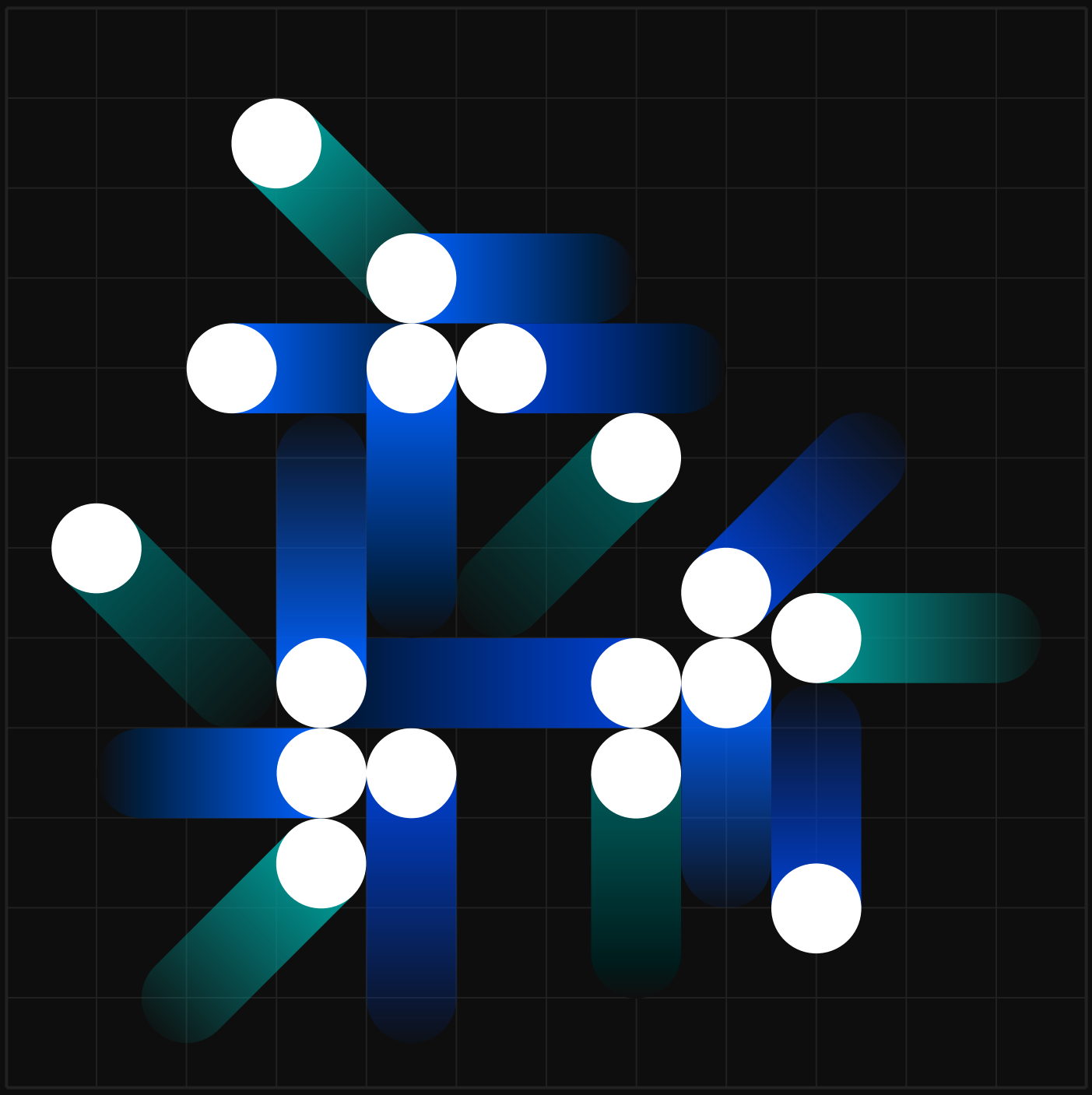
# Microservices in the enterprise, 2021: Real benefits, worth the challenges

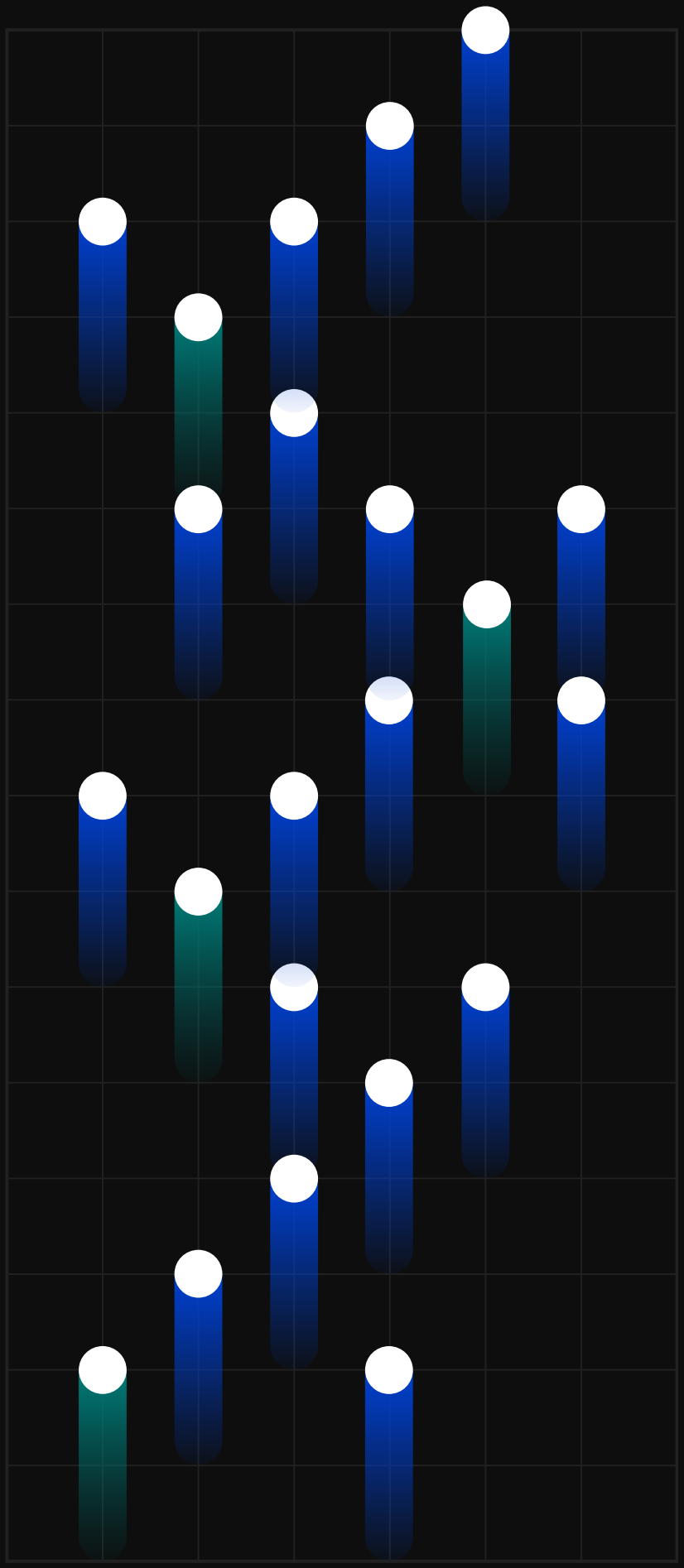
How organizations are finding speed, agility and resiliency through microservices

*Results from a survey conducted by*
IBM Market Development & Insights



## ABOUT THE RESEARCH

Recently, the IBM Market Development & Insights team conducted a series of surveys that recorded the perceptions and real-world experiences of microservices users and those considering adoption. These included more than 1,200 IT executives, developer executives and developers from large and midmarket companies that are currently using a microservices approach, as well as nonusers who are exploring or planning to adopt this approach in the near future. The results offer great insight into the real-world opportunities and challenges for implementing a microservices development approach.



