

Business Value of Cloud Modernization

January 2022

Prepared by

Known

Commissioned by

aws




Modernization Pathways

Containers

Serverless

Managed Data

Managed Analytics

EXECUTIVE SUMMARY

Organizations are modernizing their cloud infrastructure and adopting services beyond basic compute and storage. Our research reveals four primary cloud modernization pathways utilized by organizations. Therefore, we define cloud modernization as moving from basic to modern cloud services via: (1) adopting Containers, (2) building Serverless applications, (3) modernizing with Managed Data, and (4) using Managed Analytics. This research study quantifies business value created by utilizing these pathways.

We benchmarked 22 unique KPIs to understand the value of using modern cloud services and we found that organizations reported:

- 28% revenue growth after adopting Containers
- 39% reduction in IT spend after adopting Serverless
- 13% faster time to resolve security incidents after adopting Managed Data
- 35% faster time to insights after adopting Managed Analytics
- 43% revenue growth after adopting all four pathways

In this paper we will examine each pathway and discuss the detailed list of KPI improvements.

Basic to Modern Cloud Benefits



28% Increase in **organization revenue**



39% Reduction in **IT spend**



13% Reduction in **time to resolve security incident**



35% Faster **time to insight**

Highly Modernized Organizations



43% Increase in **organization revenue**



How do you define modernization?

How do you quantify impact?

Are there standard pathways to pursue?

What's the value beyond cost savings?

INTRODUCTION

Modernization pathways present opportunities to create business value; however, these opportunities are not clearly defined or quantified. At the outset, it is difficult to justify modernizing basic cloud infrastructure due to the variety of cloud solutions and the absence of standard metrics to quantify the business impact.

The challenge is not limited to how to quantify but how to distinguish modern cloud services. Today, 94% of enterprises are using cloud infrastructure, and many view the use of any cloud service as inherently modern. For instance, one Managing Director of IT of a financial services firm said, "Cloud modernization is an oxymoron. Shouldn't a cloud be modern?"

Moreover, there is no single pathway to cloud modernization. A Senior Director of IT for a retail company said, "Our next modernization is around automation and machine learning." A VP of IT for a media company said, "I would say using a database service would be a good example of cloud modernization." Another Senior Director of IT for a retail company said, "Cloud modernization is to go Serverless and to go API-driven."

To add clarity to the amorphous landscape of cloud modernization, we set out to explore the pathways that organizations can embark on to modernize and quantify the value that each brings.

This white paper provides guidance for anyone interested in the business value and operational impact of modernizing cloud infrastructure and applications.

METHODOLOGY & FRAMEWORKS

METHODOLOGY

The findings in this white paper come from a two-phase double blind research conducted in 2021 by AWS and Known. In phase one, we interviewed 30 enterprise IT leaders to identify organizational KPIs and explore the impact of modernized cloud services. In phase two, we surveyed 505 U.S. enterprises that are already migrated to cloud to quantify the impact of modernization.

MODERNIZATION PATHWAYS

Based on 30 interviews with enterprise IT decision makers (ITDM) and subject matter experts (SME) we uncovered the four most popular modernization pathways:

Containers: a standard way to package an application's code, configurations, and dependencies into a single object.

Serverless: a way to build and run applications and services without managing servers, removing the costs of acquisition and maintenance.

Managed Data: a fully managed, purpose-built database service, supporting diverse data models and applications.

Managed Analytics: a range of services supporting analytics use cases like data lake initiatives, big data processing, real-time analytics, and operational analytics.

QUANTIFYING THE BUSINESS IMPACT

Infrastructure and application modernization drive business value, but understanding the specific quantifications of that value quickly become complex. Just as the benefits of migrating to the cloud go beyond total cost of ownership (TCO) savings, the benefits of switching from Amazon EC2 compute to a Serverless architecture also go beyond TCO savings. To capture these broader implications, we utilize the Cloud Value Framework (CVF) developed by AWS, consisting of four main value pillars: **Cost Savings, Business Agility, Operational Resilience, and Staff Productivity**.

