# Deloitte.

# Getting Multi-Cloud Right The First Time
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# Key Drivers for a Multi-Cloud Environment

We believe multi-cloud can drive increased cost efficiency and flexibility while tapping in to technology innovation democratized in the cloud

## Multi-Cloud Adoption Drivers

- **Reduce cloud spend** through competitive negotiation

- **Gain autonomy** by minimizing vendor lock-in

- **Improve resiliency and reliability** by distributing workloads across multiple cloud service providers

- **Increase business agility** through greater access to the latest technologies across multiple providers

- **Optimize the best of breed** of cloud computing solutions across the various Cloud Service Providers

- Meet current and future requirements of **governance, security, privacy, risk management and compliance regulations**

## Multi-Cloud Environment Benefits

### Business Continuity
Improve geographic presence and disaster recovery in response to outages

### Technology Innovation
Adopt the latest technologies from different leading service providers

### Cost Reduction
Reduce operating cost with more competitive price

### Service Flexibility
Offers true flexibility to implement solutions that best fit each business workload to optimize performance

### Vulnerability Mitigation
Reduce vulnerability risk by limiting blast radius with multiple Cloud Service Providers

### Data Gravity Reduction
Reduce latency caused by exploding data volume on single cloud service provider platform

*An IDC study found that 86% of enterprises predict that they will need a Multi-Cloud approach to support their solutions within the next two years*

Baxter Multi-cloud Strategy Discussion

# Key Considerations for Multi-Cloud Strategy

Getting multi-cloud right means being thoughtful about how you approach it

**Security** – Embed integrated, next generation security and privacy concepts into requirements, design, build, and testing.

**Compliance** – Meet regulatory compliance and data residency requirements e.g., GDPR, GxP's and Part 11

**Cost** – Move workloads to cheaper regions. Leverage cloud policies to manage cloud spend by real time alerts

**Disaster Recovery (DR)** – Provide resiliency against cyberattacks and data center outages

**Portability** – Provide portability through the ability to migrate from the cloud to another using automated deployment scripts (Terraform, Ansible, etc.)

**Data Management** – Multiple providers for different workloads with different performance and capacity requirements

**Infrastructure right sizing** – On-demand and distributed virtualized application mobility

**Lower Latency** – Proximity of geographically distributed customers to cloud data centers
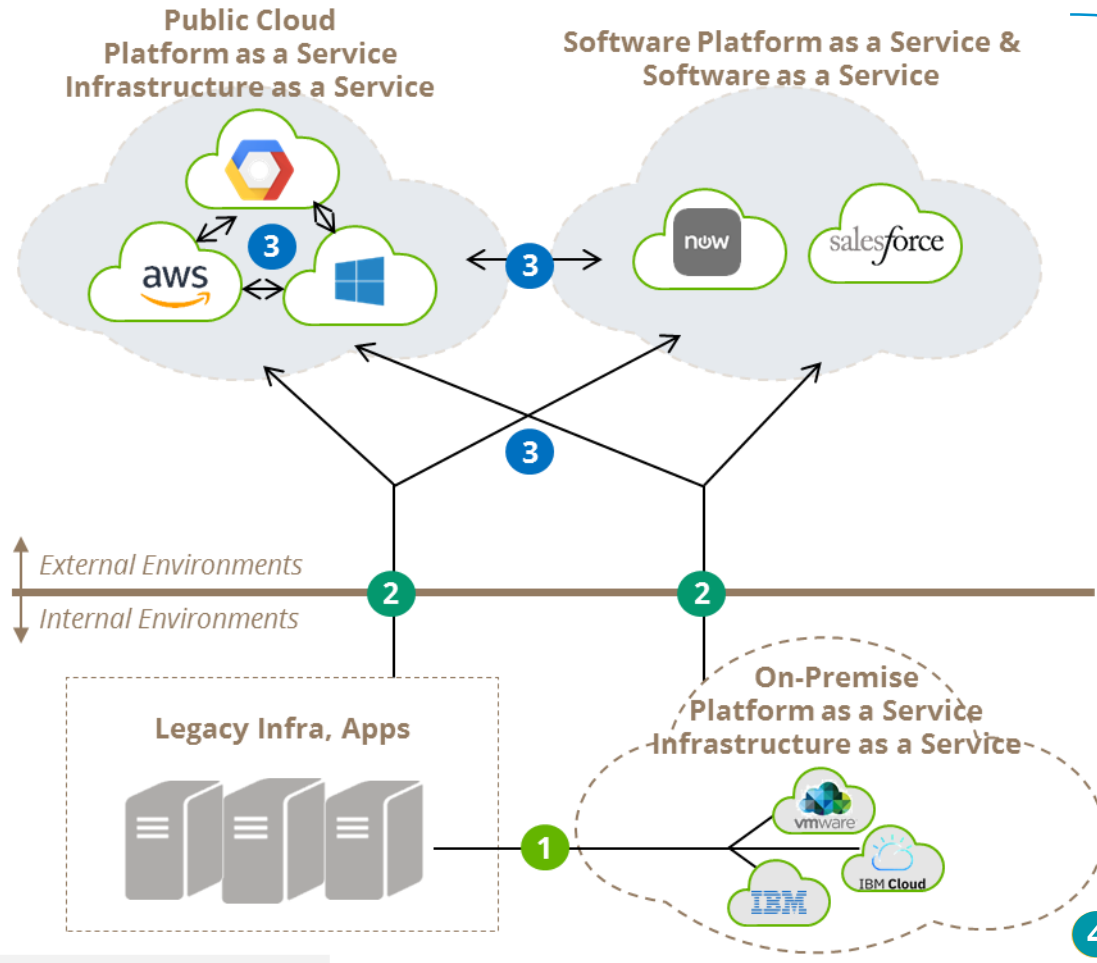
# Challenges of Multi-Cloud Environments

