

Google Cloud

# State of Cloud Threat Detection and Response Report

Office of the CISO

March 2023

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## Introduction

# State of cloud threat detection and response report

Whether your company is a small startup or a mega corporation, the transformational potential of cloud technology presents an opportunity that should not be ignored. In fact, cloud has created a unique moment for organizations of all sizes and origins [to transform security operations](#) across compute, storage, and networking.

Our State of Cloud Threat Detection and Response report summarizes the survey responses of 400 security leaders and SecOps practitioners in North America regarding the capabilities, practices, and behaviors of protecting against, identifying, and remediating cloud-based threats.

The report looks at the differences between cloud threat detection and response behaviors and their on-premises counterparts, and the connection between cloud transformation and security transformation. We conclude with guidance on how to incorporate these lessons into your company's current operations and considerations for the future.

Introduction

# Key survey findings

- ✓ **The cloud presents better security improvement opportunities than on-prem.**

**25% more** respondents say that the richness of security telemetry in the cloud, the ability to automate, and the ability to rapidly learn from security incidents are far greater “opportunities” in the cloud versus on-prem.

- ✓ **The cloud can offer superior detection and response.**

**71%** say “entire classes of threats” are eliminated by migrating to the cloud.

**82%** say the cloud affords the ability to process more data, including on-prem data, which can improve detection across the board.

- ✓ **More automation is key to solving short-term and long-term security challenges, especially among cloud-heavy organizations.**

**84%** of respondents say they have to automate more tasks and processes if they want to keep up with evolving threats.

**82%** believe automating security tasks becomes more important as assets move to the cloud.

**55%** say more advanced security tools, including automated detection and response, are available for the cloud.

- ✓ **Security operation teams generally feel well-staffed, so cloud challenges are less about people power and more about gaps in skills and capabilities.**

**63%** of respondents feel sufficiently staffed ... but **82%** say their organization has to grow their public cloud skills and knowledge to thrive long-term.

- ✓ **Compared to on-prem, data leakage and cryptomining are seen as the biggest threats in the cloud.**

**44%** of respondents versus 33% feel data leakage is a bigger threat in the cloud than on-prem. **42%** of respondents versus 32% feel cryptomining is also a bigger threat in the cloud than on-prem.

Part 1

# The present day of cloud detection & response

With fierce digital transformation underway, this survey seeks to understand the disparities between the cloud and on-prem in regards to security. Although some security experts believe that attacks will increase against the cloud as more organizations undergo digital transformations, their concerns are assuaged by [the opportunities the cloud offers](#). Cloud changes some of the fundamentals of digital defense, including threat detection, alert and signal management, and incident response.

However, these fundamentals should be revisited within the context of new cloud technologies that can help guide new IT practices, all of which can happen at a much higher velocity.



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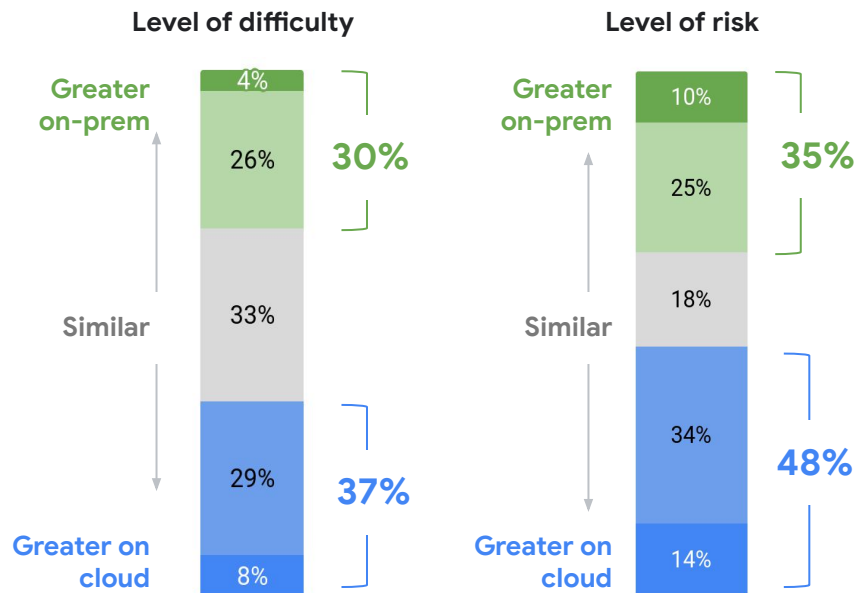
## Cloud vs. on-prem security perceptions

The average security pro says cloud security is slightly more difficult than on-prem and involves a higher level of risk.

Base: total participants (n=400)

Q305. First, think about what's required to protect on-prem environments vs. cloud environments. Which would you say is more difficult for your organization?

Q314. Below are some ways cloud and on-prem security could differ for your org. For each, which type of environment is greater?



