



# Top challenges for CIOs in a software-driven, hybrid, multi-cloud world

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2019–20 Global CIO Report

# Software rules the world

**Software rules the world. Retail, financial markets, transportation, emergency services, government bodies. Every industry, and every company, is transforming itself with software to deliver innovative digital services that capture new markets and reduce operational costs.**

However, as the software landscape evolves, enterprise applications, and the hybrid cloud environments they run in, are increasingly dynamic and complex — thousands of connected services, millions of lines of code, trillions of dependencies.

One break in this complex delivery chain can mean significant revenue loss and reputational damage.

Consequently, technical leaders around the world are concerned about the effect this has on IT performance and ultimately, the business. This report shines a light on this modern-day challenge and why IT complexity is pushing to the top of the list as one of the biggest concerns for CIOs in 2019–20.

# What's inside

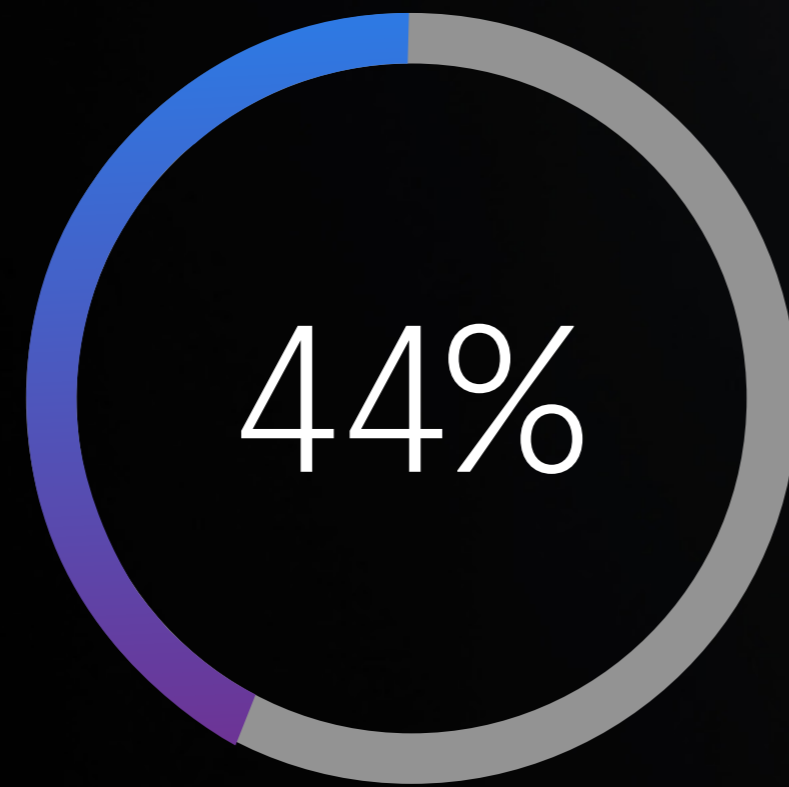
- 1** Software is transforming every business
- 2** Enterprise “cloud-first” strategies increase complexity
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# Software is transforming every business

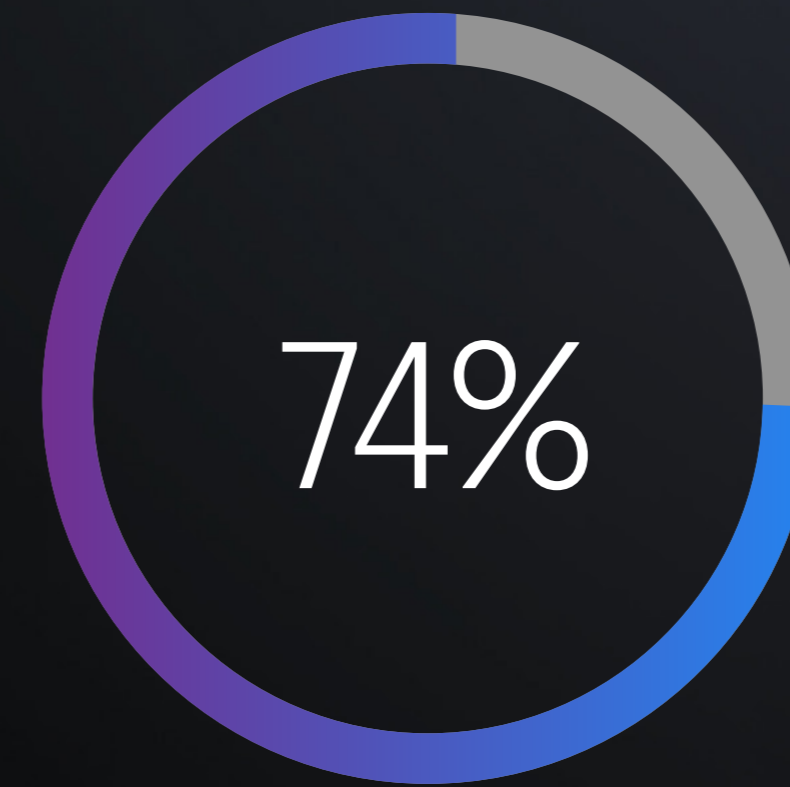
Every company, in every industry, is transforming into a software business. The way enterprises interact with customers, assure quality experiences and optimize revenues is driven by applications and the hybrid, multi-cloud environments underpinning them. Success or failure comes down to the software supporting these efforts. The pressure of this “run-the-business” software performing properly has significant ramifications for IT professionals.



