systems. In the future, however, the focus will be on modernizing business processes, prioritizing data and information management requirements and then understanding system replacement needs that can lead to adoption of cloud solutions with minimal customizations.

While developing this type of an agency-level cloud transition "roadmap" is important, only a few agencies have started this planning in earnest. Also, some consistency in the approach to this planning across agencies will be needed to ensure each of these agency roadmaps can feed into an enterprise-wide roadmap for planning and strategy purposes. Additional funding is needed to support this effort at an enterprise level.

The state can take steps now to plan for and prepare workers for cloud migrations. While WaTech may not understand all the specific technologies in use by each agency, there are common technical concepts in modern technology environments that WaTech can collect and provide to state agencies to educate their employees. Helping employees understand the incremental changes between how they work with today's technologies and how they will work with future technologies in the cloud will provide staff with a baseline level of comfort as agencies consider cloud-based technology. This should also accelerate their understanding of the specific technologies to be deployed once they are selected.

> **Finding #3:** More information about the state's future technology environment is needed before we can fully understand the skills that will be needed to support Washington's computing environment; however, training can begin now for skills commonly in demand in cloud computing environments. *See Recommendation #1.*

Once an agency has defined their modernization strategy, they can evaluate how their current IT workforce will need to be restructured to better meet future needs. While the state can contract out for cloud computing expertise for initial planning and migrations, cost-effective and long-term support requires a state IT workforce skilled in areas such as cloud architecture, development, security, compliance, contract management and operations. (Our labor partners will also receive notice from the agency should there be a need to contract out for this expertise.) Based on what is currently known about the state transition strategy, it is far more likely agencies will ultimately need and want to have state staff skilled in cloud support. Currently, too little is known about agency migration plans to be precise about the number of cloud-skilled staff or the appropriate mix of skill sets that will be needed. However, agencies can begin training employees on cloud computing concepts relevant to their current functions.

As part of the state's cloud migration, agencies will need to plan to train technical staff to manage new cloud environments. Again, establishing a common approach to this staff training planning will provide consistency so that centralized planning to address needed training can be completed.

> **Finding #4:** Staff training planning is an integral component of an agency's cloud transition roadmap. *See Recommendation #1.*

A well-managed workforce transition can help ensure that impacts are clearly identified and anticipated, and that employees receive the training and other support needed to successfully transition to new IT roles within state government.

Workforce retention is a significant issue in IT generally, and specifically around the migration to cloud services. For example:

- Concerns have been raised that moving to cloud computing will result in the privatization of the state's IT workforce. For example, if staff are not properly retrained to do their work in the new cloud environment or provided opportunities to receive training in new and emerging technology roles, they will not be able to remain competitive. There is concern the state would then outsource that work to skilled cloud technology workers in the private sector and those state jobs would not be recovered. It is likely that in the future the role for state employees will not necessarily be in operations and maintenance of systems but will shift to data integration and services development to integrate cloud applications and services to other necessary services and data.

- There is also concern that if demand for certain types of skills is reduced or eliminated in a cloud environment that employees will not be properly trained to move to another position at a comparable level.

- State agencies have had difficulty attracting and retaining qualified IT workers for many years, and as the market demand for cloud-related skilled workers increases, there is concern that it may be increasingly difficult to retain IT staff.

There is some evidence that the increased efficiencies cloud services provide will result in the reduced need for some skill sets. The recent Unisys study suggests that demand for certain skills will decrease, particularly around system administration. However, that study used benchmarks that reflect the experience of single organizations. The decentralized nature of IT in Washington does not make it easy to draw a direct comparison with industry benchmarks. Further, only 5% of state CIOs surveyed reported that they expect to see a gradual reduction in staff levels by 5% or more.

Results from a recent survey of other states undertaking a similar transition suggest that an increased need for training, rather than a reduction in staff is to be expected. In January 2021, the ITPS Governance Committee requested that State HR gather information on other states' workforce experiences in moving to the cloud. State HR reached out to the National Compensation Association of State Governments (NCASG) with an email survey on the impact to the IT workforce when transitioning to the cloud. Eleven states responded, including states with a mix of centralized and decentralized IT workforce, and represented and non-represented IT staff. All are still in the early stages of moving to the cloud. None have experienced any downsizing of their IT workforce. Some have brought on contractors to support the initial transition to the cloud environment. The most significant impact noted by the states surveyed is the need to train existing staff on the new platforms or with new skill sets to support and manage the new cloud environment.

Workforce changes resulting from changing technologies is not new to the state. For example, in 2014 the State Printing Office was merged into the Department of Enterprise Services. A primary driver was the Governor's directive to centralize services. However, a secondary driver was the impact of technology on printing services. As printing became more digitized, agencies were able to produce and manage

distribution electronically. The need for printing services underwent a transformation. This required the state to revise the printing job classifications and compensation. The impacts of the change were negotiated, and existing employees were cross walked to the new job classifications. No layoffs or reductions in force occurred. Employees did not experience a reduction in salary. Some employee salaries were frozen because of the new job classification salary range being lower than the employees existing salary.

