SMARTBEAR

State of API Report 2016

A Global Survey Looking at the Growth, Opportunities, Challenges, & Processes for the API Industry in 2016

Preface

This survey was designed to establish benchmarks among API developers and consumers regarding the state of APIs in 2016. The following report will cover:

- API Technology and Tools
- API Development and Delivery
- API Quality and Performance
- API Consumption and Usage

Methodology

SmartBear Software conducted a global online survey over the course of two weeks during the month of January 2016. The findings presented are based upon the aggregated responses from over 2,300 software developers, testers, IT/operations professionals, and business leaders representing more than 50 different industries and 104 different countries around the globe.

Content

I. Top Level Takeaways 4

II. Current Trends and Future Possibilities 9

a. Growth of the API space 10

b. Future opportunities 14

c. API consumption 17

III. API Development & Delivery 21

a. Delivery models 22

b. Documentation 24

c. Measuring success 25

IV. API Quality & Performance 26

a. Focus on API quality 27

b. Quality challenges 30

c. Consumer expectations 34

V. Demographic & Firmographic Data 36

1 Rapid Growth of the API Industry Accelerates Even More with Mobile & IoT Expected to Drive Future Growth

While many organizations have been developing and integrating with APIs for more than a decade, a significant number of respondents say they only began providing APIs in the last couple years.

- 42.1% of API providers have been providing/developing APIs for six years or more, while 51.5% began developing APIs in the last five years.
- One in five API providers (20.3%) only began developing APIs within the last two years.

Looking to the future, there are two standout technologies that are expected to drive the most growth for the API industry in the coming years – Mobile and the Internet of Things (IoT).

- 54.1% of API providers say mobile is the technology that will drive the most growth in the API industry over the new two years. (63.4% of API providers already support mobile.)
- 44.4% of respondents say IoT will drive the most API growth in the next two years. (20.6% of API providers already support IoT.)

2 Improved Integration Drives Decision Making as Lack of Integration Between Existing Tools Holds Teams Back

Integration is a key challenge for the API industry at large in 2016. While teams strive to provide high quality APIs, they are held back by the lack of integrations between tools and systems.

- Integrations are the #2 technology challenge teams want to see solved; 39% of respondents say *easier integration between tools* is the biggest technology challenge they hope to see solved.
- Integrations are the #2 obstacle teams face when developing high quality APIs; 38.5% of respondents say *lack of integration between tools/systems* is the biggest obstacle they face.
- Integrations are the #1 factor respondents look for when selecting an API tool; 41.4% of respondents say *integrations with existing tools* is the number one thing they look at.
- Integrations are the #3 technology area expected to drive the most growth API growth in the next two years; 28.2% of respondents say *enterprise integration* will drive the most API growth.

3 Organizations Understand the Need for API Security and Want to See the Security Challenge Solved in the Years Ahead

In today's connected world — where information is being shared via APIs to external stakeholders and within internal teams — security is a top concern. API security is the single biggest challenge organizations want to see solve in the years ahead, and solving the security challenge is expected to be a catalyst for growth in the API world. Despite these facts, API providers that are using a tool to test API security remain in the minority.

- Security is the #1 technology challenge teams want to see solved; 41.2% of respondents say security is the biggest API technology challenge they hope to see solved.
- Security is the #4 technology area expected to drive the most API growth in the next two years; 24% of API providers say digital security will drive the most API growth in the next two years.
- 40.4% of API providers are currently utilizing a tool for testing API security.

4 API Performance is Paramount — For Both Providers and Consumers

When it comes to measuring the success of an API, providers and consumers agree — performance is paramount. Before key business metrics like new subscribers, revenue, or retention, API providers are looking at performance as the metric that matters most when determining the success of an API.

Consumers agree, as API performance is ranked among the top characteristics they need in an API.

- Performance is the #1 way API providers measure the success of their API; 3 in 4 API providers (74.5%) say performance is the best measure of success for their API. Comparatively, less than 1 in 4 (23.3%) say monetization is the best measure of success.
- The top three most important characteristics API consumers want in an API are: 1) Ease of Use (37.8%), 2) Responsiveness/Performance (36.7%), and 3) Service Reliability/Uptime (35.8%).

5 API Providers Struggle to Balance Speed of Delivery and API Quality

API quality is a top concern for organizations, with a majority of respondents reporting that API quality is something that they believe is either very important or extremely important. But while API quality is a top priority, the need to move faster and deliver quicker is putting pressue on development teams, making it difficult to maintain quality.

- 84.5% of respondents say that API quality is either very important (43.2%) or extremely important (41.3%) to their organization. (Less than 1% of respondents say that API quality is not important at all.)
- The increased demand for speed of delivery is the #1 obstacle to maintaining API quality, with 39.2% of respondents citing speed of delivery as a top challenge.

6 API Providers Face Losing Users/Customers as a Result of Quality Issues

API providers understand that consumers have high standards for the quality and performance of their APIs and know the risks of not meeting those expectations.

- Loss of customers is the #1 potential risk of poor API quality; 43% of API providers believe that a potential loss of customers is the greatest potential risk. Damaging company/brand reputation is the #2 biggest risk, according to 35.5% of respondents.
- One-third of API consumers (33.4%) will consider switching API providers permanently upon encountering an API quality issue; 31% will report the problem externally (i.e. peers, customers, partners).
- Less than 10% of API issues are resolved within 24 hours.
- Nearly 1-in-4 API quality issues (23.9%) will remain unresolved for one week or more.
- The #1 barrier to resolving API quality issues is determining the root cause (45.2%), followed by isolating the API as being the cause of the issue (29%).

7 The Demand for Efficient, Easy-to-Use Tools Increases as Teams Try to Manage Limitations on Time, Resources, and Skills

As teams continue to move faster and struggle to balance the demands of speed and quality, they are also faced with constraints on time, resources, and internal knowledge.

- Nearly one-third of respondents (32.7%) say that lack of time and/or resources due to workload is one of the biggest barrier to delivering high quality APIs.
- Lack of internal knowledge, experience, or skills (32%) and complexity of existing tools (28%) were also cited as top challenges by organizations looking to deliver high quality APIs.
- For 39% of respondents, re-usability of tests/scripts/resources is the number one thing they look for when selecting an API tool. Re-usability is the #1 thing that testers look for when evaluating tools, according to 55.9% of testers.
- Ease of use (36%), ease of implementation (33.6%), and learning curve (18.1%) were also major considerations when selecting an API tool.

8 The Lines Between Teams Blur as Developers, Testers, and IT/Operations Are Involved Throughout the Entire API Lifecycle

The API industry is experiencing a shift away from teams working in silos, to cross-functional team members sharing responsibilities and getting involved throughout the API lifecycle. The continued movement to the left, with testers getting involved earlier in the testing process, is just one example of how responsibilities throughout the delivery process are changing. With nearly three-quarters of teams now embracing agile, and a growing percent adopting continuous integration, continuous delivery, and DevOps, responsibilities will continue to shift.

- Nearly 3 in 4 teams are now using an agile approach to software development (74.6%); less than 1 in 4 are using waterfall (23.7%).
- 37.8% of respondents are currently employing continuous integration, 27% are using continuous integration, and 25.4% have adopted DevOps.

9 Teams Understand the Need for Standardization but Face Challenges When Implementing Key Components

Standardization is still seen as a challenge for API developers. In fact, a quarter of providers believe it is the biggest challenge they'd like to see the industry solve in the coming years. But while standardization is a challenge teams want solved, many are slow to prioritize key components, like a developer documentation process.

And a significant percentage of providers that do have a formal developer documentation process admit that it is not a priority for their teams.

- 1 in 4 API respondents cited standardization as the top technology challenge they want the API industry to solve in the coming years. Standardization was the #3 technology challenge respondents want to see solved.
- Nearly 75% of API providers have a formal API developer documentation process, but only 45.6% say that it is a priority for their team.
- A quarter of API providers (25.3%) say they either do not have, or are unaware of their team's API developer documentation process.

"Our API is the backbone of our business. It enables us to interact with hundreds of different systems and allows our customers and community to build on top of the PagerDuty platform."

Ryan Hoskin,
Director, Customer Advocacy & Support , PagerDuty

II. Current Trends and Future Possibilities

The API industry is evolving in 2016. In section 1, we look at how the industry is growing, the factors that are driving that growth, and the challenges that will define the API industry in the years ahead.

Highlights

- 1 in 5 API providers began providing APIs within the last two years.
- Nearly two-thirds of API providers support mobile; 1 in 5 support IoT.
- Nearly three-quarters of API providers deliver both internal and external APIs.
- Mobile, IoT, enterprise integrations, digital security, and Microservices are the top five technology areas expected to be key drivers of future growth.
- Security, easier integration between tools, and standardization are the top three API technology challenges respondents want to see solved.
- Integrations, re-usability of tests/scripts/resources, and ease-of-use are the top three most important factors teams consi er when evaluating API tools.
- Organizations depend on APIs to enhance interoperation between internal teams and tools, extend product functionality, and reduce development time.
- Ease-of-use, performance, and service reliability/uptime are the most important characteristics consumers want in an API.

1 in 5 API providers began providing within the last two years

How long has your organization been providing/developing APIs?

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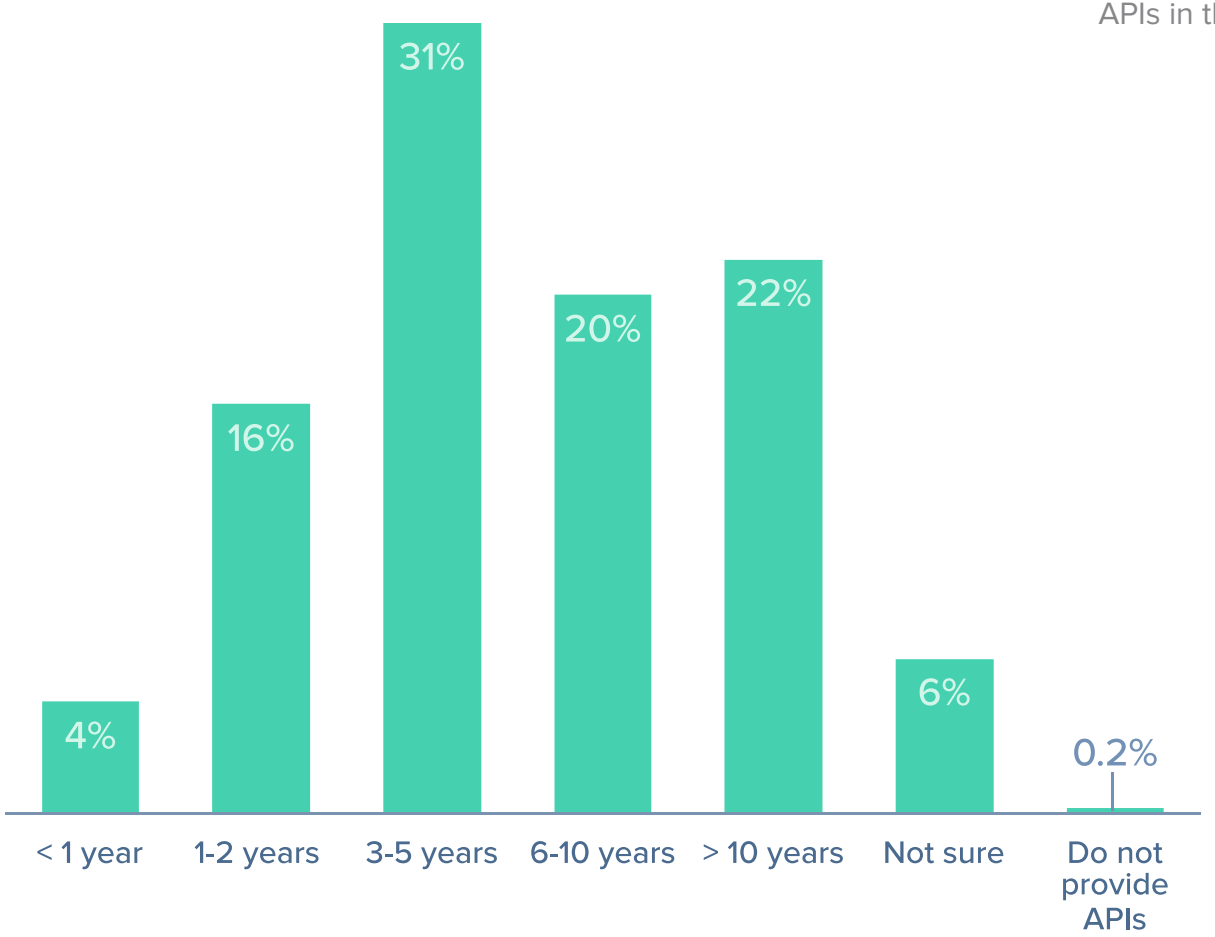

While organizations have been developing and integrating with APIs for a while, our survey found that a majority of API providers began developing APIs within the last five years.

Furthermore, of those API providers that began developing APIs in the last five years, 1 in 5 began developing APIs in the last two years alone.

"APIs are popping up everywhere. Want to add a shopping cart? API. Want to look up an address? API. Want to handle a chat window? API. But take a deep breath first. You've still got to test them. You have to make sure they deliver what you need them to do, that they perform under load and that they operate securely and that means testing."

-Andrew Fullen,
Studio Manager, Sogeti UK

Nearly three-quarters of organizations provide both internal and external APIs

A majority of respondents that provide APIs do so for both internal and external audiences. Serving these different audiences comes with their own set of challenges and opportunities for API providers. As we look at the API industry and attempt to measure the number of APIs that are being developed, it's important to understand that a large percentage of APIs are being developed for internal purposes. And even those organizations that provide external APIs rely on APIs to connect internal systems and to power their applications.

"Whether they're employed internally, externally or both, APIs are vital assets that connect systems, streamline workflows and make every type of integration possible. In fact, beyond strengthening operational efficiency and enabling cross-system communication, APIs now serve as competitive differentiators for many organizations."

-Robert Schneider,
Senior Consultant and Trainer, WiseClouds

What audience(s) do your APIs serve?