While multi-cloud strategy improves performance, minimizes risk of downtime, and avoids data loss, challenges can be significant

Resource constraints

Management Complexity

Transitioning complexity

Challenges with multi-cloud environment

Compliance with Governance

Security

Procurement, Billing and Accounting

- **Resource constraints**
  - ○ Requires excellent infrastructure and resource expertise as cross functionality across teams is required
- **Transitioning complexity**
  - ○ Application feasibility review required before choosing cloud platform
  - ○ Same application should not be on multiple clouds
- **Management Complexity**
  - ○ Need a robust multi-cloud management portal
  - ○ A standard set of interfaces and capabilities can be provided as APIs might not be compatible
- **Compliance with Governance**
  - ○ Multiple cloud vendors have to meet the company's compliance requirements
  - ○ Right resources should have access to the right applications
  - ○ Quality Agreements driving GxP compliance requirements
- **Procurement, Billing and Accounting**
  - ○ Company has to compare cloud providers and handle multiple invoices
  - ○ Potential for lower discount rates due to multiple providers
- **Security**
  - ○ Strong identity management is required between different cloud providers
  - ○ Disparate solutions with different, inconsistent approaches to integrating security concepts

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# Key Considerations & Best Practices

There are different flavors of multi-cloud based on the specific needs of your business



