

State of API Economy 2021 Report

How APIs Powered Digital Transformation in 2020—
and Why They'll Be Even More Important in 2021



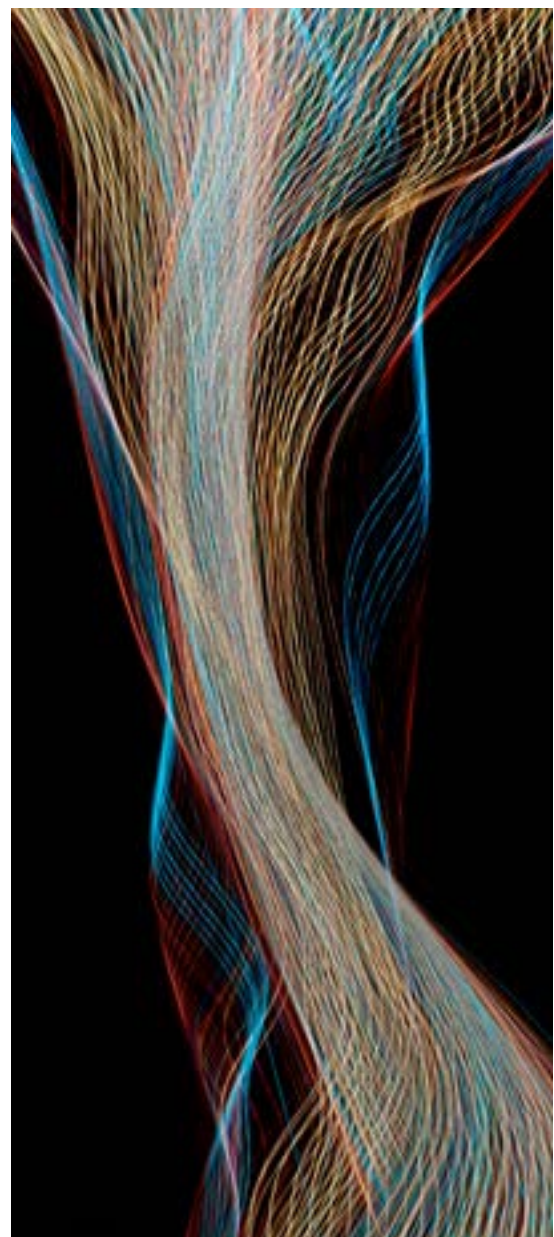
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Executive Summary

In 2020, virtually all industries, from retail and manufacturing to finance and hospitality, shifted how they do business, with a focus on digital maturity coming into sharp relief in the wake of COVID-19. The following report describes how digital transformation initiatives evolved throughout the year, as well as where they're headed in the years to come. This report is based on Google Cloud's Apigee API Management Platform usage data between September 2019 and September 2020, Apigee customer case studies, and analysis of several third-party surveys conducted with technology leaders from enterprises with 1,500 or more employees, across the United States, United Kingdom, Germany, France, South Korea, Indonesia, Australia, and New Zealand.

"How APIs Powered Enterprise Digital Transformation in 2020" explains why Application Programming Interfaces, or APIs, are central to enterprises' needs and digital transformation efforts. This report provides an overview of key technology trends, identifies important shifts in the role of APIs in digital transformation initiatives, and investigates factors that contribute to building successful digital platforms. It also explores enterprises' intentions for IT investment, the changing market for the API-first digital economy, and how enterprises can build or participate effectively in digital ecosystems.



The Digital Transformation Imperative

Digital transformation describes the IT evolution that businesses undergo to improve efficiency, unlock new business models, and create digital experiences for their customers, partners, and employees.

This evolution is unlikely to occur if a business pursues only the basic table stakes of the digital world, such as adopting a mobile strategy or leveraging the cloud for improved efficiency and CapEx-to-OpEx gains. The point isn't just to launch an app or migrate data or workloads to a cloud provider. Rather, it's to embrace a shift in the nature of supply and demand—one in which resource-constrained strategies give way to infinitely replicable digital assets and new opportunities around economies of scale.

For example, rather than limiting much of their business to physical branches, banks across the world want to [make their services available](#) to customers wherever they are. A first-party mobile app is a start, but customers increasingly want to manage finances within the experience they're already engaged with. If they're using a retail app or responding to an offer on a social media platform, they want to be able to transact within that experience, without jumping over to a different banking app or going through too many authentication hoops. Accomplishing this friction-free fluidity means various banking systems—such as those for looking up accounting balances, executing transactions, applying for loans, and so on—need to be expressed as software that can be repeatedly integrated across a wide variety of use cases and digital experiences, whether that means in a brick-and-mortar branch, across mobile apps, or at kiosks spread around the world.

Likewise, a few years ago, most restaurants would have needed to juggle a number of mandates: running a kitchen, staffing a dining room, operating a website and mobile app to attract customers, investing in traditional marketing to attract customers, employing drivers for delivery services, and more.



Embrace a fundamental shift in the nature of supply and demand—one in which resource-constrained strategies give way to infinitely replicable digital assets and new opportunities around economies of scale.

Suppose that instead, a digitally-savvy entrepreneur were to simply rent a kitchen space, put her menu up on meal-delivery apps (after all, the customers are already there), and then focus on making great food. In this scenario, instead of shouldering heavy burdens for attracting customers and supplying them services, the restaurant can offload tasks to ecosystem partners.

This idea reshapes a restaurant's business model to the extent that the entrepreneur might hire a few more chefs with different skills to work out of her single kitchen, effectively letting her run four or five different delivery "restaurants" without having to proportionally scale all of her other infrastructure and overhead costs. In this way, she can focus on what she does best (producing delightful food) and partner with others (such as those with delivery expertise) to create the end consumer's experience. These new, ecosystem and platform-based strategies are possible because technology connects and mediates interactions across the value chain, from developers building the platform, to the kitchen receiving orders, to the drivers delivering meals, to the consumers whose purchases turn all of these interactions into revenue streams. Moreover, it does all of this without incurring marginal costs for each additional participant or interaction in the value chain.



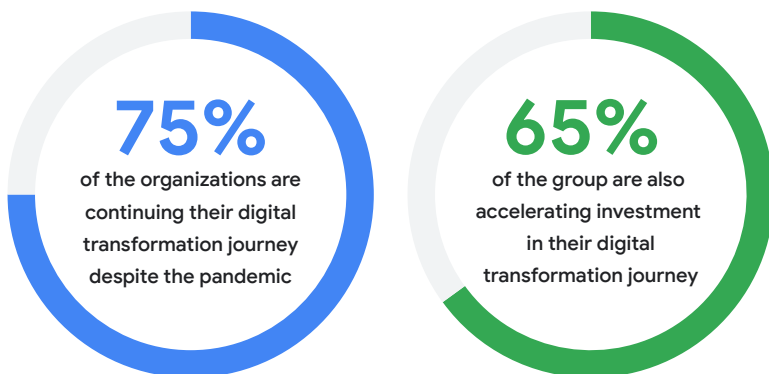
How COVID-19 Affects Digital Transformation

For years, digital transformation has regularly been among enterprises' top business imperatives, but the COVID-19 pandemic and changing market conditions have increased this urgency. Many industries, [headlined by healthcare](#), weathered the pandemic by compressing years of digital transformation into just a few months.

