July 2019

AZURE ECONOMIC ASSESSMENT

Client Branch Office

REPLY
VALOREM

AGENDA

Executive Overview

Findings & Recommendations

Cost Analysis & Outcomes

Next Steps & Migration

VALOREM REPLY CLOUD CAPABILITIES

Modernization		Innovation		Operations	
Application Modernization	**Data Modernization**	**Internet of Things**	**Modern Application Development**	**Big Data + Data Warehouse**	**Cloud Security**
Dev/Test	**Business Continuity**	**High Performance Computing**	**Mixed + Immersive Reality**	**BI + Analytics**	**DevOps**
Datacenter Migration	**Hybrid Datacenter**	**AI + Machine Learning**	**Bots and Cognitive Services**	**SAP on Azure**	**Application Insights**

ENGAGEMENT OVERVIEW

As a part of a larger Cloud Migration Strategy, a client requested Valorem Reply perform an Azure Economic Assessment on a small branch office. The engagement will provide needed insight into current on-premises infrastructure and the cost comparison between the customer owned datacenter and migrating to the cloud. In addition to the TCO analysis, this engagement detailed Azure costs, recommendations to help drive success across the client cloud journey.

1 CURRENT INFRASTRUCTURE

The virtual machines in this environment were analyzed for cloud compatibility, application dependency and network readiness.

2 TOTAL COST OF OWNERSHIP

Detailed comparisons of on-premises technical infrastructure and Azure's comparable components provide insight into how the cloud can provide significant cost benefit.
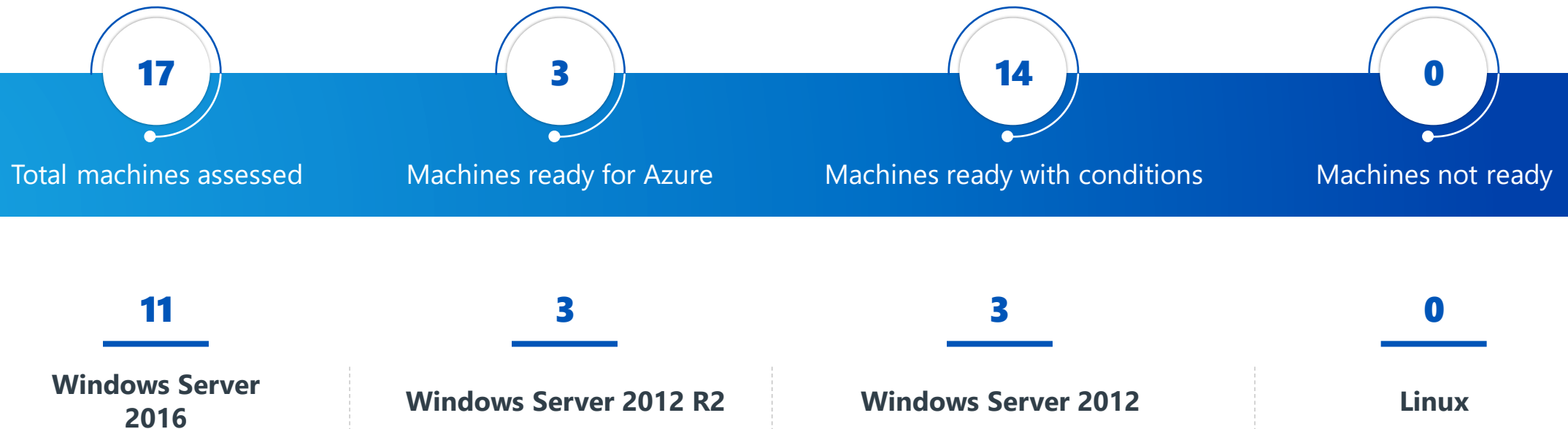
3 MIGRATION STRATEGY