Organizational Change Management (OCM) is a key component of success for any technology project requiring individuals to change, but it is especially critical for cloud project success. While the OCM philosophies essentially stay the same for cloud initiatives, end users may have misconceptions or an unclear understanding of how the cloud functions, adding to the complexities of the change environment. As a result, change impacts to the organization can be more significant and a solid OCM plan becomes crucial to achieve project goals.

For example, transitioning to cloud services typically requires more than a simple "lift and shift" migration from an on-premises data center server environment to a new cloud service. In many cases, business processes need to be revamped and reconfigured, and an associated data strategy or the restructuring of data and processes is required to capitalize on the efficiencies offered in the cloud. Often, the better way to do this is to design a system that takes advantage of updated and automated business processes and workflows and then realize the benefits of the cloud. Understanding the architecture and cost aspects of the cloud will save money over time.

Changes in the agency's approach to planning for, designing and implementing cloud services has the potential to meet significant resistance if the change management and training is not a part of the upfront organizational planning. Employees may be fearful about learning new approaches to their job, or they may be concerned about whether their work will become irrelevant. Agency leaders may be concerned about moving to new cost structures. Teams need to learn new ways of designing and integrating multiple cloud services to meet the agency's policy and security needs. All these and more fall under the category of change, and that change needs to be well managed. Without an effective strategy to identify the impacts on people and processes and putting in place a plan to manage change and the natural resistance to change, successful adoption is very difficult to achieve.

> **Finding #5:** Agencies need to implement organizational change management during the planning process to ensure people and processes are well prepared for change. *See Recommendation #1.*

Modifications will be needed to the state's classification and compensation structure as the cloud transition progresses.

In addition to workforce development and retraining, a large-scale state migration to cloud services may prompt some modifications to the state's current classification and compensation structure. Today's Information Technology Professional Structure (ITPS) was 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 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, which attract top talent from around the world. Competing for talent is an ongoing challenge for state organizations. As the state transitions to cloud computing, it may experience increased issues with attracting and retaining qualified candidates in cloud technology.

At this time the State HR Division does not expect major modifications will be needed to the existing ITPS job families or levels to support the state's cloud transition. In July 2019, the state implemented a new classification and compensation structure to respond to the unique forces in the IT labor market.

The current view is that while new skill sets will be needed, they will fall within the existing job families. For example, the enterprise roles "Identity Architect" and "Security Architect" shown in chart 2 would most likely fall under the "Architecture" job family and "Site Reliability/Automation Engineer" would most likely fall under the "Network & Telecommunications" job family. Some roles, such as "Financial Management Specialist" and "Cloud Contracting & Licensing Specialist" would not be considered IT work but fall under existing general government job classifications such as Fiscal Analyst or Contracts Specialist, which are not in the ITPS.

The possibility exists that job family definitions may require updates because of new/emerging technologies, and those can be done within the established process for managing the state's classification and compensation structures. A primary goal in the development of the ITPS was to ensure adaptability of the structure to keep pace with the changes in technology.

The state conducts biennial compensation surveys to inform compensation changes. Every cycle the survey benchmarks are reviewed and updated to account for any new work. Compensation impacts are captured through this process.

To ensure that the ITPS remains relevant, the ITPS Governance Committee was established with the State CIO and Assistant Director of State Human Resources as co-chairs. Committee members are made up of HR and IT managers representing both general government and higher education. ITPS governance creates a responsible, realistic and effective way to integrate and align ITPS across state agencies and higher education institutions. The governance framework provides appropriate controls for ongoing implementation and operations, assesses achievement of desired outcomes over time and provides a forum for continuous response to a rapidly changing environment.

The recommendations of the taskforce, and other research and information discovered by the IT and HR communities, will inform recruitment and retention strategies. Additionally, State HR and the ITPS Governance Committee will continue to proactively monitor workforce impacts and adapt the ITPS classification and compensation structure. The possibility exists that job family definitions and/or compensation may require updates because of new/emerging technologies, and these can be done within the established process for managing the state's classification and compensation structures.

> **Finding #6:** Sound workforce planning is needed to ensure that state employees are prepared to address the challenges of the future technology environment and the state's classification and compensation remains in sync with future needs. *See Recommendation #3.*

State IT Workforce Retraining Needs and Methods of Delivery

An enterprise-wide retraining strategy backed up with appropriate funding accessible by all agencies will be critical.

The primary workforce risk related to the cloud transition lies in the need for ongoing upscaling of the existing IT workforce skills. Without an enterprise strategy backed up with appropriate funding to support

all levels of IT staff within all agencies (large, medium and small), there is a significant risk to inequitable access to training based on agency budgets, or lack thereof.

Agencies will need to focus much of their future hiring on acquiring skill sets that will be needed in future cloud computing environments. Agencies will need, for example, individuals who are knowledgeable in cloud architecture so that state systems can be appropriately integrated across multiple platforms.

However, relying on hiring alone to fill the knowledge gaps will not likely be successful. It is very difficult for an organization to hire its way out of a skills gap. Most importantly, new hires will not have the deep knowledge of the state's business and computing environment. And, hiring can be expensive, time consuming and it is often difficult for state government to attract and retain top talent, especially for newer cloud technologies.

A strong worker retention program must include a robust worker training program.

State IT workforce upskilling and retraining needs

As the state continues to evolve its systems, state IT staff will need to be retrained and provided opportunities to improve skills in new areas.