# Software is transforming every business



of CIOs fear there could be a threat to the existence of their business if they are **unable to manage IT performance.**



of CIOs say that increased complexity could soon make it **extremely difficult to manage performance** efficiently.

# Software is transforming every business

CIOs highlighted a number of concerns if IT performance becomes too difficult to manage:



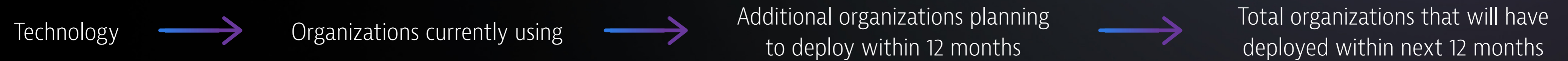
# Enterprise “cloud-first” strategies increase complexity

Underpinning the software revolution is the enterprise cloud, allowing companies to innovate faster and better meet the needs of customers. The enterprise cloud is dynamic, hybrid, multi-cloud, and web-scale, containing hundreds of technologies, millions of lines of code and billions of dependencies. However, this transformation isn't simply about lifting and shifting apps to the cloud, it's a fundamental shift in how applications are built, deployed and operated.



# Enterprise “cloud-first” strategies increase complexity

The vast majority of CIOs expect to have deployed new stack technologies in the next 12 months



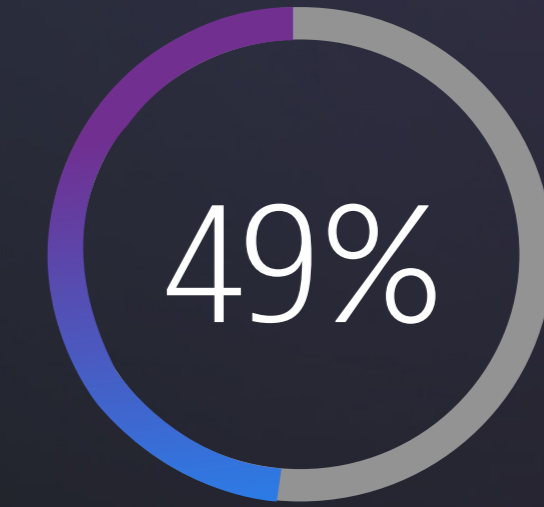
Technology	Organizations currently using	Additional organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	70%	18%	<b>88%</b>
Containers	68%	18%	<b>86%</b>
Serverless Computing	60%	25%	<b>85%</b>
PaaS	75%	14%	<b>89%</b>
SaaS	83%	11%	<b>94%</b>
IaaS	77%	14%	<b>91%</b>
Private cloud	87%	8%	<b>95%</b>

A single web or mobile application transaction now crosses an average of 37 different technology systems or components.

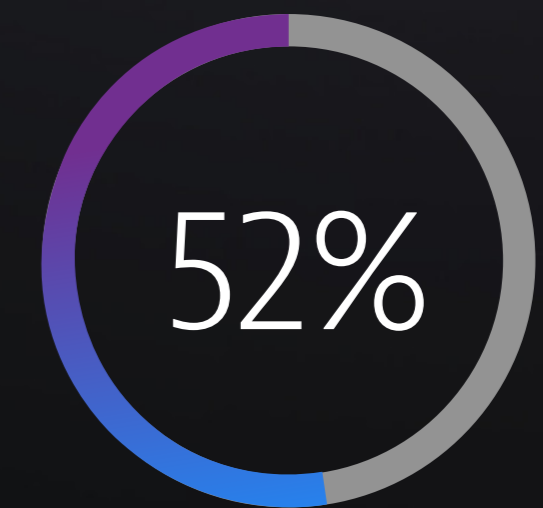
# The age of the customer increases pressure

We are squarely in the age of the customer, where high quality service is paramount due to the ease with which customers will try competitive offerings and share their experiences instantly via social media. However, businesses are struggling to combat IT complexity that threatens the customer experience.

On average, organizations have suffered **6 IT outages** where user experiences, business revenues or operations were impacted in the last 12 months.