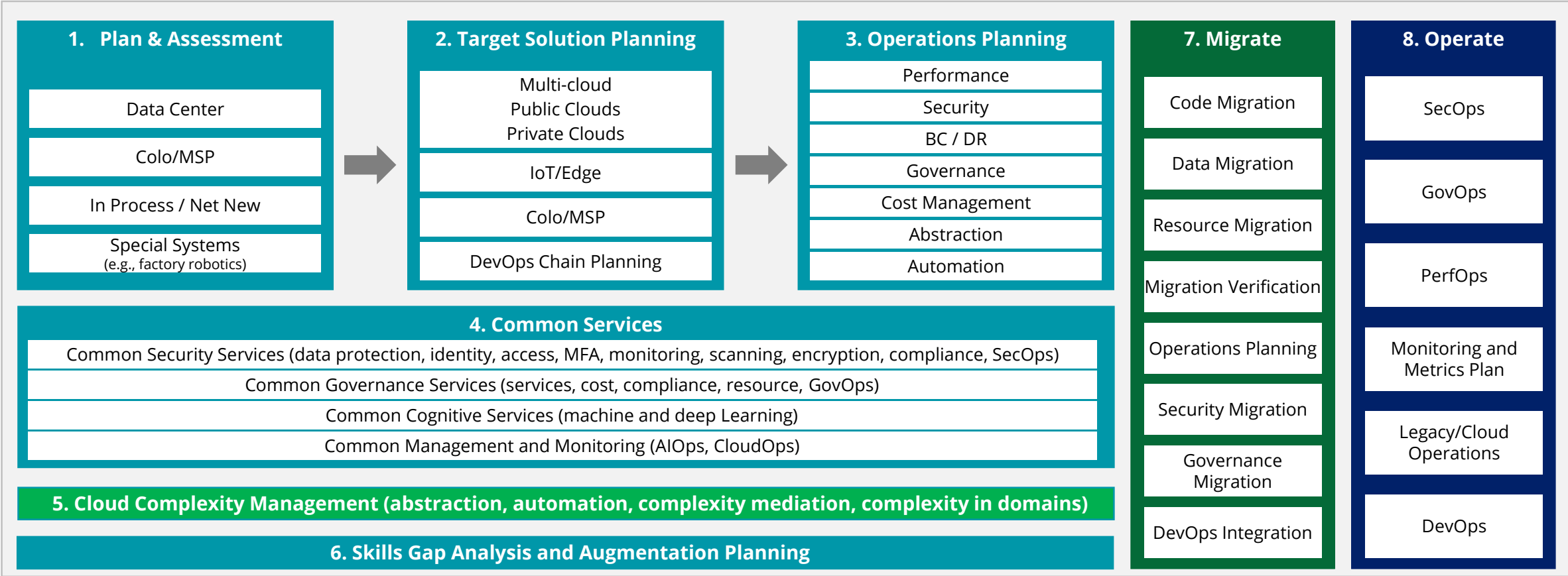Illustrative Multi-Cloud Environment

**Public Cloud Platform as a Service Infrastructure as a Service**

**Software Platform as a Service & Software as a Service**

External Environments

Internal Environments

**Legacy Infra, Apps**

**On-Premise Platform as a Service Infrastructure as a Service**

**1 Connecting Legacy Data Centers to Private Clouds**
- Increased communication load on legacy infrastructure
- Complex integration architecture – mainly point-to-point
- Transition from monolithic or service oriented architecture to micro services architecture

**2 Connecting Internal & External Infrastructure**
- Implementation of multi layered security and access controls / link encryption
- Dynamic management (policy driven) of routing,, quality of service, performance
