GUIDEPOINT
SECURITY

# Cloud Security

## Five Phases of Cloud Security

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# Our journey led us here

With more than a decade having passed cloud continues to be defined differently depending on perspective. Identifying effective cloud security is dependent on how your organization defines cloud and the operational model chosen to build and manage your environment (i.e. CI/CD, lift-and-shift, IaaS, PaaS, SaaS). Today, we will cover the following topics:

- How cloud customers have approached cloud security and some of the challenges they have encountered,
- Cloud computing is an operational model with patterns. We'll talk about observations that developed the patterns presented today, and
- As more cloud customers are adopting multi-cloud solutions, how a holistic approach will set the foundation for future success.

# About Me

- 20+ years in IT and security career spanning multiple disciplines

  application development and security, web development, compliance, middleware administration, SMB hosting, network security, SOA to microservices to PaaS

- CI/CD experience began in the data center in the early 2000's, before "cloud"

- The experience from multiple disciplines led to building and deploying to AWS since 2007

- I have designed and built my own solutions since the early 2000's, out of necessity

- Cloud Security Practice Director at GuidePoint Security, a pure-play cybersecurity solutions provider

JV

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“Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.“ (NIST 800-145)

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MANY TYPES OF CLOUD CUSTOMERS

# The journeymen along the cloud adoption path

## Existing Ventures Corporation

Tactical implementation of cloud services

Compute

Storage

## Smart Decisions Corporation

Strategic decision to adopt cloud

Big data solutions

Existing information security experience

## Cautious Decisions Corporation

Tactical + Strategic

Vetted information security program

Security checklist

## Solutions Everywhere Corporation

Using all PaaS services

Serverless application

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NOTHING NEW UNDER THE SUN

# Clouds are unique, so which pattern?

## Crawl, Walk, Run

- Experience
- Proven
- Sounds Simple

## Denial, Forced, Acceptance

- Cloud is a fad
- We have a new CIO
- Look at what we've built in the cloud

## CSP Patterns

- AWS Strategy – The 6 R's
- Rehost
- Replatforming
- Repurchasing
- Refactoring
- Retire
- Retain

- Azure – Cloud Adoption Framework
- Strategy
- Plan
- Ready
- Govern
- Manage
- Organize

TACTICAL APPROACH

# First conversations focused on tactical solutions

## COMPUTE

WHAT IS THE
NETWORK TOPOLOGY

WHAT ARE THE
SERVER HARDENING STANDARDS

WHAT'S THE BEST WAY TO MANAGE
DISK ENCRYPTION

HOW DO WE MANAGE
LOGS, ALERTING, & MONITORING

TACTICAL APPROACH

# First conversations focused on tactical solutions

## DATABASES

WHAT IS THE
NETWORK TOPOLOGY

WHAT'S OUR STRATEGY FOR
DISASTER RECOVERY

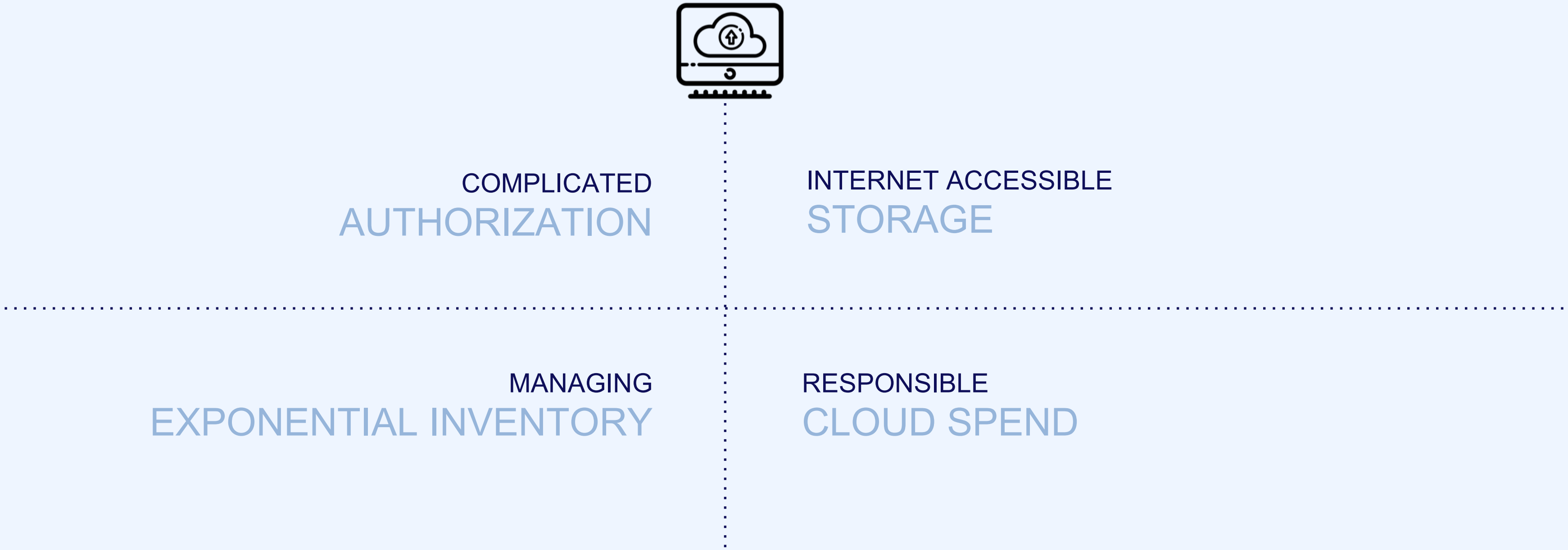
WHAT'S THE BEST WAY TO MANAGE
DATA ENCRYPTION