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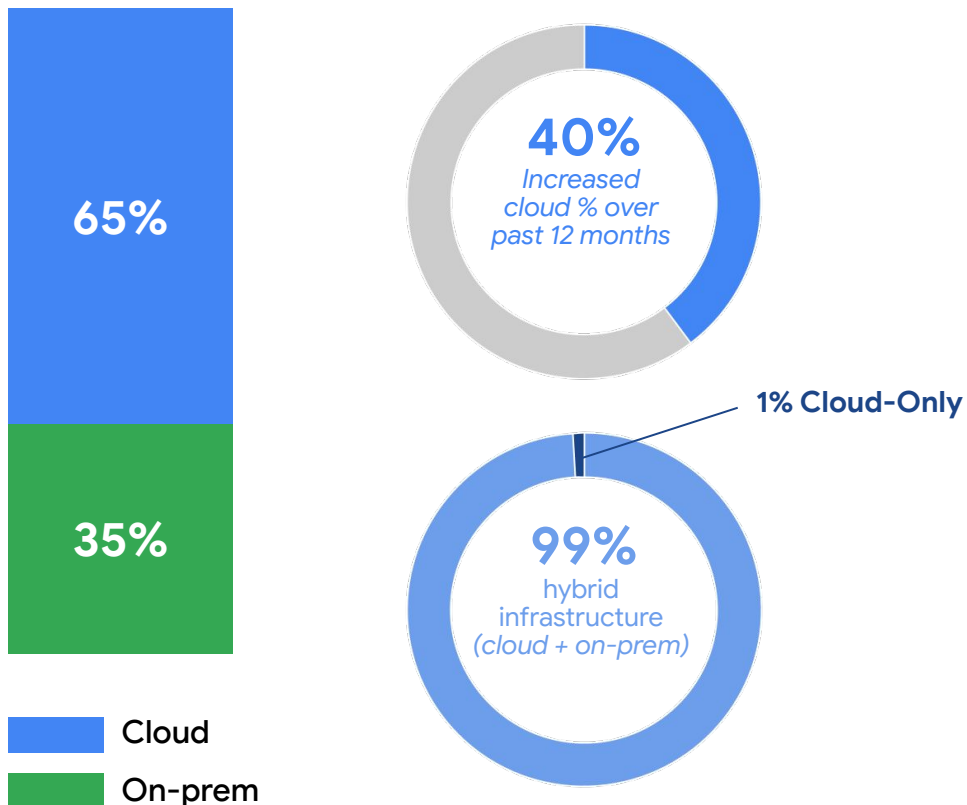
On average, survey respondents find cloud security to be only slightly more difficult for them to manage than on-prem, and 53% believe the level of risk is greater than on-prem environments. That said, all survey respondents use the cloud in some way.

More specifically, respondents report maintaining, on average, 65% of their infrastructure in the cloud, and 72% leverage multicloud environments – meaning they use multiple public cloud computing and storage services from different vendors in a single heterogeneous architecture to improve capabilities and reduce cost.

**The average org conducts the majority of its computing in the cloud.  
Four of every 10 orgs shifted more to the cloud over the past year.**

### Computing infrastructure

*Average % of org's computing*



Base: Total participants (n=400)

Q205: What percentage of your organization's computing currently occurs...

Q210: And what percentage of your org's computing occurred on each one year ago?

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Where the targets go, so do the adversaries. The newer nature of the cloud is likely to blame for this perception of increased risk. In Mandiant’s annual cybersecurity [M-Trends 2022](#) report, the company (which was acquired by Google Cloud in 2022) analyzes the impact of cloud migration from on-prem. “Adversaries correspondingly augmented their efforts in developing novel and sophisticated techniques to target identities and data housed in cloud environments,” the cybersecurity threat intelligence and remediation company wrote.

Similarly, Google Cloud's [January 2023 Threat Horizons Report](#) states that while attackers are “evolving” to target cloud customers, and cloud providers are investing in cyber-defenses for themselves and their customers, “vigilance is needed to keep pace with evolving threats.” In particular, respondents are encouraged by the possibility that increased streams of data and information can help aid detection and response efforts.

However, Mandiant also found that across recent incident response engagements, SecOps personnel are often not part of their organization’s initial cloud transformation discussions, yet they are still responsible for securing it – even if they lack the required skills.

### Leaders see more opportunity in cloud, while SecOps recognize greater risk

	Perceived as risk T2B - somewhat + much greater risk			Perceived as opportunity T2B - somewhat + much greater opportunity		
	Total	Leaders	SecOps	Total	Leaders	SecOps
A shift to the cloud naturally creates more data and information	36%	29%	43%	47%	54%	41%
Assets and instances are scaled across the cloud	40%	40%	41%	38%	41%	35%
The cloud is more API driven, making API security a more prominent need	34%	29%	39%	41%	46%	36%
Protecting the identity layer is critical in the cloud	37%	32%	42%	39%	46%	33%
The scale of logging is much higher in the cloud	32%	27%	36%	43%	48%	39%
More data can be pre-processed in the cloud	32%	23%	41%	46%	53%	39%

Base: Total participants (n=400) / security leaders (n=200) / SecOps (n=200)

Q340: Below are some key reasons why security in the cloud is different from on-prem security.

Do you view each of these as more of a risk, or more of an opportunity?

We’ll discuss specific cloud-based threats on the minds of security professionals a little later. But first, let’s dig deeper into understanding why some security leaders are still worried about security risks in the cloud.