of CIOs say that lost revenue and reputational damage

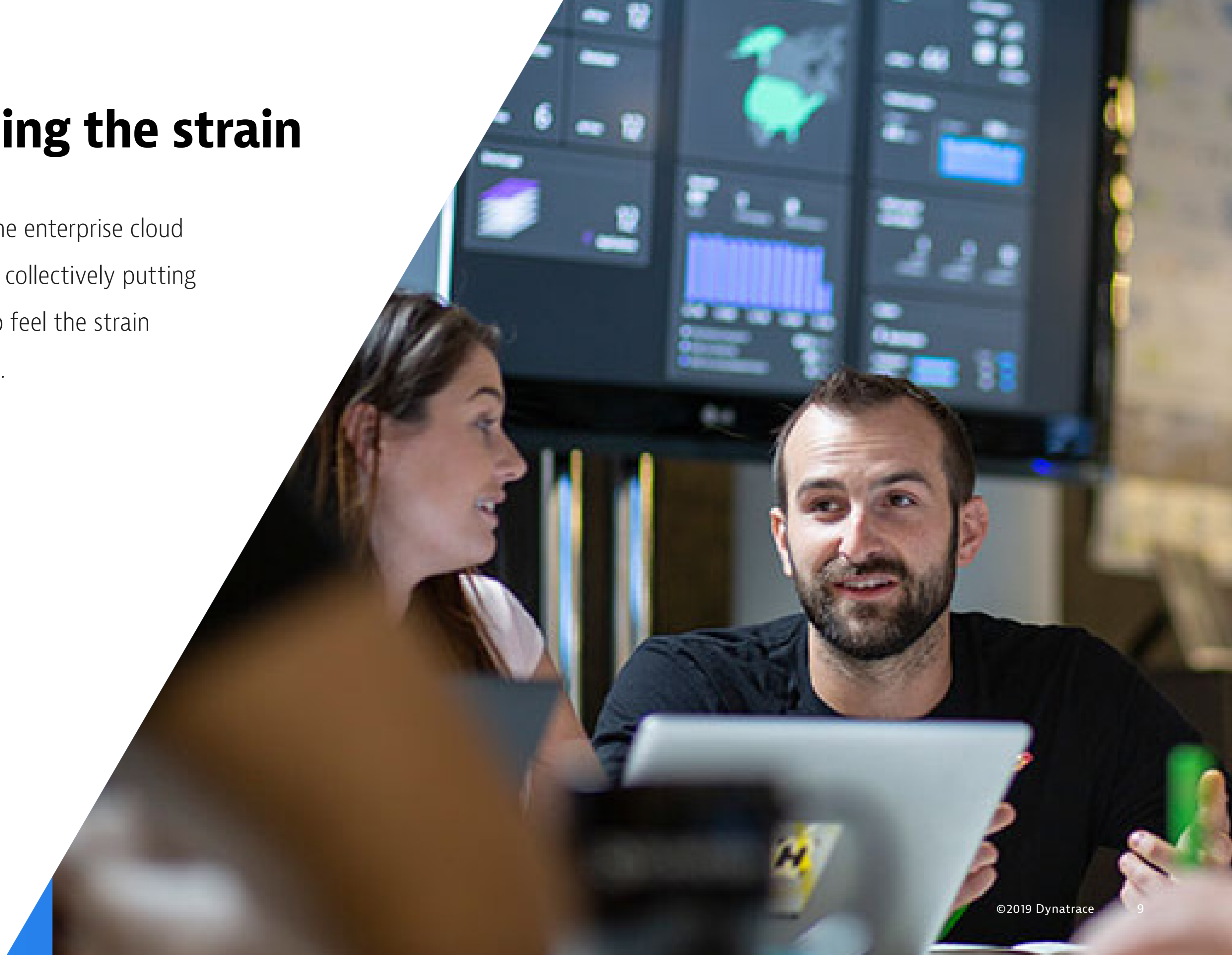


are among the biggest concerns as they digitally transform and move to the cloud.