- Storage and data management, esp. online and transactional data

**3 Connecting Multiple Cloud End-Points**
- Multi-nodal service management capabilities with exponential growth in end points
- Additional points of failure, increased issue complexity drives increased MTTR
- Multiple toolsets drive complexity and overhead
- Balancing data security and privacy, governance, cost, and utility objectives

**4 Proactively Governing Technology and Vendors**
- Maintenance of multiple vendor specific policies, SLAs
- Increased configuration management complexity
- Applying on premise risk, security, compliance for vendor provided services
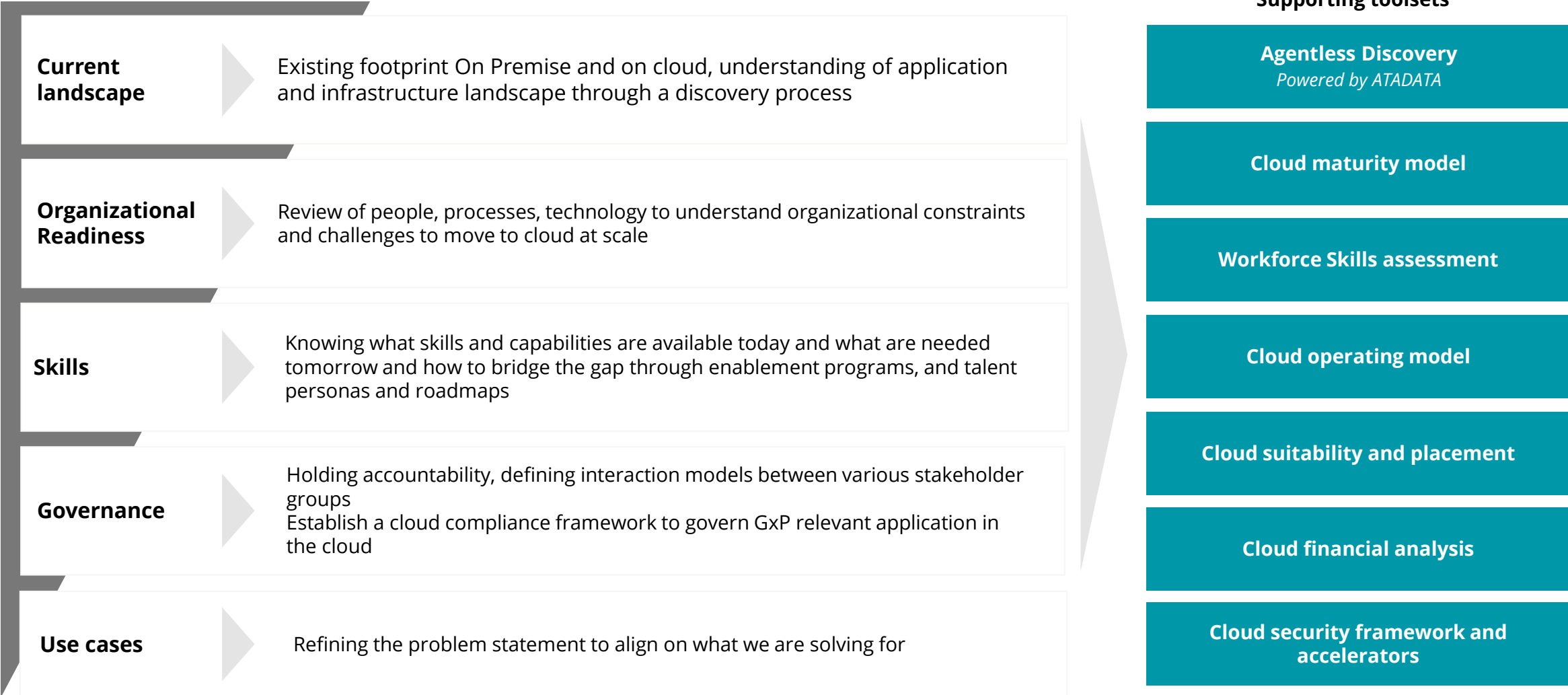- Balancing data privacy, governance, cost, and utility objectives