## Staffing and security

There's no question that cloud migrations can take a toll on security practitioners, but there appears to be a disconnect between practitioners and security leaders on the staffing levels needed to complete a migration successfully. Sixty-three percent of total respondents say they are sufficiently staffed, but when we dig into the numbers, we find that only 60% of practitioners believe this versus 67% of their leaders – a small but notable difference between decision-makers and frontline personnel.

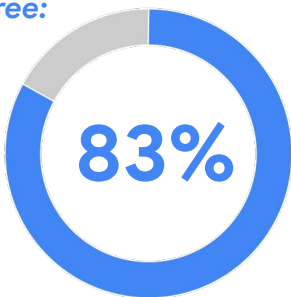
Overcoming alert overload and complexity requires more than setting the proper thresholds to manage noise and false positives. It also calls for the right detection and response tools that can correlate security telemetry across environments – on-prem, in the cloud, or a combination of the two – with analytics and threat intelligence, enabling practitioners to intelligently group related alerts so analysts have greater context of the issues they need to tackle. Ideally, SIEM and SOAR technologies are brought together to offer a more streamlined and integrated experience for security operations teams needing to identify threats and close cases quickly.

Will hiring more security personnel with cloud skills solve problems, or is it just the perceived answer? To find out, we asked about skills. Often the industry's long-standing shortage of available proficiency and talent is lumped into the same bucket, but they are two distinct categories. Just because a security seat has been filled doesn't mean that the person working the job has been trained for cloud security threats.

### Challenges with cloud relate to skilling and knowledge.

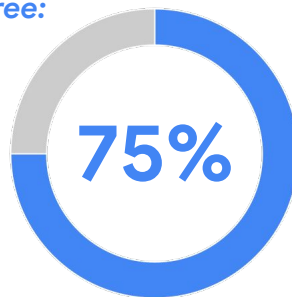
"Our org **has to grow its public cloud skills** and knowledge to succeed long-term"

Agree:



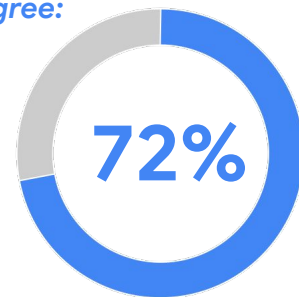
"Our security team's **cloud-specific knowledge is limited** and needs to grow"

Agree:



"Professionals with **cloud-specific security skills are scarce** and difficult to find"

Agree:



Base: Total participants (n=400)

"Agree" % = agree + strongly agree, 5-pt. scale

Q410: How much do you agree or disagree with the following?

Skills limitations have long tripped up well-intentioned security efforts – and studies suggest that they [are a key contributor to data breaches](#).

Part 2

# Bridging from on-prem to the cloud

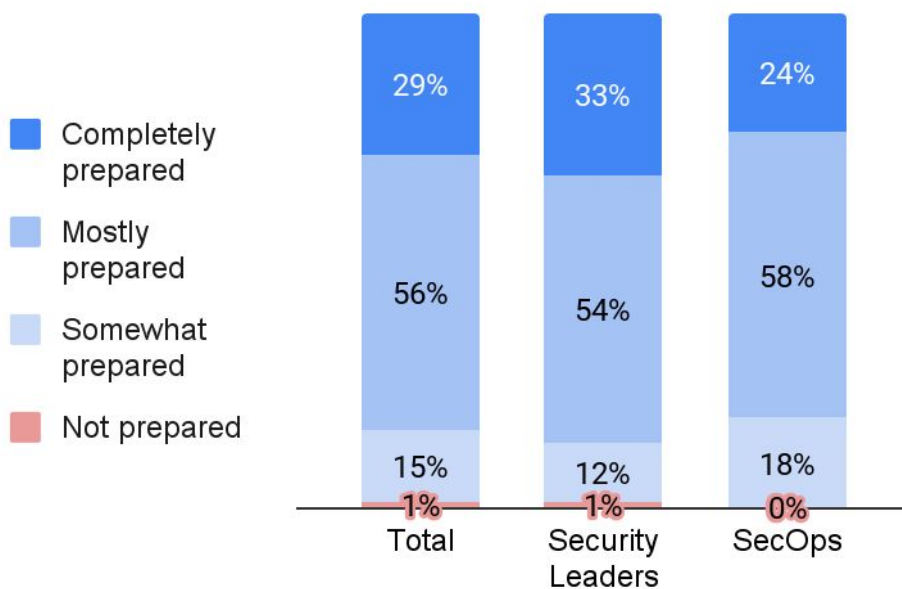
Though security challenges exist relative to managing alerts, staffing, and skills, 85% of security professionals who responded to this survey believe they are either “completely prepared” (29%) or “mostly prepared” (56%) to protect their organization if its assets transitioned to the cloud tomorrow. This includes those who reported that security in the cloud is more difficult than on-premises.

Although our respondents overall express confidence in their cloud security skills, we discovered a disconnect again between leaders and practitioners. One-third of security leaders said they were completely prepared, but only one-quarter of security practitioners felt the same.