Beyond defined milestones, an overall plan and execution strategy are key to a successful cloud migration.
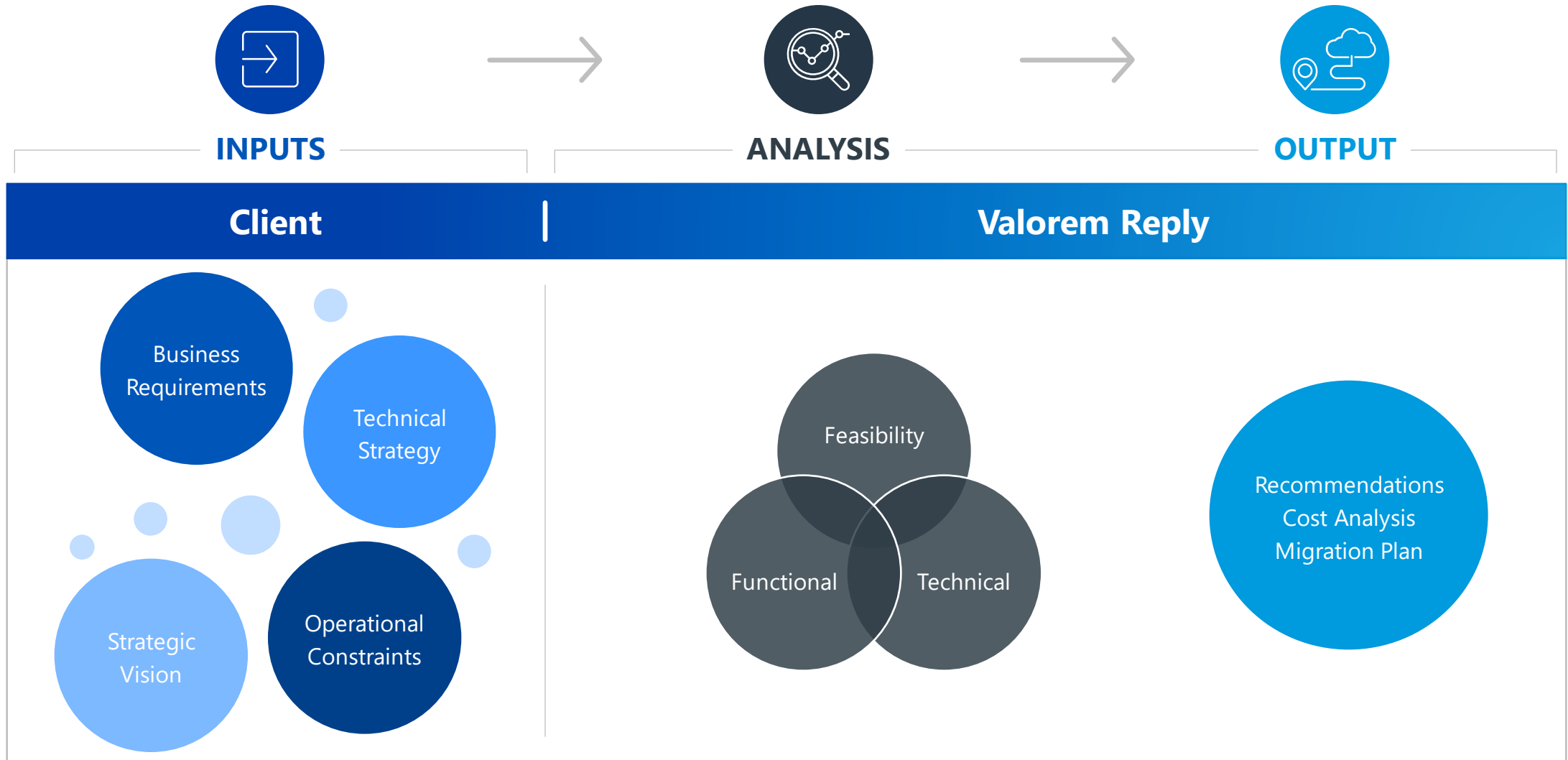
ASSESSMENT SCOPE

This Azure Economic Assessment includes analysis and planning for a set of services that will demonstrate the feasibility, functionality and cost associated with running infrastructure in Azure. While this analysis was performed on a small branch office, critical services such as domain controllers, file servers, SQL servers and web services were assessed to provide detailed outputs and technical recommendations.

