Project Investment Justification

Cloud Migration Enterprise (CME)

RT21001

Arizona State Retirement System

Contents

1. GENERAL INFORMATION

PIJ ID: RT21001
PIJ Name: Cloud Migration Enterprise (CME)
Account: Arizona State Retirement System
Business Unit Requesting: Arizona State Retirement System
Sponsor: Anthony Guarino
Sponsor Title: Deputy Director
Sponsor Email: anthonyg@azasrs.gov
Sponsor Phone: (602) 240-2077

2. MEETING PRE-WORK

2.1 What is the operational issue or business need that the Agency is trying to solve? (i.e....current process is manual, which increases resource time/costs to the State/Agency, and leads to errors...):

At present, nearly all ASRS' IT services and applications are hosted on-premises, within the agency's datacenter, located at 3300 N Central Avenue.

Primary driver for this cloud migration is to achieve compliance with Statewide Cloud First Initiative, which will move all ASRS IT datacenter operations into AWS Cloud. ASRS intends to achieve greater flexibility in scaling/right sizing compute, memory, storage, network capacity. The ASRS also seeks to improve its security posture through network segmentation, tightly controlled administrative access, and creation of a base, cloud foundation that allows for future security enhancements not currently available/in place with existing, on-premises infrastructure.

2.2 How will solving this issue or addressing this need benefit the State or the Agency?

Migrating ASRS' on-premises datacenter-hosted servers/services/applications to AWS achieves compliance with the Statewide Cloud First Initiative and greater flexibility in scaling/right-sizing compute, memory, storage, network capacity.

ASRS InfoSec and IT considers this project an opportunity to close gaps in network and access security. Looking ahead, the project is building a foundation to accommodate future improvements with an eye on important initiatives such as Infrastructure as Code, zero-trust access, protection against and recovery from ransomware and unauthorized configuration changes, and future development improvements through cloud-native services/serverless technologies and refactoring of legacy applications.

An AWS "Sandbox" development environment is planned, to provide a secure space for ASRS IT staff to perform research & development on future initiatives that leverage native AWS services. This will provide an environment to consider refactoring of existing applications, away from the current, traditional server-based model.

2.3 Describe the proposed solution to this business need.

ASRS' initial Cloud First migration was completed In 2019 with the implementation of Disaster Recovery in the AWS Cloud. ASRS selected AWS as its cloud provider of choice and worked to establish a cloud presence in Oregon, including direct connect networking through the state's Iron Mountain Datacenter, perimeter and internal border Palo Alto Firewalls, Transit Gateway, multiple AWS accounts/VPC's and VMware Cloud on Cloud (VMC) with Site

Recovery Manager (SRM) PaaS. This infrastructure was purpose-built to replace the agency's on-premises disaster recovery operation, previously hosted in its Tucson Office on 4400 E Broadway Blvd.

This PIJ addresses the plan to complete a full lift-and-shift migration to AWS IaaS and graceful transition away from VMC for disaster recovery to a DR solution leveraging native AWS technologies.

 Scope includes:

-Hiring an on-contract Cloud integrator/partner to:

---speed analysis/assess current state of ASRS' AWS presence

---develop future-state technical design and security controls to ASRS requirements, using AWS well-architected framework and CIS benchmarks

---assist with adjusting existing AWS configurations and building additional/foundational design specifications in preparation for receiving ASRS' datacenter-hosted servers and full operation "in the cloud"

---create a wave migration plan based on application tier dependencies and assist with initial VM-to-EC2 server migrations.

2.4 Has the existing technology environment, into which the proposed solution will be implemented, been documented?

Yes

2.4a Please describe the existing technology environment into which the proposed solution will be implemented.

2.5 Have the business requirements been gathered, along with any technology requirements that have been identified?

Yes

2.5a Please explain below why the requirements are not available.

ASRS' plans to start this project in FY22 (July 2021). A full requirements document is not yet drafted.

3. PRE-PIJ/ASSESSMENT

3.1 Are you submitting this as a Pre-PIJ in order to issue a Request for Proposal (RFP) to evaluate options and select a solution that meets the project requirements?