IT training needs will vary widely depending on the needs of each agency and the specific job classification. Some staff will see little difference between the work they do today and supporting their work in the cloud. For others, however, some retraining will be important. For example:

- Upskilling: Some staff will remain working on applications that were once provided as an on-premises service and are now being migrated to a cloud-enabled service. These staff will need to be trained on the new tool. Their basic role/work may not change, but the method by which it is completed will change. This will be necessary for ancillary roles not typically considered when designing an IT workforce plan. For example, staff responsible for contracts, vendor management and finance will need to learn new approaches.

- Retraining: Some staff will need complete retraining. Their current knowledge, skills and abilities will not translate to a cloud service (for example, system developers who are responsible for coding on-premises systems or providing data management). This work may be provided by the third-party vendor and they may be required to develop APIs or micro servers to integrate the SaaS application(s) to other on-premises or cloud services.

Retraining

Retraining involves training employees on an entirely new set of skills to prepare them for the future. This typically occurs when workers' current tasks or responsibilities change due to an organization embracing advancements in technology.

Upskilling

Upskilling occurs when workers improve upon existing skills and deepen their abilities and impact within their area of expertise. By expanding their knowledge, skills and abilities employees become better positioned for additional responsibilities and higher-level roles on a particular career track.

In addition to retraining and upskilling, some staff will continue to work on legacy systems until those systems are prioritized for modernization. These staff will need to continue to receive training support on the work for which they are responsible in addition to training related to the future of the service they are currently maintaining. They will understand the technology roadmap for the service they support and receive career guidance and training to support the future change.

Furthermore, new work enabled by cloud computing will emerge, and it will need to be maintained. Architecture and design, artificial intelligence, data analytics and reporting, cloud cybersecurity and business process automation that includes robotics will require entirely new skill sets. These roles will likely need to be filled either through retraining current workers or hiring new talent trained in these fields. Finally, some work traditionally done within an agency IT shop may shift to become the responsibility of the business unit. In these cases, business staff will need to become familiar with and trained in the relevant skills. For example, if an agency moves a custom-built, on-premises business application to a cloud-based Software-as-a-Service, some tasks such as business analysis, requirements definition, user testing and change control may become the responsibility of the business unit. This shift will require organizational change management, including skills development.

Addressing barriers to workforce retraining

Agencies surveyed for the Unisys report identified the biggest barriers to training include:

- Inadequate training budgets (18% of respondents).
- Timeliness of training versus applying new skills in the environment (19% of respondents).
- Avoidance of business disruptions due to unavailable resources (16% of respondents).

Accurate data on the state's annual training expenditure per IT worker is not currently available. According to the 2020 Unisys report, in 2019 the 34 agencies included in the analysis received a total of $2.15 million for all training (IT and non-IT) and employee development. If this were divided solely by the number of IT workers (approximately 4,600) it would average out to under $500 per worker. This would be far below the average U.S. company's training investment per employee ($1,286.) **The Unisys report concluded that the state should plan to invest $900-$1,200 per IT employee, per year, to develop the skills needed to support a cloud-based environment.**

Finding #7: The state will need to invest in retraining for the IT workforce as agencies transition to cloud services. *See Recommendation #2.*

For a training program to be effective, agencies not only need funding, but staff must be allowed the time needed to take the training. The results of the Unisys survey indicate that in many cases agencies have been unable to free up staff to take necessary training because business operations must take precedence. In developing a workforce retraining program, consideration should be given to prioritizing training and, in some cases, providing sufficient resources to backfill staff as needed to support the necessary retraining. This is a leadership role that falls to agency executive management to ensure managers and supervisors provide sufficient time to avail themselves of the training as well.

There is no lack of quality training. IT workforce training comes in a wide array of shapes and sizes, from bite-sized ("snackable") brief tutorials to long-term investments in certificates or degrees. Each type of training opportunity meets some specific need. A comprehensive workforce training program should draw on the variety of resources to provide staff a menu of choices that can meet their specific needs, based on the timing and substance of their agency's cloud transition.

The exhibit below describes some of the more popular types of training.

TRAINING TYPE	STYLE	PROVIDERS	BENEFITS	COST	TIME COMMITMENT
Snackables	Videos, Audio (e.g., podcast)	Dept of Enterprise Services (DES) LinkedIn Learning YouTube	Easy to get quick tutorials Self-paced and "just in time" Suitable for skill development on the fly	Free - Low Cost	3 mins to 1/2 day
Instructor-led	On-line or in-person	South Puget Sound Community College DES Independent training providers (e.g., Coursera)	Broad skills development Well-recognized degree or certification	Moderate - High Cost	1-day to 2-year Associates degree
	On-line or in-person	System / tool-specific vendor led training	Specific to system being inplemented Provided "just in time"	Free or cost built into implementation contract	Varies by role
Certifications	Web-based courses, exams	Microsoft Azure, AWS, Google, etc.	Foundational, industry recognized certifications	Free to high cost	Self-paced (weeks to months)
On-the-job Training / Mentoring	Knowledge transfer	Pairing with vendor team during system implementation	Hands-on	Typically included in implementation contract	Varies

Exhibit 7: Training types, providers benefits (compiled from multiple sources)

The key to a successful workforce retraining effort, however, is to ensure staff receive the right training at the right time. Most vendors provide some level of training on their specific tool set. This is typically an item that is addressed during the contracting process to ensure that knowledge transfer and skills development are provided as part of the implementation. When a system goes live the agency will have the necessary skills to support the system and the business processes surrounding it.

