GLOBAL MICROSERVICES TRENDS

A SURVEY OF DEVELOPMENT PROFESSIONALS

April 2018

dimensional research

Sponsored by LIGHTSTEP

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Introduction

Traditionally, software applications were developed as a single project with a single codebase and a single deployed binary. This worked well for small software applications, but ever-expanding feature lists and the demand for internet-scale usage patterns inevitably led to sprawling, inflexible, and complex codebases. These "monolithic applications" were difficult to maintain and operate: since most of the code is tightly coupled, it was difficult to make even minor changes without unintended consequences. Everyday maintenance, feature updates, scaling upticks, or new security requirements led to recurring nightmares for development and architecture teams, especially with the competitive push towards shorter software release cycles.

Technology innovators have embraced microservice architecture as an elegant solution to the manifold problems inherent to monoliths. By breaking applications down into lightweight and decoupled services that each serve a specific business need, development teams could deploy more frequently, scale more effectively, and avoid many of the problems of software monoliths. The promise of microservice architectures was compelling, and buzz grew as many development leaders embraced this new paradigm. But what is happening in real life? Are microservices solving problems as expected, or simply creating new problems? How is adoption progressing? What are the barriers?

The following report, sponsored by LightStep, is based on an online survey of 353 senior development stakeholders responsible for microservices adoption working at companies with more than 500 employees. The goal of this survey was to capture hard data on current adoption of microservices and gain practical insights into the real-life experiences of development teams.

DEFINITION: A "microservice" is a small, independently deployable, independently scalable software service that is designed to encapsulate a specific semantic function in the larger application. Modern applications can be entirely composed of microservices or leverage microservices as ancillary support for a monolithic application.

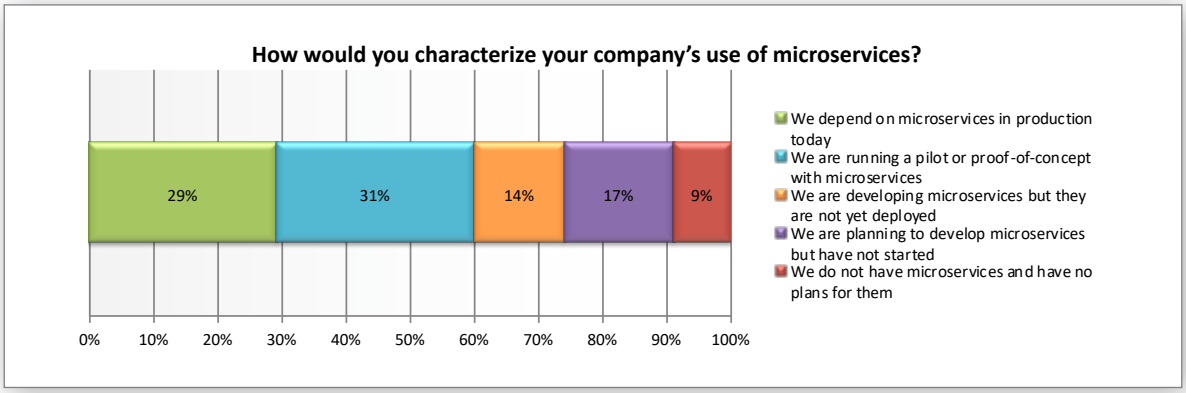
Key Findings

- **Microservices have become mainstream in the enterprise**
  - 91% are using or have plans to use microservices
  - 60% have microservices in pilot or production
  - 92% grew their number of microservices last year
  - 92% expect to grow their use of microservices in the coming year
  - 86% expect microservices to be the default within five years
- **Microservices adoption driven by need for agility and scalability**
  - Agility (82%) and scalability (78%) are the top motivators for microservices adoption
  - 63% of those with production microservices say they are already successful
- **Expect challenges and changes on the microservices journey**
  - 99% report challenges with using microservices
  - 56% say each additional microservice increases operational challenges
  - 73% find troubleshooting is harder in a microservices environment
  - 98% of those that face issues identifying the root cause of issues in microservices environments report it has a direct business impact
  - 87% of those in production report microservices generate more application data
- **Microservices performance management will be critical to success**
  - Additional performance management capabilities desired by microservice stakeholders
  - 74% plan to increase their microservice performance management investment in the coming year