HOW DO WE MANAGE
LOGS, ALERTING, & MONITORING

NEW BUT OLD PROBLEMS

# Security considerations overlooked in the cloud

**Unknowns**



COMPLICATED AUTHORIZATION

INTERNET ACCESSIBLE STORAGE

MANAGING EXPONENTIAL INVENTORY

RESPONSIBLE CLOUD SPEND

NOTHING NEW UNDER THE SUN

# Clouds are unique, so which pattern?

## LOGGING

- What do we log?
- Where do we store our logs?
- Do we encrypt the logs?
- How do we interpret our logs?

## ENCRYPTION

- Do we use cloud native or a third-party key management solution?
- Who and what systems have access to data encryption keys and secrets?

## AUTHORIZATION

**Define**

- Service
- Action
- Resource
- Condition

**For**

- 100’s of services
- 1000’s of actions
- Countless Resources
- Many conditional options

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                "iam:ListRoleTags",
                "iam:ListGroupPolicies",
                "iam:ListAttachedRolePolicies",
                "iam:ListAttachedUserPolicies",
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                "iam:ListRolePolicies",
                "iam:ListInstanceProfiles"
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    ]
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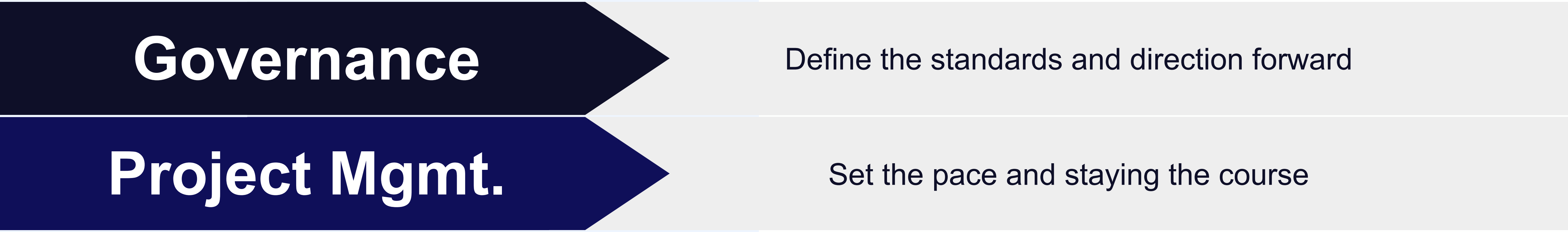


