WHETHER YOU LIKE IT OR NOT.....

You’re on a Cloud Security Team

Kat Traxler

SHOULD I CREATE A 'CLOUD SECURITY' TEAM ?

What should they do and who should they report to?

Incident Response

Mission

Detect, mitigate, and recover from security incidents to minimize damage and maintain business operations.

What's new with the cloud ?

What stays the same ?

New Tools? Definitely

New Mindset or Skillset ?

Threat Hunting

Mission

Actively search for hidden or emerging security threats that may go undetected by automated security systems, enabling early response and mitigation.

What's new with the cloud ?

What stays the same ?

New Tools? Probably

New Mindset or Skillset ?

Detection Engineering

Mission

Develop and maintain detection mechanisms to **identify and alert on active security threats and vulnerabilities.**

What's new with the cloud ?

What stays the same ?

New Tools? Definitely

New Mindset or Skillset ?

Insider Risk

Mission

Protect the organization from both intentional and unintentional insider threats, including employees, contractors, or other trusted insiders.

What's new with the cloud ?

What stays the same ?

New Tools? Probably

New Mindset or Skillset ?

Forensics

Mission

Aid remediation and assist legal by **investigating security incidents** through collecting and analyzing digital evidence.

What's new with the cloud ?

What stays the same ?

New Tools? Definitely

New Mindset or Skillset ?

Security Engineering

Mission

In the buy versus build, they are the build. Security Engineering implements and maintain technical solutions to **enable the rest of the security organization.**

What's new with the cloud ?

What stays the same ?

New Tools? Definitely

New Mindset or Skillset ?

Cryptography

Mission

Ensure the confidentiality, integrity, and authenticity of **data in-transit and at-rest** through the application of cryptographic techniques and best practices.

What's new with the cloud ?

What stays the same ?

New Tools? Definitely

New Mindset or Skillset ?

Third-Party Risk

Mission

Assess, manage, and mitigate the security risks associated with the organization's relationships with **third-party vendors, suppliers, and service providers.**

What's new with the cloud ?

What stays the same ?

New Tools? Probably Not

New Mindset or Skillset ?

Application Security and Pentesting

Mission

Collaborate with development teams to address **vulnerabilities**, employing secure coding practices and fixes. **Identifying security weaknesses through testing** to ensure application resilience.

What's new with the cloud ?

What stays the same ?

New Tools? Definitely

New Mindset or Skillset ?

Governance Risk & Compliance

Mission

Ensure that the organization adheres to applicable laws, regulations, industry standards, and internal policies regarding information security and data protection.

What's new with the cloud ?

What stays the same ?

New Tools? Probably Not

New Mindset or Skillset ?

Enterprise Security Architecture

Mission

Design a security framework that aligns with business objectives and effectively mitigates the risk introduced in an ever expanding attack surface.

What's new with the cloud ?

What stays the same ?

New Tools? Probably

New Mindset or Skillset ?

Identity and Access Management (IAM)

Mission

Maintain secure systems for managing user identities and controlling their access to organizational resources. These are your IdP admins, your AD Admins **managing user identities and entitlements**

What's new with the cloud ?

What stays the same ?

New Tools? Probably

New Mindset or Skillset ?

Threat Intelligence

Mission

Provide context around threats and vulnerabilities, such as how they may impact specific business processes or critical assets, helping leadership make informed decisions.

What's new with the cloud ?

What stays the same ?

New Mindset or Skillset ?

New Tools? Not Really

Security Leadership

Mission

Communicate risk to the business and provide **strategic direction**, ensuring it aligns with business goals and objectives.

What's new with the cloud ?

What stays the same ?

New Tools? Definitely

New Mindset or Skillset ?

Vulnerability and Patch Management

Mission

Identify, assess, and triage security vulnerabilities in the **organization's infrastructure** to reduce the risk of exploitation by malicious actors. Coordinate with resource owners to drive remediation.

What's new with the cloud ?

What stays the same ?

New Tools? Definitely

New Mindset or Skillset ?

Cloud Security

Mission

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What would a Cloud Security Team Do?

Tooling

Mindset or Skillset ?

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Enterprise Security Capabilities

Mission

Enable business through risk reduction and protect the organization's assets, data, and operations from security threats.

What's new with the cloud ?

- How does a team's mission grow, change or morph with the introduction of the cloud?
- What new areas of focus does the team need in order to fulfill their mission?

What stays the same ?