Detailed Findings: Microservices have become mainstream in the enterprise

Enterprises are on a microservices adoption journey

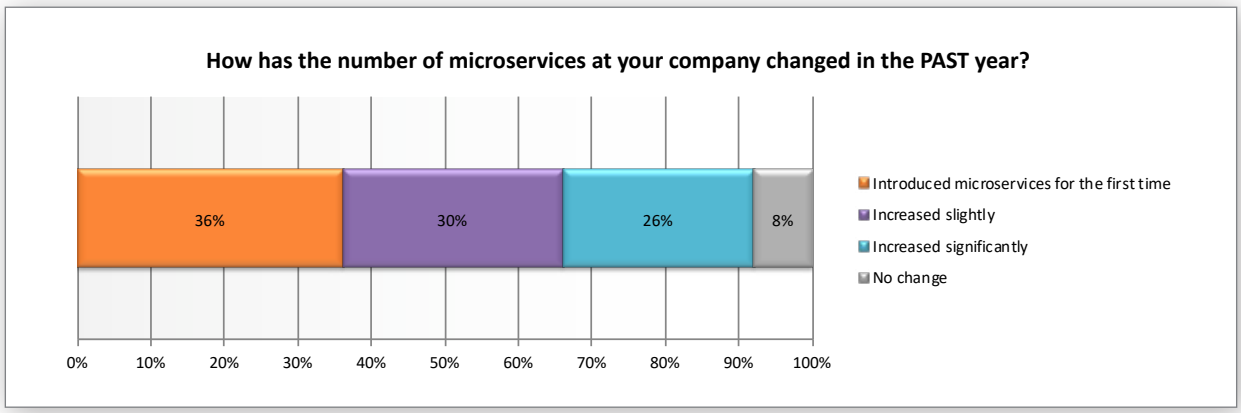
Microservices have become ubiquitous among enterprise development teams. About 9 in 10 (91%) are currently using or have plans to use microservices. For well over half (60%), adoption is already advanced. This includes close to a third (29%) who already depend on production microservices for their applications, and a further third (31%) that have an active pilot or proof-of-concept running.



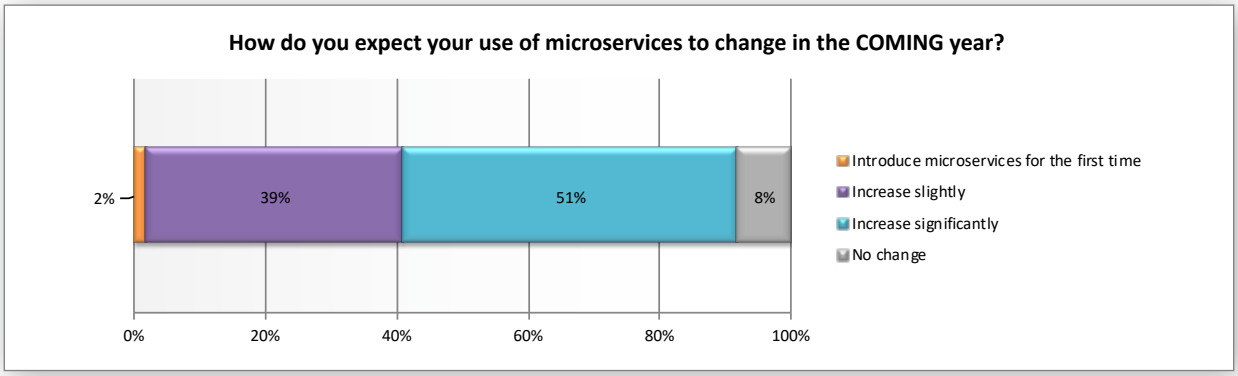
METHODOLOGY: The individuals who indicated that they had no plans for microservices were not asked further questions, as the goal was to focus on real-life experiences, not just opinions. The remainder of this research report includes feedback only from the 322 participants (91%) who are currently using or planning to use microservices.

Microservices growth is explosive

The use of microservices is moving incredibly quickly. In the past year, the vast majority of development teams at large companies (92%) reported an increase in their number of microservices. This included over a third (36%) who went from having no microservices to having some, and a quarter (26%) that characterized their increase as "significant." Only 8% reported no change in their number of microservices in the past year, and none (0%) reported that they had decreased.

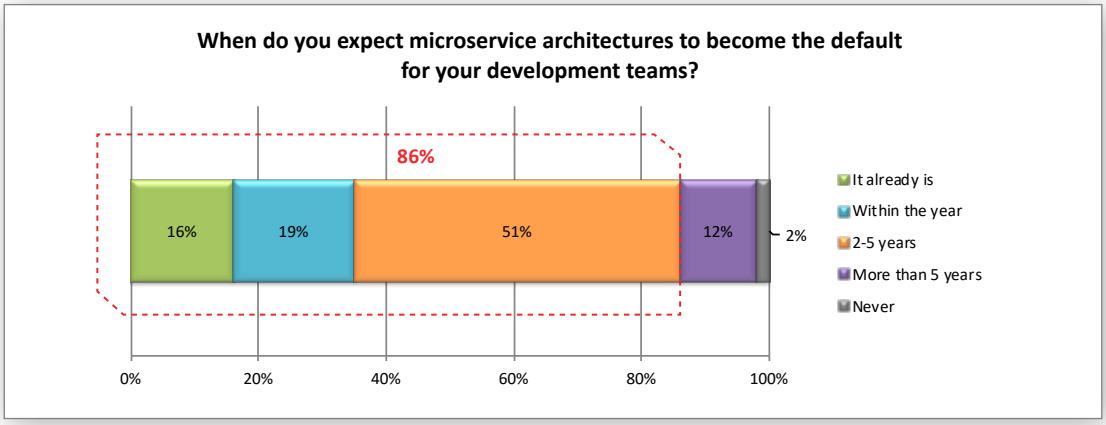


Similar growth rates are expected for the coming year with the majority (92%) reporting an expected increase in the use of microservices. This includes a full half (51%) who reported that they expected their increase to be "significant." Again none (0%) reported that their use of microservices would decline.



