Clear Skies: Avoiding Security Breaches in AWS

Nick Jones – AWS Community Day DACH 2023

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aws sts get-caller-identity

Nick Jones – @nojonesuk

- Principal Consultant @ WithSecure
- Cloud Security Consulting Lead
- AWS Community Builder
- Focus on:
  - Security automation
  - Attack detection
  - Making security work for engineering teams

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Agenda

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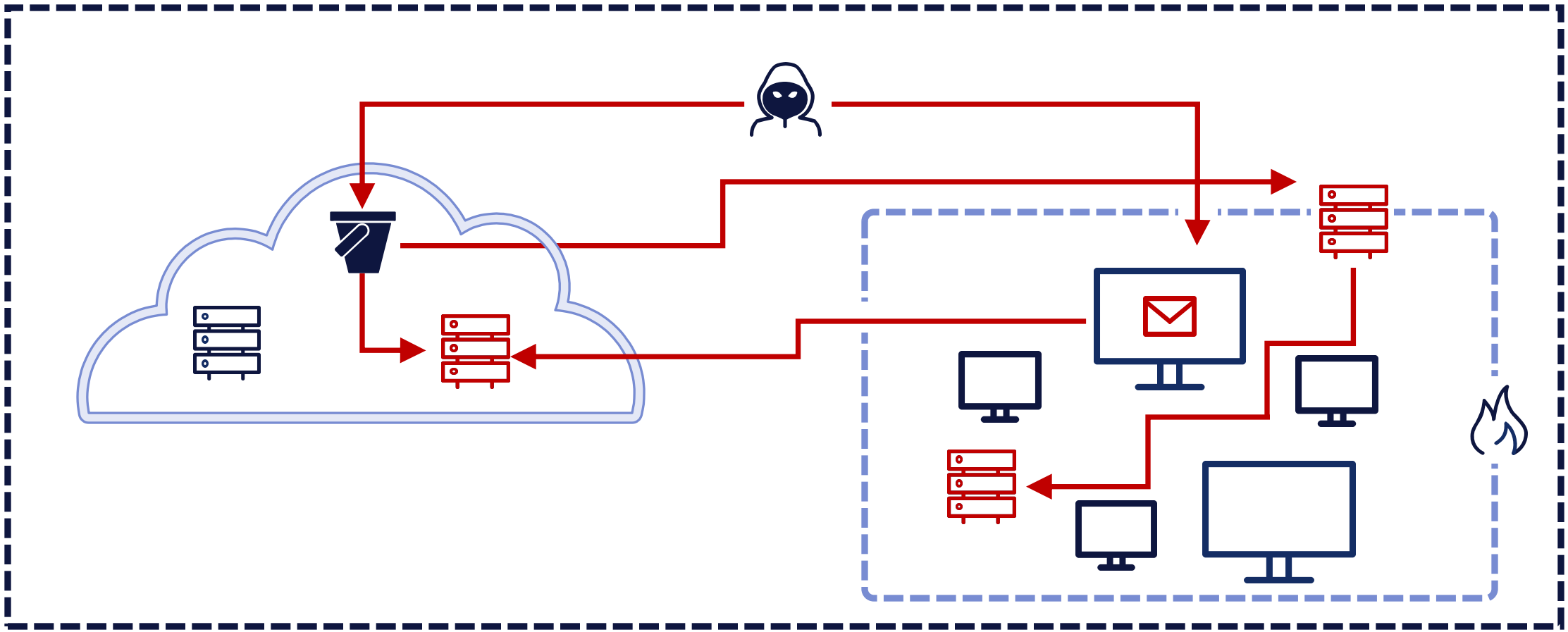
Security's Idea of the Cloud

Attackers Target Everything



Real World Breach Scenarios

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Breach Dataset

Rami McCarthy's Breach Dataset

- Curated dataset of AWS related security incidents
- https://github.com/ramimac/aws-customer-security-incidents

Highlights

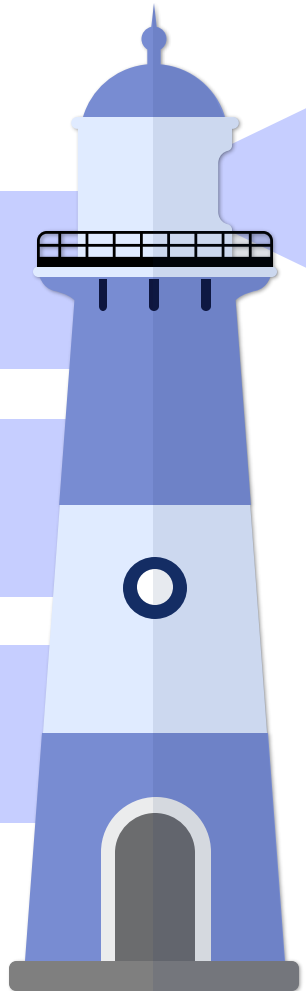
- 45 breaches back to 2014
- 21 incident reports
- Ignores S3 buckets – too many to count!

Inherently Flawed Data

Not all breaches get spotted

Providers hate talking about it

Focus on low hanging fruit



A Note on Cloud Zero Days

Cool but mostly irrelevant

- CloudVulnDB tracking >120 vulns
- One exploited in the wild, no breaches reported
- https://www.cloudvulndb.org

Expect this to change

- Israel leading the charge: Wiz, LightSpin, Orca
- fwd:cloudsec 2022 keynote from Wiz is a good overview

Open S3 Buckets

The perennial problem

- Biggest source of breaches for years now
- Trivial to find and exploit

Situation is Improving

- AWS providing good options now to prevent
- Enable block public buckets everywhere!