- The more that changes the more that stays the same right?
- Are their ways of working a practitioner can expect to stay consistent between on-prem and cloud worlds?

New Tools?

Definitely

Given an expanded scope, are their any new tools either free, commercial, custom or open-source that need to be adopted to carry out the mission?

New Mindset or Skillset ?

- What new skills should practitioners learn to adapt to the changing landscape?
- How should they think differently about the attack surface in order to meet the challenges of the cloud

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Incident Response

Mission

Detect, mitigate, and recover from **security incidents** to minimize damage and maintain business operations.

What's new with the cloud ?

- Log '**variety**' explodes as do problems with correlation.
- With the adoption of Platform as a Service (PaaS) and Software as a Service (SaaS), reliable host-layer logging is likely to diminish.
- Host-layer logging may become less available to cloud consumers, especially when dealing with **ephemeral hosts** that are challenging to instrument.

What stays the same ?

- Problems of **log inconsistencies** and correlation are not new to IR teams.

New Tools?

Definitely

Performing initial triage and analysis within **cloud-native tooling** is likely easier than running long expensive queries from your traditional SIEM.

- Athena / Sentinel /Stackdriver
- Data Lake
- Cloud Native Detection & Response (CDR)

New Mindset or Skillset ?

Tracking malicious actors actives through your cloud environment requires a deep understanding of how **identities** are used, borrowed and abused in each of the clouds and spoiler alert, there are significant differences in the identity models for each cloud.

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Threat Hunting

Mission

Actively search for hidden or emerging security threats that may go undetected by automated security systems, enabling early response and mitigation.

What's new with the cloud ?

- More place for an attacker to hide.
- Seemingly **endless ways to persist** access in the cloud such as through the manipulation of cloud accounts, and serverless processes.
- Hunters will likely be hamstringed looking for suspicious/malicious traffic over the network.
  - Cloud providers will only expose metadata about traffic inbound and outbound of virtual cloud networks.

What stays the same ?

- Log analysis is log analysis
- You're still looking for a needle in haystack

New Tools?

Probably

Connecting to new data sources from cloud providers might be easier on the outset using cloud native / purpose-built tooling.

- Cloud-Provider CLI Tools
- Athena
- Sentinel
- Stackdriver
- Data Lakes

New Mindset or Skillset ?

- Just because you don't have host-layer logs doesn't mean you're blind to a threat actor.
- If you don't have access to the host, its likely they don't either.
- Recognize the control-plane of the cloud is just as powerful an attack surface to pivot from.

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Detection Engineering

Mission

Develop and maintain detection mechanisms to **identify and alert** on active security threats and vulnerabilities.

What's new with the cloud ?

- Detection engineers are no longer analyzing protocols, looking for suspicious packets, rather they are looking for **unusual patterns of use**.
- With the cloud, their plane of view comes up to layer 7 and stays there.
- Testing rule effectiveness might be easier as Cloud APIs are documented and predictable.

What stays the same ?

- The fundamental philosophy remains unchanged.
- Detection engineering continues to be the practice of **finding anomalies in a vast sea of data**, crafting rules to spot the exceptions, and consistently validating the efficacy of these rules.

New Tools? Definitely

Building detections and rule sets against cloud providers requires the use of purpose-built tools.

- Cloud-Provider CLI Tools
- Terraform
- Python

New Mindset or Skillset ?

- Even malicious actors in a cloud environment leverage the cloud APIs according to spec.
- Cloud Detection Engineers will need intimate knowledge of the Cloud Provider APIs, and a **creative mind** to understand how to leverage them for evil.

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Forensics

Mission

Aid remediation and assist legal by i**nvestigating security incidents** through collecting and analyzing digital evidence.

What's new with the cloud ?

- No evaluation of physical evidence.
- **Remote collection** techniques often supported with custom solutions or by the cloud providers.
- Frequently there are no hosts or disks to analyze, no memory dumps to take as with PaaS or SaaS architecture.

What stays the same ?

- Forensics teams already have exposure to virtualization and should be accustom to working with disk snapshots.

New Tools?

Definately

Pre-built custom solutions and provisioned cloud access is needed **prior to an investigation**.

- Cloud-Provider CLI Tools
- Custom snapshot patterns
- Cloud backup and recovery vendors

New Mindset or Skillset ?

- Forensics teams need to become part-time engineers as they get their hands dirty with triage and collection.
- Planning and designing a disk collection system might take more time and effort than investigation work itself.

