



# Navigating the Cloud: Migration and Modernization Executive Guidance



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# Table of Contents

Abstract .....	1
Introduction .....	1
AWS Cloud Value .....	3
Migrate to Modernize .....	6
Accelerating the Migration Conveyor .....	8
Migration Assessment .....	8
Migration Mobilization .....	10
Cloud Financial Management .....	10
Cloud Operating Model .....	12
Migration Planning .....	14
Migration Execution .....	18
The Migration Factory .....	19
Managing Specialized Workloads .....	21
Continuous Modernization .....	22
Accelerating AWS Value with Artificial Intelligence .....	28
The State of AI Today .....	28
AWS Artificial Intelligence and Machine Learning .....	29
Conclusion .....	32



# Abstract

The purpose of this document is to simplify cloud migration and modernization guidance for senior executives. The first section frames the cloud guidance discussion. We introduce opinionated definitions, and a mental model that provides a bridge between migration and modernization topics. The sections that follow discuss the three most important cloud strategy areas—moving to AWS, continuous modernization in AWS, and accelerating value with artificial intelligence. Sections outline guidance for executive decisions, engagement, and execution.

# Introduction

Cloud adoption is for leaders seeking to grow their business through technology and organizational changes that increase efficiency, innovation, cost optimization, and revenue. **Cloud adoption** is migrating to the cloud and adopting a cloud operating model that supports continuous modernization. Moving to the cloud has many business benefits from reducing total cost of ownership to increasing business agility and resiliency enhancing market competitiveness for companies. Helping customers migrate and modernize are how AWS empowers customers to grow their businesses by finding the right balance between cost saving and revenue generating investments.

Successful business transformation to a cloud operating model is a commitment to migrate and modernize. After migrating to AWS, the initial business benefits can make it seem the mission is complete—cloud benefits achieved. However, stopping here will fall short of maximizing competitive gains (e.g., speed, efficiency, financial benefits) that are only achievable through modernizing on the cloud. Business leaders should plan for accelerating business growth in the cloud through modernization from the outset.

### Key Points

- Cloud adoption is migrating to the cloud and adopting a cloud operating model that supports continuous modernization.
- Migration is the set of strategies used to move workloads to the cloud – retire, retain, repurchase, rehost, relocate.
- Modernization is the incremental change to workloads, process, and organizations through replatform or refactor.
- Rehost migration benefits extend beyond cost reduction to availability, resiliency, security, and agility.
- Application refactor in AWS improves on rehost benefits driving significant business agility and revenue growth.

Migration and modernization are part of the same business value spectrum. Sometimes they share similar benefits with different degrees of impact that can make discussion of goals and guidance confusing. For example, reducing infrastructure cost by rehosting and cost optimizing by rearchitecting for elastic scale. AWS uses seven strategies (i.e., [the 7Rs](#)) to disambiguate and guide cloud adoption decisions: retire, retain, repurchase, rehost, relocate, replatform, and refactor.

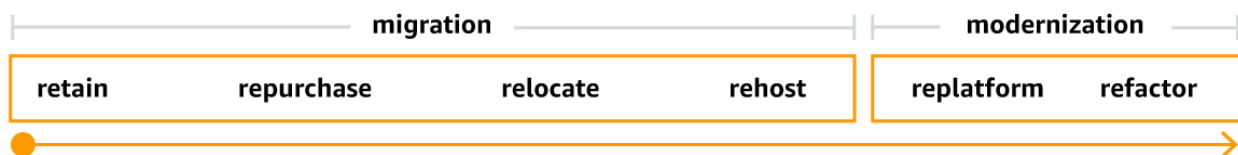


Figure 1: The business value spectrum from on-premises to AWS and beyond.

[Figure 1](#), shows the spectrum of business value across strategies from lowest to highest impact. Each strategy provides business benefits, but replatform and refactor yield outsized results. For example, a typical rehost migration provides incremental improvements to availability, resiliency, security, agility, and cost; whereas an application refactor to cloud native services can lead to upwards of 43% revenue growth.<sup>1</sup> We define **migration** as the set of strategies used to move workloads to the cloud—retain, retire, repurchase, relocate,

<sup>1</sup> Known (2022), *Business Value of Cloud Modernization*



rehost. **Modernization** is the incremental change to workloads, process, and organizations through replatform and refactor (including rewrite and rearchitecture).

## AWS Cloud Value

AWS cloud adoption has a large and continuous impact to profitability and market competitiveness for customer businesses. These benefits scale with the speed, amount, and duration of cloud usage. The velocity of digital transformation (e.g., migration, modernization), the percentage of workloads in AWS, and how long workloads run in AWS all directly correlate to improvements in EBIDTA, Enterprise Value (EV), and cost. Businesses with workloads on AWS see 4.2 times better financial performance on average than other companies.<sup>2</sup>

### Key Points

- AWS cloud adoption drives a virtuous cycle increasing productivity, business value, and profitability.
- Business benefits scale with the number of workloads migrated and how long workloads run in AWS.
- The average financial growth over six years: 42.6% EBIDTA, 73.2% EV, and 82.8% revenue per employee
- Infrastructure costs decrease an average of 20% per year over six years.

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<sup>2</sup> *The Hackett Group (2022), Supercharge Financial Performance with Amazon Web Services*

Together, migration and modernization drive a positive feedback loop that accelerates value creation for customer businesses. The AWS Cloud Value Flywheel (figure 2) summarizes the virtuous cycle between cloud investments and increased profitability. Investments in migration and modernization activities increase IT staff productivity through new levels of automation allowing time to be reallocated to more value-added activities. The increased focus and automation drive faster innovation and time to market amplifying business value creation leading to increased profitability. The return on investment fuels additional cloud adoption activities, closing the loop.

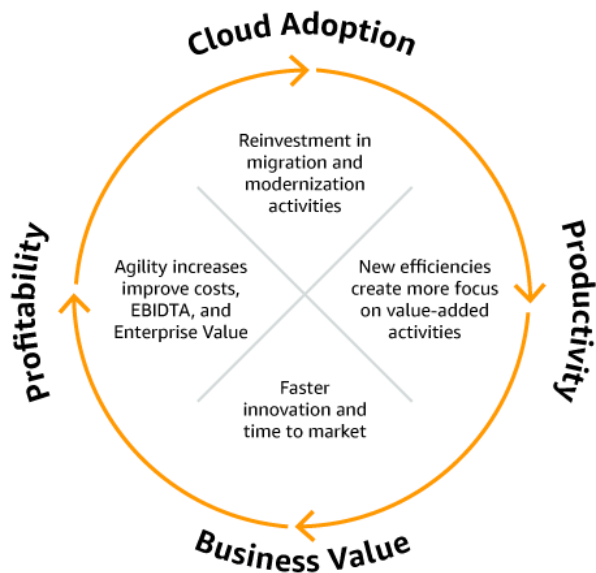


Figure 2: The AWS Cloud Value Flywheel shows the virtuous cycle between cloud investments and increased profitability.

Looking at customer business value over time is the best evidence of flywheel results. AWS commissioned a study that evaluated customer financial performance and business value relative to years of cloud use, percentage of a customer’s digital estate running in AWS, and the optimal point for AWS value realization. The study measures financial performance using earnings before interest, taxes, depreciation, and amortization (EBITDA), and uses enterprise value (EV) as the measure of a company’s total business value.

The findings show that the longer a company uses AWS the better the realization of financial performance, value, and revenue per employee. Businesses using the cloud 1–3 years see an annualized EBIDTA growth rate of 1.8% YoY, 3–6 years 5.4%, and more than 6 years 7.1%. EV also increases over time with annualized growth rate after 1–3 years of 5.4%, 3–6 years 8.3%, and more than 6 years 12.2%. Similarly, the approximate revenue per employee grows annually from 7.1% in the first three years to 13.8% in six years. Companies see significant business value benefits over six years in EBIDTA growth (42.6%), EV (73.2%), and revenue per employee (82.8%).