Consider the restaurant example in the previous section. Throughout 2020, in-restaurant dining was not an option in many pandemic-stricken parts of the world, meaning that shifts to app-based, delivery-based ecosystems quickly evolved from the mark of a visionary leader to a necessity for almost all players in the industry.

Our research reflects this urgency. We surveyed over 700 IT decision-makers around the globe. In response to the pandemic and its rippling effect on business in 2020, three in four organizations continued their digital transformation investments. Nearly two-thirds of those companies are increasing investments or completely evolving their strategies to become digital-first companies. Though the pandemic's disruptions posed economic challenges for many industries, only one in four respondents indicated that COVID-19 prompted them to pause or reduce digital transformation efforts.

Digital Transformation Strategy Impact of COVID-19



Nearly two-thirds of those companies report either increasing their digital transformation investments or completely evolving their digital transformation strategies to become digital-first companies.

Why APIs Are Core to a Successful Digital Transformation

Digital transformation relies on an organization's ability to package its services, competencies, and assets into modular pieces of software that can be repeatedly leveraged.

Every company in the world already has valuable data and functionality housed within its systems. Capitalizing on this value, however, means liberating it from silos and making it interoperable and reusable in different contexts—including by combining it with valuable assets from partners and other third parties. Banks want their services to fluidly integrate with retailers' apps just as retailers want their customers to have easy, in-app access to preferred payment choices, for example, and restaurants want their services to be part of delivery ecosystems just as delivery ecosystems want participation from more restaurants.

APIs enable these synergies by letting developers easily access and combine digital assets in different systems, even if those systems were never intended to interoperate. In their most basic form, APIs are how software talks to software, but if the APIs are [designed with the developer experience in mind](#), rather than just as bespoke integration projects, they become extremely powerful. When made to be easily reusable, APIs let developers modularly combine, and recombine, functionality and data for new uses, with [virtually no marginal cost for each additional use of the API](#). If one developer builds a new application by leveraging an API that looks up store locations, another developer can leverage the same API for another application without the enterprise absorbing any additional meaningful overhead.

Because there is little to no cost for each additional API call, the more interactions there are around a given API, the more value it tends to create for all participants (e.g., for the firm that owns the API, the developers who leverage the API, and the end users who consume the developers' apps). More restaurants, drivers, and consumers interacting with a delivery service's APIs, for example, only encourage further participation from still more restaurants, drivers, and consumers, as well as more developers interested in building delivery services into their apps, and on and on.



Most enterprises can apply aspects of this thinking. They're in business because they do something well—and whatever that is, it can be encapsulated by software at different points in the value chain. Even when used just by internal developers, APIs accelerate development of line-of-business applications, process automations, and more. Extended to outside partners and developers, APIs open even more opportunities, letting a business focus on maximizing its strengths while relying on other ecosystem participants for complementary technologies and to fill competitive or go-to-market gaps.

That APIs can produce these kinds of efficiency gains, revenue opportunities, and network effects is [well-supported](#) in academic research, and our surveys indicate many enterprise leaders agree that APIs are core to digital transformation strategies.

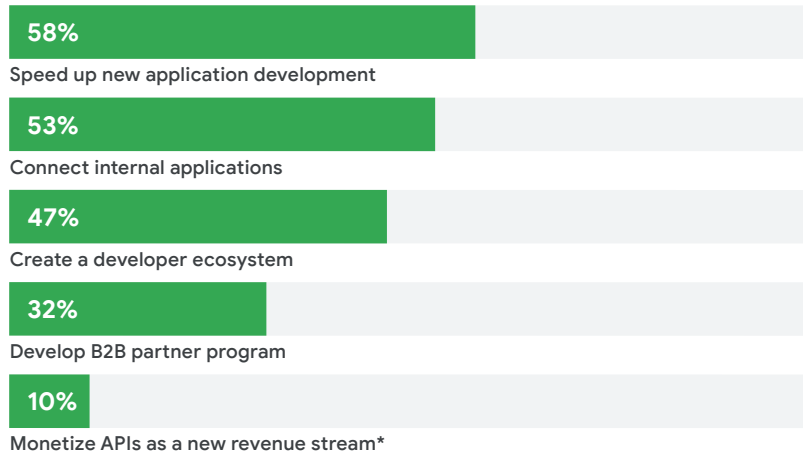
Views of APIs



According to our research, 56% of IT decision-makers view APIs as assets that help organizations build better digital experiences and products, 52% say APIs accelerate innovation by enabling partners to leverage digital assets at scale, 40% view APIs as systems integration enablers, and 36% say they see APIs as strategic assets for creating business value.

As this data attests, integration remains an important API use case—but it can also be limiting if it's perceived as the only API value proposition. Making two systems interoperate is not intrinsically valuable—what's valuable is what this integration enables in terms of business outcomes, and whether it can be replicated, iterated, and managed at scale as business needs change. That's why use cases that exceed standard point-to-point integration are so well-represented in our survey results.

Top API Platform Initiatives



Organizations with high API maturity are more likely than their peers to increase IT spending and accelerate digital transformation. Among industries, retail respondents were the most likely to report increased IT spend (43%), as developing modern omnichannel strategies and digital ecosystem participation has become critical to e-commerce success, to say nothing of the ways in which COVID-19 has shifted consumer buying habits to online spaces.

This dynamic is likewise reflected in our respondents' API initiatives. More than half indicate their API projects involve traditional systems integration projects such as connecting internal applications—but most of the other top API initiatives more strongly reflect modern, API-first attitudes. Some 58% say top API initiatives emphasize speeding up new application development; 47% include creation of a developer platform among their core API projects; 32% are using APIs to develop B2B partner programs; and 10% are focused on monetizing APIs to unlock new revenue streams.

Customer Story

Magalu speeds up development with APIs

Summary: Brazilian retailer Magalu (formerly Magazine Luiza) adopted a two-speed IT approach to first accelerate the customer-facing parts of their business, and then phase in new approaches elsewhere. This effort involved using APIs to decouple backend systems from the frontend and to let these systems interoperate. These APIs let developers quickly begin iterating on customer experiences while backend teams maintained systems of records and adapted to new strategies at their own pace.

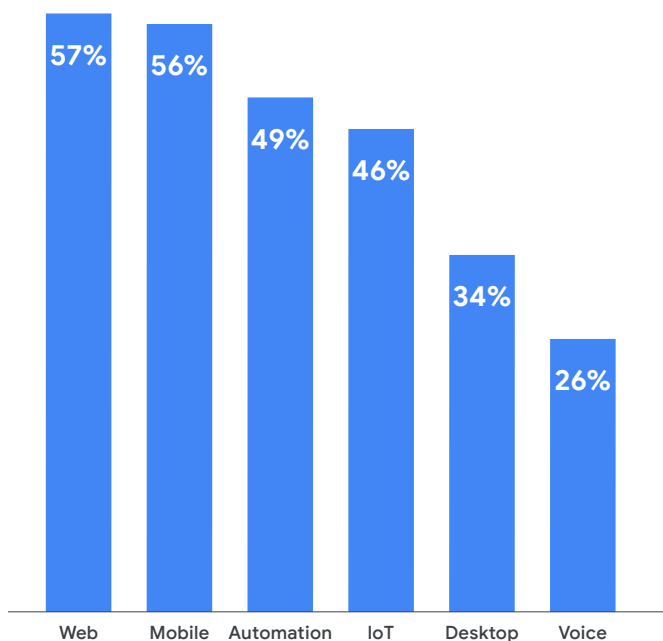
This enhanced IT agility helped Magalu [transform from a brick-and-mortar retailer](#) with e-commerce capabilities into, as some commentators have put it, the ["Amazon of Brazil."](#) Central to this evolution was the launch of an online marketplace open to third-party sellers, who are able to join the marketplace via API-powered processes. This marketplace led to exponential growth in both the number of SKUs Magalu offers and the e-commerce revenue it takes in.