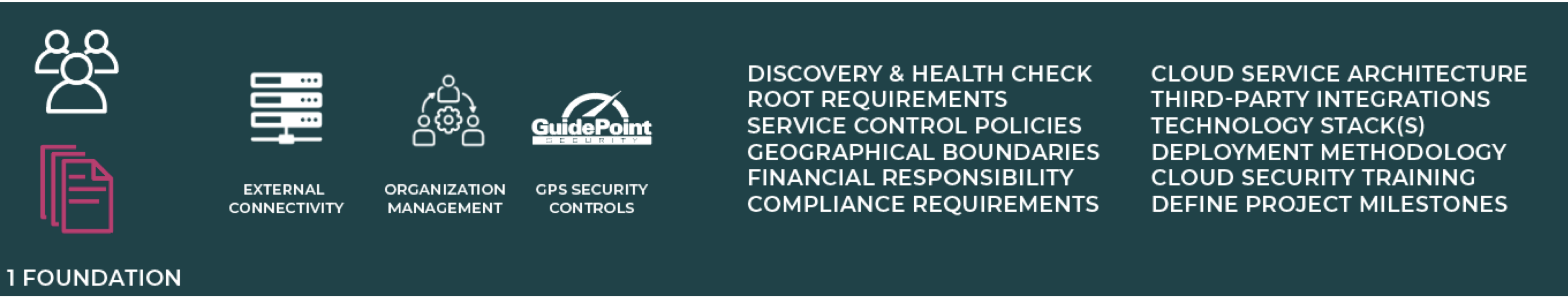
**Governance**

Define the standards and direction forward

**Project Mgmt.**

Set the pace and staying the course

# Building a strong foundation



1 FOUNDATION

EXTERNAL CONNECTIVITY

ORGANIZATION MANAGEMENT

GPS SECURITY CONTROLS

DISCOVERY & HEALTH CHECK
ROOT REQUIREMENTS
SERVICE CONTROL POLICIES
GEOGRAPHICAL BOUNDARIES
FINANCIAL RESPONSIBILITY
COMPLIANCE REQUIREMENTS

CLOUD SERVICE ARCHITECTURE
THIRD-PARTY INTEGRATIONS
TECHNOLOGY STACK(S)
DEPLOYMENT METHODOLOGY
CLOUD SECURITY TRAINING
DEFINE PROJECT MILESTONES

Have you identified a current posture and baseline?

[AWS] How will *root* accounts be managed?

How will you address exposure and threats from new cloud services?

Which compliance requirements impact your business?

A “we run everything” tech stack is fine, but how does that impact standardization , efficiency, and agility?

Are you ok with managing multiple authentication mechanisms, separately?

Is your team adequately trained to adopt cloud computing?

As secure as your network is, a compromised privileged cloud identity will supersede any network security enforcement

Identity management must be an early consideration, especially how to monitor and right fit your entitlements

Network topologies have become easier. Take your pick, but ensure you have egress visibility

IAM

NETWORK SECURITY

EXTERNAL CONNECTIVITY

2 PERIMETER

KEY MANAGEMENT

REPORTING

SECRETS

3 DATA PROTECTION

Key management in the cloud can be trusted. A proper implementation can be secure, efficient, and extremely cost efficient.

However, understand that the cloud providers approach encryption different: data encryption, secrets, certificates

Enforce encryption and data access using the same methods used to build business solutions

You're going to need a logging platform that helps you understand cloud events in addition to other events?

You will need to log cloud API activity, network traffic, infrastructure changes

Automate your Change Advisory Board, all cloud resources and changes to them are logged and can be prevented or rolled back

Most importantly, understand what to look for

- Excessive denied API requests
- Anomalies in cloud API usage, even with successful least privilege policies
- Change in baselines, i.e. increased compute capacity or network ingress/egress traffic
- Understand what NOT to look at, i.e. rabbit holes

## 5 CLOUD SOLUTIONS

Compute instances are following configuration management, golden AMIs processes, hardened, roles/service principals only when needed

Serverless architectures are flexible but there is now visibility and continuous monitoring for improvements to access controls

You’ve deployed acceptable web application protection based on your PaaS architecture

You’re better prepared to accept the adoption of new cloud services

While public cloud service providers are different, you’re in a better situation to tackle the common denominators.

With cloud being a vast landscape of services, you’re in a good spot to align with other frameworks, e.g. the GuidePoint CSAF.