Microservices architecture expected to become the default

This growth in use of microservices is remarkable. However, many enterprises are still at the start of their migration, so we wanted to understand how far, and how quickly, microservices stakeholders expect to evolve. The answer is clear: enterprise development teams do not expect the momentum in microservices to slow down. Almost all (98%) expect microservices to become their default architecture, and the majority (86%) expect that to happen within the next five years.

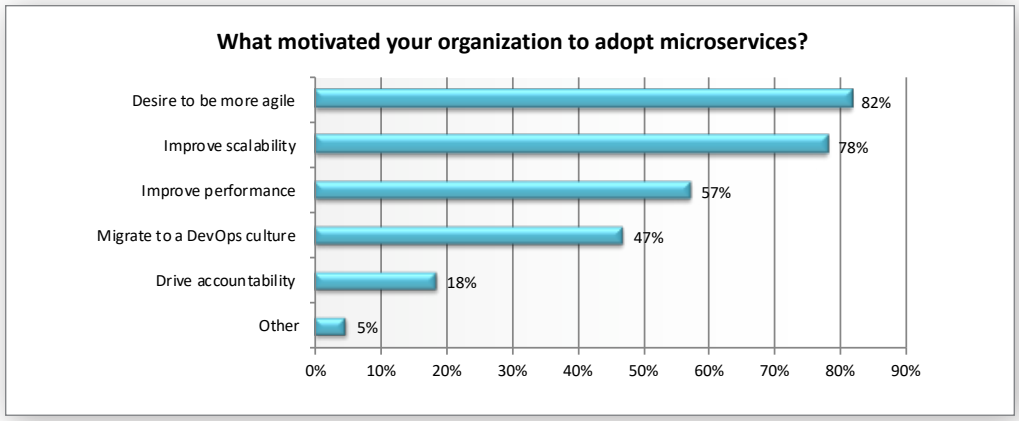


Detailed Findings: Microservices adoption driven by need for agility and scalability

Agility and scalability drives adoption of microservices

Development teams report a wide range of motivations for adopting a microservices architecture, but they are very consistent. The top two drivers were both reported by the majority of participants: agility (82%) and scalability (78%).

There were a wide variety of other motivators reported including over half (57%) that were inspired to adopt microservices because of a desire to improve performance, and close to half (47%) who reported that microservices were part of their migration to a DevOps culture. Just under a fifth (18%) were motivated by a drive to increase accountability in their organization.

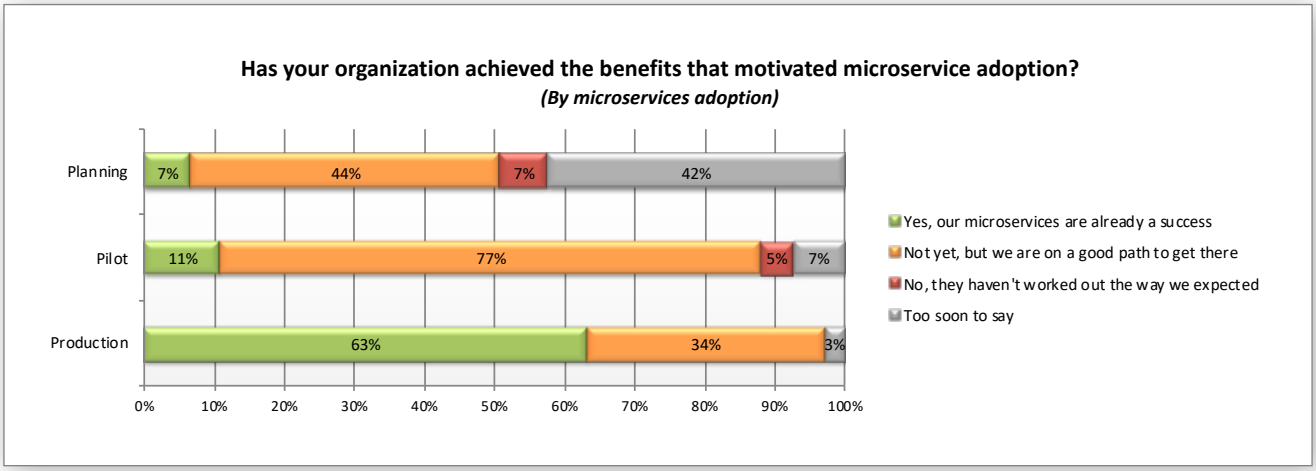


Participants were very engaged with the topic of microservices, and many took the time to write in detailed comments about their motivations. These included multiple answers about the need to simplify different steps in the application development cycle including support, security, deployment, maintenance, and rollbacks. Several reported their microservices adoption was driven by an overall technology strategy including cloud, a shift towards open APIs, or as a way to get more from large databases. Still others were motivated by a need for organizational separation and responsibility, requirement to deliver specific business requirements, or desired cost savings. And for some, their existing monolithic approach was simply far too painful, and they needed to try something else.

Microservices projects are resulting in tremendous success

There is great news for those considering microservices. Most enterprise development teams report that their microservices are delivering against expectations, and that confidence increases substantially as they gain experience.