To assess the value realized across each pillar of the CVF, we measured the change in 22 unique KPIs from basic to modern cloud.

We also studied the value realized by **Highly Modernized Organizations** that have adopted all four modernization pathways.



Surveyed

505

U.S. Enterprises



Interviewed

30

IT Decision Makers

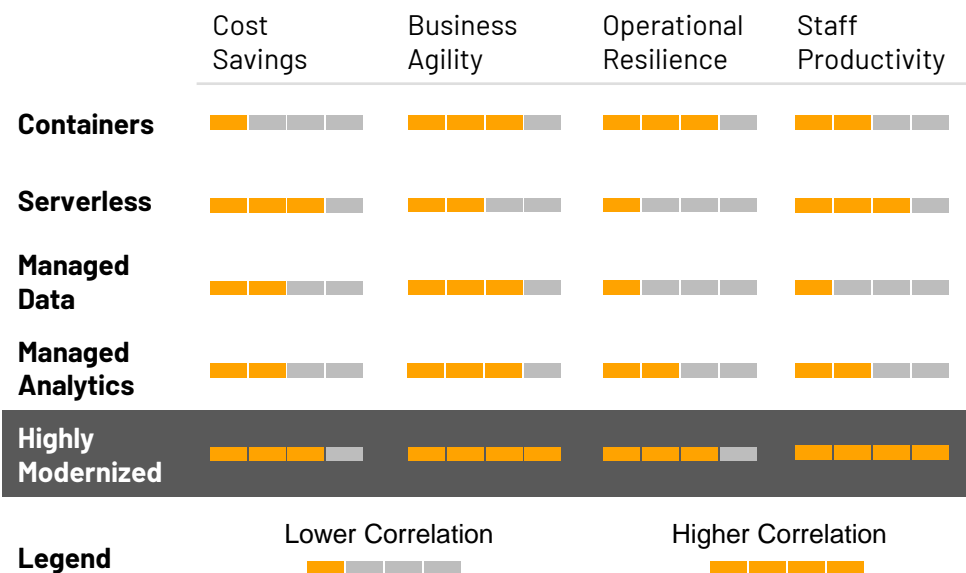
BUSINESS IMPACT SUMMARY

Our findings revealed correlations between modernization pathways and KPIs. We categorized KPIs under CVF pillars and summarized the distribution of impact per pillar (see Figure 1).

- **Containers** mainly drive increased business agility and operational resilience. 5 of 8 business agility KPIs improved by up to 45% and 1 of 2 operational resilience KPIs improved by 40%.
- **Serverless** primarily drives cost savings and increased staff productivity. 5 of 6 cost savings KPIs improved by up to 39% and 3 of 5 staff productivity KPIs improved by up to 30%.
- **Managed Data** drives improved business agility, 6 of 8 KPIs improved by up to 71%.
- **Managed Analytics** drives improved business agility, 6 of 8 KPIs improved by up to 71%.
- **Highly modernized organizations** realize higher improvement across all CVF Pillars compared to partially modernized organizations.

In the following sections, we will dive deeper into these pathways and specific KPI improvements leading to this summary.

Figure 1. Business Value Impact by Modernization Pathway



“
Containers speed up our development life cycle. It really has streamlined and brought unison to our technology department.
”
IT Leader, financial services firm

“
Number one benefit that Serverless brings to our organization is reduced cost.
”
Senior Director of IT, telecom

“
Before, our time to insight was 15 hours, with Managed Analytics, it was slashed to 1 hour.
”
IT Leader, media

CONTAINERS BUSINESS VALUE ANALYSIS

Containers provide a standard way to package an application's code, configurations, and dependencies into a single object. Examples of Container services include Amazon Elastic Container Service (ECS) and AWS Elastic Kubernetes Service (EKS). These modern services enable organizations to deploy applications rapidly, scale infinitely, and run as resource-isolated processes. These ensure quick, reliable, and consistent deployments, regardless of the environment. In addition, Containers require fewer system resources and can be deployed anywhere consistently.