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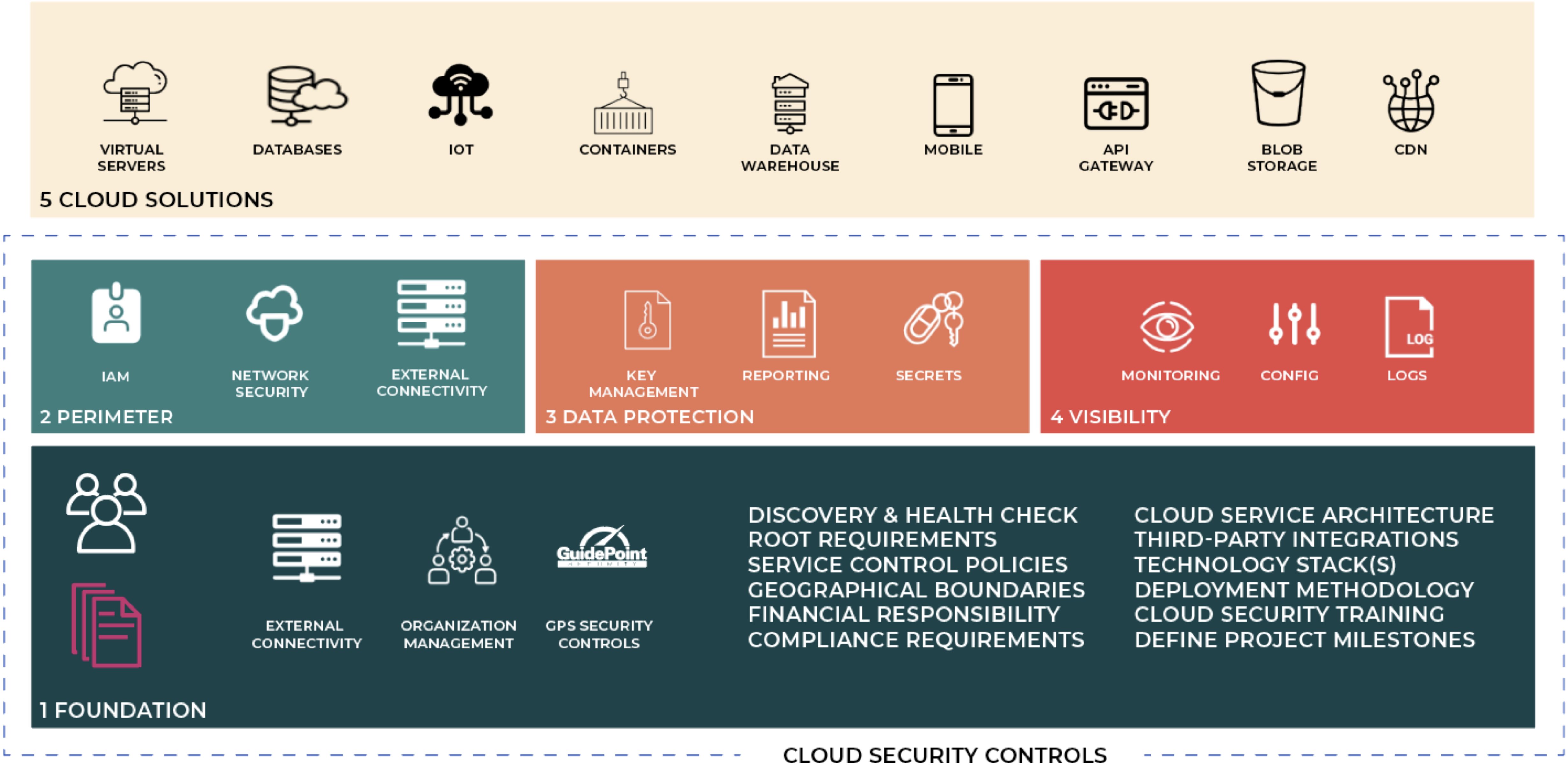

5 CLOUD SOLUTIONS

- VIRTUAL SERVERS
- DATABASES
- IOT
- CONTAINERS
- DATA WAREHOUSE
- MOBILE
- API GATEWAY
- BLOB STORAGE
- CDN

2 PERIMETER

- IAM
- NETWORK SECURITY
- EXTERNAL CONNECTIVITY

3 DATA PROTECTION

- KEY MANAGEMENT
- REPORTING
- SECRETS

4 VISIBILITY

- MONITORING
- CONFIG
- LOGS

1 FOUNDATION

- EXTERNAL CONNECTIVITY
- ORGANIZATION MANAGEMENT
- GPS SECURITY CONTROLS

DISCOVERY & HEALTH CHECK
ROOT REQUIREMENTS
SERVICE CONTROL POLICIES
GEOGRAPHICAL BOUNDARIES
FINANCIAL RESPONSIBILITY
COMPLIANCE REQUIREMENTS