Even among those that are still in the planning stage more than half (53%) report they are on a good path to achieve the benefits that motivated their adoption. This number includes some (7%) that already have met their goals even though they haven't deployed their microservices yet. These numbers grow dramatically with experience. Once microservices are put into production two thirds (63%) report they already have achieved success and a further third (34%) have high confidence that they will reach them.

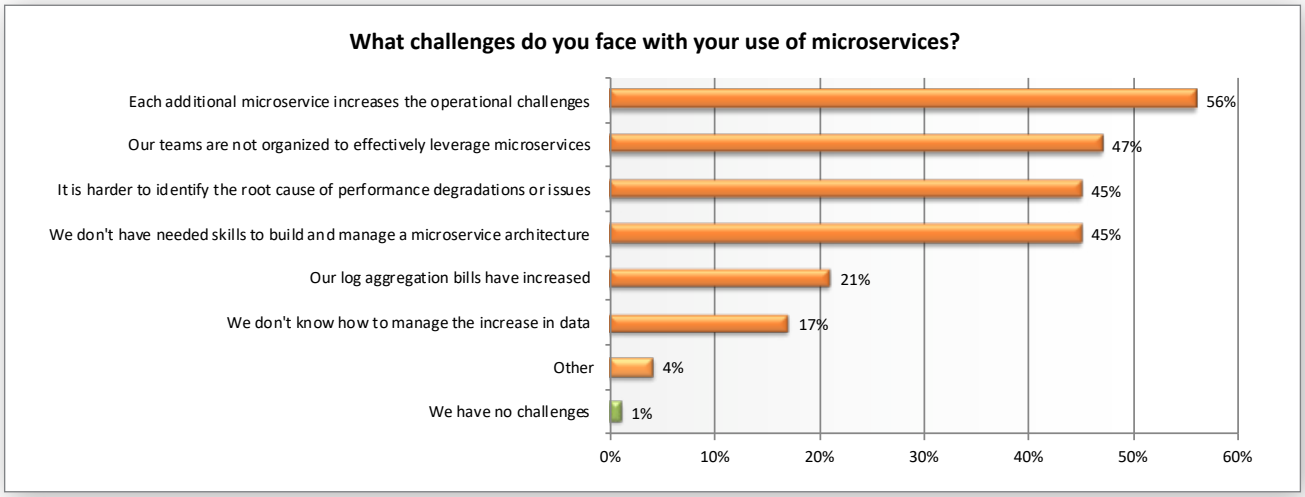


Detailed Findings: Expect challenges and change on the microservices adoption journey

Microservices adoption is not without challenges

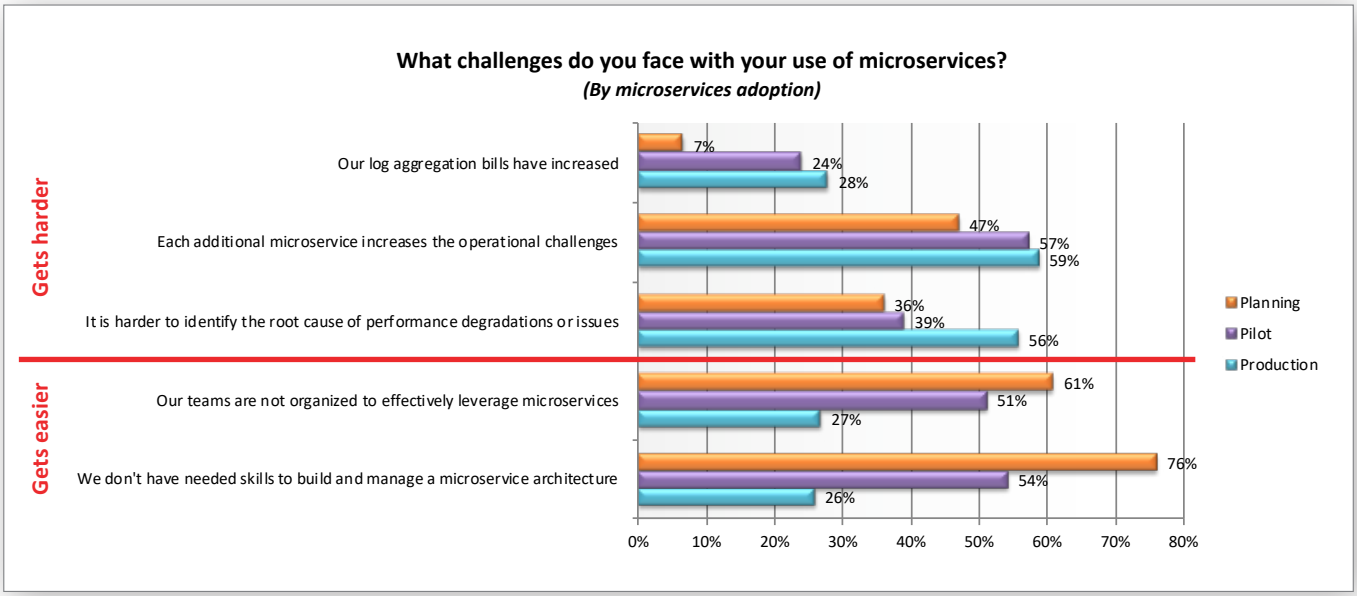
While microservices adoption has many potential benefits, the migration does involve doing many things in a different way. This change can create difficulties as teams adjust to a new way of doing things, and teams who are considering their own microservices strategies should plan for these, as almost all (99%) microservices stakeholders report that they have faced challenges.