What Apigee Customers Are Building

Our customers have increased their number of active applications by 53% between September 2019 and September 2020

Survey participants report using APIs for a wide array of applications, with web (57%) and mobile (56%) efforts leading the way, followed by automation (49%) and Internet of Things (IoT) (46%) initiatives. Our research shows that larger companies use APIs more often to power mobile applications, while smaller enterprises are more likely to focus on desktop apps. This difference can be explained, in part, by size: large enterprises often face stronger imperatives to connect an increasingly distributed workforce, while smaller companies are more likely to exist in more contained office environments. That said, thanks to the emerging union between APIs and no-code, smaller companies are also embracing the idea that the workforce should be empowered to work from anywhere, whether in the office, at home, or in the field.

Applications Powered by APIs



Organizations with high API maturity and that increasingly use microservices-based architectures are more likely to focus on monetizing APIs as a new revenue stream.

Automation (49%) and IoT (46%) are growing areas for API-powered application development, and these types of applications are considerably more widely adopted among mature API users globally.

From stamp machines to cloud services: The Pitney Bowes transformation

Summary: By creating a common way to integrate applications with their back office, Pitney Bowes reduced their time to build new applications from 18 months to as little as 4 months.

After nearly a century of offering mailing and shipping solutions, enterprise giant Pitney Bowes transformed into a provider of digital shipping and e-commerce solutions by making their core services, such as location intelligence and shipping capabilities, available as APIs. This let internal developers build applications more quickly, as well as let partners and external developers build Pitney Bowes services into third-party applications.

To achieve this digital transformation, Pitney Bowes used Apigee, Google Cloud's API management platform, to power the Pitney Bowes Commerce Cloud. With their Commerce Cloud, Pitney Bowes delivered a variety of services, analytics, and APIs that power a range of differentiating, cloud-based

solutions. Their API-driven transformation allowed Pitney Bowes to find new ways to leverage their existing shipping services platform, as well as find additional ways to engage with customers. With this new platform, Pitney Bowes:

- **Reduced time to market** for new application development from **18 months to 4 months**
- **Grew customer engagement and revenue** through the Commerce Cloud ecosystem
- Simplified the process to **deploy new features** with the move to cloud infrastructure

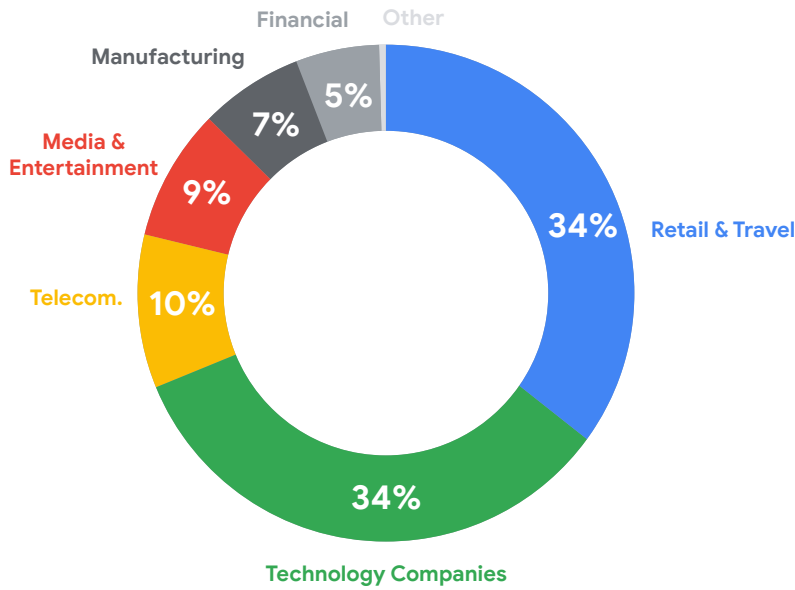
"We've built a robust go-to-market strategy for the APIs with Google. It's a whole new kind of business for Pitney, based on exposing APIs directly to customers for their consumption."

— James Fairweather,
Chief Innovation Officer, Pitney Bowes

What API Traffic Teaches Us

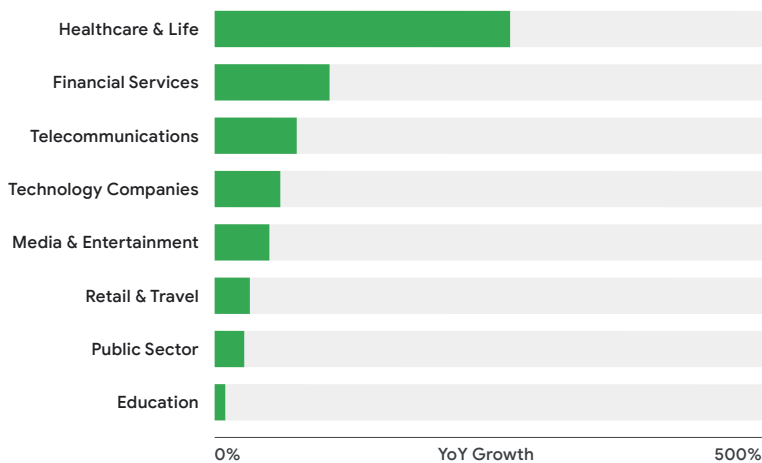
API traffic for Apigee customers increased 46% year-over-year to 2.21 trillion calls between 2019 and 2020

Mirroring our survey results that indicate increased spending on digital transformation, API traffic for Apigee customers increased 46% year-over-year, to 2.21 trillion calls, between 2019 and 2020. This rise reflects the growth in digital maturity across industries, with more industries embracing digital-first business strategies. A few industries stand out as particularly proactive: the retail and travel (34.5%) and technology (34.3%) industries accounted for the largest share of API traffic, while the healthcare and financial services sectors posted the most significant year-over-year increases.



Driven by both the rise of challenger banks and traditional banks' desire to remain competitive by offering new digital experiences to increasingly-connected customers, Apigee users in the financial services industry grew API traffic by more than 125% in 2020. But this growth is a fraction of what the healthcare industry, reacting to one of the biggest disruptions of all time in COVID-19, achieved: a 400+% increase in API traffic.

Healthcare industry sees an explosive growth in API traffic in 2020



Remain competitive by offering new digital experiences to increasingly-connected customers.

COVID-19 is making the increasingly complex need to share data between healthcare providers, payers (insurance companies), and pharmaceutical companies even more crucial. APIs are the key enablers of this data sharing which is a contributing factor in the impressive API traffic growth within the healthcare industry.

This API traffic growth in healthcare can be attributed to not only pandemic response efforts, but also the large-scale digital transformation initiatives taking place across the industry. Both patients and professionals now expect and require digital experiences that offer efficiency, accuracy, and privacy, and hospitals and other providers must satisfy this demand to achieve success in 2020 and beyond. Challenges range from providing safe and efficient virtual visits to navigating increasingly complex compliance programs and regulations, all of which can be accomplished through an API-first approach to digital transformation.