Baxter Multi-cloud Strategy Discussion

# Deloitte's Framework for Multi-Cloud Execution

Our holistic framework means that we can support Baxter at every stage of your multi-cloud journey

## 1. Plan & Assessment

- Data Center
- Colo/MSP
- In Process / Net New
- Special Systems (e.g., factory robotics)

## 2. Target Solution Planning

- Multi-cloud
  Public Clouds
  Private Clouds
- IoT/Edge
- Colo/MSP
- DevOps Chain Planning

## 3. Operations Planning

- Performance
- Security
- BC / DR
- Governance
- Cost Management
- Abstraction
- Automation

## 7. Migrate

- Code Migration
- Data Migration
- Resource Migration
- Migration Verification
- Operations Planning
- Security Migration
- Governance Migration
- DevOps Integration

## 8. Operate

- SecOps
- GovOps
- PerfOps
- Monitoring and Metrics Plan
- Legacy/Cloud Operations
- DevOps

## 4. Common Services

- Common Security Services (data protection, identity, access, MFA, monitoring, scanning, encryption, compliance, SecOps)
- Common Governance Services (services, cost, compliance, resource, GovOps)
- Common Cognitive Services (machine and deep Learning)
- Common Management and Monitoring (AIOps, CloudOps)

## 5. Cloud Complexity Management (abstraction, automation, complexity mediation, complexity in domains)

## 6. Skills Gap Analysis and Augmentation Planning

## Key Considerations

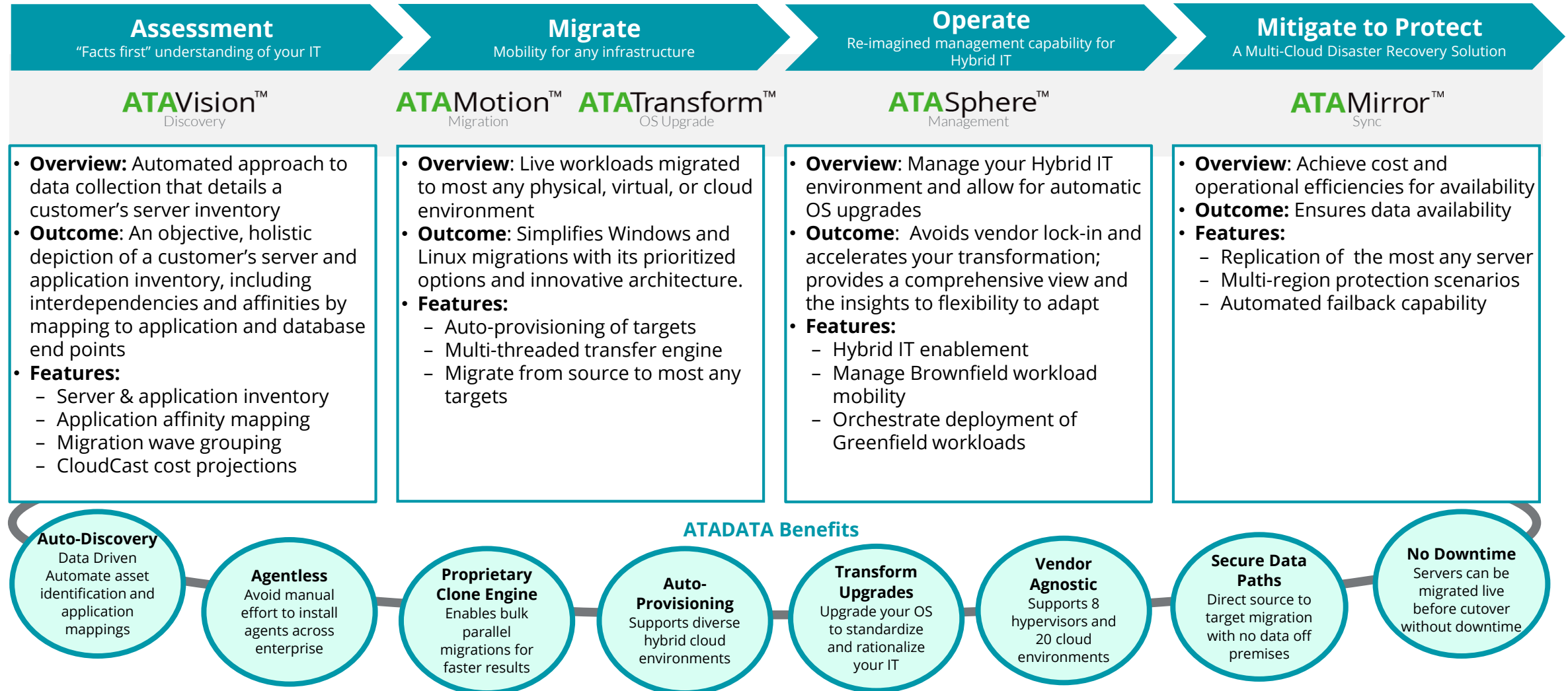| | | | | |
|---|---|---|---|---|
| Modernization | Security and Privacy | Complexity Management | Use Cases | DevOps & Agile |
| Migration | Monitoring | Innovation | Deployments | Financial Management |

Planning | Migrate | Operate

# Our Comprehensive Approach to Cloud Assessment, Strategy and Planning

We take an asset and methodology driven approach to define the path forward for our clients' multi-cloud journey

**Current landscape**
Existing footprint On Premise and on cloud, understanding of application and infrastructure landscape through a discovery process

**Organizational Readiness**
Review of people, processes, technology to understand organizational constraints and challenges to move to cloud at scale

**Skills**
Knowing what skills and capabilities are available today and what are needed tomorrow and how to bridge the gap through enablement programs, and talent personas and roadmaps

**Governance**
Holding accountability, defining interaction models between various stakeholder groups
Establish a cloud compliance framework to govern GxP relevant application in the cloud