I have to be a bit more cautious with cloud security though it enables us to do so much more.”

—CSO, Software Technology Industry



Earlier we considered the perceived risk and difficulty of the cloud versus that of on-prem. We found correlations in the response data between perceived cloud risk and feelings of cloud security preparedness. Organizations that consider themselves less prepared for cloud security see more risk in cloud environments.

More than half (56%) of those respondents who believe cloud security is more difficult than on-prem security feel “somewhat or not prepared” to perform cloud security. This data affirms our belief that being prepared to defend in the cloud goes hand in hand with understanding the realities of cloud security risk.

**Orgs that are less prepared for cloud security see more risk in cloud environments.**

**Level of cloud security preparedness**

	Somewhat or not prepared*	Mostly prepared	Completely prepared
<b>“Cloud environments have more risk than on-prem”</b>	49%	46%	32%
<b>“Level of risk is greater with cloud than on-prem”</b>	61%	46%	42%
<b>More of a risk than an opportunity:</b>			
<i>Assets and instances are scaled across the cloud, meaning a vulnerability in one can apply to multiple</i>	54%	42%	29%
<i>The cloud is more API driven, making API security a more prominent need</i>	54%	34%	24%
	n61*	n222	n113

\* Caution: Small base

%s shown are top-2-box on a 5-point scale

Q330: Let's say your org decided to move all of your on-prem environments to the cloud tomorrow. Which best describes how prepared you are to protect these new cloud environments?

Q307: Which best describes your current point of view on cybersecurity risk levels when it comes to on-prem vs. cloud environments?

Q314: Below are some ways cloud and on-prem security could differ for your org. For each, which type of environment is greater? – Level of Risk

Q340: Below are some key reasons why security in the cloud is different from on-prem security. Do you view each of these as more of a risk, or more of an opportunity?

Securing cloud infrastructure has become even more important as organizations pursue their digital cloud transformations alongside an ever-growing proliferation of connected devices and the work-from-home boom. Those technological shifts come with clear differences between how best to secure the cloud and on-prem, as we laid out in a [recent research paper](#).

- **The cloud is ephemeral and scaled:** Short-lived assets predominate the cloud and are easy to overlook. In addition, assets and instances are commonly replicated in and scaled across the cloud - a vulnerability in one, even if it has been taken offline, can ignite a ripple effect among live assets.
- **The identity layer of the cloud is critical:** Securing privileges in the public cloud, hybrid cloud, and multicloud environments, with huge numbers of identities and entitlements, is much more complex than controlling access across the traditional data center perimeter. This is evidenced by the large-scale public breaches in which adversaries gained initial footholds via identity-based attacks such as phishing and credential stuffing.

It's clear that the way security professionals approach protecting the cloud needs to be different from on-prem, and yet the findings indicate that's not the case among many of the respondents. The majority of survey participants (63%) believe they are using an approach that's "mostly" or "exactly the same" in the cloud as compared to on-prem security. This is especially true for practitioners, so some groups misperceive how cloud security is being handled on the frontlines.



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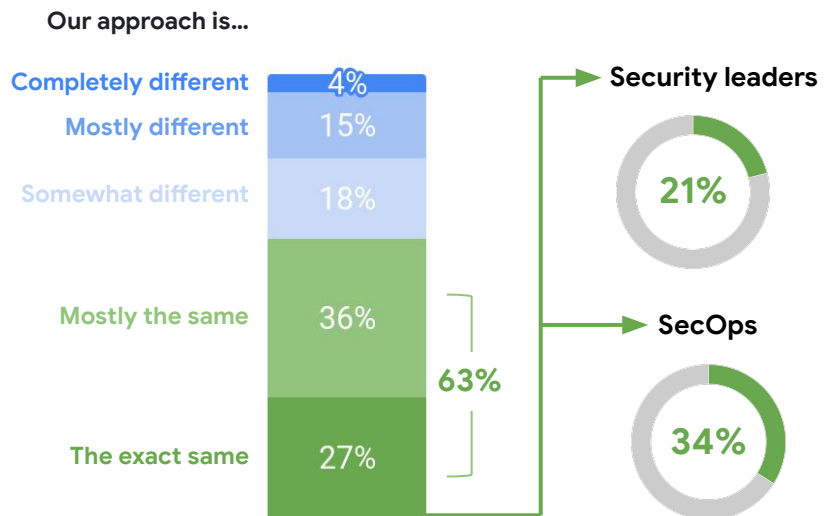


Security experts at organizations that have created a new security strategy for the cloud say they feel best equipped to defend their cloud infrastructure. Only 15% who apply a different detection and response approach to the cloud believe they are ill-equipped to safeguard their cloud presence.

### Approach to cloud vs. on-prem security

Most orgs utilize the same approach to cloud vs. on-prem security.

SecOps are more likely to use the **exact** same approach as their leaders, indicating misalignment on vision vs. implementation.



Base: Total participants (n=400) / security leaders (n=200) / SecOps (n=200)  
Q310: How much does your approach to TDIR (threat detection and incident response) differ for cloud vs. on-prem environments, if at all? If you don't currently work to protect both, how would you expect your approach to differ?