Customer Story

Cleveland Clinic powers connected health and digital innovation with APIs

Summary: Using Apigee, Cleveland Clinic is realizing the full potential of their electronic medical records (EMR) to support the discovery of enhanced treatment options in real time to build new applications from 18 months to as little as 4 months.

Providers at hospitals and medical research centers regularly use electronic medical records (EMRs) during patient visits, and the clinicians at Cleveland Clinic sought to produce higher-quality insights from EMR data to improve their standard of care. To transform massive amounts of patient data into actionable insights, Cleveland Clinic [adopted Apigee](#) to power their API platform. With this API-powered approach, Cleveland Clinic was able to extend and augment EMR functionality, and is now running advanced analytics and machine learning-based predictive models to surface valuable insights to clinicians for exceptional patient care.

The API platform now allows Cleveland Clinic to:

- **Improve patient experience** through an API-powered EMR platform that produces insights for patient care
- **Accelerate time to discovery** by bringing the Apigee platform to researchers for faster data analysis
- Enable other departments to **develop future API integrations** through Apigee

"When we can open up the EMRs through Apigee and APIs, we can extend their use so that the clinicians feel like they're getting the partner they need in technology."

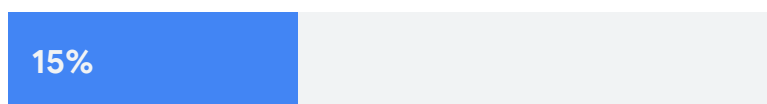
— Beth Meese, Executive Director of Technology, Agile Transformation, and Centers of Excellence, Cleveland Clinic

How Organizations See Their API Maturity

High-maturity companies ranked creating a developer ecosystem among their top priorities.

Though API traffic has increased across industries, the range of possible uses is vast, and most of our survey respondents recognize their organizations are not fully leveraging APIs. When asked to assess the level of their organization's API maturity, most ranked themselves as "medium," using the following definitions:

API Maturity



Low maturity: "APIs are siloed without a centralized program in place to manage administration; we have an API gateway at best."



Medium maturity: "APIs are built within individual projects / teams, and managed through a Center of Excellence (CoE) team; we have an API management platform that we use."



High maturity: "Centralized company-wide initiative for API-first strategy; we have an API management platform, and a well-orchestrated way to administer APIs both internally with developers, and externally with partners."

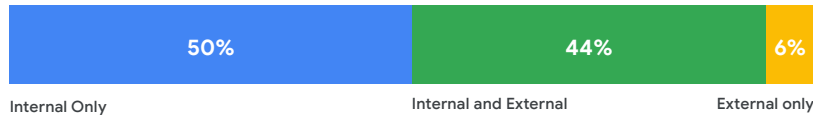
Our research indicates higher API maturity tends to correspond with more robust digital transformation efforts. Companies based in the United States, larger companies, and companies within the technology and financial services verticals were most likely to report high API maturity.

APIs are the backbone of digital business ecosystems that encompass networks of partners, developers, and customers. These ecosystems may be composed entirely of internal parties (i.e., developers within an organization) or may include external individuals and organizations, such as suppliers, third-party providers, contractors, customers, developers, regulators, or even competitors.

Organizations that see an increase in SaaS (Software as a service) deployment are more likely than their peers to have strong API program maturity.

Our survey found that in 2020, enterprises split their API efforts between internal APIs, which serve both an organization’s staff developers and contractors, and external APIs, which serve partners or developers outside the organization. That said, most of the APIs applied to external use were also used internally: 50% of APIs were designed solely for internal uses, 44% were designed for both internal and external use, and 6% were exclusively designed for partners or developers outside the company. This indicates the potential for internal APIs to become externalized as they’re applied in new ways and iterated.

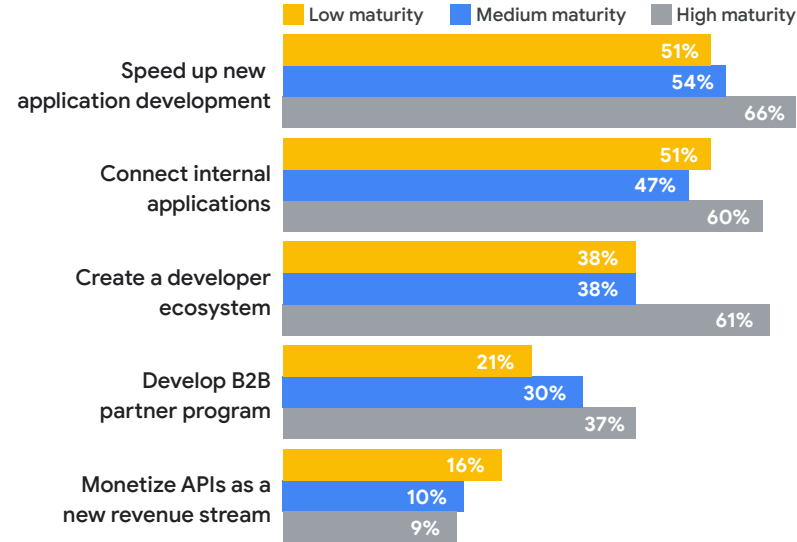
Types of APIs



While companies of all API maturity levels are likely to be focused on speeding up development of new applications and connecting internal applications, high-maturity respondents are significantly more likely to focus on developing a developer ecosystem or B2B partner ecosystem around their APIs.

Companies that open APIs to the public tend to have greater API maturity. While most companies use a mix of internal- and external-facing APIs, the travel and transportation vertical is more likely than others to use external-only APIs. While businesses in these verticals have a variety of reasons for externalizing their APIs, some of the broad incentives are clear: if your business relies on more people traveling, you want more people exposed to your services, so letting external developers build apps around your services is a good way to extend reach.

High maturity enterprises prioritize creating a developer ecosystem



Customer Story

Autodesk builds a digital ecosystem to enable new revenue streams with APIs

Summary: By powering their Autodesk Forge cloud platform with Apigee, Autodesk was able to expose a new set of web services and web APIs for faster and broader innovation.

Autodesk—maker of 3D design, engineering, and construction software—is in the business of revolutionizing how things are made. The company sought to establish customer awareness in new markets and encourage developer innovation by externalizing APIs in order to broaden their ecosystem. To support their APIs, the company adopted Apigee, which allows developers to integrate Autodesk resources, such as design or edit data, into other applications.

By [adopting a strong and secure API infrastructure](#), Autodesk was able to achieve scalability and enhanced security while also minimizing time to deployment.

Among the benefits Autodesk has seen with their API platform are:

- Boosted customer engagement, creating **3x increase in API calls**
- **Enhanced public awareness** of ecosystem through APIs that bring the platform to new customer markets
- Reduced time to deployment through **accessible Apigee API management** and development infrastructure

“Apigee was easy to work with, and the flexibility of allowing us to use the Apigee product as a platform and tailor it to our needs was key.