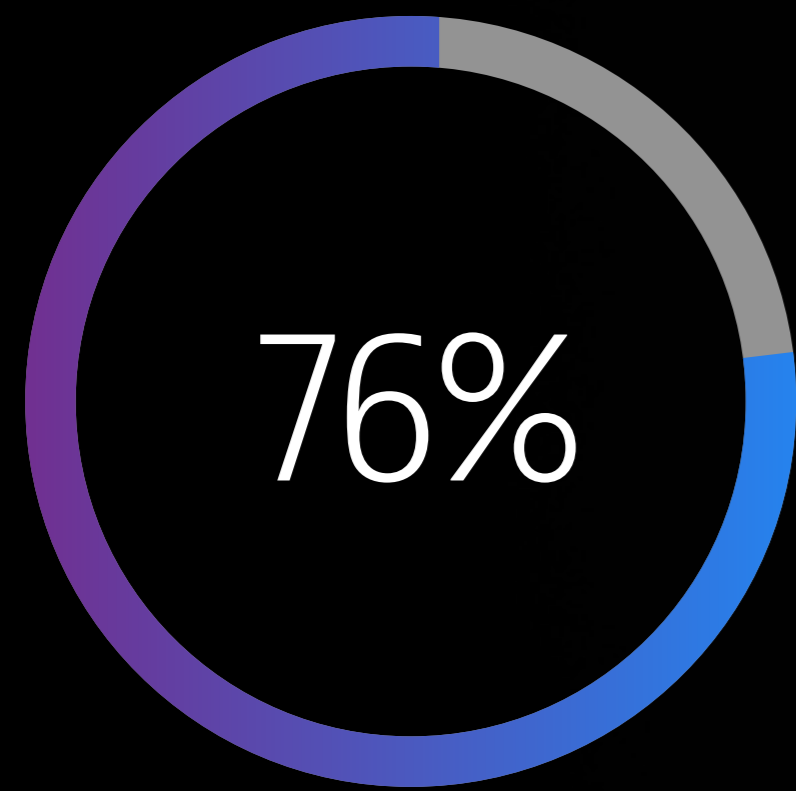


# IT teams are feeling the strain

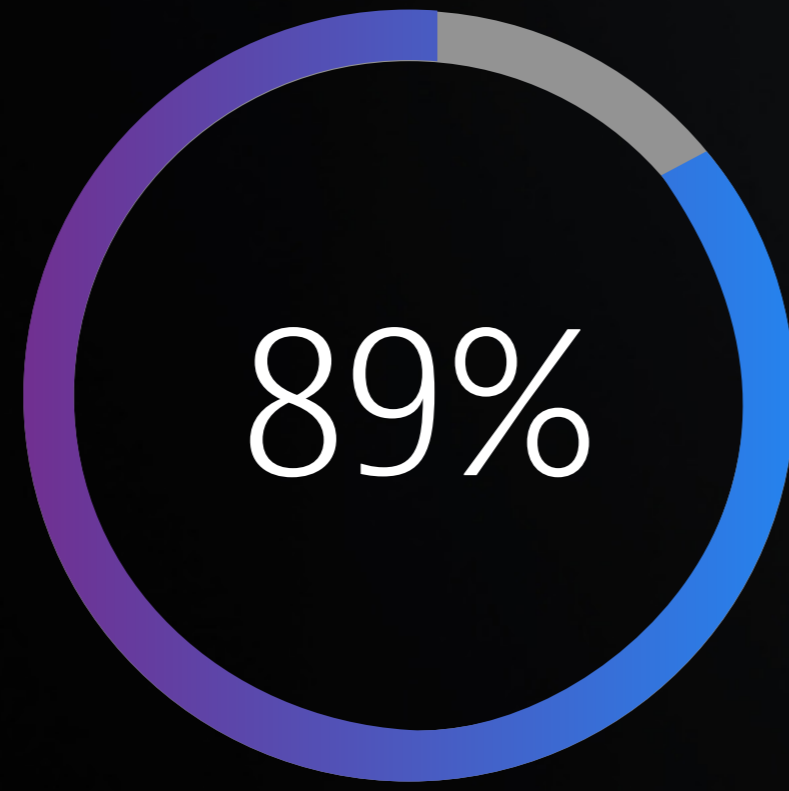
Digital transformation, migration to the enterprise cloud and increasing customer demands are collectively putting pressure on IT teams, who continue to feel the strain especially as it relates to performance.



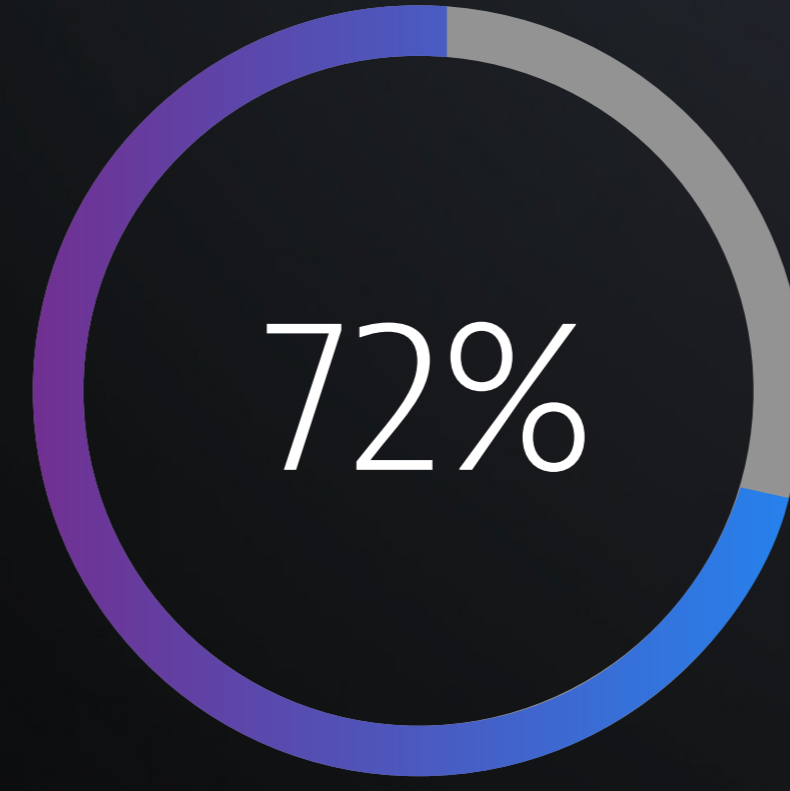
# IT teams are feeling the strain



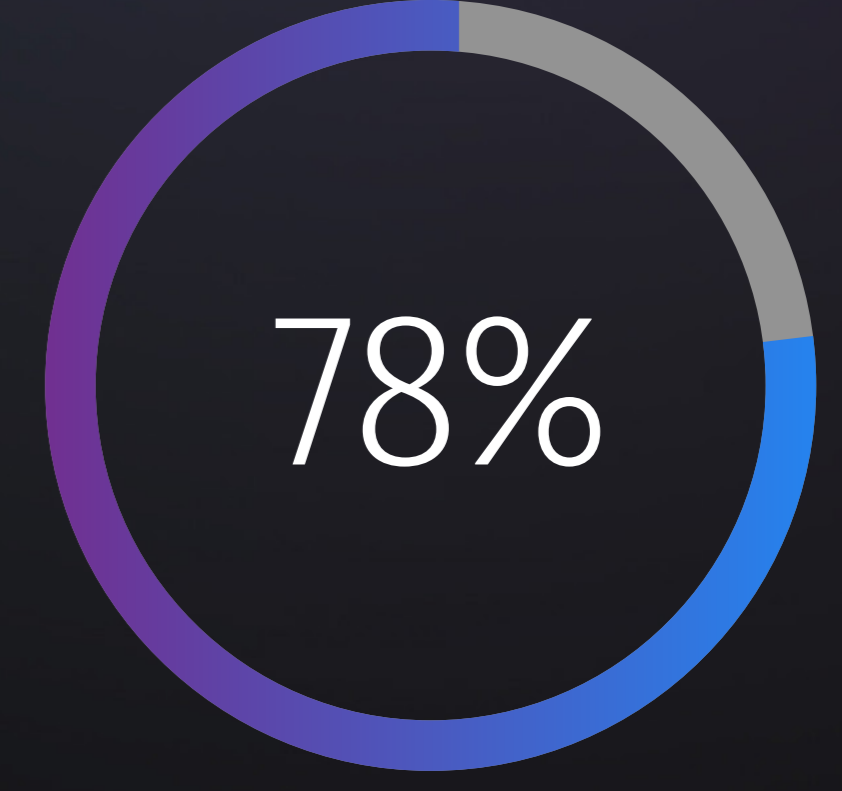
of CIOs say they don't have complete visibility into application performance in cloud native architectures.