Photo from https://www.flickr.com/photos/electronicfrontierfoundation/50617066023

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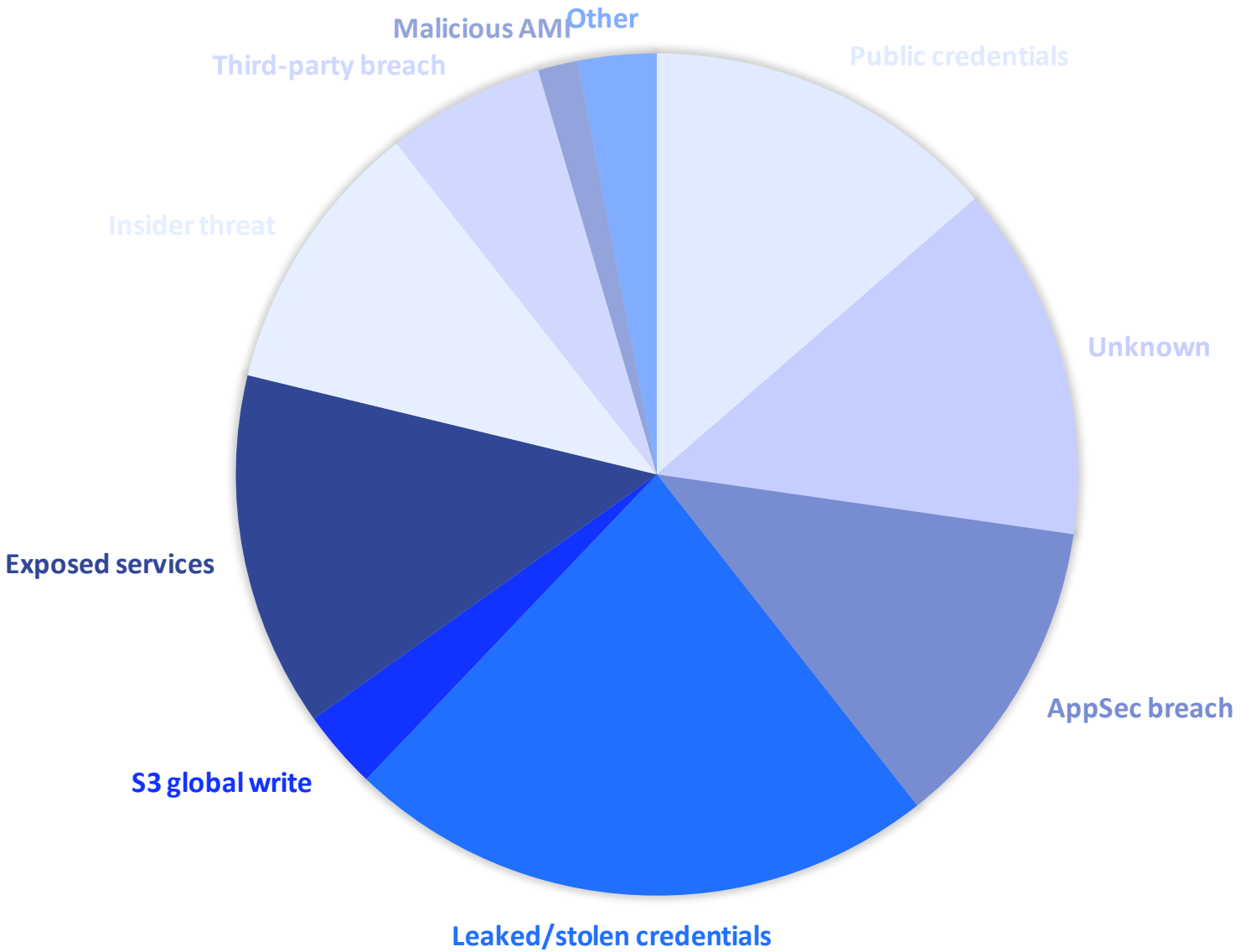
Breach Causes