Providing "just-in-time" training helps to ensure newly gained knowledge can be put to work immediately. In most cases, the timing of staff training will need to be synced with the implementation of a new or migrated service. Training staff too early without an immediate hands-on application of the training results in the loss of learning and the need for future retraining. This reduces the benefit to the agency and is frustrating to an employee who has invested time and energy in training with no way to put it to use. Ensuring staff training is appropriately timed to coincide with implementation requires that it be incorporated as part of the overall system implementation planning.

There is also a need for longer-term training to support career path development. In some cases, employees will require more extensive training that would require a longer commitment. For example, an employee wants to invest in enhanced certifications that will make them more marketable and their skills more transferable to other agencies and support an upwardly mobile career path. In other cases, an employee will have a role that will be dramatically different or will be aligned with a completely new role and skill set in a cloud environment. These individuals may embark on certification programs offered by large technology companies. Microsoft Azure, AWS and Google all offer certification programs designed to train IT professionals on their suite of tools. The state's technical and community colleges also offer various certificate programs that provide a broad-based foundation in the emerging tools.

Finally, as in any profession, IT staff need training to stay abreast of industry changes and to keep skills refreshed. There is a burgeoning field of "snackable"-sized training (anywhere from a couple of minutes to hour-long bite-sized trainings that allow employees to learn as time permits (on breaks, during commutes or over a lunch hour for example.) The Department of Enterprise Services eLearning Center provides snackable courses either directly or through partners such as LinkedIn.

Development of a successful workforce upskilling and retraining program requires data. While there is a wide array of training opportunities, creating a comprehensive workforce retraining program that ensures

staff will be appropriately skilled for the state's future cloud computing environment requires strategic and tactical planning. And planning requires sound data. Agencies will need to take specific steps to properly gauge what skills they have within their current workforce, what skills will be needed to support future computing, and methods for closing the gap between the two.

The first step is to determine the agency's short-, mid-, and long-range business and technology modernization goals and associated cloud adoption. That roadmap should include an assessment of the roles and staff skills needed to design, implement, and maintain cloud services as they are adopted.

Most state agencies have not completed the detailed assessment of their applications portfolios or documented their roadmap for cloud adoption. The new Enterprise Cloud Computing (ECC) program is expected to consult with agencies to review their application portfolio modernization strategy and assist agencies in mapping to modern staff roles and skill sets.
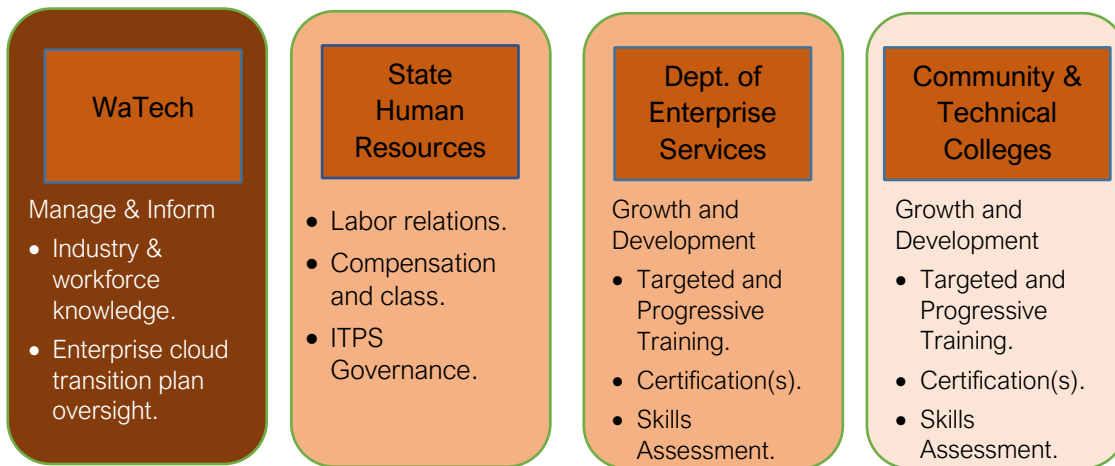
Without information about future cloud adoption, it is difficult to complete the next step: determining the IT skills gap. Agencies will need additional support to define an inventory and skills gap assessment process that can be used by all state agencies.

The next step in preparing a sound workforce retraining plan is understanding the need. Agencies will need to complete an analysis of the gap between the skills sets their IT workforce has today and what skills and competencies will be needed to support the systems defined in the roadmap.

There is currently no single state system that collects this information. The Human Resource Management System (HRMS) has a field available for this information, however it is not used consistently across agencies and is therefore unreliable at an enterprise level. The Department of Enterprise Services (DES) Washington State Learning Center (WSLC) tracks training taken by state employees, but it does not have a comprehensive data set that includes training taken outside of state government. The state's workforce planning and retention would benefit from an enterprise-wide method for maintaining an inventory of knowledge, skills and training.