—Shawn Gilmour, Director, Identity and Access Management, Autodesk

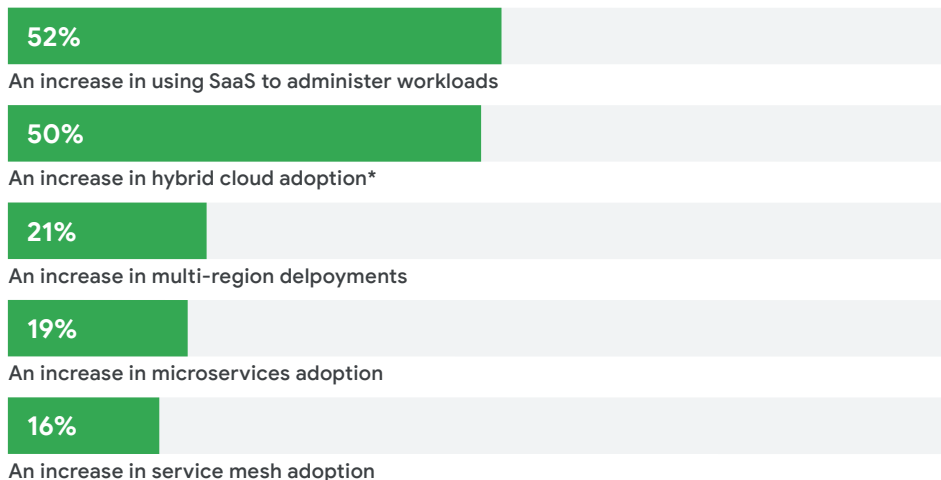
Improving API Maturity: How Increased SaaS and Hybrid Cloud-based APIs Underscore the Importance of Deployment Flexibility

One in two companies reported an increased use in SaaS to administer workloads, as well as an increase in hybrid cloud adoption.

A company’s API maturity and ability to execute on digital strategies depend on how APIs intersect with other technologies. Some APIs make legacy applications accessible largely in order to bring the past in line with the present, for example, while others are used for sharing cloud-native microservices that facilitate particularly agile, granular, and modular development techniques. APIs may also be hosted anywhere and everywhere: in the cloud, on a private server, or via hybrid models.

Due to this evolving architectural complexity in which APIs might be involved, API deployment flexibility is increasingly critical to digital success. Our research suggests many companies are adapting toward this end.

Technology Adoption Focus in the Next 12 Months



When asked about future areas of technology focus and investment, one in two respondents reported an increased use in SaaS to administer workloads (52%), as well as an increase in hybrid cloud adoption (50%)—both areas in which APIs are crucial tools. Likewise, increased investment in microservices (19%) indicates increased API maturity and adoption of modern development frameworks that include API-first strategies.

Customer Story

HP adopts hybrid deployment with APIs

Summary: When HP—a global leader in innovative personal computing devices, printers, 3D printing, and related services and solutions—decided to adopt a hybrid deployment model for increased flexibility, the company turned to an API-first approach.

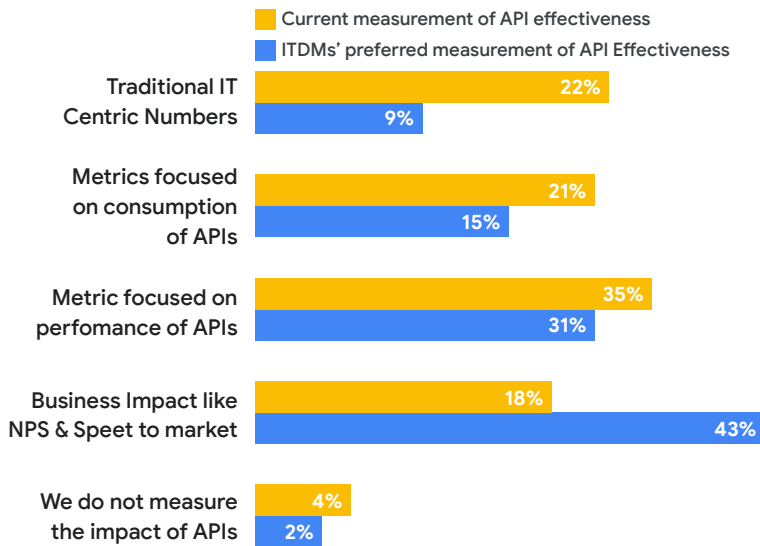
“HP’s digital evolution is accelerating, and our goals necessitate a comprehensive API-management platform that works across disparate enterprise requirements and locales,” said HP developer experience lead, Evan Scheessele. “As a result [of hybrid API management], we are able to pursue consolidated management and share standardized policies and verifiable security across our diverse API product teams.”

How Metrics and Analytics Accelerate Momentum

Among customers of Google Cloud's Apigee API Management Platform, API analytics adoption increased by 75% from 2018 to 2020.

While the deployment of APIs helps companies develop their digital presence, measuring API performance is key to ensuring effective use, and can illuminate further routes to innovation. APIs are most useful when thought of as products for developers, and that means they should be managed like any software product is, from establishing security protections to optimizing performance to iterating new versions based on user feedback. A business can't effectively manage its APIs if it cannot measure and learn from API traffic, so it's no surprise our data shows increased interest in API metrics and analytics.

API Effectiveness



When our survey respondents were asked how APIs at the company are currently measured, top responses included metrics focused on API performance (35%), those focused on traditional IT-centric numbers (22%), and those focused on consumption of APIs (21%). But when asked about preference for API measurement, business impact—including Net Promoter Score (NPS) and speed-to-market—tops the list (43%). The data suggests that API effectiveness metrics vary across geography and industry, with measurement by business impact or API performance serving as a collective north star.



Measuring API performance is key to ensuring effective use, and can illuminate further routes to innovation.

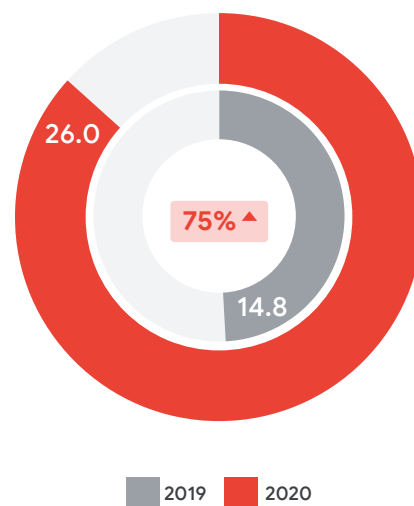
Curiously, only 18% of respondents currently measure the effectiveness of their API programs via business impact, even though 43% would prefer to measure it this way. This delta can be explained by a range of factors, including cultural challenges, systems issues, and a lack of resources.

Basic API metrics, such as the number of APIs produced or the number of internal projects for which an API is used, may be relatively straightforward to collect—but it can be more complicated to generate more advanced metrics, such as which APIs are driving the most traffic or developer adoption, which APIs are performing best, and which APIs are generating the most revenue. This difficulty is partly a matter of mindset, as companies should invest more in measurements of how APIs are consumed than in measurements of how APIs are produced. But it is also a matter of resources. To record these more mature and sophisticated measurements, and derive the insights they facilitate, enterprises need robust API management tools that include comprehensive monitoring and analytics capabilities, including support for alerts, diagnostics, predictive analysis, and quick paths to acting on data.

Among Apigee customers, API analytics adoption significantly increased, by 75%, from 2018 to 2020—growth that reflects the broader need to holistically assess the business and digital transformation impacts of API programs. Use cases range from improving performance by measuring errors, to identifying API monetization candidates, to detecting security threats, to running experiments in which different API-first projects are launched, then observed, then iterated based on data.