The most common issue reported by microservices adopters, experienced by just over half (56%) is that each additional microservice increases the operational burden. Other frequently reported challenges include teams not being organized to leverage microservices (47%), increased difficulties with troubleshooting to find the root cause of performance issues (45%) and lacking needed skills to build and manage a microservices architecture (45%).



Many participants took the time to write in detailed comments about the challenges they have faced on their microservices migration. Several reported issues related to organization such as communication breakdowns and establishing boundaries between teams. For many, microservices created new issues around compliance and standards. Making decisions about where to start identifying building blocks within traditional monoliths was also reported as an issue, as was figuring out infrastructure needs, and determining the right service capabilities.

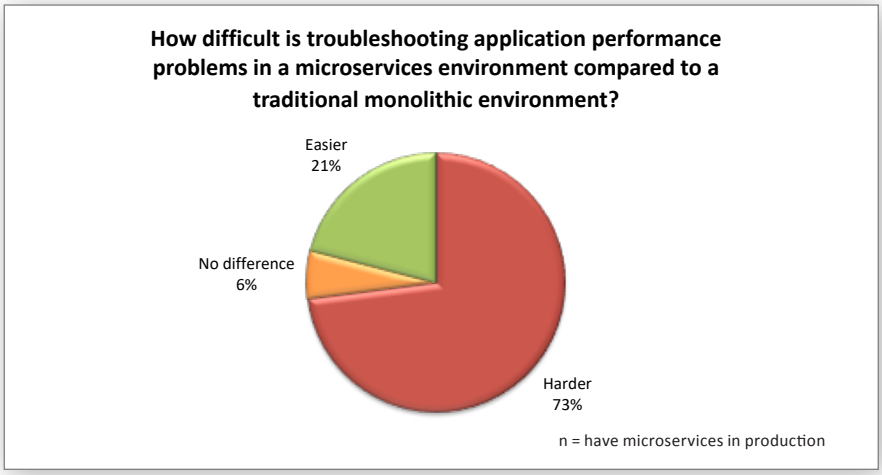
Interestingly, specific challenges faced by enterprise development teams changed rather dramatically as their adoption matured. By the time teams were in production with their microservices, team-related challenges including organization and skill were both reported much less frequently. On the other hand, issues such as increased log aggregation bills and increased operational issues were much more frequent. Challenges related to identifying the root cause of performance degradation or issues also jumped significantly with a move to production microservices.



Troubleshooting is harder in a microservices environment

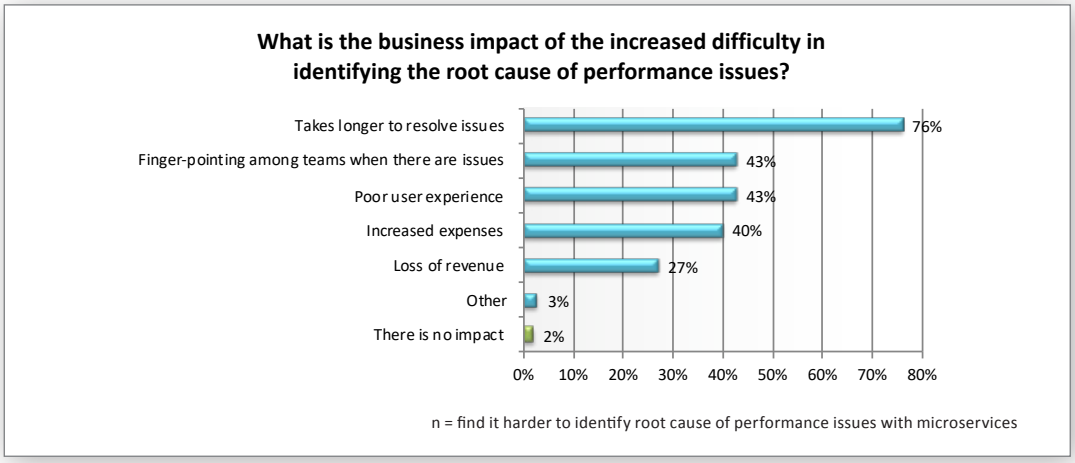
One of the hardest tasks for any development team is tracking down the cause of application performance problems. Troubleshooting within a complex environment is never easy. Unfortunately, microservices do not solve this problem.

Among those that have microservices in production, most (73%) report that they have found it is actually more difficult to troubleshoot in this environment than it is with a traditional monolithic application.