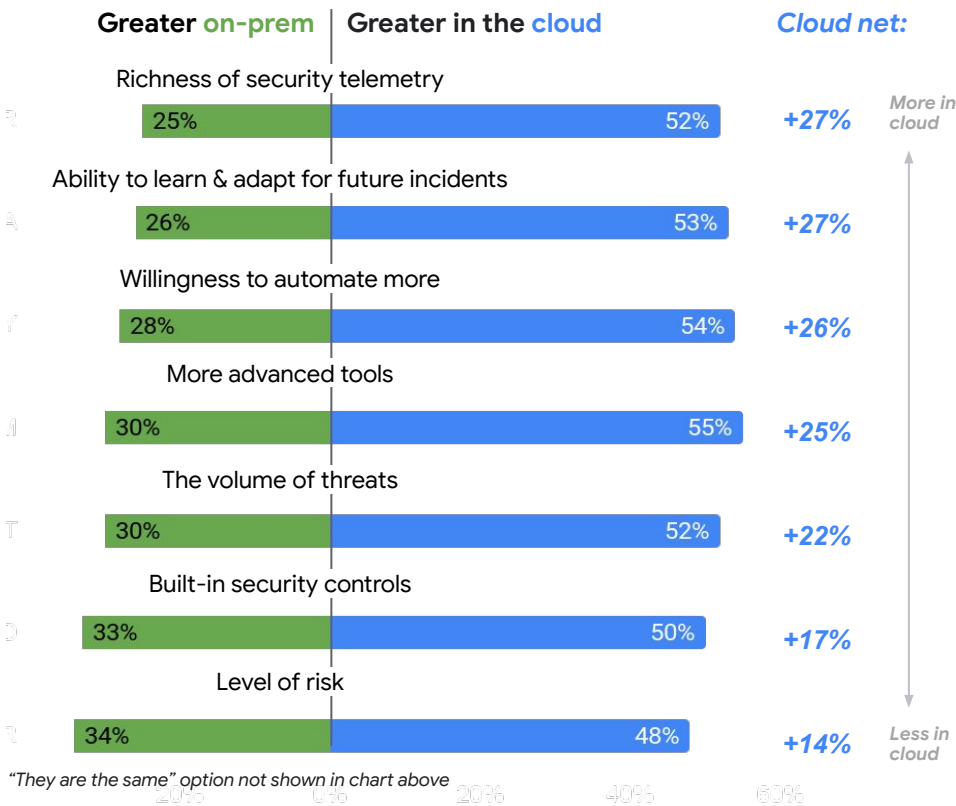
## Cloud risk and on-prem risk, perception versus reality

We queried respondents on several actions and consequences to see how perceptions differed for on-prem and the cloud.

Fifty-two percent of survey participants say “richness of security telemetry” - the vital threat data that can help manage the life cycle of a disruptive event - is greater in the cloud, versus 25% of respondents who report that telemetry is more robust on-prem. This was the largest net difference.

### Reasons cloud vs. on-prem differ

While there is more risk and threats in the cloud, the biggest differences relate to richness of telemetry, adaptability, openness to automation, and better tools.



*In the cloud, we use **scalable deployments** of Fortinet and Cloud Custodian to help us manage threats, vulnerabilities, and encryption, vs in our colo where we rely heavily on other **legacy tools**.”*

– Sr. Engineering Manager

Base: Total participants (n=400)  
 Q314. Below are some ways cloud and on-prem security could differ for your org. For each, which type of environment is greater?

The richer and larger the amount of telemetry, the better for the security operations teams responsible for detecting and responding to threats. Additional benefits include reduced blind spots, valuable context, and improved overall productivity and efficiency.

The “ability to learn and adapt for future incidents” is also viewed as significantly more likely in the cloud versus on-prem (53% versus 26%). We believe this is because effective post-incident analyses and lessons-learned discussions are enabled by the rich diagnostic information that cloud logs provide. Ultimately, this can be a helpful tool to reduce future risk.

Respondents also cite the willingness to automate more and leverage advanced tools when operating in the cloud, with half of respondents stating that “built-in security controls” present a superior opportunity.

We’ll dig into automation, tools, and the notion of shared responsibility in the next section. But first, let’s explore specific classes of threats as compared between on-prem and the cloud.

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## Misconfiguration malaise

Attackers traditionally choose the path of least resistance to identify and compromise their victims - and they carry this same mindset into the cloud. That is why misconfigurations, a top-three cloud concern for 28% of respondents, are also [one of the most preferred](#) launching pads for cloud-based attacks. The danger of misconfigurations, which are often caused by human error, has been well documented – for example, [accidentally making a private storage bucket available to the public](#).

Advanced Persistent Threats (APTs), ransomware, misconfigurations, compromised credentials, and third-party supply-chain attacks were identified by the respondents as the issues more likely to appear on someone’s cloud list versus on-prem.



Misconfigurations, a top-three cloud concern for 28% of respondents, are also [one of the most preferred](#) launching pads for cloud-based attacks. The danger of misconfigurations, which are often caused by human error, has been well documented.”