Leading businesses use API metrics not only to inform new strategies but also to align leadership goals and outcomes. Because executive sponsors tend to support tangible results (like an API that's attracting substantial developer attention or accelerating delivery of new products), teams can use API metrics to effectively unite leaders around digital strategies and justify continued platform-level funding for the API program.

API Analytics usage saw a 75% increase



Customer Story

Arity drives success with APIs and analytics

Summary: Using an API-centric approach, Arity was able to significantly expand their digital ecosystem to improve innovation around their key asset: data.

Arity—an analytics-driven startup within insurance giant Allstate—wanted to expand their intelligence platform to partners in order to further encourage research innovation. To accomplish this goal, Arity [developed strong API programs](#), as well as detailed performance and monitoring feedback to help hone their API experience. With Apigee, Arity was able to make their APIs and software development kits (SDKs) available to customers and third-party developers to help insurance agents do things like improve their ability to price policies.

Knowing that APIs and API management are essential to scaling a digital ecosystem quickly, Arity's bet on an API-driven approach is paying dividends. This approach has helped Arity to:

- **Provide growth opportunities** by opening driving database access to partners
- **Create avenues for optimization** through Apigee analytics that track API performance
- **Combine APIs and IoT (Internet of Things) hardware** for extensive big data analysis

Why Management and Security Capabilities Are Indispensable

Between September 2019 and September 2020, use of anomaly detection, bot protection, and security analytics features grew 230% among Apigee customers.

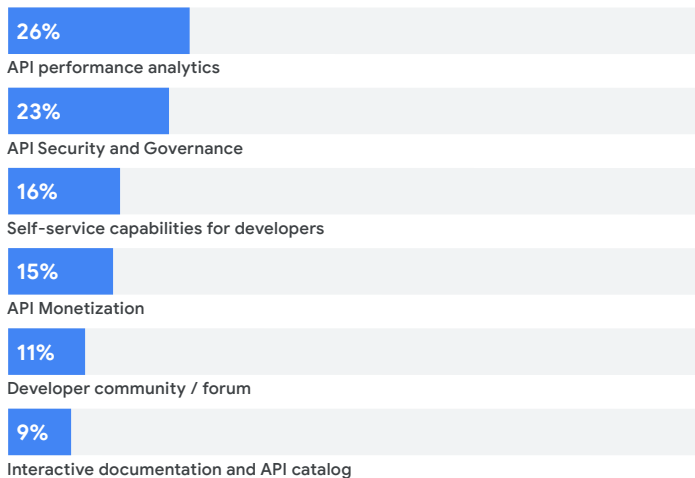
API metrics and analytics are just one component of effective API management. Security and governance are also essential. APIs are how an enterprise's most valuable assets are accessed, which makes them akin to the doors and windows of the enterprise. Enterprises want friction-free ways for employees to enter the office but still use precautions—from locks to cameras to key cards—to keep physical spaces secure. Digital assets deserve no less. Because APIs facilitate virtually all digital interactions, how APIs are managed can significantly impact many upstream communities and processes.

Upstream Impact of API Operations



When managed properly, APIs provide business optionality to control access to digital assets, to combine old systems with new technologies, and to empower developers to experiment, innovate, and react to changing customer needs. But APIs exposed without the proper controls, security protections, developer considerations, and visibility mechanisms can become a liability that puts corporate and customer data at risk.

Which components are most important to your API developer programs?



According to our survey data, technology leaders recognize API performance analytics (26%) and API security and governance (23%) capabilities as the most critical components of a successful API program. Other important components include self-service capabilities for developers (16%), API monetization (15%), developer community forums (11%), and interactive documentation and API catalogs (9%).

How To Inject Intelligence With AI and ML

Among Apigee customers, anomaly detection, bot protection, and security analytics usage grew by 230% between September 2019 and September 2020.

While some aspects of API security and management are as straightforward as applying authentication mechanisms to control access or applying rate limits when API calls exceed a certain limit (such as during a DDoS attack), artificial intelligence (AI) and machine learning (ML) are emerging as important ways for organizations to bolster their API management and security capabilities. AI and ML can help teams predict API behavior, detect anomalies in real time, quickly identify security incidents, precisely diagnose the root cause behind performance and security alerts, and reduce [mean time to detect \(MTTD\)](#) disruptions. These technologies can also help ensure that APIs adhere to security and compliance requirements, and protect sensitive information from internal abuse.

With so many applications, it's no wonder that new, AI- and ML-powered API security and monitoring solutions are gaining widespread adoption to help companies detect and block malicious attacks. In fact, usage for anomaly detection, bot protection, and security analytics grew 230% year-over-year among Apigee customers between September 2019 and September 2020.

Anomaly detection, bot protection, and security analytics usage grew 230% compared to same time last year among Apigee customers

2020 230%▲

21.4

2019

6.5

Customer Story

Citrix enhances the performance and security of their APIs with AI-powered API Management

Summary: Citrix is among the Google Cloud customers using Apigee Advanced API Operations to proactively monitor the performance, availability, and security health of their APIs.

“By applying AI and ML models to our historical API data, these advanced features are able to alert us about scenarios we haven’t thought of,” says Adam Brancato, senior manager of customer apps at Citrix.

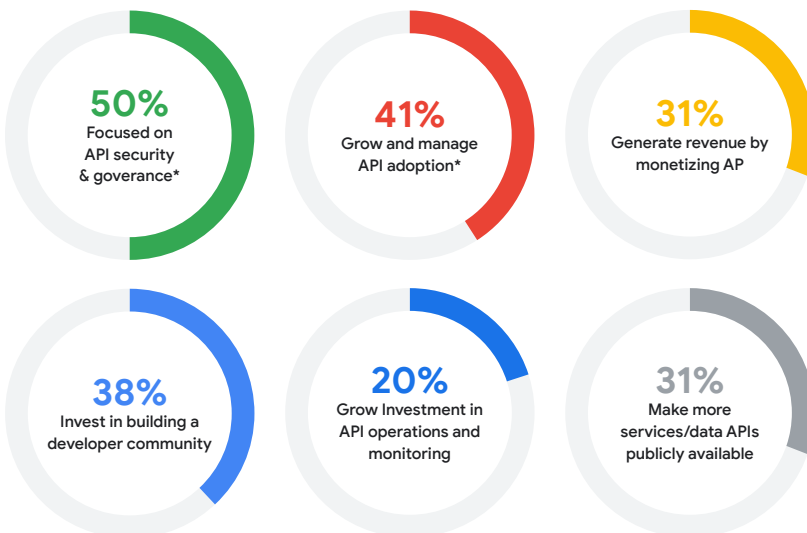
“Such automation capabilities significantly reduce our upfront efforts. And from a security perspective, these actionable insights help us ensure that our proxies are exposed only over secure HTTPs ports and adhere to compliance requirements. We’re also able to closely monitor user activity and quickly pull out reports during audits.”

Focus on 2021: Investment Priorities

Moving forward, high-maturity API organizations plan to focus on increased security and governance, growing API adoption, and building a developer community.

Looking to the future, our research indicates that businesses plan to increase investments in API programs, as well as to enhance security. Companies report that their key priorities for 2021 include a focus on API security and governance (50%), growth and management of API adoption (41%), investment in building a developer community (38%), generating revenue by monetizing APIs (31%), making more services and data publicly available (31%), and growing their investment in API operations and monitoring (20%).