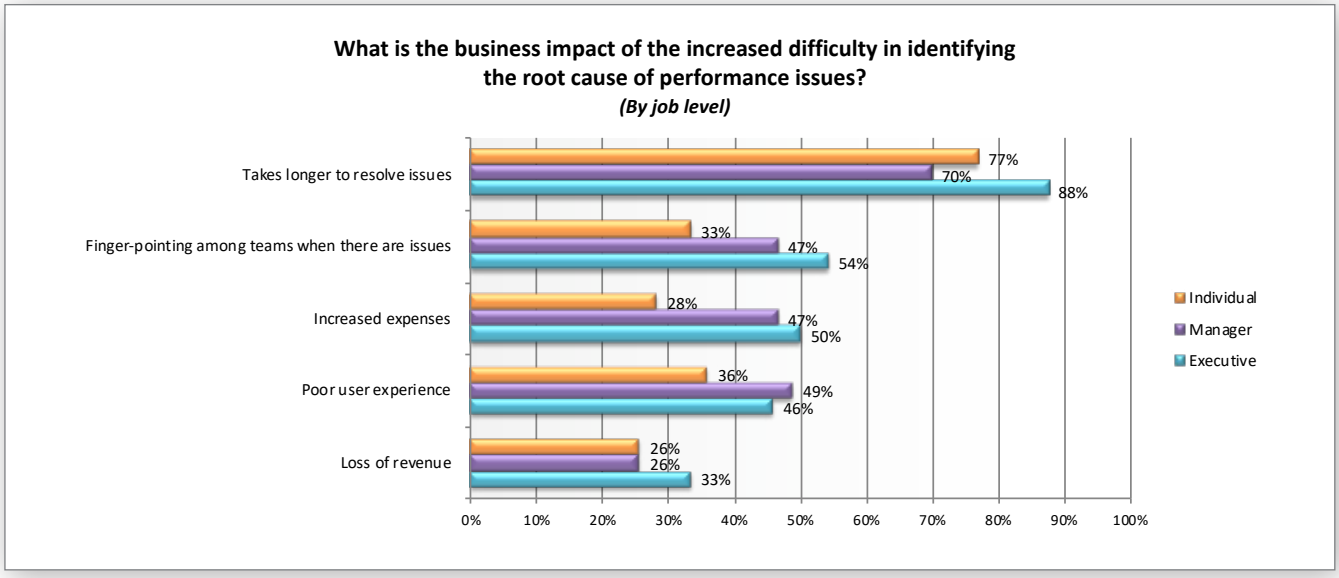


Increased difficulty in identifying root cause has clear business impact

These difficulties identifying and troubleshooting the root cause of performance issues are of significant concern, since these issues have real business impact. Almost all (98%) microservices stakeholders that report they face challenges identifying the root cause of performance issues say that it has a direct business impact. Taking longer to resolve issues is common (76%) which means development teams spend more time on these issues and application users are impacted longer. A range of other impacts were also reported including finger-pointing among teams when there are issues (43%), poor experience for end users (43%), higher costs (40%), or even loss of revenue for certain types of applications (27%). Some wrote comments about other business impacts which included an increased operational burden, as well as a need to invest in tools to aid in troubleshooting.

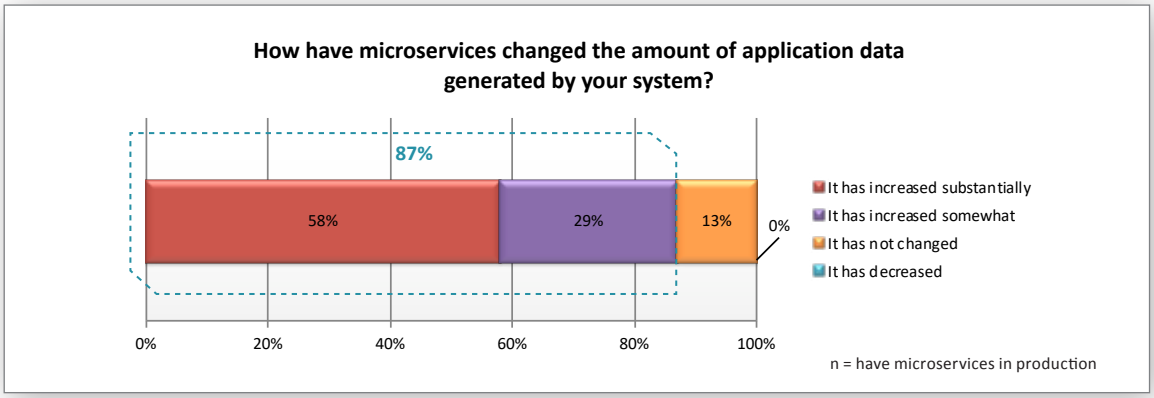


These business impacts are reported even more frequently among executives and team managers. These senior roles are particularly sensitive to direct financial impacts including both increased costs and lost revenue, as well as team issues such as finger-pointing.



Microservices frequently result in increase in application data

One of the key architectural differences in a microservices environment is that they process transactions through heavy use of cross-service API calls, which has caused an increase in application data volume. Most (87%) development teams with microservices in production report an increase in the amount of data generated. This includes more than half (58%) that characterize the additional data as a "substantial" increase.