Each individual agency will need to develop a workforce retraining plan that syncs to their cloud adoption strategy and roadmap. However, the state enterprise will need to provide agency guidance and ensure these efforts are coordinated so that there is consistency across agencies. State Human Resources, The Department of Enterprise Services, the State Board for Community and Technical Colleges and WaTech all play key roles in ensuring continuity and consistency across the enterprise.

WaTech	State Human Resources	Dept. of Enterprise Services	Community & Technical Colleges
Manage & Inform • Industry & workforce knowledge. • Enterprise cloud transition plan oversight.	• Labor relations. • Compensation and class. • ITPS Governance.	Growth and Development • Targeted and Progressive Training. • Certification(s). • Skills Assessment.	Growth and Development • Targeted and Progressive Training. • Certification(s). • Skills Assessment.

Finding #8: A funded, coordinated retraining program that defines and implements a well-planned training program aimed at building core competencies is needed. *See Recommendation #2.*

Strategic industry partnerships can contribute to the success of an IT workforce training program. The technology sector will both support and benefit from Washington's transition to cloud computing. Developing strategic partnerships with the key players in the technology industry to help plan and implement IT workforce training will provide mutually beneficial rewards.

Washington is home to one of the most vibrant technology sectors in the United States. We are fortunate to have relationships with global industry leaders, innovative start-ups, and a wide array of supporting technology services. Both the state and the technology industry have much to gain from a collaborative strategic partnership. The 2018-19 state IT investment totaled approximately $3.4 billion, nearly 50% of which was an investment in external technology hardware, software, telecommunications and IT services. *See* IT Spend Dashboard informing the 21-23 Biennial Report | OCIO (wa.gov). Assuming this level of investment will continue, both the state and industry benefit from strong strategic partnerships.

The state will rely on these partnerships to ensure investments build systems that provide the greatest value and customer experiences for Washingtonians. While successful strategic partnerships can take many forms, in the context of this specific discussion the state should focus efforts on ensuring the state's IT workforce is properly prepared to maintain, operate and use these systems to efficiently carry out the state's business.

One responsibility of the Cloud Retraining Program should be to establish strategic partnerships with the technology community to plan and provide appropriate cloud training to prepare the state's IT workforce. As noted previously, technology providers offer an array of training opportunities. Most vendors provide user training and knowledge transfer when implementing a new system in an organization. In addition, major technology providers (for example, Microsoft, Amazon and Google) all provide some version of training and certifications that are designed to develop core competencies in both cloud technology in general and their products. The Cloud Retraining Program should leverage existing and potential relationships to ensure these training opportunities are made available to state staff, and that the vendors work with the state to forecast future technology competencies and build programs designed specifically to address the future needs as well.

Finding #9: Strategic technology partnerships should be leveraged to plan and provide IT workforce training that prepare the state's IT workforce in current and future core competencies. *See Recommendation #4.*

Recommendations

Guiding Principles

The following seven principles guided the Task Force's consideration of the recommendations provided below.

1. All business and IT staff that are impacted in the movement to the cloud will have an opportunity for retraining.

2. Large, medium and small agencies will be treated equally in the retraining plan.

3. Accountability rests with agency leaders for ensuring affected staff are provided the time and opportunity to participate in cloud retraining.

4. Agency business and IT leadership must develop a modernization plan for their current application portfolio and services to assist in the change management and retraining process.

5. Agency business leaders need to prioritize business process automation and improvement as a necessary step and skill set in their modernization strategy.

6. Maintaining a highly skilled workforce is a value shared by the state and its private sector partners, and solutions will be a shared responsibility.

7. Rapid and continuous change will continue to be a hallmark of the technology industry.

The following recommendations are offered to address the findings identified above. These recommendations are reflected in a cloud transition budget request from WaTech.

Recommendation 1: Establish a Cloud Readiness Program within WaTech to help agencies plan and prepare for further transitioning to cloud computing.

A cloud readiness program should be established to focus on developing appropriate tools and technical assistance to help agencies prepare agency-specific cloud transition roadmaps, associated staff training plans and organizational change management (OCM).

Considerations for implementation

To properly determine what the impacts of the state's transition to cloud computing will have on the state's workforce, the state needs better information about how that transition will occur. Each agency's cloud transition will be unique, depending on the services that will be migrated. This will require all state agencies to review their current computing environment and map out the timing and sequencing of their own agency's transition. Once these roadmaps are in place, agencies will be able to work with their employees to plan for upskilling or retraining their technology team to support the agency's computing environment through the migration and beyond.

In keeping with Washington's highly federated technology environment, each agency's cloud transition will have its own cadence and content and therefore the responsibility for their staff readiness plan will need to rest with each individual agency. These training plans should address the gap between existing staff skills and the skills that will be needed because of the cloud transition and be in line with the agency's business modernization and application modernization plans. At a minimum the staff readiness plans should address the training that will be needed, plans for how the training will be provided and how the agency will ensure staff are provided sufficient time to take the training.

Agency staff training plans will need to incorporate not only IT staff whose role will change, but also business and other ancillary staff who will need to learn new skills. For example, if a SaaS solution is implemented to replace a home-grown, on-premises application, there will be opportunities to move roles that have traditionally been an agency IT employee's responsibility (e.g., change control and testing) to the business owner of the SaaS solution. And staff responsible for contract management, vendor management and financial planning will likely need to learn new ways of approaching their work as well. Agency staff training plan should address all these needs.