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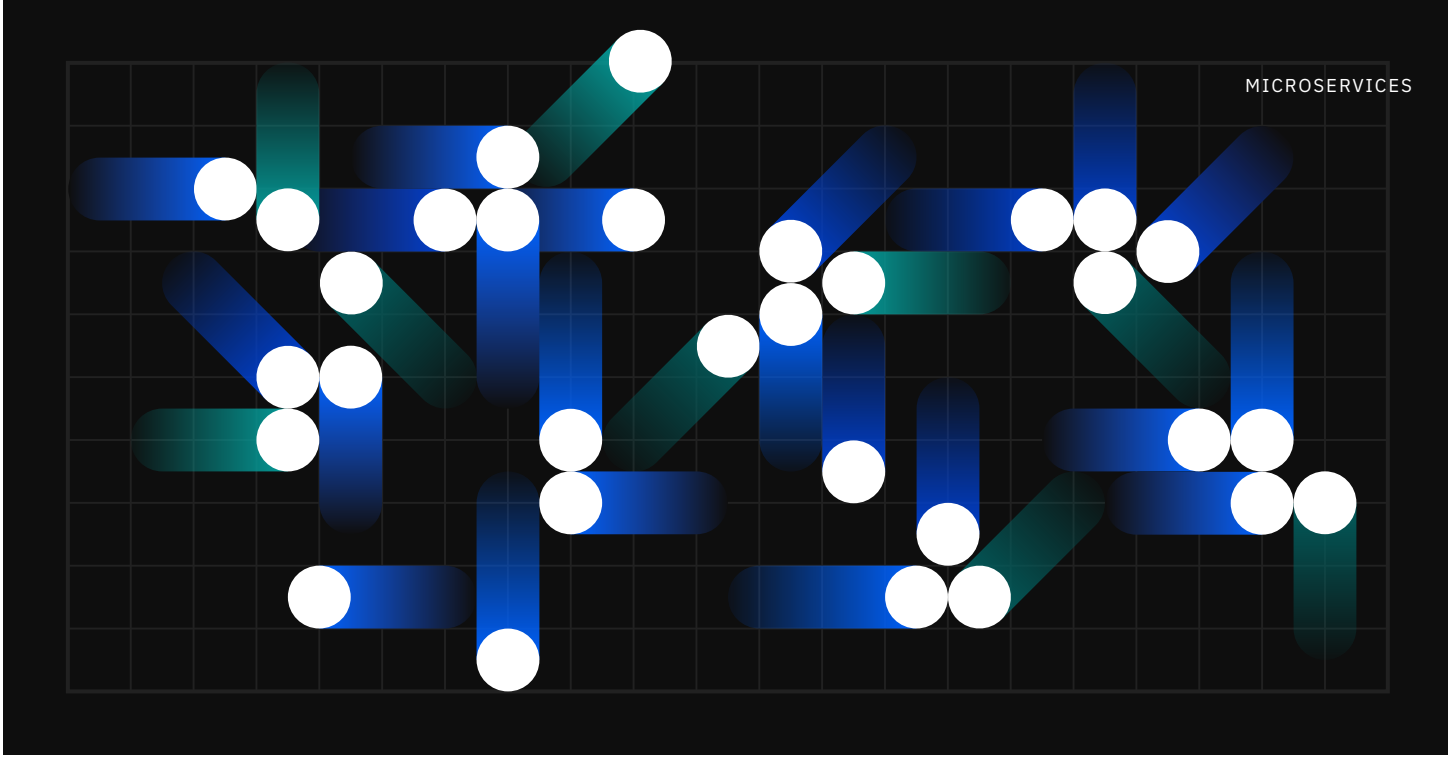



# Managing unrelenting change

For many, modernizing infrastructure for today's disruptive marketplace means moving toward cloud-native applications that are built as microservices and deployed through container technologies such as Kubernetes and Docker. Designed to improve responsiveness, flexibility and resiliency, it's an approach that enables action at the speed of business. As consumers become increasingly demanding and quicker to shift their loyalties, microservices offer the faster development speeds and rapid service iteration needed to keep pace.

A microservices development approach can help you manage the pace and volume of change at virtually unlimited scale. It is a modular approach in which applications are created from dozens, hundreds or even thousands of distinct, independently deployable and updatable services instead of a single monolithic body of code. This modularity helps you deliver the new features and personalized experiences consumers want, faster and more reliably.

With microservices, making incremental updates or scaling to meet planned or unplanned surges in traffic doesn't require massive effort. And because microservices are built on foundational cloud technology, they can be built, run and managed the same way in public, private, hybrid and multicloud environments.

In a time of unrelenting change, microservices make it easier to act with agility. They enable you to be ready for what's next.

# Benefits outweigh challenges

## Survey results overview

A microservices approach brings a number of important advantages for users over monolithic, centralized applications.

These include bottom-line benefits—such as greater employee productivity, improved customer satisfaction and faster time to market—that can drive business growth. For developers and IT operations, microservices simplify application management, make it easier for teams to collaborate and share data, and enable flexibilities such as agnosticism in programming language and on-demand scalability.

Although the advantages can be many, our survey respondents say some significant challenges remain. Concerns include:

- The potential for increased complexity
- A lack of in-house experience with microservices
- An uncertainty over which applications to move, data security, and the required timeframes and costs required for a long-term commitment to microservices

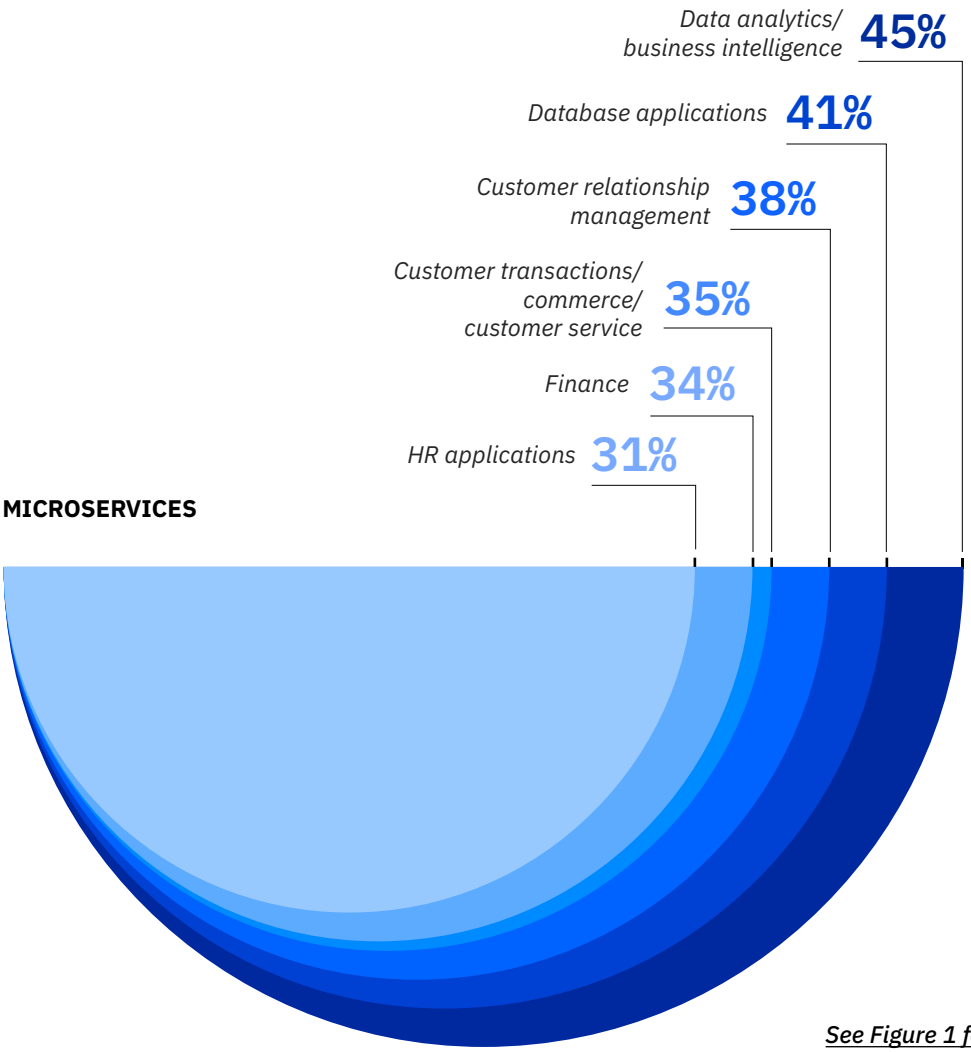
Most professionals we surveyed believe that even though the challenges are real, they can be overcome. And they report that the effort is worth it.

# Real-world business benefits of microservices

Although a microservices approach isn't right for all applications, microservices are heavily in use and delivering benefits for many industries worldwide.