Using Containers, organizations are able to create, configure, and manage workloads more efficiently. This leads to greater agility, improved portability of applications, and operational resilience.

BUSINESS AGILITY

- Containerization helps organizations focus on their core business objectives, leading to greater potential revenue gains. **Organizations that use Containers saw a 28% improvement in revenue.** While other factors influence this figure, the data suggests that the ability to deliver revenue-generating services more quickly and accurately plays a part in this outcome.
- Container adoption also strongly impacts the portability of applications between cloud vendors. For instance, **portability of apps is increased by 45%** when using Containers. Enterprises perceive portability as very important due to rapidly changing business needs. In addition, increased portability allows companies to be more flexible in deployment and reduces vendor lock-in.
- The usage of Containers also correlates with greater usage of agile methodologies. Using Containers **increased the number of mission-critical applications developed and maintained using agile methodologies by 36%**. Data suggests that supporting agile and DevOps efforts through technology such as Containers can improve productivity as reflected in other KPIs such as on-time releases mentioned under the Staff Productivity section.



72%

of surveyed enterprises adopted Containers

Impact Summary

Business Agility



Operational Resilience



Staff Productivity



Cost Savings



Benefits of Moving from Basic Cloud to Containers



28% Increase in organization revenue



45% Increase in portable applications



36% Increase in apps developed using agile

OPERATIONAL RESILIENCE

- Organizations that use Containers experience a **40% reduction in downtime**. Containerization features like granular access permission to isolated microservices, policy automation, and standardization drive increased compliance and more stable products.

STAFF PRODUCTIVITY

- Organizations utilizing Containers reported running **80% more virtual machines (VMs) per administrator**.
- Packaging everything into more secure and reliable single objects that are lightweight leads to more on-time releases. Study participants working in organizations using Containers report that **13% more of their application releases hit their target date**.

COST SAVINGS

- Adopting Containers led to a **23% improvement in compute utilization**. Better orchestration and integration with a wide range of solutions enable higher efficiency in resource management.

Containers' ease of configuration, orchestration, and portability enable staff to focus more on strategic work. Popular use cases like machine learning and batch processing allow organizations to use Containers and quickly scale applications in response to demand.

Benefits of Moving from Basic Cloud to Containers



40% Reduction in downtime



80% Increase in # VMs per admin



13% Increase in on time releases



23% Increase in compute utilization



*The goal is to put more and more on containerized platforms. It really gives us the **ability to scale**.*

IT Director, wholesale trade

SERVERLESS BUSINESS VALUE ANALYSIS

Serverless enables organizations to build and run applications without provisioning or managing infrastructure. These services, such as AWS Lambda and AWS Fargate, allow organizations to worry less about operational overhead and enable faster time to market. Features like automatic scaling and pay-for-use billing drive business agility and cost-efficiency.

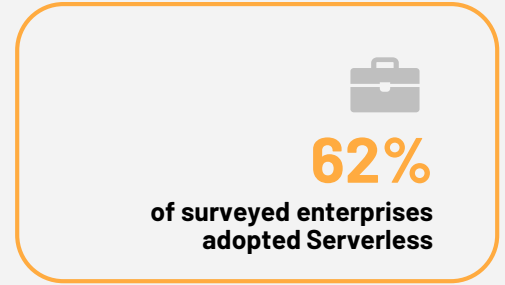
The use of Serverless architecture helps organizations be more productive and reduce costs. Serverless enables organizations to deploy features more quickly, release new builds more frequently, and drive higher levels of cloud-native deployment.

STAFF PRODUCTIVITY

- **Organizations using Serverless have a deployment cycle that is 25% shorter.** As employees no longer have to focus on administrative tasks such as server configuration, monitoring utilization rates, and managing scaling they can focus more time on feature development.
- **Organizations that use Serverless deploy new features 41% more frequently.** Serverless leads to more agile development and more frequent deployments.