Infrastructure costs for migrated applications also decrease over time: 14% in year 2 to 30% by year 6; an average of 20% per year over six years.<sup>3</sup>

<sup>3</sup> The Hackett Group (2022), *The Business Value of Migration to Amazon Web Services*



AWS Use (years)	EBITDA (annualized)	EV (annualized)	Revenue Per Employee (annualized)
1-3	1.8%	5.4%	7.1%
3-6	5.4%	8.3%	11.3%
+6	7.1%	12.2%	13.8%

Financial performance also strongly correlates to the amount of a digital estate that is migrated to AWS. The more workloads running in AWS, and not on-premises, the better the EBITDA growth. Companies with up to 50% of their workloads running in AWS see YoY EBITDA growth of 3.9% on average with YoY growth more than doubling to 9.2% when 76% or more of workloads are migrated.

*Use the AWS Cloud Value Flywheel to help create KPIs to monitor the impact of underlying drivers on productivity, business value, and profitability.*

Workloads Migrated to AWS	YOY EBITDA Growth
25%-50%	3.9%
51%-75%	4.1%
76%+	9.2%

The cumulative financial and agility benefits of using AWS are clear. The data show that customer business value of using AWS accretes with time and use. The optimal realization of financial and agility benefits occurs in year 3 and when 75% of workloads are migrated. Prioritize migration investments to initiate the cloud value flywheel as early as possible to begin driving increases in innovation capacity and business agility.

## Migrate to Modernize

Businesses maximize cloud investment returns with the more workloads they migrate and the more time they operate in the cloud. Our customer studies and experience helping thousands of customers accelerate migrations align—the fastest time to cloud value is to rapidly rehost workloads first, and then modernize infrastructure and applications on the AWS cloud.

The only exception to this rule is when there are **specialized workloads** in a digital portfolio. Specialized workloads are workloads that run on unique platforms, have unique hardware requirements, or exceptional licensing costs or complexity. Specialized workloads (e.g., mainframe, Oracle, SAP) require replatforming or refactoring to move to the cloud. Modernize, then migrate these workloads. Following this approach, customers realize an initial step function change in business impact from rehosting followed by the acceleration of business agility and innovation from continuous modernization.

### Key Points

- Rehost first, then modernize. Migrate to accelerate business benefits, then modernize to amplify them.
- Create modernization plans while assessing workloads to start modernizing workloads as they arrive in the cloud.
- Identify specialized workloads early in a migration. Modernize, then migrate these workloads.

Figure 3 shows the Migration Conveyor. We can think of migration as a conveyor belt pushing workloads to AWS that are ready to start infrastructure and application modernization as they arrive. The Migration Conveyor model simplifies migration workload decisions by circumventing common ideation and ‘refactoring while migrating’ pitfalls that can stall migrations, and may result in the ‘two putt refactoring’ pitfall where workloads are refactored a second time after rehosting. Migrate first, then modernize on AWS except for specialized workloads that require replatforming or refactoring to migrate. Workloads coming off the migration conveyor initiate the first turn of the continuous modernization flywheel.

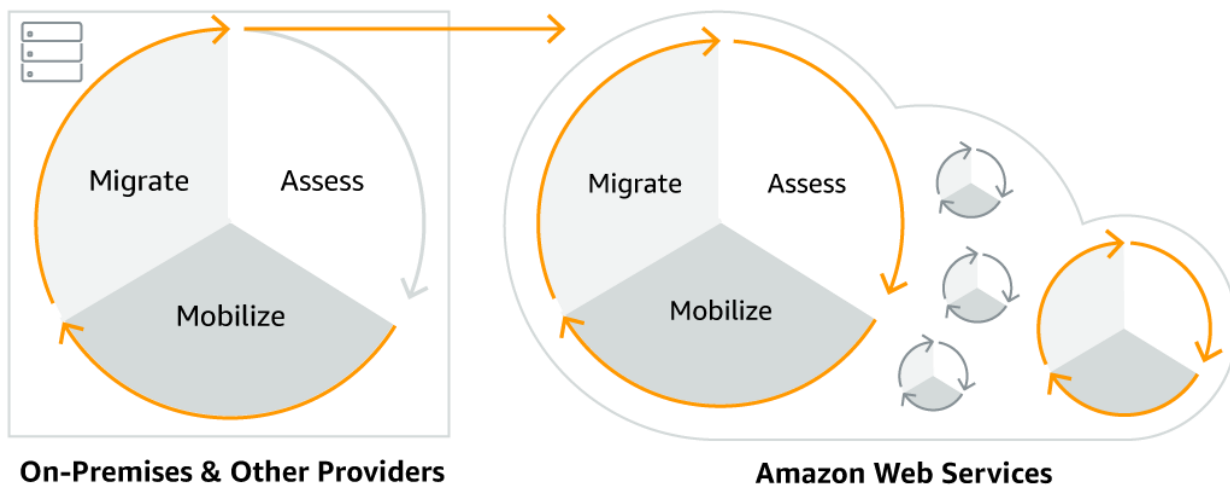


Figure 3: The Migration Conveyor model prioritizes rapid migration to initiate the continuous modernization flywheel.

**Continuous modernization** is the phase when workloads, process, and teams<sup>4</sup> continue to grow and evolve in AWS through infrastructure and application replatforming and refactoring (including rearchitecture and rewrite). During this phase it’s important to develop a business plan for moving to cloud native applications. Avoid investments in building and maintaining services and infrastructure outside of the business’s core domain. Instead, guide teams to use AWS services in these areas. Let AWS enhance and operate these services to eliminate building, maintaining, and operating investments. Prioritize thinking about application refactoring using a combination of serverless (e.g., [Lambda](#)), containers (e.g., [Fargate](#)), and managed services. Adopting these services will reduce cost while increasing staff productivity and business agility. Establish a data strategy early that leverages managed data (e.g., [Aurora](#),

<sup>4</sup> Melvin E. Conway (1968), [How do committees Invent?](#)

[Redshift](#)) and analytics (e.g., [Kinesis](#), [Athena](#)). Using managed data and analytics reduces the time to insights resulting in faster and more accurate decision making that amplifies business agility. Refactoring to cloud native applications with a solid data strategy accelerates business agility benefits while also establishing the foundation for continued growth and innovation through artificial intelligence.

## Accelerating the Migration Conveyor

The [Migration Acceleration Program](#) (MAP) is the AWS flagship program for helping customers accelerate each step (assess, mobilize, migrate) of the migration conveyor. MAP uses an outcome driven methodology refined and proven through thousands of successful enterprise customer migrations. Executive leaders should consider MAP to help their business transition to the cloud with strong AWS cloud foundations, rapid migration, reduced risk, and financial assistance that offsets initial migration costs.

## Migration Assessment

Before migration, customers typically start with one or more on-premises data centers and a compelling business event like a data center exit. Data center facilities likely evolved over time and may include multiple generations of commercial off the shelf software (COTS), custom applications, and infrastructure. It's common at this stage for leadership teams to be aligning on cloud strategy, looking for clarity on the full scope of a migration, and trying to understand the financial impact of moving to the cloud. This is the right time for business leaders to evaluate their digital estate using a migration assessment, the first step of the migration conveyor.

A **migration assessment** is an automated deep evaluation of digital assets used to create a data-driven business case for moving to the cloud. The business case clarifies current data center software and infrastructure, is a tool for stakeholder alignment, and identifies cost saving opportunities (e.g., software licensing, infrastructure). Business cases deliver a comparative analysis of on-premises total cost of ownership (TCO) and projected cloud TCO.

During an assessment, digital assets (e.g., software, servers, storage) are automatically discovered across all environments including on-premises data centers, edge data centers, carrier hotels, and colocation facilities. Inventory and utilization (e.g., CPU, memory, configuration, storage) data are collected for recommendation synthesis. For example, assessments identify cost saving opportunities like overprovisioned (underutilized) workloads to right-size in the cloud, idle hosts for removal, and mitigations for costly software licensing.

Business case recommendations help reduce migration scope and cost optimize AWS destination environments prior to migration. Use [Migration Evaluator](#) for a free AWS assessment.