## How microservices are being used

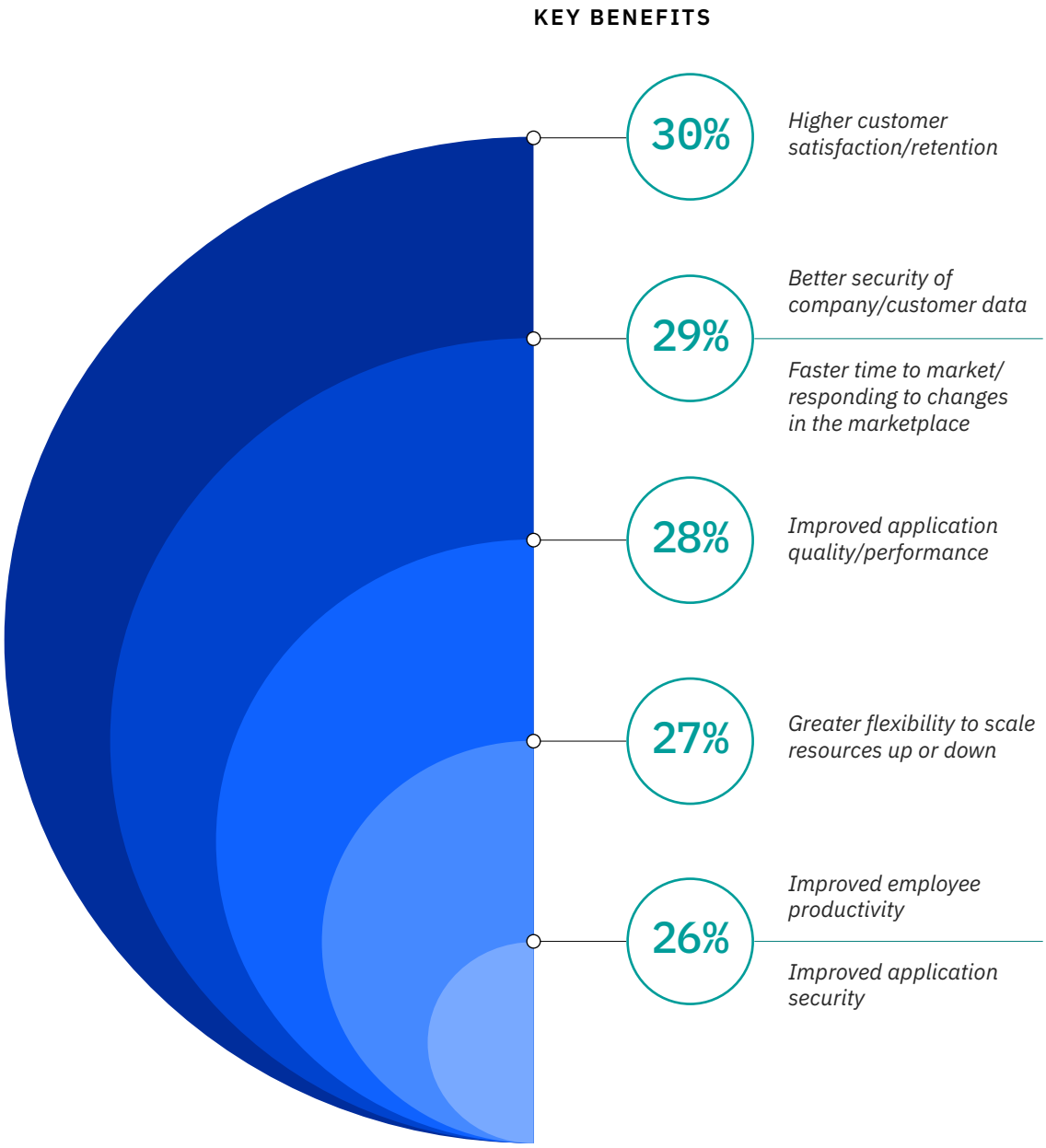
Survey respondents called out more than a dozen current use cases for microservices that are already delivering benefits for their organization. The most common use cases included:




*See Figure 1 for complete data.*

## What users see

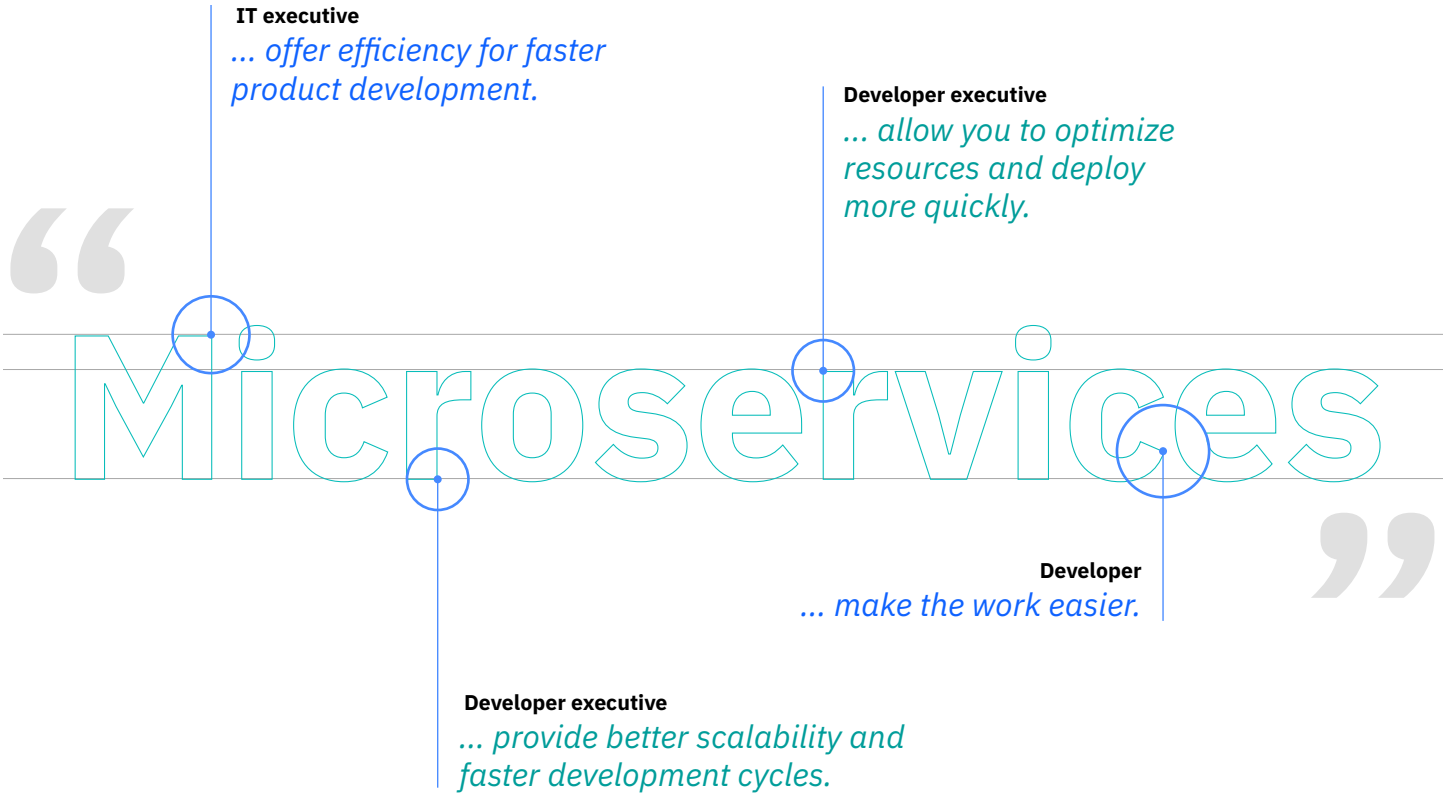
Users said they're seeing improvements from microservices across many areas of their business. The benefits they felt were most important included:




*See Figure 2 for complete data.*

## What users say

Respondents highlighted key themes, such as how microservices improve their ability to optimize resources, enhance collaboration and streamline business processes.




### KEY TAKEAWAYS

- There is broad acceptance among IT executives and application development professionals who currently use a microservices approach that it can provide significant, ongoing business benefits.
- Those using microservices today are seeing positive results for use cases that span the gamut of organizational needs.