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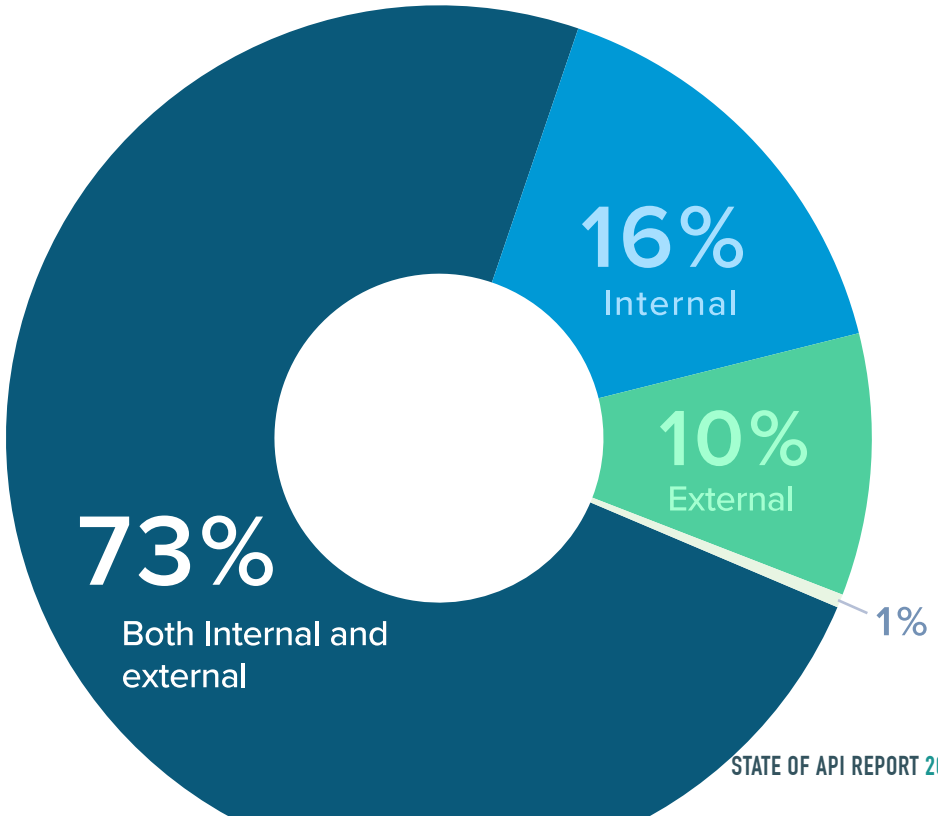
- Both internal and external only
- Internal only
- External only
- Other



Nearly two-thirds of API providers support mobile; 1 in 5 support IoT

Web and mobile are the top platforms supported by APIs. While smaller in size compared to more prominent platforms like web and mobile, as well as desktop and automation scripts, IoT is also being supported by 1 in 5 API providers, showing that the newer technology is already playing a sizeable role in the API industry.

"My customers are continuing to develop new APIs this year as the next step in their digital strategy of unbundling and productizing their business and technical capabilities. The result is a more modularized enterprise that is prepared to deliver new user experiences across a variety of applications and devices."

-James Higginbotham,
Executive API Consultant, LaunchAny

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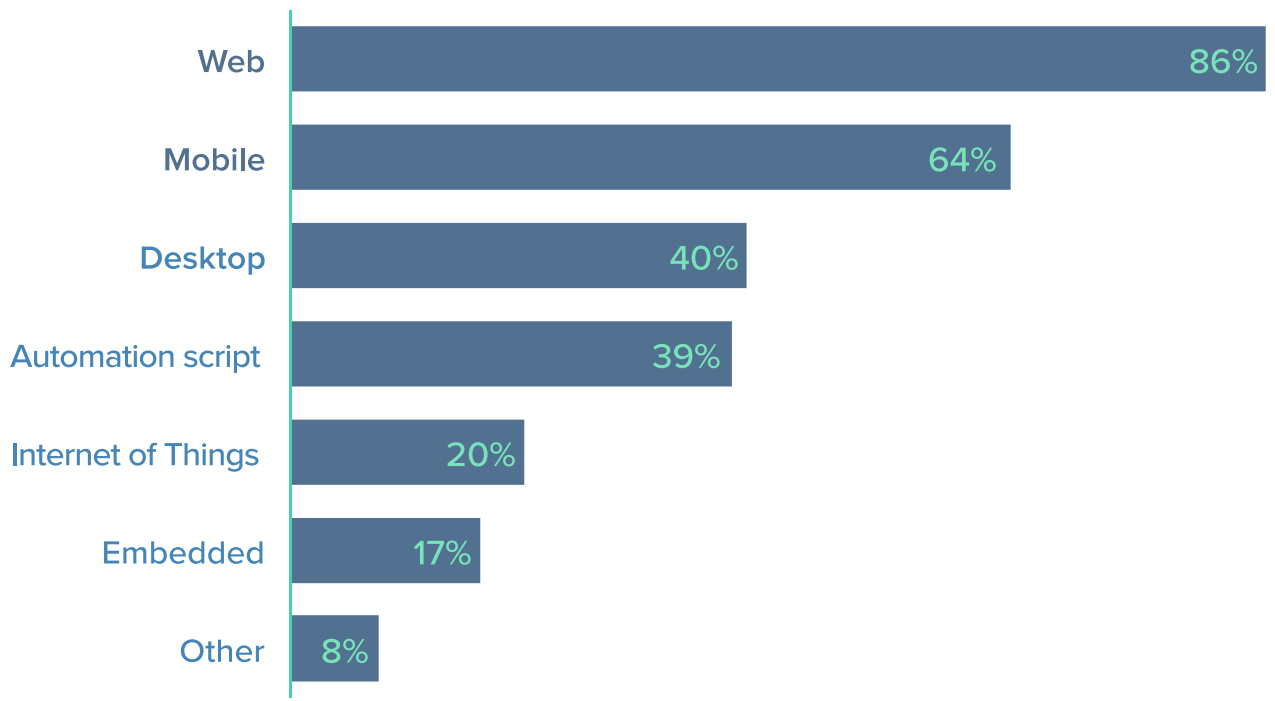
Which experiences do your APIs support?



Mobile, IoT, and enterprise integrations will be key drivers of future growth

In your opinion, which of these technology areas do you expect will drive the most API growth in the next two years?

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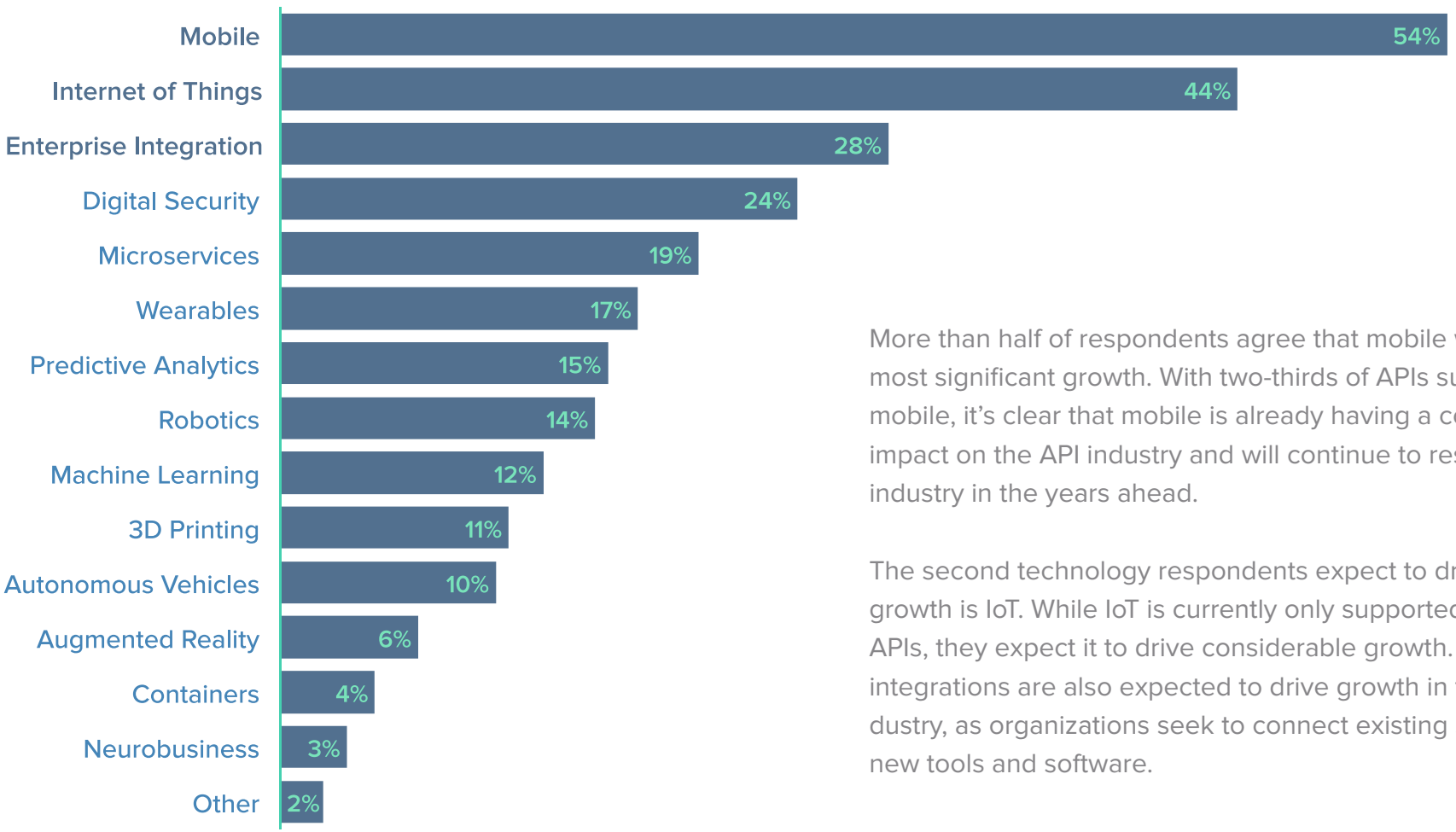

More than half of respondents agree that mobile will drive the most significant growth. With two-thirds of APIs supporting mobile, it's clear that mobile is already having a considerable impact on the API industry and will continue to reshape the industry in the years ahead.

The second technology respondents expect to drive API growth is IoT. While IoT is currently only supported by 20% of APIs, they expect it to drive considerable growth. Enterprise integrations are also expected to drive growth in the API industry, as organizations seek to connect existing systems with new tools and software.

Security, easier integration, and standardization are the top API challenges organizations want to see solved.

The two biggest challenges that organizations want to see solved within the next two years are: security and improved integration. The focus on security is a top concern for both internal and external APIs, as organizations seek to secure their information and the information of external consumers.

Improved integration is looked at as both a potential driver of growth and an existing challenge in the API industry. Standardization, scalability, and reusability were also top challenges that organizations want to see solved.

Which API technology challenges do you most hope to see solved in the near future?

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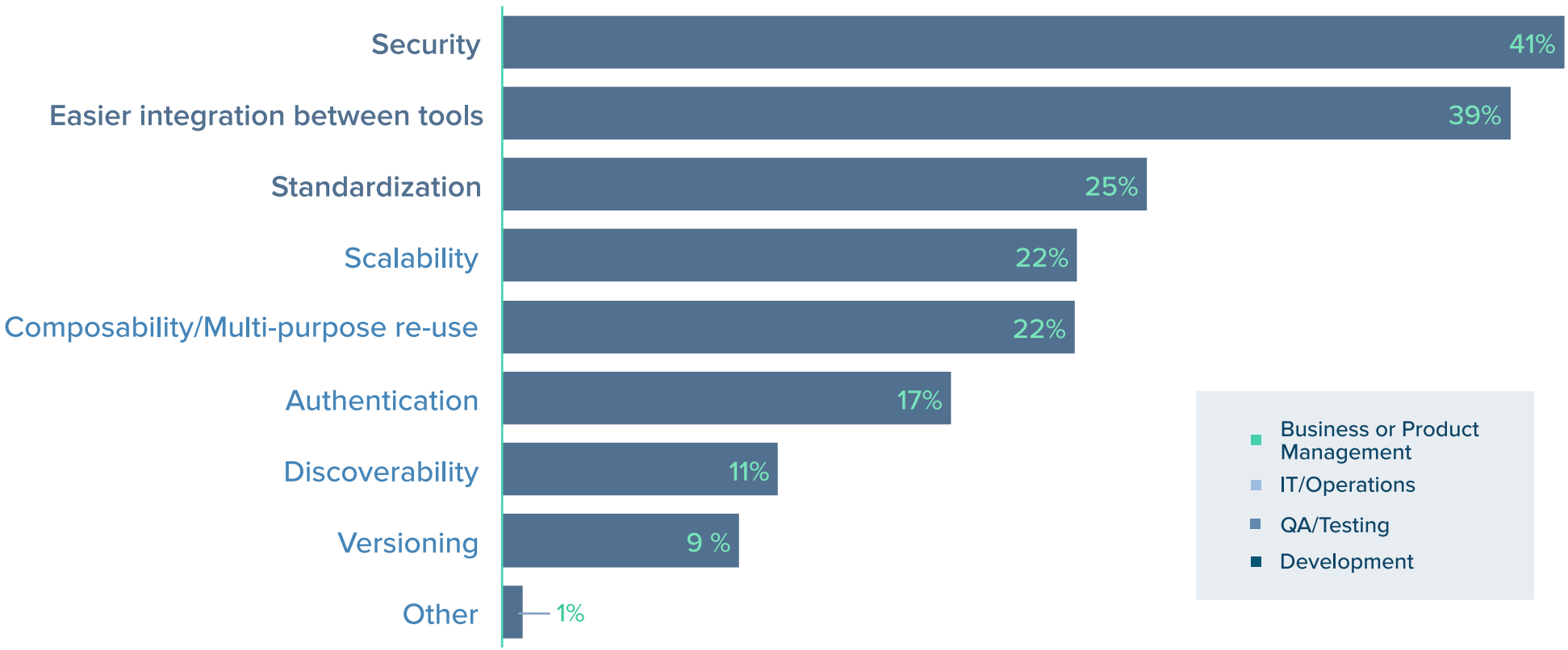
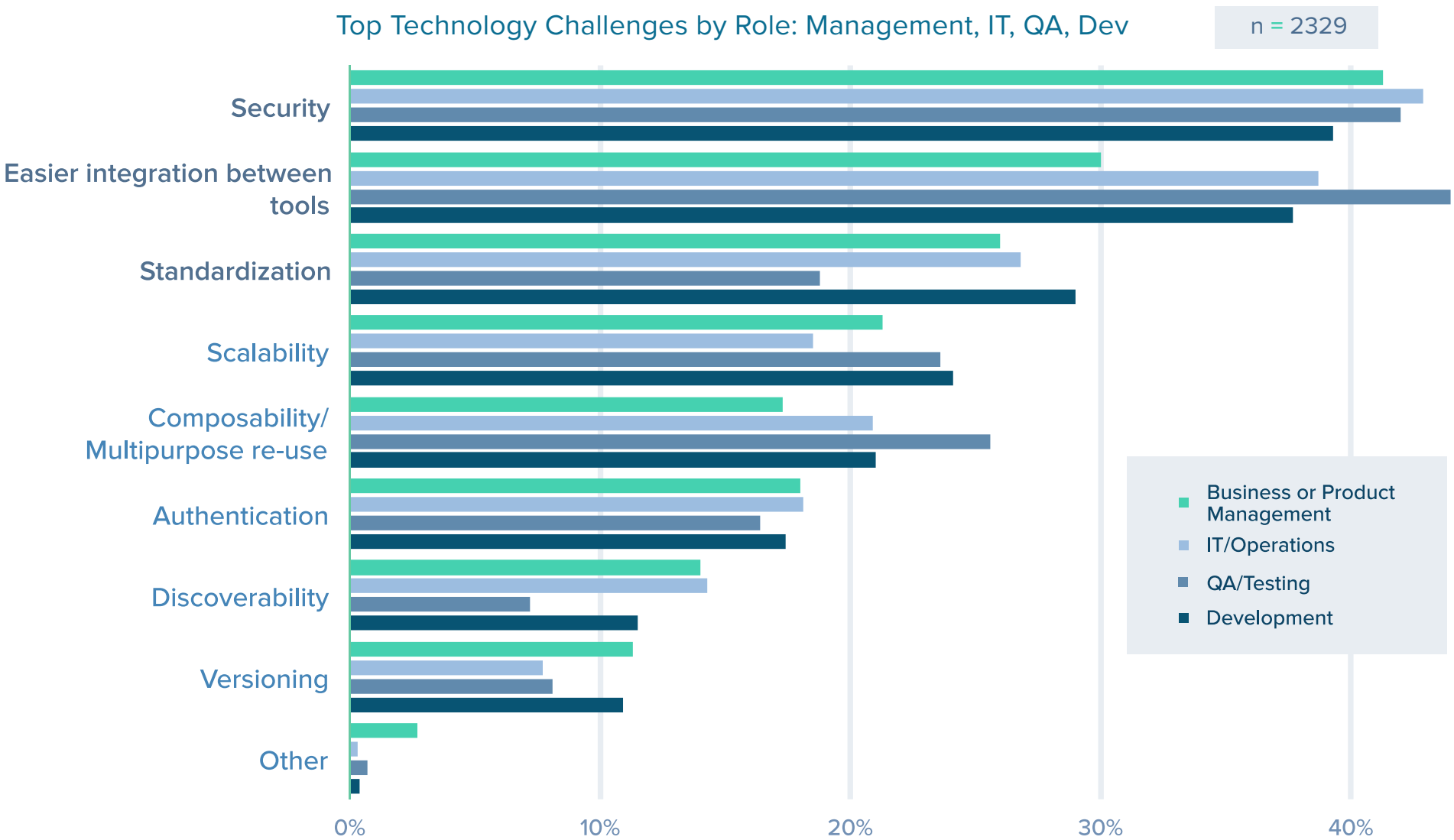


Security, easier integration, and standardization are the top API challenges organizations want to see solved.