Because this dynamic can understandably lead to confusion and uncertainty about who handles what when it comes to prevention, detection, and response, we asked respondents about which tools and providers their organizations currently use to secure their cloud environments.

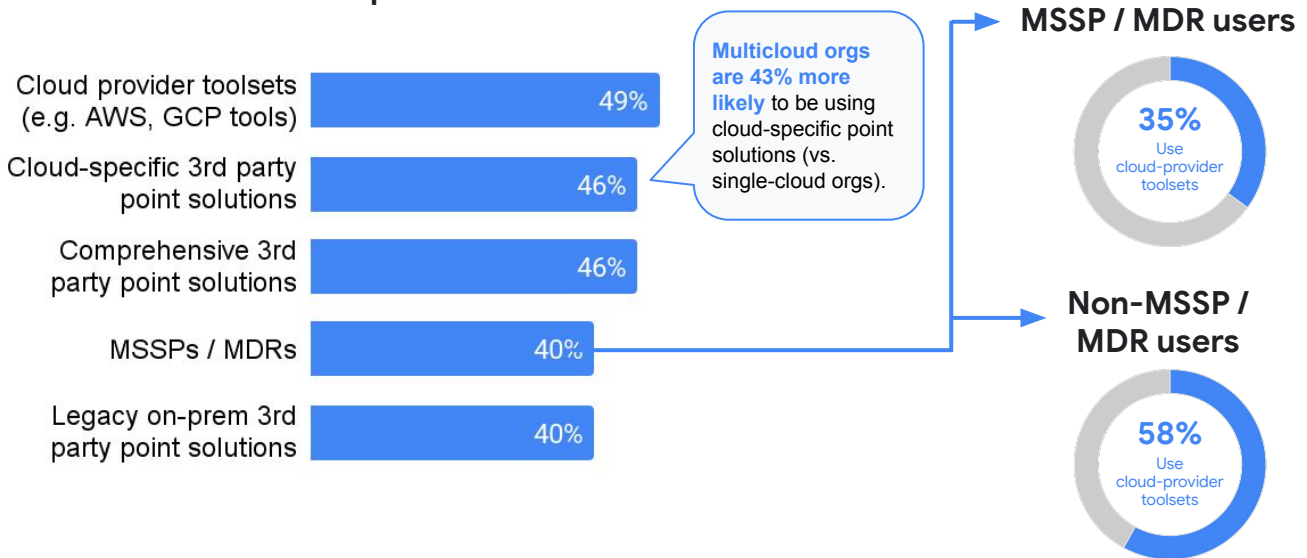


Respondents currently favor multiple security options, but they did communicate that they are more likely to turn to their cloud service provider for threat prevention needs. However, they look to themselves or third-party providers to help them with tasks related to detection, investigation, and response.

While “third parties” can cover managed and non-managed security, we expect this to largely reference managed security service provider (MSSP) and managed detection and response (MDR) companies, whose bottom lines are booming as organizations accept the likelihood that they will experience attacks and compromises. In the following chart, four out of 10 respondents are turning to managed help to secure their cloud infrastructure. The question of how to identify the MSSP / MDR that can deliver cloud excellence was not studied in the survey.

### Which types of TDIR (threat detection & incident response) tools and providers does your organization currently use to secure your cloud environments?

#### Current cloud TDIR tools / providers



Base: Total participants (n=400) / MSSP/MDR users (n=161) / Non-MSSP/MDR users (n=239)  
Q505: Which types of TDIR (threat detection & incident response) tools and providers does your organization currently use to secure your cloud environments?

## Looking to automation to meet security challenges

Another reason organizations are eager to offload some of their internal responsibilities to an external provider is that they believe their status-quo security tools are inadequate. Security teams spend too much time on repetitive, manual tasks, according to 67% of respondents. Meanwhile, 68% of total respondents, including 72% of practitioners, say their existing tool stack doesn't do enough to cut down on the time it takes to investigate threats.

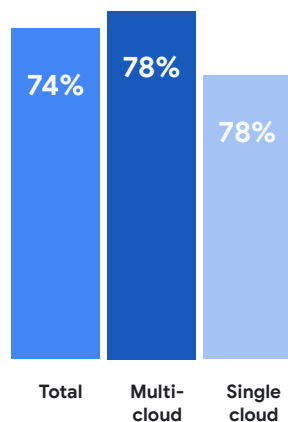
“ Another reason organizations are eager to offload some of their internal responsibilities to an external provider is that they believe their status-quo security tools are inadequate.

Transitioning to the cloud will not eliminate detection challenges; instead identity and trust relationships in and between cloud environments will continue to get more complex. Potentially, this can make it more difficult for security teams to gain visibility into emerging threats. Not surprisingly, 76% of respondents say they need more out-of-the-box detection tools that can easily adapt to their needs in the cloud.

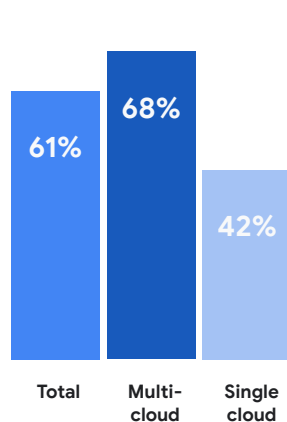
### Today's tools are powerful but security teams need more help with efficiency, especially multicloud orgs.