CLOUD SERVICE ARCHITECTURE
THIRD-PARTY INTEGRATIONS
TECHNOLOGY STACK(S)
DEPLOYMENT METHODOLOGY
CLOUD SECURITY TRAINING
DEFINE PROJECT MILESTONES

CLOUD SECURITY CONTROLS

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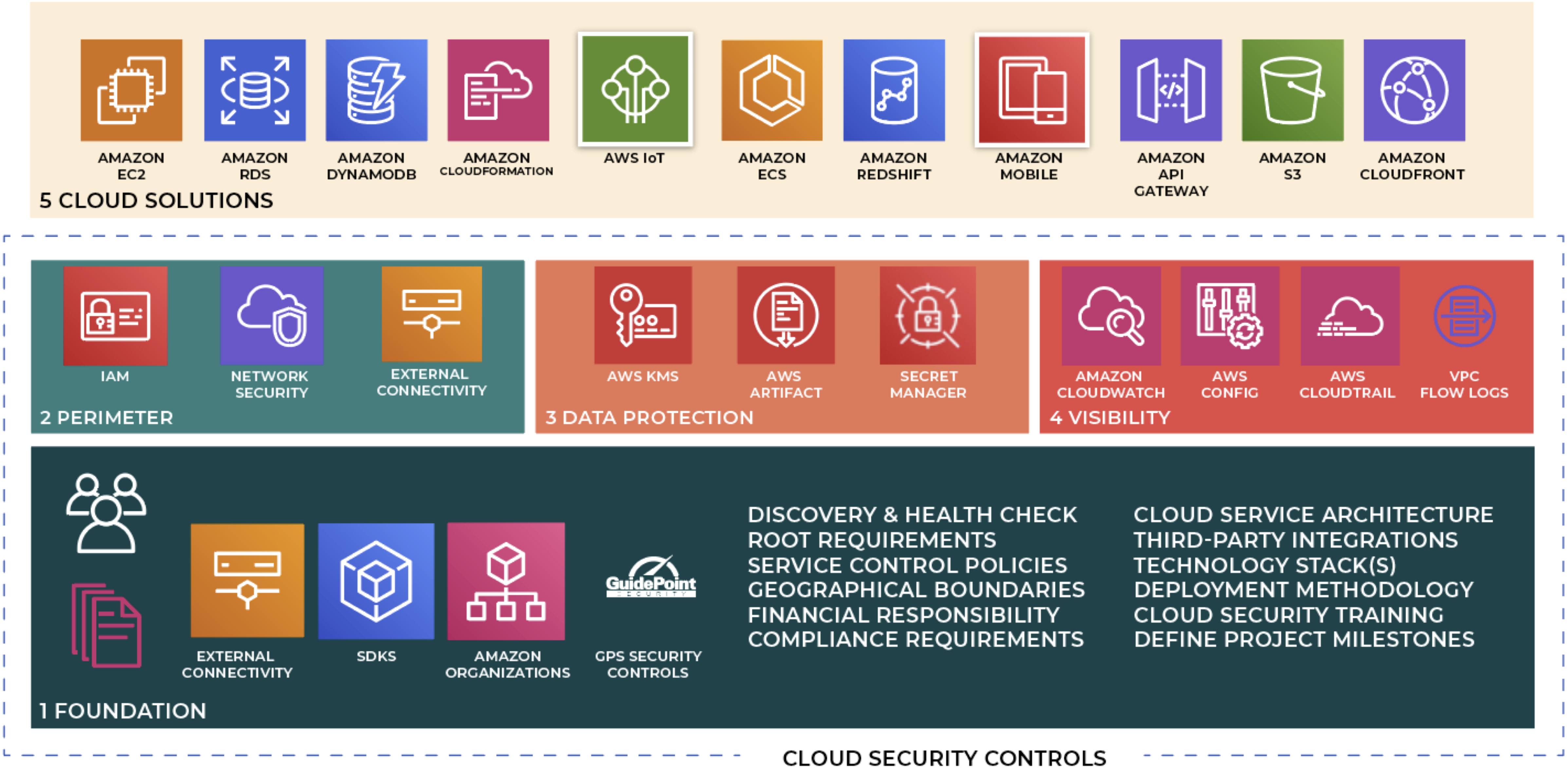