Integrations, re-usability, and ease-of-use are the top factors teams consider when evaluating API tools

Teams want tools that easily integrate with existing systems and are easily to implement. They also want tools to improve efficiency by re-using tests, scripts, and resources.

Less than a third of API providers say that cost is the most important factor when evaluating APIs, and only 1 in 5 say that superior features/capabilities are their top consideration.

Which of the following factors are most important to you when evaluating API tools?

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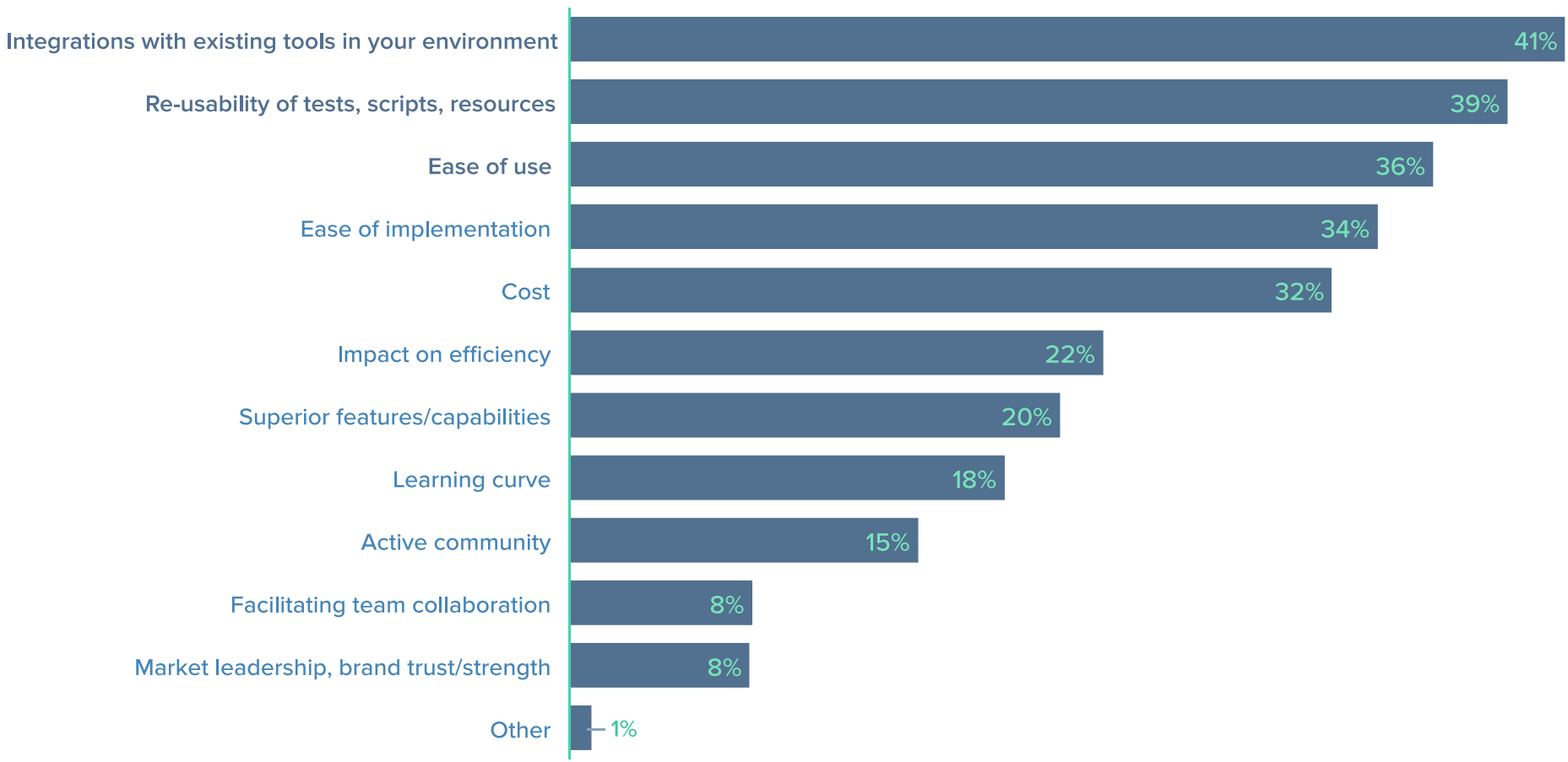

Top factors for evaluating API tools by role

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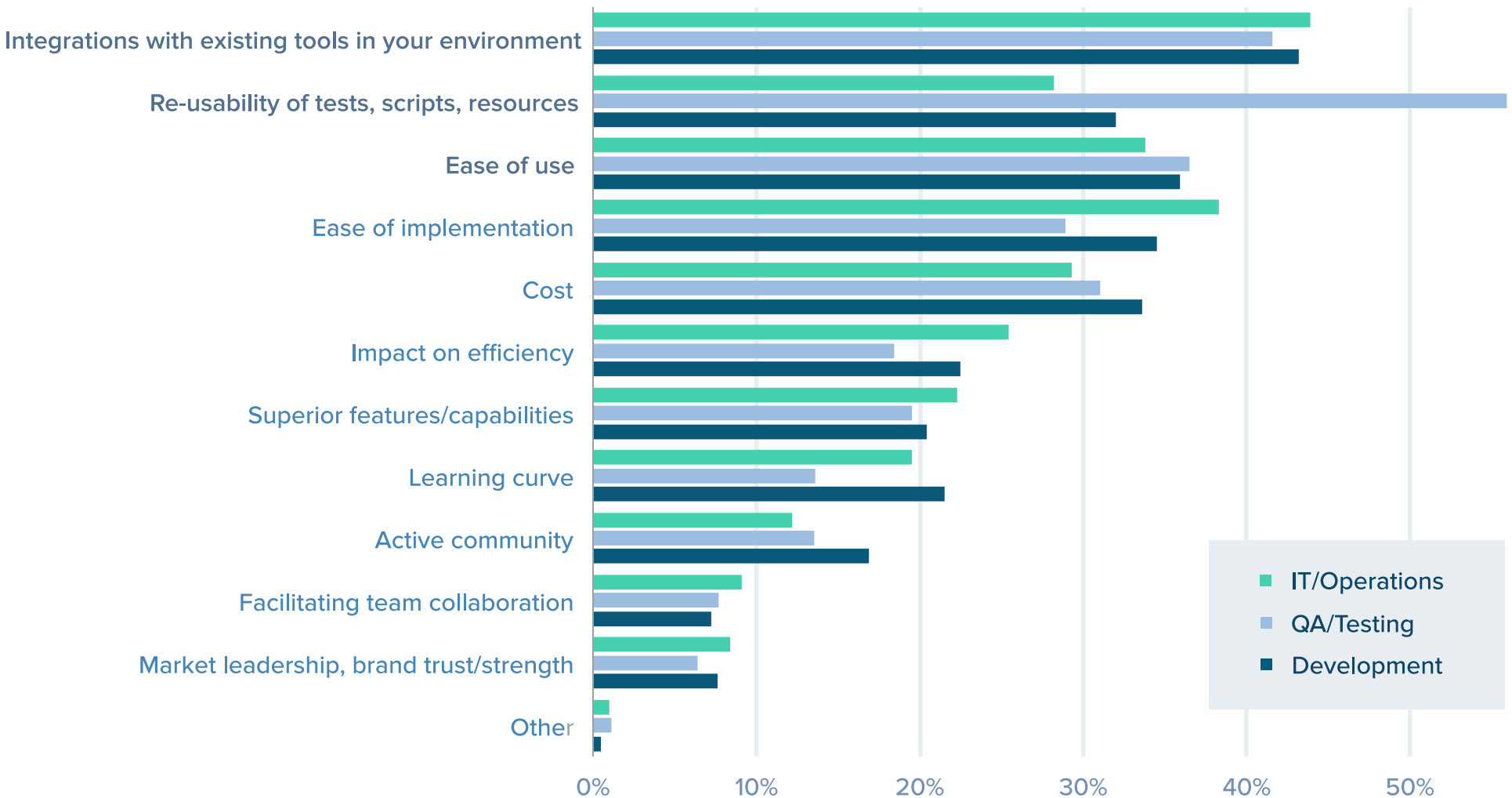
Which of the following factors are most important to you when evaluating API tools?



Organizations depend on APIs to enhance internal systems, extend product functionality, and reduce development time

The biggest use case for APIs is to better connect existing systems and to extend the functionality of a product or service. Similarly, APIs are being utilized to improve efficiency within organizations, by reducing development time and cost, while also reducing infrastructure overhead. APIs are also helping organizations better connect with third-parties through API-powered partnerships and the sharing of data/features from third-party products.

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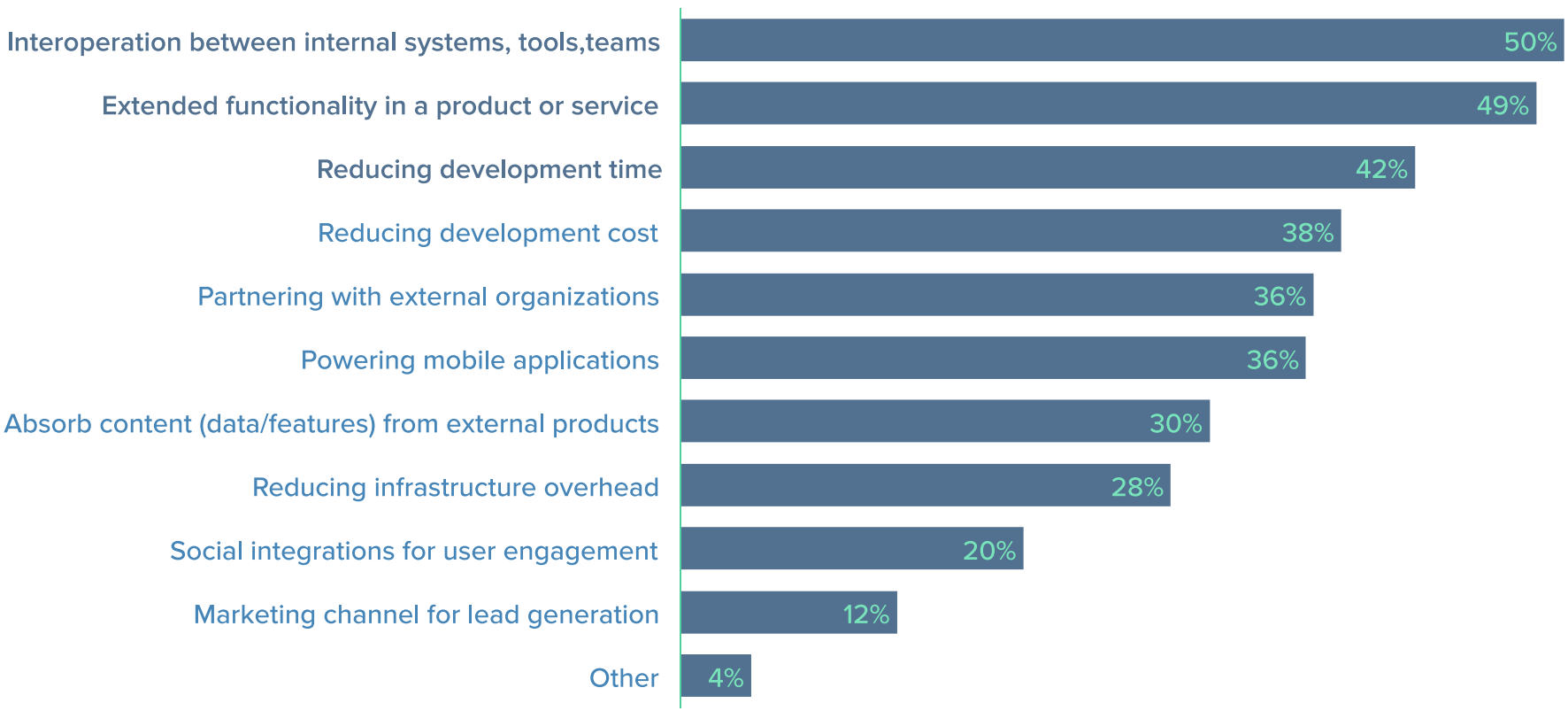
Why do you consume/use APIs?



API consumers value ease of use, performance, and service reliability when choosing an API

In your opinion, what are the top three most important characteristics you need in an API?