**Use cases**
Refining the problem statement to align on what we are solving for

## Supporting toolsets

**Agentless Discovery**
*Powered by ATADATA*

**Cloud maturity model**

**Workforce Skills assessment**

**Cloud operating model**

**Cloud suitability and placement**

**Cloud financial analysis**

**Cloud security framework and accelerators**

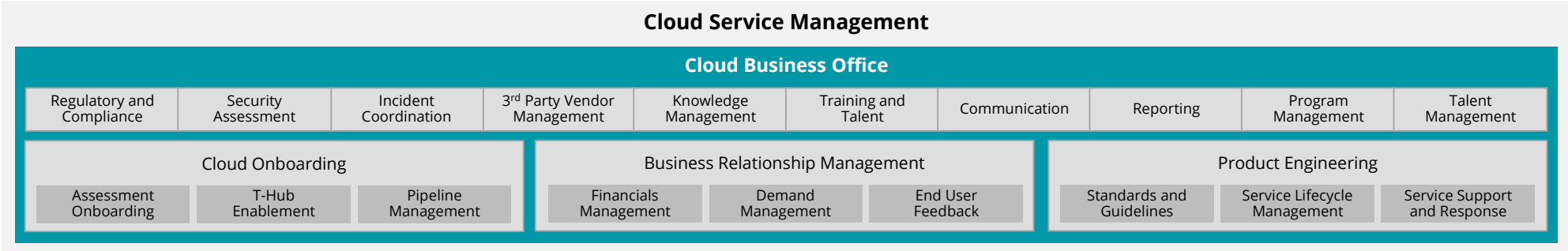Baxter Multi-cloud Strategy Discussion

# Assessment: Our Asset Driven Approach to Migrating to a Multi-cloud Environment

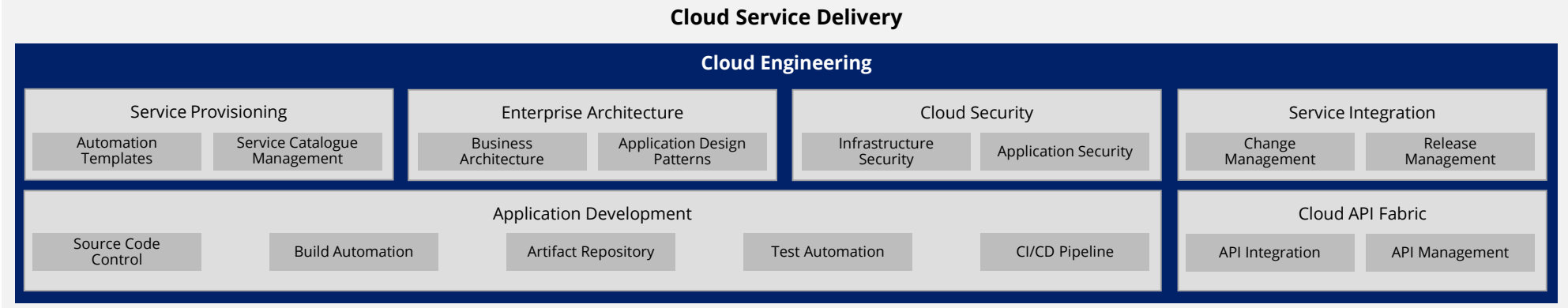Differentiator: We have invested in a methodology and ATADATA toolset that drive at scale migrations to public cloud

| Assessment | Migrate | Operate | Mitigate to Protect |
|---|---|---|---|
| "Facts first" understanding of your IT | Mobility for any infrastructure | Re-imagined management capability for Hybrid IT | A Multi-Cloud Disaster Recovery Solution |

**ATAVision™** Discovery | **ATAMotion™** Migration **ATATransform™** OS Upgrade | **ATASphere™** Management | **ATAMirror™** Sync

**ATAVision™**
- **Overview:** Automated approach to data collection that details a customer's server inventory
- **Outcome:** An objective, holistic depiction of a customer's server and application inventory, including interdependencies and affinities by mapping to application and database end points
- **Features:**
  - Server & application inventory
  - Application affinity mapping
  - Migration wave grouping
  - CloudCast cost projections

**ATAMotion™ / ATATransform™**
- **Overview**: Live workloads migrated to most any physical, virtual, or cloud environment
- **Outcome**: Simplifies Windows and Linux migrations with its prioritized options and innovative architecture.
- **Features:**
  - Auto-provisioning of targets
  - Multi-threaded transfer engine
  - Migrate from source to most any targets

**ATASphere™**
- **Overview**: Manage your Hybrid IT environment and allow for automatic OS upgrades
- **Outcome**:  Avoids vendor lock-in and accelerates your transformation; provides a comprehensive view and the insights to flexibility to adapt
- **Features:**
  - Hybrid IT enablement
  - Manage Brownfield workload mobility
  - Orchestrate deployment of Greenfield workloads

**ATAMirror™**
- **Overview**: Achieve cost and operational efficiencies for availability
- **Outcome:** Ensures data availability
- **Features:**
  - Replication of  the most any server
  - Multi-region protection scenarios
  - Automated failback capability

## ATADATA Benefits

**Auto-Discovery**
Data Driven Automate asset identification and application mappings

**Agentless**
Avoid manual effort to install agents across enterprise

**Proprietary Clone Engine**
Enables bulk parallel migrations for faster results

**Auto-Provisioning**
Supports diverse hybrid cloud environments

**Transform Upgrades**
Upgrade your OS to standardize and rationalize your IT

**Vendor Agnostic**
Supports 8 hypervisors and 20 cloud environments

**Secure Data Paths**
Direct source to target migration with no data off premises

**No Downtime**
Servers can be migrated live before cutover without downtime

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# Cloud Center of Excellence: Manage Migration and establishing Governance

Moving to multi-cloud creates additional complexity that requires a robust organizational construct to manage the overall cloud footprint

## Cloud Service Management

### Cloud Business Office

| Regulatory and Compliance | Security Assessment | Incident Coordination | 3rd Party Vendor Management | Knowledge Management | Training and Talent | Communication | Reporting | Program Management | Talent Management |
|---|---|---|---|---|---|---|---|---|---|