5 CLOUD SOLUTIONS

AMAZON EC2
AMAZON RDS
AMAZON DYNAMODB
AMAZON CLOUDFORMATION
AWS IoT
AMAZON ECS
AMAZON REDSHIFT
AMAZON MOBILE
AMAZON API GATEWAY
AMAZON S3
AMAZON CLOUDFRONT

2 PERIMETER

IAM
NETWORK SECURITY
EXTERNAL CONNECTIVITY

3 DATA PROTECTION

AWS KMS
AWS ARTIFACT
SECRET MANAGER

4 VISIBILITY

AMAZON CLOUDWATCH
AWS CONFIG
AWS CLOUDTRAIL
VPC FLOW LOGS

1 FOUNDATION

EXTERNAL CONNECTIVITY
SDKS
AMAZON ORGANIZATIONS
GPS SECURITY CONTROLS

DISCOVERY & HEALTH CHECK
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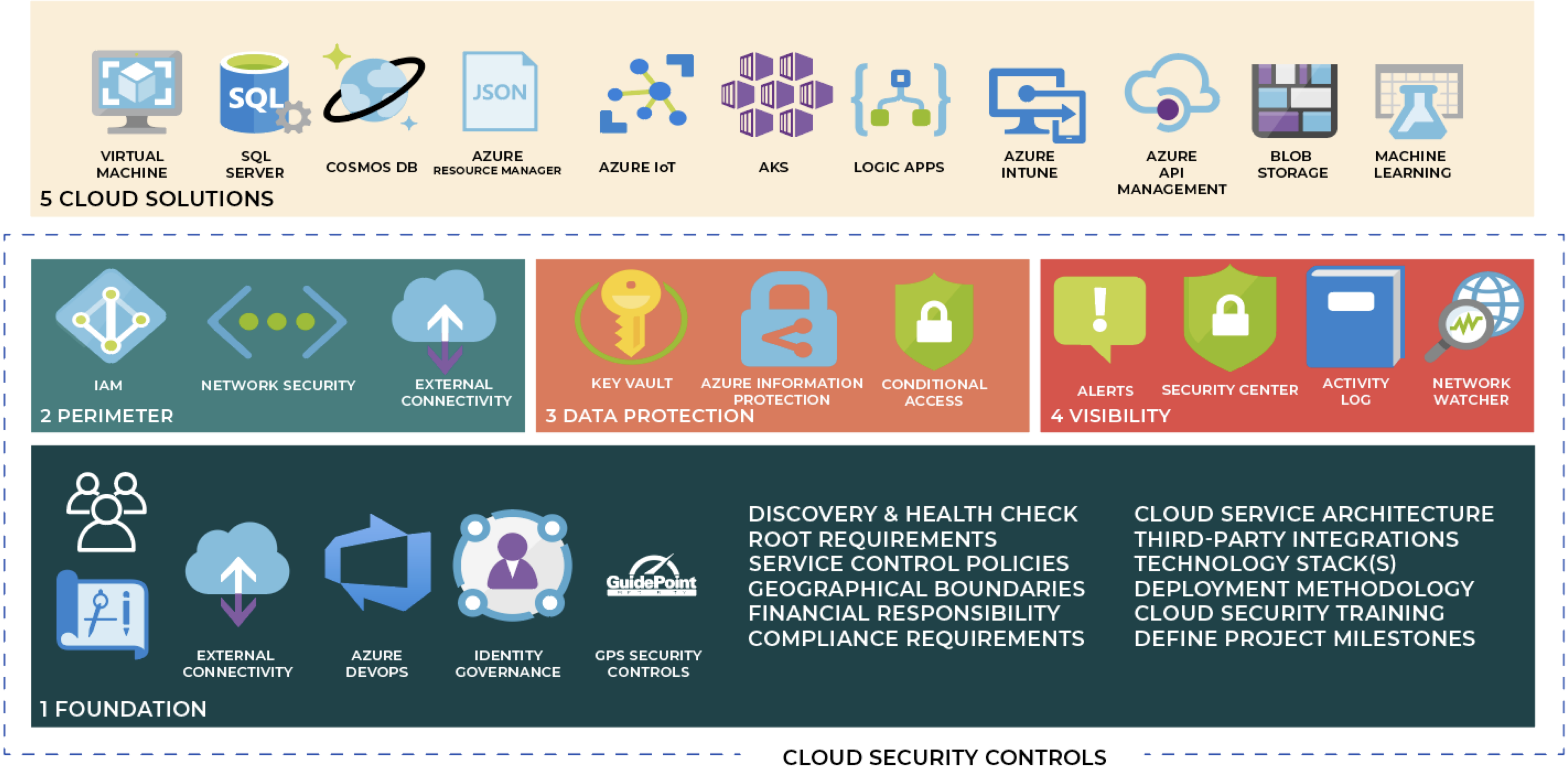