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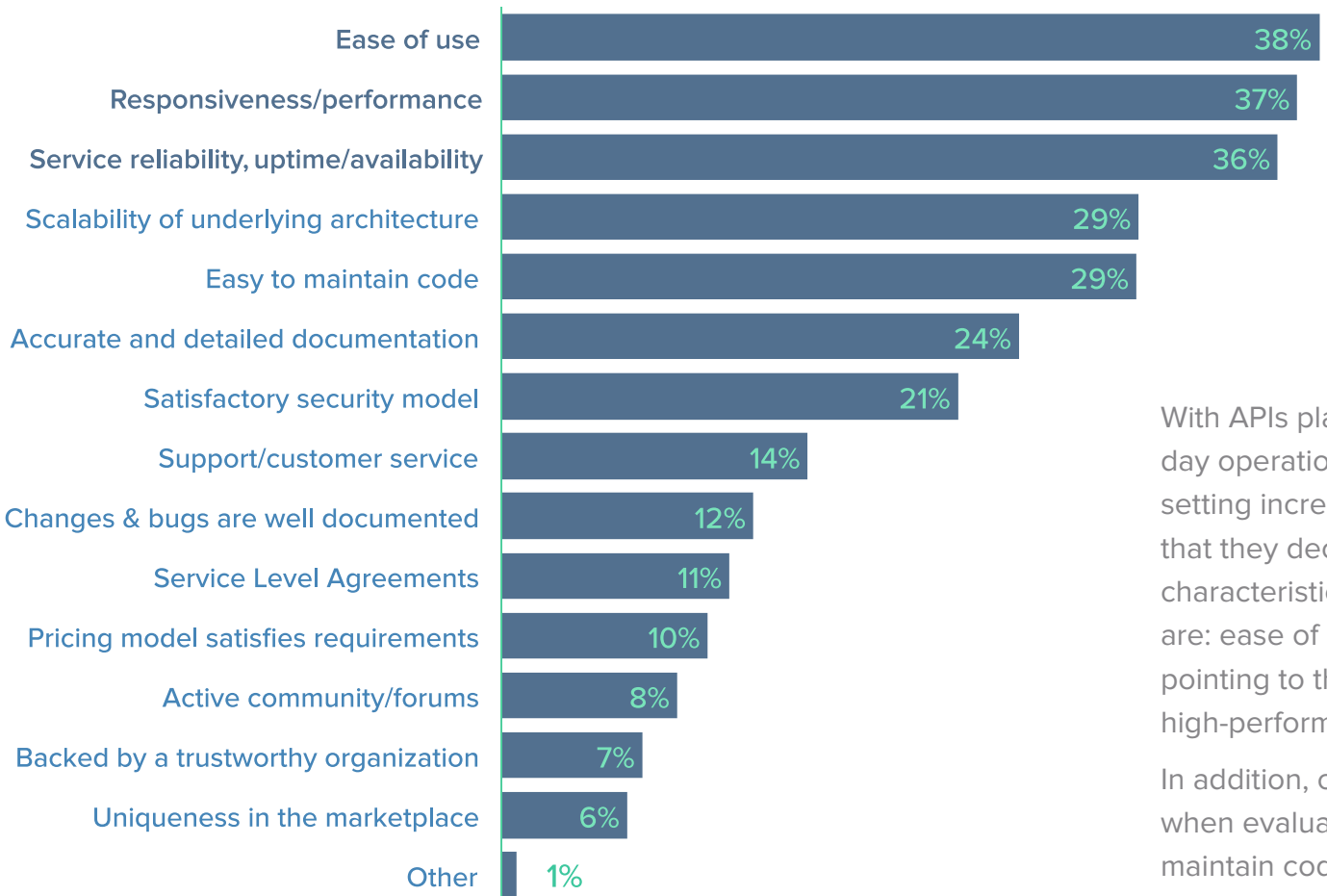

With APIs playing a critical role in the day-to-day operations of organizations, consumers are setting increasingly high standards for the APIs that they decide to integrate with. The top three characteristics consumers look for in an API are: ease of use, performance, and reliability – pointing to the increased focus on developing high-performing APIs.

In addition, consumers are thinking long-term when evaluating APIs, as scalability and easy to maintain code are also a top concern for nearly a third of API consumers.

Most important characteristics of an API: providers vs consumers

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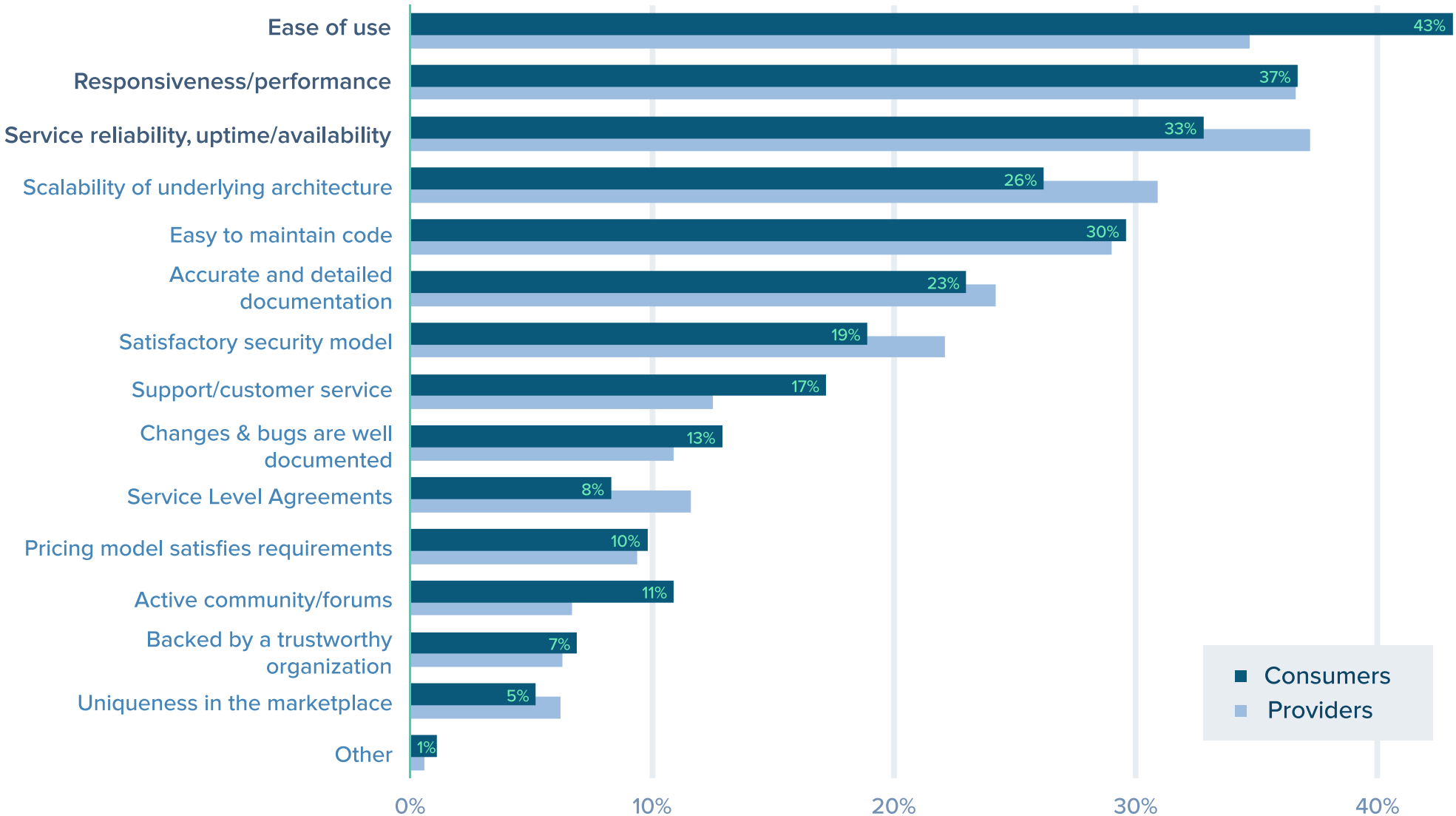

III. API Development & Delivery

The shift to agile, continuous integration and delivery, and DevOps models, and the rise of IoT, Microservices, and SOA are among the many modern trends causing significant changes across the software world. The API industry is no different. In section 2, we will look at how teams are developing and delivering APIs in 2016.

Highlights

- Three quarters of API teams are using Agile; less than 1-in-4 are using Waterfall.
- The responsibilities of team members are no longer defined by their core role.
- Nearly three-quarters of API teams have a formal documentation process, but less than half say it's a priority.
- Mobile, IoT, and enterprise integrations will be key drivers of future growth.
- Performance is the number one metric providers use to measure the success of their API, followed by uptime/availability.

API teams are adopting modern software delivery models

A majority of API teams are now embracing an agile approach to software development. Waterfall is still being used by a portion of teams but is outpaced by other delivery methods, including continuous integration (37.8%), continuous delivery (27%), and DevOps (25.4%).

Which software delivery methods does your organization employ?

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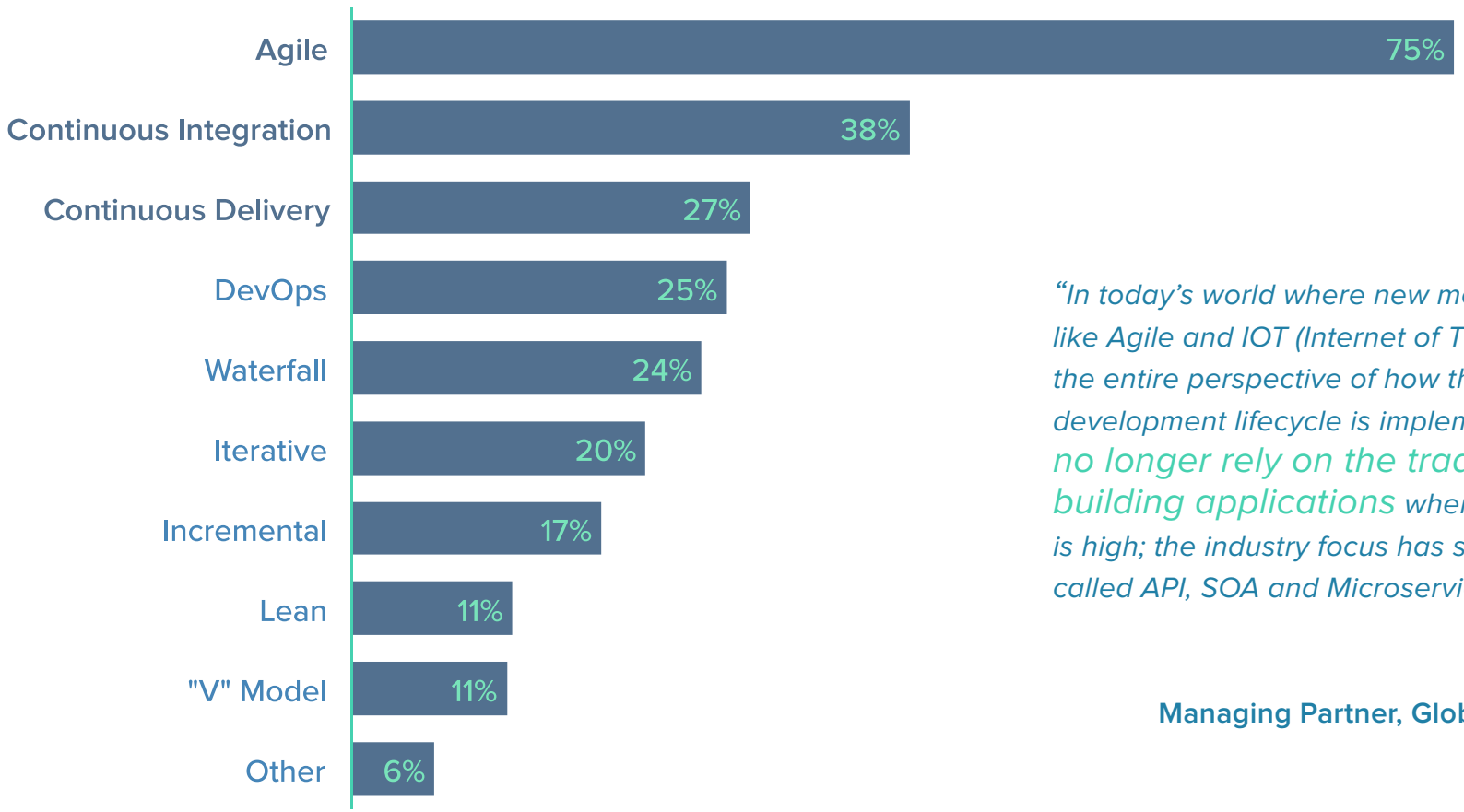

"In today's world where new methodologies, like Agile and IOT (Internet of Things), changed the entire perspective of how the software development lifecycle is implemented. We can no longer rely on the traditional way of building applications where the dependency is high; the industry focus has shifted to what is called API, SOA and Microservices."

-Sunil Seghal,
Managing Partner, Global Testing Practice

The responsibilities of team members are no longer defined by their traditional role

The roles and responsibilities of software teams are changing, as more teams adopt modern software delivery trends. Testing for example, is now being done across groups with testers, developers, and IT/operations folks, with varying skillsets, getting involved in the testing process. But as the chart below shows, these shared responsibilities spread across the entire lifecycle of developing and maintaining an API.

Which of the following API-related responsibilities are you involved in?

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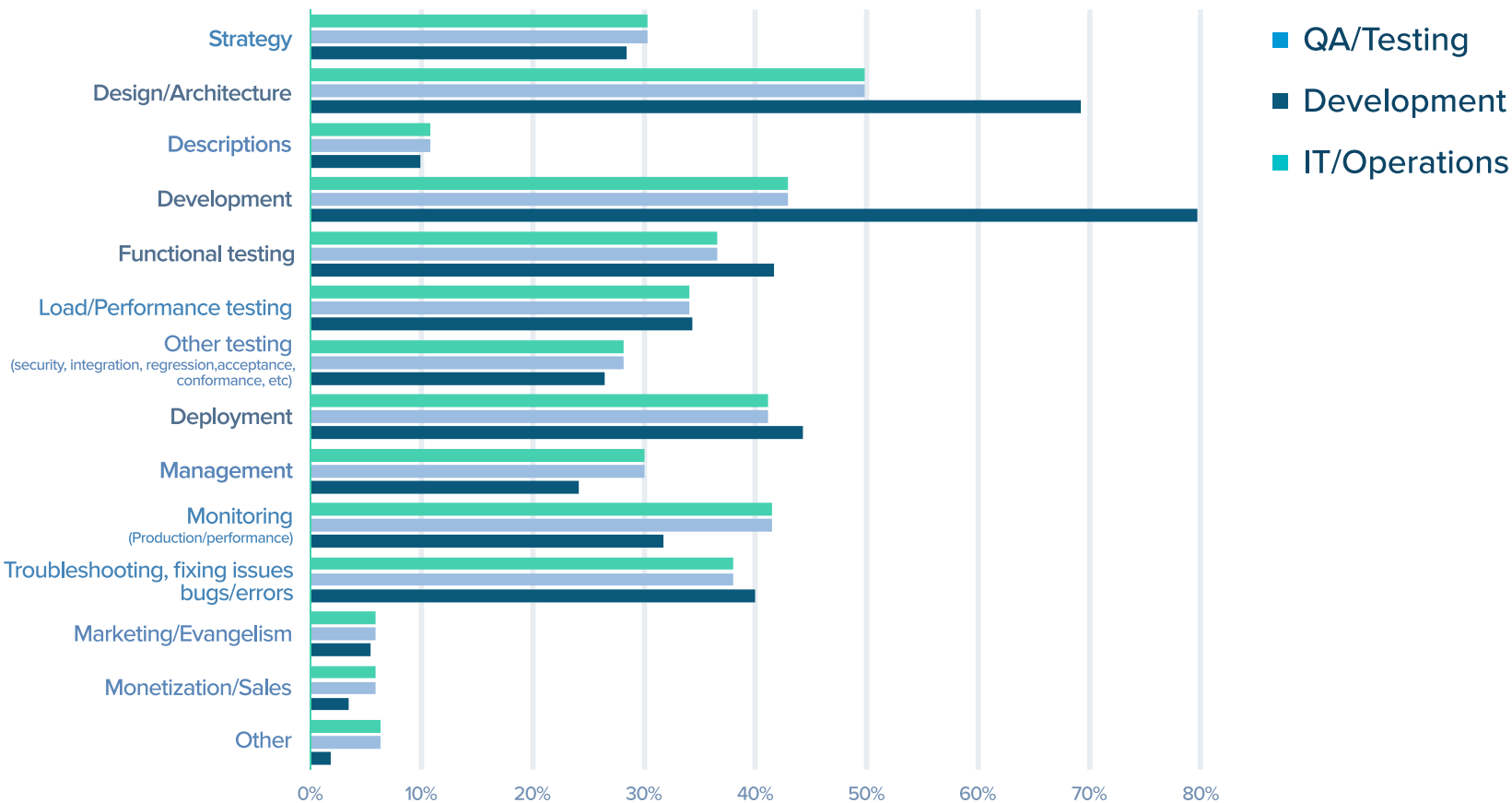

Nearly three-quarters of API teams have a formal documentation process, but less than half say it's a priority

Does your organization have a formal API developer documentation process?