### Executive impact areas

- Use business cases to evaluate opportunity size and drive alignment discussions with executives.
- Create migration goals to communicate and clarify business mission, purpose, and outcomes across the organization.
- Create migration tenets that apply migration business goals to the evaluation of application workloads.

**Align executives:** Successful cloud adoption requires durable commitment and alignment between executives. Use the business case to evaluate the cloud migration opportunity and drive discussion with executives and cloud stakeholders. Make sure to evaluate whether [MAP](#) is a fit for the business. Assessment business cases can be used for MAP qualification.

**Create goals:** Use assessments to help establish **migration goals**, which are business goals driven by a compelling event (e.g., a data center exit). Use migration goals to communicate and clarify business mission, purpose, and outcomes across the organization. Avoid the trap of conflating goals and events or having goals that are too high-level. The ambiguity reduces stakeholder alignment. Guide data-driven migration goal setting toward SMART goals while avoiding late discovery of missing data needed that can introduce delay.

**Establish tenets:** Create migration tenets that apply migration goals to the evaluation of application workloads. A good set of tenets provides the business context for evaluating and prioritizing migration workloads during the mobilization phase, and is a mechanism for creating organizational alignment.

Assessments help customers get a clear understanding of digital assets, and a business case for migrating to AWS that provides a clear understanding of the business opportunity. Business cases used in tandem with migration goal setting establish the groundwork for accelerating subsequent migration planning during mobilization.

# Migration Mobilization

Migration assessment provides the business case for moving to the cloud and helps executive leaders define migration objectives. Realizing migration goals requires important enablement and planning efforts for business leaders and their teams. The goal of the mobilization phase is to help organizations build the cloud foundations (e.g., leading, transforming, operating) to manage, operate, and grow mission-critical applications on AWS before workloads arrive in the cloud. After mobilization, customers have the tools, process, and capability to rehost at scale and operate in the cloud. Business leaders should consider taking advantage of [AWS Professional Services](#) and the [AWS Partner Network](#) to help accelerate the migration journey.

## Cloud Financial Management

Cloud financial management (CFM) is a best practices approach to cost management and financial governance of cloud spend. Ultimately, the goal is to achieve cloud financial operations that enable spend monitoring (e.g., cost, consumption, service KPIs), forecasting, optimization, and accountability. AWS customers that adopt CFM best practices have outsized post-migration benefits—with 50% higher outcomes across cost savings, staff productivity, agility, and resiliency.<sup>5</sup>

Begin CFM planning as early as possible during the mobilization phase. Introduce teams (e.g., executives, finance, engineering) to CFM and basic cloud economics with training like [AWS Cloud for Finance Professionals](#) and [AWS Cloud Financial Management for Builders](#). This will accelerate alignment and improve ownership. Ensure the organization prioritizes creating a baseline of current on-premises cost and usage before migration begins with a migration assessment using [AWS Migration Evaluator](#). Use the baseline for post-migration comparative analysis.

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<sup>5</sup> *The Hackett Group (2022), Cloud Financial Management Maximizes Business Value on Amazon Web Services*

### Executive impact areas

- Create an organizational culture of cost ownership.
- Allocate spend ownership to the business units or teams generating the costs.
- Establish strong partnerships between finance and engineering teams.
- Direct cloud leaders to implement cost tracking and management.
- Create governance for tracking cloud spend.

**Ownership culture:** Executives should focus on building a culture of cost ownership across the organization. A high level of ownership across teams maximizes visibility and continuous cost savings. Business leaders should ensure CFM investments are part of product roadmaps, and teams collaborate cross-functionally to enable success.

**Allocate spend:** Allocate 70% or more of the cloud spend to the business units or teams generating the costs. Spend ownership ensures teams continuously optimize workloads. Use practices like dynamic provisioning (e.g., [Amazon EC2 Auto Scaling](#)), instance selection (e.g., Amazon EC2 [Reserved](#) and [Spot](#) Instances, [Graviton](#)), and moving to [serverless](#) and managed services. This results in average cost savings of 52% and a 29% increase in SLA consistency (e.g., availability, scalability, latency).<sup>5</sup>

**Partnerships:** Establish a strong cloud operating partnership between finance and engineering teams with regular cloud usage and cost reviews. Developing strong partnership amplifies finance and engineering performance with average increases in spend forecast accuracy (46%), improved service SLA consistency (32%), and savings (22%).<sup>5</sup>

**Cost tracking:** Cloud leaders should implement cost tracking using account best practices and a tagging strategy for cloud resources. Use [AWS Control Tower](#) to create account structures that align with business functions and teams, and guardrails to govern usage. Implement a resource cost allocation tagging using [AWS Cost Categories](#) to greatly simplify cost and usage mapping to organizational structure.

**Governance:** Create governance for tracking cloud spend. Start with the [AWS Cloud Financial Management suite](#). Use [AWS License Manager](#) to leverage rule-based controls and dashboards for cloud license usage visibility. [AWS Trusted Advisor](#) can help analyze cloud usage and reduce spend with actionable recommendations. This increases likelihood of a 30 day reduction in time to market by 45% and a 120 hour reduction in time to insight by 56%.<sup>5</sup>

## Cloud Operating Model

Transitioning to a Cloud Operating Model (COM) is a fundamental determinant of cloud adoption success. A cloud operating model aligns the continuous delivery of business value to autonomous cross-functional teams that fully own one or more business capabilities as part of a cloud product. A COM enables cloud technology and best practices to maximize business agility, resiliency, and the financial benefits. Building a COM is an iterative process requiring experimentation to identify processes and mechanisms that work best for a business's specific needs. Rapid organizational learning from iterative successes and failures will help drive optimal outcomes. Businesses with a strong COM can see a 14 times improvement in time to market, 60% reduction in downtime, and 43% reduction in spend.<sup>6</sup>

### Executive impact areas

- Ensure visible and consistent executive sponsorship and communication.
- Manage organizational change with an iterative, adaptive, and transparent approach.
- Shift the organization from functionally aligned teams to product aligned teams.
- Create a Cloud Center of Excellence to drive the transition to a cloud operating model.

**Executive sponsorship:** Visible and consistent executive sponsorship and communication is a best practice when creating a cloud operating model. Executives should participate in key cloud operating model areas including managing change, facilitating transition to product aligned teams, and establishing a Cloud Center of Excellence.

**Managing change:** Adopting a cloud operating model is not a pure technology change or addition to a business's current operating model. It involves organizational, cultural, and process changes. Avoid the pitfall of using a traditional project-based approach that adds cloud as a technology layer into the existing operating model. This will likely result in higher costs, slow or stalled adoption, outages, or security breaches. Support challenges to the status quo and the adaptation or abandonment of the previous ways of doing things. Foster quick cycles of experimentation, learning, and adapting. Encourage teams to use agile

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<sup>6</sup> AWS (2020), *Building a Cloud Operating Model*

practices for planning, estimation, and execution. Agile methods will help ensure prioritization, clear goals, and short time frames.

**Product alignment:** Adopting a product-oriented approach is the foundation of COM and amplifies business benefits (e.g., cost savings, staff productivity, operating resilience, business agility). The goal is to create strong ownership, accountability, and responsibility for delivering business value at the team level. Executives should ensure cloud leaders identify products and align teams to products. A **product** is a set of one or more related business capabilities owned by an autonomous **product team** of 7–10 cross-functional (e.g., product management, design, engineering) members. Teams decide and act independently fully owning their customer, technology, and business outcomes. Product orientation will be a paradigm and cultural shift for a company with functionally aligned teams. Supportive executive engagement and consistent reinforcement of business goals is critical.