No

3.1a Is the final Statement of Work (SOW) for the RFP available for review?

3.2 Will you be completing an assessment/Pilot/RFP phase, i.e. an evaluation by a vendor, 3rd party or your agency, of the current state, needs, & desired future state, in order to determine the cost, effort, approach and/or feasibility of a project?

No

3.2a Describe the reason for completing the assessment/pilot/RFP and the expected deliverables.

3.2b Provide the estimated cost, if any, to conduct the assessment phase and/or Pilot and/or RFP/solicitation process.

3.2e Based on research to date, provide a high-level cost estimate to implement the final solution.

4. PROJECT

4.1 Does your agency have a formal project methodology in place?

Yes

4.2 Describe the high level makeup and roles/responsibilities of the Agency, Vendor(s) and other third parties (i.e. agency will do...vendor will do...third party will do).

Agency project team consists of a Project Manager and technical subject matter experts.

Third-party AWS-recommended partner will be hired to accelerate technical decisions and AWS configuration, cover knowledge/skills gaps, and manage risk associated with the project.

4.3 Will a PM be assigned to manage the project, regardless of whether internal or vendor provided?

Yes

4.3a If the PM is credentialed, e.g., PMP, CPM, State certification etc., please provide certification information.

4.4 Is the proposed procurement the result of an RFP solicitation process?

No

4.5 Is this project referenced in your agency's Strategic IT Plan?

Yes

5. SCHEDULE

5.1 Is a project plan available that reflects the estimated Start Date and End Date of the project, and the supporting Milestones of the project?

Yes

5.2 Provide an estimated start and finish date for implementing the proposed solution.

Est. Implementation Start Date	Est. Implementation End Date
8/23/2021 12:00:00 AM	6/30/2022 12:00:00 AM

5.3 How were the start and end dates determined?

Dates provided

5.3a List the expected high level project tasks/milestones of the project, e.g., acquire new web server, develop software interfaces, deploy new application, production go live, and estimate start/finish dates for each, if known.

Milestone / Task	Estimated Start Date	Estimated Finish Date
Document ASRS IT & InfoSec Requirements and Architecture Decisions	07/01/21	08/31/21
AWS Account discovery and analysis, develop future state design, remediation recommendations	08/23/21	10/29/21
Vendor (Slalom) Onboarding, Comms, Discovery, Account Access	08/23/21	09/10/21
AWS Account configuration, landing zone buildout (network, security, etc)	09/20/21	11/19/21
Transition current DR to AWS-based solution(s)	09/20/21	06/30/22
Migration preparation, process design, execute first migration wave (10-20%)	11/01/21	01/21/22
Migration Wave 2 Preparation and Execution (the balance)	01/10/22	06/30/22
Decommission former DR solution - VMware on AWS Cloud (VMC)	05/02/22	06/30/22
Final vendor payments	06/01/22	06/30/22

5.4 Have steps needed to roll-out to all impacted parties been incorporated, e.g. communications, planned outages, deployment plan?

No

5.5 Will any physical infrastructure improvements be required prior to the implementation of the proposed solution. e.g., building reconstruction, cabling, etc.?

No

5.5a Does the PIJ include the facilities costs associated with construction?

5.5b Does the project plan reflect the timeline associated with completing the construction?

6. IMPACT

6.1 Are there any known resource availability conflicts that could impact the project?

No

6.1a Have the identified conflicts been taken into account in the project plan?

Yes

6.2 Does your schedule have dependencies on any other projects or procurements?

No

6.2a Please identify the projects or procurements.

6.3 Will the implementation involve major end user view or functionality changes?

No

6.4 Will the proposed solution result in a change to a public-facing application or system?

No

7. BUDGET

7.1 Is a detailed project budget reflecting all of the up-front/startup costs to implement the project available, e.g, hardware, initial software licenses, training, taxes, P&OS, etc.?

Yes

7.2 Have the ongoing support costs for sustaining the proposed solution over a 5-year lifecycle, once the project is complete, been determined, e.g., ongoing vendor hosting costs, annual maintenance and support not acquired upfront, etc.?