While each agency must be responsible for their own cloud transition roadmap and accompanying staff readiness plan, this will likely be a labor-intensive activity and one that may be new to many IT divisions. There is efficiency to be gained by defining a common approach that can be tailored to meet each agency's unique needs. Providing templates and other planning tools, as well as hands-on technical assistance, will offer needed support to agencies in this critical planning work. In addition, a common approach will provide the opportunity to roll up individual agency roadmaps into an enterprise view that is consistent across the enterprise.

Organizational change management will be a critical success factor for most agencies as they continue their migration to cloud computing. Training is one important component of OCM. Putting in place an OCM plan that focuses on including staff in the planning for the transition, capitalizing on the skills and knowledge in place at the agency, and identifying what is needed to make the transition a success for both the agency and employees is critical to reducing the natural resistance to change.

Again, establishing common tools and approaches that can be tailored to the unique needs of each agency will provide several benefits. Most agencies do not have internal OCM programs, and typically fund OCM activities in the context of a specific project. With the cloud transition, it may be useful for agencies to have support to do this work as part of the roadmap planning effort rather than as part of any individual project.

Also, an enterprise program can help provide consistency and commonality across agencies. This increases the ability to share lessons learned, and it provides an ability to monitor progress at an enterprise level.

The Cloud Readiness Program would initially be established by up to three contracted staff with deep expertise in technology planning and OCM. Their role would be to establish tools, templates, and a technical assistance program. In two years, once the initial program is established, the ongoing work of the program would transition to state staff.

Expected outcomes

- Agency-level cloud transition modernization strategies and associated roadmaps will be completed which will provide details on the systems to be transitioned and the timeframes in which they are planned to occur. This detailed information can be used to further identify and address skills gaps.

- Agency roadmaps, and associated staff plans, will provide detail on the types of training that are needed. This will help the Cloud Retraining Program provide enterprise-wide training. (The Cloud Retraining Program will be iterative, initially focusing on skills gaps agencies are currently experiencing. The ongoing development of the Cloud Retraining Program will become more robust as more is known about agencies' future needs.)

- Training coordinated at the enterprise level is expected to result in reduced costs because the state can negotiate bulk rates that may not be achievable if each agency procures training separately.

- OCM technical assistance will provide agencies help in identifying areas of resistance and people and process changes needed. OCM increases change adoption rates, reduces failed projects and project costs, and helps organizations adhere to established timelines.

Proposed budget and staffing assumptions

- Two staff resources will be devoted to developing tools and templates for agency use.

- Three staff resources will provide direct technical assistance to agencies to assist with reviewing modernization strategies and roadmaps, staffing plans and OCM strategies.

- Total cost: $1,820,000 per year. $364,000 per year, per consultant (five consultants full time).

Recommendation 2: Establish the Cloud Retraining Program to provide a coordinated approach to skills development and retraining.

A Cloud Retraining Program and fund should be established within the Cloud Readiness Program to provide a coordinated approach to skills development and retraining to ensure IT staff can prepare appropriately for the state's transition to cloud computing.

Considerations for implementation

A wide array of training opportunities is available to help staff become proficient in cloud-related skills and, where needed, receive retraining. The Department of Enterprise Services (DES), the State Board for Community and Technical Colleges (SBCTC), and private sector technology partners offer well-designed training that range from brief, easily consumable online tutorials to industry-recognized certifications and two- or four-year degree programs.

- A Cloud Retraining Workgroup, facilitated by WaTech in collaboration with DES, SBCTC, state agencies, State Human Resources and IT workers, should be established to define and implement a cloud transition retraining program. The goals of this program would be several-fold.

- Create an inventory and clearinghouse of training opportunities.

- Curate the training opportunities available to ensure that staff have access to skills development and retraining that is appropriate to their needs.

- Administer a cloud retraining fund to reduce the burden on agencies of having to fund cloud-specific training for those agencies that have limited general training budgets.

- Define goals, measures of success and establish a process for tracking staff training to determine whether they are being achieved.

- Review existing staff training tracking tools and recommend improvements to support tracking progress toward established goals.

- Implement a cloud training portal for agency staff. This would provide a single system for all staff training to be offered and tracked. (If feasible, this portal could build on the existing WSLC, which would reduce the cost of building a new portal, however it is more likely that a separate portal will be built to meet the cloud retraining program needs. Once in place, the portal can be integrated with WSLC to leverage the functionality it provides.)

- The Cloud Retraining Workgroup would provide all key stakeholders a voice in defining core competencies and appropriate training opportunities.

As with the Cloud Readiness Program, the Cloud Retraining Workgroup should consider ways of ensuring that training funds are made available on an equitable basis. All agencies, whether small, medium, or large, should have access to needed training. And training will need to be inclusive of business and IT staff to ensure all staff whose responsibilities will be impacted are provided appropriate retraining opportunities.

To support training efforts for individual staff impacted by a cloud transition, dedicated funding should be provided to agencies to retrain their staff. This funding should be in addition to existing agency training budgets and provided solely to assist agencies with a significant cloud initiative underway. A revolving cloud training fund, initially funded at $5 million per biennium, should be established and administered by

the Cloud Retraining Program. The initial infusion of funding will support enterprise-wide training of common cloud technology concepts and support training needs of agencies currently transitioning to cloud services.