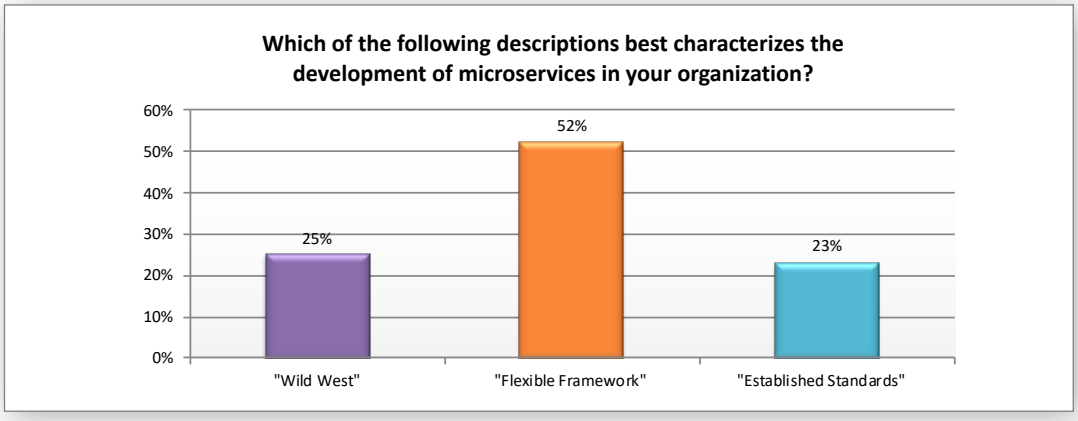


Standards and platforms for microservices are evolving

To understand the culture of teams using microservices, we asked survey participants to characterize their development efforts using the following categories:

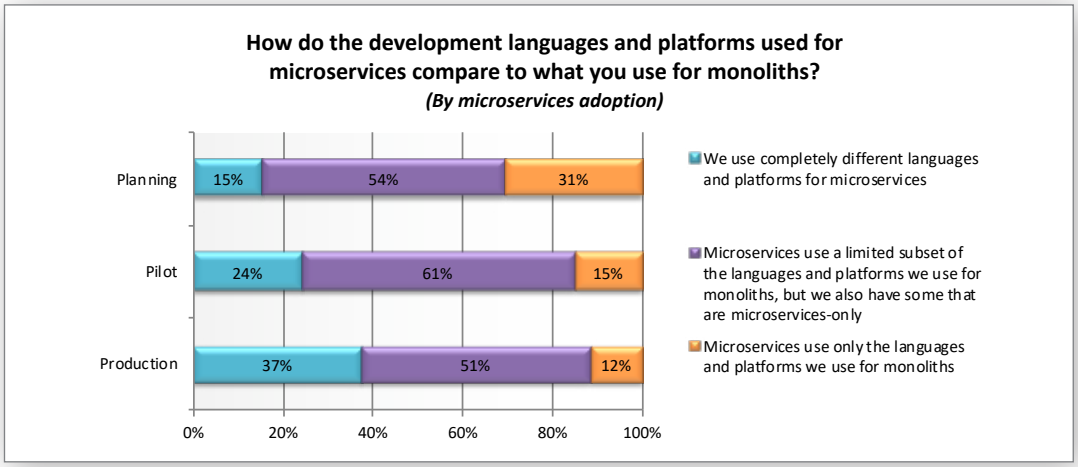
- **"Wild West"** - developers and teams have freedom to make all decisions around microservices use
- **"Flexible Framework"** - there are limits on the allowed languages and frameworks, but otherwise developers have freedom
- **"Established Standards"** - there are clear standards or a per-service template

Microservices teams cross the spectrum of these cultures. About a quarter (25%) are still freewheeling it in a "wild west" culture with complete freedom around how they choose to develop, while another quarter (23%) are at the other end of the spectrum with clearly "established standards." The remaining half (52%) are in the middle, with a "flexible framework" culture that gives some freedom within a limited set of options.



In a similar vein, no matter what point on the microservices journey a development team is on, there is a range of possible approaches to languages and platforms. In all stages there are some development teams who maintain similar languages and platforms to their existing monolith environments, while some are at the other end of the spectrum with unique choices only for their microservices, and most are somewhere in the middle.

However, it is interesting to note that languages and platforms do evolve as microservices adoption matures. As development teams move from planning to production, we see a distinct shift away from using the same languages and platforms, which is common for monolithic environments, towards using different languages that are chosen specifically for the needs of their microservices environments.



Detailed Findings: Microservices performance management will be critical to success

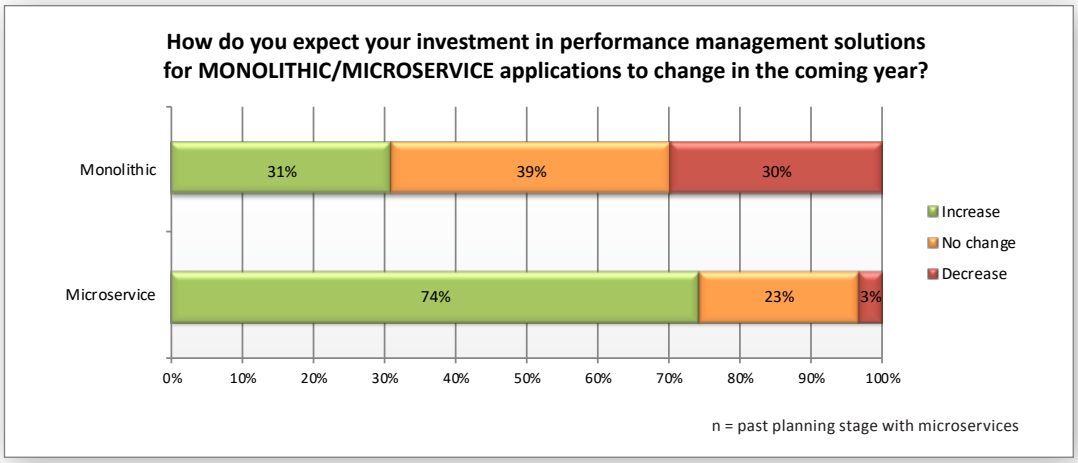
Microservice-specific performance management capabilities desired

