Google Cloud

The Digital Crunch Time: 2022 State of APIs and Applications

How companies across the world are driving digital innovation
to meet the moment

Executive Summary

Organizations across the world have experienced rapid digitization at a pace unlike ever before, as unexpected market forces led them to move from technology enablement of operations to full digitization.

Now, more than ever, customers and employees are looking for digital-first, connected, and seamless business interactions. And businesses are looking not only to keep up with fast-changing customer expectations but also maintain their profitability. To do this successfully, they must find ways to balance both by leaning into sustainable innovation across every aspect of business.

Innovation at speed is easier said than done, especially when barriers such as legacy systems, shortage of skilled resources, or operating silos slow down the pace of development at every organization. However, despite challenges, recent developments have accelerated digital transformation efforts—in the wake of the many disruptions over the past two years, more than nine in 10 (91%) organizations have adopted or have plans to adopt a digital-first business strategy.[1] APIs serve as a critical component of this strategy, connecting applications and microservices that developers use to rapidly create new, innovative digital products and services.

To better understand how enterprises are benefiting from, utilizing, and planning to use digital transformation, cloud, modern applications, and APIs, Google Cloud surveyed 770 technology leaders, 90% of whom were manager-level or above, across North America, Latin America, Europe, and Asia-Pacific. This comprehensive report includes new insights and trends extracted from the survey, and it covers the topics of cloud adoption, microservices, APIs, and applications in digital transformation efforts across the world. This study builds on a 2021 survey by Google Cloud.

According to this research survey, enterprises have seen significant benefits from their digital transformation efforts over the past 12 months, but only a small percentage (20%) are achieving all of their objectives. These organizations are planning to further leverage cloud, APIs, and microservices to improve the gains they've already made and deliver on the rest of their goals.

This report provides an overview of key technology trends, identifies important shifts in the role of applications and APIs in digital transformation initiatives, and investigates factors that contribute to building successful digital platforms. It also explores enterprises' intentions for IT investment to drive innovation, the changing market for the API-first digital economy, and how enterprises are building modern applications.

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[1] 2021 Foundry Digital Business Research survey

The world has experienced considerable disruptions over the past two years. These events have put market forces into motion that are rapidly changing how leaders shape their business and digital strategies.

Businesses, for example, are continuing to accelerate adoption of digital offerings and experiences to meet changing customer demands. In healthcare, after the pandemic pushed patients to use telemedicine, subsequent studies show that patients found the experience valuable. A 2021 survey from Sykes showed that more than three-quarters (77%) of patients said they were willing to try telemedicine in the future and nine in 10 said they'd continue to use it for non-urgent health matters.

E-commerce, too, continues to grow. This year, global e-commerce sales will surpass $5 trillion, growing to $7 trillion by 2025. Moreover, two-thirds (66%) of shoppers prefer to search online for items they're looking to buy versus 27% who prefer to shop offline, according to statistics from Google.

Remote and hybrid work are also here to stay, creating enormous implications for how organizations secure, create, deliver, and deploy applications. According to a 2022 McKinsey survey, 58% of employees have the ability to work from home at least one day a week, and more than one-third (35%) can work from home five days per week.

And all of the above is colored by economic uncertainty. In 37 of 44 countries, the average inflation rate in Q1, 2022 was double what it was two years prior, according to Pew, and supply chain problems continue to complicate manufacturing and slow the delivery of products.

In short, the growth of e-commerce, hybrid work models, and industrial digitization, coupled with economic uncertainty, and growing supply chain risks have put immense pressure on leaders to gain agility, efficiency, and other advantages to cope with current conditions and position themselves to succeed.

Businesses recognize that addressing these challenges will require digital transformation, and they're reacting accordingly. One McKinsey study found that large organizations accelerated their digital transformation projects by three to four years in response to the recent disruptions. "And

the share of digital or digitally enabled products in their portfolios has accelerated by a shocking seven years," the report notes. Many of these organizations are adopting modern development practices such as serverless deployment, continuous integration, continuous delivery (CI/CD), an API-first strategy, and containerized applications to spend less time on operations and more time on innovation.

Progress on Digital Transformation

Being a "digital-first" organization is key to being competitive today, and our research findings have uncovered that organizations are charging ahead in accomplishing their digital transformation goals.