Anticipated API Changes in the next 12 Months



Visibility and Security at Every Interaction

In a world of digital ecosystems and API-first applications, the traditional network firewall ceases to exist. One company's APIs will interact with those of another, and API calls will originate not only within the corporate network but also across desktops, smartphones, tablets, and even IoT devices around the world. With API-based transactions originating across a range of environments, enterprises need control over and visibility into each and every one.

Asia Pacific companies show high interest in building developer communities, driven largely by Australia and New Zealand (53%) and Indonesia (60%). In Europe, the Middle East, and Africa (EMEA), German companies are most likely to invest in developer communities (41%).

High-maturity organizations stand out with a greater than average focus on security and governance (59%), growing API adoption (48%), and building a developer community (49%).

To remain secure in a sprawling digital environment, enterprises should ensure they can control who accesses APIs while still providing self-service access and a friction-free experience. Remember: developers won't adopt APIs as readily if they have to go through laborious manual processes for access, but APIs that aren't secure are always an intolerable risk. These mandates must both be served. A starting point is managing APIs such that authentication is required for access and role-based access control can be applied. But robust management should also include machine learning-based monitoring for suspicious activity, actionable alerts to API administrators, and the ability to answer questions such as the following:

- Are there traffic anomalies, and if so, do they represent a surge in legitimate demand or an attack?
- How often do attacks occur?
- What are the latency rates and are they changing over time?
- What IP addresses are sending the requests, and where are they located?

Enterprises need to be able to address questions like these in near real-time. Without comprehensive control and visibility—and the informed actions that come from it—APIs cannot successfully perform as transformational business tools.

Indeed, as more businesses use software to automate security, more bad actors are leveraging automation themselves. Attacks from malicious bots, such as brute-force denial-of-service (DDoS) and distributed denial of service (DDoS) attacks, [are increasing](#).

For example, an attacker who has compromised an API key may deploy thousands of bots posing as people trying to buy products, log into loyalty accounts, or impact marketplace rankings and prices. To combat these attacks, companies must establish comprehensive visibility into API traffic, invest in scalable infrastructure that can automatically keep API-based services online when traffic (either legitimate or malicious) spikes, and implement policies like rate limits to stop bad actors before they get started. These precautions can help prevent unexpected activity from impacting the backend, and keep systems online when such attacks materialize.



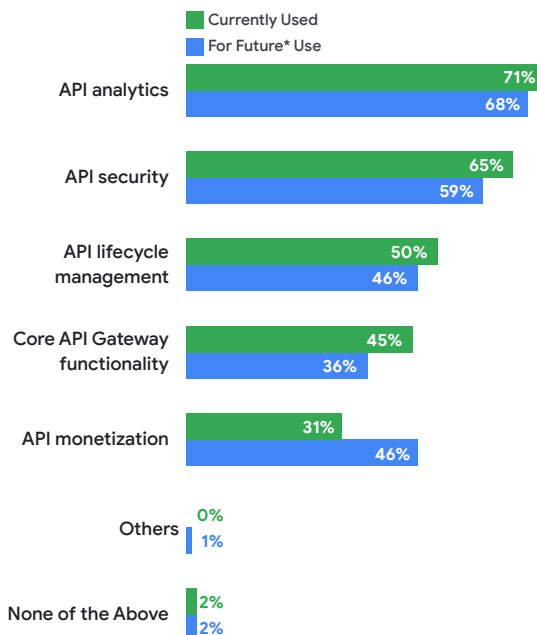
As risk increases with use, it's essential that businesses not only carefully manage their API keys, but also discern traffic patterns to identify when API calls are coming from legitimate users. Our research indicated a year-over-year 172% rise in abusive traffic, making the ability to analyze traffic in near-real time to detect and block suspicious behavior more crucial than ever to both enterprise security and digital transformation strategies.

Apigee customers reflect this increased emphasis on API security: their number of protection rules deployed more than doubled between September 2019 to September 2020.

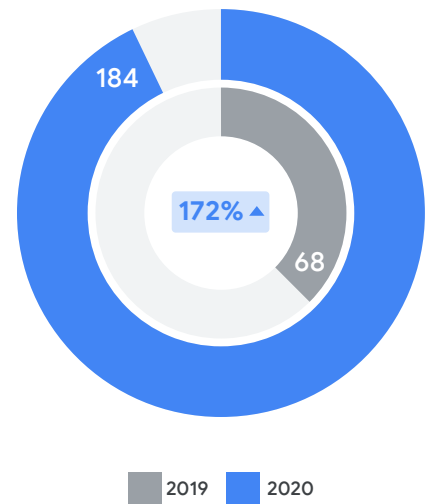
This increase in the implementation of protection rules indicates that Apigee customers are increasingly taking preventive measures to mitigate risks associated with abusive traffic.

Like API security, API analytics is among the top API management capabilities that enterprises value today. This should be no surprise, since in addition to providing insights that can impact the business, such as which APIs are attracting the most developers, analytics also play a role in identifying and removing security risks. Some 68% of respondents report API analytics is the top API management capability respondents plan to focus on in 2021.

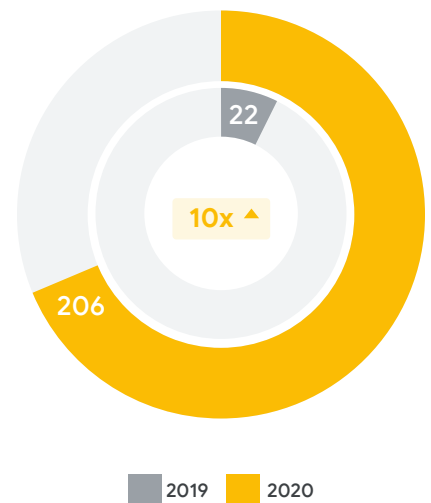
API Capabilities



Abusive traffic up 172% to 184M in Sep 2020



The number of protection rules deployed by Apigee customers more than doubled compared to last year



API Monetization

Some companies have functionality so valuable or data so rare that it might make more sense for the organization to sell access to its APIs. Only around one in three enterprises are monetizing APIs today, based on our research, but this is also the area of API management that organizations are most intent on ramping up: around half of enterprises in our sample plan to use API monetization capabilities in the next year.

API monetization can take two main forms: direct or indirect. Direct monetization, such as charging for different tiers of API access, can be a lucrative strategy for companies that own valuable data or functionality that is not easy for others to replicate.

For instance, the world's largest weather data company, AccuWeather, recently launched a self-service developer portal that operates as an online store for their API packages and as a hub for their external developer community. The inventory of monetized AccuWeather APIs spans a spectrum designed to fit different developer needs. For example, one paid option offers continuous updates in near-real time, while another free option offers more periodic updates for developers who want to keep traffic demands or costs low. Within 10 months of launch, the portal had attracted more than 24,000 developers, issued 11,000 API keys, and generated hundreds of paid package purchases. AccuWeather recognized the unique value of their data—and of easy access to it—and was able to directly monetize its APIs. At the same time, they were able to derive indirect value through a growing developer ecosystem around their services—leading to exposure in new markets as developers use their APIs in new ways.

However, indirect monetization can often be more lucrative.