Yes

7.3 Have all required funding sources for the project and ongoing support costs been identified?

Yes

7.4 Will the funding for this project expire on a specific date, regardless of project timelines?

Yes

7.5 Will the funding allocated for this project include any contingency, in the event of cost over-runs or potential changes in scope?

Yes

8. TECHNOLOGY

8.1 Please indicate whether a statewide enterprise solution will be used or select the primary reason for not choosing an enterprise solution.

Other (please specify)

8.2 Will the technology and all required services be acquired off existing State contract(s)?

Yes

8.3 Will any software be acquired through the current State value-added reseller contract?

Yes

8.3a Describe how the software was selected below:

At this time, we do not believe software purchases will be necessary; however, if needed, they will be acquired through SHI or CDW-G SVAR contracts.

8.4 Does the project involve technology that is new and/or unfamiliar to your agency, e.g., software tool never used before, virtualized server environment?

No

8.5 Does your agency have experience with the vendor (if known)?

Yes

8.6 Does the vendor (if known) have professional experience with similar projects?

Yes

8.7 Does the project involve any coordination across multiple vendors?

Yes

8.8 Does this project require multiple system interfaces, e.g., APIs, data exchange with other external application systems/agencies or other internal systems/divisions?

No

8.9 Have any compatibility issues been identified between the proposed solution and the existing environment, e.g., upgrade to server needed before new COTS solution can be installed?

No

8.9a Describe below the issues that were identified and how they have been/will be resolved, or whether an ADOA-ASET representative should contact you.

8.10 Will a migration/conversion step be required, i.e., data extract, transformation and load?

Yes

8.11 Is this replacing an existing solution?

Yes

8.11a Indicate below when the solution being replaced was originally acquired.

ASRS' current datacenter equipment has been in operation for >7 years (blade servers, disk storage arrays, core networking switches, VMware vSphere).

8.11b Describe the planned disposition of the existing technology below, e.g., surplused, retired, used as backup, used for another purpose:

Undetermined at this time. There may be a use for some of the equipment for development/testing. Otherwise and more likely, it's destined for ADOA Surplus.

8.12 Describe how the agency determined the quantities reflected in the PIJ, e.g., number of hours of P&OS, disk

capacity required, number of licenses, etc. for the proposed solution?

Detailed cloud estimate was formulated using current datacenter footprint, future-state requirements, margin for growth, and contingency for unknowns.

P&OS estimate is derived from a 4-month RFQ process conducted by ASRS IT, InfoSec and Procurement. Three vendors were provided project requirements and series interative meetings held to arrive at the final SOW and cost with the selected vendor, Slalom (see attachments).

8.13 Does the proposed solution and associated costs reflect any assumptions regarding projected growth, e.g., more users over time, increases in the amount of data to be stored over 5 years?

Yes

8.14 Does the proposed solution and associated costs include failover and disaster recovery contingencies?

Yes

8.14a Please select why failover and disaster recovery is not included in the proposed solution.

8.15 Will the vendor need to configure the proposed solution for use by your agency?

Yes

8.15a Are the costs associated with that configuration included in the PIJ financials?

Yes

8.16 Will any app dev or customization of the proposed solution be required for the agency to use the project in the current/planned tech environment, e.g. a COTS app that will req custom programming, an agency app that will be entirely custom developed?

No

8.16a Will the customizations inhibit the ability to implement regular product updates, or to move to future versions?

8.16b Describe who will be customizing the solution below:

8.16c Do the resources that will be customizing the application have experience with the technology platform being used, e.g., .NET, Java, Drupal?

8.16d Please select the application development methodology that will be used:

8.16e Provide an estimate of the amount of customized development required, e.g., 25% for a COTS application, 100% for pure custom development, and describe how that estimate was determined below:

8.16f Are any/all Professional & Outside Services costs associated with the customized development included in the PIJ financials?

8.17 Have you determined that this project is in compliance with all applicable statutes, regulations, policies,

standards & procedures, incl. those for network, security, platform, software/application &/or data/info found at aset.az.gov/resources/psp?