Q9: Which of your organization's digital transformation goals have you accomplished in the last 12 months?
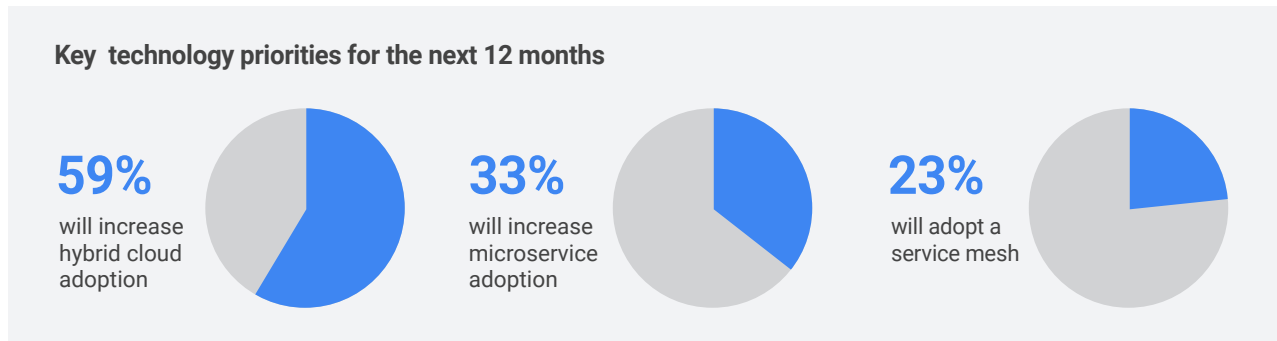
Cloud's Central Role

The growing adoption of cloud and hybrid cloud is one of the driving factors of success, with 93% of respondents saying they are "mostly cloud" in some form, up from 83% two years ago. Meanwhile, "mostly on-premises" dropped by half this year.
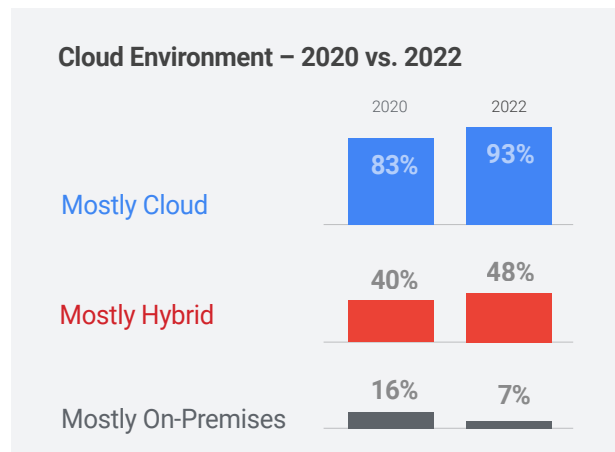
Q6: How best would you describe your cloud environment?

Looking further ahead, organizations are doubling down on cloud and hybrid cloud, pushing even more applications out of on-premises environments within the next 12 months. That means a significant percentage of enterprises are investing in technologies and methodologies to fully utilize the cloud's potential.

Our study indicates that CIOs are defaulting to cloud-based services when upgrading or purchasing new technical capabilities. Furthermore, IT leaders say cloud capabilities helped their organization achieve increased and sustainable revenue over the past 12 months.
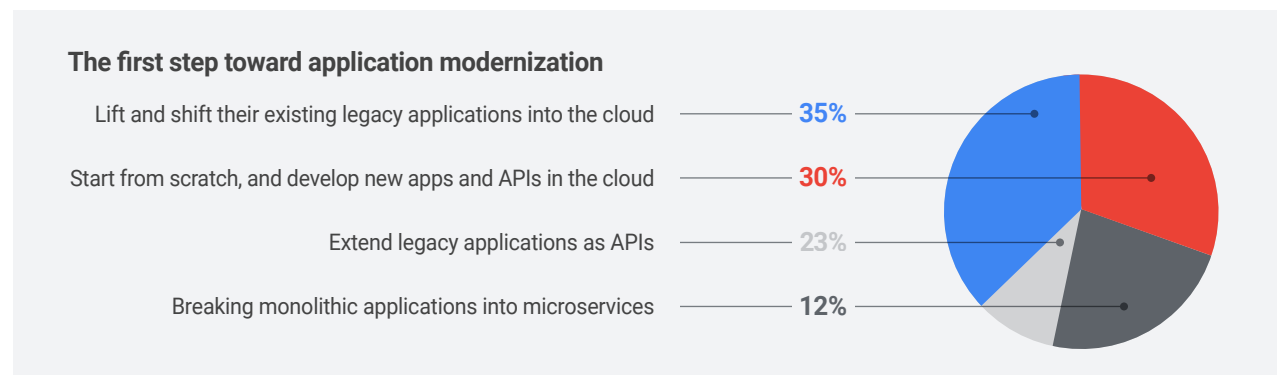
Key technology priorities for the next 12 months