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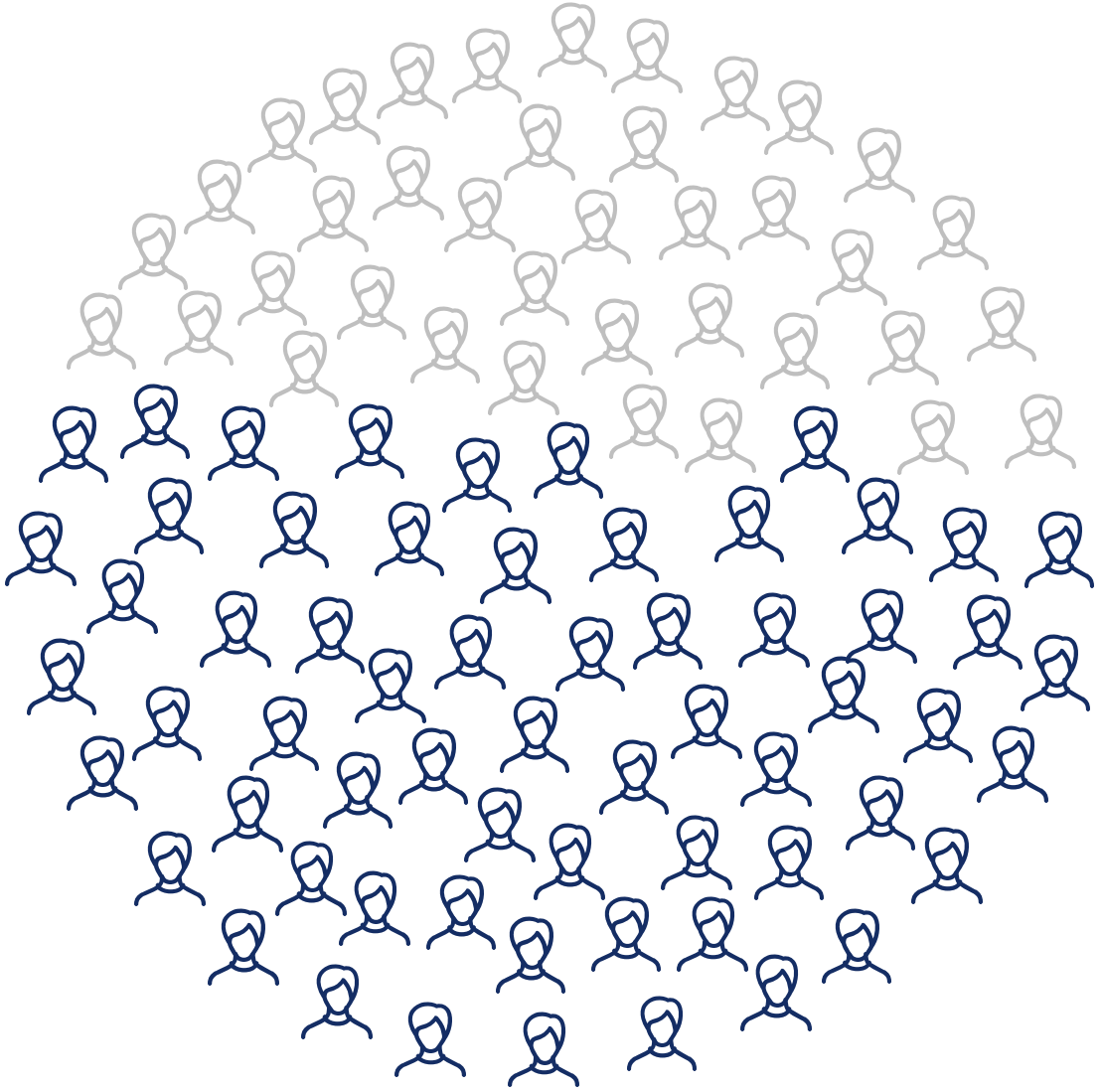
44%*

Breaches involving IAM users



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NUKE IT FROM ORBIT
ITS THE ONLY WAY TO BE SURE
memegenerator.net

Summary

Attackers look for the easiest path

- Most attacks are opportunistic
- Your org is likely not a priority target
- The basics helps stop APTs too

Most get screwed by the basics:

- **Public S3 buckets**
- Forgotten accounts
- Leaked credentials
- Bad leaver handling
- IAM Users

You **probably** won't get breached by:

- Encryption at rest
- Not using the Nitro Enclaves etc
- Zero days
- AWS Insider threat

Other Interesting Attack Vectors

Cloud Native Management Services

Native SSH/RDP aren’t great

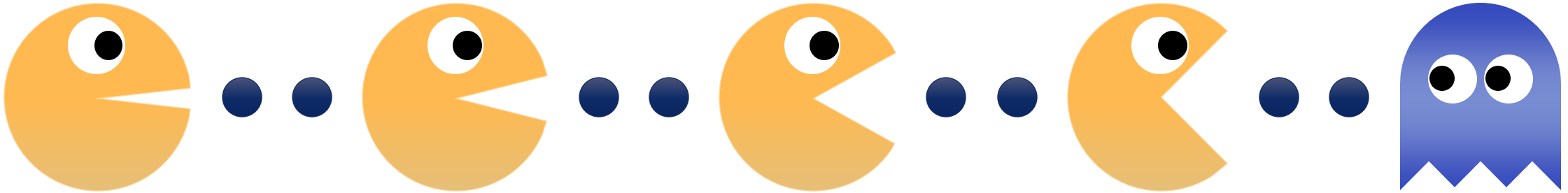
- Network level access to manage
- Overhead of separate authentication systems
- Harder to log & audit

SSM & Instance Connect are *mostly* better

- (Usually) easier identity management, fewer networking concerns
- Caveat: It joins two previously separate security domains
- Your IAM configuration needs to be solid!

Cloud-Style Shell Popping!

Objective
Root on an EC2 instance full of sensitive data



Compromise Credentials
Find IAM User keys in a public Github Repository

Enumerate Foothold
Who are we, what access might we have?

Recon
What services is the client using?

Pop Shells
Use SSM to get shell access on EC2 instances

Cloud Native Phishing

Identity Platforms / SSO

- Okta, Ping, OneLogin, Auth0…
- Single point of access
- Supply chain risk too

Interesting security properties

- MFA, CAPs etc etc
- Often poor session management
- Get the session token, get access to ***everything***