Yes

8.17a Describe below the compliance issues that were identified and how they have been/will be resolved, or whether an ADOA-ASET representative should contact you:

8.18 Are there other high risk project issues that have not been identified as part of this PIJ?

No

8.18a Please explain all unidentified high risk project issues below:

9. SECURITY

9.1 Will the proposed solution be vendor-hosted?

Yes

9.1a Please select from the following vendor-hosted options:

Commercial data center environment, e.g AWS, Azure

9.1b Describe the rationale for selecting the vendor-hosted option below:

AWS is one of the state's premier/preferred cloud hosting vendors.

ASRS selected AWS based on its position in the market and broad/deep service offerings to accommodate current and future cloud initiatives.

ASRS has already established a cloud presence in AWS for disaster recovery; the strategy forward is to leverage/build upon this foundation for the full move of operations in the cloud.

9.1c Has the agency been able to confirm the long-term viability of the vendor hosted environment?

Yes

9.1d Has the agency addressed contract termination contingencies, e.g., solution ownership, data ownership, application portability, migration plans upon contract/support termination?

Yes

9.1e Has a Conceptual Design/Network Diagram been provided and reviewed by ASET-SPR?

Yes

9.1f Has the spreadsheet located at https://aset.az.gov/arizona-baseline-security-controls-excel already been completed by the vendor and approved by ASET-SPR?

Yes

9.2 Will the proposed solution be hosted on-premise in a state agency?

No

9.2a Where will the on-premise solution be located:

9.2b Were vendor-hosted options available and reviewed?

9.2c Describe the rationale for selecting an on-premise option below:

9.2d Will any data be transmitted into or out of the agency's on-premise environment or the State Data Center?

9.3 Will any PII, PHI, CGIS, or other Protected Information as defined in the 8110 Statewide Data Classification Policy be transmitted, stored, or processed with this project?

Yes

9.3a Describe below what security infrastructure/controls are/will be put in place to safeguard this data:

AWS and any other selected cloud provider are AZRamp certified.

ASRS data CIA controls are in place currently and will be matched or exceeded with this cloud migration.

10. AREAS OF IMPACT

Application Systems

Database Systems

Oracle;MS SQL Server

Software

Hardware

Hosted Solution (Cloud Implementation)

State Data Center;Century Link - I/O Data Center;AWS (non-government) cloud;Vendor Hosted

Security

Encryption;Firewall

Telecommunications

Enterprise Solutions

Cloud First policy using ASET-preferred, AWS-recommended, SPO-contracted vendors. No statewide solution. ASRS plans to use SHI's Cloud Contract for purchasing and AWS as its cloud-hosting provider.

Contract Services/Procurements

11. FINANCIALS

Description	PIJ Category	Cost Type	Fiscal Year Spend	Quantity	Unit Cost	Extended Cost	Tax Rate	Tax	Total Cost
Palo Alto Physical and Virtual Firewalls	Hardware	Development	1	10	$18,000	$180,000	860.00 %	$15,480	$195,480
Palo Alto Firewall Install/Configuration Services	Professional & Outside Services	Development	1	250	$175	$43,750	0.00 %	$0	$43,750
AWS Partner Services Engagement Slalom	Professional & Outside Services	Development	1	1	$266,000	$266,000	0.00 %	$0	$266,000
Year 1 - Initial Cloud Operating Costs (reflects partial-year and incremental migration runtime in AWS)	Other	Development	1	1	$477,215	$477,215	860.00 %	$41,040	$518,255
Year 2 Cloud Operating Costs	Other	Operational	2	1	$1,067,851	$1,067,851	860.00 %	$91,835	$1,159,686
Year 3 Cloud Operating Costs	Other	Operational	3	1	$990,466	$990,466	860.00 %	$85,180	$1,075,646
Year 4 Cloud Operating Costs	Other	Operational	4	1	$970,523	$970,523	860.00 %	$83,465	$1,053,988
Year 5 Cloud Operating Costs	Other	Operational	5	1	$950,581	$950,581	860.00 %	$81,750	$1,032,331