59%
will increase
hybrid cloud
adoption

33%
will increase
microservice
adoption

23%
will adopt a
service mesh

Q12: Which of the following technology trends is an area of focus / investment for your organization in the next 12 months?

Application modernization efforts accelerated

This massive shift has had a profound impact on existing applications, which must be modernized to take full advantage of cloud benefits—and to stay competitive. Not surprisingly, most organizations are modernizing their applications, though approaches to migrating them from traditional, on-premises deployments to a cloud infrastructure differ widely.
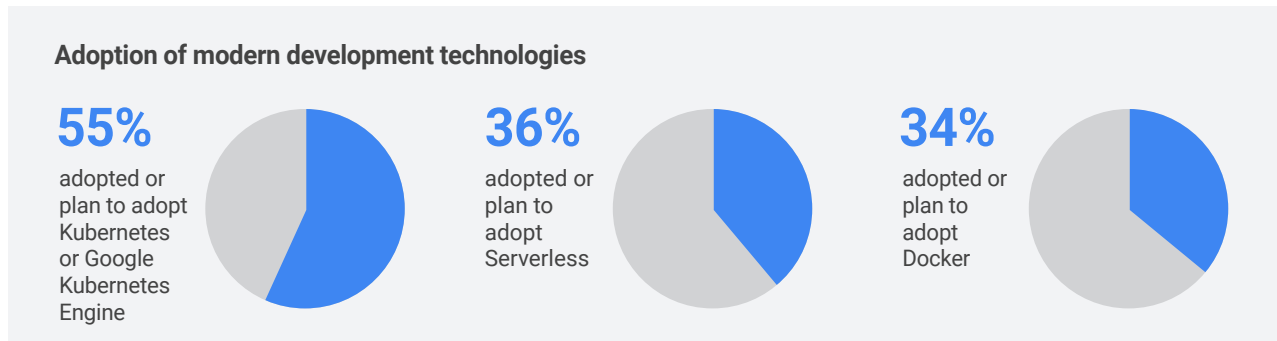
Each organization has its own cloud and transformation journey under way. Some companies choose lift and shift as a first step, a move favored by cloud-progressive organizations (in the process of public cloud migration). Others are starting from scratch with cloud-first development practices.

Cloud-native organizations (founded on or after 2000; cloud-enabled since inception) start here more often, using the cloud as their development platform. Cloud-traditional companies (primarily on legacy systems) have a higher rate of extending monolithic apps via APIs for modern application development. These organizations are unlocking the value of their legacy data and applications by building an API abstraction layer on top of their legacy applications to easily manage and streamline development efforts. This approach both enables developers to leverage a legacy asset without being familiar with the underlying technical details and to connect old technologies with new ones. APIs are often critical to allowing old and new systems to drive value together.

The first step toward application modernization

Lift and shift their existing legacy applications into the cloud	**35%**
Start from scratch, and develop new apps and APIs in the cloud	**30%**
Extend legacy applications as APIs	**23%**
Breaking monolithic applications into microservices	**12%**

Q11: What's the first step in your organization's application modernization journey?

In addition to moving to the cloud, an increasing number of organizations are building applications with modern development technologies such as Kubernetes. Kubernetes has emerged as one of the most popular technology adoption trends in our research. This open-source platform for managing containerized services and workloads marks a breakthrough for applications because it allows teams to keep pace with the requirements of modern software development. A great example of this is South American retailer Magazine Luiza. The company has adopted Kubernetes to modernize its applications which has helped this 60-year-old company transform from a brick-and-mortar business with basic e-commerce capabilities to one of the most successful e-commerce operations in Brazil.

Adoption of modern development technologies

55%
adopted or plan to adopt Kubernetes or Google Kubernetes Engine

36%
adopted or plan to adopt Serverless

34%
adopted or plan to adopt Docker

Q13: Which of the following technologies does your organization currently use or is planning to use within the next 12 months to develop applications?