# Identifying challenges

Although survey respondents reported many benefits to adopting a microservices approach, they also identified a number of challenges that they faced during their adoption journey. Asked about barriers to adoption or expansion of microservices within their organizations, respondents named several areas as being a challenge or a significant challenge. These included:


**54%**
*Talent with this expertise is expensive and difficult to find*

**53%**
*Security concerns*

**52%**
*Complexity of learning microservices*

**51%**
*Internal data management geared toward monolithic application development*

**51%**
*Lack of the modern infrastructure needed to effectively run microservices*

**51%**
*Difficulty predicting performance in production environments*

**50%**
*Difficulty integrating cloud and on-premises environments*

**49%**
*Difficulty assessing which applications will benefit from refactoring with microservices*

**49%**
*Insufficient internal expertise in DevOps or agile practices*

**48%**
*Uncertainty regarding time and costs involved for building applications*

***See Figure 3 for complete data.***

Interestingly, only a relatively small percentage (≤25%) of those in roles we surveyed—developers, developer executives and IT executives—called out any of these as a significant challenge. Additionally, these numbers include the perception of respondents who have not used microservices and, as we'll see later, may not accurately reflect the reality of those already using microservices.

## KEY TAKEAWAYS

- While the challenges of adopting a microservices approach are real, many concerns—such as the lack of experienced talent, uncertainty around security issues and confusion about which applications are the best targets for transition to microservices—can be mitigated by bringing in the right talent.
- Additional concerns, such as gaining a commitment to modernizing infrastructure and the need to evolve legacy attitudes and processes designed for monolithic applications, may require internal shifts that can be made easier by building a strong business case.
- Complexity is being tamed through container technologies, such as Kubernetes, along with a service mesh that provides consistent structure that makes it easier to manage communications and monitor security between and across the many services that comprise applications developed with microservices.

## PERCEPTION VERSUS REALITY:
# the talent gap

Some fascinating insights from our survey centered around the lack of internal talent versed in microservices and an organization's ability or willingness to consider deploying or expanding a microservices approach.

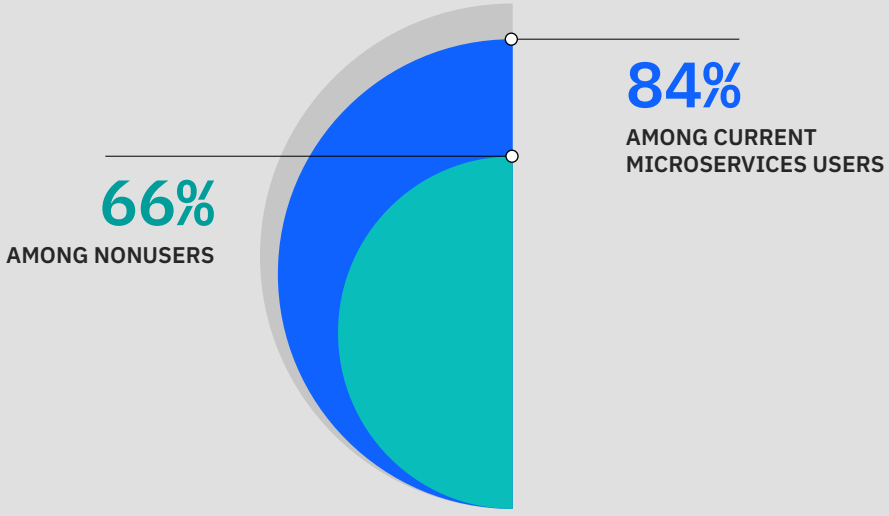
We asked current nonusers why they were not using or not planning to use microservices.

**31%** *named insufficient internal expertise as their biggest concern—number 2 overall among 12 options.*

*See Figure 4 for complete data.*

**Yet both current users and nonusers see a microservices approach as a way to attract talent to their organization.**

*Agree or agree completely that using microservices helps attract talent*



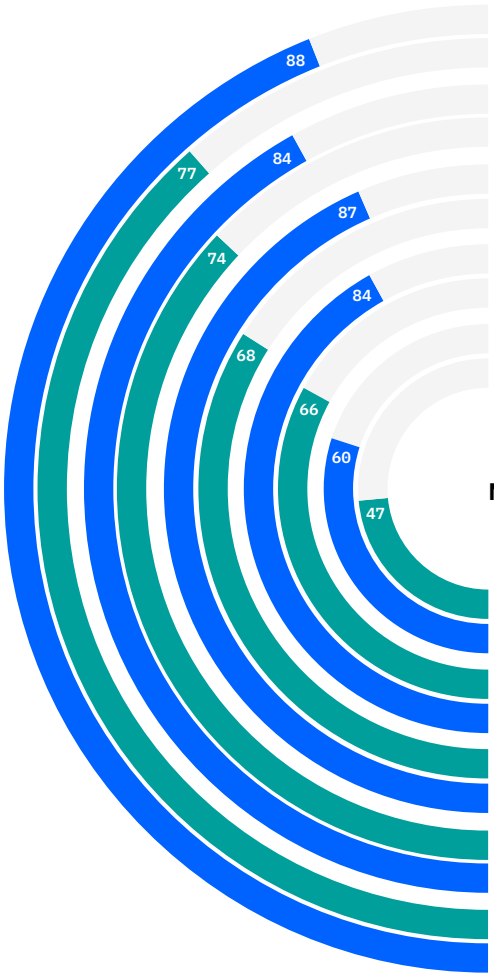

*See Figure 5 for complete data.*

This difference is telling because although both see microservices as being attractive to developer talent, those using microservices today are convinced that it's a major draw, based on their experience.

This could be because microservices allow programming language agnosticism. After the microservices framework and service mesh is in place, rather than locking developers into writing code for a monolithic application written in a specific coding language, talented developers can write code for a microservice in their language of choice, confident that it will work as part of a larger service.

# Exceeding expectations

A majority of current microservices users and nonusers say they believe the benefits are real and that they're likely to increase their reliance on microservices or adopt a microservices development approach in the next two years.




**USERS**
**NONUSERS**

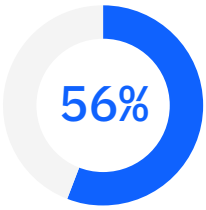
**MICROSERVICES**

| USERS | NONUSERS | |
|---|---|---|
| 77% | 59% | *agree or agree completely that microservices are a time-tested model of application development* |
| 84% | 66% | *agree or agree completely that using microservices helps attract talent* |
| 87% | 68% | *agree or agree completely that the effort and expense of adoption is or will be worth it* |
| 84% | 74% | *agree or agree completely that microservices create better collaboration among team members* |
| 88% | 77% | *agree or agree completely that microservices offer many benefits to development teams* |

*See Figure 5 for complete data.*

## Here to stay

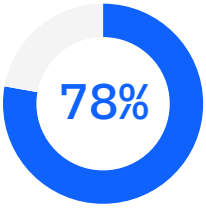
Given the benefits identified, most nonusers are planning to adopt.




***S**ay they are very likely or likely to adopt a microservices approach in the next two years.*

***See Figure 6 for complete data.***

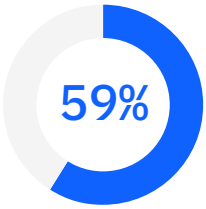
Those already using microservices will continue to invest.



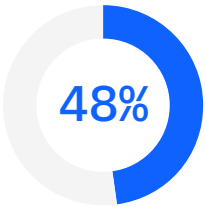

***O**f current users say their business will likely increase money/time/effort invested in microservices.*

***See Figure 7 for complete data.***

Users expect the percentage of applications created through microservices to increase.




*(Mean) of applications will be created with microservices in the next two years.*