of CIOs say increasing complexity and the challenges of keeping a CMDB up to date in real-time is making service management more difficult.



of CIOs say monitoring the performance of microservices in real-time is almost impossible.



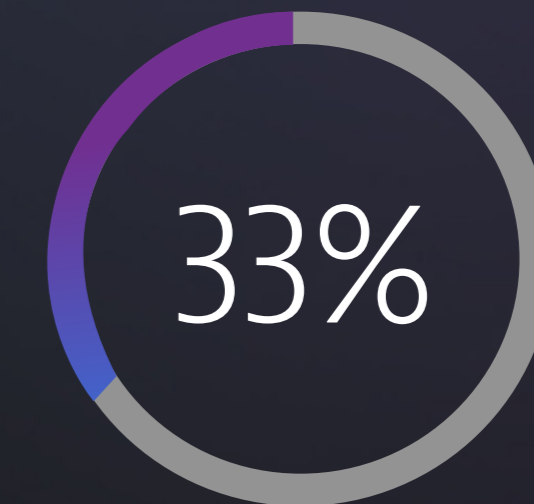
of CIOs are frustrated that so much time is spent setting up monitoring for different cloud environments when deploying new services.

# IT teams are feeling the strain

## Challenges of managing the performance of microservices in containerized environments:

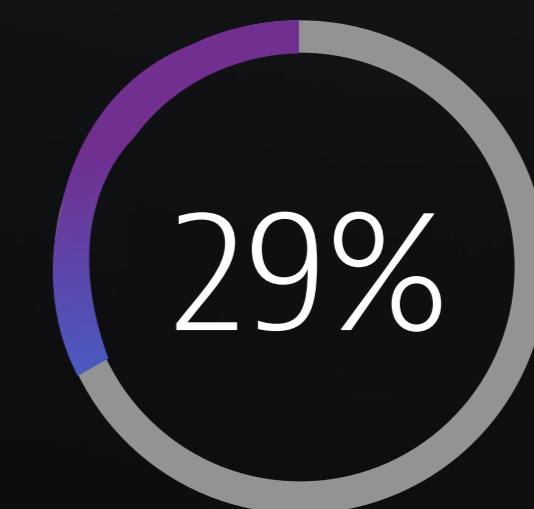
Maintaining and configuring performance monitoring	→	<b>49%</b>
Identifying the impact that container resource consumption has on microservice performance	→	<b>48%</b>
Identifying service dependencies and interactions	→	<b>46%</b>
Limited visibility into the microservice layer	→	<b>45%</b>
Identifying clustered processes supporting services	→	<b>39%</b>
Limitations of Docker API metrics	→	<b>34%</b>

The average proportion of IT teams' time spent tackling digital performance problems in 2019 is



\$3,366,000 is the average organizational overhead for dealing with performance problems\* in 2019 — a 34% increase in the average organizational overhead for dealing with performance problems\* since 2018.

In comparison, the average proportion of IT teams' time spent tackling digital performance problems in 2018 was:



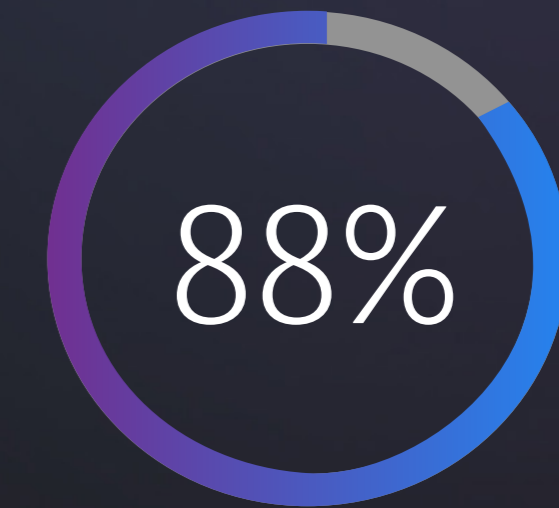
\*Based on the average annual spend on IT staff and percentage of IT's time spent dealing with digital performance problems.