APIs are critical components of successful digital transformation

APIs are the driving force behind digital business ecosystems that encompass a network of partners, developers, and customers facilitated by modern, cloud-first technologies. These ecosystems can be made up entirely of internal parties (such as developers within an organization) or can expand to include external individuals and organizations, such as suppliers, third-party providers, customers, developers, and regulators.

For example, Bank BRI, one of the largest banks in Indonesia, drove over $50 million in new revenue through Apigee, a Google Cloud API management platform, by creating an API product marketplace with more than 50 monetized, open APIs for over 70 ecosystem partners wanting to do credit scoring, business assessments, and risk management.

Forty-six percent of organizations surveyed use APIs exclusively within their own organization while 54% extend APIs to partners, customers, or other external developers to enable third-party development, or even to create marketplaces or ecosystems. Among this 54%, only 8% extend APIs solely for external consumption, while 46% enable development for both internal and external audiences.

APIs are critical to application modernization and digital transformation because, along with microservices, they enable rapid delivery of new experiences to customers, while cutting the cost of development and maintenance. APIs sit at the intersection of business strategy and technical competencies, says IDC, and "scalable API-centric approaches to creating digital process code and a digital-centric culture both reduce the effort it takes to transform and increase the speed at which an organization can transform."[2] As such, it's critical to create a mature, centrally managed API program as part of an API-first corporate strategy for internal and external stakeholders.

Types of APIs

46%
Internal only

46%
Internal and external

8%
External only
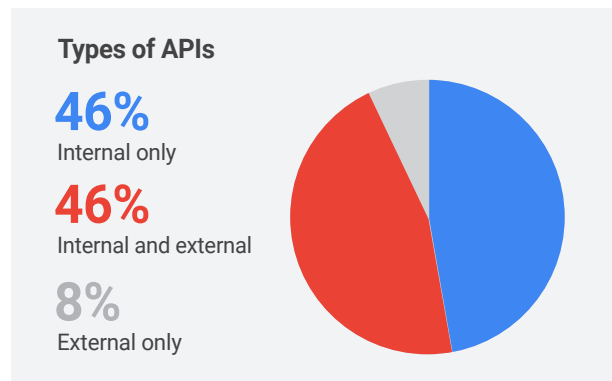
[2] *Digital Transformation Success Requires an API-Centric Approach*, IDC, May 2020, Shawn Fitzgerald, Research Director, Digital Transformation Strategies

A successful example of this is [Nationwide Insurance](), a Fortune 100 company and one of the largest insurance and financial services companies in the United States. The company recognized an opportunity to provide quotes for pet insurance aggregators faster as part of the API ecosystem. The team developed an API product to address this need. Upon the release of this product, they quickly saw a large increase in the number of quotes generated through various pet insurance aggregators.

However, the majority of the organizations surveyed haven't adopted a comprehensive API strategy - the results of our study identified that 66% of organizations say their API programs are "medium" to "low" in terms of maturity, with only 34% rating themselves as "high maturity."

Our study shows that mature API organizations are considerably ahead in their digital transformation efforts compared to low-maturity API organizations.

High API-maturity organizations are leading in attaining digital goals

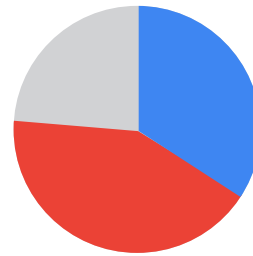|	High maturity	Low maturity
Increased efficiency	82%	59%
Increased collaboration	58%	40%
Increased agility	55%	43%
Creating new business models	50%	36%

Q9: Which of your organization's digital transformation goals have you accomplished in the last 12 months?

Technology leaders already understand the value that APIs bring. More than six in 10 (61%) say that APIs help build better digital experiences and products, and 54% say they accelerate innovation by facilitating collaboration with partners.

As in the Google Cloud's State of the API Economy 2021 report, the 2022 survey saw high-API maturity

API maturity: A Self-Assessment

34% - High maturity

As eager participants in the API Economy, high-maturity API organizations consume and expose APIs to speed development and add value for customers. Heavy cloud use with only 7% on premise.

- Centralized organization-wide initiative for API-first strategy
- API management platform
- Well-orchestrated way to administer APIs.

43% - Medium maturity

These organizations have updated their API framework based on pilot projects and plan to grow their API initiative. Have embraced cloud (52% hybrid cloud).