Given the number of microservices adopters facing challenges with troubleshooting and root cause analysis, and the importance of doing that quickly to avoid business impacts, it is not surprising that there is a clear demand for additional application performance management capabilities for microservices environments. Our participants had many requests for features they would like to see, with the top 10 requests including:

1. Integrations with alerting systems and dashboards
2. Accessibility of data via APIs
3. Cross-platform support across languages and frameworks
4. Compliance (Data Scrubbing, PII management)
5. Agentless design
6. Establish Service Level Objectives for individual services
7. Availability of distributed traces for each performance issue
8. Monitor specific applications or versions of applications independently
9. Ability to manage performance from mobile and web clients to the microservices and monoliths
10. Monitor specific customers or types of customers independently

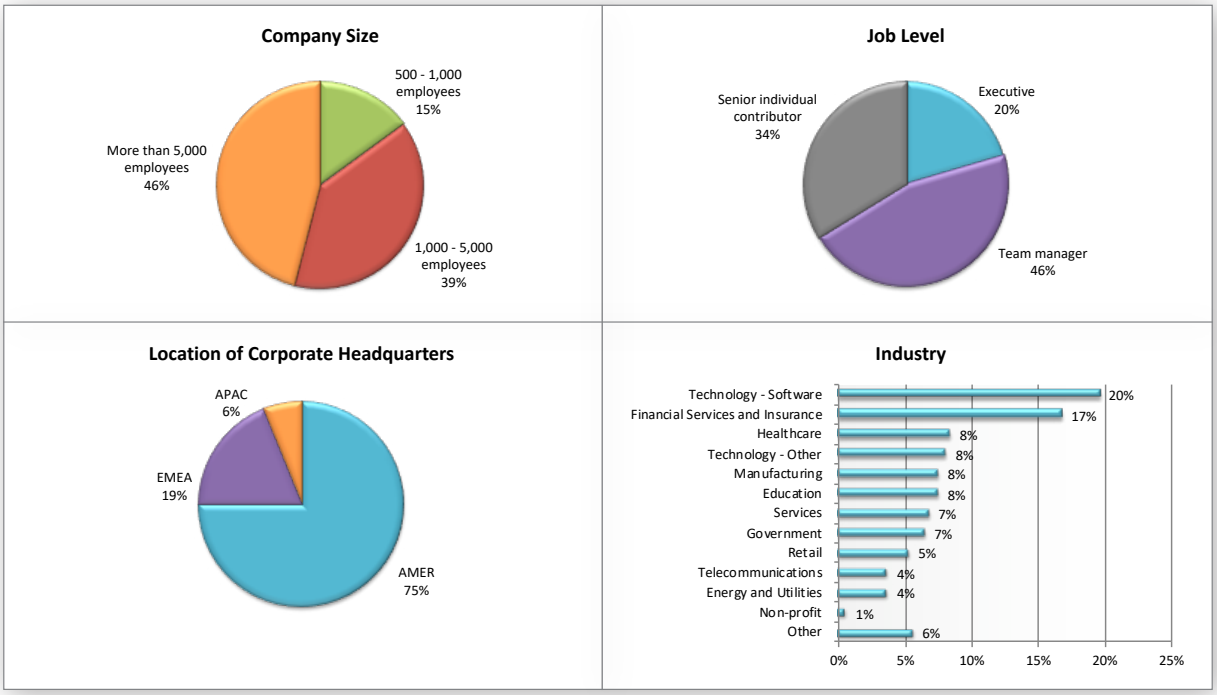
Enterprises are increasing investments in microservices performance management

These feature requests are more than idle dreams. Performance management for microservices will be a big area for investment in the coming year, with most (74%) microservices users who have moved past the planning stage reporting that they will increase their investment. Only a very small number (3%) say that they will spend less than they did this year. The money to fund these purchases will frequently be coming from existing expenditures for performance management of monolithic applications, since a third (30%) will be decreasing their investments in those types of solutions in the coming year.



Survey Methodology and Participant Demographics

An online survey was sent to independent databases of professionals responsible for software development and architecture. A total of 353 qualified development professionals with responsibility for microservices adoption at large enterprises participated in the survey. Most of this report focuses on the experience of the 322 individuals who reported that their teams are currently using or planning to use microservices. Participants in this global survey included a mix of job levels, company sizes, and industries.



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About LightStep

LightStep's mission is to deliver insights that put organizations back in control of their complex software applications. Its first product, LightStep [*x*]PM, is reinventing application performance management. It provides an accurate, detailed snapshot of the entire software system at any point in time, enabling organizations to identify bottlenecks and resolve incidents rapidly. LightStep is backed by Redpoint and Sequoia and is headquartered in San Francisco, CA. For more information, visit https://lightstep.com or follow at @LightStepHQ.