**Cloud Center of Excellence:** Transformation to a COM requires executives ensure the business builds a critical mass of people with AWS experience that can lead change. Business leaders must ensure momentum continuously builds with consistent and visible progress. The best practices approach is to create a Cloud Center of Excellence (CCOE) to lead the business from on-premises into the cloud. A **CCOE** is composed of business and technology leaders that come together to drive the transition to a product-centric cloud operating model. Executives should ensure the CCOE is setup as an enabling team that leads in service to other teams. CCOE team success requires earning trust through partnership to ensure standards adoption and that the platform they build to vend cloud resources is accelerating development velocity across every line of business. The CCOE must establish clear operating principals, guardrails, and executive alignment as they lead change to a COM in six areas ([figure 4](#)): establishing a customer obsessed working backwards process, moving to product-centric operation, reorganizing teams to products, creating process that brings work to teams (e.g., teams not individuals own business goals), risk reduction, and reinforcement of full product development lifecycle ownership (e.g., “you build it, you run it”). Executives should consider leveraging the AWS Cloud Native Accelerator program (CNA). The CNA helps customers navigate the best practices creation of a cloud operating model from creation of a CCOE and upskilling to business and technology decision making.

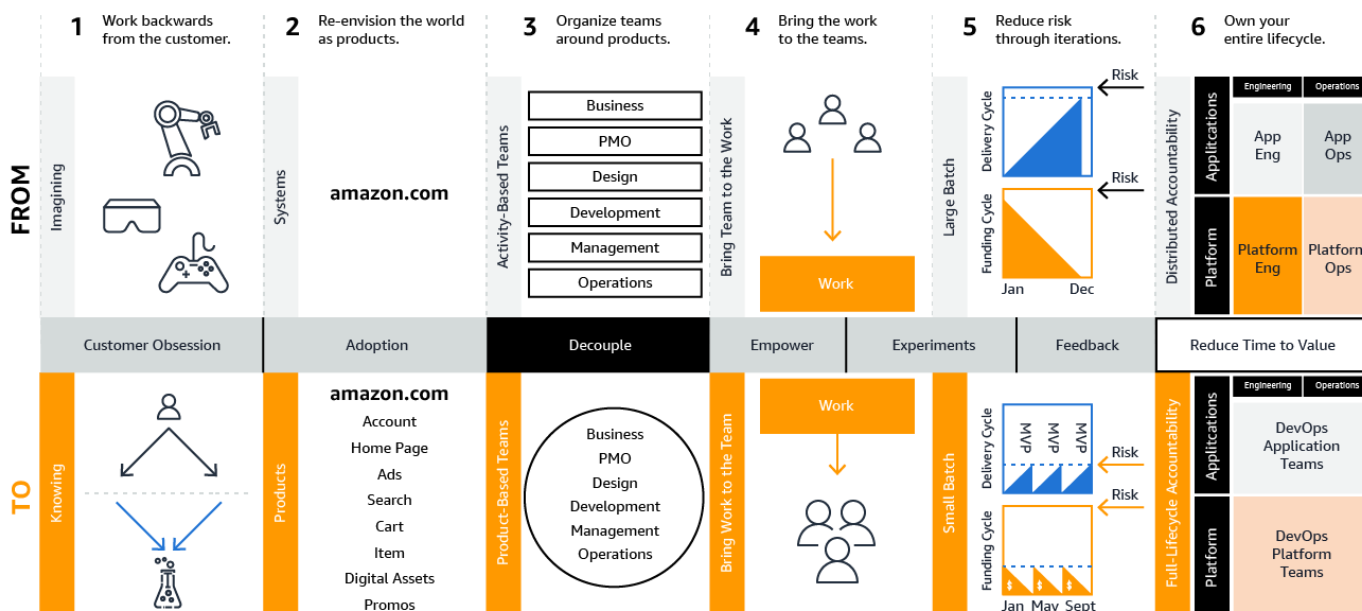


Figure 4: The six transformational steps for building a cloud operating model

## Migration Planning

Migration planning should start in tandem with cloud operating model efforts. Migration planning is the process of creating a single plan for rehosting to AWS and captures the overall effort including scope management, migration waves, schedule management, resource planning, risk management, coordination, and communication to all stakeholders. Migration planning has a broad scope and all the information and challenges will not be known upfront. Planning requires discovery, learning, and adaptation to stay on track.

### Executive impact areas

- Guide teams to adopt an agile approach to migration planning.
- Set migration planning participation expectations with organizational leaders (e.g., business, finance, engineering).

**Agile:** Executives should identify and guide cloud leaders to initiate planning early. Guide teams to adopt an agile approach that supports planning, learning, iteration, and transparency. Using agile will provide visibility of prioritized work and alignment tracking with business goals, along with teams that can adapt and iterate with new findings. The best practice is to develop an agile migration plan with a clearly articulated backlog of known work, and stories defined for resolving ambiguity of known-unknowns. This ensures work is estimated, clarified, inspected, and de-risked.

**Participation:** Executives should set participation expectations with organizational leaders (e.g., business, engineering, compliance, legal, finance) that they will help inform migration planning and participate in progress check points. [AWS Professional Services](#) and [AWS Migration Competency Partners](#) can help create and accelerate an agile migration planning.

## Workload Strategy Analysis

After the full list of workloads and infrastructure to migrate is known the next step is applying a workload strategy analysis.<sup>7</sup> A workload strategy analysis is the process of examining each workload discovered and determining which migration strategy (e.g., retain, retire, repurchase, relocate, rehost, replatform, refactor) to apply. The [7Rs](#) are designed to assist in deciding and acting. Workload strategy decisions have implications to speed, cost, and business benefits. Leverage the migration tenets created during assessment to ensure workload decisions align with business goals.

### Executive impact areas

- Ensure engineering leaders 'migrate to modernize' and rehost is the default migration strategy for workloads.
- Direct engineering leaders to identify rehost exceptions as they evaluate workloads.
- Have engineering leaders implement a second pass inspection of retain, refactor, replatform workloads.

**Migrate to modernize:** Executives should ensure engineering leaders follow the 'migrate to modernize' paradigm. Recall the lessons from the AWS Cloud Value Flywheel ([figure 2](#)) and the Migration Conveyor ([figure 3](#)): 1/ Cloud investment returns are maximized with the more

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<sup>7</sup> Assessment provides discovery across the full digital estate, but additional discovery may be necessary.

workloads migrated and the more time they run in the cloud. 2/ The fastest time to cloud value is to rapidly rehost workloads first, and then modernize infrastructure and applications on the cloud. The rehost migration strategy should be the default choice for all workloads. Avoid the common pitfall of overanalyzing workload decisions. If a workload can be rehosted, rehost it. Stay away from refactoring or replatforming a workload that can be migrated first. Modernizing workloads is faster and easier in AWS (i.e., rapid resource provisioning, deployment automation, AWS service access), and rehosting these workloads first has immediate business benefits. Refactoring while migrating can lead to the 'crawl or stall migration' and 'two putt refactoring' pitfalls.

**Identify exceptions:** Specialized workloads can be the exception to the rehost rule. Identify workloads that may require replatforming or refactoring like those that run on unique platforms (e.g., SAP), have unique hardware requirements (e.g., mainframes: IBM AS/400, non-x86: Oracle Solaris), or have exceptional licensing costs or complexity (e.g., SQL Server, Oracle RAC). Look for replatform exceptions that typically occur when workloads can be replaced with an AWS managed service. Common examples include databases, ElasticSearch, Redis, Memcached, RabbitMQ, ActiveMQ, and Kafka. Evaluate these workloads to ensure they cannot be rehosted first and replatformed afterward. Executives should direct engineering leaders to look for exceptions as the triage workload technology stacks, business criticality, database use, and dependencies. Find the full set of considerations in [AWS Prescriptive Guidance](#).

Retire is an overlooked strategy. Identifying and retiring workloads early in a migration reduces time, effort, and risk. Engineering teams will have fewer servers to patch, upgrade, and maintain enabling more investment in accelerating the migration. A best practice for workload identified for retirement is to schedule a controlled stop exercise during migration phase. A controlled stop simulates application retirement during a migration to help identify issues.

**Inspection:** Executives should direct engineering leaders to use the best practice of a second pass inspection before finalizing workload decisions. During a second-pass inspection stakeholders and engineering leaders review and discuss workloads marked for retain, refactor, and replatform to create alignment, debate high-judgement decisions, and identify business impact.