- APIs built within individual projects or teams
- Management through a center of excellence team (CoE)
- API management platform in use

23% - Low maturity

Low maturity organizations are validating the architecture and technology viability with proof-of-concept initiatives. Usually spearheaded by a single team for a single pilot project. Lower cloud maturity as well: 16% on premise, only 30% hybrid cloud..
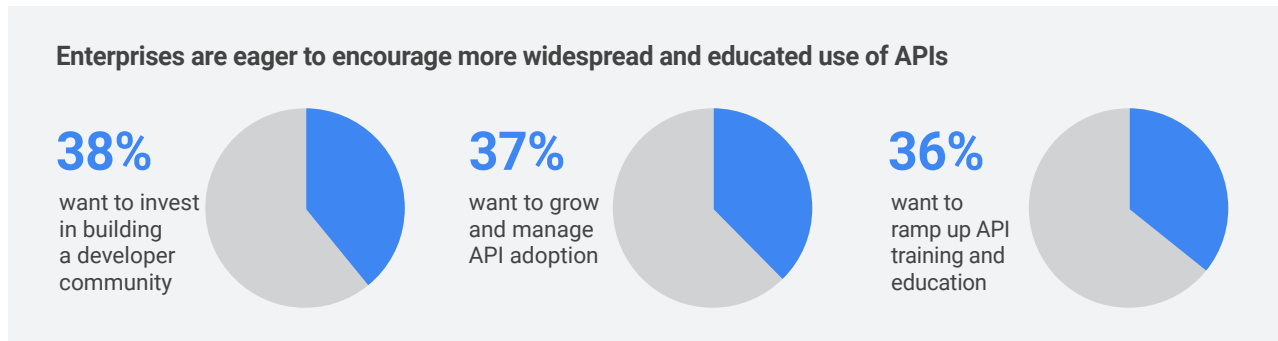
- Siloed APIs
- No centralized management program
- Relying on an API gateway, at best

Q7: Which of the following scenarios best describes the current state of your API program?

organizations over-index on almost all use cases versus low-maturity organizations. Lower maturity organizations increasingly focused on speeding up new application development:

- **65% of medium-maturity organizations** want that speed advantage, compared to 54% in 2020
- **59% of lower-maturity organizations** want that speed advantage compared to 51% in 2020

Given the value that APIs bring, they factor strongly in enterprises' plans for the next 12 months. More than two-thirds (67%) want APIs to help speed application development and 56% are looking to connect internal applications. Now they're looking to leverage that success in new ways. For example, more than half (52%) of enterprises are looking to democratize application development using low-code / no-code solutions, expanding the ability to create applications to non-technical employees. Doing so, however, means that digital strategy will need to extend beyond technical developers to include business users, which could vastly extend the number of use cases it must consider and cover.

Enterprises are eager to encourage more widespread and educated use of APIs

38%
want to invest in building a developer community

37%
want to grow and manage API adoption

36%
want to ramp up API training and education

Q27: How do you anticipate your API program will change in the next 12 months, if at all?

Challenges to Further Progress

While most enterprises have made progress on at least one of their digital transformation goals, there is plenty of opportunity to achieve additional gains: four out of five organizations surveyed have not achieved all their goals. Most notably, 26% have not achieved the cost reductions they hoped to attain, and 22% have failed to improve developer productivity.

APIs are critical in this endeavor to attain organizational goals. In the past 12 months, most enterprises say that APIs have played a key role in helping them realize better efficiency and improve their customer service. But significant challenges remain: 94% say they face at least one more significant issue, including high cost and time consumption (48%), excessive complexity (42%), and security (39%).