Threat Intelligence

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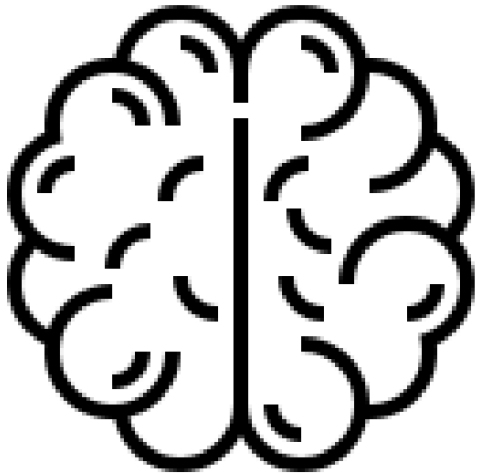

Mission

Provide context around threats and vulnerabilities, such as how they may impact specific business processes or critical assets, helping leadership make informed decisions.

What's new with the cloud ?

- What **an 'indicator' is in the cloud** is different than on-premises.
- Rather than a hash of an executable, an indicator in the cloud, can be global identifiers which can be attributed to malicious behavior (i.e. AWS Account Ids and Image Ids)
- Indicators such as IP addresses and domains are less useful in the cloud as most **attacks are more bespoke than classic on-premises.**

New Tools?

Not Really

What stays the same ?

- Threat Intel still requires endless hours of trolling yuck corners of the web and **reading breach notices** for tidbits of intel.

New Mindset or Skillset ?

- Threat Intel teams need to recognize attacks on cloud-hosted resources can be done **without** a piece of malware or malicious software.
- Only by observing patterns of API access could indicators be harvested.

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Insider Risk

Mission

Protect the organization from both intentional and unintentional **insider threats**, including employees, contractors, or other trusted insiders.

What's new with the cloud ?

- With the cloud, Insider Risk is set on Hard Mode!
- **New paths for exfiltration** with cloud and SaaS explodes often with data never landing on a workstation or hitting a monitored network.
- New cloud-native data stores require constant scanning and monitoring.

What stays the same ?

- Insiders, employees still have incredible access whether the system is on-prem or cloud.
- You will still need to take a **data centric approach** in protecting resources.

New Tools? Probably

With the advent of the cloud, Insider Risk teams might look to CASB solutions for help in cataloging SaaS tools used to get a handle around exfiltration.

- CASB
- Behavioral Profiling with UEBA
- Cloud-Native DLP

New Mindset or Skillset ?

- Understanding how data is moved intra cloud, along a providers backbone will help Insider Risk understand the gaps in visibility when data is stored in the cloud or SaaS solutions.

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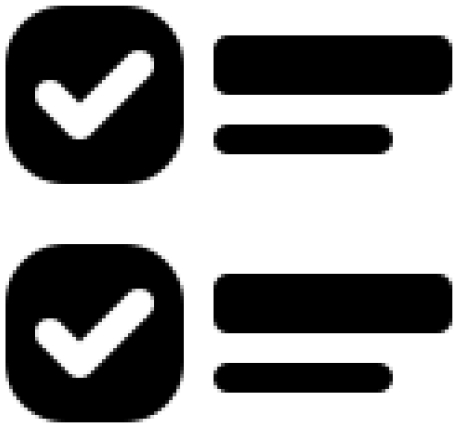
Governance Risk & Compliance



Mission

Ensure that the organization adheres to applicable laws, regulations, industry standards, and internal policies regarding information security and data protection.

What's new with the cloud ?

- With new types of infrastructure must come new compliance frameworks - yay!
- Cloud adoption initiatives will envelope the entire organization and have aggressive timelines making a traditional GRC waterfall program always being behind the curve of adoption.

What stays the same ?

- GRC still needs to provide the appropriate checks and balances to technology teams.

New Tools? Probably Not

- New frameworks for benchmarking your environment.
- CSA - Cloud Control Matrix: Provides a set of security controls specifically designed for cloud computing environments.
- CIS Benchmarks: align with industry best practices and enhance the security of their cloud infrastructure.

New Mindset or Skillset ?

- Learn the new cloud-specific compliance and regulatory requirements, including data residency and best-practices.
- Change management processes need to evolve from gates to guardrails by applying more rigor to changes only when they deviate from approved patterns and policy.