# AI adoption surges amongst enterprises

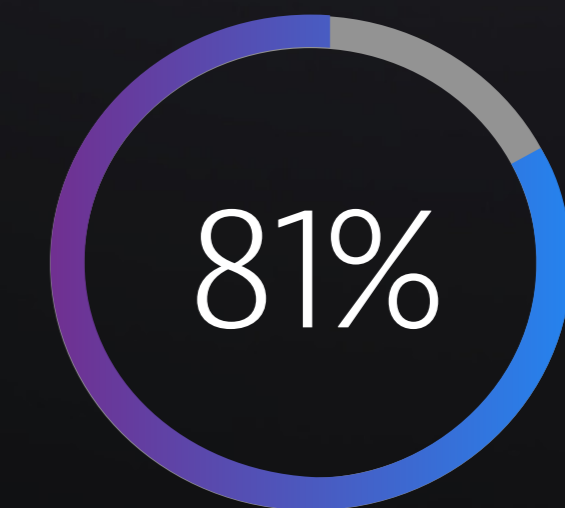
Traditional methods are no longer sufficient to succeed in today's cloud environments, so organizations must look to take a different approach.

**"As complexity grows beyond IT teams' capabilities, the economics of throwing more manpower at the problem no longer works. Organizations need a radically different approach. That's why we reinvented from the ground up, creating an all-in-one platform with AI at the core."**

—Bernd Greifeneder, CTO and Founder, Dynatrace



of CIOs say that they believe AI will be critical to IT's ability to master increasing complexity, up from



in 2018.

# Methodology

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This report is based on a global survey of 800 CIOs in large enterprises with over 1,000 employees, conducted by Vanson Bourne and commissioned by Dynatrace.

The sample included 200 respondents in the US, 100 in the UK, France, Germany and China, and 50 in Australia, Singapore, Brazil and Mexico respectively.

# The Dynatrace difference

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The Dynatrace Software Intelligence Platform automatically discovers and captures high fidelity data from applications, containers, services, processes, and infrastructure. It then automatically maps the billions of dependencies and interconnections in these complex environments. Finally, the AI engine, Davis, analyzes this data and its dependencies in real-time to instantly provide precise answers — not just more data on glass. It's this level of automation and intelligence that overcomes the challenges presented by the enterprise cloud and enables teams to develop better software faster, automate operations and deliver better business results.

## Why we are radically different

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### Automatic

Zero-touch configuration, continuous discovery and relationship mapping in real-time, instant answers and precise causation.

### Full-stack

Understand all the relationships and interdependencies, top to bottom, from end-user experience to infrastructure health.

### AI at the core

Radically different open AI engine, Davis, processes billions of dependencies for instantly precise answers beyond human capabilities.

### Web-scale

Scale-out cloud native architecture, role-based governance for large global teams, and automatic enterprise-wide deployment.

# Dynatrace supports a wide range of platforms and operating systems



The biggest hybrid, multi-cloud environments rely on Dynatrace:

**SAMSUNG**



**DAIMLER**



# Appendix: Global data summary

CIOs concerned that rising IT complexity could soon make it extremely difficult to manage performance efficiently and effectively

Country	Number of CIOs
Global	74%
US	76%
UK	68%
France	77%
Germany	71%
China	56%
Australia	80%
Singapore	84%
Brazil	90%
Mexico	76%



# Appendix: Global data summary

CIOs' biggest concerns if IT performance becomes too difficult to manage

## Global

Concern	
Inability to provide a good customer experience	55%
Impact on company reputation	52%
Lost revenue	49%
Threat to the existence of our business	44%
Impact on customers' livelihoods	35%
Impact on public services	35%

## US

Concern	
Inability to provide a good customer experience	61%
Impact on company reputation	56%
Lost revenue	60%
Threat to the existence of our business	41%
Impact on customers' livelihoods	41%
Impact on public services	41%

# Appendix: Global data summary

CIOs' biggest concerns if IT performance becomes too difficult to manage

## UK

Concern	
Inability to provide a good customer experience	69%
Impact on company reputation	63%
Lost revenue	44%
Threat to the existence of our business	34%
Impact on customers' livelihoods	22%
Impact on public services	32%

## France

Concern	
Inability to provide a good customer experience	48%
Impact on company reputation	44%
Lost revenue	55%
Threat to the existence of our business	52%
Impact on customers' livelihoods	44%
Impact on public services	25%

# Appendix: Global data summary

CIOs' biggest concerns if IT performance becomes too difficult to manage

## Germany

Concern	
Inability to provide a good customer experience	39%
Impact on company reputation	44%
Lost revenue	44%
Threat to the existence of our business	45%
Impact on customers' livelihoods	32%
Impact on public services	38%

## China

Concern	
Inability to provide a good customer experience	38%
Impact on company reputation	48%
Lost revenue	29%
Threat to the existence of our business	48%
Impact on customers' livelihoods	29%
Impact on public services	52%

# Appendix: Global data summary

CIOs' biggest concerns if IT performance becomes too difficult to manage

## Australia

Concern	
Inability to provide a good customer experience	68%
Impact on company reputation	45%
Lost revenue	43%
Threat to the existence of our business	53%
Impact on customers' livelihoods	43%
Impact on public services	43%

## Singapore

Concern	
Inability to w a good customer experience	50%
Impact on company reputation	55%
Lost revenue	52%
Threat to the existence of our business	62%
Impact on customers' livelihoods	24%
Impact on public services	24%

# Appendix: Global data summary

CIOs' biggest concerns if IT performance becomes too difficult to manage

## Brazil

Concern	
Inability to provide a good customer experience	56%
Impact on company reputation	64%
Lost revenue	47%
Threat to the existence of our business	38%
Impact on customers' livelihoods	36%
Impact on public services	24%