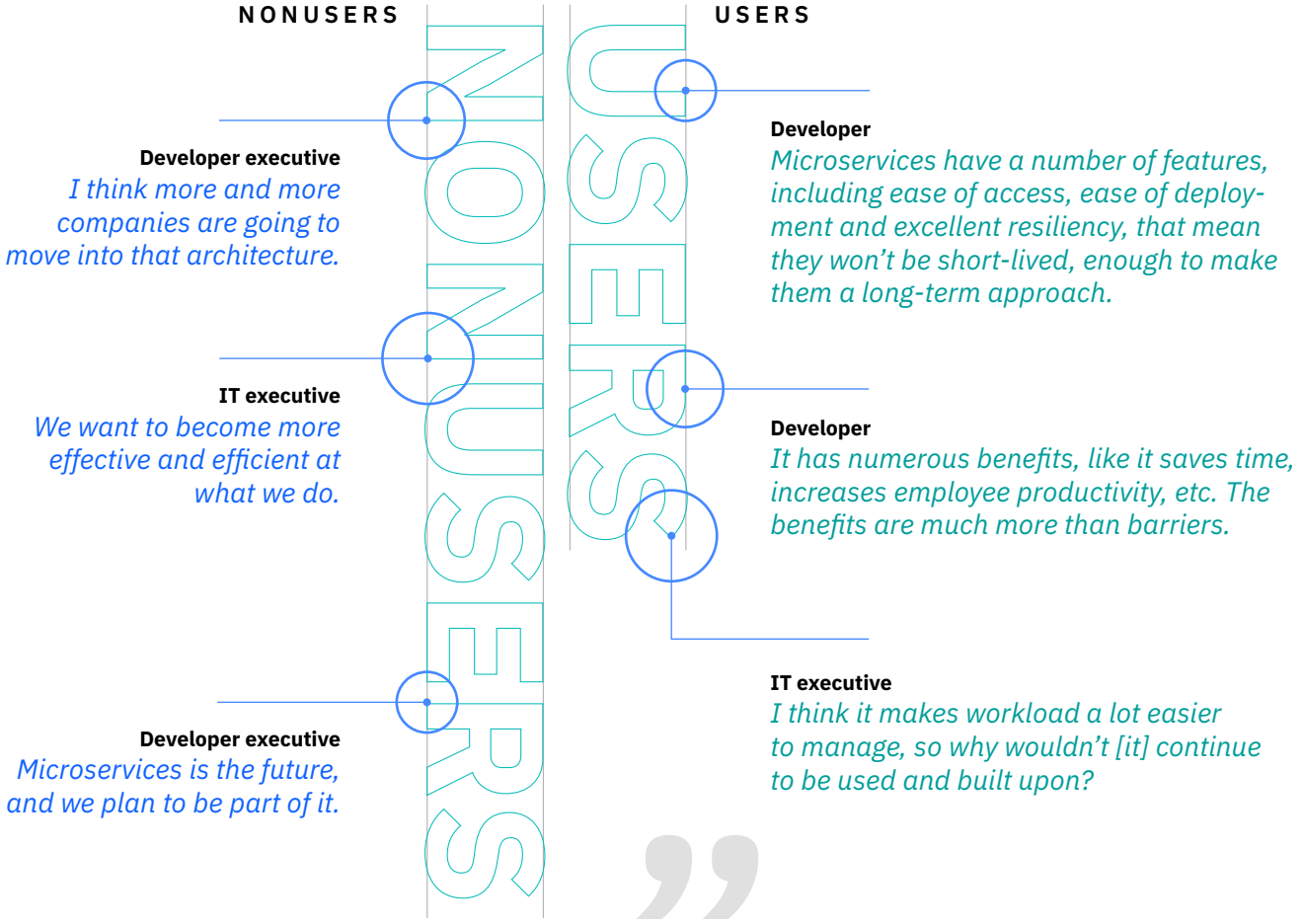



*That's up from **48%** (mean) in the past two years.*

***See Figure 8 for complete data.***

## Confidence in the future

Although both users and nonusers recognize the current and potential benefits of microservices, the real-world experience of those already using microservices shows greater confidence in the future of microservices.




### KEY TAKEAWAYS

- Both current users and nonusers are excited about the potential of increasing the use of microservices for their organizations, and both groups believe that the trend will continue.
- Adoption breeds confidence, as current users of microservices reflect even greater confidence in microservices to deliver value.
- Both groups believe that the benefits of adopting a microservices approach are worth the time, effort and investment needed to do so successfully.

## PERCEPTION VERSUS REALITY:

# microservices and security

Security was an area where the perception of microservices among nonusers differed markedly from the experience of those using microservices today.

We asked nonusers why they were not using or not planning to use microservices. Respondents could have more than one answer, selected from 12 potential responses.

**HERE'S WHAT THEY SAID:**

**29%** *of all respondents and*

**33%** *of developers cited lack of security requirements—this was the fourth most common answer among all users.*

*See Figure 4 for complete data.*

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**Our survey also asked current microservices users what they felt were the most important benefits of their shift to microservices.** Again, respondents could have more than one answer, in this case, selected from 23 options. What they said was revealing, especially in the context of nonuser concerns:


*noted improved application security—also placing it among the most common answers.*


*said better security of company/customer data was the most important benefit they've seen—this was the second most common answer among users.*

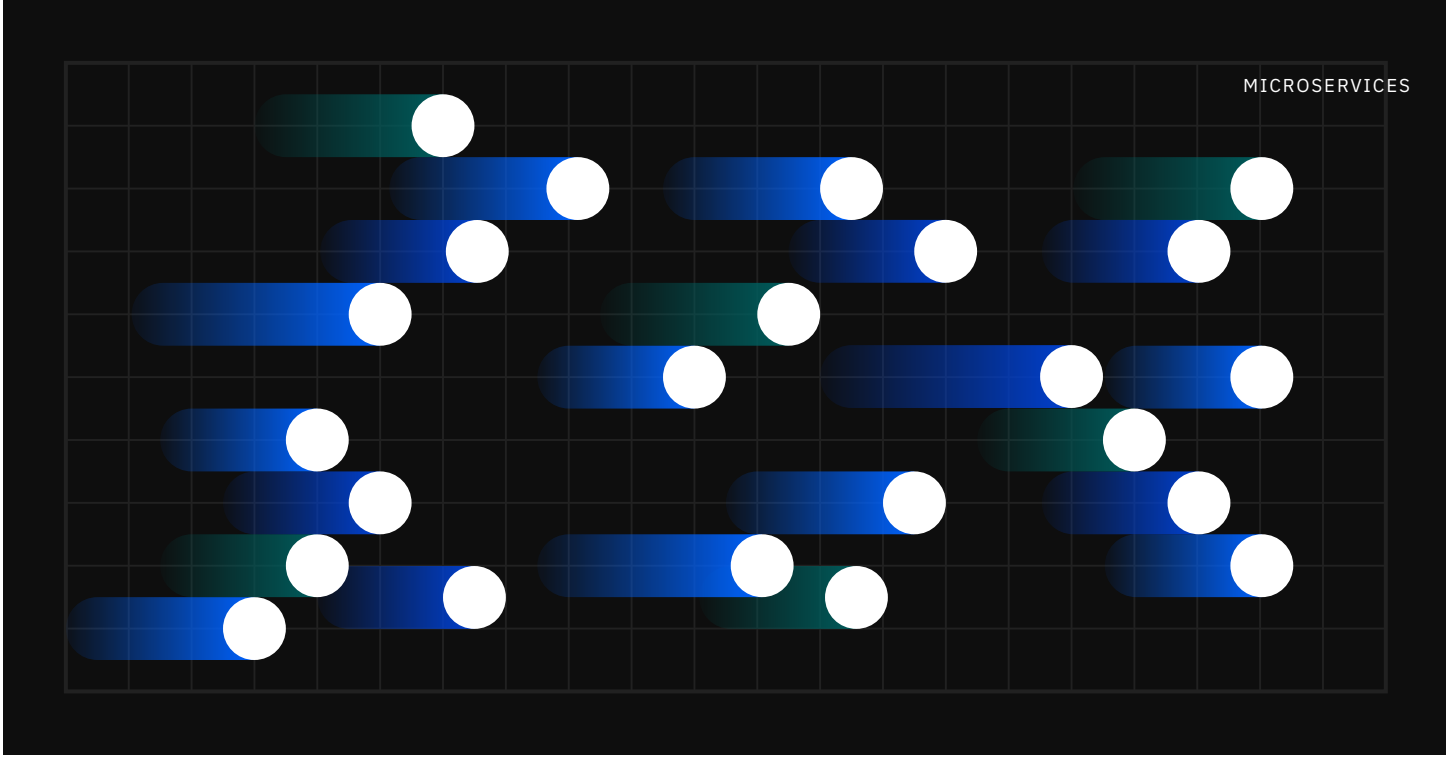
Clearly, there is a significant disconnect between perception and reality. As users have learned through their real-world experience, in many cases, microservices are actually improving data and application security for the organization.

*See Figure 2 for complete data.*

# The evolution continues

Microservices aren't new; teams have been using microservices to capture low-hanging fruit for nearly a decade. What's different is that now, advances in secure container technologies and accelerated development of application programming interfaces (APIs) are opening new avenues to benefit many more areas of the business.

Although not without challenges, adopting this approach is seen by users and nonusers alike as worth the time and effort. Container technologies such as Kubernetes and Docker are making managing diverse workloads simpler. Through a service mesh, services are communicating and working together seamlessly, regardless of developers' preferred programming language. Updating complex apps comprising hundreds or thousands of distinct services is becoming a simple, automated affair, often performed with a single click.




# The way forward

Disruption and rapid change are the new normal, and agile organizations are better equipped to thrive in this dynamic environment. Our research shows that more organizations are adopting a microservices development approach to develop and update applications faster, scale with confidence and keep their data secure. They're finding that the challenges of talent and technology can be overcome—and the effort is worth it.