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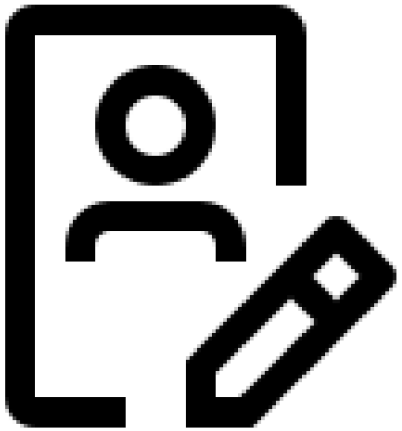
Third-Party Risk



Mission

Assess, manage, and mitigate the security risks associated with the organization's relationships with **third-party vendors**, suppliers, and service providers.

What's new with the cloud ?

- New cloud security vendors requesting access into your cloud plane.
- Third-party Risk needs to focus on the access requested from vendors and how they will integrate with your IaC, automation and monitoring environments

What stays the same ?

- The vendor selection process is still broken.
- Vendor questionaires never worked and still don't.

New Tools? Probably Not

Tool proliferation itself is a major risk!

New Mindset or Skillset ?

- Focus on a solid understanding of the granular permissions in the cloud specifically the difference between the **control-plane and the data-plane.**
- Be wary of vendors who ask for over-privileged setups.

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Cryptography

Mission

Ensure the confidentiality, integrity, and authenticity of data i**n-transit and at-rest** through the application of cryptographic techniques and best practices.

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What's new with the cloud ?

- Encryption-at-rest is widely available to any aspect of an architecture without complex integrations.
- Because everyone can crypto now, you'll need to **get ahead of development teams** to centralize secrets management and cryptpgrahic key storage, providing standardized patterns of use.

What stays the same ?

- As with on-premises crytographic architecture, there is **always a backing key somewhere** that is protected by access controls. Cryptographic controls in the cloud are no different, their security relies on access to the underlying key.

New Tools?

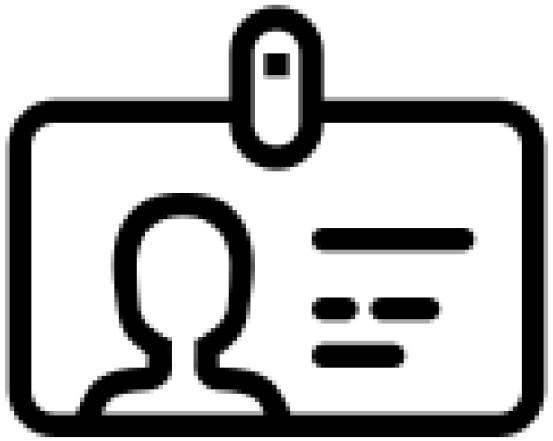
Definitely

- You'll be leveraging the cryptographic services from the cloud providers, including cloud-native secrets management stores and HSMs
  - Cloud KMS / Cloud HSM
  - Secrets Manager

New Mindset or Skillset ?

- Get to know the identity controls available in cloud cryptographic services.
- Gain familiarity with the **technical whitepapers** that detail the security controls of Cloud Hardware Security Modules (HSMs) and Key Management hardware. This will help you assess whether entrusting the management of your cryptographic material to these devices makes senses.

Identity and Access Management (IAM)



Mission

Maintain secure systems for managing user identities and controlling their access to organizational resources. These are your IdP admins, your AD Admins **managing user identities and entitlements**.

What's new with the cloud ?

- The need for consistent identity across cloud providers puts your IAM team front and center.
- **Extend identity into the cloud** both for access into the cloud-plane and cloud-hosted applications.

What stays the same ?

- Technologies used by the IAM will feel like old hat.
  - SAML, OIDC, SCIM. These were the backbone protocols in on-premise systems are still used to federate the cloud.

New Tools? Probably

Given a transformative shift to the cloud an organization needs to decide how to expose their corporate identities previously locked behind AD. Often this is through a **cloud-hosted Identity Provider (IdP)**.

- Azure Active Directory (AAD)
- Okta
- JumpCloud
- Auth0

New Mindset or Skillset ?

- Understand what can be centralized and what can't.
- Identity teams should define the scope of their centralized identity and authorization framework in the cloud, identifying the transition points where native cloud authorization systems take over.

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Vulnerability and Patch Management

Mission

Identify, assess, and triage security vulnerabilities in the organization's **infrastructure** to reduce the risk of exploitation by malicious actors. Coordinate with resource owners to drive remediation.

What's new with the cloud ?