COST SAVINGS

- Serverless organizations can better match their infrastructure to the demands of their applications and workloads using automatic scaling and reduce overprovisioning of compute resources that sit unused. This results in a **23% improvement in compute utilization**, translating into direct cost savings for these organizations.
- The efficiency inherent in Serverless, such as pay-for-use billing that avoids overprovisioning, leads to cost savings for organizations. **Organizations using Serverless report spending 39% less on IT infrastructure.** This can represent millions of dollars in savings depending on the size of the organization.



Impact Summary

Staff Productivity



Cost Savings



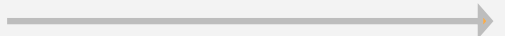
Business Agility



Operational Resilience



Benefits of Moving from Basic Cloud to Serverless



25% Reduction in **time to deploy features**



41% Increase in **frequency to deploy new features**



23% Increase in **compute utilization**



39% Reduction in **IT infrastructure spend**

BUSINESS AGILITY

- Serverless arms employees to start thinking in a cloud-native manner, which has a positive effect on business agility and downstream workflows. Organizations that use Serverless report that they build **26% more of their applications as cloud-native**. Serverless is a key cloud-based technology that is integrated with many other modern solutions like Containers which facilitates the deployment of cloud-native services more quickly and easily.
- Similarly, Organizations that have implemented **Serverless report converting monolithic applications to cloud-native applications 22% faster**.

OPERATIONAL RESILIENCE

- **Organizations can resolve security incidents 14% faster** by eliminating configuration steps and vulnerabilities associated with the human factor and traditional server provisioning.

Adopting Serverless technologies allows employees to spend less time managing and provisioning compute resources and instead can spend their time on the work that matters most – innovating and releasing new features or builds.

Benefits of Moving from Basic Cloud to Serverless



26% Increase in % apps developed as cloud-native



22% Reduction in time to convert to cloud-native



14% Reduction in time to resolve security incidents



With Serverless it's easier for us to **innovate faster** because we don't have to stand up all this infrastructure anymore.

Sr Director IT, entertainment

MANAGED DATA BUSINESS VALUE ANALYSIS

Managed Data is a fully managed, purpose-built database service. The service supports diverse data models and allows organizations to build use case driven, highly scalable, and distributed applications. Examples of Managed Data services include Amazon Aurora and Amazon Redshift.

Massive data growth requires more resources to manage infrastructure, address performance issues, ensure workload resilience and compliance with data regulations. Managed Data solutions automate administrative tasks like setup, patching, and backups, allowing employees to focus more on transformative tasks.

Organizations that have offloaded data management to their cloud service provider have greater business agility.

BUSINESS AGILITY

- Utilizing Managed Data enables organizations to access and use more data. Organizations that have adopted Managed Data report an **increase in the amount of data they utilize for insights by 35%**.
- Similarly, this ease of access to data means the organization can react more quickly. **Utilizing Managed Data allows organizations to derive insights in 34% less time.**
- Organizations using Managed Data report an **increase in the number of applications built using cloud-native architecture by 71%**.
- Having more data for insights, faster time to insights, and more cloud-native apps drive a **28% increase in revenue for organizations using Managed Data solutions.**

COST SAVINGS

- The efficiencies inherent in Managed Data also help optimize block storage utilization by replacing manual management with policy automation and standardization. **Organizations using Managed Data report an 8% improvement in their storage utilization.**



65%

of surveyed enterprises adopted Managed Data

Impact Summary

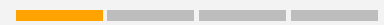
Business Agility



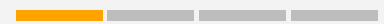
Cost Savings



Operational Resilience



Staff Productivity



Benefits of Moving from Basic Cloud to Managed Data



35% Increase in % **data utilized for insights**



34% Reduction in **time to insight**



71% Increase in % **app developed cloud-native**



28% Increase in **organization revenue**



8% Increase in **storage utilization**

OPERATIONAL RESILIENCE

- Organizations using Managed Data report resolving security incidents 13% more quickly due to features like low-latency read replicas, the ability to recover data from a particular time in the past, and continuous backup and replication across multiple redundancy regions.