Because the state's cloud transition will occur incrementally, likely over the next decade and beyond, retraining will not be a "one-and-done" effort. Additional training funds will be required in future biennia, based on needs identified through the cloud retraining program and agency cloud transition planning efforts. It is likely that training demand will vary across years. And the type of training needed will inform the need for funding because the varied options in training curricula and delivery methods available in the marketplace today.

Research conducted by the cloud transition task force suggests a range of funding per employee of about $500-$1,200 per year for cloud training, however this needs to be validated through completing the necessary planning and through actual demand. A revolving fund that continues across biennia will ensure that staff can receive needed training at the appropriate time and pace as the cloud transition continues throughout the decade.

Expected outcomes

- Trained state IT workers will gain the knowledge and expertise to continue to support cloud-enabled state systems that serve the state and Washingtonians.

- State agencies will be better able to retain IT staff who have a deep understanding of the state's lines of business and the systems that support them.

- Strategic partnerships with the technology industry will ensure training offerings are designed or selected to meet the forecasted technology needs.

- Providing a single repository of information about training opportunities will promote more precise matching between the skills development needs of an individual employee and training to meet those needs.

- Development and offerings of cloud training will be data driven and agency roadmaps can ensure training can be targeted to the most critical skill needs.

Proposed budget and staffing assumptions

- IT Workforce Retraining Fund: Initial investment $5 million.

- $240,000 per year to hire one FTE (EMS3) to manage the Cloud Retraining Workgroup and the Cloud Retraining fund.

- $75,000 to fund modifications to WSLC to provide a cloud retraining portal.

Recommendation 3: Define career pathways and core competencies that will support opportunities for the state's IT workforce for advancement and transferability across agencies.

Considerations for implementation

State IT workers want to ensure that they are properly prepared for meaningful jobs as the state transitions to cloud services. While "just-in-time" and "snackable" training are effective at gearing up to use a specific tool or understand a specific concept, they may not be sufficient to ensure the staff continue to have advancement opportunities. Defining core competencies needed for cloud-based services and marrying those competencies with foundational training opportunities (i.e., certifications or degreed programs) may be more effective at providing career stability and portability.

Change is now a constant within the technology arena, and as technologies evolve the state's IT workforce core competencies will need to be updated. This will drive changes in the skills training needed for cloud-related IT career paths, but the state's compensation and classification system will also need to be kept current. The state's Human Resources Division maintains and monitors this system on a regular basis to determine if, and when, adjustments need to be made.

In addition to defining training needs, the Cloud Transition Workgroup should also be responsible for defining core competencies for IT disciplines that will be most heavily impacted by the transition to cloud services. These core competencies can then be used to define retraining pathways for agency staff. To assist with this work, the Task Force recommends that a position be established within State HR. This position will participate in the Cloud Transition Workgroup and will develop connections to all State HR disciplines needed to support the goal of defined career pathways and core competencies within the state's IT workforce.

This position will also help navigate the state's rule and policy framework (under OFM's authority) if any changes that affect the state's classification and compensation plan are planned and assist with labor relations associated with this work effort.

Expected outcomes

- Defined career pathways and core competencies will help state IT employees build the skills and knowledge needed for their chosen field.

- Core competencies that reflect enterprise-wide needs (and can be adapted to meet agency-specific needs) promotes improved employee transferability across the enterprise.

- Ensures the work completed by the Cloud Training Program is appropriately linked to the state's classification and compensation systems.

Proposed budget and staffing assumptions

- $240,000 per year to hire one FTE (EMS3) located in the State HR office to act as a liaison and subject matter expert to the Cloud Retraining Program.

Recommendation 4: Develop public-private partnerships with industry partners to ensure effective planning for staff retraining.

Private sector technology partners invest substantial resources into forecasting, defining, and delivering state-of-the-art technology to support the business of the state. State technology and political leaders understand that developing strong strategic relationships is key to sustained delivery of high-quality business solutions over time.

Considerations for implementation

A key aspect of a successful strategic partnership between the state and private sector technology providers is ensuring that both partners are actively focused on meeting key performance measures. This includes helping the state's IT workforce keep pace with today's technical roles and responsibilities. Many technology providers offer training, up to and including certifications. Access to these opportunities can be built into strategic partnership agreements to ensure current and future successful implementation and maintenance of mission-critical technology.

Agencies often work with their solution providers to design a knowledge transfer and training program when a new solution is implemented. This approach works well for specific implementations and the cost is often built into the contract. There is also a need to ensure vendor contracts contain sufficient language to hold vendors accountable to fulfilling training and knowledge transfer when appropriate.

In addition to agency-level partnerships with vendors, WaTech is encouraged to develop training partnerships with our state's technology partners at an enterprise level to provide ongoing insights into the changing landscape and forecasting where skill development will be needed.

Expected outcomes

- Strong partnerships with industry will ensure training strategies are targeted to meet both agency-driven needs and industry-led forecasts of future technology trends.

- The state will be better able to leverage free or low-cost training produced by industry.

- Employees trained using industry-recognized certifications and training demonstrate increased efficiency in their work, report increased job satisfaction, and have greater advancement opportunity.