## Mexico

Concern	
Inability to provide a good customer experience	66%
Impact on company reputation	45%
Lost revenue	50%
Threat to the existence of our business	32%
Impact on customers' livelihoods	40%
Impact on public services	29%

# Appendix: Global data summary

CIO adoption of new stack technologies

## Global

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	70%	18%	88%
Containers	68%	18%	86%
Serverless computing	59%	25%	84%
PaaS	74%	14%	88%
SaaS	83%	11%	94%
IaaS	77%	14%	91%
Private cloud	88%	8%	96%

## US

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	65%	21%	86%
Containers	68%	16%	84%
Serverless computing	58%	27%	85%
PaaS	72%	12%	84%
SaaS	80%	10%	90%
IaaS	76%	12%	88%
Private cloud	87%	10%	97%

# Appendix: Global data summary

CIO adoption of new stack technologies

## UK

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	51%	17%	68%
Containers	52%	18%	70%
Serverless computing	37%	29%	66%
PaaS	61%	17%	78%
SaaS	81%	12%	93%
IaaS	74%	15%	89%
Private cloud	79%	10%	89%

## France

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	76%	19%	95%
Containers	70%	20%	90%
Serverless computing	66%	17%	83%
PaaS	78%	13%	91%
SaaS	88%	9%	97%
IaaS	83%	12%	95%
Private cloud	90%	6%	96%

# Appendix: Global data summary

CIO adoption of new stack technologies

## Germany

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	70%	19%	89%
Containers	69%	18%	87%
Serverless computing	61%	23%	84%
PaaS	73%	18%	91%
SaaS	82%	15%	97%
IaaS	79%	12%	91%
Private cloud	88%	6%	94%

## China

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	82%	14%	96%
Containers	81%	14%	95%
Serverless computing	65%	29%	94%
PaaS	84%	9%	93%
SaaS	82%	13%	95%
IaaS	79%	14%	93%
Private cloud	89%	8%	97%



# Appendix: Global data summary

CIO adoption of new stack technologies

## Australia

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	54%	32%	86%
Containers	76%	14%	90%
Serverless computing	66%	20%	86%
PaaS	70%	16%	86%
SaaS	88%	8%	96%
IaaS	72%	20%	92%
Private cloud	92%	4%	96%

## Singapore

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	74%	16%	90%
Containers	64%	24%	88%
Serverless computing	68%	20%	88%
PaaS	70%	18%	88%
SaaS	82%	8%	90%
IaaS	78%	16%	94%
Private cloud	86%	10%	96%

# Appendix: Global data summary

CIO adoption of new stack technologies

## Brazil

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	84%	12%	96%
Containers	68%	24%	92%
Serverless computing	62%	30%	92%
PaaS	88%	10%	98%
SaaS	82%	14%	96%
IaaS	84%	14%	98%
Private cloud	94%	6%	100%

## Mexico

Technology	Organizations currently using	Organizations planning to deploy within 12 months	Total organizations that will have deployed within next 12 months
Microservices	86%	10%	96%
Containers	70%	24%	94%
Serverless computing	58%	32%	90%
PaaS	70%	16%	86%
SaaS	84%	14%	98%
IaaS	70%	26%	96%
Private cloud	90%	8%	98%

# Appendix: Global data summary

A single transaction on a web or mobile application can touch multiple technology systems or components on its journey

Country	Average number of different technology systems or components
Global	37
US	36
UK	43
France	34
Germany	39
China	32
Australia	33
Singapore	38
Brazil	43
Mexico	35

# Appendix: Global data summary

The burden of IT outages

Country	Average number of IT outages businesses have suffered in the last 12 months where user experiences, business revenues or operations were impacted
Global	6
US	5
UK	5
France	6
Germany	5
China	6
Australia	6
Singapore	5
Brazil	6
Mexico	6

# Appendix: Global data summary

Challenges of monitoring cloud native environments create performance blind spots

Country	Average proportion of organizations that don't have complete visibility into the performance of applications in cloud native architectures	CIOs say increasing complexity and the challenges of keeping a CMDB up to date in real-time is making service management more difficult	CIOs say monitoring the performance of microservices in real-time is almost impossible
Global	76%	88%	72%
US	69%	85%	81%
UK	92%	93%	79%
France	83%	94%	57%
Germany	83%	96%	77%
China	55%	80%	53%
Australia	78%	90%	86%
Singapore	80%	96%	74%
Brazil	72%	86%	68%
Mexico	86%	76%	66%

# Appendix: Global data summary

Managing cloud performance is a significant burden for IT teams

Country	CIOs find it a frustration that IT teams have to spend so much time setting up monitoring for different cloud environments / providers when deploying new services	Average number of monitoring tools organizations have deployed
Global	78%	12
US	82%	12
UK	72%	12
France	82%	14
Germany	76%	15
China	58%	9
Australia	84%	12
Singapore	86%	10
Brazil	92%	16
Mexico	88%	14

# Appendix: Global data summary

Challenges of managing the performance of microservices in containerized environments

## Global

Challenge	
Maintaining and configuring performance monitoring	49%
Identifying the impact that container resource consumption has on microservice performance	48%
Identifying service dependencies and interactions	46%
Limited visibility into the microservice layer	45%
Identifying clustered processes supporting services	39%
Limitations of Docker API metrics	34%

## US

Challenge	
Maintaining and configuring performance monitoring	46%
Identifying the impact that container resource consumption has on microservice performance	49%
Identifying service dependencies and interactions	49%
Limited visibility into the microservice layer	46%
Identifying clustered processes supporting services	45%
Limitations of Docker API metrics	32%