STAFF PRODUCTIVITY

- Organizations using Managed Data spend 24% less time on each new feature or service release. The data layer is an important component of modern applications and Managed Data solutions allow quick and scalable integration with all the layers of modern applications. That’s why organizations that have implemented Managed Data report the ability to deploy new features or services more quickly.

Managed Data not only allows organizations to make the most out of their data but enables business growth in the form of agility due to far greater accessibility, integration, and utilization of data.

Benefits of Moving from Basic Cloud to Managed Data



13% Reduction in **time to resolve security incidents**



24% Reduction in **time to deploy new features**



*Our insights are entirely driven from Managed Data. Our **speed to insight** is clearly from AWS.*

Cloud Architect, telecom

MANAGED ANALYTICS BUSINESS VALUE ANALYSIS

Managed Analytics is a service comprised of automated processes to organize, access, query, and stream the data from multiple sources and turn it into insights. A wide range of solutions supports purpose-built analytics use cases like data warehousing, big data processing, real-time analytics, and operational analytics. Examples of Managed Analytics solutions include Amazon Kinesis and Amazon Athena.

Organizations require analytics to make faster and more accurate business decisions, but making sense of the wealth of data is not a simple task. Finding the right skillsets, establishing and formalizing the process, and making data available are major challenges. Managed Analytics offers an opportunity to offload and outsource these critical functions, allowing organizations to dedicate more energy and resources to their core strengths.

Managed Analytics is closely associated with several of the same KPI improvements as Managed Data. However, there are notable differences, and these two pathways should not be conflated. Managed Analytics helps provide tailored insights into business issues, enabling speed to data insights and a pathway to faster decision making. Managed Analytics adoption also influences the architecture of applications towards a more modern approach.

BUSINESS AGILITY

- Like Managed Data, organizations can spend less time sifting through data by adopting Managed Analytics, which leads to running more queries in a shorter time. Organizations that utilize Managed Analytics report a **35% reduction in time to insight**.
- Managed Analytics also enables organizations to use more of their data for insights. Organizations using Managed Analytics report **increasing the amount of data they utilize for insights by 32%**.



63%

of surveyed enterprises
adopted Managed Analytics

Impact Summary

Business Agility



Staff Productivity



Operational Resilience



Cost Savings



Benefits of Moving from Basic Cloud to Managed Analytics



35% Reduction in **time to insight**



32% Increase in % **data utilized for insights**

STAFF PRODUCTIVITY

- By adopting Managed Analytics, **organizations increased the number of transformation-focused resources by 33%**. Removing data and analytics management tasks from staff enables organizations to focus time and resources on initiatives that drive the business.

COST SAVINGS

- Finally, Managed Analytics provides organizations with the insights they need to reduce block storage. After adopting Managed Analytics, **organizations improved their storage utilization by 10% on average**.

OPERATIONAL RESILIENCE

- Organizations can resolve security incidents 18% faster**. Managed Analytics solutions are not only used for customer facing revenue generating activities but also for internal and operational purposes. For instance using Amazon Kinesis, Athena and Comprehend telecom companies can analyze customer tweets to detect outages faster.

Adoption of Managed Analytics benefits organizations across several KPIs. Deriving insights more quickly means employees are armed with the data they need to solve business problems faster.

Benefits of Moving from Basic Cloud to Managed Analytics



33% Increase in **transformation focused resources**



10% Increase in **storage utilization**



18% Reduction in **time to resolve security incidents**



With **Managed Analytics** it is easier to see the huge amount of data and then analyze those **in seconds**. That is the value.

Senior Architect, healthcare

HIGH MODERNIZATION BUSINESS VALUE ANALYSIS

Previously, we have discussed how adopting specific modern cloud services can promote different business outcomes. However, in this section, we will focus on highly modernized enterprises that have adopted all four pathways (i.e., Containers, Serverless, Managed Data, and Managed Analytics).

While adopting all four modernization pathways is ideal, this level of investment is not always possible. Our data shows that only 30% of enterprises that are in the cloud are highly modernized. While a higher level of modernization may be ideal, incremental modernization is still a meaningful pathway to increased value realization.