**Cloud Onboarding**

| Assessment Onboarding | T-Hub Enablement | Pipeline Management |
|---|---|---|

**Business Relationship Management**

| Financials Management | Demand Management | End User Feedback |
|---|---|---|

**Product Engineering**

| Standards and Guidelines | Service Lifecycle Management | Service Support and Response |
|---|---|---|

Understands the business priorities, filters customer demand, and governs the development and delivery of cloud services
Establish qualification plans for the migration of GxP relevant application. Assist in qualification activities

## Cloud Service Delivery

### Cloud Engineering

**Service Provisioning**

| Automation Templates | Service Catalogue Management |
|---|---|

**Enterprise Architecture**

| Business Architecture | Application Design Patterns |
|---|---|

**Cloud Security**

| Infrastructure Security | Application Security |
|---|---|

**Service Integration**

| Change Management | Release Management |
|---|---|

**Application Development**

| Source Code Control | Build Automation | Artifact Repository | Test Automation | CI/CD Pipeline |
|---|---|---|---|---|

**Cloud API Fabric**

| API Integration | API Management |
|---|---|

Responsible for integrating technology and cloud services from different cloud vendors and for managing the service catalogue; Delivers reliable cloud services and provides an end-to-end integration point

## Cloud Service Operations

### Cloud Operations Support

| Incident Management | Problem Management | Availability Management | Asset and Config Management | Access Management | Security Operations | Logging and Monitoring | Backup and Recovery |
|---|---|---|---|---|---|---|---|

Provides cloud service operations support for the platform with focus on continuous improvement across the multi-cloud environment

 Baxter Multi-cloud Strategy Discussion

# Revising the Operating Model in Anticipation of Multi-Cloud (1)

Moving to multi-cloud increases an organization's need to focus on maturing the operating model in response to cloud



**Cloud Operating Model Maturity** (vertical axis)

**Time** (horizontal axis)

**Cloud 3.0:** Enhance operating model, incorporate feedback, iterate and automate workflows and processes

**Cloud 2.0:** Design and formulate teams, define processes, frameworks and test plans to implement changes identified in the assessment process

**Cloud 4.0:** Achieve end state maturity with optimized model. Fully-integrated capabilities aligned with cloud organization; Frictionless governance and control policies in place; and automated operations

Business inputs are increasingly delivered through ongoing iterations of cloud services

**Cloud 0:** Assess current state of Operating model using the diagnostic tool across the 8 key categories, current state competency assessment

**Cloud 1.0:** Identify gaps, new roles / capabilities, key procedures, tools, KPIs and standards and policies across all 8 categories

Operating model continues to evolve and be refined

Today · 90 Days · 180 Days · 270 Days · 360 Days

As part of the cloud transformation program, an organization needs to evolve its existing IT Operating Model processes, workflows, roles, and governance to support the agile nature of cloud, and transform how services are delivered in efficient manner.

Roll out of cloud operating model can be iterative and continue to evolve over time. It can start with establishing a Minimum Viable Operating Model leveraging 3-5 scenarios per LOB as pilots, and evolve into a fully integrated set of cloud with business focus.