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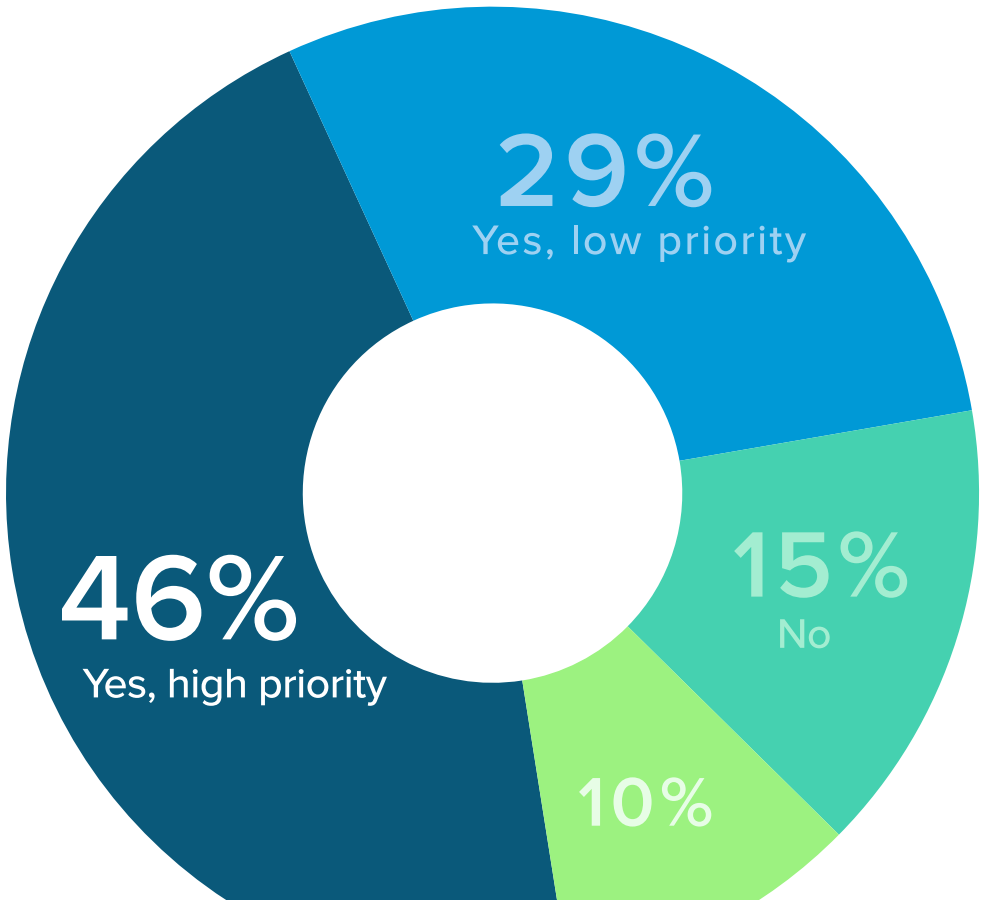

- Yes, developer documentation is a high priority
- Yes, but developer documentation is low priority
- No
- I am not sure

API teams understand the need for a formal documentation process, as a majority of teams say they have a process in place. But a quarter of teams either don't have an establish process or haven't effectively communicated the process within their team.

Performance is the number one metric providers use to measure the success of APIs

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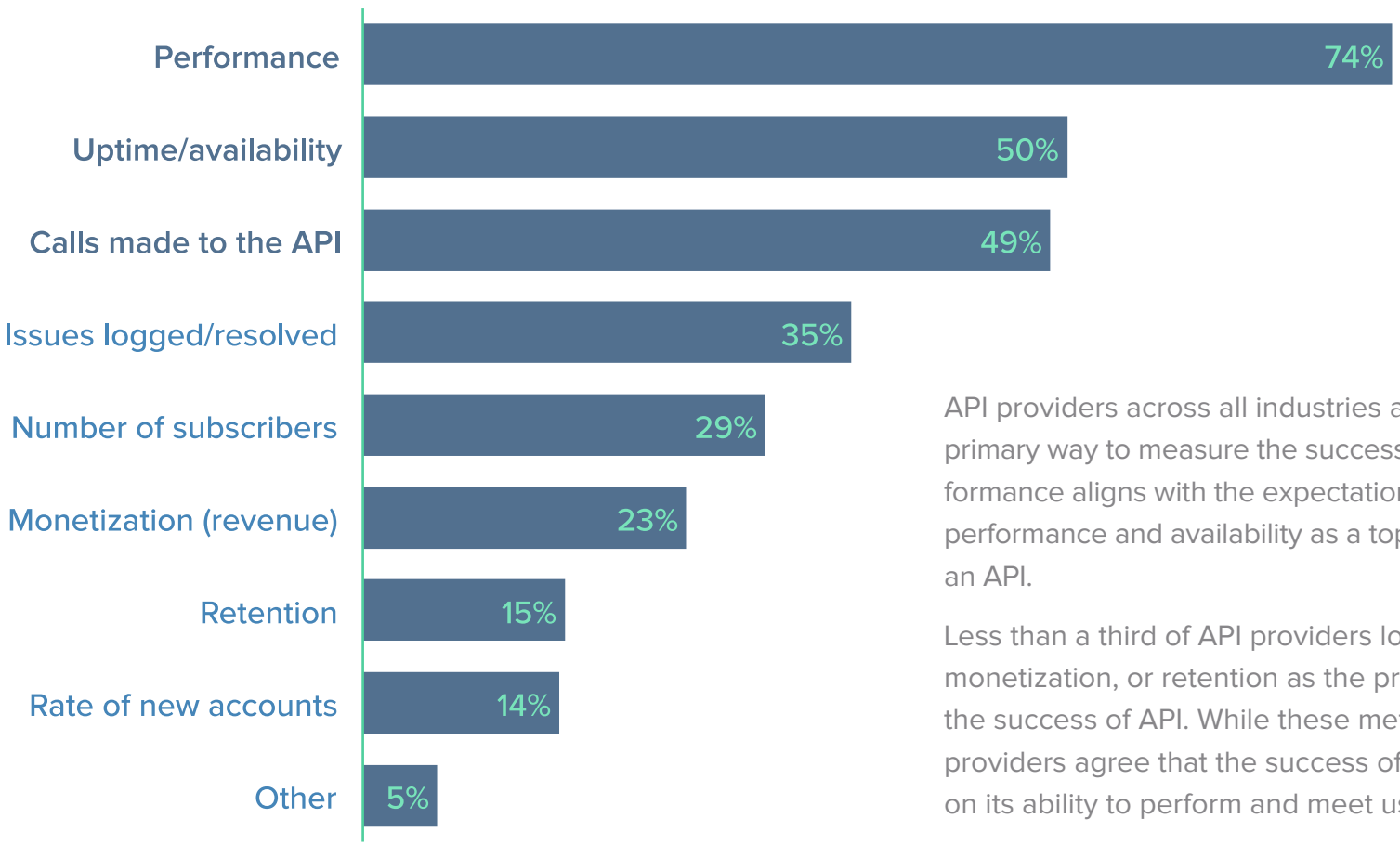
How do you measure success of your APIs?



API providers across all industries agree — performance is the primary way to measure the success of an API. The focus on performance aligns with the expectations of consumers, who look at performance and availability as a top concern when evaluating an API.

Less than a third of API providers look at number of subscribers, monetization, or retention as the primary method for measuring the success of API. While these metrics are critically important, providers agree that the success of an API will be dependent on its ability to perform and meet user expectations.

IV. API Quality & Performance

Building quality software and maintaining standards of performance are staples in the software world. But what does quality mean to the API industry and what happens when performance goals aren't met? In the third section of this report, we examine how organizations that deliver and consume APIs view quality and performance and the challenges that are preventing teams from achieving their goals.

Highlights

- API quality is a top priority/concern for API providers & consumers.
- Organizations are using an average of 4 different tools to ensure API quality and performance.
- Increased demand for speed of delivery and lack of integration between tools present the biggest challenges for delivering high quality APIs.
- Loss of users/customers and damaging brand reputation are viewed as the biggest risks of poor API quality.
- Less than 10% of API issues are resolved within 24 hours; 55% are resolved within a week.
- Determining root cause analysis presents the biggest obstacle for resolving API issues.
- One-third of consumers will consider permanently switching API providers upon encountering an API quality or performance issue.

The importance of API quality is understood across organizations and job functions

Organizations across industries agree that API quality is a top priority. Those that doubt the importance of developing quality APIs are in the extreme minority.

How important do you think API quality is to your organization?

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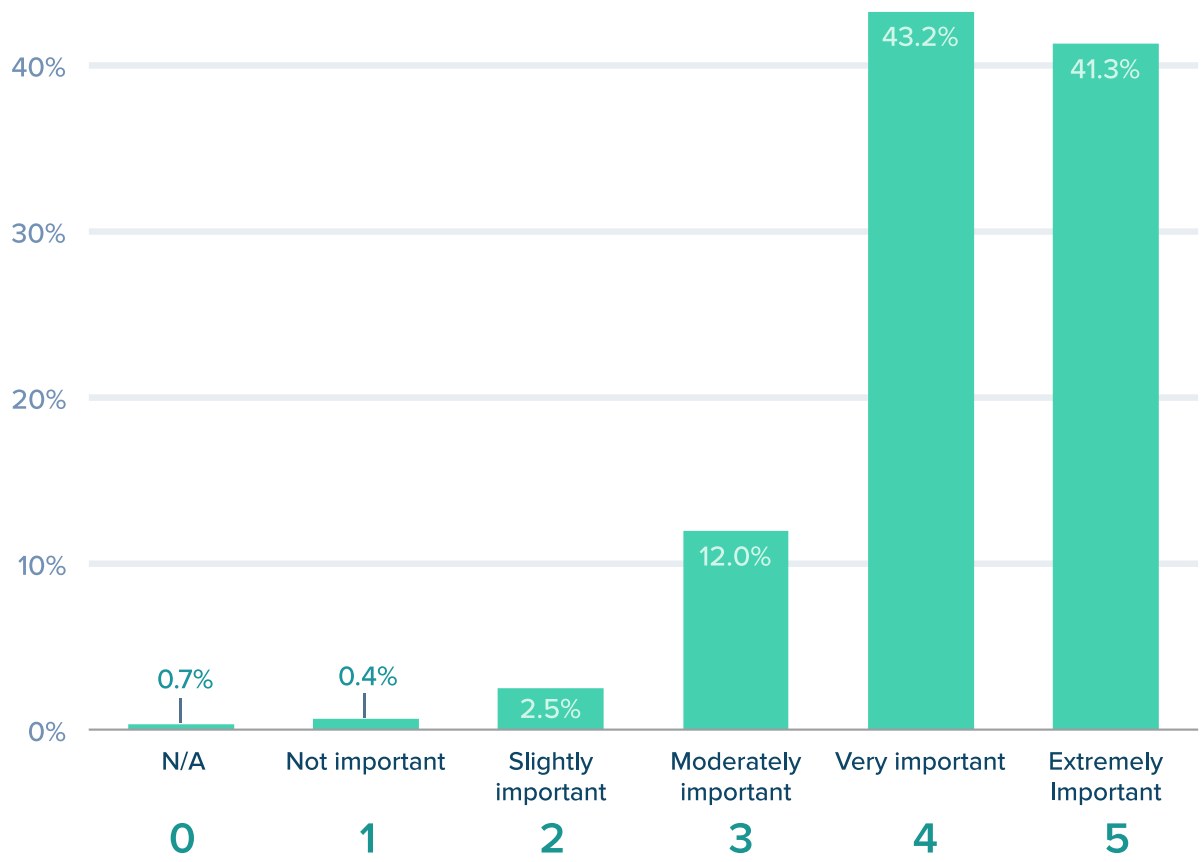

"API Quality is of utmost importance to our products. It is one of our building blocks for our software offering and is a crucial part of our foundation. In order to offer our customers a solution for success we depend on the people, tools, and process to ensure high quality deliverables."

Fred Kwan
Director of Software QA and Release Management, Trillium Software

Organizations are using an average of 4 different API quality tools

Testing is the primary focus for organizations looking to improve API quality. Functional testing, performance testing, unit testing, and performance monitoring are the top tools being used to ensure API quality across the API lifecycle.