## Wave Planning

Wave planning is the last step of migration planning and the wave plan is an input to migration execution. A **wave plan** is a set of migration waves where each wave can be successfully migrated independently. A **migration wave** is a set of workloads that can have interrelated dependencies, but have no dependencies with workloads outside of the wave

ensuring workloads can run after migration. Typically, a migration wave will contain one or more applications with servers, databases, and other application resources. Size migration waves to deliver a meaningful unit of business value. During rehosting a good wave plan enables parallel wave migration to improve efficiency.

Applications with the highest business priority should be targeted for initial migration waves. Determine **wave capacity**, the number of applications a wave can contain, based on resource availability, risk tolerance, constraints (business or technical), experience, and skills. A good wave plan enables a phased migration that allows teams to learn and improve iteratively by starting small with a few applications and servers, and can be gradually adjusted to increase migration velocity as teams build confidence. [AWS Professional Services](#) and [AWS Migration Competency Partners](#) can provide specialists to assist wave planning.

# Migration Execution

AWS cloud migration is the process of shifting an organization's applications, servers, data, and infrastructure from on-premises environments or other cloud providers to AWS. The main goal of migration is to begin the virtuous cycle of the AWS Cloud Value Flywheel ([figure 2](#)) where migration investment leads to increasing productivity, business value, and profitability. Rehost migration to AWS makes a step function business impact in all areas of the AWS Cloud Value Framework across cost savings, staff productivity, resiliency, and agility. The benefits of migration to AWS go far beyond infrastructure cost reduction. A recent study by the Hackett Group of more than one thousand AWS customers evaluated post-migration business value.<sup>8</sup>

## Post-migration business impact

<b>Spend</b>	<b>20%</b> Cost reduction
<b>Productivity</b>	<b>17%</b> Improved infrastructure staff productivity
	<b>29%</b> More development staff time on new features
<b>Resiliency</b>	<b>69%</b> Less unplanned down time
	<b>54%</b> Less unplanned outages
<b>Security</b>	<b>45%</b> Fewer security incidents
	<b>39%</b> Faster time to detect an incident
<b>Performance</b>	<b>23%</b> Improved application SLAs (e.g., latency, availability)
<b>Agility</b>	<b>43%</b> Faster time to market
	<b>34%</b> Faster production release cadence
	<b>40%</b> Increase in agile and devops adoption

<sup>8</sup> *The Hackett Group (2022), Business Value of Migration to Amazon Web Services*

**60%** Faster time to actionable insights

## The Migration Factory

Large migrations can be complex and challenging, requiring careful execution planning, and execution. Continuous learning and improvement are prerequisites. A **migration factory** is a best practices approach to combining people, process, and technology to create structure and repeatable success throughout migration execution. Creating a migration factory involves validating the migration plan, building an execution plan, creating workstreams, setting up processes, and executing migration factory workstreams. The migration factory rehosts workloads at scale using [Application Migration Service](#) to target AWS environments built with [AWS Control Tower](#).

Occasionally, customers will pursue a manual migration execution because of the effort to define, configure, automate, and track processes. This is a pitfall to avoid. There may be some early success with a pilot of a small number of workloads, but manual efforts are prone to compounding errors. This can lead to migration delay, failure, or abandonment. Our experience over thousands of migrations is that automation and migration process rigor yield the best results even for small migrations. Learn more about the [AWS Cloud Migration Factory Solution](#).

### Executive impact areas

- Ensure visible and consistent executive sponsorship and communication.
- Identify and empower single-threaded leadership for migration execution.
- Start execution early to drive rapid iteration and finalization of the migration plan.
- Create senior leadership alignment on migration goals and single-threaded leader empowerment.
- Ensure the allocation of the resources (e.g., staff, budget) needed to support successful migration.
- Define clear cross-team escalation paths to align teams and quickly resolve issues.

**Executive sponsorship:** Visible and consistent executive sponsorship and communication is a key factor for successful migrations. Executives should participate in migration progress

reviews, nurture collaboration and alignment across teams, and drive consistent communication of business goals.

**Single-threaded leadership:** When starting a large migration, executives should identify a technical leader that is 100% dedicated and accountable for outcomes. Empower the leader to take direct action on making high velocity and critical decisions, avoiding migration delays, removing team or knowledge silos, and setting consistent migration priorities.

**Start early:** Rehost migration begins while the migration plan continues evolving allowing fail-fast organizational learning from hand-on experience. Starting migration execution early drives rapid iteration of the migration plan and convergence to a final state.

**Leadership alignment:** Create alignment between senior leaders across teams and drive collaboration to define success criteria for the migration. Challenges will surface during a migration requiring action and coordination between different teams. Reinforce the single-threaded leader's role and empowerment with senior leaders and stakeholders. Early alignment on collaboration expectations, goals, and the role of the single-threaded leader will reduce friction and increase efficiency.

**Resource allocation:** Executives must ensure the necessary allocation of resources including budget and personnel to support effective migration execution. Lack of adequate resource investment risks falling into the 'crawl and stall' pitfall that can decrease migration velocity and create low staff morale.

**Escalation:** Large migrations involve diverse leaders from across teams and occasionally their priorities will conflict with one another. Executives need to drive creation of a clear escalation matrix that helps align teams and quickly resolve issues and conflicts.

## Managing Specialized Workloads

Specialized workloads require replatforming or refactoring (including rearchitecture and rewrite) to move to the cloud. These workloads need just enough modernization to migrate. Only modernize to the extent needed to support rehosting, then continue modernization once in AWS. The three most common specialized workloads are databases, mainframes, and SAP.

**Databases:** Licensing and technology complexities play a significant role when dealing with databases. For instance, moving shared storage from Oracle RAC and MSSQL directly to EC2 is not feasible without making changes to database components. The licensing process is more negotiation-driven effort than technical, often taking weeks or months to finalize terms and quantities. [AWS Database Migration Service](#) (DMS) can facilitate data migration to a modern platform, while the [Schema Conversion Tool](#) (SCT) helps in changing the database schema to accommodate replatforming to a different database engine. Use these services to move to [Amazon RDS](#), [Amazon Aurora](#), or [Amazon DynamoDB](#).

**Mainframes:** Mainframes represent one of the largest segments of specialized workloads resistant to migration to the cloud due to fundamental hardware incompatibility with cloud-based technologies, making rehost migration unviable. AWS provides replatforming and refactoring options. The [AWS Mainframe Modernization](#) supports replatforming by creating a software version of the mainframe on cloud-compatible technology. This is the preferred pathway if the mainframe workload is compatible with emulation. Replatform, then rehost and refactor on AWS. AWS Mainframe Modernization service also provides direct refactoring and rearchitecture from mainframes to Java microservices. Using this pathway modernize then migrate.

**SAP:** Legacy SAP implementations using R3 or ECC run on hardware that is not cloud compatible, and the operating system and database versions may also not be compatible with AWS compute offerings. Migrating these workloads requires bringing the incompatible components on-premises up to date and then using automated tools like [AWS Migration Hub Orchestrator's](#) SAP solution. Once these workloads are migrated, customers can continue modernizing in AWS.

# Continuous Modernization

After rehosting, workloads and teams are now operating in the cloud. The Cloud Operating Model is live with product-aligned teams continuing to be enabled with best practices and standards from an evolving Cloud Center of Excellence. The next step is to ensure the ongoing realization of cost savings, business agility, and innovation speed through continuous modernization. This phase consolidates rehost gains through a perpetual cycle of iterative improvement to workloads, processes, and teams. Each cycle creating new efficiencies, increasing staff productivity, and accelerating innovation resulting in incremental profitability gains ([AWS Cloud Value Flywheel](#)).

Known’s research on the value of modernization in AWS evaluated 505 customers identifying the most popular modernization pathways and assessing the impact of refactoring to containers, serverless, managed data, and managed analytics.<sup>9</sup> The results show modernization has a large impact in savings, agility, resiliency, and productivity.