17	3	14	0
Total machines assessed	Machines ready for Azure	Machines ready with conditions	Machines not ready

11	3	3	0
Windows Server 2016	Windows Server 2012 R2	Windows Server 2012	Linux

ANALYSIS APPROACH

INPUTS

ANALYSIS

OUTPUT

Client

Valorem Reply

Business Requirements

Technical Strategy

Strategic Vision

Operational Constraints

Feasibility

Functional

Technical

Recommendations
Cost Analysis
Migration Plan

OUTCOMES OVERVIEW

Based on the analysis performed during this engagement, the below summarized outcomes align with the overall business goals, technical feasibility and guidelines for the initial cloud economic assessment

1 Readiness Assessment	**2 Platform Approach**	**3 Migration Strategy**	**4 Cost Analysis**	**5 Modernization Opportunity**
Based on the infrastructure analysis, this environment is mostly ready for cloud migration, with all 17 virtual machines validated as ready.	Leveraging Infrastructure-as-a-Service (IaaS) will provide a quick and seamless migration process for this small branch office platform.	Using Azure Migrate will provide a low-cost and straight forward migration approach with minimal additional on-premises infrastructure.	The Total Cost of Ownership analysis demonstrated significant savings by migrating the infrastructure to Azure.	While not included in the initial migration, Azure platform services provide additional opportunity to save cost and improve functionality, especially with the identified SQL servers in this environment.

FINDINGS SUMMARY

Assessing and understanding your on-premises environment is an important part of a successful cloud migration. Accordingly, we used a set of tools that analyzed the servers, applications and performance of the branch office and provided additional insight on the viability of migrating to Azure. Below is the initial set of findings recorded during this analysis.

- 17 instances of Windows Server. Of those, 17 are running Windows Server 2008 or newer and are technically available to be migrated to the cloud.

- 0 instances of Windows Server 2003 Enterprise and Standard and Windows 2000, should be retired and applications/workloads migrated to the cloud or moved to another on-premises server.

- 0 applications on Windows Server 2003/XP that may or may not be legacy proprietary applications that cannot run on newer versions of the applications.

- Failover servers could be moved to Azure to optimize workloads because they are only used in the event one machine fails and another machine takes over to resume service.

- Through consolidation and migration to Azure, you can significantly reduce some operational costs by reduction in hardware maintenance, support, and operations costs.
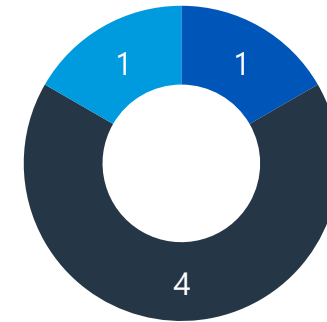
SQL SERVER FINDINGS

The SQL server environment for this branch office is fairly Azure-ready. There are 5 total SQL servers and all of them are on newer additions of SQL. Additionally, the overall utilization of the SQL environments are low. The instances will also need further assessment for SQL PaaS compatibility. Other outcomes include:

- 0 Instances of SQL Server 2005 or older which going to lose its extended support in April 2016. That needs to be upgraded and or moved to Azure.

- The 2 instances of SQL Server licenses are good candidates to migrate to Azure due to the variable nature of use. As the number of users access these workloads, Azure can scale up or down to meet your needs.