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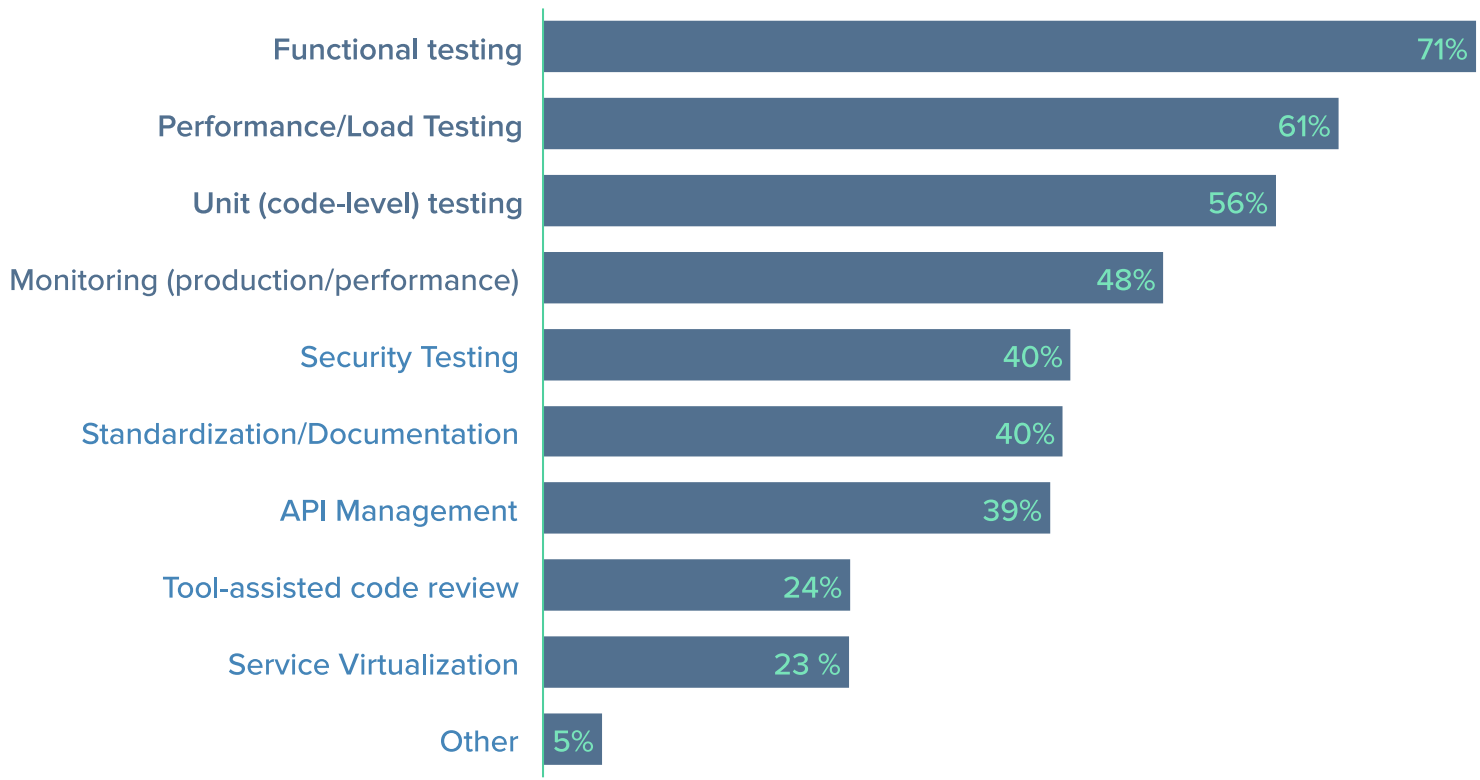
Which of the following tools does your organization utilize to deliver high quality APIs?



Teams Working to Ensure Quality and Performance Across the API Lifecycle

Which of the following API-related responsibilities are you involved in?

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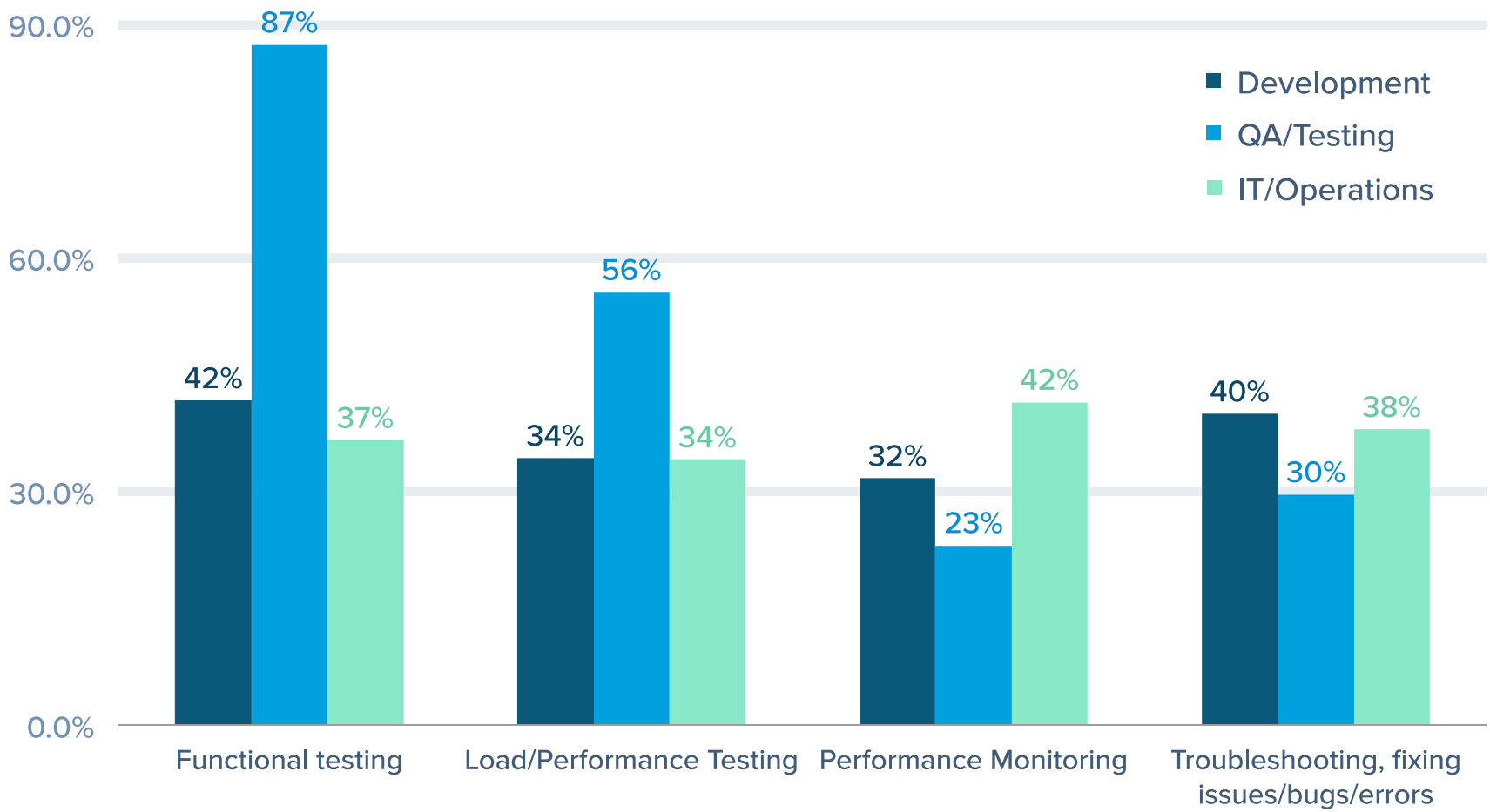

Speed of delivery and lack of integration present the biggest challenges for delivering high quality APIs

Dev, Test, and IT/Operations teams agree that the increased speed of delivery is the primary challenge for maintaining API quality. The increased pressure to speed up delivery is accompanied by a lack of integrations between tools and systems, and strains on resources due to increased workload.

Nearly one third of API providers also agree that a lack of knowledge, experience, and skills put the quality of APIs at risk.

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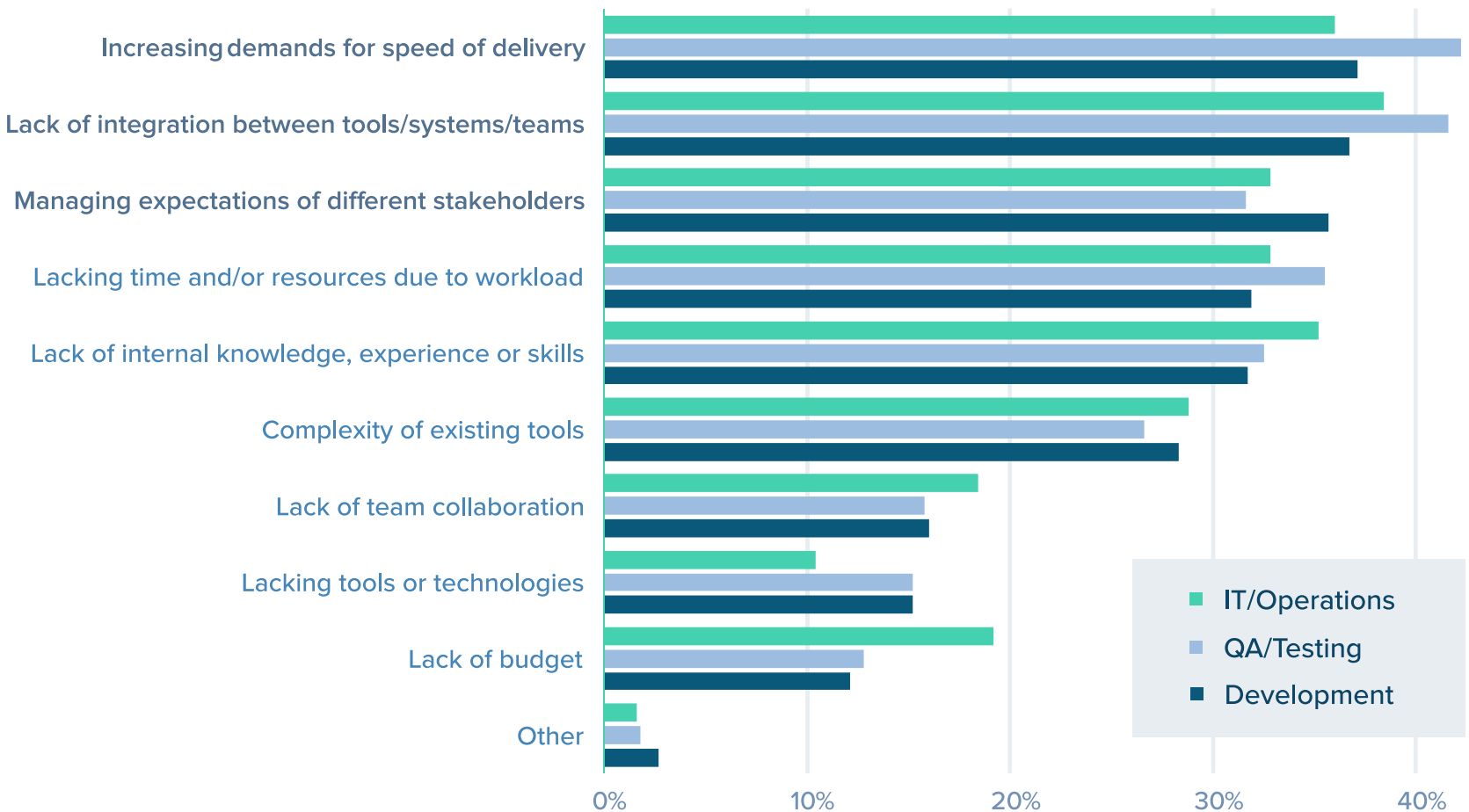
What do you think are the top challenges for delivering high quality APIs?



Loss of customers and brand reputation are viewed as the biggest risks of poor API quality

Loss of customers is a top concern when it comes to API quality. Teams understand that consumers have high expectations and are focused on providing quality APIs for that reason. Along with the loss of customers, teams express concern over how poor API quality can hurt productivity and take up time/resources. As demonstrated throughout this report, increased speed of delivery and concerns over available time and resources are top concerns for organizations that provide APIs.

What would you consider to be the greatest potential risks of poor quality APIs to your organization?

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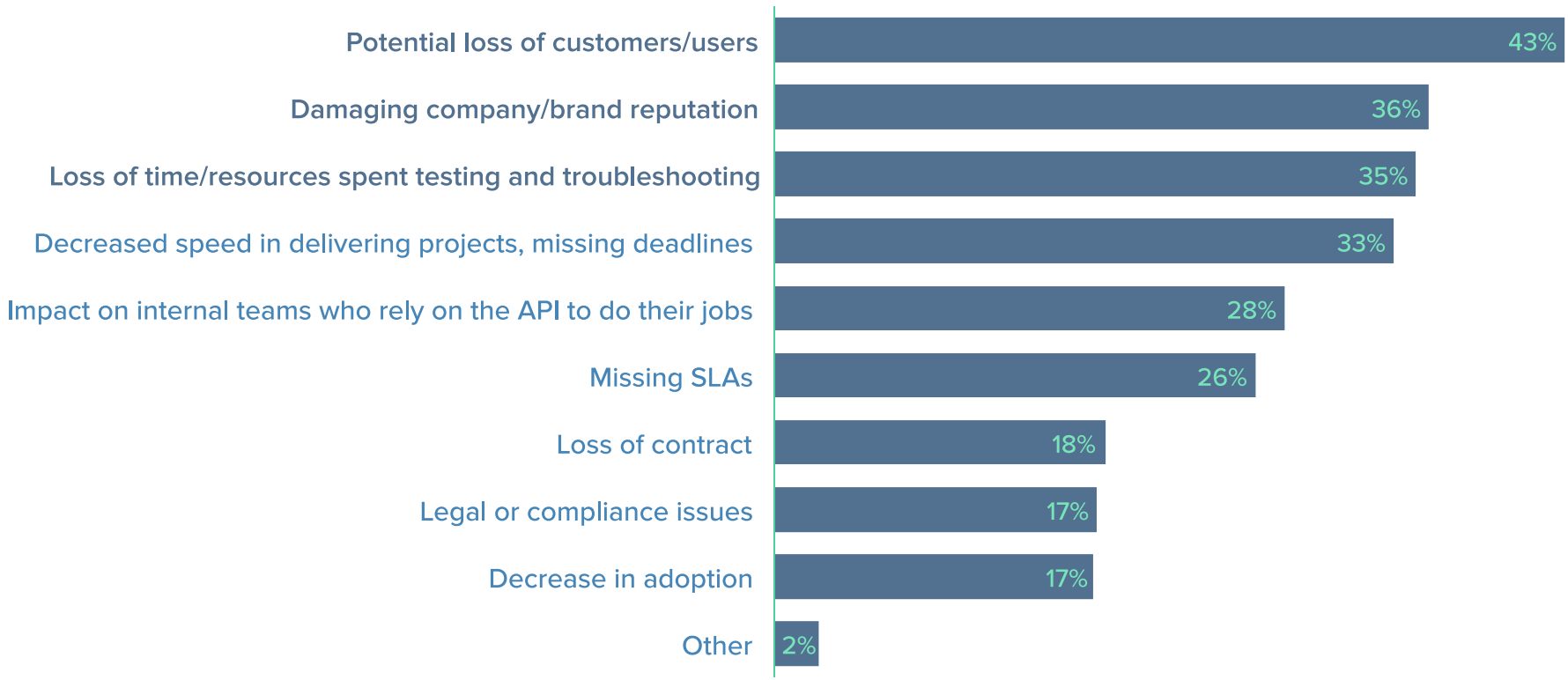
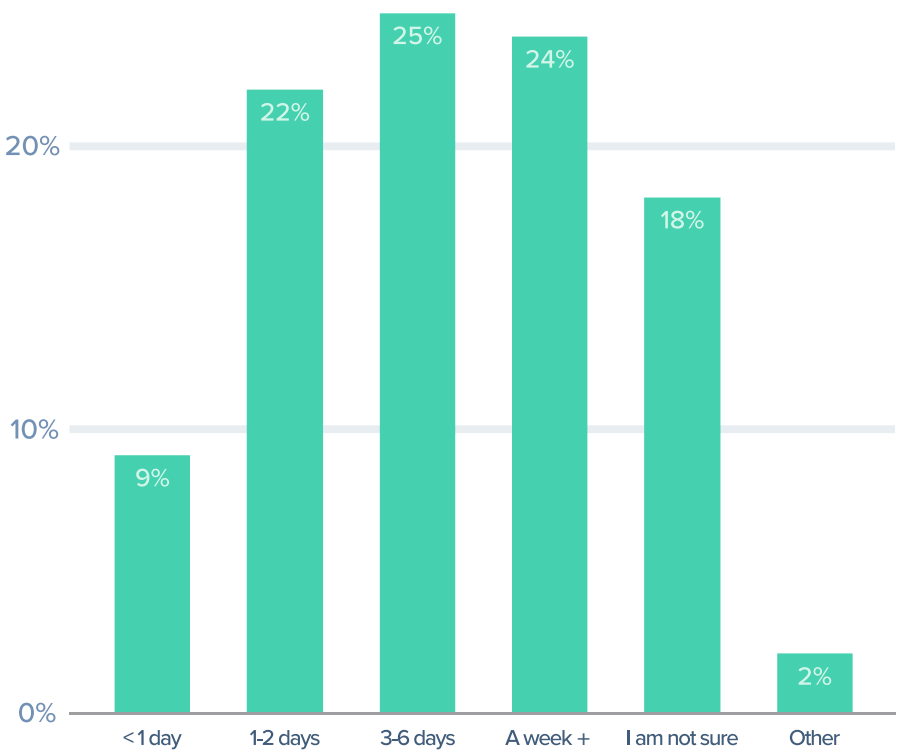


Less than 10% of API issues are resolved within 24 hours; 55% are resolved within a week

What would you say is the average amount of time it takes providers to resolve an API quality issue? (Please select all that apply)

n = 1898



"The performance of our tech stack is technology "job number one" for us at 1800flowers.com, Inc. Our customers trust that we will deliver smiles on time with the highest quality and integrity. Our enterprise API and services layers are help to extremely high levels of performance to help us achieve our customer experience goals. They are in the "middle" of everything we do!"