Base Budget (Available)	Base Budget (To Be Req)	Base Budget % of Project
$0	$5,371,775	100%
APF (Available)	**APF (To Be Req)**	**APF % of Project**
$0	$0	0%
Other Appropriated (Available)	**Other Appropriated (To Be Req)**	**Other Appropriated % of Project**
$0	$0	0%
Federal (Available)	**Federal (To Be Req)**	**Federal % of Project**
$0	$0	0%
Other Non-Appropriated (Available)	**Other Non-Appropriated (To Be Req)**	**Other Non-Appropriated % of Project**
$0	$0	0%

Total Budget Available	Total Development Cost
$0	$1,023,485
Total Budget To Be Req	**Total Operational Cost**
$5,371,775	$4,321,651
Total Budget	**Total Cost**
$5,371,775	$5,345,137

12. PROJECT SUCCESS

Please specify what performance indicator(s) will be referenced in determining the success of the proposed project (e.g. increased productivity, improved customer service, etc.)? (A minimum of one performance indicator must be specified)

Please provide the performance objective as a quantifiable metric for each performance indicator specified.
Note: The performance objective should provide the current performance level, the performance goal, and the time period within which that performance goal is intended to be achieved. You should have an auditable means to measure and take corrective action to address any deviations.
Example: Within 6 months of project completion, the agency would hope to increase "Neighborhood Beautification" program registration by 20% (3,986 registrants) from the current registration count of 19,930 active participants.

Performance Indicators

1 Meet or exceed the State of AZ deadline (currently with approved extension to June 30, 2022) to migrate data center (servers, storage, applications hosted in data center) enterprise operations to the cloud. Success Criteria: Migration completed by approved extension date (currently June 30, 2022).

2 Where feasible utilize infrastructure and routing established by the State of AZ to achieve alignment and security. Success Criteria: Standard egress and ingress connectivity outside of AWS environment shall run through State of AZ core network.

3 Cloud migrated apps and data will allow staff to meet the same strategic objectives as pre-migration. Success Criteria: Cloud migration did not negatively impact staff ability to meet strategic objectives as demonstrated through internal survey comments and senior management feedback.

4 Cloud migrated apps and data will meet established availability objectives. Success Criteria: Meet TSD KPIs related to availability.

5 ASRS cloud operations are entirely supported by TSD FTE Staff Members without reliance on external professional services by October 2022. Success Criteria: Successful migration of last 50% of migration with little to no assistance from an external vendor.

6 Disaster recovery capabilities in the cloud meet ASRS's recovery time objectives (RTO)/recovery point objectives (RPO) for critical applications. Success Criteria: COOP recovery time objectives and no loss of data beyond established RPOs (currently 1 hour for critical business applications).

13. CONDITIONS

Conditions for Approval

Should development costs exceed the approved estimates by 10% or more, or should there be significant changes to the proposed technology scope of work or implementation schedule, the Agency must amend the PIJ to reflect the changes and submit it to ADOA-ASET, and ITAC if required, for review and approval prior to further expenditure of funds.

Monthly reporting on the project status is due to ADOA-ASET no later than the 15th of the month following the start of the project. Failure to comply with timely project status reporting will affect the overall project health. The first status report for this project is due on September 15, 2021.

14. OVERSIGHT SUMMARY

Project Background

The Arizona State Retirement System (ASRS) is a state agency that administers pension plans, long term disability plans, retiree health insurance plans and other benefits to qualified government workers.

The current ASRS datacenter equipment - blade servers, disk storage arrays, core networking switches, VMware vSphere - has been in operation for over 7 years. Currently, nearly all ASRS' IT services and applications are hosted

on-premises, within the agency's datacenter, located at 3300 N Central Avenue. The primary driver for this cloud migration is to achieve compliance with the Statewide Cloud First Initiative, which will move all ASRS IT datacenter operations into AWS Cloud.