# Appendix: Global data summary

Challenges of managing the performance of microservices in containerized environments

## UK

Challenge	
Maintaining and configuring performance monitoring	35%
Identifying the impact that container resource consumption has on microservice performance	43%
Identifying service dependencies and interactions	31%
Limited visibility into the microservice layer	31%
Identifying clustered processes supporting services	33%
Limitations of Docker API metrics	24%

## France

Challenge	
Maintaining and configuring performance monitoring	50%
Identifying the impact that container resource consumption has on microservice performance	43%
Identifying service dependencies and interactions	51%
Limited visibility into the microservice layer	48%
Identifying clustered processes supporting services	33%
Limitations of Docker API metrics	35%



# Appendix: Global data summary

Challenges of managing the performance of microservices in containerized environments

## Germany

Challenge	
Maintaining and configuring performance monitoring	52%
Identifying the impact that container resource consumption has on microservice performance	42%
Identifying service dependencies and interactions	48%
Limited visibility into the microservice layer	45%
Identifying clustered processes supporting services	34%
Limitations of Docker API metrics	34%

## China

Challenge	
Maintaining and configuring performance monitoring	48%
Identifying the impact that container resource consumption has on microservice performance	55%
Identifying service dependencies and interactions	54%
Limited visibility into the microservice layer	46%
Identifying clustered processes supporting services	37%
Limitations of Docker API metrics	35%

# Appendix: Global data summary

Challenges of managing the performance of microservices in containerized environments

## Australia

Challenge	
Maintaining and configuring performance monitoring	54%
Identifying the impact that container resource consumption has on microservice performance	60%
Identifying service dependencies and interactions	40%
Limited visibility into the microservice layer	56%
Identifying clustered processes supporting services	50%
Limitations of Docker API metrics	36%

## Singapore

Challenge	
Maintaining and configuring performance monitoring	48%
Identifying the impact that container resource consumption has on microservice performance	34%
Identifying service dependencies and interactions	46%
Limited visibility into the microservice layer	50%
Identifying clustered processes supporting services	56%
Limitations of Docker API metrics	34%

# Appendix: Global data summary

Challenges of managing the performance of microservices in containerized environments

## Brazil

Challenge	
Maintaining and configuring performance monitoring	62%
Identifying the impact that container resource consumption has on microservice performance	56%
Identifying service dependencies and interactions	40%
Limited visibility into the microservice layer	48%
Identifying clustered processes supporting services	38%
Limitations of Docker API metrics	50%

## Mexico

Challenge	
Maintaining and configuring performance monitoring	60%
Identifying the impact that container resource consumption has on microservice performance	60%
Identifying service dependencies and interactions	46%
Limited visibility into the microservice layer	48%
Identifying clustered processes supporting services	32%
Limitations of Docker API metrics	34%

# Appendix: Global data summary

Digital performance problems come at a high price

Country	Average proportion of IT teams' time spent tackling digital performance problems (2019)	Average proportion of IT teams' time spent tackling digital performance problems (2018)
Global	33%	29%
US	33%	31%
UK	28%	25%
France	35%	28%
Germany	31%	28%
China	35%	32%
Australia	34%	33%
Singapore	33%	30%
Brazil	36%	29%
Mexico	32%	24%

# Appendix: Global data summary

Digital performance problems come at a high price

Country	Average organizational overhead for dealing with performance problems in 2019 (\$ million)	Average organizational overhead for dealing with performance problems in 2018 (\$ million)	Average annual increase from 2018-2019
Global	\$3.37	\$2.52	34%
US	\$3.55	\$2.45	45%
UK	\$2.99	\$5.22	-43%
France	\$3.47	\$1.94	79%
Germany	\$3.34	\$2.08	61%
China	\$3.99	\$1.62	146%
Australia	\$2.87	\$2.36	22%
Singapore	\$3.04	\$2.54	20%
Brazil	\$3.57	\$2.13	68%
Mexico	\$2.27	\$0.92	147%

# Appendix: Global data summary

AI is crucial to mastering performance in the enterprise cloud

Country	CIOs say AI will be critical to IT's ability to master increasing IT complexity (2019)	CIOs said AI will be critical to IT's ability to master increasing IT complexity (2018)
Global	88%	81%
US	95%	83%
UK	81%	72%
France	92%	84%
Germany	72%	65%
China	94%	95%
Australia	80%	80%
Singapore	94%	88%
Brazil	88%	78%
Mexico	94%	92%

# Software Intelligence for the Enterprise Cloud

We hope this 2019–20 Global CIO Report has inspired you to take the next step in your digital journey.

Dynatrace is committed to providing enterprises the data and intelligence they need to be successful with their enterprise cloud and digital transformation initiatives, no matter how complex.

[Learn more](#)

If you are ready to learn more, please visit [dynatrace.com/platform](https://dynatrace.com/platform) for assets, resources, and a **free 15-day trial**.



## About Dynatrace

Dynatrace provides software intelligence to simplify enterprise cloud complexity and accelerate digital transformation. With AI and complete automation, our all-in-one platform provides answers, not just data, about the performance of applications, the underlying infrastructure and the experience of all users. That's why many of the world's largest enterprises trust Dynatrace to modernize and automate enterprise cloud operations, release better software faster, and deliver unrivaled digital experiences.