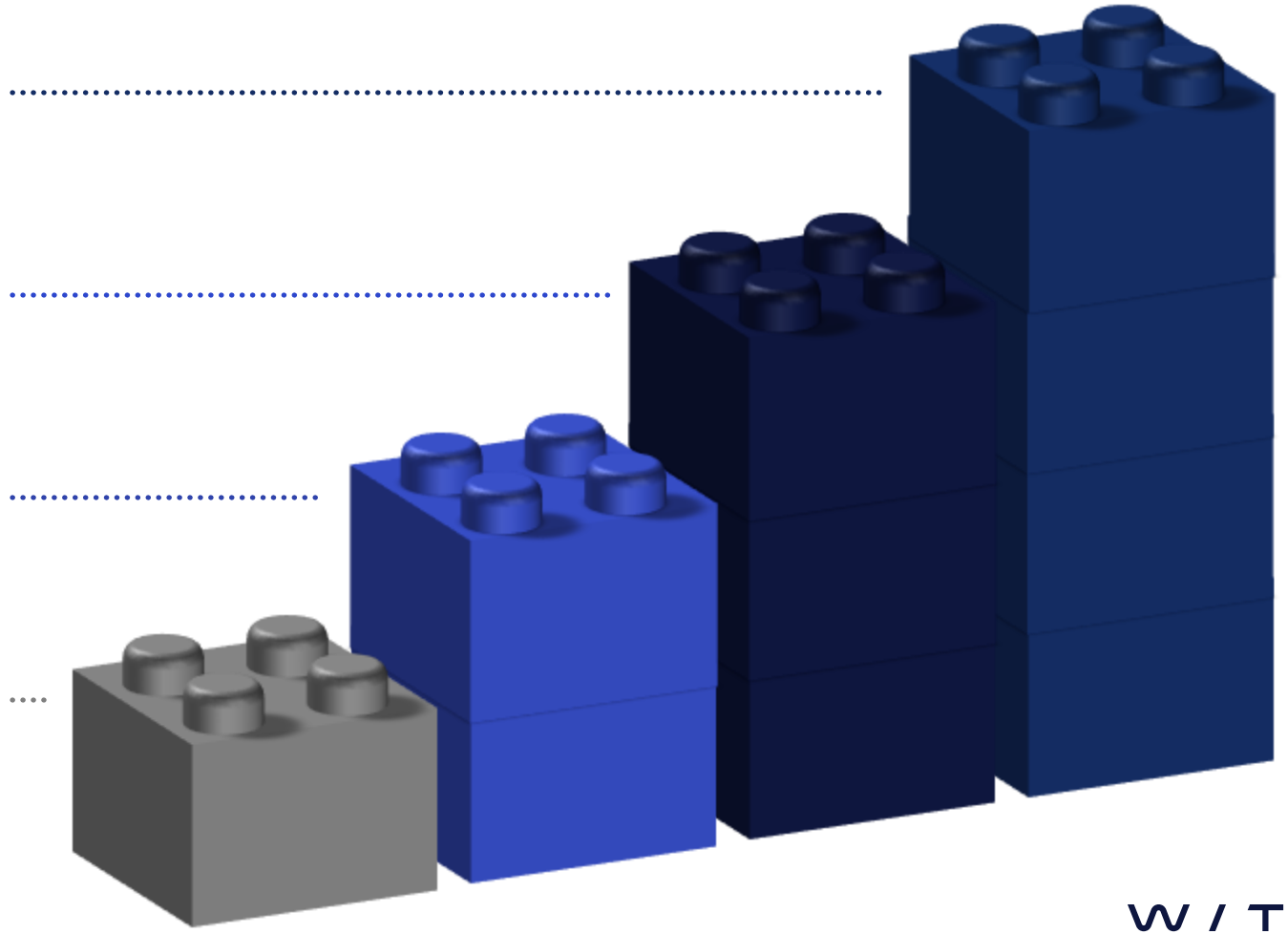
Exploiting Development Workflows

Source Code Management
Everyone uses GitHub or similar to develop and collaborate on their code

CI/CD
Continuous integration and continuous delivery to automate testing and deployment of cloud workloads

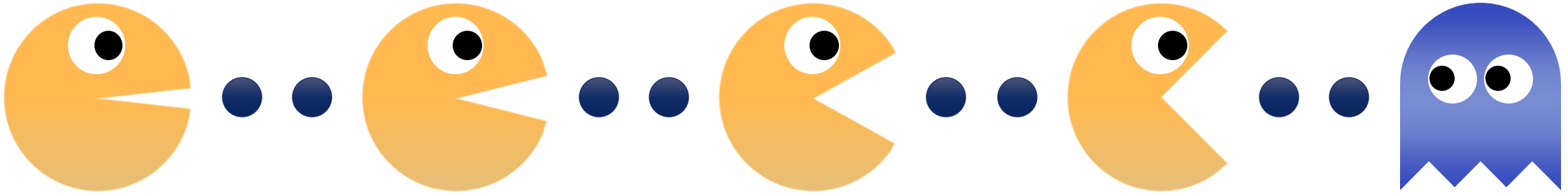
Dev Usability > Security
Enabling devs to move at speed often means system architectures and controls are not well hardened

Automatic IaC Deployments
IaC changes often automatically deployed after merging – can we bypass approvals process?



Attack Path 2: DevOoooops

Objective
Admin access over production AWS account



Phish a Developer
Steal their SSO session cookie

Access GitHub
Find some interesting IaC repositories

Malicious Pull Request
Exploit Terraform Cloud's operating model

Exfiltrate Credentials
Grab the credentials Terraform Cloud uses to deploy

Key Security Controls

Strong Identity Controls

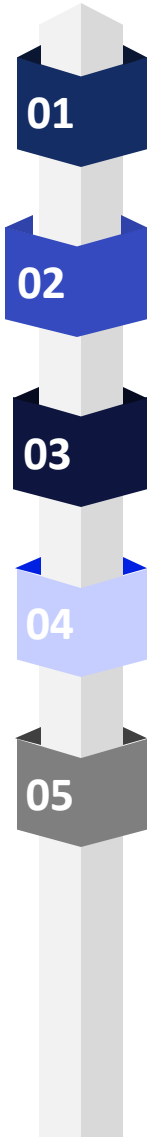
Enforce Multi-Factor Authentication (MFA) everywhere