#### Cloud security tool perceptions (% agree + strongly agree)

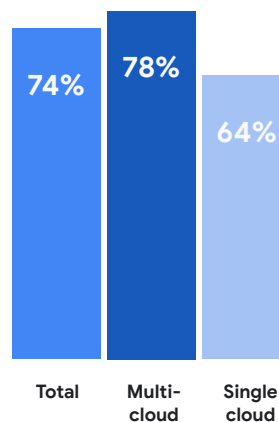
*“Our cloud-security tools are **robust and leave no blind spots**”*



*“Our cloud-security tools **do not save us any time**”*



*“We would spend more on tools if we knew they could cut down on manpower required to do our jobs”*



Base: Total participants (n=400) / Multicloud orgs (n=288) / Single-cloud orgs (n=112)

Q510. How much do you agree or disagree with the following when it comes to tools you and/or your team use?

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This all leads to a resounding need expressed by respondents to fill their detection and response gaps: more automation. Eighty-four percent of respondents feel that they have to automate more if they want to keep up with the evolution of security threats, and 82% admit automating security tasks becomes more important as more assets move to the cloud.

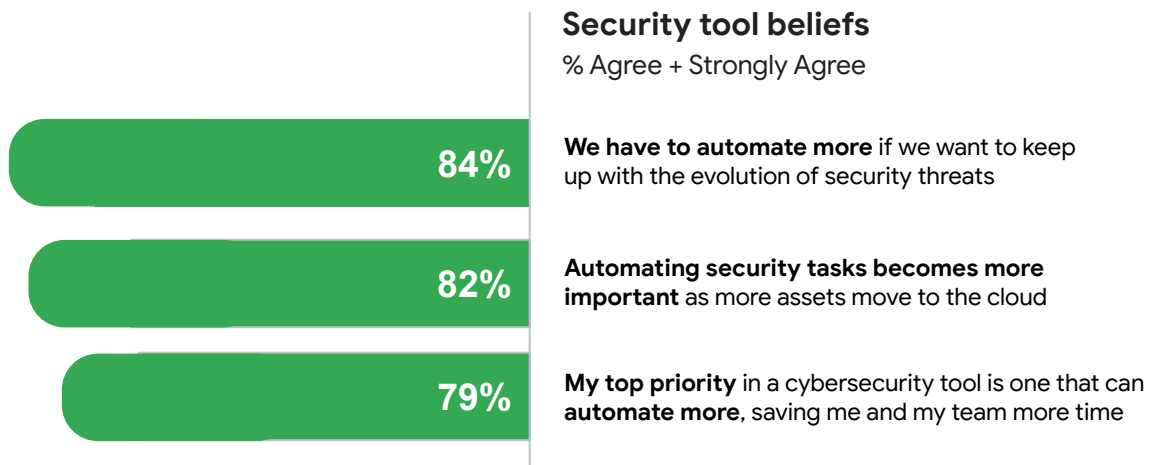
When it comes to cybersecurity tools, 79% of respondents say their top priority is implementing ones that automate more. Similarly, 74% communicate a willingness to spend more on tools if they are able to cut down on the people power required to do their jobs.



Eighty-four percent of respondents feel that they have to automate more if they want to keep up with the evolution of security threats, and 82% admit automating security tasks becomes more important as more assets move to the cloud.

Of course, automation also requires resources to be implemented, which brings us back to the importance of a mutually beneficial [shared fate model](#).

### Automation is a key priority in cloud security tools and the future of TDIR.



Base: Total participants (n=400)

Q510: How much do you agree or disagree with the following when it comes to tools you and/or your team

# Final thoughts

The overall message from our survey respondents is as clear a signal as any SecOps team or CISO could want to see: they believe in the promise of cloud technology for improving security and reducing risk. They understand that a well-architected modern cloud can be more secure and present a more dynamic way to address risk than handling data in-house.

Survey participants are genuinely optimistic about what the cloud can bring to security teams, from collecting richer telemetry data, to better monitoring for threats, to automating out of the box, to performing an overall more robust response.

In addition, our respondents' recognition that they don't have to go it alone is another point in favor of the cloud, as they are able to tap into cloud service providers' security personnel, expertise, and default configurations, among other things, that may have been otherwise unavailable to them.

- **Know what you're defending:** Before undergoing a cloud migration, one of the first things to do is take inventory of what will need securing. While you may be parting ways with legacy technology, new assets and resources will emerge, including virtual servers, containers, and APIs.
- **Prioritize IAM:** Of all the domains that look different in the cloud, identity and access management (IAM) may be the most important for you to get right. Detecting access anomalies is critical. With IAM tools, you're able to grant access to cloud resources at a granular level, creating more access control policies for attributes such as device security status, IP address, resource type, and date and time to better ensure appropriate access controls are in place.
- **Ask the right questions:** Copying all your on-premises detection tools and their threat detection content to the cloud won't reduce risks in the way that most cloud-first organizations will need. Lean into this. Moving to the cloud provides the opportunity to rethink how your security goals can be achieved with the new opportunities created by cloud process and technology.