# Revising the Operating Model in Anticipation of Multi-Cloud (2)

Maturing the operating model means taking action across multiple dimensions

| | | Cloud 1.0 - Foundational | Cloud 2.0 – Transformative | Cloud 3.0 - Innovative | Cloud 4.0 - Exponential |
|---|---|---|---|---|---|
| **1** Transformation | **Symphonic Organization** | • Define the interaction between teams on how the flow of work gets performed in the cloud<br>• Identify new roles, responsibilities and skills required to build, adapt and operate cloud | • Augment with cloud specific roles, working models supporting the new operating model<br>• Adopt working models such as Platform teams and Cloud Business Office (CBO) | • Transform IT operating model to optimize the people, process and technologies in distributed environment | • Incubate agile, multi-functional teams which are proficient in cloud capabilities |
| | **Cloud Native Competencies** | • Identify competencies needed to support cloud based organization<br>• Define the gaps in competencies and provide recommendations for filling the gaps | • Implement organizational change management process to facilitate transition<br>• Develop a transition plan from being operators & administrators to being developers of automation & cloud solutions | • Shift mindset from siloed teams & work queues to product-centric, cross-functional teams<br>• Evaluate resources & map current vs. future competencies required to run Cloud Native applications and services | • Build in-house center of excellence to incubate best practices and best-in-class cloud trends and technologies<br>• Partner with HR/ Talent and establish specific incentive programs |
| **2** Governance | **Governance & KPIs** | • Establish a governance framework for cloud & leverage methods such as automation & continuous monitoring<br>• Establish necessary policies & check points | • Align KPIs with overall cloud strategy<br>• Identify KPIs & develop dashboards across strategic, executive and operational levels | • Enhance existing capabilities to address the requirements for multi cloud setup | • Oversee overall performance and manage contracts of external advisors and vendors |
| | **Security & Compliance** | • Setup a system to design & manage security policies and compliance consistently across cloud vendors and business units<br>• Ensure the organization has preventive, detective, and corrective controls | • Ensure cloud platform & software is auditable and compliant with defined security controls & policies<br>• Design architectures to accelerate recovery and reduce incident response time | • Create comprehensive visibility of cloud assets down to the guest-level by providing visibility and detection beyond the traditional perimeter (enterprise networks, legacy data centers, on-premise users) | • Build resilient, highly-available infrastructure on cloud, aligned to business requirements by leveraging elastic and distributed capabilities |
| | **Cloud Economics** | • Setup processes, guidelines, and tooling to manage and optimize cloud spend, spread accountability of cloud optimization across the enterprise | • Implement governance policies for the cloud, have a centralized cloud financial policy for teams to access<br>• Provide daily reports & enforce usage quotas | • Make chargeback granular and traceable by business unit, application/platform<br>• Provide audit trail capabilities, establish approval processes for new services and regions | • Optimize the cloud landing zone design decisions and application patterns during cloud adoption as impact grows bigger with the scale of workloads migrated to the cloud |
| **3** Engineering | **Cloud Adoption** | • Draft gov. policies, standards and procedures<br>• Create training program to build competencies<br>• Identify remediation to make existing apps cloud ready | • Evaluate workloads for cloud suitability<br>• Develop architecture standards for cloud native development<br>• Develop Applications with cloud principles of multi-tenancy, autoscaling & easy integration | • Implement the migration factory, migration roadmap and baseline tools & processes for automation and operations<br>• Finalize governance framework for vendor selection & create onboarding process for new users | • Optimize KPIs, KRIs & service targets for vendor management<br>• Pilot application migration & phased migration<br>• Enable use of CI/CD pipelines for faster provisioning |
| | **Cloud Platform** | • Define policies/controls/design patterns for cloud native architecture<br>• Define the service catalog, service configuration and deployment policies | • Establish Architectural practice and maintain modular and repeatable patterns<br>• Enable self service access to the self service catalog | • Develop open, scalable architecture to leverage multiple cloud platforms<br>• Develop Cloud Integration architecture & tooling for on-premise to cloud and cloud to cloud | • Orchestration based on user-defined policies and scripts implemented<br>• Understand business priorities, customer demand & govern development and delivery |
| | **Cloud Operations** | • Define and manage configuration, health, performance of cloud infrastructure, platform and SaaS solutions<br>• Define processes to monitor the utilization of infrastructure resources to avoid cloud sprawl | • Centralized monitoring for performance and health<br>• Monitor and automate failure detection and self-healing of cloud services and configurations | • Enable cloud service redundancy, resiliency and replication for high-availability and disaster recovery, leveraging cloud provider's built-in capabilities and third-party tooling | • Enable compliance monitoring and reporting for regulatory and audit controls<br>• Provided consolidated management of overall cloud deployment |

# Optimizing the Multi-Cloud Footprint

Creating a multi-cloud environment is only half the journey. There needs to be a continued focus on keeping this environment efficient

| PLAN | DESIGN | DISCOVER | CRAFT | STABILIZE |
|---|---|---|---|---|
| Understand customer financial requirements | Create tagging schema and implementation plan | Collect utilization data to understand usage behavior | Create optimization roadmap and recs | Maintain realized savings. Utilize potential discounts |
| Collect billing, utilization and other documentation | Define usage metrics and alerting mechanism | Identify idle resources and waste for deletion | Integrate recs with change management policies | Budget consumption trends and RI management |
| Identify areas of focus for optimization roadmap | Create initial governance policies | Identify rightsizing of architecture based on priority | Enact recommendation and track implementation | Continuous monitoring and usage tracking |
| Finalize roles and responsibilities along with key timelines | Identify areas for automation and scripting | Identify other consumption trends | Update budget projection and investigate purchase tactic | Tagging structure and reporting updates |

# Thank You

Questions?

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