- Any SQL workloads that are used for development purposes are also potential candidates to move to Azure. And in accordance with your cloud readiness strategy, any new SQL instances for development should be deployed in the cloud.
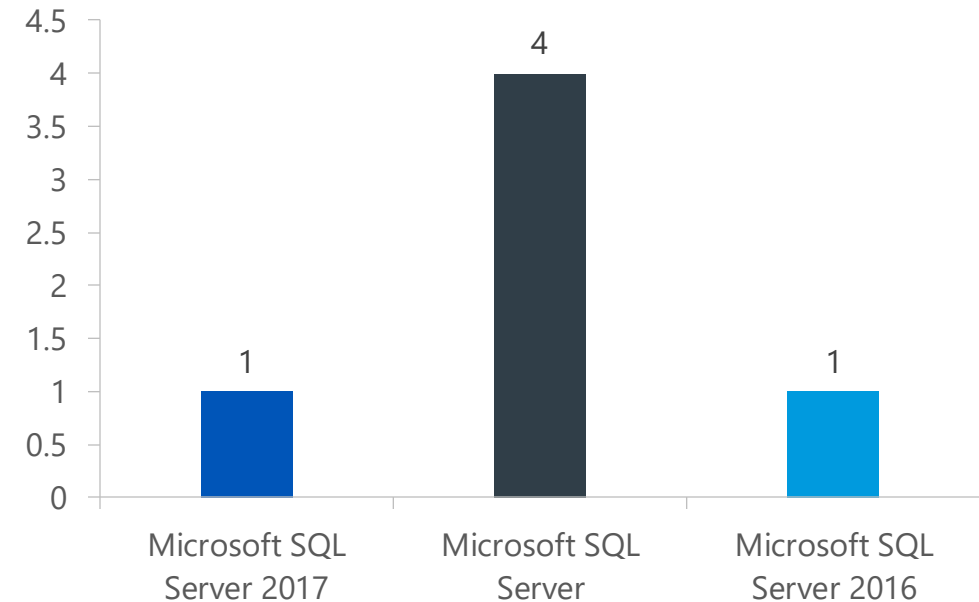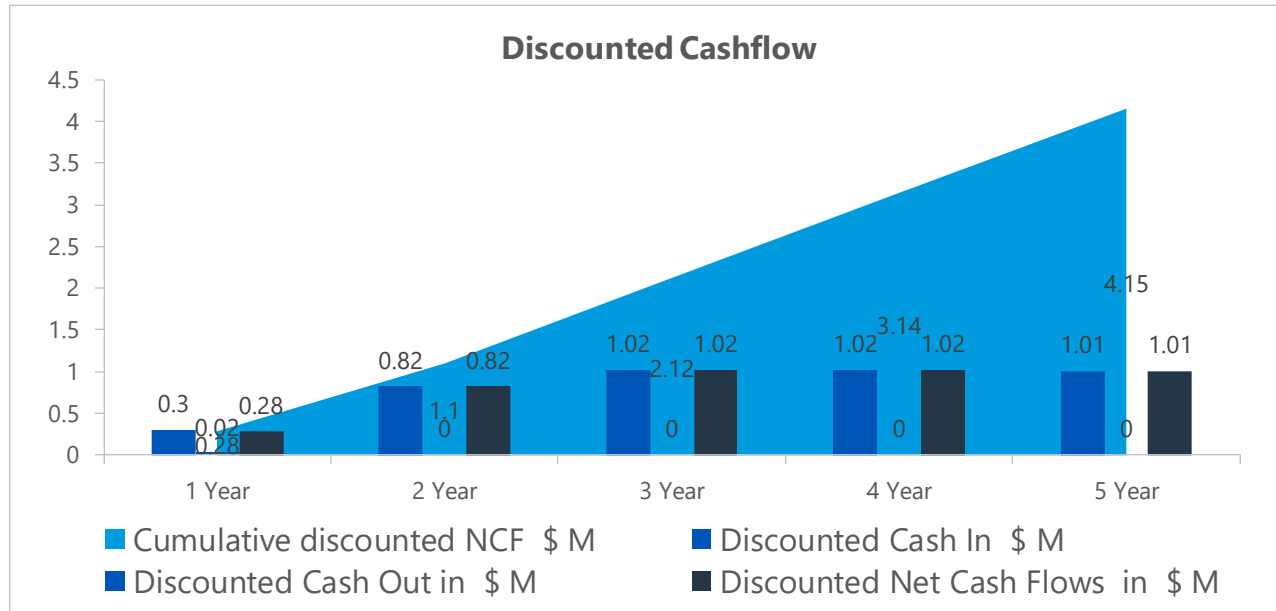
AZURE SERVICE RECOMMENDATIONS