The future of microservices is unfolding now. Adopters are realizing advantages that will set them apart for years to come.

Build your future with microservices.
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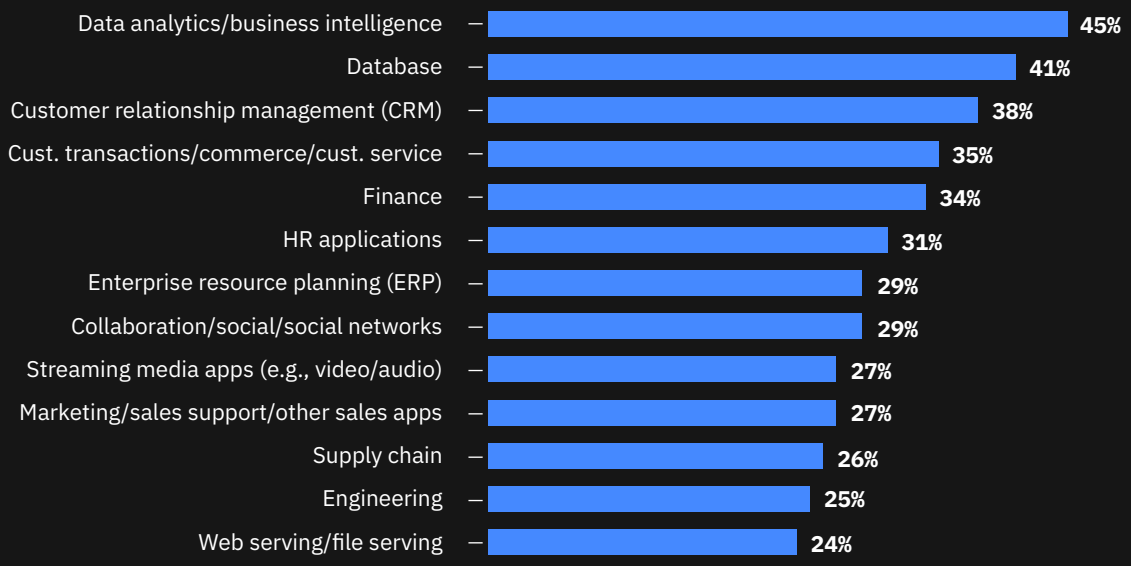
# APPENDIX

## Applications using microservices

*(Users developing apps internally/with help of third party, n=396)*

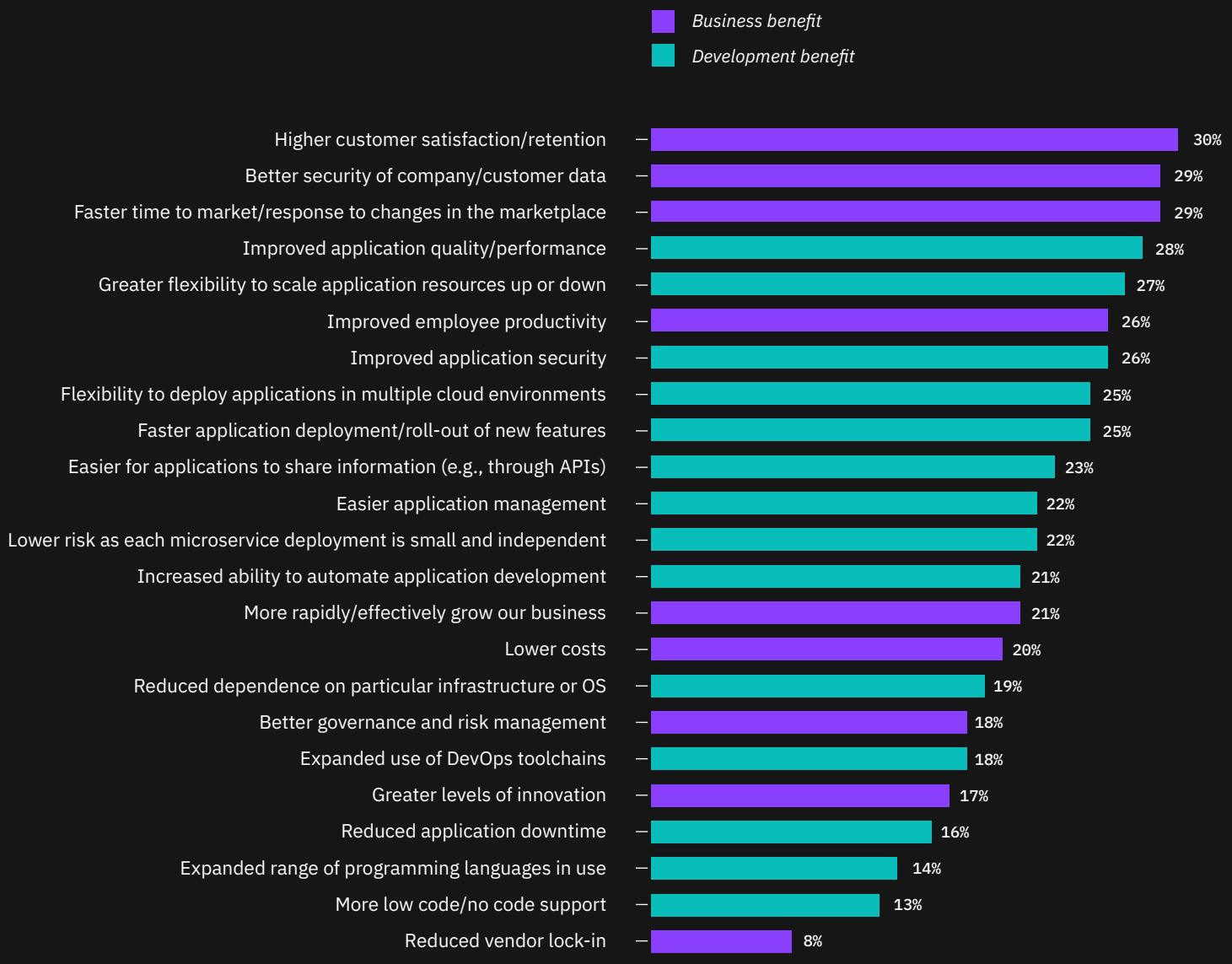



**Q7.** *You indicated that the following applications are usually developed internally or with the help of an external provider. Which of these applications use microservices? Why is it important for these applications to use microservices?*

*Figure 1*

## Most important benefits experienced from adopting microservices

*(Users, n=397)*

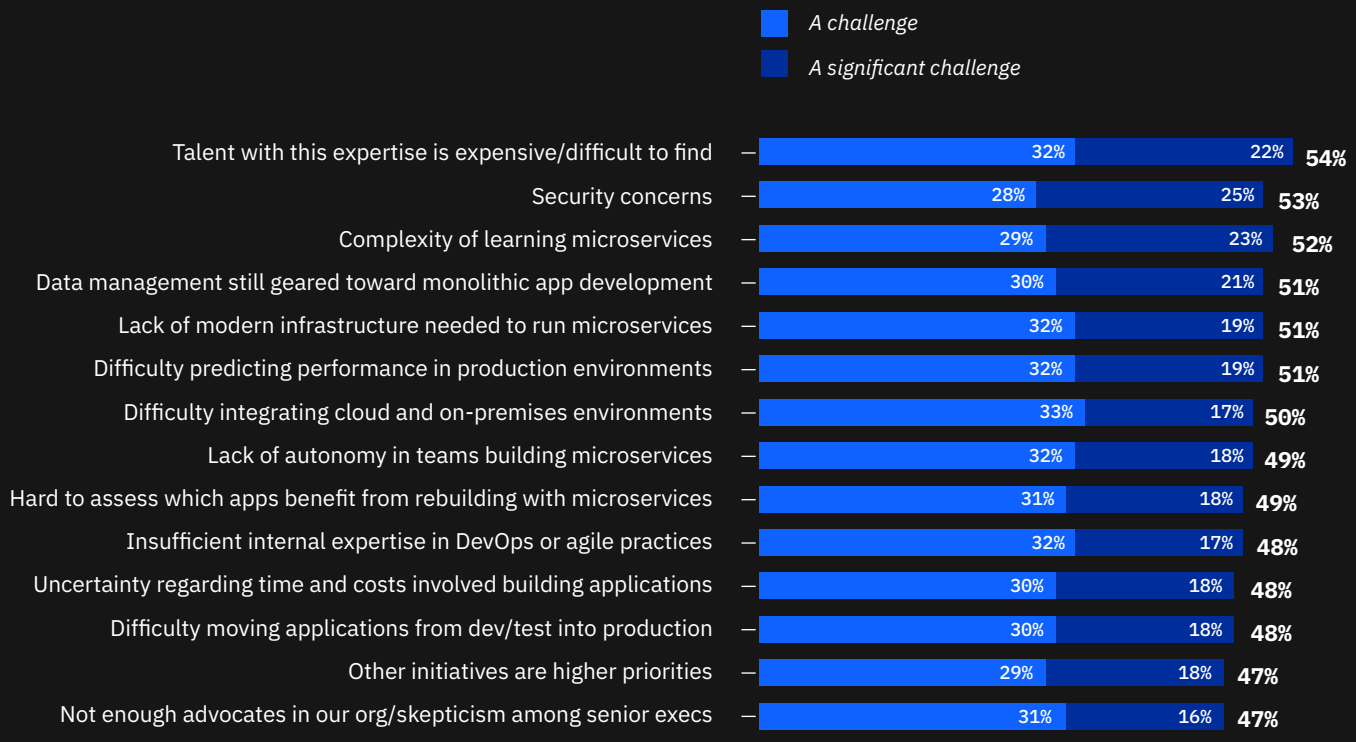



**Q15**. *Shown below are the benefits you identified as experienced by your company as a result of using microservices. Which of these benefits are most important to you and your company?*