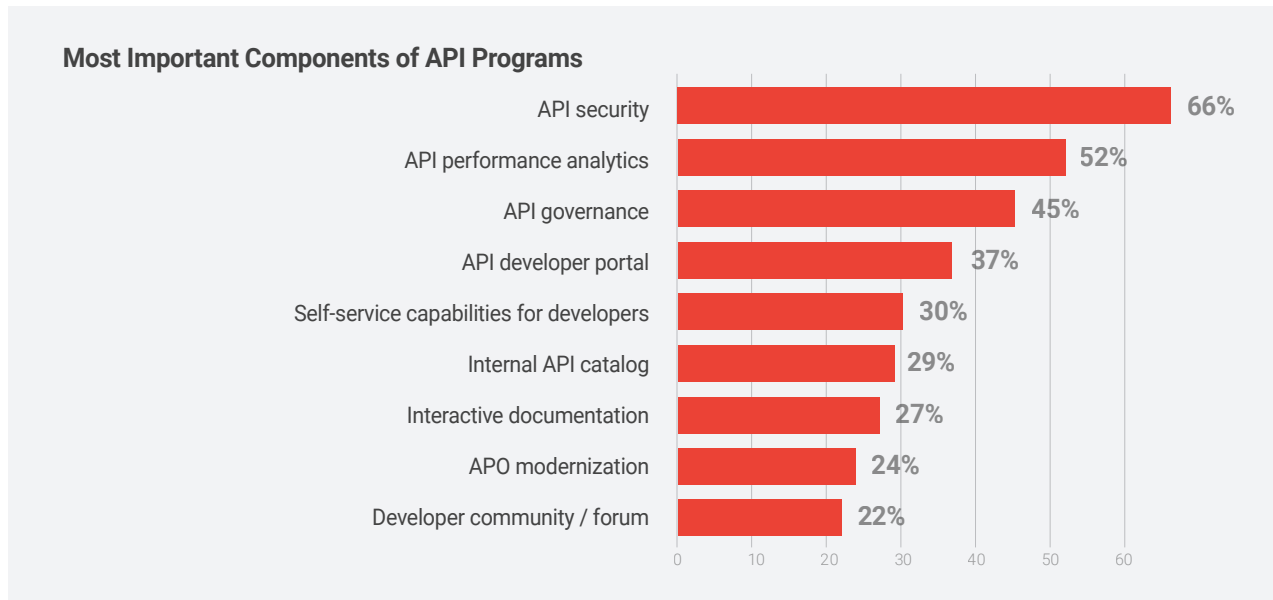**Full Lifecycle API Management: More Than a Gateway**

API gateways are often a starting point when enterprises begin investing in APIs and API management. To an extent, this focus makes sense: API gateways secure and mediate traffic between clients and backends, and between a company's APIs and the developers, customers, and partners who use them—so they are a crucial piece of the API management puzzle.

However, a gateway alone is insufficient for scaled API programs. Full lifecycle API management offers a complete solution beyond the essential gateway functions such as reliable processing of API calls or controlling who can use APIs. API management offers API design, development, publishing, deployment, security, governance, monitoring, analytics, monetization, and versioning capabilities that when used together drive successful API programs. These capabilities enable IT organizations to align various internal stakeholders, serve different API user constituencies, continually iterate and improve APIs, identify opportunities for innovation, and find new markets and revenue channels.

For example, as the number of APIs has surged to support the digital ecosystems and applications of the world, so has concern over security risks. Today, securing APIs requires visibility across all application interactions and observing, analyzing, and taking action at every level of the technology stack using an API management solution.

It's no wonder that when considering the components of their API programs, enterprises put security at the very top with 66% saying it's a priority. Specifically, they're prioritizing the adoption of threat protection (58%), real-time monitoring (58%), and authorization and access control (52%) capabilities.

Because APIs encompass business-critical information, any downtime or performance degradation can lead to significant loss in revenue, customers, and brand value. Therefore, there's mounting pressure on operations teams to ensure that APIs are always available and performing as expected. If the APIs go down, so too do the services that fuel customer experiences and on which the organization relies for collaboration and business processes. Due to this urgency, organizations' performance analytics (52%) and governance (45%) round out the rest of the top three components demonstrating the critical need for visibility into APIs to ensure compliance and that microservices and applications function as expected.

Most Important Components of API Programs

Component	Value
API security	66%
API performance analytics	52%
API governance	45%
API developer portal	37%
Self-service capabilities for developers	30%
Internal API catalog	29%
Interactive documentation	27%
APO modernization	24%
Developer community / forum	22%

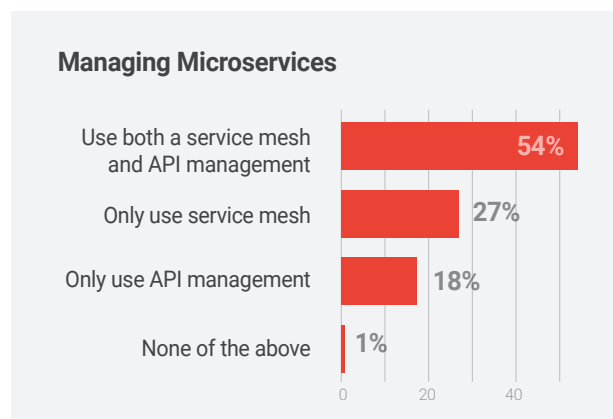Q23: Which components are most important to your API programs?