Apply principle of not-very-much privilege

Eliminate long-lived credentials **(IAM USERS!)**

Use provider-backed authentication where possible

Automate credential management and rotation



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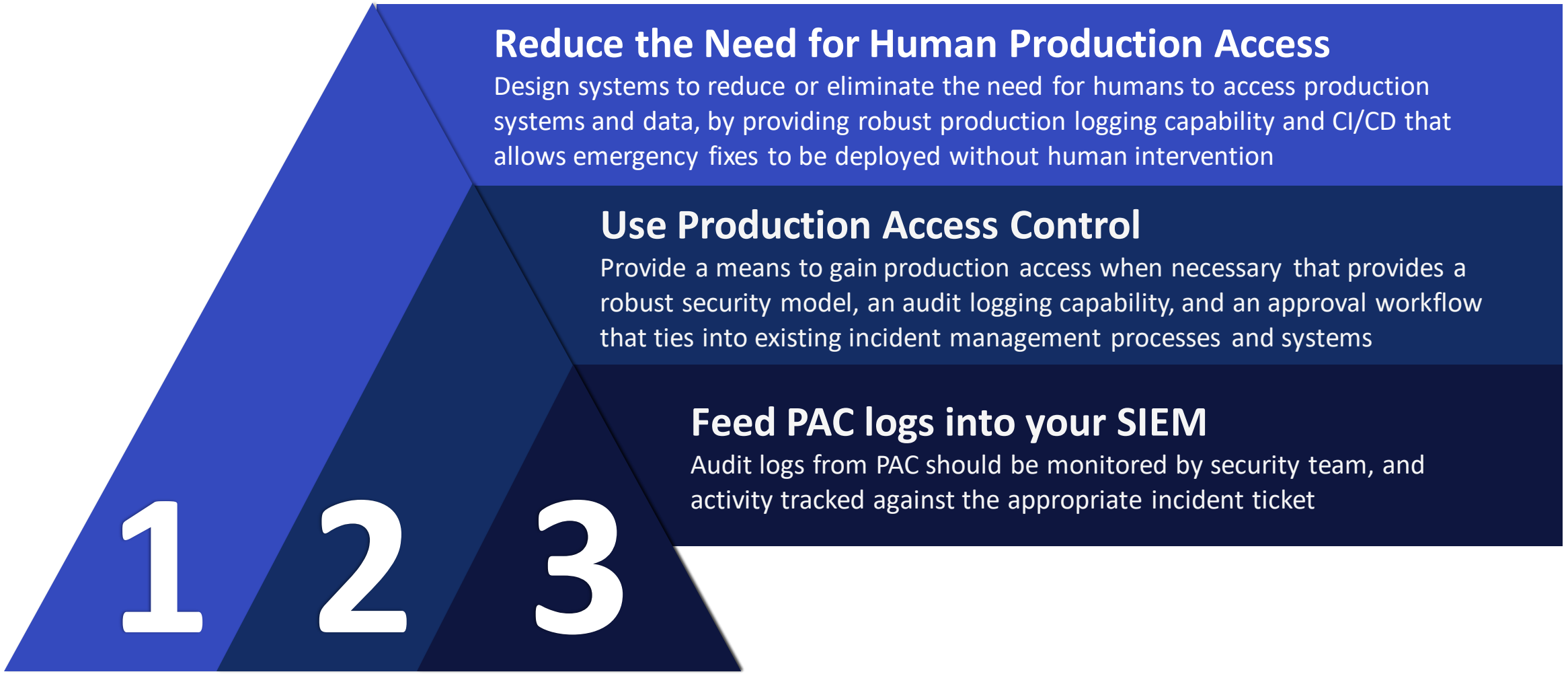
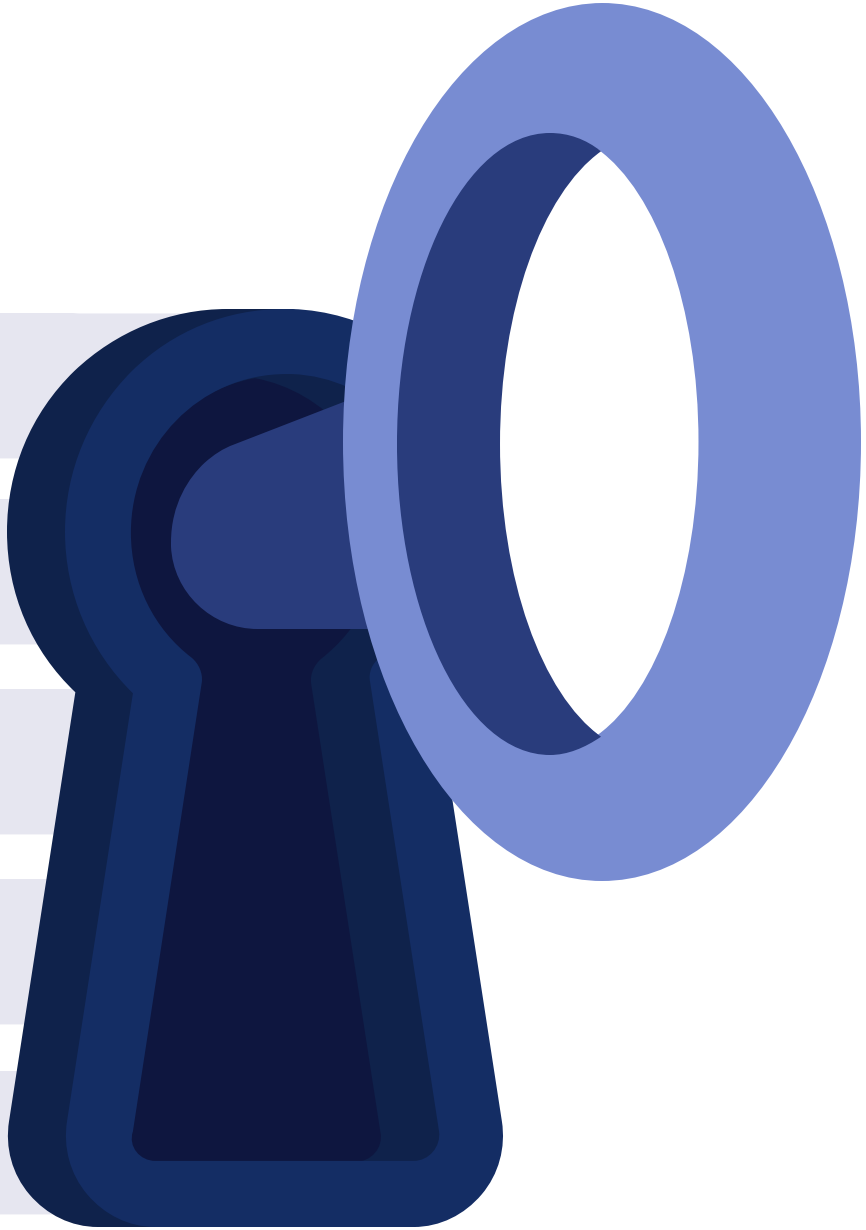
Production Access Control