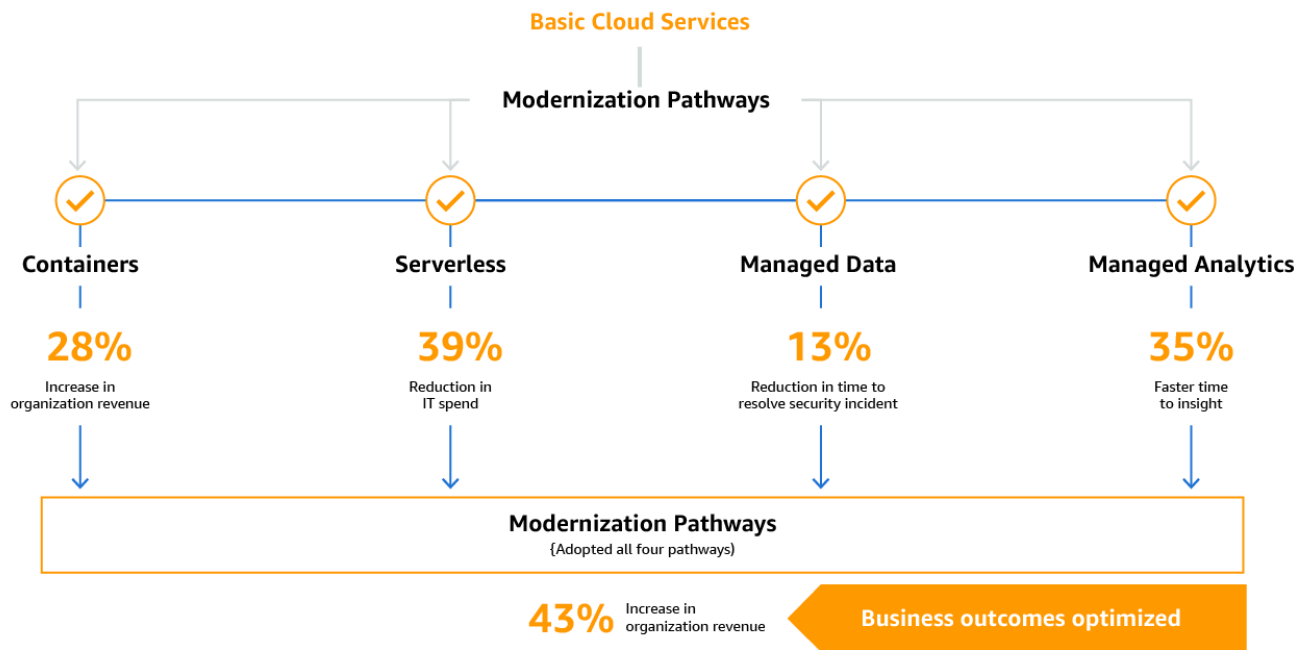


Figure 5: High-level benefits of the top four most popular modernization pathways.

<sup>9</sup> Known (2022), *Business Value of Cloud Modernization*

## Modernization pathway impact

<b>Serverless</b>	<b>39%</b>	Less spend
	<b>41%</b>	Faster time to market
	<b>25%</b>	Faster deployment time
	<b>22%</b>	Faster application refactoring to cloud-native
	<b>26%</b>	Increase in cloud-native application development
<b>Containers</b>	<b>28%</b>	Increase in revenue
	<b>40%</b>	Better resiliency
	<b>13%</b>	Increase in on time releases
<b>Managed Data</b>	<b>71%</b>	Increase in cloud-native application development
	<b>34%</b>	Faster time to insight
	<b>35%</b>	Increase in data used for insights
<b>Managed Analytics</b>	<b>33%</b>	Increase in staff productivity
	<b>18%</b>	Faster time to resolve security incidents

After rehosting to AWS, customers sometimes ask, “When do I start modernizing?” The answer is modernization has already started. It is part of operating in the cloud. Teams are gaining productivity through rapid resource provisioning and deprovisioning and automating creation of pre-production and production environments. They are monitoring SLAs, KPIs, and cloud spend with regular check-ins with finance partners established during the Cloud Financial Management process. The Cloud Center of Excellence (CCOE) is growing into its role enabling teams with cloud best practices, strategies, and guardrails to accelerate on-boarding to AWS. The business has also created a validated list of workloads targeted for

replatforming and refactoring from the second-pass inspection during migration planning workload analysis. There may also be rehosted specialized workloads that need additional modernization. The investments made during migration provide a solid foundation for continuous modernization.

Like migration – **Assessment** is where the business and technical case is made for modernization investment. **Mobilization** is the planning and preparation for modernizing. **Modernization execution** is the implementation of replatforming or refactoring (including rearchitecture and rewrite). The principal differences between the two are: 1/ modernization phases are iterative cycles that range from quick tactical investments to slower large strategic efforts. For example, replatforming from RabbitMQ to [Amazon Simple Query Service \(SQS\)](#) versus refactoring a distributed monolith to microservices. 2/ The mobilization phase will not always be necessary as teams progressively develop cloud innovation skills.

Prioritize monitoring the agility of all product teams as early as possible. Measuring and tracking agility is a best practice for Cloud Financial Management and modernization. Use the CCOE to drive best practices and standardization for monitoring key metrics like availability, time to market, deployment frequency, mean time to recovery, and change failure rates. This allows the business to understand the results of modernization investments, discover new modernization opportunities, improve prioritization, and quantify return on investment (ROI) projections. The [DevOps Monitoring Dashboard on AWS](#) implementation guide, [AWS Professional Services](#), and [AWS Partners with devops competency](#) can help.

Infrastructure modernization is a good place to begin assessing opportunities to advance agility and productivity gains. **Infrastructure modernization** is the replatform or refactor of tooling used to create and operate applications and the underlying services used to run applications in the cloud. Early investments should progressively advance product team modernization competencies and validate agility monitoring and analysis. Consider early adoption of continuous integration, test, and deployment (CI/CD), refactoring for elastic scale, and replatforming to managed services.

Early CI/CD adoption will improve productivity and the quality of product pre-production and production environments. Guide product teams to transition product delivery to CI/CD using [AWS CodeDeploy](#) and [AWS CodePipeline](#). CI/CD reduces human error providing repeatable success from build through release. It encourages disciplined test automation that improves product quality, provides alerting, is a source of agility metrics (e.g., time to market), and automates rollback of failed builds and deployments.

Refactor workloads to take advantage of elastic scalability. **Elastic scalability** automates matching resource capacity to demand. Workloads automatically scale out with increased

demand and scale in when demand dissipates ensuring service availability under dynamic load. Spend follows workload scaling and cost optimizes by increasing and decreasing with usage.

Replatform to AWS managed services when applications are using commodity resources like databases, messaging, search, and caching. **AWS managed services** are services that are secured, scaled, enhanced, cost-optimized, and operated by AWS. Using managed services, customers can reduce undifferentiated work and costs while increasing staff productivity. For example, replatforming to [Amazon ElastiCache](#) eliminates the need for teams to automate, build, deploy, secure, scale, and operate Memcached or Redis across application pre-production and production environments. AWS managed services also provide solution consistency across business applications simplifying operations, improving SLAs, and lowering costs. Let AWS manage, enhance, and operate resources that are outside the business's core domain.

Application refactoring investments yield the largest modernization business benefits. **Application modernization** is the iterative refactoring (including rewrite and rearchitecture) of applications to cloud-native microservices using a combination of serverless (e.g., [Lambda](#)), container (e.g., [AWS Fargate](#)), managed data (e.g., [RDS](#), [Aurora](#), [DynamoDB](#)), and managed analytics (e.g., [Kinesis](#), [Redshift](#), [SageMaker](#)). Follow best practices by developing a clear prioritization plan for application workloads targeted for refactoring and establish guidelines for product teams to independently evaluate and execute refactor opportunities. For example, developing a business case for refactoring that shows measurable business or technical goals. Teams should also plan application refactoring by working backwards from the end state, and decomposing the work into a set of discrete refactor iterations. Each refactor iteration should be the smallest set of changes that deliver a specific goal established in the business case and independently ships to customers. Iterations should align with specific modernization pathways like moving to serverless, containers, managed data, or managed analytics. [AWS Migration Hub Refactor Spaces](#) can help teams accelerate application refactoring.

Executives should consider the [AWS Modernization Experience Based Accelerator](#) (ModAx) program that provides technical enablement and execution guidance. The ModAx methodology provides immersive, hands-on, collaboration to help customers build core modernization competencies.