Business Justification

With this migration, ASRS will meet or exceed the State's deadline (currently with approved extension to June 30, 2022) to migrate data center (servers, storage, applications hosted in data center) enterprise operations to the cloud. Where feasible, the agency will utilize infrastructure and routing established by the State of Arizona to achieve alignment and security. Standard egress and ingress connectivity outside of the AWS environment shall run through the State of Arizona core network. ASRS intends to achieve greater flexibility in scaling and right sizing compute, memory, storage, network capacity. ASRS also seeks to improve its security posture through network segmentation, tightly controlled administrative access, and creation of a base, cloud foundation that allows for future security enhancements not currently available/in place with existing, on-premises infrastructure.

Cloud migrated apps and data will allow staff to meet the same strategic objectives as pre-migration. Cloud migrated apps and data will meet established availability objectives. The agency will meet TSD KPIs related to availability and the ASRS cloud operations will be entirely supported by TSD FTE Staff Members without reliance on external professional services by October 2022. Successful migration will mean that the last 50% of migration will occur with little to no assistance from an external vendor. Disaster recovery capabilities in the cloud will meet ASRS's recovery time objectives (RTO)/recovery point objectives (RPO) for critical application and will COOP recovery time objectives with no loss of data beyond established RPOs (currently 1 hour for critical business applications).

Migrating ASRS' on-premises datacenter-hosted servers/services/applications to AWS achieves compliance with the Statewide Cloud First Initiative and greater flexibility in scaling/right-sizing compute, memory, storage, network capacity. ASRS InfoSec and IT considers this project an opportunity to close gaps in network and access security. Looking ahead, the project is building a foundation to accommodate future improvements with an eye on important initiatives such as Infrastructure as Code, zero-trust access, protection against and recovery from ransomware and unauthorized configuration changes, and future development improvements through cloud-native services/serverless technologies and refactoring of legacy applications. An AWS "Sandbox" development environment is planned, to provide a secure space for ASRS IT staff to perform research & development on future initiatives that leverage native AWS services. This will provide an environment to consider refactoring of existing applications, away from the current, traditional server-based model.

Implementation Plan

This will be hosted in the vendor's AWS environment. AWS and any other selected cloud provider are AZRamp certified.
ASRS data CIA controls are in place currently and will be matched or exceeded with this cloud migration.

The agency project team consists of a Project Manager and technical subject matter experts. A third-party AWS-recommended partner will be hired to accelerate technical decisions and AWS configuration, cover knowledge/skills gaps, and manage risk associated with the project.

Cloud migration will not negatively impact staff ability to meet strategic objectives as demonstrated through internal survey comments and senior management feedback.

Vendor Selection

ASRS selected AWS based on its position in the market and broad/deep service offerings to accommodate current and future cloud initiatives. ASRS has already established a cloud presence in AWS for disaster recovery; the strategy forward is to leverage/build upon this foundation for the full move of operations in the cloud. Detailed cloud estimate was formulated using the current datacenter footprint, future-state requirements, margin for growth, and contingency for unknowns. P&OS estimate is derived from a 4-month RFQ process conducted by ASRS IT, InfoSec and Procurement.

Three vendors were provided project requirements and series iterative meetings held to arrive at the final SOW and cost with the selected vendor, Slalom. ASRS engaged three AWS-recommended P&O Services Partners (Accenture, Slalom and TekSystems). Requirements were provided and several meetings were conducted with each, over a 4-month period (Feb '21-May 21). Accenture and TekSystems responded with "no-bid". Slalom provided a quote and SOW. ASRS favors Slalom's approach and responsiveness over the other two vendors. Slalom has also delivered successful projects for the Department of Health and ADOT. AWS and Slalom are leveraging AWS' Migration Acceleration Program for Slalom's professional services.

Budget or Funding Considerations

Milestones are based on the project plan. Funding for this effort is 100% base budget funds and is available for the entirety of FY22.

15. PIJ REVIEW CHECKLIST

Agency Project Sponsor

Anthony Guarino

Agency CIO (or Designee)

Dave King

Agency ISO (or designee)

Jeff Hickman

OSPB Representative

ASET Engagement Manager

ASET SPR Representative

Owen Zorge

Agency SPO Representative

Chris Gustafson

Agency CFO

Martha Rozen