Secrets Management

- Often the key point of failure
- Where do applications store their secrets?
- How are credentials shared and rotated?
- How do you know when secrets are leaked?
- Use Secrets Manager / SSM Parameter Store!



Security Testing Done Right

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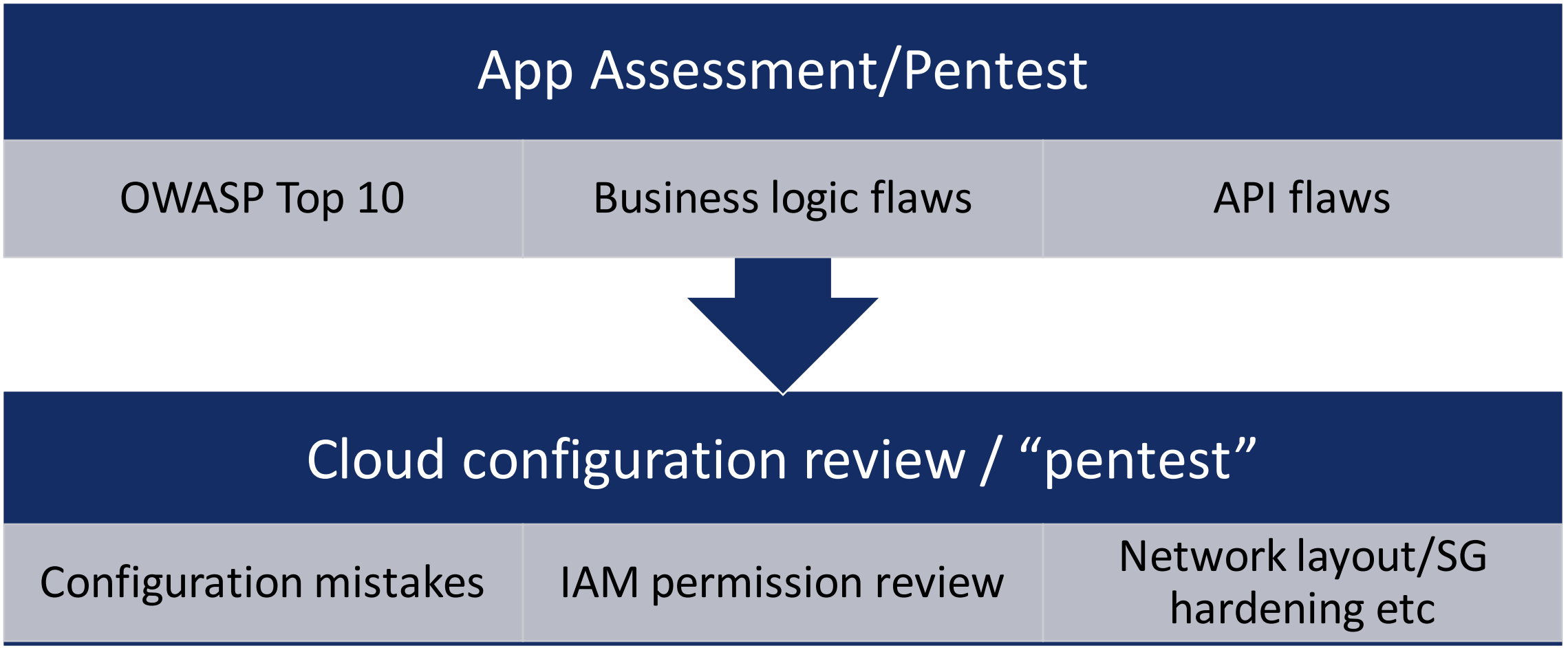
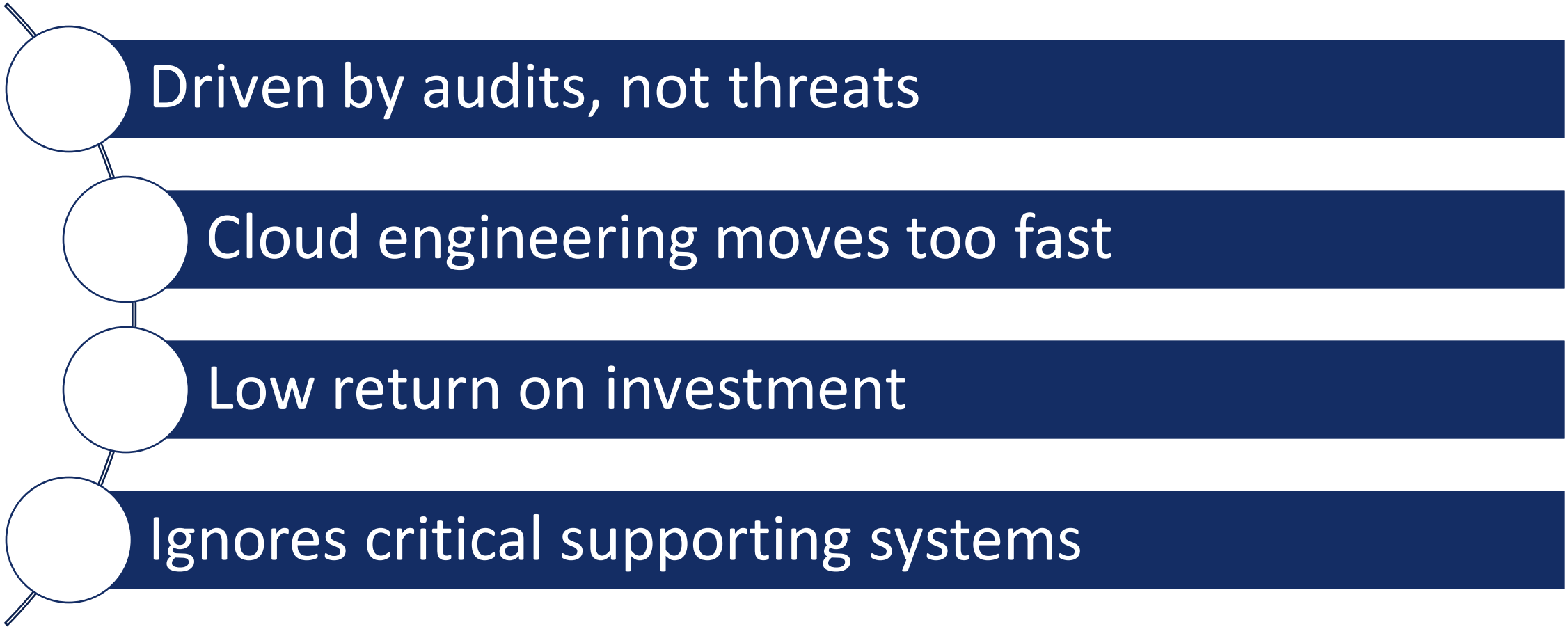
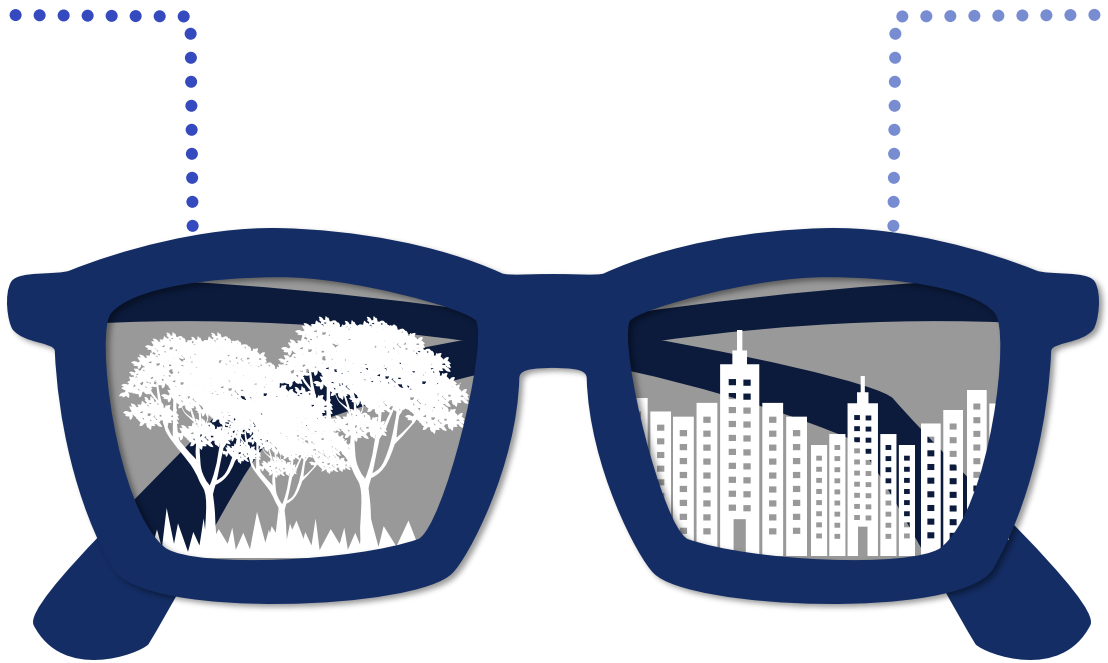
“Penetration Testing” in AWS



“Penetration Testing” Mostly Sucks



What To Do Instead?