*Figure 2*

## Challenges to adoption or expansion of microservices use

*(Users, n=399)*



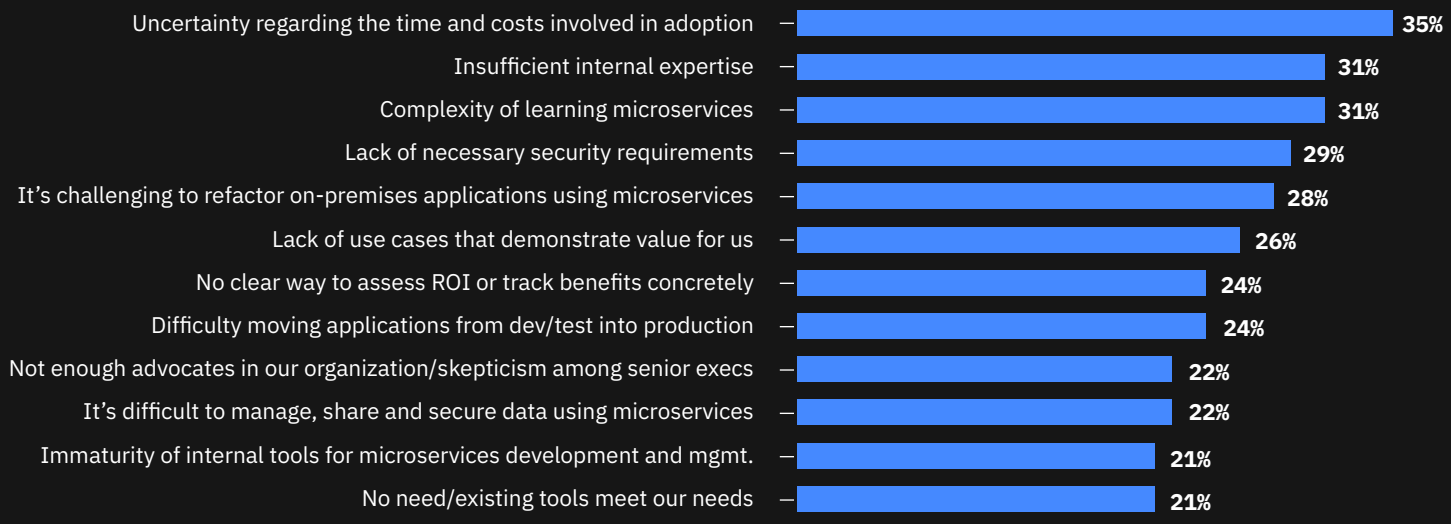

**Q16.** *Please rate the degree to which each of the following has been a significant challenge in successfully adopting or expanding the use of microservices in your company.*