Overall, enterprises that are highly modernized achieve more business value across all CVF pillars. In addition, these organizations outperform organizations that are partially modernized on 13 of 22 KPIs, 8 of them are summarized in the sections below.

BUSINESS AGILITY

- **Overall, highly modernized organizations achieve 43% greater revenue.** This can represent a delta of hundreds of millions of dollars, depending on the size of the organization.
- Highly modernized organizations automate 75% of their DevOps processes, representing a **21% increase in DevOps automation** over organizations that have not adopted all four modernization pathways.
- Similarly, highly modernized organizations **increase the number of applications they develop in a cloud-native architecture by 54%** compared to the partially modernized because they adopted all pathways leading to modernizing the full stack of their application including compute, integration, and data stores.



30%

of surveyed enterprises
are Highly Modernized

Impact Summary

Business Agility



Staff Productivity



Operational Resilience



Cost Savings



Benefits of Transforming from Partial to Highly Modernized Organization



43% Increase in
organization revenue



21% Increase in **DevOps automation**



54% Increase in **apps developed cloud-native**

STAFF PRODUCTIVITY

- Analyzing the resource allocation of highly modernized organizations to running vs. growing vs. transforming provides a clear indicator of how modernization can positively impact staff productivity. **Highly modernized organizations dedicate 38% more resources to transformation.** This indicates that staff can spend more time adding incremental value to the business.
- Highly modernized organizations have the quickest deployment schedule for new features or services, **releasing features and services in 20% less time** than partially modernized organizations.
- Highly modernized organizations run 78% more VMs per admin** than partially modernized organizations. This increase demonstrates that combining all pathways translates to an improved business value far greater than each pathway in isolation.

COST SAVINGS

- Highly modernized organizations under 5,000 employees report spending 33% less on IT infrastructure.** Smaller enterprises are more resource constrained and these savings can be significant to be used elsewhere such as growing the business.

OPERATIONAL RESILIENCE

- Finally, highly modernized organizations can resolve security incidents **21% faster** than partially modernized ones.

Benefits of Transforming from Partial to Highly Modernized Organization



38% Increase in **transformation focused resources**



20% Reduction in **time to deploy new features**



78% Increase in **# VMs per admin**



33% Reduction in **IT infrastructure spend**



21% Reduction in **time to resolve security incidents**

CONCLUSION

The challenges surrounding the business decision for modernizing cloud infrastructure and applications, such as the lack of standard operational and business metrics to quantify the business impact, will continue to exist. This paper serves as a starting point to understand the business impact uniquely attached to pursuing one or all the most popular modernization pathways highlighted in the previous sections. Organizations can leverage the correlation between the improvement in KPIs listed in the paper and modern cloud services to estimate and track the business value beyond the basic cloud services.

In summary:

Containers drive increased business agility and operational resilience through the more portable, modular, and flexible applications that developers and IT teams can create.

Serverless drives cost savings and increased staff productivity by streamlining the infrastructure development process and enabling teams to focus on strategic and value-creating workstreams.

Managed Data drives improved business agility by offloading time-consuming data processing tasks and enabling teams to uncover deeper insights in less time.

Managed Analytics drives improved business agility through unlocking more of an organization's data, empowering improved data-driven decision-making across the organization.

Organizations that utilize all four modernization pathways achieve greater benefits across all value drivers. Through all the benefits listed above and cumulative efficiencies gained from modernized infrastructure working together, highly modernized organizations achieve value that is greater than the sum of four pathways individually.



ABOUT KNOWN

Known is a modern marketing company engineered for the unprecedented challenges and opportunities facing marketers today. Known pairs PhD data scientists with award-winning creatives, expert research teams and strategists. Known is anchored by two decades of groundbreaking market research and data science capabilities, which uniquely empower our marketing strategy and acclaimed creative groups, who produce some of the most innovative, cutting-edge creative work in culture. The result? Marketing that is predisposed to succeed and be persistently optimized, directly impacting clients' bottom lines. Our clients span the leading brands in finance, technology, media, CPG, real estate and many other categories. Known has over 300 employees in 6 US cities including Seattle, San Francisco, Los Angeles, Austin, Boston and New York. Our teams have won multiple Emmys, Clios, Effies, Cannes Lions Awards and ProMax Agency of the Year three times.