Arnie Leap,
CIO, 1-800-FLOWERS

While API providers understand the risk of poor API quality and performance, many are still slow to resolve API issues when they arise. According to organizations that consume APIs, a majority of API issues will go unresolved for at least 24 hours. Nearly a quarter of API issues will take longer than a week to be resolved.

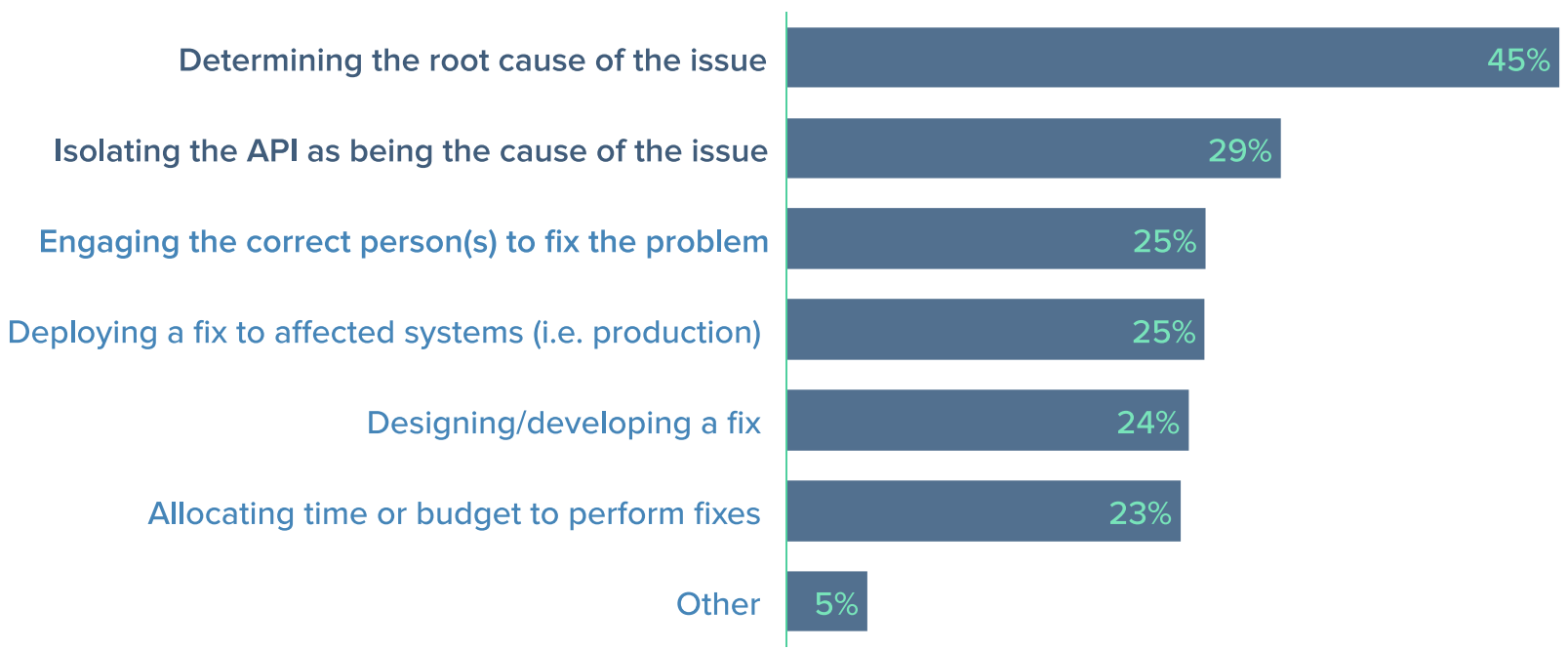
Determining root cause presents the biggest obstacle for resolving API issues

Identifying the root cause of an issue is the biggest challenge teams face when attempting to resolve an API issue. 45% of API providers say that they have difficulty determining the root cause of an issue, while 28.9% say that isolating the API as the cause is their biggest challenge.

With less than half of providers using a tool to monitor API performance, identifying and fixing API production issues will continue to be a problem the API industry needs to solve.

Which of the following do you think are the greatest barriers to solving API issues?

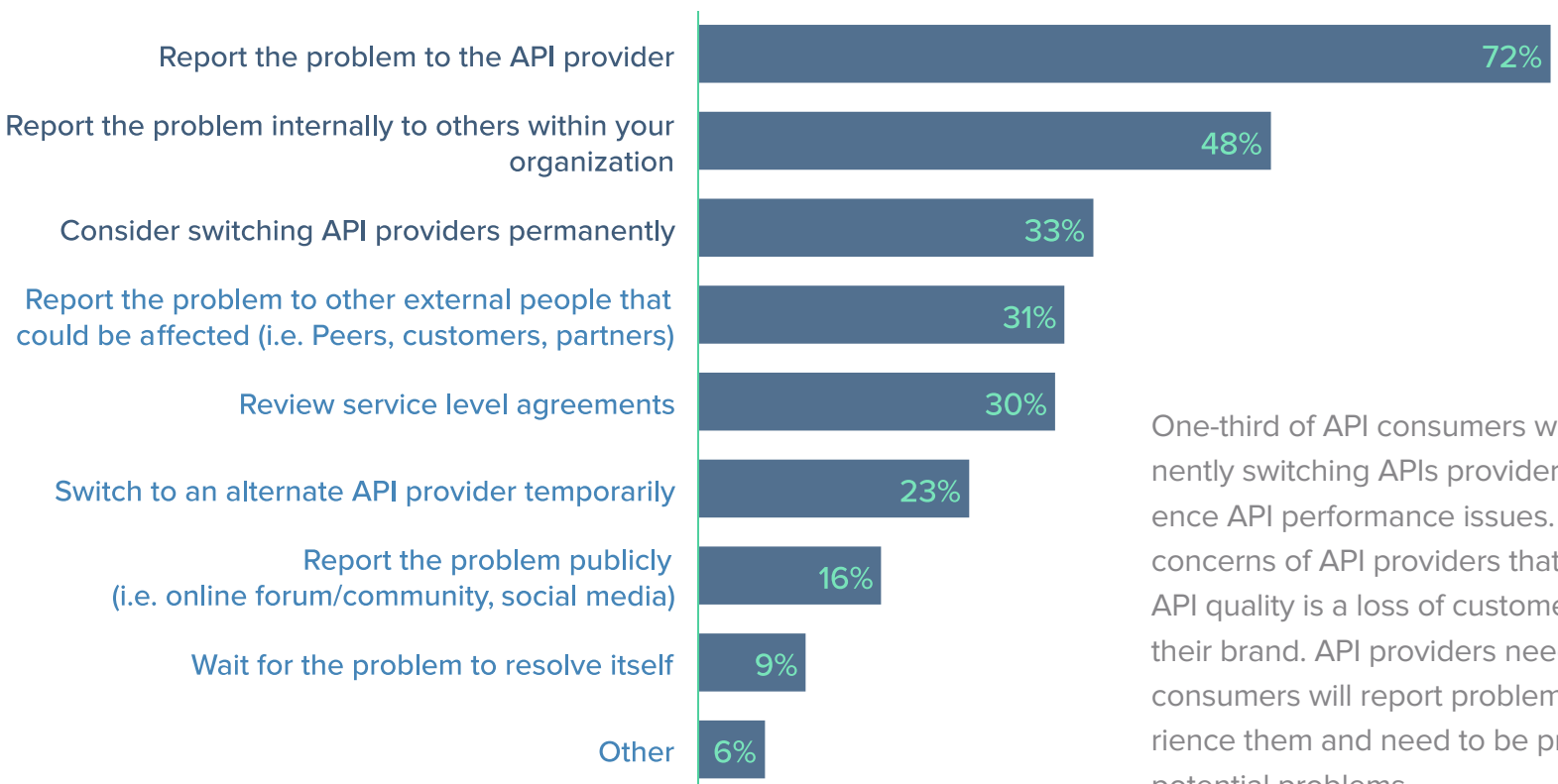
n = 1300



One-third of consumers will permanently switch API providers if they encounter a quality or performance issue

How do you react upon encountering quality or performance issues with 3rd party APIs?

n = 1898

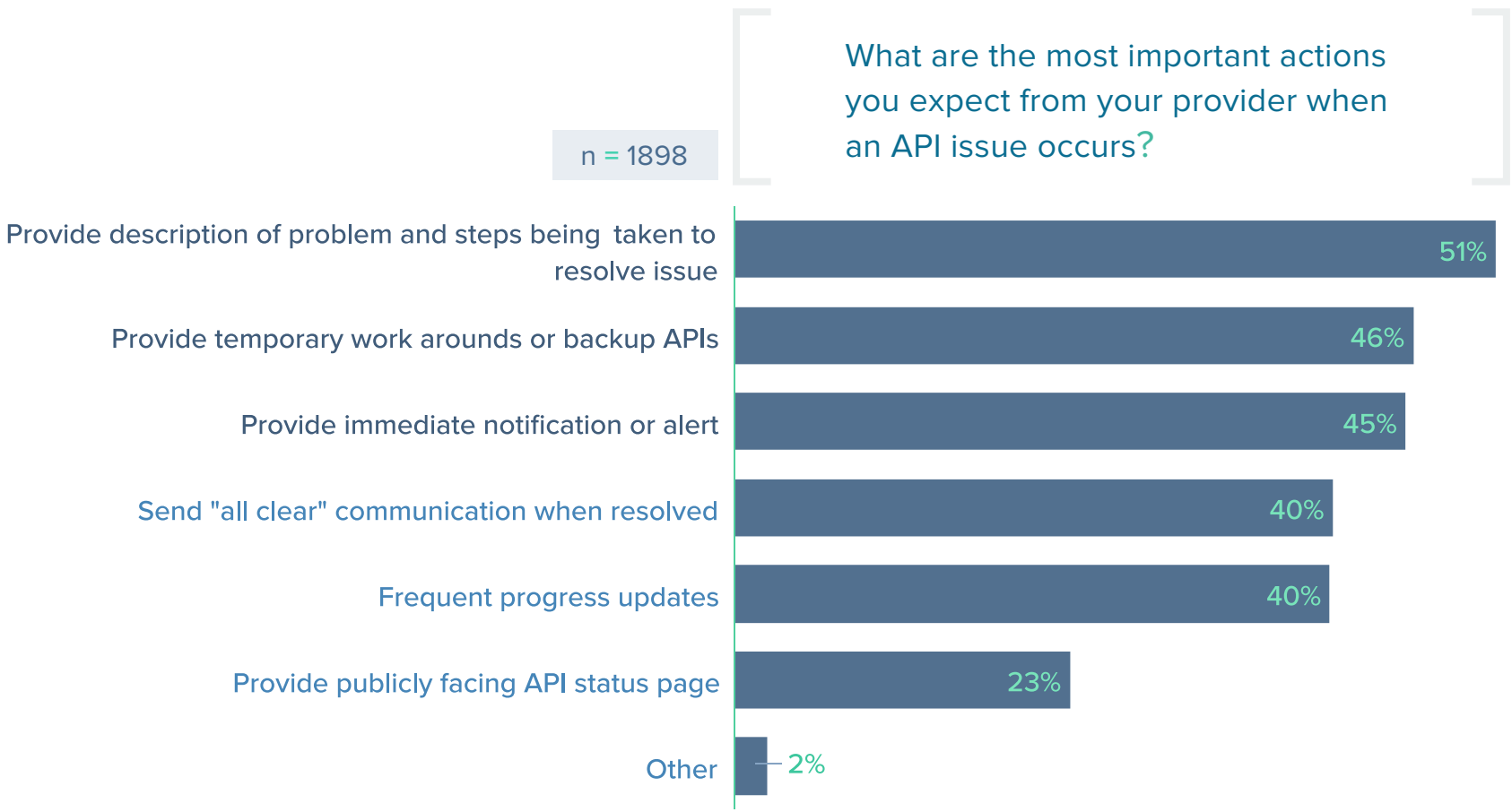


One-third of API consumers will consider permanently switching APIs providers when they experience API performance issues. This aligns with the concerns of API providers that the top risk of poor API quality is a loss of customers and damage to their brand. API providers need to be aware that consumers will report problems when they experience them and need to be prepared to address potential problems.

Consumers expect communication and a workaround when API issues occur.

Communication is a top concern for consumers of APIs when performance issues occur. Consumers expect communication in the form of — a description of problems and steps being taken, immediate alert notifications, and 'all clear' communications when the issue is resolved, frequent progress updates, and a publicly facing API status page.

45.5% of consumers also expect providers to be prepared with a work around or backup API while issues are being addressed. With a majority of API issues lasting longer than 24 hours, providers need to have a clear plan for how to deal with issues to limit the potential impact.