- The definition of a 'vulnerability' expands to include misconfigurations in cloud resources.
- It's likely vulnerability management teams will see their mission scope grow to include identifying and reporting on **cloud misconfigurations**.
- They'll be working closer than ever with DevSecOps teams to integrate tooling further and further left.

What stays the same ?

- The 'ways of working' remain consistent in a vulnerability management team from the on-prem world to the cloud.
- The need to patch vulnerabilities remains constant, whether they are in on-premises systems or cloud resources.
- Vulnerability management teams will continue to prioritize and **own the remediation process**.

New Tools?

Definitely

Traditional vulnerability **scanning tools** may not be fully equipped to handle the unique characteristics and dynamic nature of cloud environments.

- Scanners for cloud control-plane: **CSPM**
- Scanners for ephemeral virtual machines
- Scanners for containers
- Scanner for serverless

New Mindset or Skillset ?

- Understanding how misconfigurations in the cloud are exploited will help Vulnerability Management contextualize risk and prioritize remediation.
- Embrace **automation and scripting** to create and manage cloud-specific scans, prioritize vulnerabilities, and initiate remediation processes.

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Application Security and Pentesting

Mission

Collaborate with development teams to address vulnerabilities, employing secure coding practices and fixes. **Identifying security weaknesses thorugh testing** to ensure application resilience.

What's new with the cloud ?

- When applications are hosted in the cloud, pivoting from **app-layer vulnerablities to cloud-layer vulnerablities** should be added to a testing suite.
- Software development guidelines should incorporate the use of approved cloud security services for secrets management.
- AppSec might be the ones called on to test cloud environments for known mnisconfigurations.

What stays the same ?

- Despite the cloud's impact, application security teams will continue to focus on addressing issues like injection vulnerabilities and logic defects as a significant part of their daily responsibilities.

New Tools?

Definately

A new crop of **cloud pentesting tools** have emerged in the past 5 years to help audit cloud environments and exploit identified misconfigurations.

- Pacu
- Microburst
- Cloudmapper
- DeRF

New Mindset or Skillset ?

- Learning how the cloud super-sizes issues such as **RCE and SSRF** will be crutial both in performing an effective test and communicating impact.
- Having **situational awareness** for 'whats beyond' a target application, whether it be a cloud storage bucket or kubernetes cluster is required to perform a comprehensive assessment.

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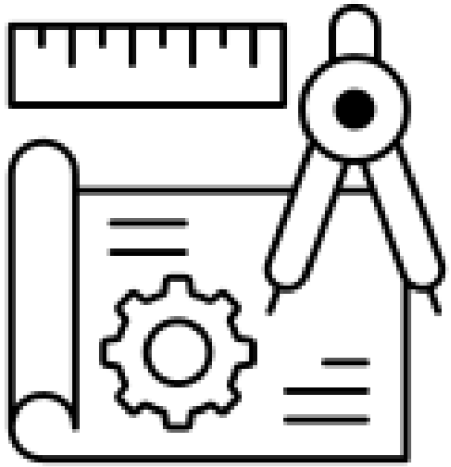
Enterprise Security Architecture



Mission

Design a security framework that aligns with business objectives and effectively mitigates the risk introduced in an every expanding attack surface.

What's new with the cloud ?

- Security architects need to understand what part of the tech stacks they control whether designing on IaaS/PaaS/SaaS.
- Understanding **how threat models change** as you move through service models (IaaS, PaaS, SaaS) will save you time, help you focus on the right thing.

What stays the same ?

- Good design is still about managing complexity.
- Core principals such as least privilege and rational, safe defaults are still relevant.
- Remaining close to core security values, will lead architecture along the right path.

New Tools? Probably

- Upgrade your visualization tools for the cloud. **A good architect 'sees' the infrastructure** - to aide this upgrade your visualization tools! Often these tools let you connect to your cloud instance and import your configurations, auto-magically generating a diagram which can be iterated on.
  - Cloudcraft, Cloudmaker, LucidScale.

New Mindset or Skillset ?

- **Serenity** to accept the things they can cannot change, The courage to change the things they can, And the wisdom to know the difference.
- This has always been a key skill of security architects but never more so than in the cloud.

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Security Engineering

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Mission

In the buy versus build, they are the build. Security Engineering implements and maintain technical solutions to **enable the rest of the security organization**.

What's new with the cloud ?