Based on the performed analysis and proposed lift-and-shift migration methodology, there are a core set of Azure services that provide key storage, compute and network functionality as well as overall virtual machine migration functionality. These platform capabilities are fundamental to any cloud environment and can quickly and easily scale beyond traditional datacenters. Key services recommended for this migration include:

- Azure Virtual Machines - Azure Virtual Machines (VM) is one of several types of on-demand, scalable computing resources that Azure offers. Typically, you choose a VM when you need more control over the computing environment than the other choices offer. This article gives you information about what you should consider before you create a VM, how you create it, and how you manage it.

- Azure Storage - Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables.

- Azure Virtual Network - An Azure Virtual Network (VNet) is a representation of your own network in the cloud. It is a logical isolation of the Azure network fabric dedicated to your subscription. You can fully control the IP address blocks, DNS settings, security policies, and route tables within this network.

- Azure Active Directory - Azure Active Directory (Azure AD) is Microsoft's cloud-based identity and access management service, which helps your employee's sign in and access resources in external resources, such as Microsoft Office 365, the Azure portal, and thousands of other SaaS applications and internal resources, such as apps on your corporate network and intranet, along with any cloud apps developed by your own organization.

- Azure Migrate - Azure Migrate helps you to migrate to Azure. Azure Migrate provides a centralized hub to track discovery, assessment, and migration of on-premises infrastructure, applications, and data to Azure. The hub provides Azure tools for assessment and migration, as well as third-party independent software vendor (ISV) offerings.

TOTAL COST OF OWNERSHIP SUMMARY

Over a typical five-year period, considering both Capital Expenditure (CAPEX) and Operating Expenditure (OPEX) categories, the TCO for Cloud services, properly sized as recommended in this report, is usually lower. The increased cost agility ensures the organization only pays for what it uses and can quickly scale up or down, depending on business demand. Based on your current IT infrastructure and the opportunities that are summarized in this report, your Cloud Total Cost of Ownership (TCO) over a five-year period is projected to be**: $273,672.69.** Further detail, including all components considered in this analysis, can be found in the appendix section of this document.

Discounted Cashflow

Legend:
- Cumulative discounted NCF $ M
- Discounted Cash In $ M
- Discounted Cash Out in $ M
- Discounted Net Cash Flows in $ M

On-Premises	VS	Azure Cost
$1,527,731.67		$273,672.68
The Cloud is 5.58 X Less		

Summary Statistics	
Total Benefits in $M	4.17
Total Sum invested in $M	0.02
NPV of Benefits in $M	4.36
Internal Rate of Return	337%
Discounted Payback Period in Months	4.08

PLATFORM COST COMPARISON

The Cloud TCO, above, needs to be compared against the equivalent On-premises TCO to understand the Return on Investment (ROI). Using the infrastructure data discovered for this assessment and applying industry standard rates and costs for licensing and support, the projected cost for your On-premises IT environment over a five-year period is: $359,166.10. Considering these two costs, running an equivalent set of infrastructure and workloads in the Microsoft Cloud solutions (e.g., Office 365, Azure) provides a 100% cost advantage, exclusive of migration costs. Further detail, including all components considered in this analysis, can be found in the appendix section of this document.

On-Premises	VS	Azure Cost
$1,527,731.67		**$273,672.68**
The Cloud is 5.58 X Less		