VIRTUAL MACHINE

SQL SERVER

COSMOS DB

AZURE RESOURCE MANAGER

AZURE IoT

AKS

LOGIC APPS

AZURE INTUNE

AZURE API MANAGEMENT

BLOB STORAGE

MACHINE LEARNING

5 CLOUD SOLUTIONS

IAM

NETWORK SECURITY

EXTERNAL CONNECTIVITY

2 PERIMETER

KEY VAULT

AZURE INFORMATION PROTECTION

CONDITIONAL ACCESS

3 DATA PROTECTION

ALERTS

SECURITY CENTER

ACTIVITY LOG

NETWORK WATCHER

4 VISIBILITY

EXTERNAL CONNECTIVITY

AZURE DEVOPS

IDENTITY GOVERNANCE

GPS SECURITY CONTROLS

DISCOVERY & HEALTH CHECK
ROOT REQUIREMENTS
SERVICE CONTROL POLICIES
GEOGRAPHICAL BOUNDARIES
FINANCIAL RESPONSIBILITY
COMPLIANCE REQUIREMENTS

CLOUD SERVICE ARCHITECTURE
THIRD-PARTY INTEGRATIONS
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DEPLOYMENT METHODOLOGY
CLOUD SECURITY TRAINING
DEFINE PROJECT MILESTONES

1 FOUNDATION

CLOUD SECURITY CONTROLS

# How does this apply to SaaS?

- APPLICATION AND DATA SECURITY
- IDENTITY AND ACCESS MANAGEMENT
- COMPLIANCE AND GOVERNANCE
- 3RD PARTY TOOLS AND ADD-ONS
- DEVICE SECURITY

- FOUNDATION
- PERIMETER SECURITY & INCIDENT RESPONSE
- DATA PROTECTION
- VISIBILITY
- CLOUD SOLUTIONS

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## Foundation

- Establish a Cloud Steering Committee for oversight
- Identify compliance requirements
- Define a cloud baseline and monitor it
- Identify account owners [AWS]
- Provide cloud adoption training and cloud security training
- Define spend thresholds and alerts

## Perimeter

- Define and implement RACI model based on current roles and future cloud roadmap
- Update permissions based on actual activity in the cloud
- Ensure egress visibility is in place for awareness of what is leaving your cloud
- Monitor and alert on deviations from your baseline, e.g. security groups, routes, gateways

## Data Protection

- Follow through on encryption requirements, act on them
- Work with developers to incorporate secrets management using native cloud services
- Don't shy away from cloud native data protection services
- Monitor and alert on deviations from your baseline, e.g. volumes/buckets not encrypted

## Visibility

- Implement known pattern of CloudTrail, VPC Flow Logs, Config, Guard Duty, Activity Logs, Security Center
- Consolidate your logs, somewhere.
- Identify what to alert, who should respond, and how to remediate cloud security events
- Monitor and alert on deviations from your baseline, e.g. anamolies, failed API calls

## Cloud Solutions

- Build and implement IaC templates to standardize deployment of cloud resources
- Use a "golden image" process and alert non-approved images are being used
- Ensure new cloud solutions have been approved by or are visible to the Cloud Steering Committee

CLOUD SECURITY

# Summary

- Cloud environments are diverse but security leaders have the foundation, some just need a blueprint
- There are historical challenges and new challenges
- Look down the path, is multi-cloud in your future?
- Establish project management patterns for cloud computing

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# Thank You

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