Authored by:

Chris Varner, Vice President of Advanced Analytics at Known
Schelley Olhava, Director of Strategy & Consulting at Known
Shea Struiksmma, Manager of Advanced Analytics at Known
Support from the Known Strategy teams

.....

TERMINOLOGY EXPLAINED

Related Question	Term	Definition
Percentage of cloud spend dedicated to Transform	Run	Time focused on the everyday operation of the application. Companies call this "business as usual," "keeping the lights on" or "sustaining IT." Does not directly increase revenue or achieve new company goals, but does maintain essential functions and deliver efficiency at the appropriate quality and price for performance.
	Grow	Time focused on developing and enhancing IT systems in support of application growth (typically organic growth or improvements in processes). This extends existing capabilities, delivers differentiation and provides competitiveness.
	Transform	Time spent implementing IT systems that enable the application to enter new markets, address new customer segments, create new value propositions and enact new business models. This is time that is targeted towards innovation.
Percentage of mission critical apps using Agile methodologies	Agile	An iterative approach to project management and software development under which requirements and solutions evolve through the collaborative effort of self-organizing / cross-functional teams and their end users.
DevOps Automation	DevOps	A set of practices that combines software development (Dev) and IT operations (Ops). It aims to shorten the systems development life cycle and provide continuous delivery with high software quality.
	Basic Infrastructure Configuration Automation	Some basic configurations are standardized but they are still isolated and not widely available
	Advanced Infrastructure Configuration Automation	More standard documentation with widely shared scripts that are properly checked for errors and other inaccuracies
	Testing and Workflow Automation	Codes are automatically merged in a repository and automatically tested prior to deployment
	Deployment Automation	Code changes are automatically prepared and tested on a predetermined production schedule
	Full Automation / Self-monitoring event driven automation	Applications and infrastructure performance are constantly monitored. Based on predetermined events codes are deployed automatically with automated provisioning, testing and remediation
Portability	Portability	Migration between different platforms and cloud providers
IT Infrastructure Spend	Infrastructure	The collection of back-end hardware, software, networks, data centers, facilities and related equipment used to develop, test, operate, monitor, manage and/or support information technology services.
	Infrastructure Operating Costs	Costs generally associated with CAPEX, such as datacenters or colocation facilities, power, maintenance costs, etc.

GLOSSARY

Term	Definition
TCO	Total cost of ownership (TCO) represents sum of acquisition and operational costs of a product over a period of time.
Public Cloud	Cloud computing where scalable and elastic IT-enabled capabilities are provided as a service to external customers using Internet technologies.
Private Cloud	Cloud computing that is used by only one organization, or that ensures that an organization is completely isolated from others.
IaaS	Infrastructure as a Service is a form of public cloud computing that provides virtual computing resources using Internet technologies.
SaaS	Software as a Service applications, a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted.
Non-Public Cloud	On-premises, Colocation, or Private Cloud
Productivity Applications	Application software dedicated to producing information, such as documents, presentations, worksheets, databases, charts, graphs, digital paintings, electronic music and digital video.
Employee Hardware	Devices distributed for employee use, including desktop and laptop PCs, tablets, etc.
AI / ML Tools	Tools that assist in the development and running of artificial intelligence (AI) and machine learning (ML).
Resilience	Infrastructure availability, illustrated by down time, such as 99.999% "five nines" and Security, defined by time to detect and resolve security incidents.
Agile Methodology	Agile methodology is an iterative approach to software development and project management. It focuses on constant collaboration among small, cross-functional teams, and the incremental development and release of small features (as opposed to large releases).
Cloud-Native	Cloud-native basically means it is created in the cloud. Cloud-native applications are designed from scratch to run in a public cloud like in AWS, Azure, or GCP using cloud-based technologies.