For example, many companies open their store location APIs for free to third-party developers. With these APIs, third-party developers can enhance their apps with store location data, while their app users benefit from a more seamless experience by accessing the information they need. A developer might combine mapping APIs, restaurant location APIs, and restaurant ordering APIs so users can easily search for nearby restaurants, browse their menus, and place an order—all within the same interface. Though the company making the store location API freely available may not receive direct monetary value from their open API, they nonetheless reap indirect value in the form of broader ecosystem reach, increased customer engagement, and variety of ecosystem partners and participants.



Customer Story

APIs are speeding up the automotive marketplace

Summary: Cars.com shares research, inventory, pricing, and lead information for data-driven decision making, using Google Cloud's Apigee API Management Platform.

Cars.com connects auto buyers and sellers by sharing research, inventory, pricing, and lead information for data-driven decision making—and the online car marketplace has long been an important sales channel for the company. As the site grew, developers wanted to optimize how data was exposed and managed by employees and resellers. Cars.com [adopted Apigee](#) to share listing information through their mobile app, Salesforce platform, and third-party resellers. Apigee's intuitive and comprehensive developer resources helped the

Cars.com team simplify their data accessibility and streamline management workflows. As a purely digital platform, APIs play a fundamental role in keeping the company's wheels turning. APIs have helped Cars.com drive their data further by:

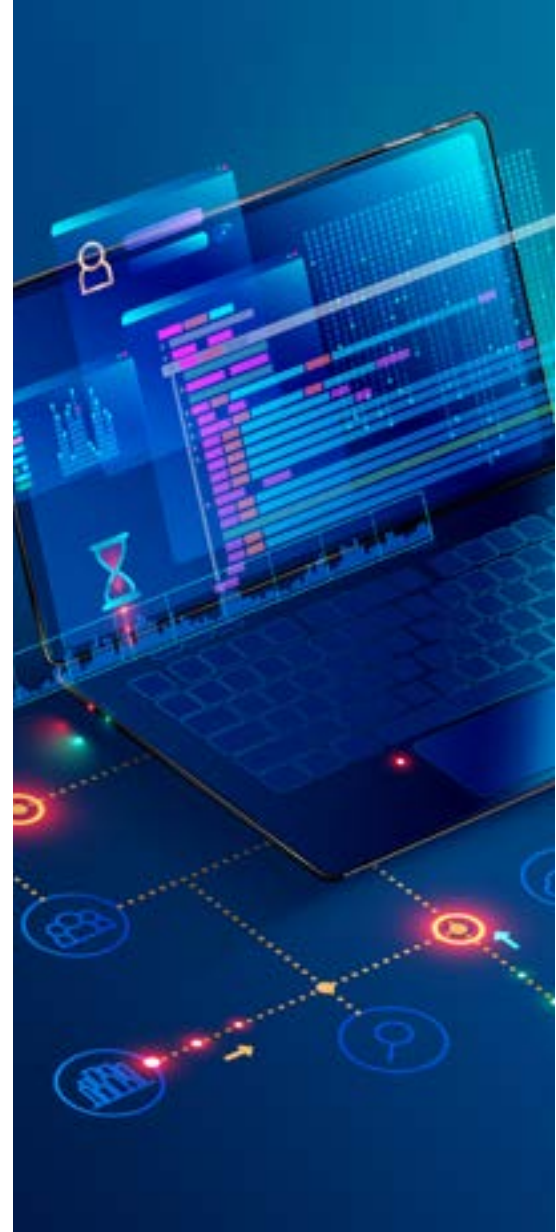
- Managing nearly **40M daily requests** via the Apigee platform
- **Improving visibility** into API calls for monitoring rate limits, throttling, and security
- **Enabling self-service reporting** for business users

In 2021, Control and Resiliency Will Rely on APIs and API Management

In 2020, API traffic and adoption of API-first strategies increased due to both the COVID-19 pandemic and ongoing technology-fueled changes across industries and markets.

This acceleration in API adoption reflects the power APIs offer to reimagine customer experiences and unlock new business opportunities, not only by empowering developers within an organization but also by letting organizations partner with outsiders more easily and at a greater scale than ever. Our research demonstrates increased investment in digital transformation writ large as well as in individual API management capabilities that let enterprises better leverage and protect their digital assets. Security and governance remain top-of-mind for our customers. Analytics—whether to uncover business insights, improve performance, or bolster security—is emerging as indispensable, particularly as AI and ML technologies open the door to faster, smarter discoveries. And after years of being a focus mostly for high-maturity digital companies, API monetization is poised to break into wider use. We are also seeing [increasing synergy between APIs and no-code development platforms](#), which further stretches the data and functionality that APIs make available, putting it into the hands of even non-technical “citizen developers.”

Even if 2021 proves no less disruptive than 2020, enterprises’ investments in digital transformation, and the API-first strategies that power it, offer control and resiliency. The digital ecosystems that customers prefer and around which commerce flows may change—and new business models may come to supplant old ones—but with well-designed APIs, enterprises can help ensure that they’re able to adapt their business from one disruption to the next.



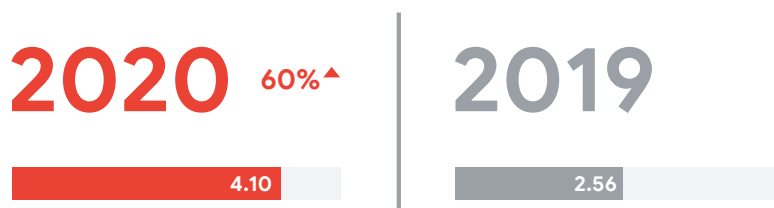
Why Google Cloud?

APIs and API management are foundational building blocks for driving API-led digital transformation for enterprises across the world. Apigee is Google Cloud's API management platform that gives businesses control over and visibility into the APIs that connect applications and data across the enterprise and across clouds. Apigee empowers organizations to accelerate their business by unlocking the value of data, driving internal efficiencies, and delivering modern applications.

Apigee is the platform for all of an enterprise's API initiatives, whether powering external experiences, enabling agility and speed for internal or external developers, or connecting internal applications and systems. With Apigee, businesses can quickly deliver the connected experiences, modernize applications and activate new business channels.

Today, tens of thousands of customers and millions of developers use Apigee to spur digital transformation with connected experiences, operational efficiency, and actionable intelligence. For the fifth time in a row, Gartner recognized [Google Cloud's Apigee as a Leader in the Magic Quadrant for Full Life Cycle API Management](#), positioned highest among all vendors for its ability to execute.

Developers grew 60%
to 4.1 million in 2020



Our customers are leveraging Apigee to engage and inspire millions of developers to build secure and scalable apps with their published APIs, and developer use grew 60% to 4.1 million developers between September 2019 and September 2020.

“Apigee allowed us to centralize a lot of the authentication, policies, throttling, scaling—the kind of things we wanted to be able to do, to expose APIs to our internal team—and it enabled us to expose those APIs to partners.”

— Shawn Gilmour, Director, Identity and Access Management, Autodesk

“At BrightInsight, we have successfully leveraged the Apigee API Management Platform to build thriving ecosystems of developers and partners [that] enable us to co-innovate with our leading biopharma and medtech customers to enable them to drive better patient outcomes.”

— Paul Schultz, Senior Director of Commercial Development, BrightInsight

Ready to learn more?

Visit cloud.google.com/apigee, or
connect with us directly at apigee@google.com.