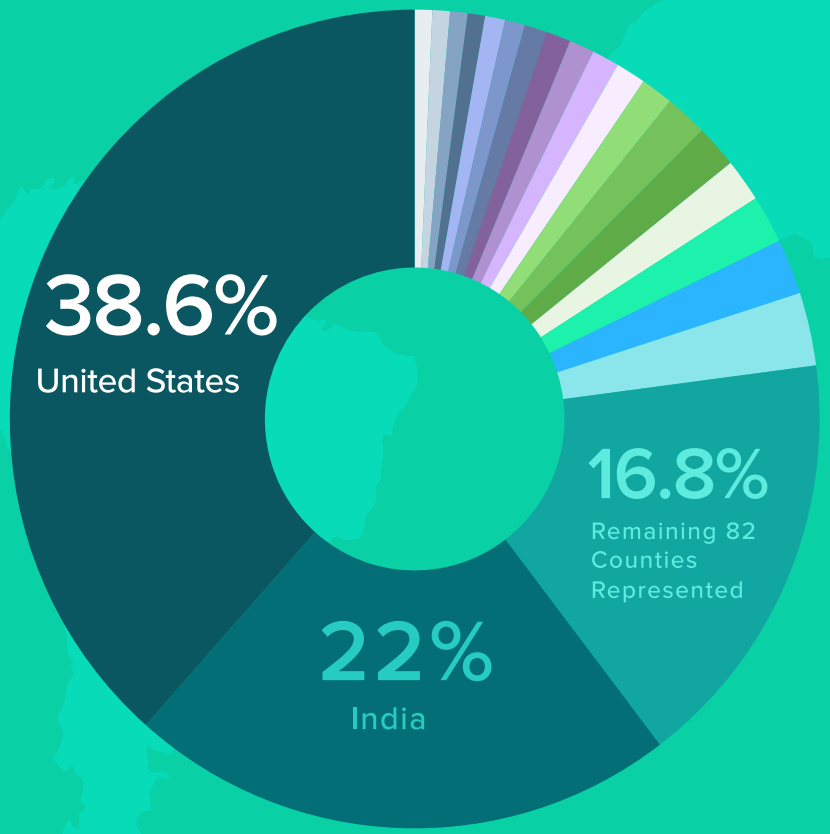


V. Demographic & Firmographic

SmartBear Software's 2016 State of API Survey includes **responses from over 2,300 individuals working in the software industry**. This section provides further insight into the participants of the survey – the industries they represent, the countries they work in, and their roles within their teams.

The State of API survey is a global survey with participants from more than 104 different countries

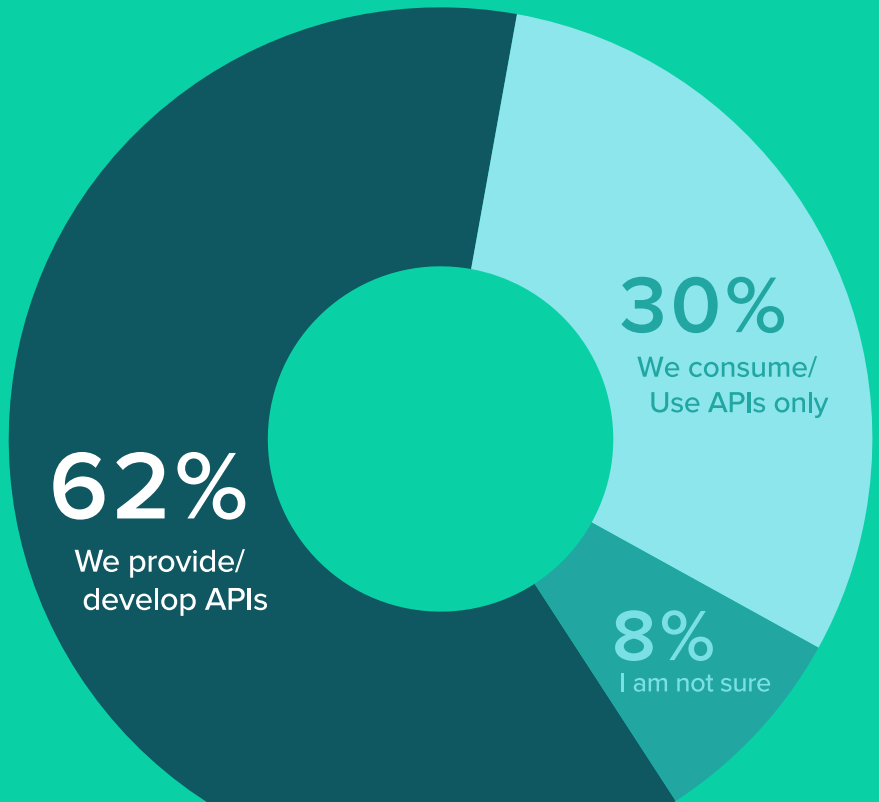
60% of survey respondents were located in the US or India.



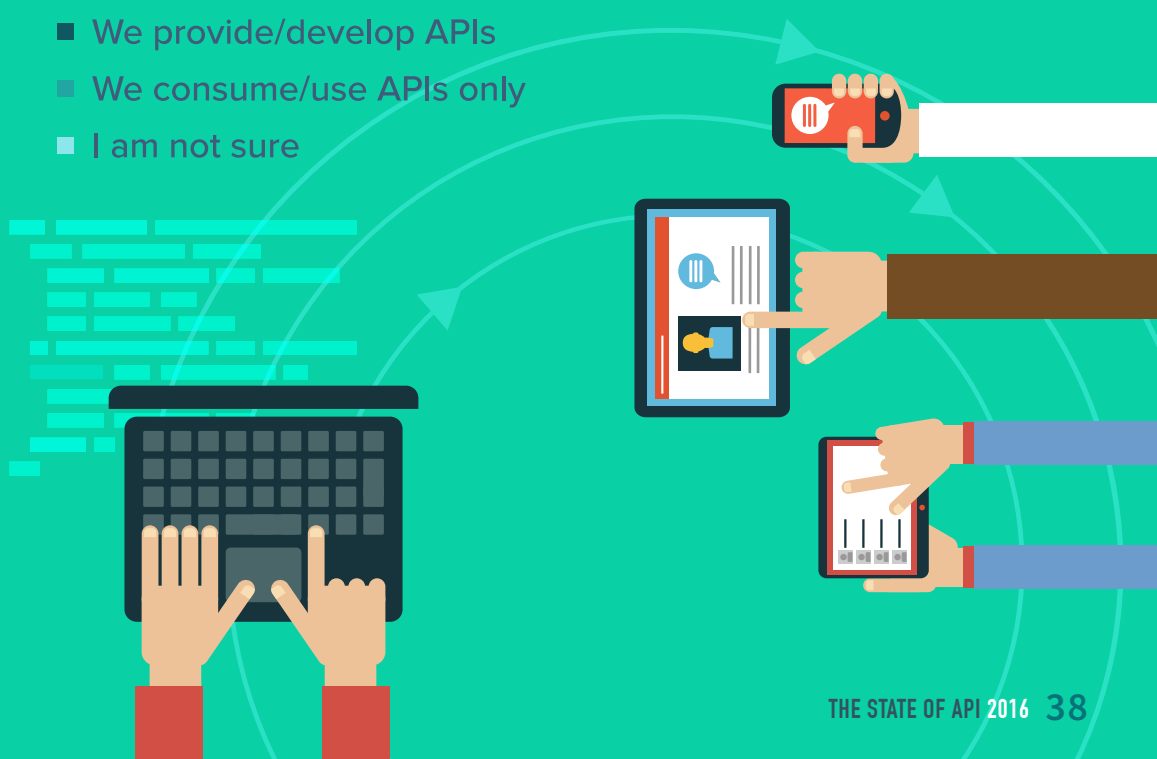
0.7%	TR - Turkey
0.7%	CN - China
0.7%	RO - Romania
0.7%	PL - Poland
0.8%	PH - Philippines
0.8%	IL - Israel
0.9%	RU - Russia
1.0%	UA - Ukraine
1.0%	NZ - New Zealand
1.1%	ES - Spain
1.2%	IT - Italy
1.3%	NL - Netherlands
1.7%	MX - Mexico
1.7%	DE - Germany
1.7%	AU - Australia
1.9%	CA - Canada
2.2%	BR - Brazil
2.9%	GB - United Kingdom
	Remaining 82 Countries Represented
	IN - India
	US - United States

The State of API survey included responses from both API providers and organizations that only consume APIs.

62% of survey respondents provide APIs, while 30.1% only consume APIs. 7.8% of respondents were unsure how APIs fit in with their organizations.

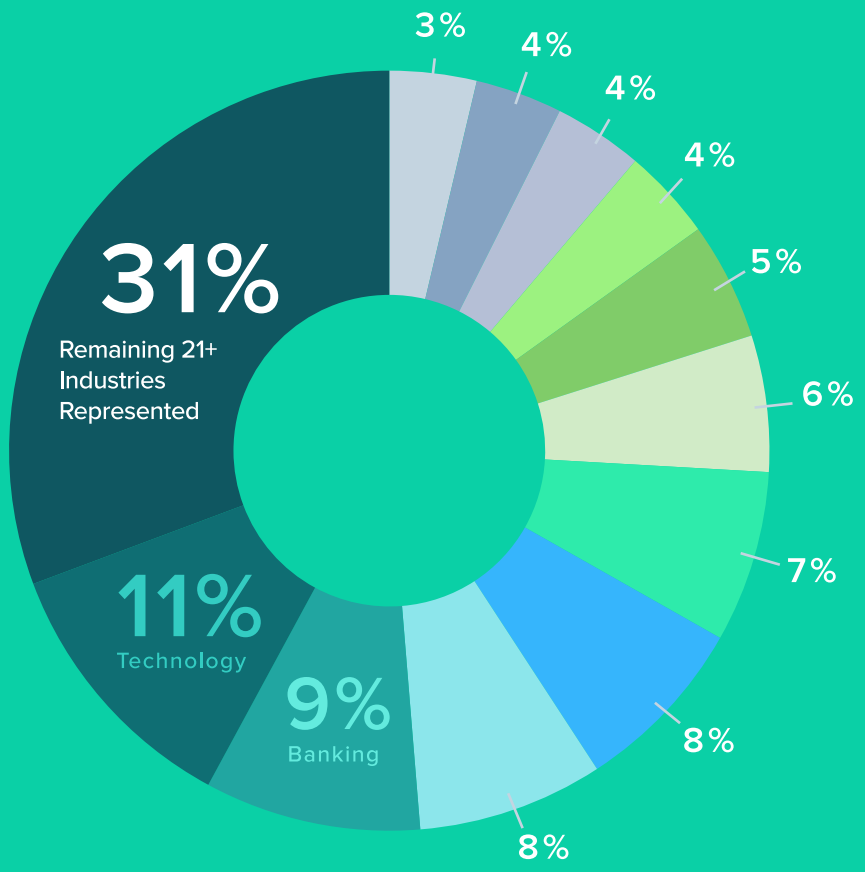


- We provide/develop APIs
- We consume/use APIs only
- I am not sure



The State of API survey included responses from more than 50 different industries

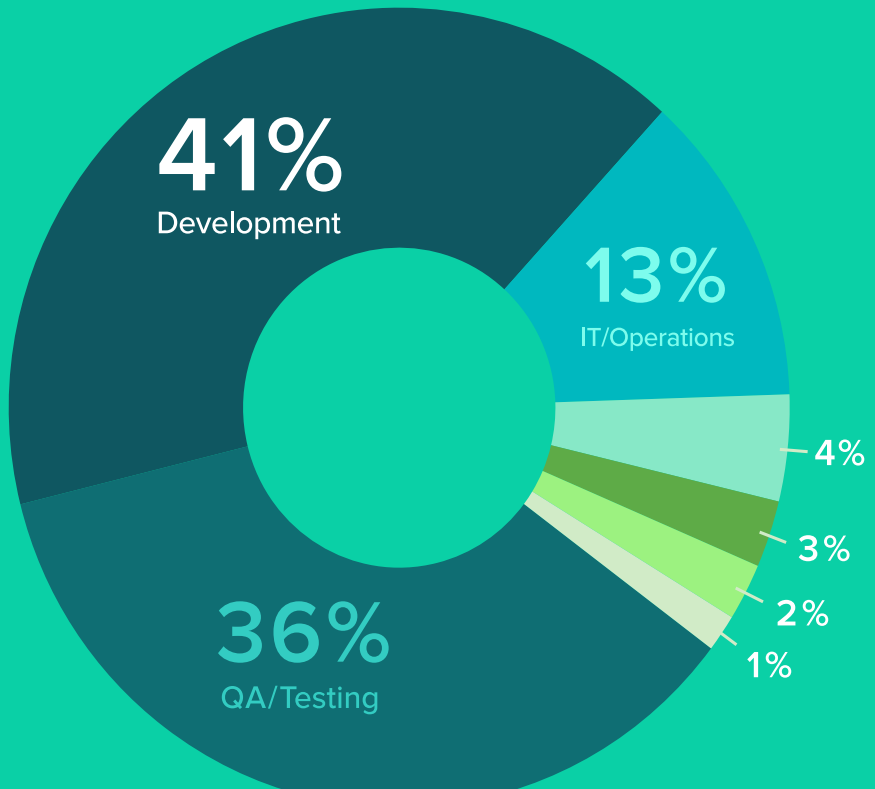
APIs are being developed and consumed across a variety of industries — even those that are not traditionally thought of as technology leaders.



- Engineering
- Government
- Education
- Consulting
- Insurance
- Retail
- Telecommunications
- Finance
- Healthcare
- Banking
- Technology
- Remaining 21+ Industries Represented

The State of API 2016 Survey included input from different departments and roles

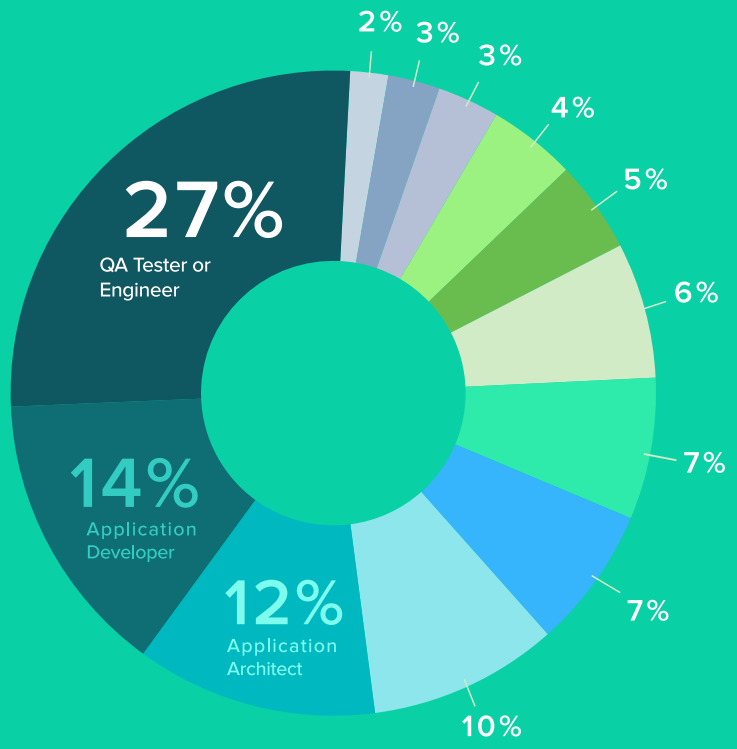
Development, QA/Testing, and IT/Operations made up the largest portion of the survey audience, but product management, marketing/sales, and business management were also represented.



- QA/Testing
- Development
- IT/Operations
- Product Management
- Marketing/Sales
- Business Management
- Other

The State of API Survey 2016 includes input from more than 15 different software roles

The survey includes a variety of perspectives from individuals working in different roles — including testers, developers, architects, directors, and engineers.



- Performance Engineer
- Operations Engineer
- Product Manager
- Other
- Consultant / Contractor
- Automation Engineer
- API Developer
- Web Developer
- Director / Manager
- Application Architect
- Application Developer
- QA Tester or Engineer

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