### Executive impact areas

- Develop a strategic plan for expanding cloud adoption and moving to cloud-native applications.
- Empower innovation everywhere with modernization tenets for teams.
- Start small and build toward advanced cloud use.
- Monitor cross-team collaborations for signs of coupling that signal refactoring need.

**Strategize:** Executives should drive development of a strategic plan for expanding cloud adoption and moving to cloud-native applications. Prioritize changes that maximize business financial and agility benefits ([figure 5](#)): 1/ modernizing applications to serverless (e.g., [Lambda](#)) and containers (e.g., [Fargate](#)) using managed services; 2/ adopting AWS managed data (e.g., [RDS](#), [DynamoDB](#)) and analytics (e.g., [Kinesis](#), [Athena](#), [Redshift](#)).

Consider prioritizing refactoring to serverless over containers to accelerate refactoring to cloud-native applications and increase cloud-native development (see [modernization pathway impact](#)). Evaluate the importance and urgency of managed data adoption for the business. Using managed data has an outsized impact on cloud-native application development and establishes a foundation for artificial intelligence innovation. Leverage AWS managed services broadly to increase staff productivity and business agility. Executives should ensure their business stays away from building and maintaining services or infrastructure where there is a readily available AWS managed service alternative. Doing otherwise, will limit cloud benefits by reducing staff productivity, agility, resiliency, and increase costs.

**Innovate:** Enable innovation everywhere. Empower teams to autonomously decide and act on replatform and refactor opportunities. Executives should partner with the CCOE to create a set of modernization tenets for product teams that align with business goals. Modernization tenets should provide guidance for evaluating, planning, and executing modernization. Tenets should codify best practices like avoiding building and maintaining services outside of the business's core domain. Recruit the CCOE and cloud leaders to be guardrails during product team discussions reinforcing tenets and nudging teams back on course.

**Advance:** Start small and build toward advanced cloud use. Continuous modernization is a skill the whole organization learns through practice. Executives should guide the CCOE to prioritize early modernization investments that build from the foundation created during rehost planning. Prioritize empowering teams to autonomously pursue infrastructure modernization like CI/CD, elastic scale, and replatforming to managed services. Advance by driving executive partnership with product leaders to empower product strategy planning for larger application refactor investments.

**Monitor:** Track and measure cross-team collaboration. Executives should ensure mechanisms are created as early as possible to collect and analyze execution and release data. During the implementation of the Cloud Operating Model there is a shift from functionally aligned teams to product aligned teams. Consider these teams as a starting point that will need iterative reshaping until cross-team dependencies are eliminated. Cross-team dependencies are a signal of potential high-coupling between underlying services that may need refactoring.

Each product team should be able to build, release, and operate independently. Two common signals that refactoring is needed are: 1/ teams with overlapping or shared ownership of a monolithic application or database; 2/ teams that frequently or always participate in the same release—a sign of a distributed monolith. Executives should establish a regular review of data with cloud leaders to identify organizational coupling, inspect refactoring needs of underlying systems, and review the service agility metrics from refactoring initiatives. Reducing organizational coupling will improve agility metrics (e.g., time to market) and increase staff productivity by eliminating unnecessary roadmap alignment, coordination, wait states, and engineering collaboration.



# Accelerating AWS Value with Artificial Intelligence

Amazon has been working on machine learning (ML) and artificial intelligence (AI) for more than 20 years. Today, more than 100,000 customers use AWS to develop and operating their AI/ML workloads. Innovation with AI/ML is rapidly accelerating due to an inflection point in technology created from the volume of readily available data generated by digital systems, the availability of cost-effective scalable cloud compute, and advances in machine learning innovation. Using AI/ML can increase innovation, productivity, and improve business efficiency.

## The State of AI Today

AI/ML provides the most value when solving or automating complex tasks, providing deep analysis and insights, synthesizing recommendations, and generating new content or ideas. AI applications are generally either *specific* or *generalized* solutions. Traditional AI applications typically solve a domain-specific problem like translating Spanish to English. These applications are based on an underlying ML model pre-trained for the specific task. Generative AI applications solve problems across different domains enabling solutions like combining elements from a cake and cookie recipe that are in different languages and creating a new recipe in English.

Like traditional AI applications, generative AI applications use pre-trained ML models except generative AI models use considerably more data empowering a broad range of solution possibilities. These models are called foundation models (FM). The use of massive amounts of data for training allows generative AI applications to map highly complex inputs and outputs enabling new levels of problem solving, content generation, and automation. This complexity enables generative AI applications to converse with humans in their language to collaborate on problem solving, business operations, brain storming, and content generation. Generative AI applications range from chatbots and virtual assistants to conversational search and code generation to modeling and process optimization.

The reach of AI/ML spans industry sectors and is accessible to companies of all sizes. The rapid pace of AI/ML innovation complimented with AWS innovations is democratizing access to AI/ML making it a central strategy for maintaining and extending a business's competitive advantage. Recent research indicates by 2024, 40% of enterprise applications will have conversational AI features, and by 2025 30% of companies will have implemented an AI-

augmented development and testing strategy.<sup>10</sup> Tools like [Amazon CodeWhisperer](#) are available today to help boost development productivity.

## AWS Artificial Intelligence and Machine Learning

AWS offers a broad set of tools supporting creating AI/ML applications built on a strong data strategy and governance foundation ([figure 6](#)). Executives should note that with AI/ML the business's data is the key differentiator powering value delivery. A comprehensive data strategy to store, analyze, and share data across the business using AWS managed services and managed analytics is the foundation. These services not only improve the financial and productivity benefits when used ([figure 5](#)) they are also central to accelerating innovation with AI/ML. Amazon [Aurora](#), [RDS](#) and [OpenSearch](#) support vector database capabilities that allow customers to store and search multi-dimensional vector embeddings used in ML and generative AI applications. Comingling vectors and data simplify joining and reduce data duplication while also providing all the benefits of fully managed services. Using [AWS Lake Formation](#), businesses can implement data governance with secure data lakes and Data Catalog access to resources across the enterprise. [Amazon DataZone](#) empowers data discovery and sharing across the organization accelerating time to insight and development of AI/ML solutions.

AWS also provides services to build machine learning models, access foundational models, and agents to complete tasks. Prepare, build, train, and deploy machine learning models using [Amazon SageMaker](#). Use [Amazon Bedrock](#) to access a broad range of foundation models including AI21 Labs, Stability AI, Anthropic, cohere, and Amazon Titan. Amazon Titan includes large language models accessible as a managed service. [Amazon Bedrock](#) is a managed service that creates a private copy of its base foundational model accessible to customers via VPN for training. No customer data is ever used to train the original base models. Customers use their data to fine-tune the model for tasks with as few as 20 examples without having to annotate large data volumes. Agents for Amazon Bedrock provide a code-free solution to breaking down generated tasks and orchestrating their execution. Agent execution securely accesses any company data for the task and automates execution of API calls along the way.