- You'll be asked to plug the gaps left by CSP's.
- Security solutions can operate at different points along the cloud deployment pipeline.
  - They can enforce standards **before** cloud resources are provisioned, or they can work on the other end, **post-deployment,** by auditing permissions, configurations, and collecting and normalizing logs.

What stays the same ?

- **Engineering resources** will always be **finite**.
- As was before, the buy versus build dilemma remains and is not measurably changed with the cloud.

New Tools? Definitely

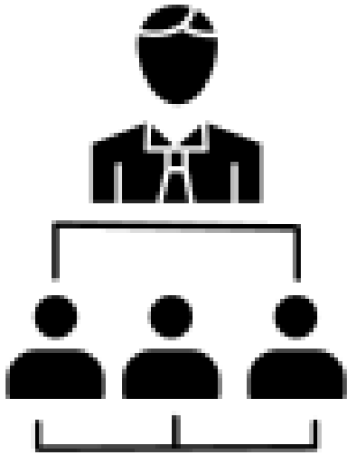
You're new programming interface will be terraform. Congradulations, you just became **YAML engineers.**

- Cloud-Provider CLI Tools
- Terraform
- YAML
- Python

New Mindset or Skillset ?

- Get to know the free security offerings from the CSPs (i.e: IAM Access Analyzer). With some security engineering elbow grease, you can build upon free services to.
- Get to know the vast eco-system of **open-source tooling** for the cloud, they can help prove out new security processes before buying an expensive solution.

Security Leadership



Mission

Communicate risk to the business and provide **strategic direction**, ensuring it aligns with business goals and objectives.

What's new with the cloud ?

- Large shift of risk and responsibilities with the move to the cloud.
- **Burn-out within your team can accelerate** as the organizational mission grows and practitioners are being asked to secure technologies they either don't understand or aren't equipped to wrangle.

What stays the same ?

- Security practitioners are still being asked to do more with less.
- Business being two steps ahead of security is nothing new.

New Tools?

Definitely

- Patience and empathy for the large shift in skills and process you're asking of staff.

New Mindset or Skillset ?

- Set the expectation for your team that the cloud is everyone’s responsibility and ensure your training budgets and training time set aside account for this huge shift you are asking your team to do.

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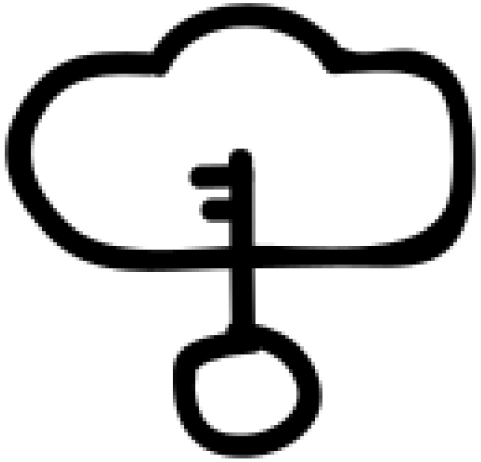
PHEW...

Cloud Security



Mission

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What would a Cloud Security Team Do?

- Facilitate the secure adoption through architecture, monitoring and defense-in-depth
- Serve as the cloud SME across the security organization.
- Liasson between cloud owners and operators and security teams
- In-depth research on cloud services providing guidance on their secure usage within the organization.

Tooling

- Assist in the selection and adoption of tooling
- Prevent tool overlap

Mindset or Skillset ?

- Members of this Cloud Security team must operate cross-functionally both within a Security Organization and the cloud consumers within business
- Team members should have excellent technical skills, be pragmatic and good internal educators.

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New Mindsets and Skillsets Needed

Learning New Skills

- Open a cloud account and start building!
- Even if you are a defender (especially if you are a defender), understanding how the widgets fit together is the perfect place to start!

Cloud Services and APIs

- Nearly every enterprise security capability will need to know about the offerings from the cloud providers.
- Some might only need a cursory understanding, others will need to research deeply how they interact with each other.

Cloud Service Models

- Understanding which layers of the technology stack are handled by the cloud provider in either an IaaS, PaaS or SaaS service model helps decifer which aspect of the attack surface to protect.

Cloud Control-Plane

- Your first line of defense is a properly configured cloud-control plane, learn how misconfigurations are abused
- Recognize the cloud-control plane as the new OS which attackers will manipulate to achieve their goals.

Cloud Provider CLI Tooling

- Each cloud provider has a programming interface which is often the most efficient way to interact with your cloud environment.

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THANK YOU