Well-documented and well-managed APIs provide a consistent, secure, and scalable interface that allows developers to work with digital assets without having to understand underlying systems complexity. Adopting the right API management solution helps organizations to reduce the specific expertise required to build innovative new applications and consequently opens up opportunities for more developers to do more, faster.

API management and Service Mesh

Many organizations ask themselves, "Do I really need both an API management platform and a service mesh?"

The answer to this question is "yes." While micro-services continue to become a more common architectural pattern, they also drive the need for technologies to manage that new complexity. An API management platform and a service mesh focus on different aspects of the technology stack and are complementary to each other. A service mesh like Anthos Service Mesh allows for service-to-service communication that maintains the quality of service in a system composed of distributed services. Simultaneously, an API management platform such as Apigee will enable organizations to drive

consumption of those services by exposing them as APIs for use by different business units or partners seeking to build new channels.

Managing Microservices

Approach	Value
Use both a service mesh and API management	54%
Only use service mesh	27%
Only use API management	18%
None of the above	1%

Q14: How does your organization approach the management of microservices in your application architecture?

By adopting API management and service mesh as part of a modernization journey, organizations become better equipped to rapidly respond to changing markets securely and at scale. Together, these technologies are helping organizations solve complex problems across the stack, delivering innovative experiences everywhere and anywhere their customers may be. According to our research, 54% of organizations now use both technologies in combination.

Google Cloud: Apigee API Management and Anthos Service Mesh

The data shows that companies are clearly moving from monolithic apps to loosely coupled, services-based architectures across different cloud and other environments. And as the survey demonstrates, when it comes to managing APIs and microservices, companies are very concerned about reducing complexity and gaining visibility into performance, networking, and, of course, security.

Google Cloud provides two solutions: First, the Anthos Service Mesh, which is powered by the open source Istio service mesh platform, is a fully managed offering that provides deep visibility into service level objectives and service-to-service transactions. IT can easily see how services are performing, how other services are affected, and issues that need to be addressed. And it's secure, enabling IT to manage encryption, authorization, and authentication between services, often without having to make any changes to the applications.

Second, Google Cloud's Apigee is a full lifecycle API management platform. It gives businesses control over and visibility into the APIs that connect applications and data across the enterprise. Apigee empowers organizations to accelerate their business by unlocking the value of data, driving internal efficiencies, and delivering modern applications.

It's Crunch Time to Build for the Future

Organizations of all sizes, across industries and geographies, are accelerating their digital transformation efforts with a focus on application modernization. As increased digital transformation investments may suggest, competitiveness is increasingly less about transformation ambitions and more about actual transformation. It's not enough to simply use the cloud, build applications, or even adopt API-first strategy. Rather, the requirement is a strategic shift to empower all stakeholders with the ability to rapidly and repeatedly deploy and scale, and to consistently deliver on digital programs.

By leveraging cloud-native technologies and modern development practices, organizations are able to innovate faster by giving developers, partners, and customers unique ways to interact with existing products and services. Moreover, the rapid deployment of technologies such as APIs and microservices are aiding in the delivery of new and innovative experiences to customers at a global scale.

The challenge for modern businesses isn't simply to continue delivering innovation, but to continue delivering innovation in a sustainable, efficient, and scalable manner. Organizations must embrace a shift in the nature of supply and demand, replacing resource-constrained strategies with infinitely replicable digital assets and new opportunities around economies of scale. In other words, success requires a fundamental transition in the way companies build applications internally to power customer experiences externally.

Learn how Google Cloud's Apigee API Management Platform can help your organization manage its API program at cloud.google.com/apigee.

Methodology

Google Cloud surveyed 770 technology leaders, 88% of whom were manager-level or above, across North America, Latin America, Europe, and Asia-Pacific.

- 23-question online survey fielded between 4/6/2022 and 5/21/2022.
- Target: IT leaders at organizations with 1,500 or more employees across all industries.
- All respondents had some role in purchase decisions for technology solutions related to API platform initiatives.