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- **Build a cloud culture:** When an organization decides to start its journey to the cloud, training staff with the new technology and tools is a necessary step, but probably not the first nor the most arduous to make. A change of mindset is paramount to fully incorporating all the benefits cloud offers for security and otherwise. This cultural shift needs to be conveyed to the SOC team.
- **Empower cloud stakeholders:** Your organization may be all in on the cloud, but you need to ensure your team is helping to rein in the risk. Do this by sharing details, observations, and data so you can actively engage with cloud stakeholders from other parts of the organization. This will increase visibility and executive support for the SOC.
- **Boost cloud skills:** Your organization may have the head count, but does it have modern cloud skills among the team? Invest in your team's skills to benefit more from the cloud, inside and outside the SOC.
- **Hire with DEI in mind:** While this survey's questions did not address DEI directly, Google Cloud strongly believes that the most successful security workforces of the future [will be the most diverse ones](#). In order to avail ourselves of the best solutions possible to protect business enterprise and consumers, new, fresh perspectives are needed.

As MK Palmore of Google Cloud's Office of the CISO [recommends](#), hiring managers should widen their lenses, organizations should invest in ongoing training and education to upskill their current workforces, leaders need to drive awareness of security career opportunities, and mentorship should be used to help prioritize retainment. We must do a better job at including diverse communities to build solutions that will help us all be safer.

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# Demographics

## Who took the survey?

400 participants in North America

## Participant job role & responsibilities

### Department

IT (information technology)	73%
Security	23%
Development / engineering	5%

### Title / Level

Individual contributor or non-manager	27%
Manager level (Senior Manager, Manager)	14%
Upper-level manager (Senior Director, Director)	38%
Senior executive (SVP, VP, GM)	10%
C-level executive (CIO, CTO, CISO, etc.)	12%

### Primary job role

Select up to two

<b>Building and testing</b> cybersecurity systems <b>or managing</b> a team that does this	63%
<b>Setting and overseeing</b> your org's overall cybersecurity <b>strategy</b>	52%
<b>Monitoring networks</b> for security breaches <b>or managing</b> a team that does this	24%

Base: Total participants (n=400)

Q125: At your organization, which best describes the department or type of role you work in?

Q130: Which best describes your level within your organization?

Q140: How do you spend most of your time at work?

## Participant firmographics & cloud usage

### Industry

Manufacturing	18%
Professional Services (Legal, Consulting, etc.)	18%
Healthcare	15%
Telecommunications	10%
Technology/software	9%
Financial Services	8%
Retail & Restaurant	5%
Transportation, Logistics & Hospitality	4%
Automotive	3%
Consumer Packaged Goods	2%
Energy	2%
Media & Entertainment	2%
Nonprofit	2%
Real Estate/Construction	2%
Defense & Intelligence	1%

### Org size: # of total employees

500–749	5%
750–999	8%
1,000–2,499	40%
2,500–4,999	29%
5,000–9,999	9%
10,000+	8%

### Infrastructure: Average % of computing

On-prem	35%
Cloud	65%
Hybrid	99%
Cloud-only	1%

### Infrastructure: Primary cloud provider

AWS	39%
Azure	27%
Google Cloud	21%
IBM Cloud	11%
Other	2%

Base: Total participants (n=400)  
 Q110: About how many employees does your organization have worldwide?  
 What percentage of your organization's computing currently occurs...  
 Q115: What is your organization's primary type of business?

# Methodology

## Research methodology

This research was conducted via online survey, with data collected between Sept 27 and Oct 11, 2022. The survey is considered “blind,” meaning at no point did participants know Google Cloud (or any other brand) was a sponsor of this research. All data was collected in a single survey, leveraging no separate, appended data. The survey began with questions on job role and firmographics, followed by a series of questions on the cloud vs. on-prem security, their security team’s staffing situation, and finally cloud security tools and solutions they use.

## Sampling and participation requirements

The participant sample was designed to represent North American cybersecurity professionals at enterprise organizations. All participants were recruited and incentivized via third-party online research panels. To qualify, participants were required to work full-time for organizations with at least 500 employees in North America (US or Canada), work in their organization’s IT, Development, or Security department, and spend most of their work time building and testing cybersecurity systems, monitoring for breaches, setting their organization’s cybersecurity strategy, or managing a team that does one of these. The sample was designed to achieve an even mix of security leaders and SecOps practitioners to allow for comparisons across these groups. Leaders are defined as those who sit in a senior executive role (CTO, VP, and so on) or manage at least 11 people. All others are considered SecOps practitioners.

## Margin of error and statistical differences

With a total sample size of n400, our margin of error is +/-5% (at a confidence level of 95%). This means each number shown in this report (that is among all participants) is up to 5 points above or below the true percentage of the entire North American enterprise security practitioners population. When comparing leaders vs. SecOps practitioners (that is, n200 per group), differences of approximately 10 percentage points are considered statistically significant at 95% confidence. This does not mean smaller differences should be completely ignored, however one cannot be sure they are not a result of random sampling error.