Cost Comparison Over 5 Years

	Azure Cost	On Premise Cost
1 Year	$225,151.19	$1,227,024.88
2 Year	$236,408.75	$1,319,712.10
3 Year	$248,229.19	$1,385,697.69
4 Year	$260,640.65	$1,454,982.54
5 Year	$273,672.68	$1,527,731.67
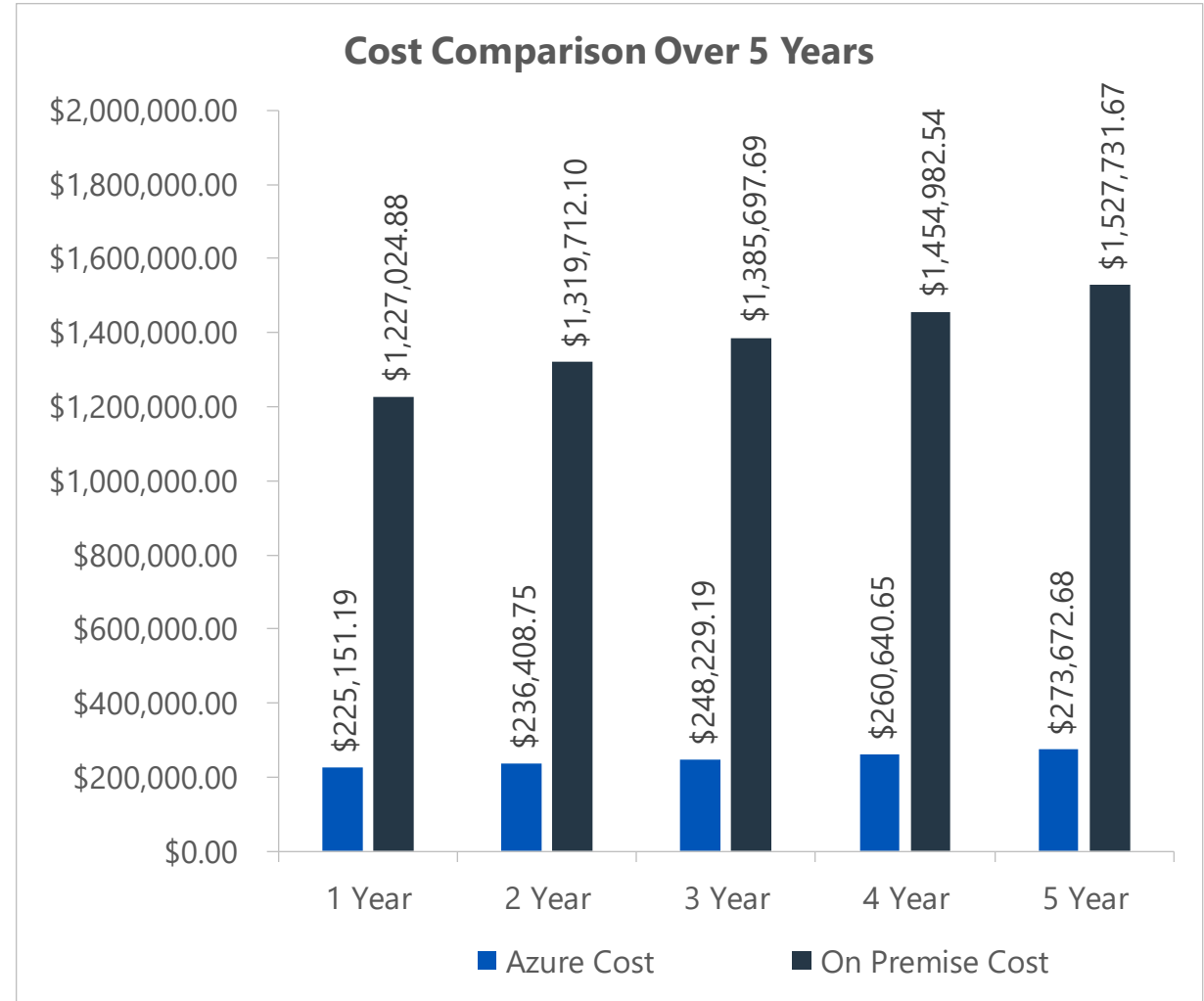
ON-PREMISES COST CONSIDERATIONS

There are several different considerations when performing a total cost of ownership analysis beyond servers and hardware. By taking into account all of the various components as demonstrated in the chart below, the assessment and outcomes in this document provide a holistic view of the comparison with Azure.