Proposed budget and staffing assumptions

- Staffing and budget for developing strategic partnerships is built into Recommendation #2.

PERSONAS

Fumio – Server Engineer

Fumio works as a Server Engineer for a large agency and has been with the state for about 10 years. About six years ago the agency moved from an on-premises environment to a cloud-based Infrastructure-as-a-Service.

Fumio's responsibilities prior to the first migration included, for example:

- Purchasing and installing hardware to the racks in the server room.
- Testing hardware.
- Installing software on servers.

After the first migration some of his responsibilities changed to focus on the cloud service. For example:

- Instead of purchasing and installing hardware, he now purchases and installs cloud capabilities from the user interface.
- Instead of testing and demonstrating hardware options, he accesses the user interface screens to view, test and demonstrate options.

The agency is now beginning to rearchitect its systems to take greater advantage of cloud-native efficiencies. Once complete, Fumio's responsibilities should be streamlined and made more efficient. This is expected to free up some of his time to address more of the agency's business computing needs.

Harper – Network Admin

Harper works as an IT network administrator for a medium size agency and has been with state for about 15 years.

Harper's **current responsibilities include** hardware and system support for the existing physical network infrastructure environment, comprising routers, switches and firewalls.

After the implementation is complete, Harper's responsibilities will shift away from activities related to physical hardware and will focus more on architecture and security issues. Harper is considering retraining to focus on cloud architecture.

The agency has decided to migrate all infrastructure services to a new cloud solution using technology that incorporates different computing platforms and technical architecture than what Harper has experience with. As a lead IT network administrator, Harper is responsible for overseeing the technical aspects of the migration.

Transitioning from a traditional flat physical network topology to a multi-layered virtual network topology has increased system complexity and blurred the boundaries between networking, applications and security.

The migration to the cloud has a very short timeline with limited resources for training. Harper worked with the IT leadership to outsource configuration of the network and provide on-the-job training. Shortly after the network is installed, consistent problems arise, and Harper is finding it very difficult to resolve the problems quickly. Harper meets with their supervisor on a weekly basis to provide updates and share concerns. Recognizing that it will take time to build competencies and efficiencies, the agency has contracted for vendor support to provide staff augmentation during critical phases of the project.

Vihn – Security Architect

Vihn is the Security Architect for a medium sized agency that recently implemented Infrastructure-as-a-Service (IaaS).

Prior to the implementation some of Vihn's responsibilities included:

- Designing security services for on-premises services.
- Developing and implementing standards, processes and procedures to integrate secure information system architecture into new IT systems.
- Act as incident commander for information security breach and investigation events.

After implementation of the IaaS, Vihn will continue to hold these responsibilities and will add the following:

- Design the security architecture to protect the agency's data in the cloud environment.
- Periodically review permissions/policies to determine if access is overly permissive for each role.
- Periodically review systems implemented in the IaaS environment to validate they are configured per the design drawings and data flow diagrams.
- Review alerts on audit logs for roles attempting to perform actions that are not included in their role-based position.
- Support incident response on security incidents.

To prepare for these added responsibilities Vihn participated in the vendor-provided training on the new IaaS product. In addition, they and their supervisor have agreed they will work toward certification as a Cloud Security Engineer.

Stu – System Administrator

Stu works for a medium-sized agency, with an IT staff of about 20. Last year the agency decided to move the on-premises content management system that Stu maintains to the cloud. They have been involved in defining requirements for the new system, were part of the vendor selection and are now on the implementation team.

Prior to the implementation Stu's responsibilities included:

- System patching.

- Hardware maintenance.

- Coding.

Once the system is implemented, those responsibilities will be shifted to the solution provider. Stu has talked with their supervisor and is excited about starting training to become an IT security officer.

To prepare for this shift in responsibilities Stu talked with their supervisor about getting detailed training on cloud security. Training will likely require them to attend an instructor led three-day training provided at South Puget Sound Community College. The vendor will also be providing IT staff training on how to do their work in the new environment.

Graphics provided by Vecteez.com <ahref="https://www.vecteezy.com/free-vector/avatar-personas">Avatar Personas Vectors by Vecteezy.

Appendix A: List of Acronyms

AWS – Amazon Web Services

CIO – Chief Information Officer

DES – Department of Enterprise Services

DSHS – Department of Social and Health Services

ECC – Enterprise Cloud Computing

EMS3 – Executive Management Service 3

FTE – Full Time Equivalent

HR – Human Resources

HRMS – Human Resources Management System

IaaS – Infrastructure-as-a-Service

IT – Information Technology

ITPS – Information Technology Professional Structure

M365 – Microsoft 365

NCASG – National Compensation Association of State Governments

OCM – Organizational Change Management

OFM – Office of Financial Management

PaaS – Platform-as-a-Service

SaaS – Software-as-a-Service

SBCTC – State Board for Community and Technical Colleges

WSLC – Washington State Learning Center

Appendix B: Cloud Transition Task Force Members

Bill Kehoe, State Chief Information Officer, Chair*

Vinod Brahmapuram, State Chief Information Security Officer*

Rose Feliciano, Internet Association

Omid Ghaffari-Tabrizi, Monument Advocacy*

Camille Kruger, Washington Federation of State Employees*

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