*Figure 3*

## Reasons why not using or planning to use microservices

*(Nonusers, n=209)*

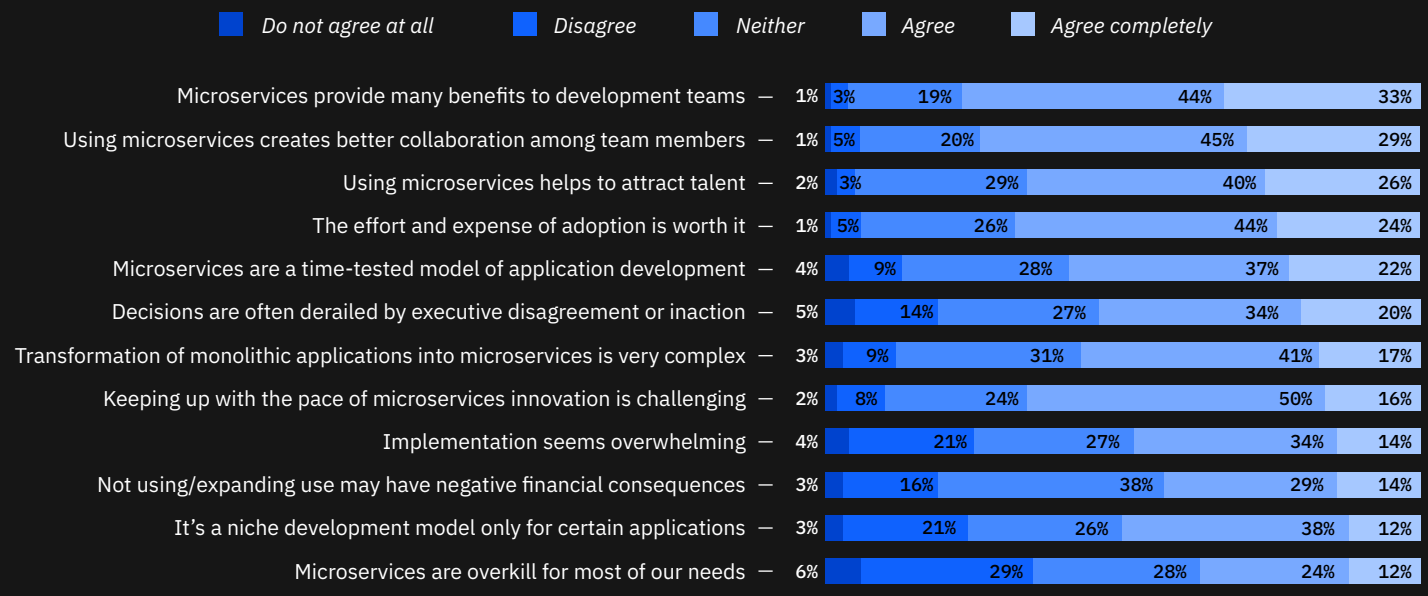
*(% selected, multiple response)*



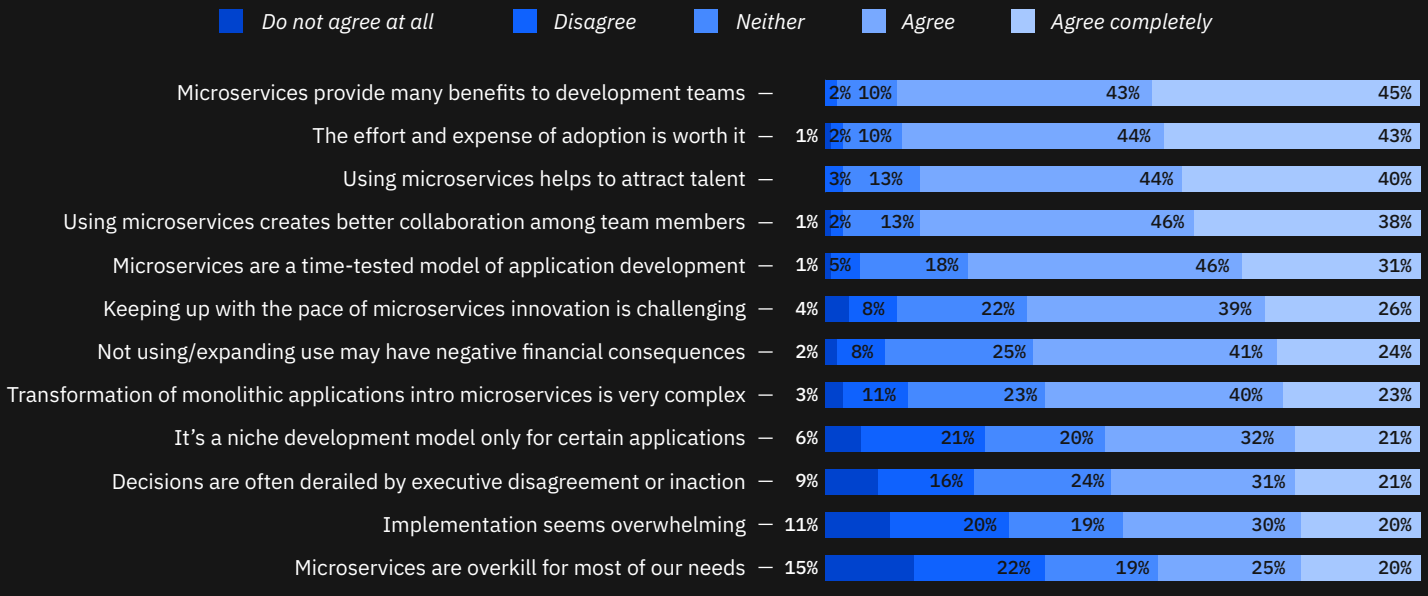

**Q2.** *Why is your company not developing or planning to develop applications using microservices architectures?*

*Figure 4*

## Microservices perceptions
*(Nonusers, n=209)*




## Microservices perceptions
*(Users, n=399)*

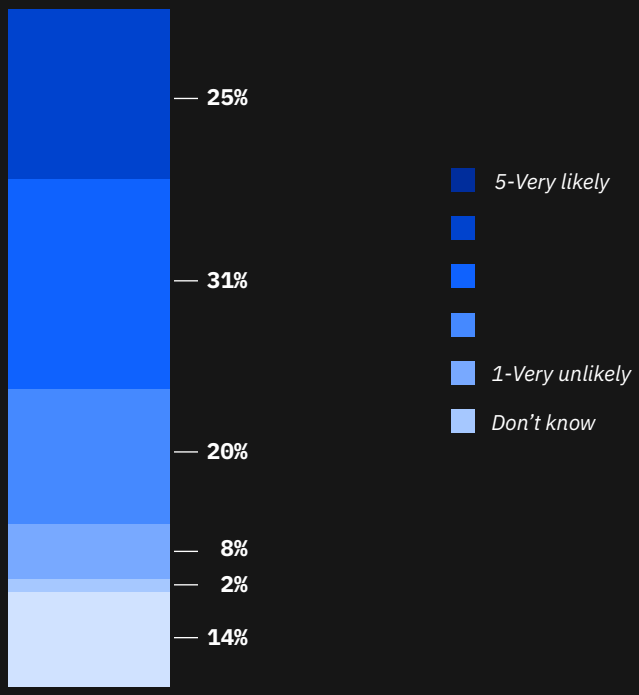



**Q18.** *How much do you agree or disagree with the following statements related to microservices?*

*Figure 5*

## Likelihood to use microservices in the next two years

*(Nonusers, n=209)*

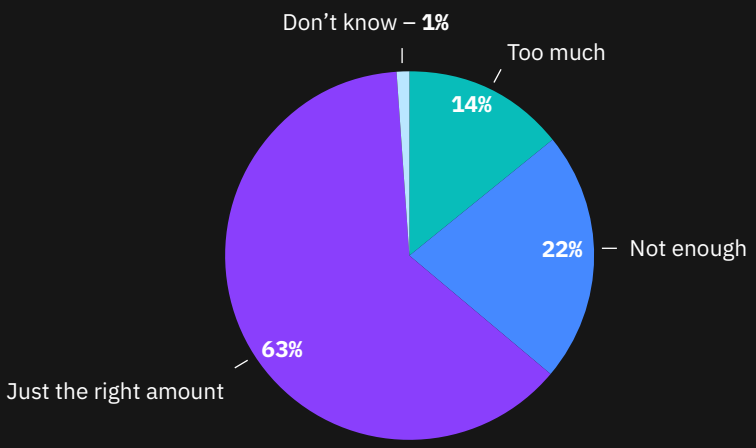



Q3. *How likely is your company to develop applications using microservices in the next two years?*

*Figure 6*

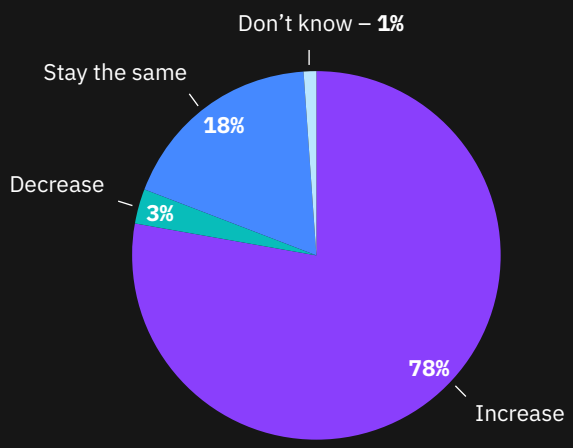
## Amount of money/time/effort around microservices is ...

*(Users, n=399)*




## Money/time/effort around microservices will likely ...

*(Users, n=399)*



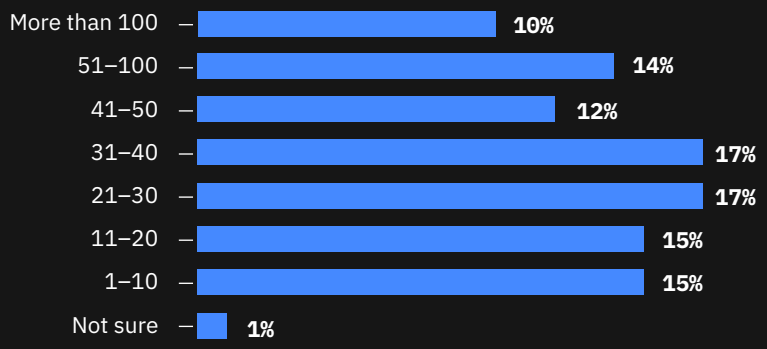

**Q11.** *Considering the approximate amount of money, time and effort your business is placing around microservices during the application development process, do you believe the amount is ...*

**Q12.** *And will this amount of money/time/effort on microservices likely increase, decrease or remain the same in the next two years?*

*Figure 7*

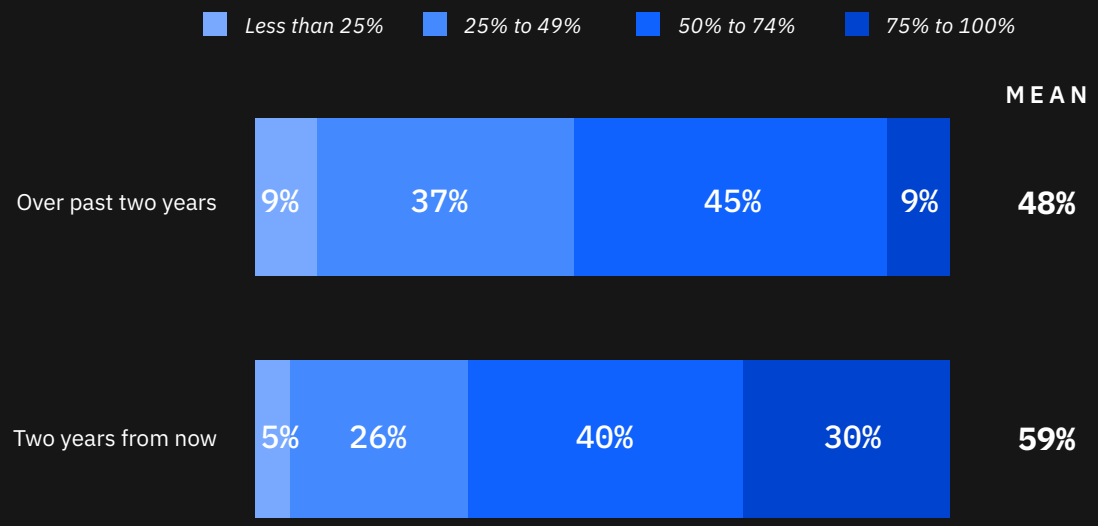
## Number of new applications developed over past two years

*(Users, n=399)*




## % of applications developed using microservices

*(Users who have developed 1+ app in past two years, n=396)*




**Q4a.** *Approximately how many new applications has your company developed over the past two years, either internally or through a third party?*

**Q4b.** *[Ask question if Q4a answer > 0] What percentage of these applications used microservices? What percentage of your future applications two years from now do you expect to be developed using microservices?*

*Figure 8*