1	Server costs	Hardware – server, rack chassis PDUs, ToR switches (+maintenance)	Software – OS, virtualization licenses (maintenance)	Overhead cost		
				Space	Power	Cooling
2	Storage costs	Hardware – storage disks, SAN/FC switches	Storage admin costs	Overhead cost		
				Space	Power	Cooling
3	Network costs	Network hardware – LAN switches, load balances costs	Network admin costs	Overhead cost		
				Space	Power	Cooling
4	IT Labor costs	Server admin Virtualization admin				

AZURE COST ANALYSIS

Assessing and analyzing cloud costs is an important part of a strategic migration and should be performed alongside the architecture and design process. The outcomes included in this roadmap is a purely infrastructure-as-a-service focused and does not include the potential cost benefits and savings of various platform-as-a-service capabilities on Azure. Accordingly, that is another important consideration for a long-term cloud migration roadmap as modernization can provide significant benefits beyond traditional lift and shift.

The cost analysis below is based on similar virtual machine sizing as on-premises and may not be a perfectly accurate estimate of the final Azure consumption. Additionally, as noted below there are opportunities to utilize reserve instances to reduce cost. Further recommendations around these topics is on the next slide.

Based on our analysis, we recommend migrating 10 virtual machines to Azure as a part of this branch office migration process.

Virtual machine Count			
Machine Type	**Physical**	**Virtual**	**Total**
Windows Server	0	8	8
Biztalk Server	0	0	0
SQL Server	0	2	2
Linux Server	0	0	0
Total Machines	0	10	10

Azure Services Costing (Monthly) (Pay as you go)	
Azure Service	**Cost**
Total Compute	$2,781.30
Total Storage	$763.98
Network/Other	$577.32
Backup Cost	$523.09
DR Cost	$513.95
Total Cost	$5,159.64

Azure Services Costing (Monthly) (1 year reserved)	
Azure Service	**Cost**
Total Compute	$2,419.69
Total Storage	$763.98
Network/Other	$577.32
Backup Cost	$523.09
DR Cost	$513.95
Total Cost	$4,798.03

Azure Services Costing (Monthly) (3 year reserved)	
Azure Service	**Cost**
Total Compute	$2,267.50
Total Storage	$763.98
Network/Other	$577.32
Backup Cost	$523.09
DR Cost	$513.95
Total Cost	$4,645.84

AZURE COST RECOMMENDATIONS

While a lift and shift approach may not immediately optimize Azure costs, there are several key activities that will be performed as a part of the migration process to ensure efficient use of cloud dollars as well as understand, analyze and manage your Azure consumption. In addition to migrate the infrastructure services, these will be a core part of the platform deployment and configuration.
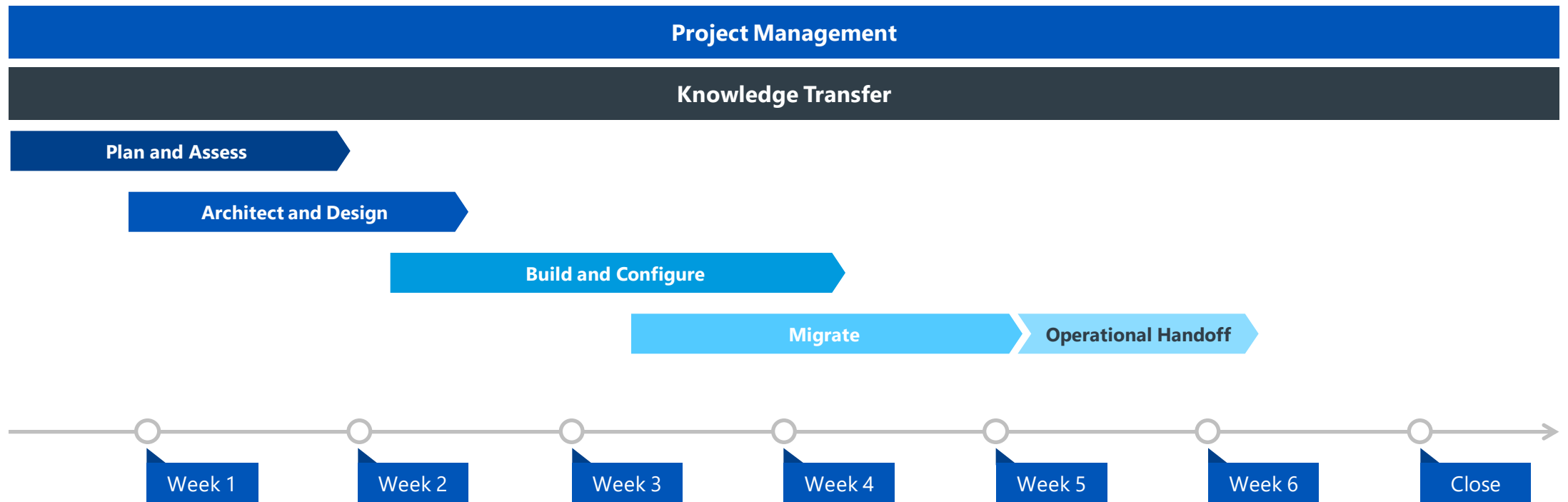
- Environment right-sizing – Based on the utilization and consumption of each virtual machine, Azure spend can be significantly optimized by right-sizing the service once migrated to Azure. Accordingly, this will be a key recommendation post-migration.