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<sup>10</sup> Gartner (2023), [What does Gartner predict for the future of generative AI use?](#)

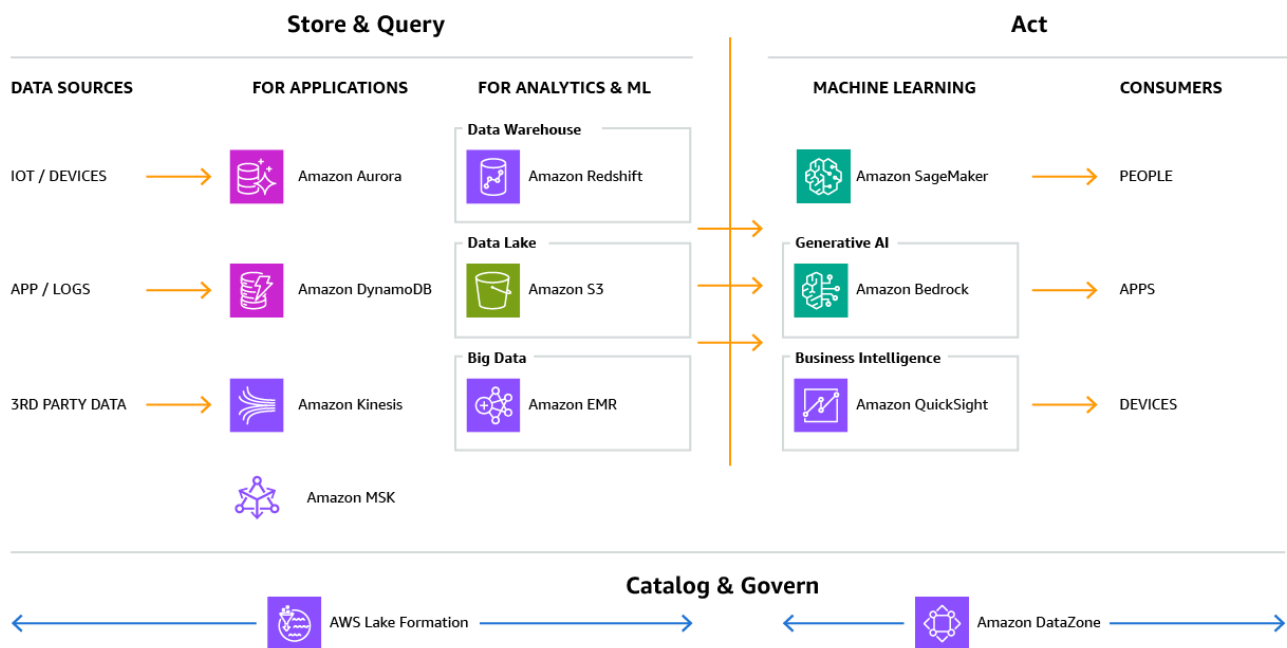


Figure 6: AWS data and AI/ML services.

### Executive impact areas

- Encourage data-driven product development and nurture teams to share data products to create an ecosystem.
- Embrace a culture of agile experimentation, iterate with measurable KPIs, and identify solutions that reduce ambiguity.
- Start small building AI/ML solutions to discrete problems. Use these solutions to build AI/ML products with greater value.

**Share:** Data is the foundation of the value generation process for AI/ML applications. Building AI/ML products requires assessment of the volume, velocity, variety, and veracity of data needed for building and fine-tuning underlying models. Data drives AI/ML product development and improvement, which leads to more customer use and more data. Businesses must consider the data value chain to progressively develop high quality data and make it broadly accessible across the organization for innovation. Encourage a data-driven product development approach that gives product teams agency over data sharing and governance using services like [AWS Lake Formation](#) to build a data mesh with governance, [AWS Data](#)

[Exchange](#) to integrate third party data, and [Amazon DataZone](#) to discover and share data. Nurture the organic growth of an ecosystem of data products by allowing product teams to share innovations with other teams to accelerate innovation. Stay away from artificially forcing ecosystem creation that can result in proliferation of low-value data services and unneeded complexity.

**Execute:** Developing AI/ML products can be a disruptive adjustment for product teams. AI/ML products are a composition of data, domain, and technology solutions that requires hypothesis driven experimentation. Product teams will not be able to reliably define time and effort estimates for complex projects given the ambiguity of problems and the need to discover answers. Executives should embrace and support a culture of experimentation using agile methods and encourage cross-team collaboration. Partner with the CCOE to create and identify successful mechanisms for managing uncertainty and make best practices known across teams. Start with time-boxing experiments with measurable results. Keep iterations to small, actionable steps, with clear KPIs. Learnings from experiments will uncover efficient approaches to reduce ambiguity risk while informing the direction of productized solutions. Avoid serializing experimentation to discover proof of concept with product development. Seek to have these activities happen in parallel with experimentation working ahead of product development.

**Advance:** Start small and progressively build AI/ML solutions with greater value. Early investments should provide direct benefit to customers or the business by solving discrete problems. Build larger impact AI/ML products from these solutions to begin accreting value. For example, creating a customer service chatbot might start by building an ML model that classifies common customer problems and requests and provides recommendations for the most successful solutions. Release the solution to customer service representatives to improve response time and accuracy. Then build a chatbot from the ML model using generative AI to reduce or eliminate the need for interaction with representatives for common issues.

## Conclusion

The rapid evolution of AWS cloud computing and AI/ML services are helping businesses compete, differentiate, and become more profitable. AWS cloud adoption has a large and continuous [impact to business performance](#) (e.g., agility, resiliency, productivity, cost savings) that scales with transformation speed, cloud use, and duration of cloud usage. Each of these dimensions amplify financial performance. The business benefits over six years span EBIDTA growth (42.6%), EV (73.2%), revenue per employee (82.8%), and infrastructure cost reduction (20% YoY).

The AWS Cloud Value Flywheel ([figure 2](#)) captures how cloud services drive business scaling. Customer investments in migration and modernization increase staff productivity allowing reinvestment of time savings into innovation. Faster innovation and business agility accelerate business value creation leading to increased profitability. The return on investment creates new opportunities for additional cloud innovation resulting in a virtuous cycle. This is the way business value is realized and amplified with each turn of the flywheel using AWS. This also why transformation speed, cloud use, and duration of cloud use are key factors in business outcomes. The faster customers migrate and transition to a cloud operating model the faster they see the business benefits.

Migrate to modernize. Rehost should be the default migration strategy for all workloads. The fastest time to cloud value is to rapidly rehost workloads first, and then modernize infrastructure and applications on the AWS cloud. Rehosting is also the fastest way to increase innovation capacity without adding headcount. The business benefits go far beyond infrastructure cost reduction. Rehost migration creates a step function change in cost savings, staff productivity, resiliency, and agility (see [post-migration business impact](#)). Specialized workloads are unavoidable, and will need replatforming or refactoring to migrate. Modernize these workloads just enough to migrate, then continue modernization after rehosting. Avoid refactoring or replatforming workloads that can be migrated first. If a workload can be rehosted, rehost it.

Migrate to accelerate business benefits, then modernize to amplify. After rehosting, the next step is operating in the cloud with continuous modernization. Start small and build toward advanced cloud use. Prioritize early modernization efforts that build from the foundation created during rehost planning (e.g., workload modernization list, specialized workloads needing additional modernization). Prioritize managed services and managed data adoption to continuously optimize innovation capacity, focus teams on business value delivery, and create a foundation for AI investments. Replatform to AWS managed services when applications use commodity resources like databases, messaging, search, and caching.

Develop cloud-native product teams that build, release, and operate independently. Empower them to decide and act on replatform and refactor opportunities. Target application refactoring using [key modernization pathways](#) including serverless (e.g., [Lambda](#)), containers (e.g., [AWS Fargate](#)), managed data (e.g., [RDS](#), [Aurora](#), [DynamoDB](#)), and managed analytics (e.g., [Kinesis](#), [Redshift](#), [SageMaker](#)). Refactoring to serverless and containers and replatforming to managed data and managed analytics is the optimal starting point for enhancing products with AI/ML.

Innovation with AI/ML is rapidly accelerating due to an inflection point in technology (e.g., readily available data, cost-effective scalable compute, AI/ML innovation). Using AI/ML can increase customer innovation, productivity, and improve business efficiency. Executives interested in AI/ML should recognize early that the business's data is the key differentiator powering value delivery. Extend investments in managed data and managed analytics services to develop a comprehensive data strategy to store, analyze, and share data across the business. Encourage teams to share data products with other teams to create an ecosystem for developing AI/ML solutions. Start small building AI/ML solutions for discrete problems, then use these solutions to build AI/ML products with greater value. Socialize and set expectations that AI/ML development requires agile experimentation and iteration.

Strong executive participation from migrating to the cloud to adopting a cloud operating model that supports continuous modernization is fundamental to successful cloud adoption. Cloud adoption has many benefits to a business, its customers, and employees. It also has a broad impact to people, process, and technology. Executives leading change through strategic planning, key decision making, and empowering organizational leaders create an outsized impact. AWS is a partner in the cloud adoption journey that can help executives and their organizations navigate, deliver, and maximize cloud adoption business outcomes.