Automate

Leverage automation to drive as much security as possible

Assess

Use humans to find the rest, and simulate attackers

Security Automation

02 IaC Scanning

Scan Infrastructure as Code in pipelines

Checkov
TFLint

01 Configuration

Assess resources for configuration issues

Prowler
ScoutSuite

Secrets Scanning 04

Scan repositories for keys, certificates etc

TruffleHog
detect-secrets

IAM 03

Identify IAM misconfigurations

Cloudsplaining
Pmapper
IAMSpy

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Human-led reviews

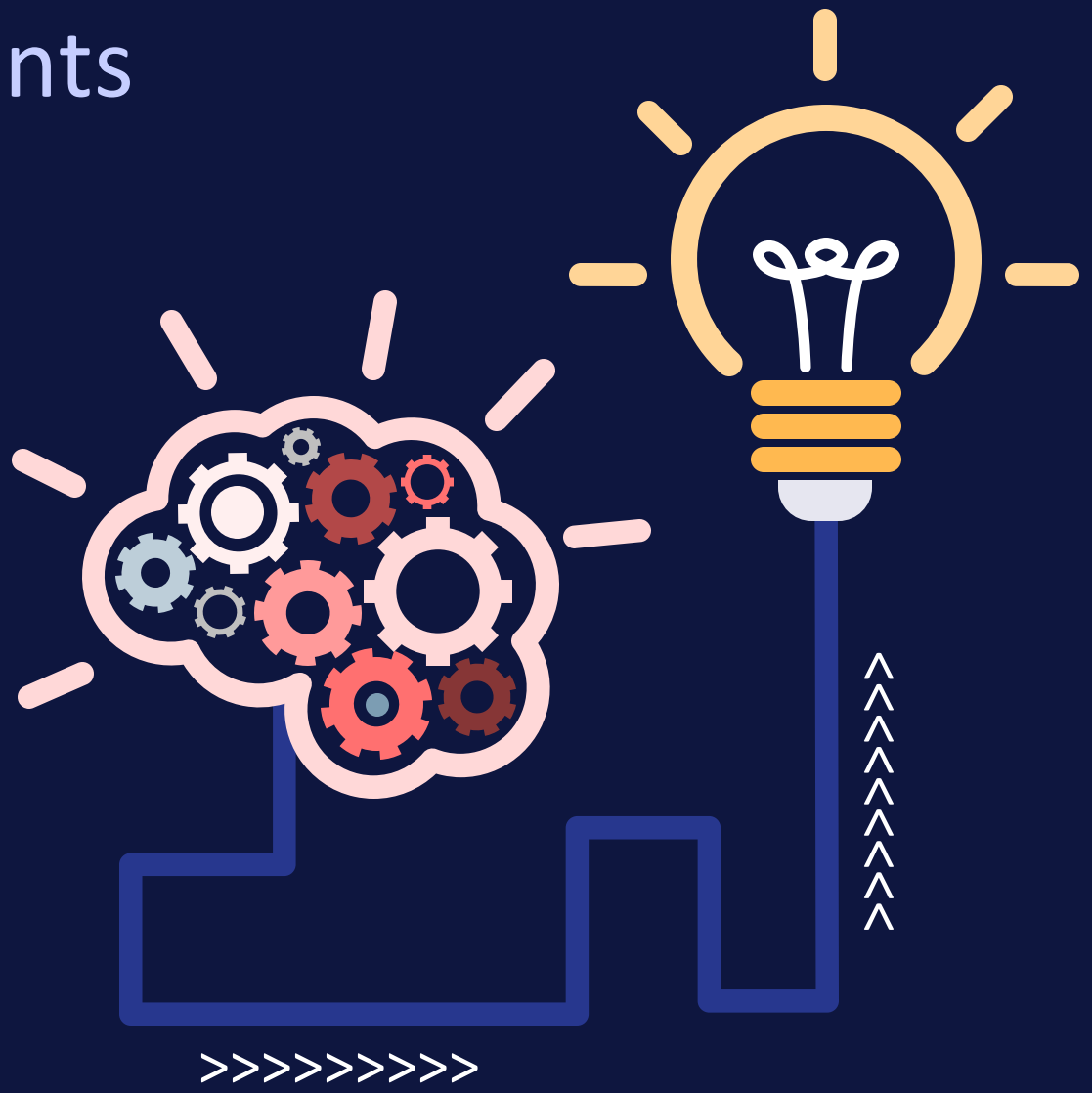
Objective-Driven Assessments

Business targets

- Steal key data/IP
- Move money
- Deploy malicious code to prod

Realistic starting points

- Leaked access keys
- Compromised developer
- Other insider threat
- Application compromise



Don’t Buy a Red Team

You likely don’t need it

- Adversarial simulation
- All about stealth, validating detection and response
- Depth, not breadth

Red Team = final step

- Confirm/harden attack surface
- Build your attack detection & response capabilities
- Test everything collaboratively
- … **then** maybe a red team!

Collaborating with Security Partners

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If You’re Buying Security Testing…

Make it work for you

- Fit their testing and reporting into your workflows
- Push for deep advice and long-term solutions

Find a good partner

- Do they get AWS/Cloud/DevOps?
- Can they show you novel R&D?
- Use engineers to vet providers’ technical knowledge

Help Us Help You!

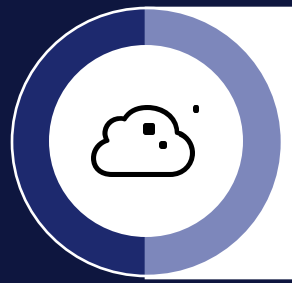
Access

- Give us read access to the AWS accounts
- If you're using IaC, show us that too

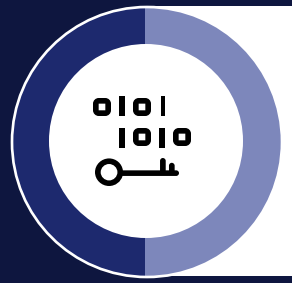
Work with us

- Help us understand what you've built
- Show us problems, help us design solutions
- Stay engaged and communicate with testers

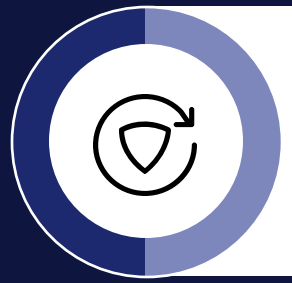
Conclusions



Security of the cloud extends to include a lot of external factors



Focus on IAM (especially users!), secrets management and CI/CD



Leverage automation and be smart about how you use humans

If you want to go fast, go alone.
If you want to go far, go together.

-- African Proverb*

* https://medium.com/@johnlatwc/the-githubification-of-infosec-afbdbfaad1d1

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Thanks for listening!

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Community Builders Slack: Nick Jones

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