- Azure Hybrid Use – Since these virtual machines are already licensed for both Windows Server and SQL (where applicable), enabling the Azure Hybrid Use benefit will save up to 40% of the consumption cost.

- Azure Cost Management – Azure has comprehensive cost analysis and management tools built right into the platform and can be used at no additional cost. Configuring policies and reports will be a core component of the Azure migration engagement.

- Resource Management and Tagging – Understanding and analyzing the spend of each resource is an important component of overall cloud cost management. Valorem Reply will build out a foundation of resource management and tagging governance to support client business objectives.

- Azure Policies – Alongside tagging and cost management, Azure policies can enforce organization requirements and procedures to ensure alignment with business objectives. Valorem Reply will implement a set of deployment policies to ensure administrators don't perform specific deployments that are unapproved by IT leadership.

NEXT STEPS OVERVIEW

Now that the on-premises environment analysis has been performed, we can look to engage further on the Azure platform build and service migration. Below is the high-level migration plan with milestones, timelines and expected outcomes. Additionally, the next few slides in this document describe the approach and client responsibilities based on our extensive platform deployment and migration expertise.

Estimated duration 4-6 calendar weeks

Project Management

Knowledge Transfer

Plan and Assess

Architect and Design

Build and Configure

Migrate **Operational Handoff**

Week 1   Week 2   Week 3   Week 4   Week 5   Week 6   Close

MIGRATION APPROACH

STRATEGY	PLAN	DEPLOY	OPERATIONALIZE
Business Objective	**Discovery**	**Build, Migrate**	**Cloud Operation Model**

Inputs to the Cloud Strategy

- IT Strategy
- Application Portfolio
- IT Delivery Model
- Operational Model
- Azure Capabilities
- Azure Services
- Run Requirements

Rapid Discovery
CAF Perspective Review
Activity Matrix
Cloud Adoption Roadmap

Migrate/Dev. — Run
Prepare — Iterate
Explore

Improve — Measure
Report

Cloud Strategy	Cloud Adoption Roadmap	Innovation/Iteration	Inform, Update Requirements

Inform and updated requirements

RESPONSIBILITIES MATRIX

| Establish a Cloud CoE → | Define Roles & Responsibilities | Identify Skills & Competencies |

CONFIDENTIAL

	CIO Office	PM Office	Architecture Team	Finance Team	Security Team	Compliance Team	Migration Team	Business Team	Application Teams	Operations Team
Application Portfolio Discovery	I	A	I		I	C	R	I	C	C
Application Analysis		A	C		C		C	I	R	
Storage and Database Analysis		A	C		C		C		R	C
Migration Design	I	A	C		C		R			C
Migration Factory	I	A	C	I		C	R			
Operations and Optimization			C	I		I		I	R	A

R: Responsible   **A: Accountable**   **C: Consulted**   **I: Informed**